ski-doo®



SHOP MANUAL 1999

Volume 1

TUNDRA /R
TOURING E/LE/SLE
FORMULA S/SL
FORMULA DELUXE 380/500
SKANDIC 380/500

484 200 001

1999
Shop Manual

VOLUME 1

TUNDRA/R
TOURING E/LE/SLE
FORMULA S/SL
FORMULA DELUXE 380/500
SKANDIC 380/500

BOMBARDIER
RECREATIONAL PRODUCTS



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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair some 1999 Ski-Doo snowmobiles. See model list on next page.

This edition was primarily published to be used by snowmobile mechanics who are already familiar with all service procedures relating to Bombardier made snowmobiles.

Please note that the instructions will apply only if proper hand tools and special service tools are used.

This shop manual uses technical terms which may be slightly different from the ones used in parts catalog.

It is understood that this manual may be translated into another language. In the event of any discrepancy, the english version shall prevail.

The content depicts parts and/or procedures applicable to the particular product at its time of manufacture. It does not include dealer modifications, whether authorized or not by Bombardier, after manufacturing the product.

In addition, the sole purpose of the illustrations throughout the manual, is to assist identification of the general configuration of the parts. They are not to be interpreted as technical drawings or exact replicas of the parts.

The use of Bombardier parts is most strongly recommended when considering replacement of any component. Dealer and/or distributor assistance should be sought in case of doubt.

The engines and the corresponding components identified in this document should not be utilized on product(s) other than those mentioned in this document.

Torque wrench tightening specifications must be strictly adhered to. Locking devices (ex.: locking tab, elastic stop nut, etc.) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be renewed.

This manual emphasizes particular information denoted by the wording and symbols:

◆ WARNING

Identifies an instruction which, if not followed, could cause serious personal injury including possibility of death.

▼ CAUTION

Denotes an instruction which, if not followed, could severely damage vehicle components.

NOTE: Indicates supplementary information needed to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use. Always use common shop safety practice.

This information relates to the preparation and use of Bombardier snowmobiles and has been utilized safely and effectively by Bombardier Inc. However, Bombardier Inc. disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic. It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

WHAT'S NEW

SERVICE TOOLS AND SERVICE PRODUCTS 01

- Complete list of SKI-DOO service tools.

277 ENGINE TYPE 04-02

- Procedure for piston removal and installation using new piston puller and sleeve kit.

377, 443 AND 503 ENGINE TYPES 04-03

- Procedure for piston removal and installation using new piston puller and sleeve kit.

OIL INJECTION SYSTEM 04-06

- Procedure for leak test.

AXIAL FAN COOLING SYSTEM 04-07

- Procedures for checking belt deflection and to replace it.

CARBURETOR AND FUEL PUMP 04-09

- New adjustment sequence.

FUEL TANK AND THROTTLE CABLE 04-10

- Procedure for leak test.

DRIVE AXLE 07-07

- New sprocket mounting measurements.
- Drive axle bearing shield is now facing chaincase on right side and facing sprocket on left side for S-Series.

INTRODUCTION

This *Shop Manual Volume 1* covers the following Bombardier made 1999 snowmobiles:

MODELS	MODEL NUMBER
TUNDRA*	3274
TUNDRA* R	3272
TUNDRA* R (Europe)	3273
SKANDIC* 380 (Canada)	1364
SKANDIC* 380 (U.S.)	1365
SKANDIC* 500 (Canada)	1361
SKANDIC* 500 (U.S.)	1362
SKANDIC* 500 (Europe)	1363
TOURING* E (Canada)	1359
TOURING* E (U.S.)	1434
TOURING* E (Europe)	1360
TOURING* LE (Canada)	1357
TOURING* LE (U.S.)	1358
TOURING* SLE (Canada)	1354
TOURING* SLE (U.S.)	1355
TOURING* SLE (Europe)	1356
FORMULA* S (Canada)	1351
FORMULA* S (Europe)	1353
FORMULA* SL (Canada)	1348
FORMULA* SL (U.S.)	1349
FORMULA* SL (Europe)	1350
FORMULA* DELUXE 380 (Canada)	1384
FORMULA* DELUXE 380 (U.S.)	1385
FORMULA* DELUXE 500 (Canada)	1386
FORMULA* DELUXE 500 (U.S.)	1387

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Tundra/R



Touring E/LE/SLE

Skandic 380/500

Formula S/SL

Formula Deluxe 377/503

These are S-Series models

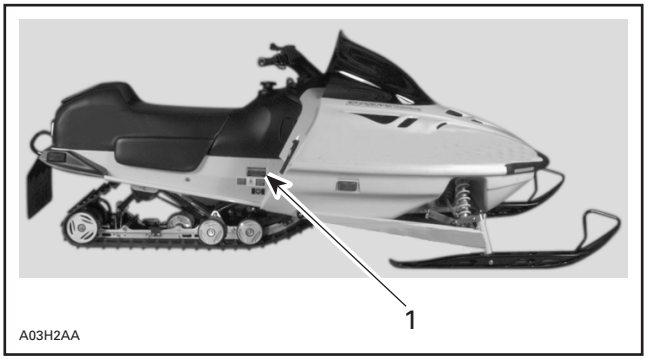


TYPICAL — S-SERIES

INTRODUCTION

VEHICLE SERIAL NUMBER

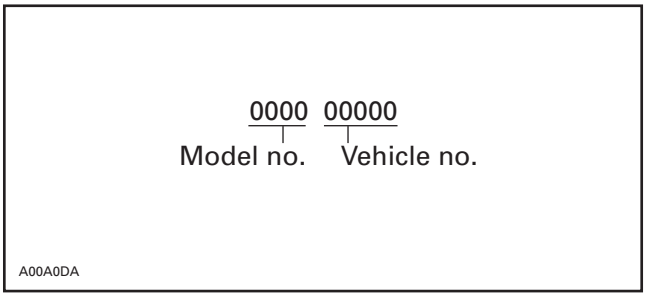
Vehicle Serial Number Location



TYPICAL

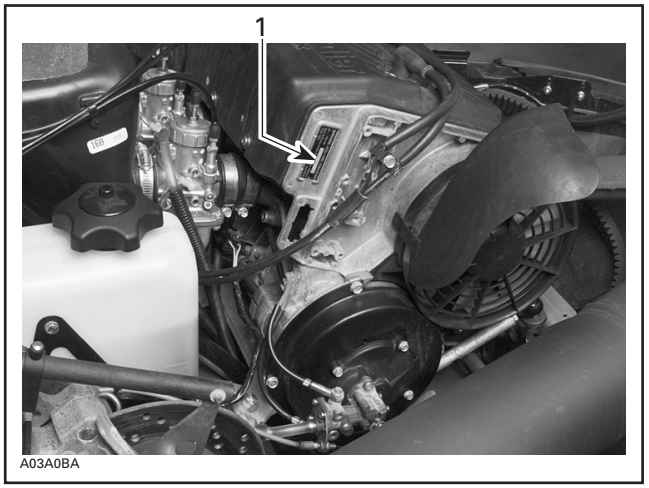
1. Vehicle serial number

Serial Number Meaning



ENGINE SERIAL NUMBER

Engine Serial Number Location



TYPICAL — FAN-COOLED ENGINES

1. Engine serial number

ARRANGEMENT OF THE MANUAL

The manual is divided into 11 major sections:

01 SERVICE TOOLS AND SERVICE PRODUCTS
02 LUBRICATION AND MAINTENANCE
03 TROUBLESHOOTING
04 ENGINE
05 TRANSMISSION
06 ELECTRICAL
07 REAR SUSPENSION
08 STEERING/FRONT SUSPENSION
09 BODY/FRAME
10 TECHNICAL DATA
11 WIRING DIAGRAMS

Each section is divided in various subsections, and again, each subsection has one or more division.

LIST OF ABBREVIATIONS USED IN THIS MANUAL

A	ampere
amp	ampere
A•h	ampere-hour
AC	alternate current
BDC	bottom dead center
BTDC	before top dead center
°C	degree Celsius
CDI	capacitor discharge ignition
cm	centimeter
cm^2	square centimeter
cm^3	cubic centimeter
DC	direct current
DSA	direct shock action
°F	degree Fahrenheit
FC	fan cooled
fl. oz	fluid ounce
ft	foot
GRD	ground
H.A.C.	high altitude compensator
hal.	halogen
imp. oz	imperial ounce
in	inch
in^2	square inch
in^3	cubic inch
k	kilo (thousand)
kg	kilogram
km/h	kilometer per hour
kPa	kilopascal
L	liter
lb	pound
lbf	pound (force)
lbf/in^2	pound per square inch
LH	left hand
m	meter
MAG	magneto
Max.	maximum
Min.	minimum
mL	milliliter
mm	millimeter
MPEM	multi-purpose electronic module
MPH	mile per hour
N	newton
N.A.	not applicable
no.	number
00.0	continuity
0.L	overload (open circuit)
O.D.	outside diameter
OPT	optional
oz	ounce
P/N	part number
PSI	pound per square inch
PTO	power take off
R	rectangular
RAVE	Rotax adjustable variable exhaust
RER	Rotax electronic reverse
RPM	revolution per minute
RRIM	reinforced reaction injection molding
Sp. Gr.	specific gravity
ST	semi-trapeze
TDC	top dead center
TRA	total range adjustable
U.S. oz	ounce (United States)
V	volt
Vac	volt (alternative current)

This *Shop Manual* uses technical terms wich may be slightly different from the ones in the parts catalog.

TYPICAL PAGE

Page heading indicates section and subsection detailed.

Subsection title indicates beginning of the subsection.

Italic subtitle above exploded view indicate pertaining models.

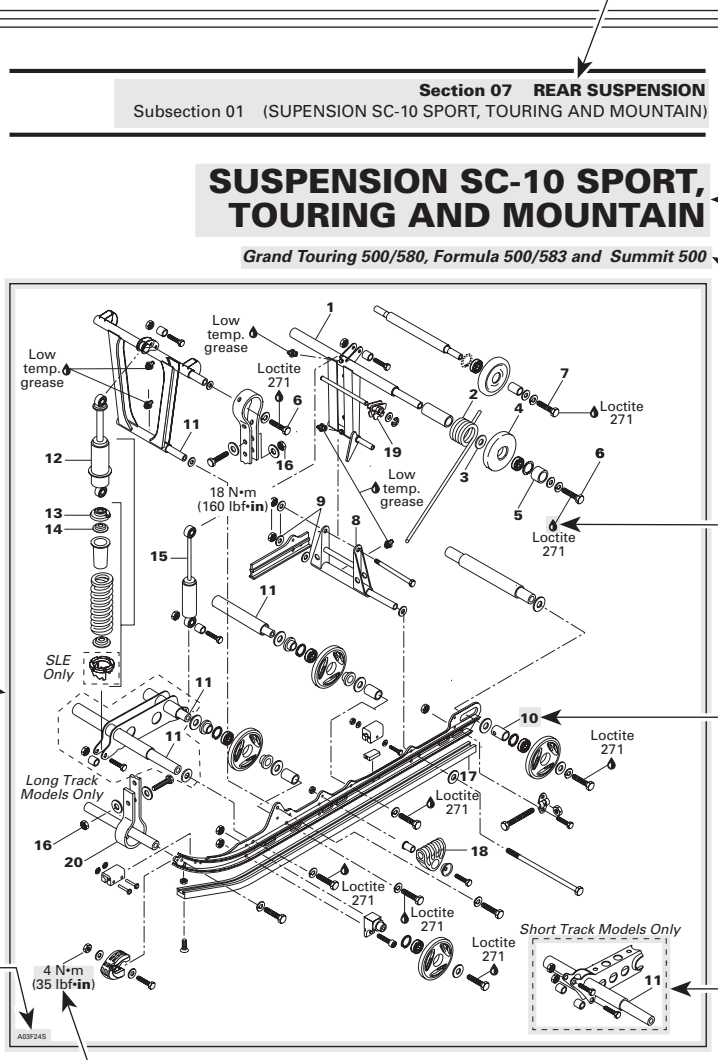
Exploded view assists you in identifying parts and related positions.

Drop represents a liquid product to be applied to a surface. In this case Loctite 271 to screw threads.

Bold face number indicates special procedure concerning this part.

Illustration number for publishing process.

Dotted box contains parts of a particular model in this case the short track models only.



Tightening torque nearby fastener. In this case, nut must be torqued to 4 N•m or 35 lbf•**in**.

Page numbering system:
07: REAR SUSPENSION section
01: SUSPENSION SC-10 SPORT, TOURING AND MOUNTAIN subsection
1: First page of this subsection

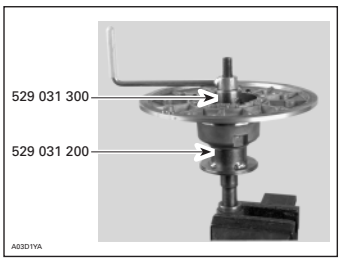
▼ CAUTION

Pay attention to torque specifications. Some of these are in lbf•**in** instead of lbf•ft. Use appropriate torque wrench.

A01A28S

TYPICAL PAGE

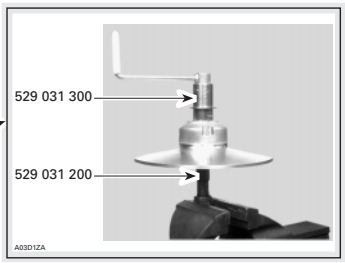
Turn puller handle and sliding half at once to extract the bushing.



IMPORTANT: Large bushing retaining screws and washers must be removed before small bushing installation.

Coat bushing outside diameter with Loctite 609 (P/N 413 703 100).

Install bushing as following photo.



ASSEMBLY

Came Slider Shoe

When replacing slider shoes **no. 4**, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

Cam

Coat cam **no. 18** interior with anti-seize lubricant.

INSTALLATION

Countershaft

▼ CAUTION

Always apply anti-seize lubricant (P/N 413 701 000) on the countershaft before final pulley installation.

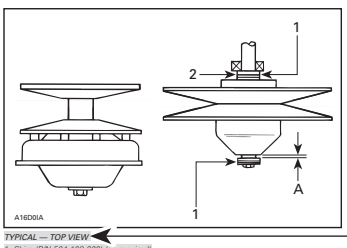
F-Series and S-Series Only

Should installation procedure be required, refer to BRAKE 05-05 then look for **Brake Disc and Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

All Models

Check end play of driven pulley on countershaft by pushing pulley towards outer housing so that the inner shims (P/N 504 108 200) contact it. Measure end play at the mounting screw end between shim(s) and puley. See illustration.



TYPICAL — TOP VIEW
1. Shim (P/N 504 108 200) (as required)
2. Contact
A. 0 to 1 mm (0 to 3/64 in)

Torque retaining screw **no. 13** to 25 N•m (18 lbf•ft).

ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT 05-04 to adjust pulley distance. Adjust drive belt height between pulley halves to obtain specified belt deflection.

Title indicates main procedure to be carried-out.

Italic bold face type setting indicates a particular procedure concerning a model.

Italic bold face setting in this case indicates that particular procedure for F and S-Series is finished, so from this point, all models are concerned.

"TYPICAL" caption indicates a general view which does not represent full detail. "TOP VIEW" caption helps you in understanding illustration.

Call-outs for above illustration.

Reference to look up a certain section and subsection. In this case it concerns pulleys adjustment.

Illustration always follows text to which it pertains.

Subtitle indicates a particular procedure for the named part.

Bold face number following part name refers to exploded view at beginning of subsection.

A01A27S

INTRODUCTION

GENERAL INFORMATION

The information and component/system descriptions contained in this manual are correct at time of publication. Bombardier Inc. however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

Due to late changes, it may have some differences between the manufactured product and the description and/or specifications in this document.

Bombardier Inc. reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligation.

USEFUL PUBLICATIONS

Refer to *Parts Catalogs* to order the right parts.

PARTS CATALOG	
MODELS	P/N
Tundra/R	484 400 016
Skandic 380/500	484 400 008
Touring E/LE/SLE	484 400 014
Formula S/SL	484 400 005
Formula Deluxe 380/500	484 400 001

Use *Specification Booklet* to find rapidly the right specs.

1995-1999 *Specification Booklet* (P/N 484 300 002).

ILLUSTRATIONS AND PROCEDURES

Illustrations and photos show the typical construction of the different assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts shown, however, they represent parts which have the same or a similar function.

▼ CAUTION

Most components of those vehicles are built with parts dimensioned in the metric system. Most fasteners are metric and must not be replaced by customary fasteners or vice-versa. Mismatched or incorrect fasteners could cause damage to the vehicle or possible personal injury.

As many of the procedures in this manual are interrelated, we suggest, that before undertaking any task, you read and thoroughly understand the entire section or subsection in which the procedure is contained.

A number of procedures throughout the book require the use of special tools. Before commencing any procedure, be sure that you have on hand all the tools required, or approved equivalents.

The use of RIGHT and LEFT indications in the text, always refers to driving position (when sitting on vehicle).



TYPICAL

1. *Left*
2. *Right*

TIGHTENING TORQUES

Tighten fasteners to torque mentioned in exploded views and text. When they are not specified refer to following table. All torques apply to 8.8 grade fasteners. Bold face size (e.g. **M4)** indicates nominal value (mean value).

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•**in**
2	**M4**	18
3	M4	27
4	**M5**	35
8	M6	71
9	M6	80
10	**M6**	89
11	M6	97
12	M6	106

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•ft
21	M8	15
22	M8	16
23	**M8**	17
24	M8	18
25	M8	18
43	M10	32
44	M10	32
45	M10	33
46	M10	34
47	M10	35
48	**M10**	35
49	M10	36
50	M10	37
51	M10	38
52	M10	38
53	M10	39
76	M12	56
77	M12	57
78	M12	58
79	M12	58
80	**M12**	59
81	M12	60
82	M12	60
83	M12	61
84	M12	62
121	M14	89
122	M14	90

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•ft
123	M14	91
124	M14	91
125	M14	92
126	M14	93
127	M14	94
128	M14	94
129	M14	95
130	M14	96
131	M14	97
132	M14	97
133	M14	98
134	M14	99
135	**M14**	100
136	M14	100
137	M14	101
138	M14	102
139	M14	103
140	M14	103
141	M14	104
142	M14	105
143	M14	105
144	M14	106
145	M14	107
146	M14	108
147	M14	108
148	M14	109
149	M14	110
150	M14	111

We would be pleased if you could communicate to Bombardier any suggestions you may have concerning our publications.

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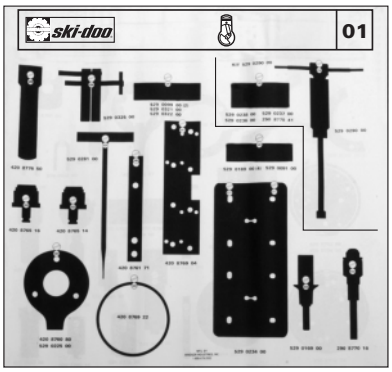
SERVICE TOOLS

This is a list of tools to properly service Ski-Doo snowmobiles. The list includes both the mandatory tools and the optional tools that are ordered separately. The list of Service Products, both mandatory and optional, are not part of any kit and must all be ordered separately. If you need to replace or add to your tool inventory these items can be ordered through the regular parts channel.

Following mention points out new tool: 

WORKSHOP — MANDATORY SERVICE TOOLS

Tool board
(P/N 529 034 000)

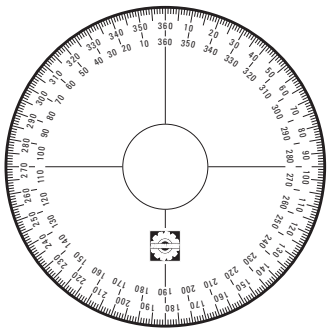


A00A3X4

APPLICATION
All models.

ENGINE — MANDATORY SERVICE TOOLS

Degree wheel
(P/N 295 000 007)



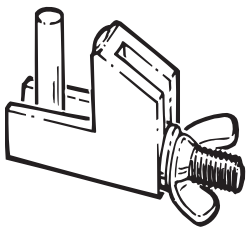
A00B334

APPLICATION

All rotary valve engines.

NOTE: Only the P/N has been changed. This degree wheel is identical to the P/N 414 352 900.

Hose pincher (2)
(P/N 295 000 076)



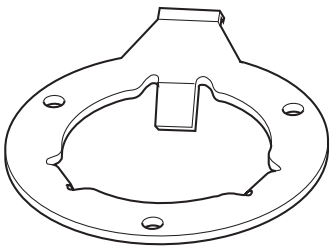
A01B2I4

APPLICATION

All vehicles.

NOTE: Only the P/N has been changed. This hose pincher is identical to the P/N 529 009 900.

Fan holder
(P/N 420 876 357)

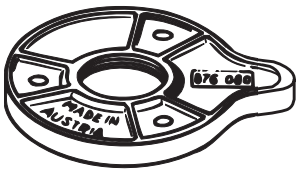


A00C0Q4

APPLICATION

377, 443 and 503 engines.

Magneto puller ring
(P/N 420 876 080)

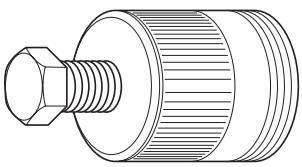


A00C1R4

APPLICATION

All engines except 247.

Magneto puller
(P/N 529 033 547)



A00C1A4

APPLICATION

All engines except 247.

NOTE: The previous extractor (P/N 529 022 500) can be upgraded by replacing the screw with the new one (P/N 529 035 549).

Aligning pin (4)
(P/N 529 018 900)

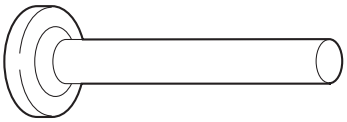


A00A1D4

APPLICATION

467, 494 and 582 engines.

Pusher
(washer behind the impeller)
(P/N 529 020 700)

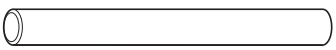


A00C3H4

APPLICATION

Rotary valve engines.

Rotary valve shaft pusher
(P/N 420 876 612)

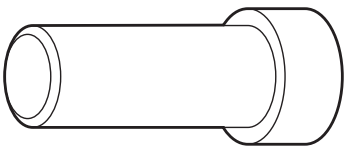


A00C0F4

APPLICATION

Rotary valve engines with a 10 mm impeller shaft.

Rotary valve seal pusher
(valve side)
(P/N 420 876 607)



A00C0Y4

APPLICATION

Rotary valve engines.

ENGINE (continued) — MANDATORY SERVICE TOOLS

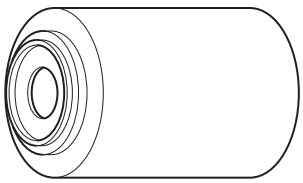
Rotary valve shaft seal pusher (inner, water pump side)
(P/N 420 876 512)



A00C374

APPLICATION
Rotary valve engines, 1991 and newer with a 10 mm impeller shaft.

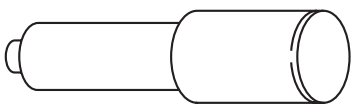
Rotary valve shaft seal pusher (outer, water pump side)
(P/N 420 877 050)



A00C0X4

APPLICATION
Rotary valve engines.

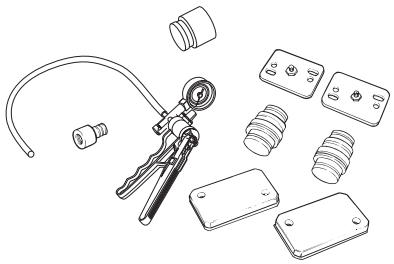
Bearing pusher (rotary valve)
(P/N 420 876 500)



A00B2J4

APPLICATION
Rotary valve engines.

Engine leak tester kit
(P/N 861 749 100)

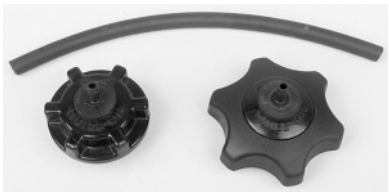


A01B2D5

APPLICATION
All engines.

Fuel and oil system leak tester kit
(P/N 529 033 100)

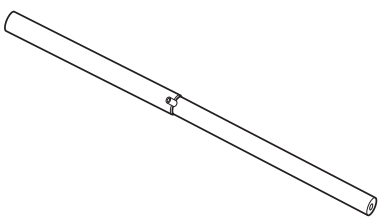
NEW



A01B5E4

APPLICATION
All models.

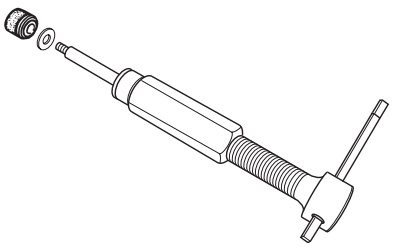
Choke plunger tool
(P/N 529 032 100)



A01C5D4

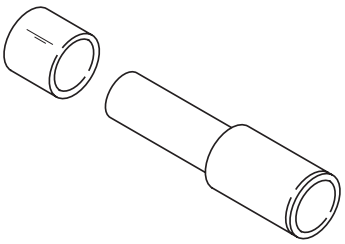
APPLICATION
All models equipped with chokes.

1) Piston pin puller
(P/N 529 035 503)



A02B094

2) Sleeve kit 18 mm
(P/N 529 035 541)
3) Sleeve kit 20 mm
(P/N 529 035 542)

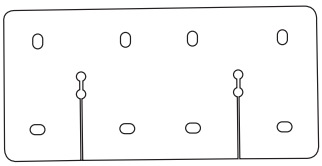


A01B5A4

APPLICATION
1) All engines.
2) 277, 443, 503 and 809 engine.
3) 670 engine.

NOTE: The previous piston pin puller (P/N 529 029 000) can be upgraded by adding protector (P/N 529 035 513) and replacing the locating sleeve and expansion sleeve with apropriate sleeve kit.

Rubber pad
(P/N 529 023 400)

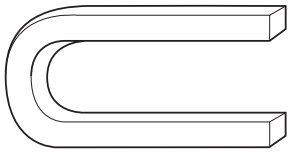


A01B4C4

APPLICATION
All cageless bearing engines.

ENGINE (continued) — MANDATORY SERVICE TOOLS

Rotary valve circlip tool
A) (P/N 529 029 100)
B) (P/N 529 020 800)

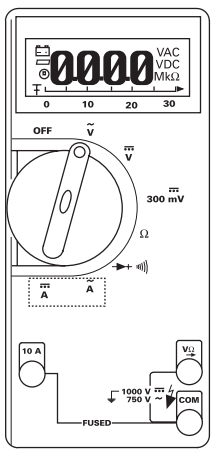


A00C3I4

APPLICATION

A) 1994 and on rotary valve engines.
B) Up to 1993 rotary valve engines.

Multimeter
(P/N 529 022 000)

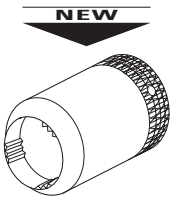


F01B1O4

APPLICATION

All models.

Choke/DESS nut tool
(P/N 529 034 600)



A01B554

APPLICATION

All models equipped with a choke and/or a DESS.

NOTE: This tool replaces choke nut tool (P/N 529 032 200).

Programmer
(P/N 529 035 585)



A01B5B4

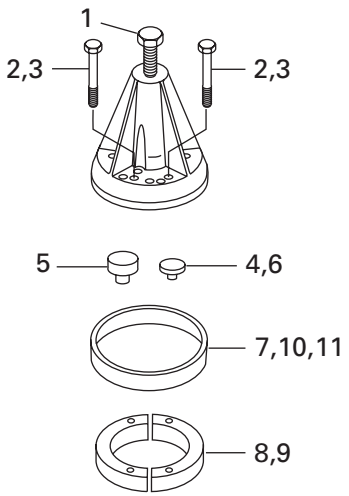
APPLICATION

All models equipped with a DESS.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

1-2) Crankshaft bearing puller with screw (P/N 420 877 635)



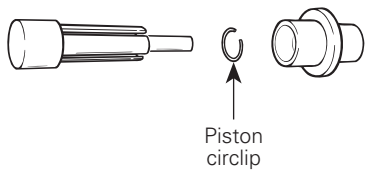
A01B546

APPLICATION
All engines.

1) Screw (M16 x 1.5 x 150)	(P/N 420 940 755)
2) Screw M8 x 40 (4)	(P/N 420 840 681)
3) Screw M8 x 70 (4)	(P/N 420 841 201)
4) Crankshaft protector 247 engine.	(P/N 420 976 890)
5) Crankshaft protector PTO All engines except 247.	(P/N 420 876 552)
6) Crankshaft protector MAG All engines except 247.	(P/N 420 876 557)
7) Puller ring Use with half rings (P/N 420 977 475 or 420 276 025).	(P/N 420 977 490)
8) Half ring (2) For 72 mm O.D. bearings.	(P/N 420 977 475)
9) Half ring For 62 mm O.D. bearings.	(P/N 420 276 025)
10) Puller ring For half rings (P/N 420 977 479).	(P/N 420 977 494)
11) Half ring For 80 mm O.D. bearings.	(P/N 420 977 479)

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

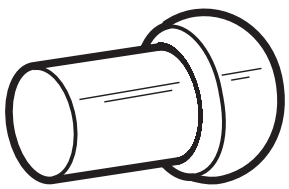
Piston circlip installer
A) (P/N 529 016 900)
B) (P/N 290 877 016)



A01B1P4

APPLICATION
A) All engines except 670.
B) 670 engine.

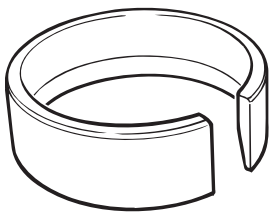
Piston pin/connecting
rod bearing centering tool
(P/N 529 009 100)
NOTE: New diameter is 9.65 mm (0.380″).



A01B1R4

APPLICATION
All engines except cageless and 670 engines.

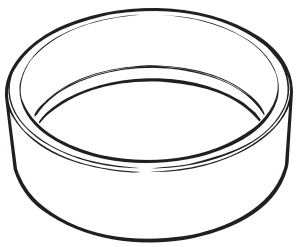
Ring compressor
A) (P/N 420 876 090) (62 mm)
B) (P/N 420 876 974) (69.5 mm)
C) (P/N 420 876 970) (72 mm)
D) (P/N 420 876 972) (76 mm)
E) (P/N 420 876 975) (67.5 mm)
F) (P/N 529 030 800) (78 mm)



A01B1T4

APPLICATION
A) 377 engine.
B) 467 and 494 engines.
C) 503, 253 and 536 engines.
D) 582, 583 and 643 engines.
E) 443 and 447 engines.
F) 670 engine.

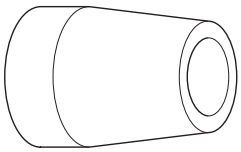
Magneto coil centering ring
(P/N 420 876 922)



A01B1V4

APPLICATION
All engines with Nippondenso CDI (160 W).

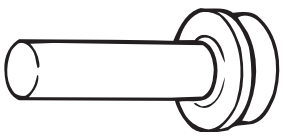
Seal protector sleeve
(P/N 420 276 900)
(MAG)



A00C0D4

APPLICATION
247 engine.

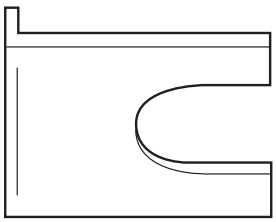
Polyamid ring pusher
(P/N 420 276 930)



A00C0Z4

APPLICATION
247 engine.

Crankshaft feeler gauge
(P/N 420 876 620)

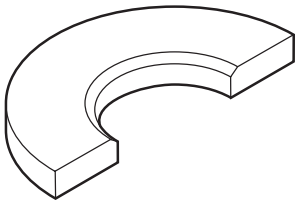


A00C114

APPLICATION
377, 443, 447 and 503 engines.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

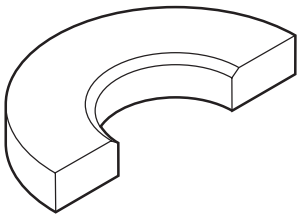
Crankshaft distance gauge (5.7 mm)
(P/N 420 876 822)



A00C294

APPLICATION
377, 443 and 447 engines.

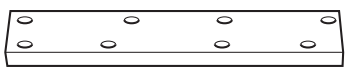
Crankshaft distance gauge (12.7 mm)
(P/N 420 876 824)



A00C3A4

APPLICATION
503 engine.

Cylinder aligning tool
A) (P/N 420 876 904) (on exhaust side)
B) (P/N 420 876 171) (on intake side)



A00B084

APPLICATION
A) 2-cylinder liquid cooled engines.
B) 2-cylinder fan cooled engines.

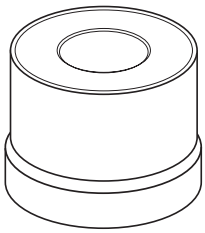
Driver tool
(P/N 529 035 521)



A00B4O4

APPLICATION
Mini Z.

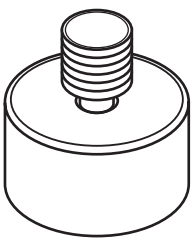
Attachment
(P/N 529 035 522)



A00B4P4

APPLICATION
Mini Z.

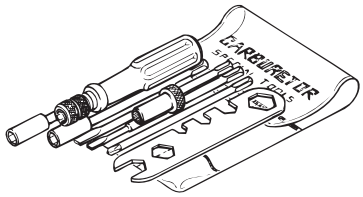
Pilot 22 mm
(P/N 529 035 523)



A00B4Q4

APPLICATION
Mini Z.

Carburetor tool kit
(P/N 404 112 000)



A00B2F4

APPLICATION
All models.

Adaptor
(P/N 529 033 800)



A00B4H4

APPLICATION
1997 and 1998 Grand Touring SE
1998 Summit x 670.

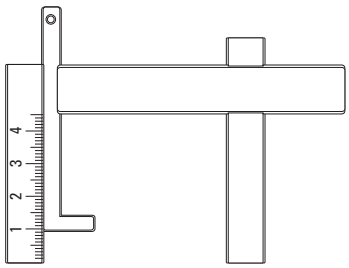
Adaptor
(P/N 529 033 302)

NEW

APPLICATION
1999 Grand Touring SE,
1999 Summit x 670 and MX Z 670.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

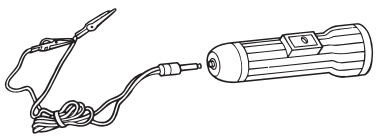
Float level gauge
(P/N 529 035 520)



A00B4N4

APPLICATION
All models.

Circuit tester
(continuity light)
(P/N 414 012 200)



A00C214

APPLICATION
All vehicles.

Stroboscopic timing light
(P/N 529 031 900)



A00B4F4

APPLICATION
All engines.

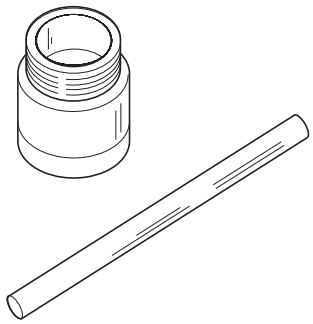
Bypass wires
(P/N 529 033 300)



A00I094

APPLICATION
360 W magneto (Grand Touring 700/SE).

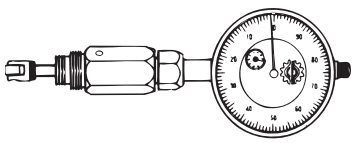
RAVE movement
indicator
(P/N 861 725 800)



A18B014

APPLICATION
All RAVE equipped engines.

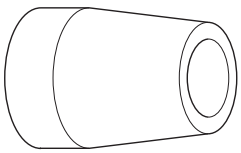
Dial indicator
(TDC gauge)
(P/N 414 104 700)



A00B4E4

APPLICATION
All engines.

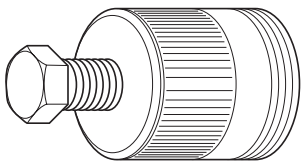
Seal protector sleeve
A) (P/N 420 876 980)
B) (P/N 420 876 490)



A00C0D4

APPLICATION
A) Rotary valve engines with 10 mm shaft.
B) Rotary valve engines with 12 mm shaft.

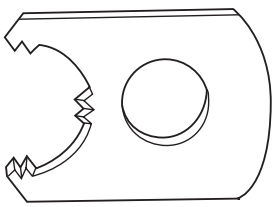
Magneto puller
(P/N 420 976 235)



A00C1A4

APPLICATION
247 engine.

Injection pump gear holder
(P/N 420 876 695)

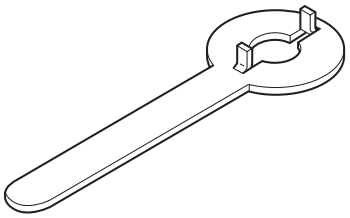


A00B314

APPLICATION
253, 377, 447 and 503 engines.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

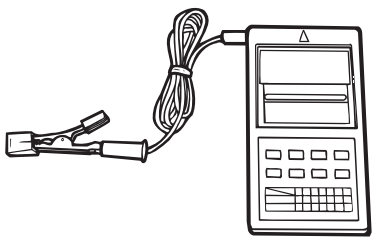
Injection pump gear holder
(P/N 420 277 905)



A00C164

APPLICATION
All liquid cooled engines.

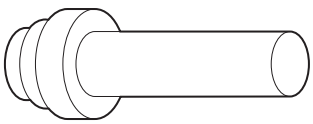
Digital/induction type tachometer
(P/N 529 014 500)



F01B1G4

APPLICATION
All engines.

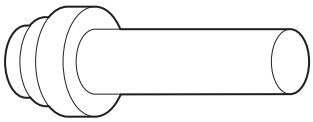
MAG seal pusher
(P/N 420 277 875)



A00C0V4

APPLICATION
277 engine.

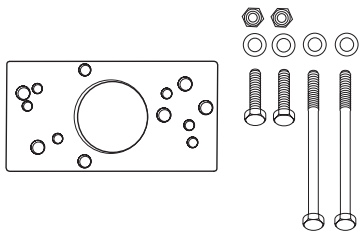
PTO seal pusher
(P/N 420 876 660)



A00C0V4

APPLICATION
277 engine.

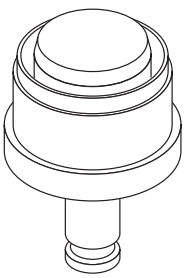
Base puller plate kit
(P/N 529 024 900)



A05C0M4

APPLICATION
277 engine.

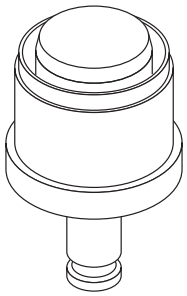
Insertion jig
(magneto side seal)
(P/N 420 876 516)



A00C3T4

APPLICATION
779 engine.

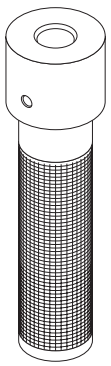
Insertion jig
(magneto seal)
(P/N 420 876 514)



A00C3U4

APPLICATION
454, 494, 599, 670, 699 and 809 engines.

Handle for insertion jig
(P/N 420 877 650)

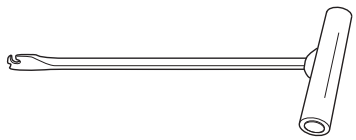


A00C3V4

APPLICATION
454, 494, 599, 670, 699, 779 and 809 engines.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

Exhaust spring installer/remover
(P/N 529 035 559)



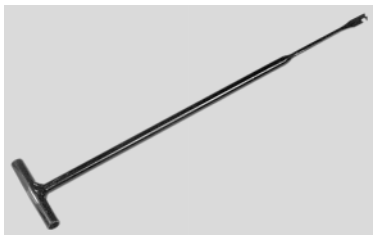
A00C3S4

APPLICATION

All models except CK3 series.

NOTE: This tool replaces exhaust spring installer/remover (P/N 529 028 100).

Exhaust spring installer/remover
(P/N 529 035 400)

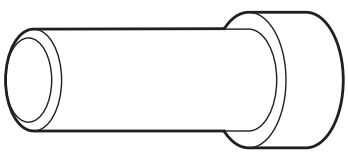


A01B584

APPLICATION

CK3 series.

Rotary valve seal and shaft pusher
(P/N 420 876 605)



A00C0Y4

APPLICATION

Rotary valve engines 1990 models and older.

Seal pusher (rotary valve)
(P/N 420 876 510)



A00C374

APPLICATION

All rotary valve shaft seals with a 12 mm I.D.

Rotary valve shaft pusher
(P/N 420 876 610)

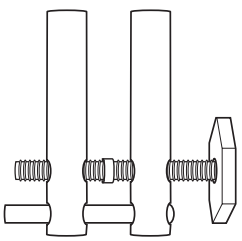


A00C0F4

APPLICATION

All rotary valve engines with 12 mm shaft.

Large hose pincher
(P/N 529 032 500)
(TYPICAL)



F01B234

APPLICATION

All vehicles.

TRANSMISSION — MANDATORY SERVICE TOOLS

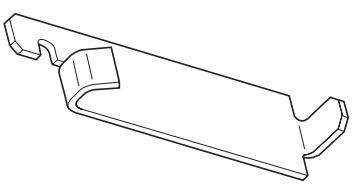
Transmission alignment bar
A) (P/N 529 026 900)
B) (P/N 529 030 000)
C) (P/N 529 035 586)
D) (P/N 529 026 700)
E) (P/N 529 035 530)
F) (P/N 529 035 545)
G) (P/N 529 035 502)
H) (P/N 529 035 527)
I) (P/N 529 035 572)



A01B4D4

APPLICATION
A) Tundra II LT/R.
B) S-Series with Bombardier Lite.
C) S-Series with Bombardier Lite and RER.
D) F-Series and S-Series with TRA.
E) S-Series with TRA and RER.
F) Skandic WT.
G) Skandic WT LC/SWT.
H) CK3 series except Mach Z series.
I) Mach Z series.

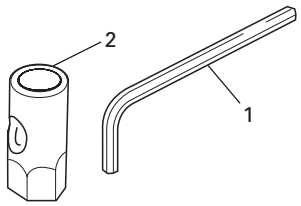
Spring scale hook (long)
A) (P/N 529 006 500)
B) (P/N 529 030 900)
C) (P/N 529 035 557)
(TYPICAL)



A00B4A4

APPLICATION
A) Tundra II LT.
B) F-Series and S-Series (1995 and newer).
C) CK3 without RER.

Drive belt tension adjuster tool
(P/N 529 008 700)

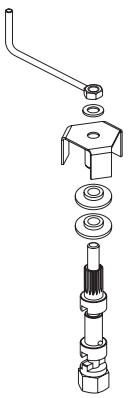


A15B044

APPLICATION
All vehicles except Élan, Tundra II and Skandic WT.

Parts included:
1) Hex wrench (P/N 420 876 730)
2) Socket wrench (P/N 529 015 000)

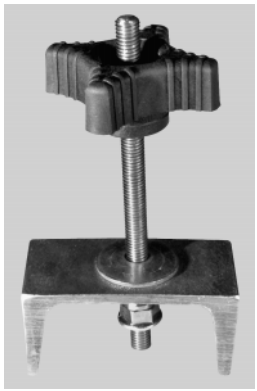
Pulley spring compressor
(P/N 529 035 524)



A02D1P4

APPLICATION (1)
All models.
NOTE: This tool has Acme threads and replaces spring compressor (P/N 529 018 600).

Driven pulley spring compressor
(P/N 529 035 300)



A05B034

APPLICATION
Tundra R.

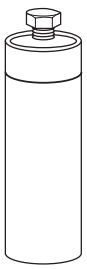
Tension tester
(P/N 414 348 200)



A00C074

APPLICATION
All models.

Countershaft bearing installer
(P/N 529 030 200)

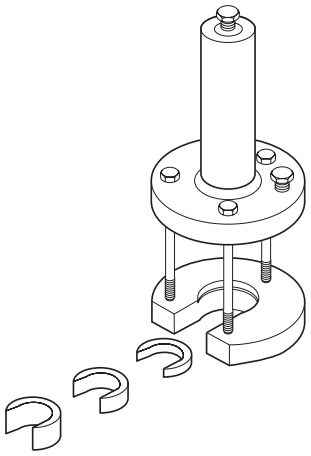


A00A194

APPLICATION
S-Series and F-Series.

TRANSMISSION (continued) — MANDATORY SERVICE TOOLS

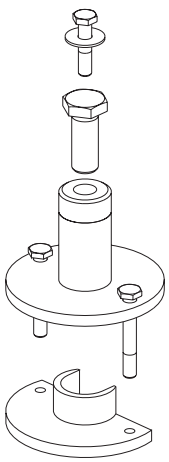
Countershaft bearing remover
(P/N 529 030 100)



A00A274

APPLICATION
S-Series and F-Series.

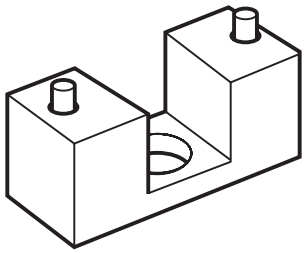
Countershaft bearing remover/installer
(P/N 529 035 554)



A01B5C4

APPLICATION
CK3 Series.

Spring cover tool
(P/N 529 027 300)



A01B4M4

APPLICATION
Bombardier Lite drive pulley.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

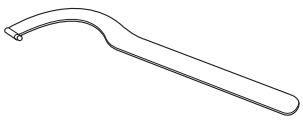
Clutch holder
(P/N 529 006 400)



A01B154

APPLICATION
All TRA drive pulleys.

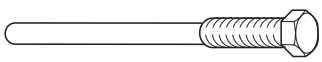
Clutch holder
(P/N 529 027 600)



A02B034

APPLICATION
Bombardier Lite drive pulley.

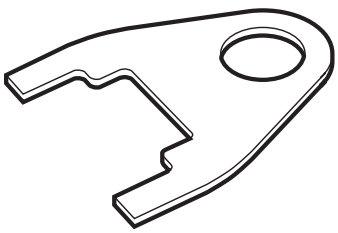
Drive pulley puller
(P/N 529 031 400)



A18B044

APPLICATION
Bombardier Lite drive pulley, except Élan.

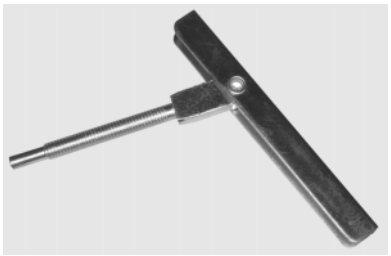
Forks (3)
(P/N 529 005 500)



A16B014

APPLICATION
All vehicles equipped with a TRA drive pulley.

Driven pulley opening tool
(P/N 529 035 500)



A02D1O4

APPLICATION
All vehicles except Élan, Tundra series, Skandic WT series, and all vehicles with RER.

Driven pulley opening tool
(P/N 529 035 501)



A03D2P4

APPLICATION
S and CK3 series with RER.

Driven pulley opening tool
(P/N 529 034 200)



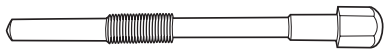
A05B044

APPLICATION
Tundra R.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

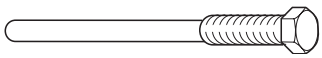
TRA drive pulley puller
(P/N 529 022 400)



A06B014

APPLICATION
TRA drive pulley for the 454, 494, 599, 670, 699, 779 and 809 engines.

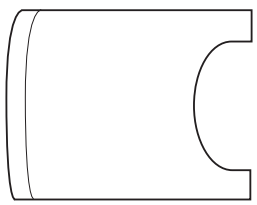
TRA drive pulley puller
(P/N 529 007 900) (25 mm)



A18B044

APPLICATION
TRA drive pulley for 443 and 503 engines.

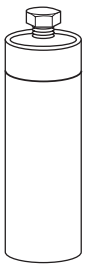
Alignment tool
(P/N 420 476 010)



A00C1D4

APPLICATION
Skandic WT and Alpine II gearbox.

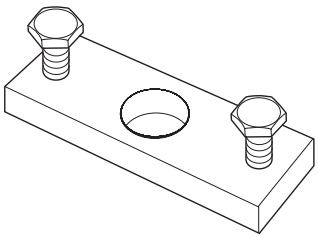
Countershaft bearing installer
(P/N 529 018 800)



A00A194

APPLICATION
PRS chassis.

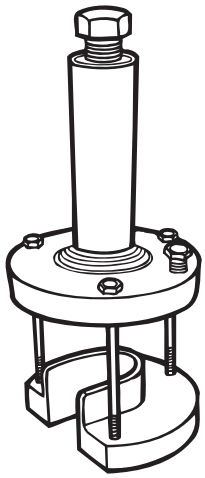
Cam pusher
(P/N 529 012 900)



A18B064

APPLICATION
Tundra II LT.

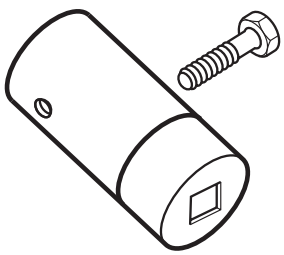
Countershaft bearing remover
(P/N 529 018 700)



A00A164

APPLICATION
PRS chassis.

Drive pulley puller
(P/N 529 023 100)



A00C3J4

APPLICATION
Élan.

Transmission ball mounting pin
(P/N 420 476 020)

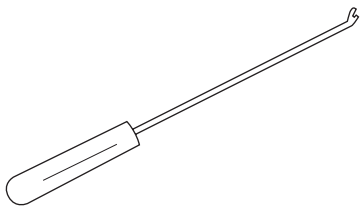


A00C1C4

APPLICATION
Alpine II 3-speed gearbox.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

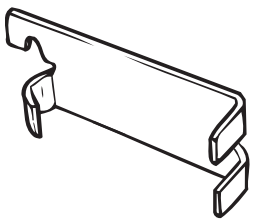
Transmission adjuster
(P/N 529 028 500)



A00D0X4

APPLICATION
F-Series equipped with "twist shifter" reverse transmission.

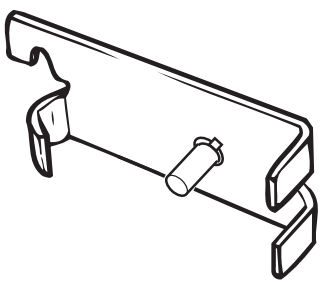
Spring scale hook (long)
(P/N 529 015 200)



A01B514

APPLICATION
1994 models and older except Alpine II.

Spring scale hook (short)
(P/N 529 006 500)



A01B174

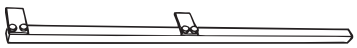
APPLICATION
Alpine II 1994 and older.

Alignment bar
A) (P/N 529 025 600)
B) (P/N 529 028 200)
C) (P/N 529 028 300)
D) (P/N 529 026 800)
E) (P/N 529 031 000)



A01B4D4

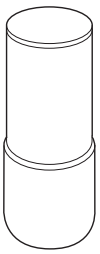
F) (P/N 529 008 300)



A03B034

APPLICATION
A) PRS chassis.
B) Alpine II.
C) Élan.
D) Safari L.
E) Skandic WT 1996.
F) Scout.

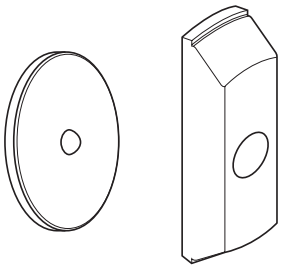
Burnishing bar
(P/N 529 026 402)



A00B464

APPLICATION
Tundra II LT, Safari L and Skandic.

Large bushing extractor
(P/N 529 031 100)

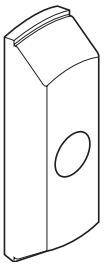


A00B4I4

APPLICATION
All models except Tundra/R, Skandic WT/SWT/WT LC and S-Series with RER.

NOTE: Use this tool only with former puller (P/N 529 018 600) that has regular threads.

Large bushing extractor
(P/N 529 035 576)



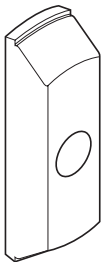
A02D1Q4

APPLICATION
All models except Tundra/R, Skandic WT/SWT/WT LC and S-Series with RER.

NOTE: Use this tool only with new puller (P/N 529 035 524) that has Acme threads.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

Large bushing extractor
(P/N 529 035 575)

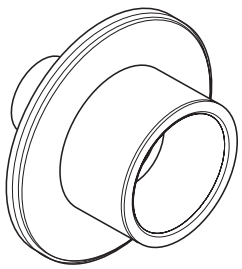


A02D1Q4

APPLICATION

S-Series with RER.
NOTE: Use this tool only with new puller (P/N 529 035 524) that has Acme threads.

Large bushing installer and small bushing extractor
(P/N 529 031 200)

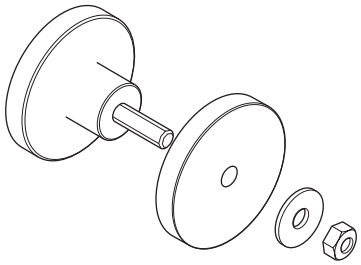


A00B4J4

APPLICATION

All models except Tundra/R, Skandic WT/SWT/WT LC and S-Series with RER.

Chaincase upper seal pusher
(P/N 529 032 300)



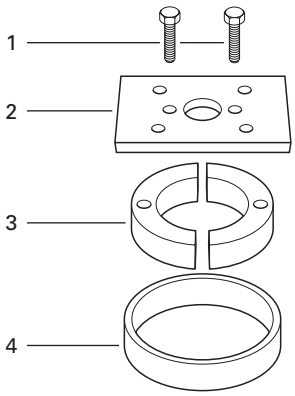
A00B4L4

APPLICATION

S and F-Series.

3-speed transmission bearing extractor

1) Screw M8 x 25 (2) (P/N 222 082 565)
2) Plate
3) Half ring (2) (P/N 420 876 330)
4) Ring (P/N 420 977 480)

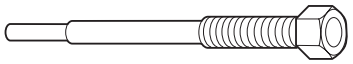


A00C1B4

APPLICATION

Alpine II 3-speed transmission.

Drive pulley puller
(P/N 529 002 100)
(standard threads)

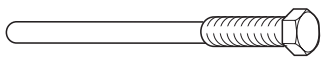


A00C084

APPLICATION

Square shaft, standard (SAE) threads.

TRA drive pulley puller (27 mm)
(P/N 529 010 100)

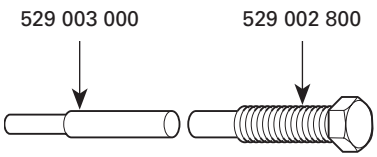


A18B044

APPLICATION

TRA drive pulley (27 mm) shaft except 454, 670 and 779 engines.

Drive pulley puller
(P/N 860 414 200)
(square shaft metric)
Consists of:



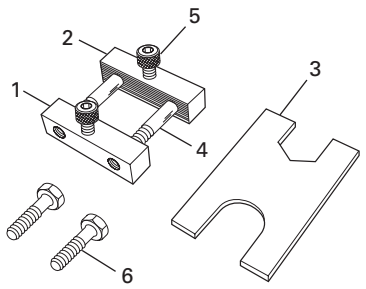
A00C095

APPLICATION

Square shaft, metric threads drive pulley.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

Drive axle sprocket adjuster
(P/N 861 725 700)



A01B2O4

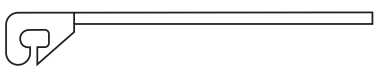
APPLICATION
All vehicles except Élan.

Parts included in the kit:

1) Block with threads
   (P/N 529 010 700)
2) Block without threads
   (P/N 529 010 800)
3) Plate
   (P/N 529 010 600)
4) Bolt M10 (2)
   (P/N 222 007 565)
5) Allen screw M8 (2)
   (P/N 222 983 065)
6) Screw M8 (2)
   (P/N 222 082 565)

NOTE: When the tool is to be used between tunnel and sprocket use screw M8.

Transmission adjuster
(P/N 529 030 300)

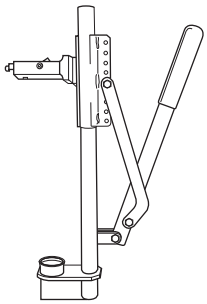


A03D1T4

APPLICATION
Vehicles equipped with "push-pull shifter" reverse transmission.

SUSPENSION — MANDATORY SERVICE TOOLS

Shock spring removal kit
(P/N 529 035 504)
Replacement clevis pin:
(P/N 414 528 400)



A01B4O4

APPLICATION

All suspensions with coil spring.

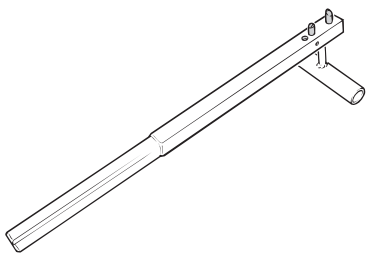
NOTE: The previous shock spring removal kit (P/N 529 027 100) can be upgraded by replacing the stopper with a wider stopper (P/N 529 035 551).

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

A) Track cleat remover
(P/N 529 008 200)

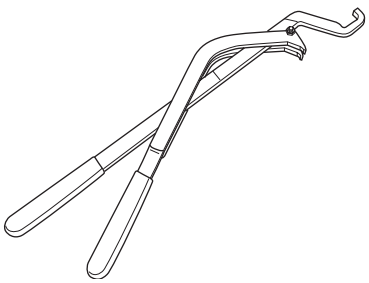
Pins
(P/N 529 008 204)

NOTE: Pins can be rotated 180° depending on whether the tool is used by a left-hander or right-hander.



A01B1J4

B) Track cleat remover
(P/N 529 028 700)



A01F224

APPLICATION

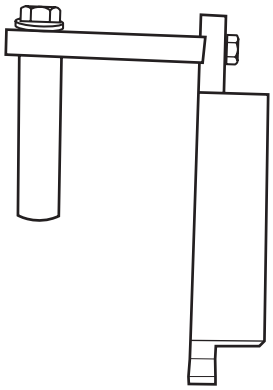
A) 1993 and older.

B) 1994 and newer except Élan and Tundra II.

Camber angle tool
(P/N 529 021 600)

NOTE: Angle finder with a magnetic base must be used.

Suggestion: K-D tool no. 2968

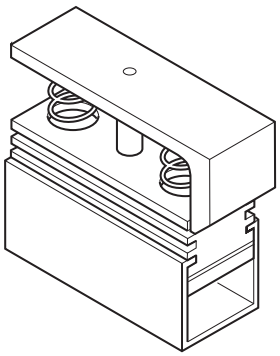


A06B024

APPLICATION

All DSA front suspensions.

Track tension gauge
(P/N 529 021 500)



A00B3X4

APPLICATION

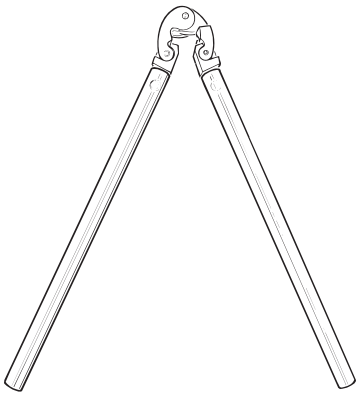
All models except Élan.

Track cleat installer

A) (P/N 529 008 500)
Narrow

B) (P/N 529 028 800)
Narrow

C) (P/N 529 007 700)
Wide



A01B1M4

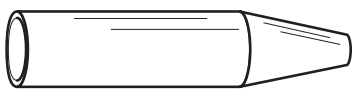
APPLICATION

A) 1993 and older.

B) 1994 and newer.

C) 1992 and older with wide cleat opening.

Dome guide
(P/N 529 026 500



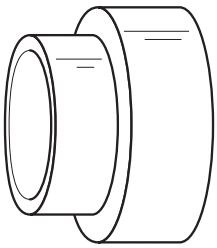
A06F1B4

APPLICATION

T/A shocks.

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

Piston guide
(P/N 529 026 600)

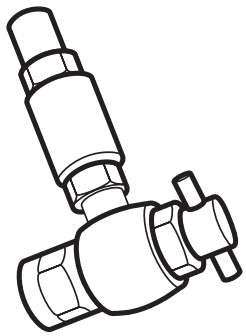


A06F1C4

APPLICATION
T/A shocks.

Gas shock valve tool
(P/N 529 035 570)

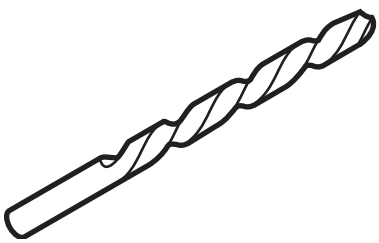
NEW



A02F134

APPLICATION
T/A shocks.

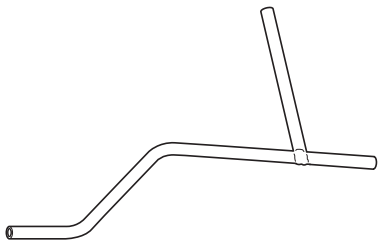
Drill bit
(P/N 529 031 800)



A01B564

APPLICATION
All 3/16 inch rivets.

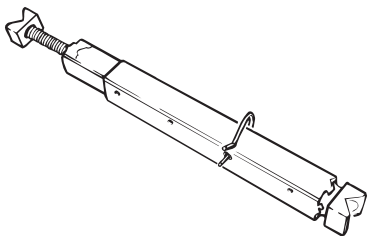
Spring installer (bar)
(P/N 529 005 000)



A00C1I4

APPLICATION
Tundra II LT, Scout and all SC-10 suspensions.

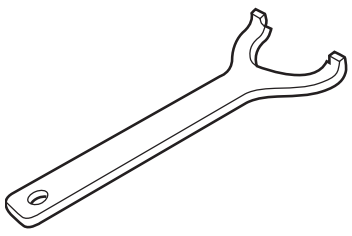
Drive axle holder
(P/N 529 007 200)



A01B1E4

APPLICATION
All models.

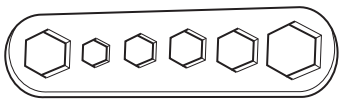
Kayaba shock adjustment tool
(P/N 529 019 000)



A00A1K4

APPLICATION
C-7 suspension.

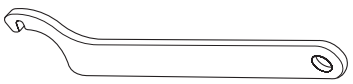
Hexagonal wrench
(P/N 529 014 700)



A19B024

APPLICATION
All SC 10 suspensions, Safari and Skandic prior to 1995.

Suspension adjustment wrench
(P/N 529 017 100)



A15B094

APPLICATION
1992 and old Formula C-7.

Suspension adjustment wrench
(P/N 529 032 900)



A02F114

APPLICATION
Arm suspension.

Suspension adjustment wrench
(P/N 529 034 100)

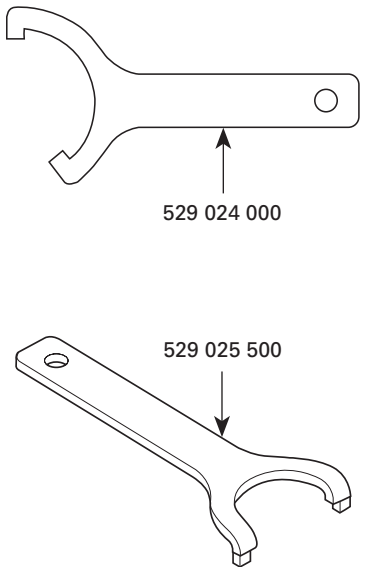


A02F124

APPLICATION
CK3 series.

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

Adjustment wrench
(P/N 861 743 900)
Consists of:



APPLICATION
T/A shock.

VEHICLES — RECOMMENDED SERVICE TOOLS

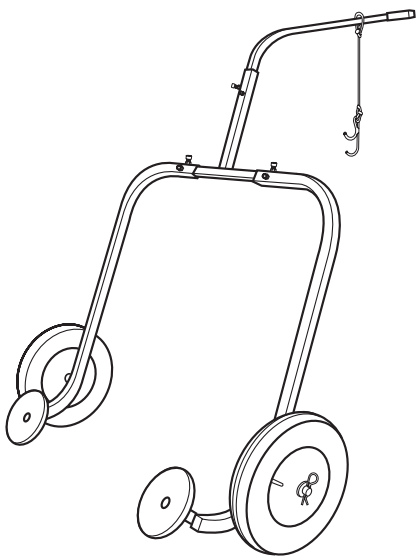
Protective mat
(P/N 529 030 600)



A01B45W

APPLICATION
All vehicles.

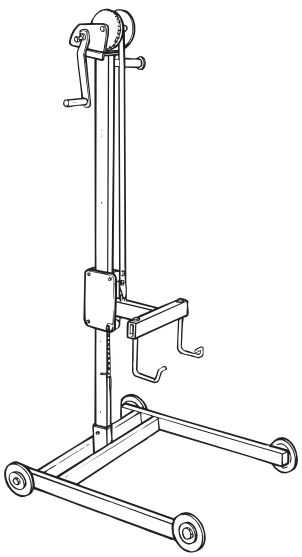
Dolly
(P/N 529 029 900)



A00B4CJ

APPLICATION
All models.

Snowmobile jack
(P/N 529 020 000)



A01A1JJ

APPLICATION
All models.

VEHICLES (continued) — RECOMMENDED SERVICE TOOLS

Template for hood drilling
(P/N 529 034 400)

NEW

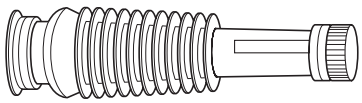


A02H154

APPLICATION
S-Series.

NOTE: To drill new hood prior to install meters.

Flexible spout for oil container
(P/N 414 837 300)



F04B044

APPLICATION
All models.

SERVICE PRODUCTS

MANDATORY SERVICE PRODUCTS

Loctite® is a trademarks of Loctite Corporation.
Dow Corning® is a trademarks of Dow Corning Corporation.

Retaining compound
(P/N 413 703 100)
Loctite® RC/609:
Retaining compound (10 mL) (green)



A00B2S4

APPLICATION
Used for retaining bushings, bearings in slightly worn housing or on shaft.

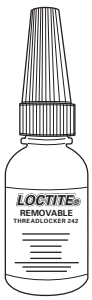
Paste gasket
(P/N 413 702 700)
Loctite® 515:
Gasket eliminator (50 mL)



A00B2T4

APPLICATION
Crankcase halves, transmission and gearbox mating surfaces.

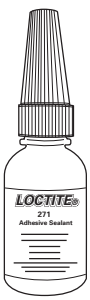
Medium-strength threadlocker
(P/N 293 800 005)
Loctite® 242:
Threadlocker (10 mL) (blue, medium strength)



A00B324

APPLICATION
Flywheel nut, crankcase studs, etc.

High strength threadlocker
(P/N 293 800 005)
Loctite® 271:
Threadlocker (10 mL) (red, high strength)



A00B2U4

APPLICATION
Fasteners and studs up to 1 in diameter.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 707 400.

Gasket/paint remover
(P/N 413 708 500)
Loctite® 79040 Chisel
510 g (18 oz)



A00B3L4

APPLICATION
Clean mating surfaces of cylinders and crankcase. Remove carbon in combustion chambers.

Loctite® primer
(P/N 293 800 041)
Loctite® 764-56
Primer N
170 g (6 oz)



A00B3N4

APPLICATION
To prepare mating surfaces before applying paste gasket, retaining compound or threadlockers.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 708 100.

MANDATORY SERVICE PRODUCTS (continued)

Silicone compound
(P/N 420 897 061)
Dow Corning® MS4



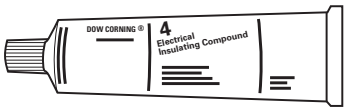
A00B3R4

APPLICATION

Lubricate pawl and pawl lock of rewind starter.

RECOMMENDED SERVICE PRODUCTS

Silicone dielectric grease
(3 oz)
(P/N 413 701 700)



A00B1X4

APPLICATION

On all electric connections. High tension coil and spark plug connections. Connector housings, etc.

Grease LMZ no. 1
(400 g)
(P/N 413 707 500)



A00B1Y4

APPLICATION

Mainly used between regulators or rectifiers and upper column to transfer the heat build-up and to assure a good ground.

Chaincase oil
(16 x 250 mL)
(P/N 413 801 900)



A00B2R4

APPLICATION

Chaincase lubricant on all fan-cooled models except Skandic WT series.

Synthetic chaincase oil
(12 x 355 mL)
(P/N 413 803 300)



A01B4Q4

APPLICATION

Chaincase lubricant on all liquid-cooled models and Skandic WT series.

Blizzard oil
(12 x 500 mL)
(P/N 413 803 100)



A00B2Q4

APPLICATION

All pre-mix models.

Injection oil
(P/N 413 802 900)
(12 x 1 liter)
(P/N 413 803 000)
(3 x 4 liter)
(P/N 413 803 200)
(205 liters)



F01B2H4

APPLICATION

All engines.

BOMBARDIER-ROTAX Formula XP-S synthetic injection oil
(P/N 413 711 000)
(3 x 4 liter)
(P/N 413 710 700)
(205 liters)



F01B354

APPLICATION

All engines.

RECOMMENDED SERVICE PRODUCTS (continued)

BOMBARDIER-ROTAX Formula XP-S synthetic injection oil
(P/N 413 710 500)
(12 x 1 liter)



F01B2G4

APPLICATION
All models.

Pipe sealant
(P/N 413 702 300)
Loctite 592 (50 mL)



A00B2W4

APPLICATION
Engine plugs and senders.

High temperature threadlocker
(P/N 420 899 788)
Loctite 648 (green)
(5 g)



A00B3D4

APPLICATION
For RAVE valve rod distance nut.

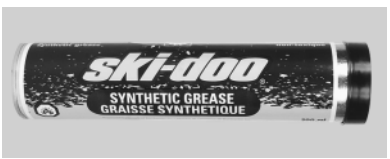
Anti-seize lubricant
(P/N 413 701 000)
Loctite anti-seize lubricant 454 g (16 oz)



F01B174

APPLICATION
Unpainted surfaces of driven pulley countershaft.

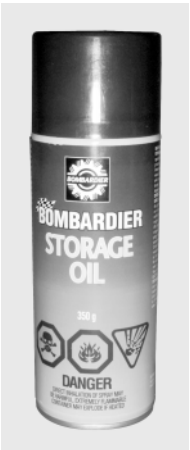
Synthetic grease
(400 g)
(P/N 413 711 500)



A01B574

APPLICATION
For idler bearings, ski legs, leaf spring cushion pads, seal interior lips, rear hub bearings, bogie wheels, countershaft bearings, etc.

Storage oil
(350 g spray can)
(12 x 350 g)
(P/N 496 014 100)



A02B054

APPLICATION
All models.

Degreaser
(P/N 413 708 400)
Permatex® 48 TA
433 g (15 oz)



A00B3K4

APPLICATION
Engine, chaincase, pulleys and any greasy surfaces.

RECOMMENDED SERVICE PRODUCTS (continued)

Gel instant adhesive
(P/N 413 708 300)
Loctite 454-40
20 g (.70 oz)



A00B3O4

APPLICATION
Isolating foam and rubber strip.

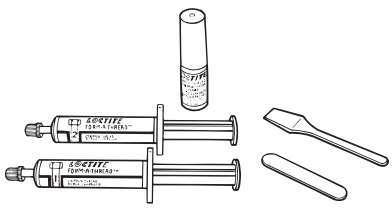
Tough adhesive
(P/N 413 408 300)
Loctite Black Max 38004
3 mL (.10 oz)



A00B3P4

APPLICATION
Shifter boot or grip.

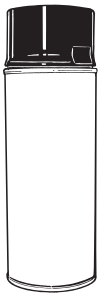
Stripped threads repair kit
(P/N 413 708 600)
Loctite 81668
Form-A-thread 81668



A00A1J4

APPLICATION
Repair damaged threads of grade 5 (SAE) or 8.8 (metric) maximum. Do not use in applications where temperatures will exceed 149°C (300°F) or on critical assemblies.

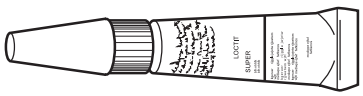
Paint for frame touch-up
(P/N 413 401 000)
Black semi-gloss
(spray can)



A00B3H4

APPLICATION
All models with a black frame.

General purpose instant adhesive
Loctite 495 (3 g)
(P/N 413 703 200)



A00B2V4

APPLICATION
Rubber to metal bonding and most hard plastic.

High temperature RTV sealant
Ultra Copper
(P/N 413 710 300)
Loctite 17914 (80 mL)



A02B044

APPLICATION
All models.

Bombardier cleaner
(P/N 293 110 001) (400 g)
(P/N 293 110 002) (4 L)



F01B2J4

APPLICATION
All models.

RECOMMENDED SERVICE PRODUCTS (continued)

Clear silicone
(P/N 293 800 033)



F01B1S4

APPLICATION
All models to seal bottom pan.

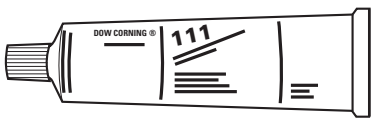
Fuel stabilizer
(12 x 8 oz)
(P/N 413 408 600)



A00B3V4

APPLICATION
All models.

Molykote 111
(P/N 413 707 000)



A00B3W4

APPLICATION
Rotary valve shaft seals.

Shock oil
(32 oz)
(P/N 413 709 400)



A06F0P4

APPLICATION
T/A shocks.

Bombardier Lube
(12 x 14 oz)
(P/N 293 600 016)



A01B4P4

APPLICATION
Steering ball joints on all models.

Super Lube (grease)
(P/N 293 550 014)



A00B474

APPLICATION
Tie rod bushings.

LUBRICATION AND MAINTENANCE CHART

SYSTEM	PART/TASK	10-HOUR OR 500 km (300 mi) INSPECTION (to be performed by dealer)	WEEKLY OR EVERY 240 km (150 mi)	MONTHLY OR EVERY 800 km (500 mi)	ONCE A YEAR OR EVERY 3200 km (2000 mi)	STORAGE (to be performed by dealer)	PRE-SEASON PREPARATION (to be performed by dealer)	REFER TO
	Rewind Starter Lubrication and Rope Condition						✔	Subsection 04-08
	Engine Head Nuts	✔			✔			Appropriate s section: See TOP END
	Engine Mount Nuts	✔			✔			Appropriate section: See ENGINE REMOVAL
	Exhaust System	✔		✔				Appropriate section: See ENGINE REMOVAL
	Engine Lubrication					✔		This section no. 1
	Cooling System Condition	✔			✔			Subsection 04-07
	Coolant Replacement (except fan cooled)						✔	Not applicable
	Condition of Seals						✔	Subsections 04-02 and 04-03
	Injection Oil Filter Condition			✔				Subsection 04-06
	Injection Oil Filter Replacement						✔	Subsection 04-06
	Oil Injection Pump Adjustment	✔			✔			Subsection 04-06
	Fuel Stabilizer					✔		This section no. 2
	Fuel Filter Replacement						✔	This section no. 3
	Fuel Lines and Connections	✔					✔	Subsection 04-10
	Carburetor Adjustment	✔			✔			Subsection 04-09
	Throttle Cable Inspection	✔			✔		✔	Subsection 04-10
	Air Filter Cleaning			✔				This section no. 4
	Drive Belt Condition	✔	✔					This section no. 5
	Condition of Drive and Driven Pulleys	✔		✔		✔		Subsections 05-03 and 05-04
	Cleaning of Drive and Driven Pulleys						✔	Subsections 05-03 and 05-04
	Retorquing of Drive Pulley Screw	✔						Subsection 05-03
	Driven Pulley Preload	✔			✔			Subsection 05-04
	Brake Condition	✔	✔					Subsection 05-06
	Brake Adjustment			✔				Subsection 05-06
	Lubrication of Ratchet Wheel or Fluid Change						✔	Subsection 05-06

SYSTEM	PART/TASK	10-HOUR OR 500 km (300 mi) INSPECTION (to be performed by dealer)	WEEKLY OR EVERY 240 km (150 mi)	MONTHLY OR EVERY 800 km (500 mi)	ONCE A YEAR OR EVERY 3200 km (2000 mi)	STORAGE (to be performed by dealer)	PRE-SEASON PREPARATION (to be performed by dealer)	REFER TO
	Drive Chain Tension	✔		✔				Subsection 05-07
	Countershaft Lubrication (S-Series)	✔		✔		✔		Subsection 05-06
	Chaincase Oil Level	✔		✔			✔	Subsection 05-07
	Chaincase Oil Change					✔		Subsection 05-07
	Lubrication of Drive Axle Bearing	✔		✔		✔		Subsection 07-04
	Handlebar Bolts. Retorque to 26 N•m (19 lbf•ft)	✔						Subsection 08-02
	Steering and Front Suspension Mechanism	✔		✔		✔		Subsections 08-02 and 08-03
	Wear and Condition of Skis and Runners	✔	✔					Subsection 08-03
	Steering and Ski Leg Camber Adjustment	✔		✔				Subsection 08-02
	Suspension Adjustments	AS REQUIRED						Section 07: See appropriate subsection and *Operator's Guide*
	Suspension Lubrication			✔		✔		Section 07: See appropriate subsection
	Suspension Condition	✔			✔			Section 07: See appropriate subsection
	Suspension Stopper Strap Condition				✔			Section 07: See appropriate subsection
	Track Condition	✔		✔				Subsection 07-05
	Track Tension and Alignment	✔	AS REQUIRED					Subsection 07-05
	Spark Plugs*	✔		✔				Subsection 06-03
	Engine Timing	✔					✔	Subsection 06-02
	Battery Condition	✔		✔		✔		Subsection 06-04
	Headlight Beam Aiming				✔			Subsection 09-02
	Wiring Harnesses, Cables and Lines	✔		✔				Subsection 09-02
	Operation of Lighting System (HI/LO Beam, Brake Light, etc.) Test Operation of Emergency Cut-Out Switch and Tether Cut-Out Switch	✔	✔			✔		*Operator's Guide*
	Rags in Air Intake and Exhaust System					✔	✔	This section no. 6
	Engine Compartment	✔		✔				This section no. 7
	Vehicle Cleaning and Protection	✔		✔		✔		This section no. 8

* Before installing new spark plugs at pre-season preparation, it is suggested to burn excess storage oil by starting the engine with the old spark plugs. Only perform this operation in a well ventilated area.

NO. 1 ENGINE LUBRICATION

Engine internal parts must be lubricated to protect them from possible rust formation during the storage period.

Proceed as follows:

Start the engine and allow it to run at idle speed until the engine reaches its operating temperature.

◆ WARNING

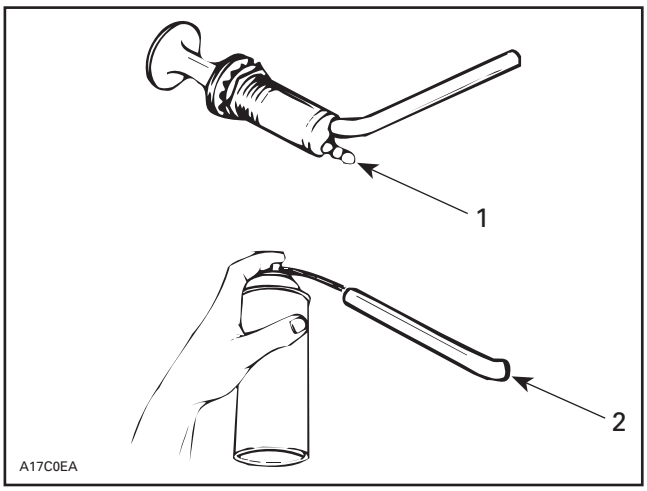
Ensure the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

Stop the engine.

Models with a Primer

To prevent fuel from draining, primer button should be pushed all the way in.

Disconnect the outlet primer hose from the primer valve (straight coupling).



1. Straight coupling
2. To intake manifold

Insert storage oil (P/N 496 014 100) nozzle into primer outlet hose.

Models with a Choke

Remove air silencers to spray storage oil into each carburetor bore.

All Models

Restart engine and run at idle speed.

Inject storage oil until the engine stalls or until a sufficient quantity of oil has entered the engine (approximately half a can).

With the engine stopped, remove the spark plug and spray storage oil (P/N 496 014 100) into each cylinder.

Crank slowly 2 or 3 revolutions to lubricate cylinders.

Reinstall the spark plugs and the outlet primer hose or air silencers.

◆ WARNING

This procedure must only be performed in a well ventilated area. Do not run engine during storage period.

NO. 2 FUEL STABILIZER

With the new fuel additives, it is critical to use the fuel stabilizer (P/N 413 408 600) (250 mL) to prevent fuel deterioration, gum formation and fuel system components corrosion. Follow manufacturer's instructions for proper use.

Pour fuel stabilizer in fuel tank prior to starting engine for internal parts lubrication so that stabilizer flows everywhere in fuel system.

After engine starting, use primer several times so that stabilizer flows inside it.

Do not drain fuel system.

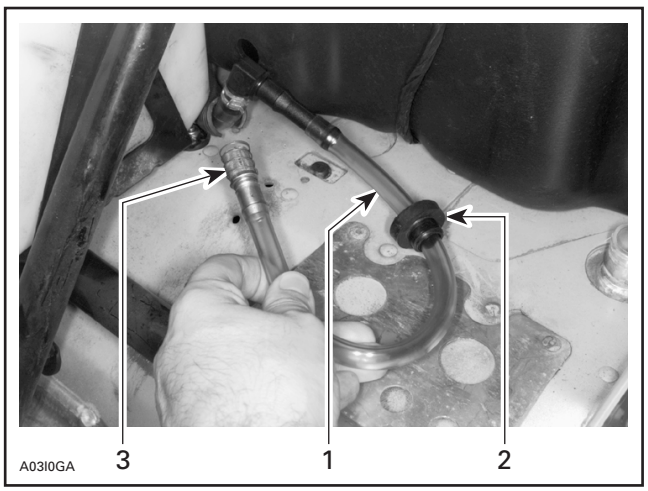
▼ CAUTION

Fuel stabilizer should be added prior to engine lubrication to ensure carburetor(s) protection against varnish deposit.

NO. 3 FUEL FILTER REPLACEMENT

Drain fuel tank.

Remove fuel line grommet from fuel tank and pull out inlet fuel line from tank.



TYPICAL
1. *Inlet fuel line*
2. *Position of grommet when installing*
3. *Fuel filter*

Replace fuel filter. To facilitate the fuel line installation, slide grommet on fuel line about 50 mm (2 in) away from elbow then install grommet on fuel tank and push elbow through grommet.

NO. 4 AIR FILTER CLEANING

Check that the air box is clean and dry then properly reinstall the filter.

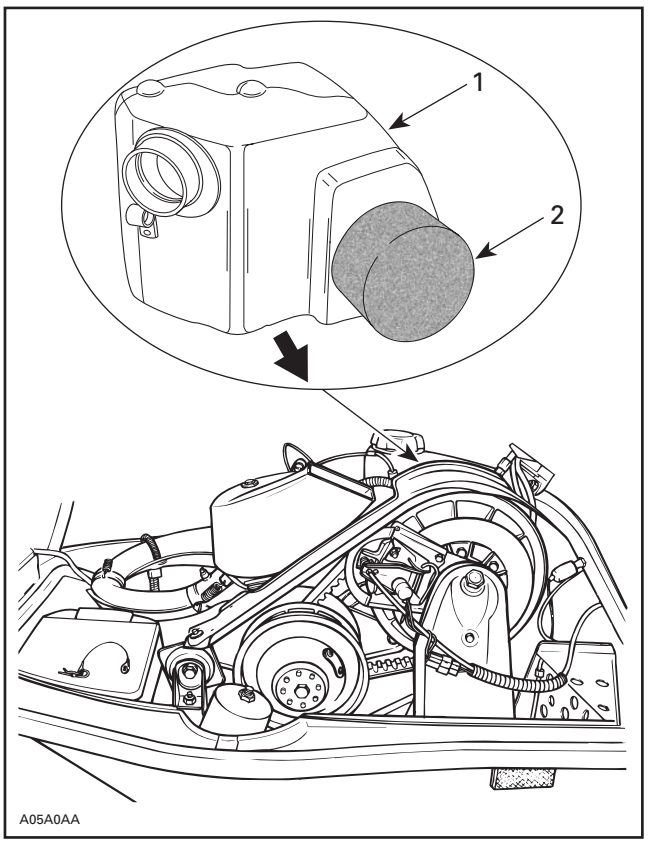
▼ CAUTION

These snowmobiles have been calibrated with the filter installed. Operating the snowmobile without it may cause engine damage.

Tundra/R

Air filter is located on lower side portion of air intake silencer. Lift hood and remove belt guard. Gently pull air filter sideward.

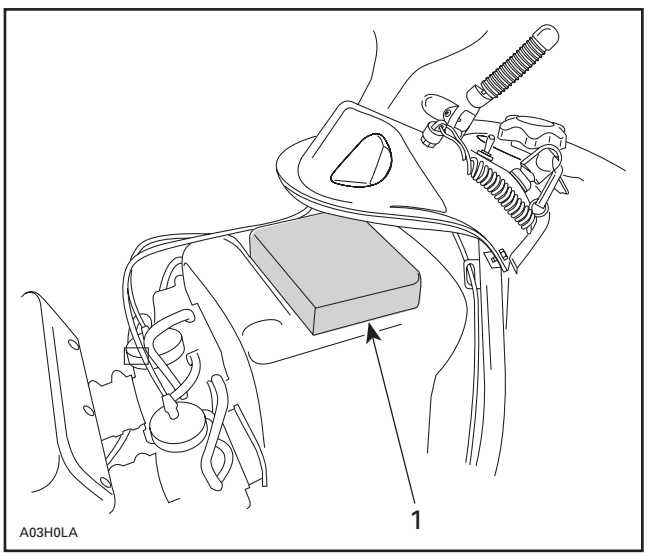
Ensure it is clean and dry. Shake snow out. Clean with a solvent and dry as necessary.



1. *Intake silencer*
2. *Air filter*

S-Series

Lift hood and remove air filter from air intake silencer.



TYPICAL
1. *Filter*

To clean the filter, shake the snow out of it then, dry it out.

NO. 5 DRIVE BELT CONDITION

Inspect belt for cracks, fraying or abnormal wear (uneven wear, wear on one side, missing cogs, cracked fabric). If abnormal wear is noted, probable cause could be pulley misalignment, excessive RPM with frozen track, fast starts without warm-up period, burred or rusty sheave, oil on belt or distorted spare belt.

Check the drive belt width. Replace the drive belt if width is less than the minimum width recommended in DRIVE BELT 05-02.

NO. 6 RAGS IN AIR INTAKE AND EXHAUST SYSTEM

At storage preparation, block air intake hole and exhaust system hole using clean rags.

Remove those rags at pre-season preparation.

NO. 7 ENGINE COMPARTMENT

Keep clean of grass, twigs, cloth, etc. These are combustible under certain conditions.

NO. 8 VEHICLE CLEANING AND PROTECTION

Remove any dirt or rust.

To clean the entire vehicle, use only flannel clothes or Kimtowels® wipers no. 58-380 from Kimberly-Clark.

▼ CAUTION

It is necessary to use flannel cloths or Kimtowels wipers on windshield and hood to avoid damaging further surfaces to clean.

To clean the entire vehicle, including metallic parts with a **thick** coat of grease, use Endust® imported by Bristol Myers, available at hardware stores or supermarkets.

For bottom pan cleaning, use Bombardier Cleaner (P/N 293 110 001 (spray can 400 g)) and (P/N 293 110 002 (4 L)).

▼ CAUTION

Do not use Bombardier Cleaner on decals or vinyl.

To clean the entire vehicle, including metallic parts with a **thin** coat of grease, use Simple Green® from Sunshine Makers Inc., available at hardware stores or at automotive parts retailer.

For vinyl and plastic parts, use Vinyl & Plastic Cleaner (P/N 413 711 200 (6 x 1L)).

To remove scratches on windshield or hood: Start with "Slip Streamer Motorcycle Windshield Heavy Duty Scratch, Remover". Finish with "Slip Streamer Motorcycle Cleaner and Polish".

NOTE: The latest product may be use alone if only light scratches are noticeable.

▼ CAUTION

Never clean plastic parts or hood with strong detergent, degreasing agent, paint thinner, acetone, products containing chlorine, etc.

Inspect the hood and repair any damage. Touch up all metal spots where paint has been scratched off. Spray all metal parts including shock chromed rods with BOMBARDIER LUBE (P/N 293 600 016). Wax the hood and the painted portion of the frame for better protection.

NOTE: Apply wax on glossy finish only. Protect the vehicle with a cover to prevent dust accumulation during storage.

▼ CAUTION

The snowmobile has to be stored in a cool and dry place and covered with an opaque tarpaulin. This will prevent sun rays and grime from affecting plastic components and vehicle finish.

Lift rear of vehicle until track is clear of the ground. Install on a snowmobile mechanical stand.

NOTE: Do not release track tension.

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ENGINE

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**ENGINE BACKFIRES.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check spark plug(s).** a. Carbon accumulation caused by defective spark plug(s). *Clean carbon accumulation and replace spark plug(s).*
	2. Check cooling system. a. Loose fan belt. *Adjust or replace fan belt (refer to TECHNICAL DATA 10).* b. Low antifreeze level. *Adjust antifreeze level. Then check clamps or hoses.* c. Defective tank cap. *Replace cap.* d. Air in system. *Bleed system.*
	3. Check ignition timing. a. Timing is too advanced. *Set timing according to specifications (refer to TECHNICAL DATA 10).*

SYMPTOM	ENGINE SUDDENLY TURNS OFF.
CONDITION	NORMAL USE.
Test/Inspection	**1. Perform engine leak test. Refer to engine leak verification flow chart. Check possible piston seizure.** a. Damaged gasket and/or seal. *Replace defective parts.*
	2. "Four-corner" seizure of piston(s). a. Accelerating too fast when engine is cold. Piston expands faster than cylinder. *Replace piston(s). Ask driver to refer to warm-up procedure in* Operator's Guide.
	3. Piston(s) seizure on exhaust side (color on piston dome is correct). a. Kinked fuel tank vent tube. *Relocate fuel tank vent tube.* b. Leaks at fuel line connections or damaged fuel lines. *Replace defective lines.* c. Fuel does not flow through carburetor(s) (plastic particles in needle area and/or varnish formation in carburetor(s)). *Clean carburetor(s).* d. Spark plug heat range is too warm. *Install spark plug(s) with appropriate heat range (refer to TECHNICAL DATA 10).* e. Improper ignition timing. *Adjust according to specifications (refer to TECHNICAL DATA 10).* f. Restriction in exhaust system. *Replace.* g. Compression ratio is too high. *Install genuine parts.* h. Carburetor calibration is too lean. *Adjust according to specifications (refer to TECHNICAL DATA 10).* i. Improper rotary valve timing or improper valve. *Adjust according to specifications (refer to TECHNICAL DATA 10) and/or install Bombardier's recommended rotary valve.* j. Poor quality oil. *Use Bombardier Rotax oil.* k. Leaks at air intake silencer. *Replace air intake silencer grommets.*

	4. Melted and/or perforated piston dome; melted section at ring end gap. a. When piston reaches TDC, mixture is ignited by heated areas in combustion chamber. This situation is due to an incomplete combustion of a poor quality oil. *Clean residue accumulation in combustion chamber and replace piston(s). Use Bombardier Rotax oil.* b. Spark plug heat range is too high. *Install recommended spark plug(s) (refer to TECHNICAL DATA 10).* c. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).* d. Inadequate fuel quality. *Use appropriate fuel.* e. Carburetion is too lean. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Seized piston all around the circumference (dry surface). a. Lack of oil, damaged oil line or defective injection pump. *Replace defective part(s).*
	6. Grooves on intake side of piston only. a. Oil film eliminated by water (snow infiltration in engine). *Replace piston(s) and check if intake system leaks.*
	7. Piston color is dark due to seizure on intake and exhaust sides. a. Broken or loose fan belt. *Replace fan belt or adjust its tension (refer to TECHNICAL DATA 10).* b. Cooling system leaks and lowers coolant level. *Tighten clamps or replace defective parts. Add antifreeze in cooling system until appropriate level is reached.* c. Accumulation of foreign particles in needle and/or main jet area. *Clean carburetor(s).*
	8. Cracked or broken piston(s). a. Cracked or broken piston(s) due to excessive piston/cylinder clearance or engine overreving. *Replace piston(s). Check piston/cylinder clearance (refer to TECHNICAL DATA 10). Adjust drive pulley according to specifications (refer to TECHNICAL DATA 10) and/or clean pulley sheaves if they are contaminated with greasy particles.*

SYMPTOM	**PISTON RING AND CYLINDER SURFACES ARE GROOVED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check oil quality.** a. Poor oil quality. *Use Bombardier Rotax oil.*
	2. Check injection pump and its hoses. a. Inadequate injection pump adjustment and/or defective hoses. *Adjust pump according to specifications (refer to ENGINE 04) and/or replace hoses.*

SYMPTOM	ENGINE DOES NOT OFFER MAXIMUM POWER AND/OR DOES NOT REACH MAXIMUM OPERATING RPM.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check spark plug condition.** a. Fouled spark plug(s). *Replace.*
	2. Check if there is water in fuel. a. There is water in fuel. *Drain fuel system, then fill it with appropriate fuel.*
	3. Check items listed in "Engine runs out of fuel" (refer to fuel and oil system subsection 02).
	4. Check carburetor adjustments and cleanliness. a. Inadequate carburetor adjustments or dirt accumulation. *Adjust according to specifications (refer to TECHNICAL DATA 10) or clean.*
	5. Check drive belt. a. Worn belt. *Replace belt if width is 3 mm (1/8") less than nominal dimension (refer to TECHNICAL DATA 10).*
	6. Check track adjustment. a. Too much tension and/or improper alignment. *Align track and adjust its tension to specifications (refer to TECHNICAL DATA 10).*
	7. Check drive pulley. a. Improper calibration screw adjustments (TRA pulley) and/or worn bushing(s). *Adjust according to specifications (refer to TECHNICAL DATA 10) and/or replace bushing(s).*
	8. Check driven pulley. a. Worn bushing and/or spring tension. *Replace spring and/or adjust its tension according to specifications (refer to TECHNICAL DATA 10).*
	9. Check exhaust system. a. Restriction. *Replace.*
	10. Check ignition timing. a. Decrease in power due to retarded ignition. *Adjust according to specification (refer to TECHNICAL DATA 10).*
	11. Check engine compression. a. Worn piston(s) and ring(s). *Replace (refer to TECHNICAL DATA 10 for specification).*
	12. Check engine cooling system. a. Engine overheats. Improper fan belt tension. *Adjust fan belt (refer to TECHNICAL DATA 10).* b. Antifreeze level is low, cap fails to pressurize system or air circulates through lines. *Adjust level, replace cap or bleed cooling system.*

SYMPTOM	ENGINE DETONATION AT MAXIMUM RPM.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check which type of fuel is used.** a. Octane number is too low and/or alcohol level is too high. *Use recommended fuel type.*
	2. Check spark plug type. a. Improper spark plug heat range. *Install recommended spark plug(s) (refer to TECHNICAL DATA 10).*
	3. Check exhaust system. a. Too much restriction. *Replace.*
	4. Check ignition timing. a. Timing is too advanced. *Adjust according to specification (refer to TECHNICAL DATA 10).*
	5. Check carburetion. a. Fouled and/or improper carburetor components. *Clean or replace according to specification (refer to TECHNICAL DATA 10).*
	6. Check compression ratio and squish area. a. Compression ratio is too high. *Install genuine parts.*

SYMPTOM	**ENGINE TURNS OVER BUT FAILS TO START.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check switches.** a. Ignition switch, emergency cut-out switch or tether switch is in the OFF position. *Place all switches in the RUN or ON position.*
	2. Check fuel level. a. Mixture not rich enough to start cold engine. *Check fuel tank level and use primer.*
	3. Check spark plug. a. Defective spark plug (no spark). *Replace spark plug(s).*
	4. Check amount of fuel on spark plug. a. Flooded engine (spark plug wet when removed). *Do not overprime or overchoke. Remove wet spark plug(s), turn ignition switch to OFF and crank engine several times. Install clean dry spark plug. Start engine following usual starting procedure.*
	5. Check fuel lines. a. No fuel to the engine (spark plug dry when removed). *Check fuel tank level; check fuel filter, replace if clogged; check condition of fuel and impulse lines and their connections.*
	6. Check engine compression. a. Insufficient engine compression. *Replace defective part(s) (ex. : piston(s), ring(s), etc.).*

SYMPTOM	**IRREGULAR ENGINE IDLE.**
CONDITION	NORMAL USE AFTER ENGINE WARM UP.
Test/Inspection	**1. Check primer.** a. Fuel leaks at primer nipple which is mounted to carburetor. *Replace.*
	2. Check choke. a. Choke plunger may be partially opened. *Readjust.*
	3. Check carburetor adapter. a. Air enters through a crack. *Replace.*
	4. Check air screw position. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check ignition system trigger coil air gap. a. Air gap is too large. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	6. Check dimension of pilot jet. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	7. Perform engine leak test. a. Leaking gaskets allow air to enter in engine. *Replace defective parts.*

SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check temperature gauge sensor.** a. False reading. *Replace.*
	2. Check fan belt. a. Belt slides because it is too loose. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	3. Verify antifreeze level and check if there is air infiltration in the system or if there are leaks in gasket areas. a. Low antifreeze level or air in system. *Add antifreeze until recommended level is reached, bleed system and/or tighten clamps at fitting.*
	4. Check if antifreeze flows through system properly. a. Foreign particles and/or broken coolant pump impeller. *Clean cooling system and/or replace coolant pump impeller.*
	5. Check thermostat. a. Thermostat reacts slowly or not at all. *Replace.*
	6. Check antifreeze concentration. a. Antifreeze concentration is too high. *Adjust concentration according to Bombardier's recommendations.*
	7. Check tank cap. a. Cap does not hold pressure. *Replace.*
	8. Check carburetion. a. Improperly adjusted or inadequate carburetor components. *Adjust according to specifications (refer to TECHNICAL DATA 10) or replace inadequate component(s).*
	9. Check cylinder head gaskets. a. Worn gaskets. *Replace.*
	10. Check ignition timing. a. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	11. Check if there are leaks at air intake silencer and/or engine crankcase. a. Leak(s). *Repair or replace.*
	12. Check condition and heat range of spark plug(s). a. Melted spark plug tip or inadequate heat range. *Replace.*

SYMPTOM	ENGINE EQUIPPED WITH RAVE VALVE DOES NOT REACH ITS FULL OPERATING RPM (500 TO 1000 RPM SLOWER).
CONDITION	NORMAL USE.
Test/Inspection	**1. Check RAVE valve pistons.** a. Valve piston(s) is (are) too far out. *Screw valve piston(s) to bottom.*
	2. Check RAVE valve stems. a. Bent RAVE valve stem(s). *Replace.*
	3. Check RAVE valves. a. Jamed valve(s). *Clean.*
	4. Check tension of RAVE springs. a. Inadequate spring tension. *Replace.*
	5. Check RAVE pressure holes. a. Clogged holes. *Clean.*
	6. Check clamps or sleeves. a. Damaged clamp(s) or sleeve(s). *Replace.*

SYMPTOM	ENGINE EQUIPPED WITH RAVE. ENGINE HESITATES AT MID-SPEED AND REACHES MAXIMUM PERFORMANCE ONLY AFTER A WHILE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check RAVE valve spring(s).** a. Spring tension is too weak or spring(s) is (are) broken. *Replace.*
	2. Check RAVE valve cover red adjustment screws. a. Adjustment screw(s) is (are) too loose. *Fully tighten.*
	3. Check RAVE valve movement (RAVE movement indicator P/N 861 725 800). a. Valve(s) is (are) stuck in open position. *Clean.*

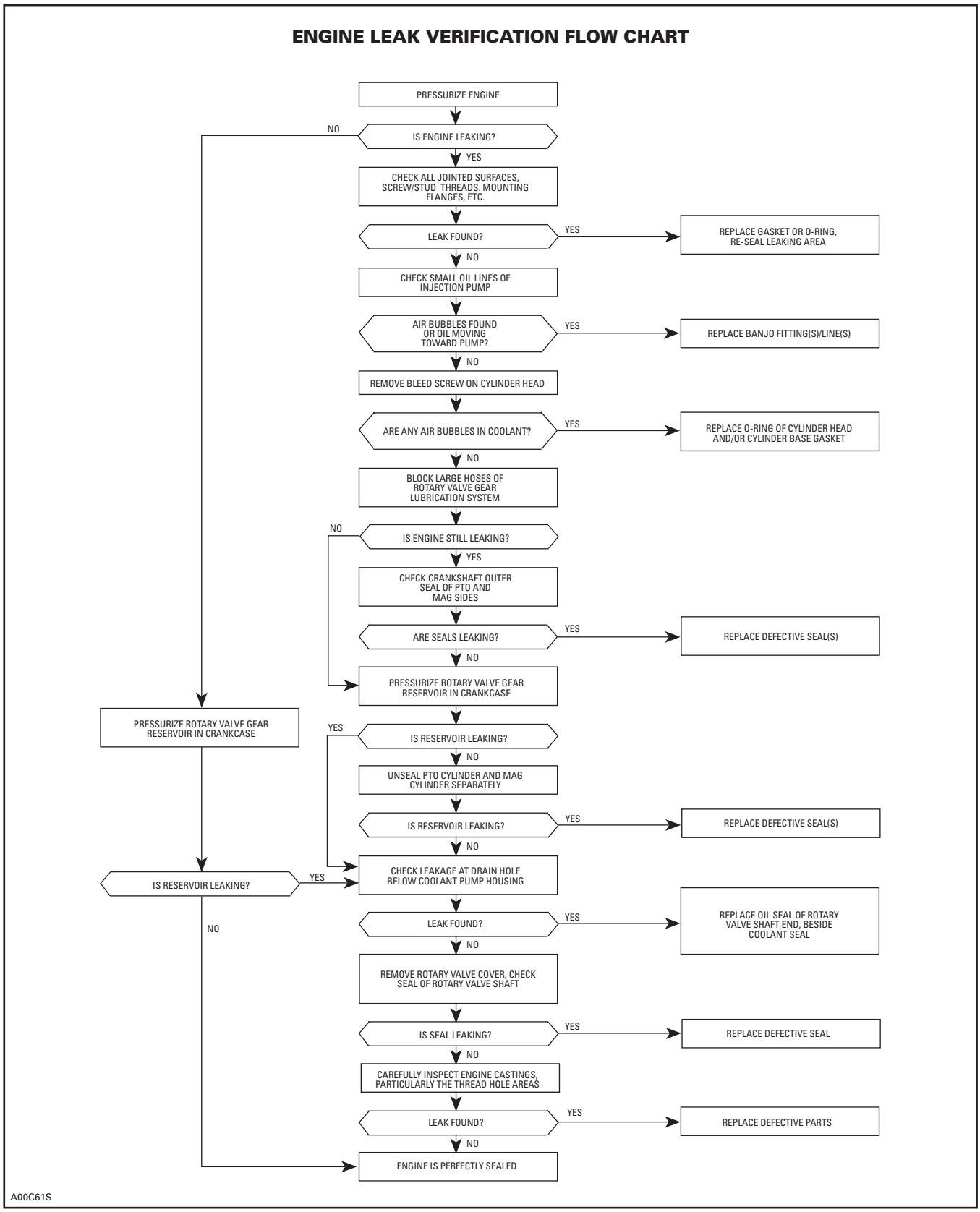
SYMPTOM	REWIND STARTER ROPE DOES NOT REWIND.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check rewind spring.** a. Broken spring. *Replace spring.*

SYMPTOM	REWIND STARTER PAWL DOES NOT ENGAGE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check stopper spring.** a. Broken stopper spring. *Replace.*
	2. Check pawl and pawl lock. a. Pawl and pawl lock have stuck together because of heat. *Replace.*
	3. Check pawl and rope sheave. a. Pawl and rope sheave have stuck together because of heat. *Replace.*

SYMPTOM	ENGINE PINGING.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel lines.** a. Bent fuel lines (preventing fuel from flowing through). *Relocate or replace fuel lines.*
	2. Check if carburetor(s) is (are) clean. a. Dirt prevents fuel from flowing through. *Clean.*
	3. Check ignition timing. a. Timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	4. Check compression ratio. a. Compression ratio is too high. *Replace inadequate part(s) to obtain manufacturer's recommended compression ratio or use a higher grade fuel.*

SYMPTOM	ENGINE GENERATES A LOT OF VIBRATIONS.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check engine supports.** a. Loose broken supports or interference between support(s) and chassis. *Retighten to specification (refer to TECHNICAL DATA 10) or replace.*
	2. Check drive pulley (refer to: vibrations coming from drive pulley).
	3. Check carburetor synchronization. a. Throttle slide heights are adjusted differently and/or throttle slide openings are unsynchronized. *Adjust throttle slide heights and throttle cable.*

ENGINE LEAK VERIFICATION FLOW CHART



FUEL AND OIL SYSTEMS

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**HIGH FUEL CONSUMPTION OR RICH MIXTURE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel tank.** a. Perforated fuel tank. *Replace fuel tank.*
	2. Check fuel pump, reservoir and carburetor fittings. a. Leaking fittings. *Replace defective part.*
	3. Check primer. a. Fuel flows through primer while engine runs. *Replace primer.*
	4. Check float height in carburetor(s). a. Fuel level is too high in float bowl(s). *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check needle valve. a. Foreign particles prevent needle valve(s) from closing and/or worn seating area. *Clean or replace needle valve(s), then clean seating area.*

SYMPTOM	**FUEL LEAKS IN ENGINE BASE WHEN ENGINE IS STOPPED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check items 3, 4 and 5 of "High fuel consumption".**
	2. Check fuel pump diaphragm. a. Cracked diaphragm. *Replace.*

SYMPTOM	ENGINE LACKS POWER OR STALLS AT HIGH RPM.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel tank vent hose.** a. Kinked or clogged hose. *Relocate or replace.*
	2. Check fuel filter. a. Clogged filter. *Replace.*
	3. Check fuel lines. a. Kinked or clogged lines. *Relocate or replace.*
	4. Check fuel pump flow. a. Dried diaphragm. *Replace.*
	5. Check if carburetor(s) is (are) clean. a. Varnish. *Clean.*

SYMPTOM	HIGH INJECTION OIL CONSUMPTION.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check oil injection pump adjustment.** a. Oil injection pump adjusted too rich. *Adjust.*
	2. Check injection pump identification. a. Wrong pump installed. *Replace with the appropriate pump. Refer to OIL INJECTION SYSTEM 04-06.*
	3. Check injection oil lines and their fitting. a. Leaking lines and/or cover. *Replace defective part(s).*
	4. Check injection pump cover gasket. a. Worn gasket. *Replace.*
	5. Pressurize crankcase rotary valve gear reservoir. a. Leaking gasket(s). *Replace gasket(s).*

SYMPTOM	ENGINE RUNS OUT OF FUEL (OR LEAN MIXTURE).
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel filter ball located in fuel tank. Ball must move freely.** a. Corrosion due to oxidation at installation. *Replace fuel filter.*
	2. Check if lines are perforated or kinked and make sure they do not leak at fittings. a. Lines are too big for their fittings or are improperly rooted. *Replace or properly relocate lines.*
	3. Check fuel pump outlet flow. a. Dirt clogging fuel pump lines or torn membrane. *Clean or replace fuel pump.*
	4. Check carburetor needle valve(s). a. Dirt (varnish, foreign particle) clogging fuel line inlets. *Clean.*
	5. Check main jet. a. Dirt (varnish, foreign particle) accumulation at main jet. *Clean.*
	6. Check float height in carburetor bowl(s). a. Running out of fuel at high speed because float height is too low. *Adjust float lever height according to specification.*

TRANSMISSION AND BRAKE SYSTEMS

The following charts are provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

TRANSMISSION

SYMPTOM	**THE SNOWMOBILE ACCELERATES SLOWLY, ESPECIALLY WHEN IT IS STOPPED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive belt condition.** a. Belt is too narrow (drive belt engagement is higher in drive pulley). *Replace belt if width is 3 mm (1/8 in) less than a new one (refer to TECHNICAL DATA 10).*
	2. Check distance between pulleys and/or drive belt deflection. a. Distance is too small between pulleys or deflection is too high (drive belt engagement is higher in drive pulley). *Adjust distance between pulleys and/or drive belt deflection according to specifications (refer to TECHNICAL DATA 10).*
	3. Check driven pulley sliding half play. a. Jammed sliding half. *Replace.*
	4. Check spring tension of driven pulley (only on models without RER). a. Sliding half rotation is accelerated when spring tension is too weak. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Refer to "Vibrations originating from driven pulley" and check items listed.
	6. Check drive pulley spring tension. a. Spring tension is too weak. *Replace.*

SYMPTOM	**ENGINE MAXIMUM RPM IS TOO HIGH AND TOP SPEED IS NOT REACHED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check items 1, 2 and 3 of "The snowmobile accelerates slowly, especially when it is stopped".**
	2. Check driven pulley spring tension (only on models without RER). a. Spring tension is to stiff. *Adjust according to specification (refer to TECHNICAL DATA 10).*
	3. Check position of the calibration screws (TRA drive pulley). a. Selected numbers are too high. *Adjust according to specification (refer to TECHNICAL DATA 10).*
	4. Refer to "Vibrations originating from driven pulley" and check items listed.

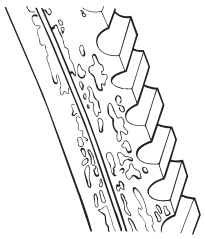
SYMPTOM	LOOSENESS IS FELT IN DRIVE SYSTEM WHEN ACCELERATING/DECELERATING.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive chain tension.** a. Drive chain is too loose. *Adjust.*
	2. Check radial play of driven pulley (aluminum frame models). a. Worn key or keyway (splines on models with RER). *Replace.*

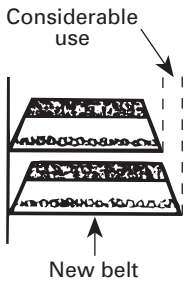
SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVE PULLEY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive belt.** a. Belt width is uneven at many places. *Replace (refer to TECHNICAL DATA 10 for the part number).*
	2. Check tightening torque of drive pulley screw. a. Moving governor cup. *Retighten screw.*
	3. Spring cover screws. a. Spring cover moves and restrains sliding half movement. *Retighten screws.*
	4. Check spring cover (TRA TYPE) and/or outer half bushings. a. Excessive gap between bushings and inner half shaft, thus restraining sliding half movements. *Replace bushing(s).*
	5. Check sliding half slider shoes. a. Worn slider shoes. *Replace.*

SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVEN PULLEY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check sliding half play.** a. Sliding half runout. *Replace sliding half bushing.*
	2. Check sliding half and fixed half straightness. a. Sliding half/fixed half runout. *Replace.*
	3. Check cam slider shoes. a. One or 2 slider shoes out of 3 are broken. *Replace.*

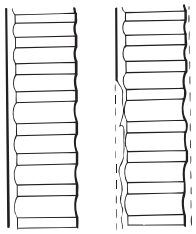
SYMPTOM	PULLEYS DO NOT DOWN SHIFT PROPERLY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check driven pulley spring tension.** a. Spring tension is too weak. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Refer to "Vibrations coming from driven pulley" and check items listed.
	3. Check drive pulley bushings (cleanliness, wear, etc.). a. Bushings stick to fixed half pulley shaft. *Clean or replace.*
	4. Check driven pulley spring tension (only on models without RER). a. Spring tension is too weak. *Replace.*

SYMPTOM	UNEVEN BELT WEAR ON ONE SIDE ONLY.
CONDITION	NORMAL USE.
Test/Inspection  A00D09Y	**1. Check tightening torque of engine mount bolts.** a. Loose engine mount. *Tighten engine mount nuts/bolts equally.*
	2. Check pulley alignment. a. Pulley misalignment. *Align pulleys.*
	3. Check drive belt contact area on pulleys. a. Rough or scratched pulley surfaces. *Repair or replace pulley half.*
	4. Check driven pulley sliding half play. a. Driven pulley bushing worn. *Replace bushing.*

SYMPTOM	BELT GLAZED EXCESSIVELY OR HAVING BAKED APPEARANCE.
CONDITION	NORMAL USE.
Test/Inspection  A00D0AY	**1. Check if drive pulley bushings are worn.** a. Insufficient pressure on belt sides. *Replace bushing.* **2. Check condition of drive pulley fixed half shaft.** a. Rusted drive or driven pulley shafts. *Clean shaft with fine steel woof.* **3. Check if pulley halves are clean.** a. Oil on pulley surfaces. *Clean pulley halves.* **4. Check pulley calibration.** a. Improper pulley calibration. *Calibrate according to specification.*

SYMPTOM	BELT WORN EXCESSIVELY IN TOP WIDTH.
CONDITION	NORMAL USE.
Test/Inspection  A00D0BY	**1. Check drive pulley.** a. Excessive slippage due to irregular outward actuation movement of drive pulley. *Carry out drive pulley inspection.* **2. Check drive belt identification number.** a. Improper belt angle (wrong type of belt). *Replace belt with an appropriate drive belt.* **3. Check drive belt width.** a. Considerable use. *Replace belt if 3 mm (1/8 in) less than recommended width (see TECHNICAL DATA 10).*

SYMPTOM	BELT WORN NARROW IN ONE SECTION.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if parking brake is released.** a. Parking brake is engaged. *Release parking brake.*
	2. Check track tension/alignment. a. Frozen or too tight track. *Liberate track from ice or check track tension and alignment.*
	3. Check drive pulley. a. Drive pulley not functioning properly. *Repair or replace drive pulley.*
	4. Check idle speed. a. Engine idle speed too high. *Adjust according to specification.*
	5. Check drive belt length. a. Incorrect belt length. *Replace belt with an appropriate drive belt (refer to TECHNICAL DATA 10).*
	6. Check distance between pulleys. a. Incorrect pulley distance. *Readjust according to specification.*
	7. Check belt deflection. a. Deflection is too small. *Adjust according to specification.*



A00D0CY

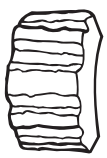
SYMPTOM	BELT SIDES WORN CONCAVE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check pulley half surfaces.** a. Rough or scratched pulley half surfaces. *Repair or replace.*
	2. Check drive belt identification number. a. Unspecified type of belt. *Replace belt with an appropriate drive belt (refer to TECHNICAL DATA 10).*

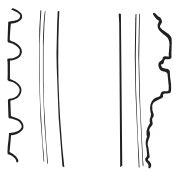


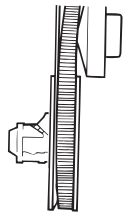
A00D0DY

SYMPTOM	**BELT DISINTEGRATION.**
CONDITION	NORMAL USE.
Test/Inspection  A00DOEY	**1. Check drive belt identification number.** a. Excessive belt speed. *Using unspecified type of belt. Replace belt with proper type of belt (refer to TECHNICAL DATA 10).* **2. Check if pulley halves are clean.** a. Oil on pulley surfaces. *Clean pulley surfaces with fine emery cloth and wipe clean using Cleaning Solvent (P/N 413 708 200) and a cloth.*

SYMPTOM	**BELT EDGE CORD BREAKAGE.**
CONDITION	NORMAL USE.
Test/Inspection  A00DOFY	**1. Check pulley alignment.** a. Pulley misalignment. *Align pulley according to specifications (refer to TECHNICAL DATA 10).*

SYMPTOM	**FLEX CRACKS BETWEEN COGS.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0GY	**1. Check drive belt condition.** a. Considerable use, belt wearing out. *Replace.*

SYMPTOM	**SHEARED COGS, COMPRESSION SECTION FRACTURED OR TORN.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0HY	**1. Check drive belt rotational direction.** a. Improper belt installation. *Replace.* **2. Check if drive belt rubs against components.** a. Belt rubbing on stationary object. *Relocate components.* **3. Check drive pulley.** a. Violent engagement of drive pulley. *Check drive pulley engagement speed, drive pulley bushings and components.*

SYMPTOM	BELT "FLIP-OVER" AT HIGH SPEED.
CONDITION	NORMAL USE.
Test/Inspection  A00D0IY	**1. Check pulley alignment.** a. Pulley misalignment. *Align pulley according to specifications (refer to TECHNICAL DATA 10).*
	2. Check drive belt identification number. a. Using unspecified type of belt. *Replace belt with an appropriate drive belt.*

BRAKE SYSTEM

MECHANICAL BRAKE

SYMPTOM	BRAKE DOES NOT ADJUST AUTOMATICALLY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ratchet wheel spring.** a. Broken ratchet wheel tag. *Replace.*
	2. Check mobile pad stud. a. Stud rotates in pad. *Replace.*

SYMPTOM	BRAKE HANDLE DOES NOT RETURN COMPLETELY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check brake return spring.** a. Broken return spring. *Replace.*
	2. Check if brake cable moves freely in its housing. a. Brake cable movement is limited due to oxidation or dirt accumulation. *Replace.*
	3. Check distance between brake lever and caliper. a. Distance is too wide. *Adjust according to specifications (refer to TRANSMISSION 05).*

HYDRAULIC BRAKE

SYMPTOM	**SPONGY BRAKE CONDITION.**
CONDITION	NORMAL USE.
Test/Inspection	*Replace brake fluid and bleed system. If problem still occurs, replace master cylinder.*

SYMPTOM	**BRAKE FLUID LEAKING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check for loosen hose connectors.** *Retighten.*
	2. Check for damaged hose, master cylinder and caliper. *Replace part(s) and check for proper mounting.*

MECHANICAL AND HYDRAULIC BRAKES

SYMPTOM	**BRAKE SYSTEM IS NOISY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check brake pad thickness.** a. Pads are worn up to wear warner. *Replace.*

ELECTRICAL SYSTEM

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**STARTER DOES NOT TURN.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuse.** a. Burnt fuse. *Check wiring condition and replace fuse.*
	2. Check continuity of starter switch contact points. a. Poor contact of starter switch contact points. *Repair or replace switch.*
	3. Check continuity between starter switch and solenoid. a. Open circuit between starter switch and solenoid switch. *Repair.*

SYMPTOM	**STARTER TURNS; BUT DOES NOT CRANK THE ENGINE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check battery capacity.** a. Shorted battery cell(s). *Replace.*
	2. Check battery charge. a. Weak battery. *Recharge.*
	3. Check wire connection. a. Inadequate connection (too much resistance). *Clean and reconnect.*
	4. Check solenoid switch contact disc. a. Burnt or poor contact of solenoid switch contact disc. *Replace solenoid switch.*
	5. Check continuity of solenoid switch pull-in winding. a. Open circuit of solenoid switch pull-in winding. *Replace solenoid switch.*
	6. Check continuity of solenoid switch hold-in winding. a. Open circuit of solenoid switch hold-in winding. *Replace solenoid switch.*

	7. Check brushes. a. Poor contact of brushes. *Replace brushes.*
	8. Check commutator. a. Burnt commutator. *Turn commutator on a lathe. Respect outer diameter wear limit. Refer to ELECTRIC STARTER 06-06.*
	9. Check height of commutator mica. a. Commutator mica too high. *Undercut mica.*
	10. Check field coil resistance. a. Shorted field coil. *Repair or replace yoke.*
	11. Check armature resistance. a. Shorted armature. *Repair or replace armature.*
	12. Check tension of brush springs. a. Weak brush spring tension. *Replace springs.*
	13. Check yoke assembly magnets. a. Weak magnets. *Replace yoke assembly.*
	14. Check if bushings are worn. a. Worn bushings. *Replace bushings.*

SYMPTOM	STARTER TURNS, BUT OVERRUNNING CLUTCH PINION DOES NOT MESH WITH RING GEAR.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check clutch pinion gear.** a. Worn clutch pinion gear. *Replace clutch.*
	2. Check clutch. a. Defective clutch. *Replace clutch.*
	3. Check movement of clutch on splines. a. Poor movement of clutch on splines. *Clean and correct.*
	4. Check clutch bushing. a. Worn clutch bushing. *Replace clutch.*
	5. Check starter bushings. a. Worn starter bushing(s). *Replace bushing(s).*
	6. Check ring gear. a. Worn ring gear. *Replace ring gear.*

SYMPTOM	ELECTRIC STARTER KEEPS TURNING WHEN ENGINE IS STARTED.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check clutch.** a. Jammed clutch pinion gear. *Replace or clean.*
	2. Check movement of clutch on splines. a. Clutch is stuck on splines. *Clean.*
	3. Check ignition switch. a. Ignition switch does not return to its ON position or is short-circuited. *Replace switch.*
	4. Check solenoid. a. Shorted solenoid switch winding(s). *Replace solenoid switch.*
	5. Check solenoid switch contacts. a. Melted solenoid switch contacts. *Replace solenoid switch.*
	6. Check starter switch. a. Starter switch returns poorly. *Replace ignition switch.*

SYMPTOM	NOISE OCCURENCE WHEN STARTING ENGINE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if ring gear is well mounted to drive pulley inner half.** a. Loose and/or broken bolts. *Retighten bolts using thread-locker or replace ring gear and drive pulley inner half.*

SYMPTOM	**ELECTRIC STARTER SOMETIMES DOES NOT WORK WHEN TURNING IGNITION SWITCH.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check battery cables and starter wires.** a. Corroded and/or loose connection(s). *Clean and/or retighten.*
	2. Check fuse. a. Oxidized fuse. *Clean.*
	3. Check wiring harness connections. a. Oxidized connections. *Clean or replace defective terminals.*
	4. Check ignition switch. a. Defective contacts in ignition switch. *Replace.*
	5. Check solenoid of electric starter. a. Shorted solenoid wiring harness or eroded contact washer. *Replace.*

SYMPTOM	**HEADLAMP NOT LIGHTING.**
CONDITION	WHITE BULB.
Test/Inspection	**1. Check bulb.** a. Gas leak. *Replace bulb.*
CONDITION	BROKEN ELEMENT.
Test/Inspection	**1. Check for loose headlamp housing and bulb socket.** a. Vibration problem. *Tighten headlamp mounting screws. Lock bulb in socket. Replace bulb.*
CONDITION	MELTED FILAMENT (ENDS OF ELEMENT HOLDER) AND BLACK BULB.
Test/Inspection	**1. Check voltage at headlamp at different speeds. It must not be above 15 Vac.** NOTE: If quartz halogen bulb is involved, ensure that proper voltage regulator is installed. a. Excessive voltage in lighting circuit. *Replace voltage regulator and ensure proper grounding. Retest.*

SYMPTOM	HEADLAMP DIMING.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check voltage at headlamp at different speeds. It must not be below 11 Vac.** a. Insufficient voltage in lighting circuit. *Replace voltage regulator and retest.*
	2. Visually inspect wiring harness for damaged and/or melted wires and/or bad wire terminal crimping and/or connections. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. *Repair/replace damaged wires and/or terminals. Reroute harness where necessary.*
	3. On manual start models: Verify regulator ground. a. Rusted or loose retaining screws. *Clean, apply lithium grease (LMZ1) and firmly tighten screws.*
	4. Verify if there is an interconnection between AC and DC current. a. Faulty installation of optional equipment. *Find optional equipment connected directly to DC ground (BK wire or chassis) or to any DC hot wire (RD, RD/BL). Disconnect and reconnect to AC current (YL and YL/BK wires).*
	5. Verify of optional electric accessories are overloading the magneto/generator. a. Excessive electrical load to magneto/generator. *Reduce the electrical load by removing excess accessories. Reconnect as recommended by manufacturer.*
	6. Hot Grips brand: Verify if they were connected in parallel by mistake. a. Excessive electrical load to magneto/generator. *Reconnect as recommended by manufacturer.*
	7. Bombardier heating grips: Verify if the return wires of the elements were grounded to the chassis by mistake. a. Faulty installation of optional equipment. *Reconnect as recommended by manufacturer.*
	8. Verify if heating grips installation overloads the magneto/generator capacity. a. Excessive electrical load to magneto/generator. *Reduce the electrical load by removing accessories.*

SYMPTOM	FALSE FUEL AND/OR TEMPERATURE GAUGE READINGS.
CONDITION	NORMAL USE.
Test/Inspection	**1. Verify if gauge was connected on DC current by mistake (in case of optional installation).** a. Faulty installation of optional equipment. *Find optional wires connected directly to DC ground (BK wire to chassis) or to any DC hot wire (RD, RD/BL). Disconnect and reconnect to AC current (YL and YL/BK wires).*
	2. Verify sender unit for free movement and/or correct arm position. a. Defective or damaged part. *Correct or replace sender unit.*
	3. Verify sender unit/gauge wiring harness condition. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. *Replace or repair damaged wires. Reroute where necessary.*

SYMPTOM	ENGINES DOES NOT START — NO SPARK AT SPARK PLUG.
CONDITION	AT ENGINE CRANKING.
Test/Inspection	**1. Verify spark plug condition.** a. Defective, improperly set, worn-out, fouled. *Identify source of problem and correct. Replace spark plug.*
	2. Verify spark plug cap resistance with an ohmmeter. a. Defective part. *Replace cap.*
	3. Verify if problem originated from electrical system wiring harness and/or accessories and/or ignition cut-out switches by unplugging the BLACK/YELLOW wire between the magneto/generator and the vehicle wiring harness. Check condition of connectors. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. Defective switch(es). Corroded connector terminals. *Replace or repair damaged wires. Reroute where necessary. Replace defective switch(es). Clean connectors and apply silicone dielectric grease.*
	4. Verify trigger coil resistance with an ohmmeter and connector condition. a. Defective coil. Corroded connector terminals. *Replace defective coil. Clean terminals and apply silicone dielectric grease.*
	5. Verify condition of ignition coil. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace ignition coil.*
	6. Verify condition of ignition generator coils. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace coils.*
	7. Verify CDI (Capacitor Discharge Ignition) module. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace CDI module, retest and verify ignition timing.*

SYMPTOM	**ENGINE STALLS.**
CONDITION	AT LOW SPEED.
Test/Inspection	**1. Verify items 4, 5 and 6 above.**

SYMPTOM	**IRREGULAR ENGINE SPEED.**
CONDITION	AT HIGH SPEED.
Test/Inspection	**1. Verify items 4, 5 and 6 above.**
CONDITION	AT LOW SPEED.
Test/Inspection	**1. Verify items 4 and 5 above and trigger coil/flywheel protrusion air-gap.** a. Air-gap too large. *Readjust air-gap.*

SYMPTOM	**ENGINE IS MISFIRING — ERRATIC SPARK AT SPARK PLUG.**
CONDITION	RIDING ON WET SNOW.
Test/Inspection	**1. Verify if spark plug wires and/or spark plug cap seals are sealing-out moisture.** a. Defective wires and/or seals. *Replace defective part.*
	2. Verify if ignition system wiring harness connectors are in good condition and/or are sealing-out moisture. a. Loose connectors, corroded terminals or defective parts. *Clean terminals and apply silicone dielectric grease. Replace defective parts.*
CONDITION	NORMAL USE.
Test/Inspection	**1. Verify misfiring by observing flash of stroboscopic timing light; unplug connectors between magneto/generator and vehicle wiring harness to isolate problem. Check condition of connectors.** a. Defective spark plug and/or cables/caps. Defective electrical system wiring harness and/or accessories and/ignition cut-out switches. Condition of connector terminals. *Replace defective parts and/or repair damaged wires. Replace defective switch(es). Clean terminals and apply silicone dielectric grease.*
CONDITION	RIDING IN DEEP AND THICK SNOW.
Test/Inspection	**1. Perform all verifications outlined under "Engine does not start — no spark at spark plug".**
	2. Verify spark plug(s). Proceed with spark plug analysis in order to identify source of problem. a. Defective and/or worn spark plug(s) and/or cable(s) and/or cap(s). *Replace defective part(s). Proceed with ignition system testing procedures. Perform engine analysis.*

SYMPTOM	**FOULED (BLACK) SPARK PLUG TIP.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check carburetor(s).** a. Carburetion is too rich. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Check injection oil consumption. a. Injection pump flow is too high. *Adjust according to specification or replace.*
	3. Check oil quality. a. Poor oil quality that creates deposits. *Use Bombardier oil.*
	4. Check engine compression. a. Leaking piston ring(s). *Replace.*

SYMPTOM	**SPARK PLUG TIP(S) IS (ARE) LIGHT GREY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Refer to "Engine slows down or stops at high RPM" and check items listed.**
	2. Check spark plug heat range. a. Spark plug heat range is too high. *Replace by Bombardier's recommended spark plug (refer to TECHNICAL DATA 10).*
	3. Check if air intake silencer leaks. a. Air surplus coming from opening(s) located between halves. *Seal.*
	4. Check carburetor adapter collars. a. Loose collar(s). *Tighten.*
	5. Check carburetor adapter(s). a. Cracked or deformed adapter(s). *Replace.*

SYMPTOM	**BRAKE LIGHT REMAINS ON.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if bulb is properly installed.** a. Bulb is not installed correctly (contact elements are reversed). *Install bulb correctly.*
	2. Check brake switch. a. Switch contact remains closed. *Adjust brake cable or brake switch.*

SYMPTOM	REAR LIGHT BULB FLASHES.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check bulb tightness in housing.** a. Looseness at bulb contact elements. *Install bulb correctly.*
	2. Check if rear light is properly connected. a. Connector housing is partially connected. *Install connector housing properly.*
	3. Check continuity of wires. a. Corroded terminals and/or broken wires. *Replace terminal(s) or crimp defective wires.*

SYMPTOM	TACHOMETER DOES NOT WORK.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuse.** a. Burnt fuse. *Replace.*
	2. Check continuity of wires. a. Corroded terminals and/or broken wires. *Replace terminal(s) or crimp defective wires.*

SYMPTOM	HIGH BEAM PILOT LAMP LIGHTS UP WHEN LOW BEAM IS SELECTED.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check proper connections.** a. Yellow wire connected to pilot lamp. Mixed-up connections with heating element pilot lamps. *Reconnect a YELLOW/BLACK wire to pilot lamp. YELLOW wires are connected to heating element pilot lamps.*

SUSPENSION AND TRACK

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**REAR SUSPENSION BOTTOMS OUT.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check rear spring preload or rear arm spring preload.** a. Spring tension is too low. *Increase rear arm spring preload.*

SYMPTOM	**SLIDER SHOES WEAR OUT PREMATURELY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Pressure is too great on slider shoes. *Adjust according to specifications (refer to TECHNICAL DATA 10).* *Replace defective parts.*

SYMPTOM	**TRACK CLEATS BECOME BLUE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Pressure is too great on cleats. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Check slider shoes and/or suspension retaining screws. a. Worn slider shoes or lost retaining screws. *Replace defective parts and/or tighten loose screws.*

SYMPTOM	NOISE OR VIBRATIONS ORIGINATING FROM THE TRACK.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check slide suspension retaining bolts.** a. Missing bolt(s) allowing movement of certain components which in turn interfere with track rotation. *Replace missing bolt(s).*
	2. Check condition of idler wheel(s). a. Idle wheel rubber is damaged. *Replace.*
	3. Check guide cleats. a. Top portion of guide cleat(s) is bent. *Replace.*
	4. Check sprockets. a. One or various teeth of drive shaft sprockets are broken. *Replace sprocket(s).*
	5. Check track rods and/or internal traction teeth. a. One or various track rods and/or teeth are broken. *Replace track.*

SYMPTOM	DERAILING TRACK.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Track is too loose. *Adjust.*
	2. Check if track and slider shoes are properly aligned. a. Improper alignment. *Adjust.*

SYMPTOM	REAR SUSPENSION IS LOW OR TOO STIFF.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Track is too tight. *Adjust.*
	2. Check if axles are properly lubricated. a. Improper lubrication and/or contaminated grease (sticky oil sludge). *Clean and/or lubricate.*
	3. Check rear spring preload. a. Insufficient preload. *Increase preload using shock adjustment cams.*

SYMPTOM	**WHEN HANDLEBAR IS TURNED, SNOWMOBILE UNDERSTEERS.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ski runner condition.** a. Worn ski runners. *Replace.*
	2. Check tension of front spring adjustment cams. a. Insufficient ski pressure on the ground. *Increase spring preload.*
	3. Check if front arm stopper strap is too long. a. Insufficient ski pressure on the ground. *Shorten stopper strap.*
	4. Check front arm spring tension. a. Insufficient ski pressure on the ground. *Reduce spring preload.*

SYMPTOM	**HANDLE BAR IS DIFFICULT TO TURN.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check position of front spring adjustment cams.** a. More pressure on the ground when cam increases spring preload. *Reduce front spring preload.*
	2. Check position of stopper strap. a. More weight when stopper strap is short. *Lengthen front arm stopper strap.*
	3. Check position of front arm shock adjustment cam(s). a. When spring tension is weak, more weight is transferred to the skis. *Increase spring preload.*
	4. Check condition of ball joints. a. Corrosion restrains movement. *Lubricate or replace.*
	5. Check straigthness of suspension components. a. Bent component(s). *Replace as required.*

SYMPTOM	THE SNOWMOBILE IS UNSTABLE (IT MOVES FROM LEFT TO RIGHT AND VICE VERSA).
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ski runner condition.** a. Worn or bent ski runners. *Replace ski runners.*
	2. Check ski alignment. a. Improper ski alignment. *Align skis in order to obtain proper toe-out (opening) (to adjust, refer to STEERING SYSTEM 08).*
	3. Check if bushings are too loose in steering system. a. Bushings are too loose. *Replace.*

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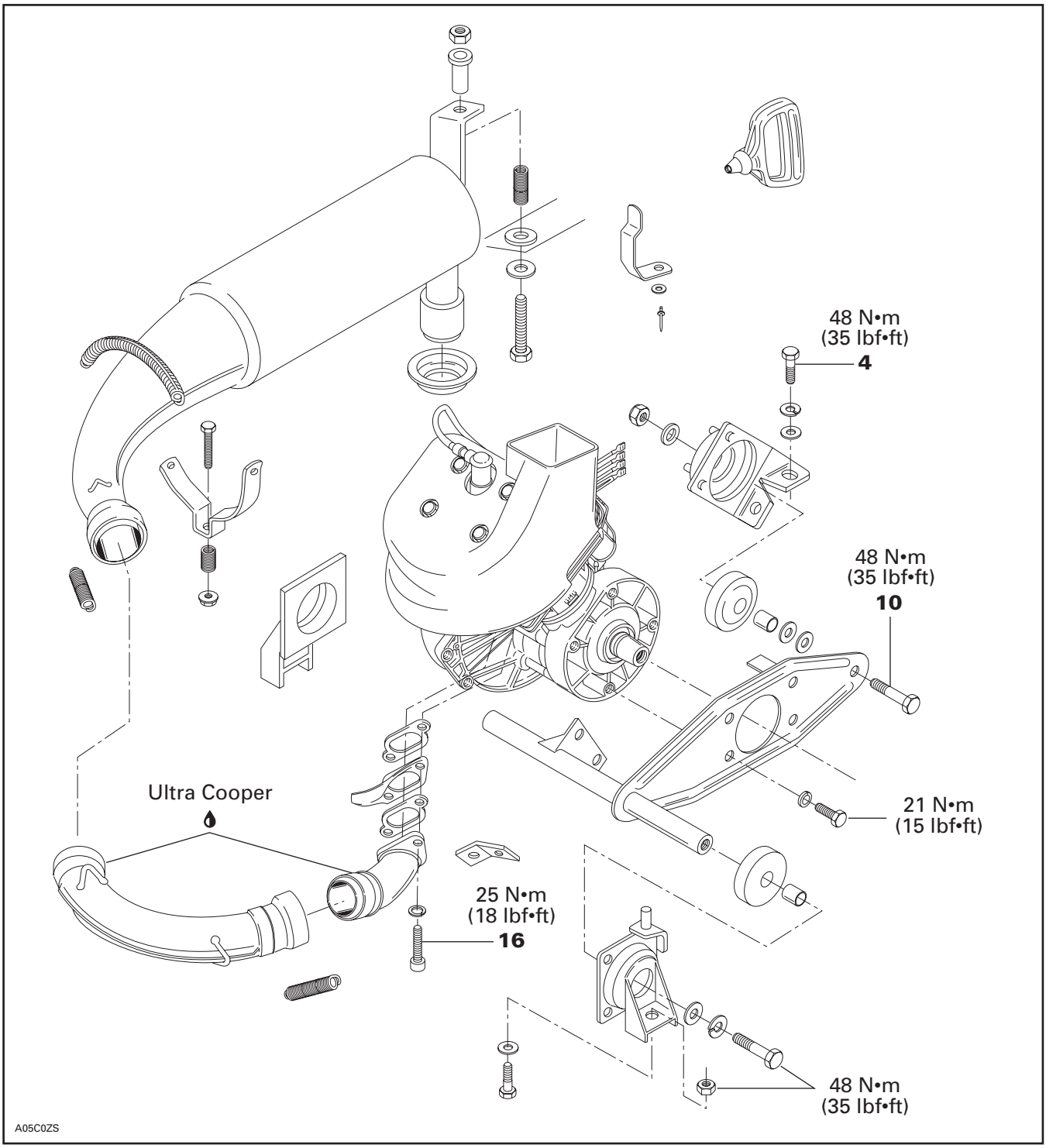
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277 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION



PARTS

REMOVAL FROM VEHICLE

Remove or disconnect the following then lift engine from vehicle:

– belt guard
– drive belt
– muffler
– carburetor
– oil injection pump cable
– oil injection inlet line
– impulse line
– electrical connectors
– hood retaining cable
– engine mount nuts

ENGINE SUPPORT AND MUFFLER DISASSEMBLY AND ASSEMBLY

Torque the manifold screws **no. 16** to 25 N•m (18 lbf•ft).

Torque the engine support screws **nos. 4** and **10** to 48 N•m (35 lbf•ft).

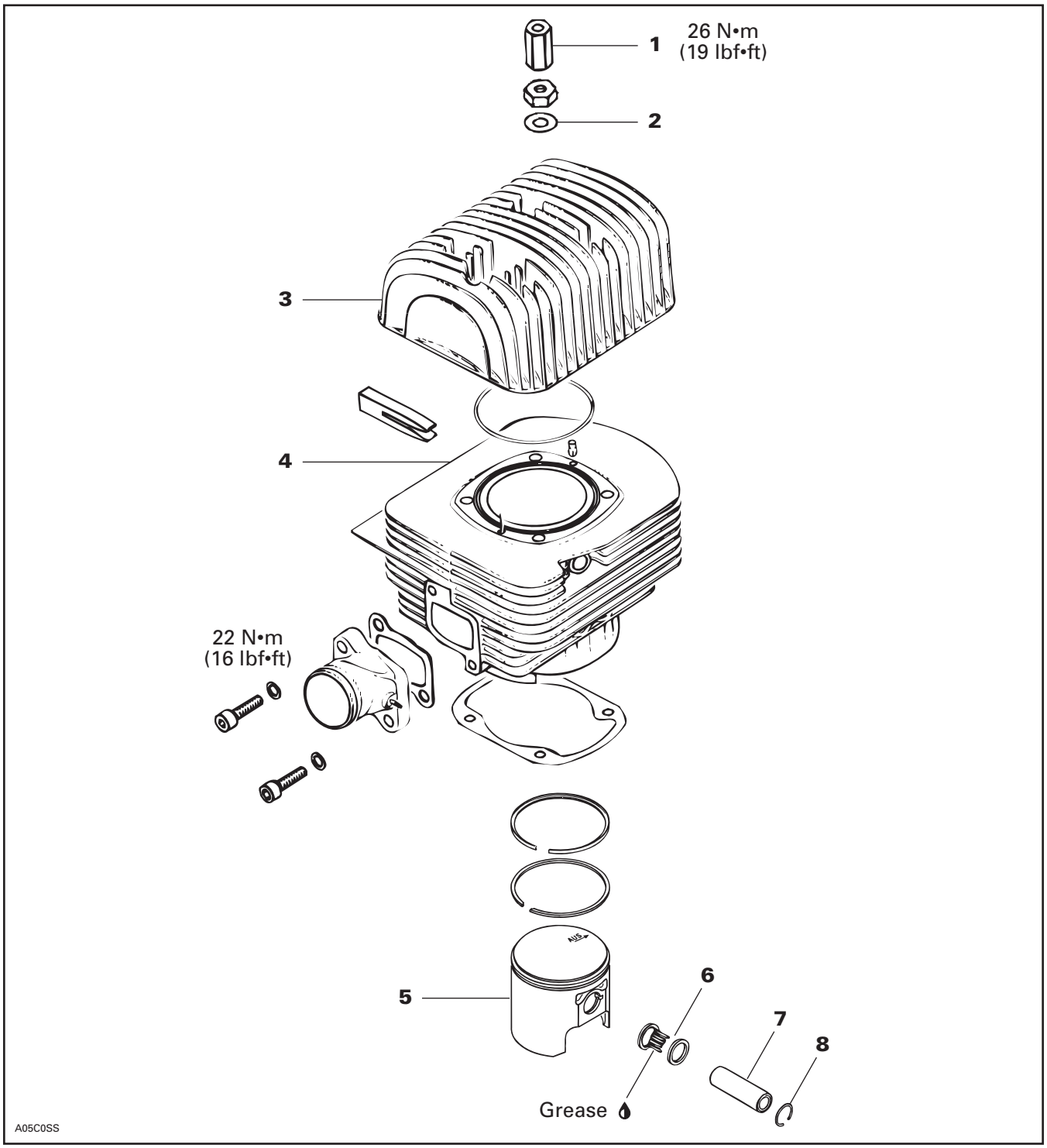
Torque the engine mount screws to 21 N•m (15 lbf•ft).

INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention to the following:

– Check tightness of engine mount nuts, and drive pulley screw.
– After throttle cable installation, check maximum throttle slide opening.
– Check pulley alignment and drive belt tension.
– Should a light exhaust leak is experienced at muffler ball joint, Ultra Cooper (P/N 413 710 300) can be used.

TOP END



PARTS

TROUBLESHOOTING

Before completely disassemble engine, check airtightness. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT 04-04.

NOTE: The following procedures can be done without removing the engine from chassis.

TOP END REMOVAL (without removing engine from chassis)

Remove the following then lift cylinder head **no. 3** and cylinder **no. 4**:

- belt guard
- carburetor
- exhaust system
- spark plug
- oil injection inlet
- fan cowl and hood cable
- cylinder head nuts **no. 1** and washers **no. 2**

CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

NOTE: The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

DISASSEMBLY

5, Piston

On this engine, piston pin needle bearing **no. 6** is mounted without a cage.

Use piston pin puller (P/N 529 035 503) along with 18 mm sleeve kit (P/N 529 035 541) and locating sleeve (P/N 529 023 800).

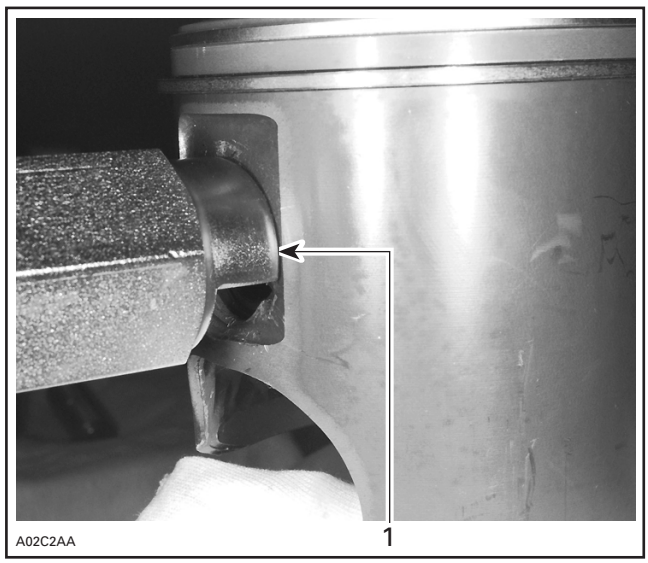
NOTE: The locating sleeve is the same that contains new cageless bearing.

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase to prevent circlips **no. 8** from falling into crankcase. Then with a pointed tool inserted in piston notch, remove both circlips from piston **no. 5**.



TYPICAL

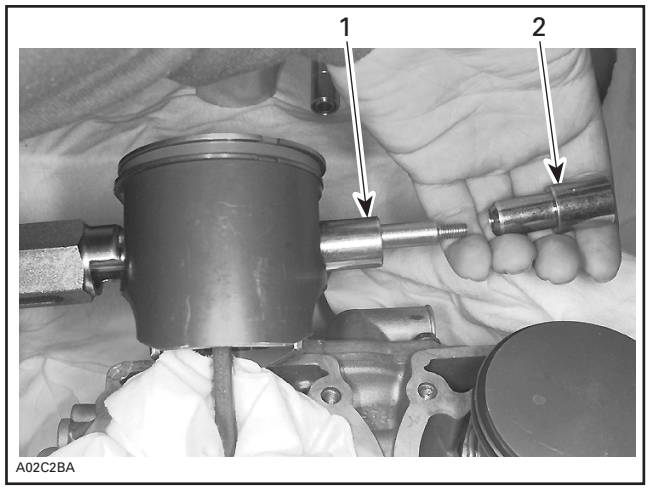
Insert piston pin puller (P/N 529 035 503) making sure it sits squarely against piston.



TYPICAL

1. Properly seated all around

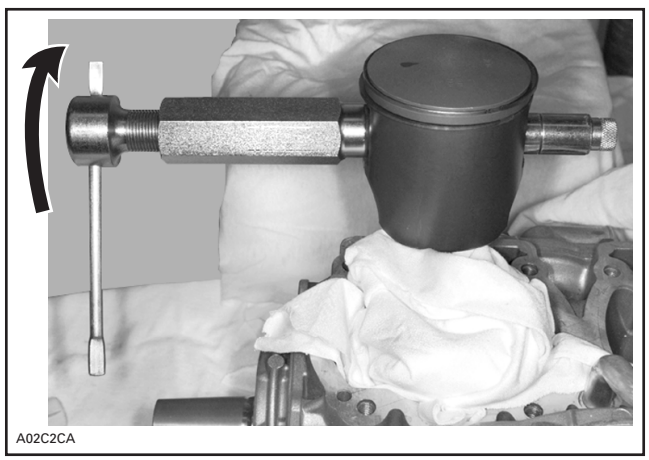
Install sleeve then shouldered sleeve over puller rod.



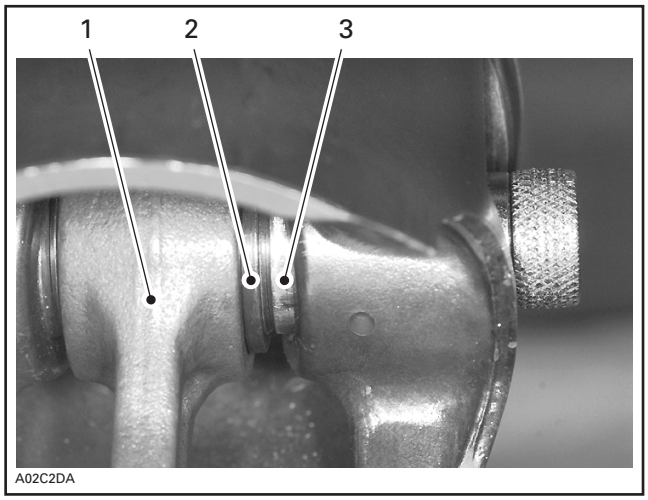
TYPICAL — INSTALLATION OF SLEEVE KIT

1. *Sleeve*
2. *Shouldered sleeve*

Pull out piston pin no. 7 by unscrewing puller until shouldered sleeve end is flush with thrust washer of piston pin bearing.



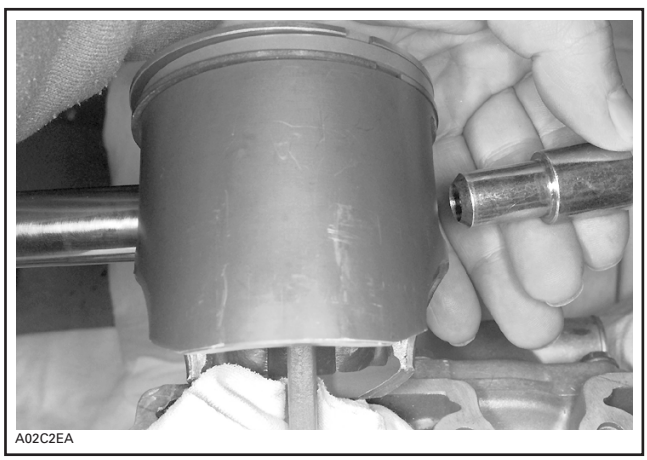
TYPICAL — PISTON PIN EXTRACTION



TYPICAL

1. *Sleeve inside bearing*
2. *Thrust washer*
3. *Shouldered sleeve end*

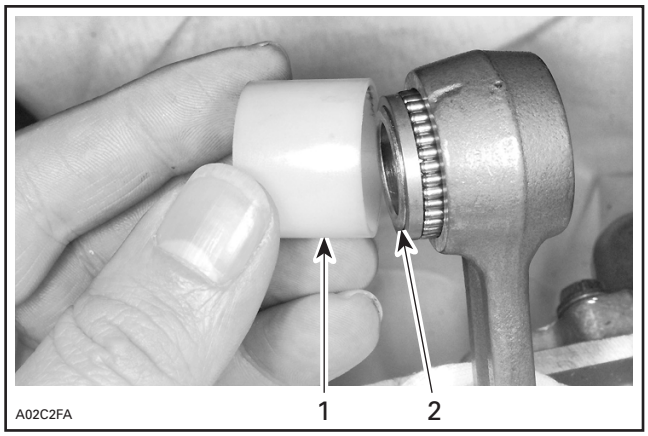
Remove puller. Pull out shouldered sleeve carefully.



TYPICAL

Remove piston from connecting rod.

Install locating sleeve. Then push needle bearings along with thrust washers and sleeve.



TYPICAL

1. *Locating sleeve*
2. *Sleeve*

NOTE: 0.25 and 0.5 mm oversize pistons and rings are available if necessary.

Use a locking tie to fasten all needles and thrust washers along with locating sleeve.

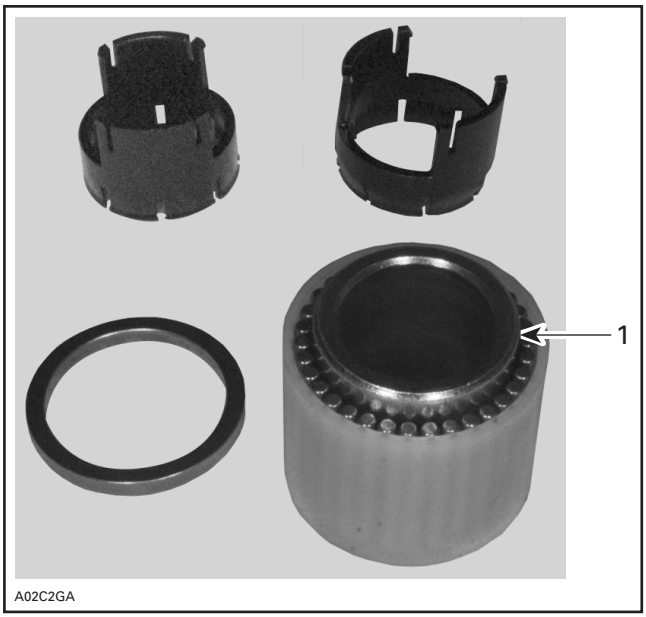
INSPECTION

Refer to LEAK TEST AND ENGINE DIMENSIONS MEASUREMENT 04-04.

ASSEMBLY

When reinstalling original needle bearings, make sure that 31 needles are inserted between sleeve and locating sleeve.

When installing a new cageless bearing, replace half plastic cages by sleeve.



TYPICAL

1. *Sleeve*

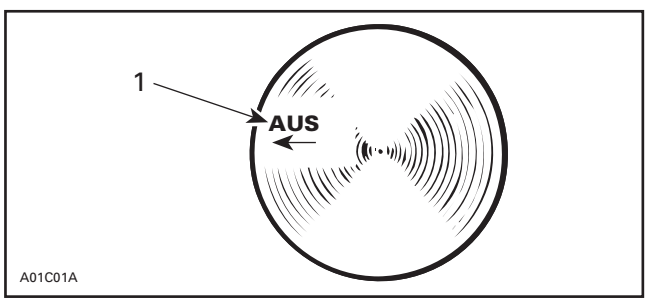
Grease thrust washers and install them on each end of needles.

Insert cageless bearing into connecting rod.



TYPICAL — CAGELESS BEARING AND SLEEVE INSTALLED

Mount piston over connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in the direction of exhaust port.



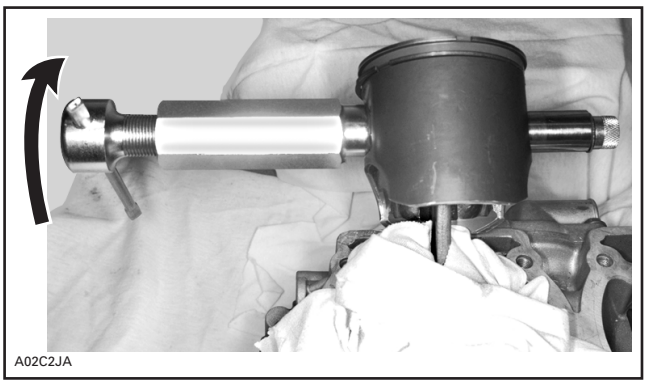
1. *Exhaust*

Install shouldered sleeve.



TYPICAL — SHOULDERED SLEEVE INSTALLATION

Install piston pin puller and turn handle until piston pin is correctly positioned in piston.

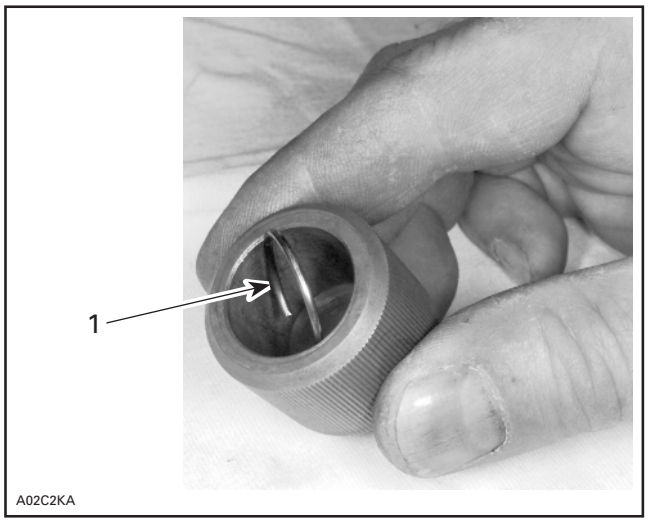


TYPICAL

Remove piston pin puller and sleeve kit.

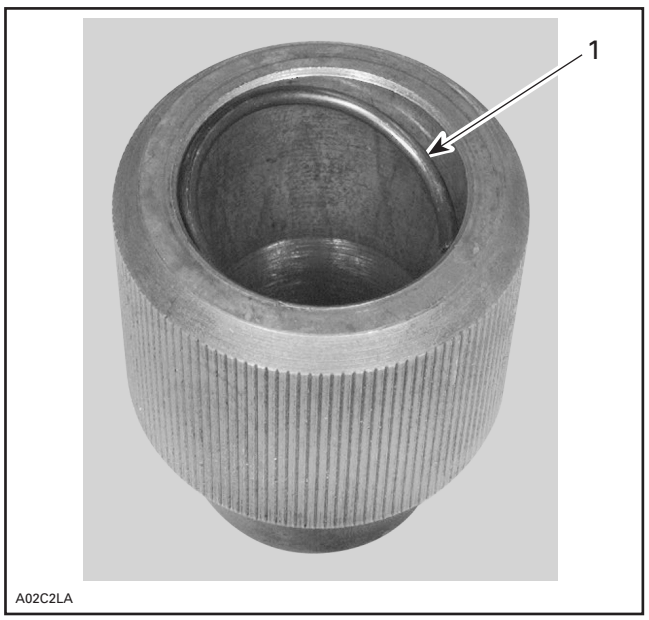
To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 035 561).

Insert circlip in tool at an angle.



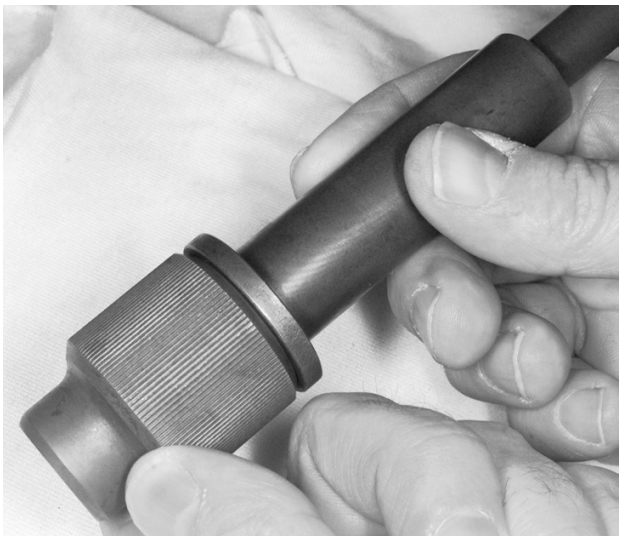
1. Circlip

Square it up using a finger.

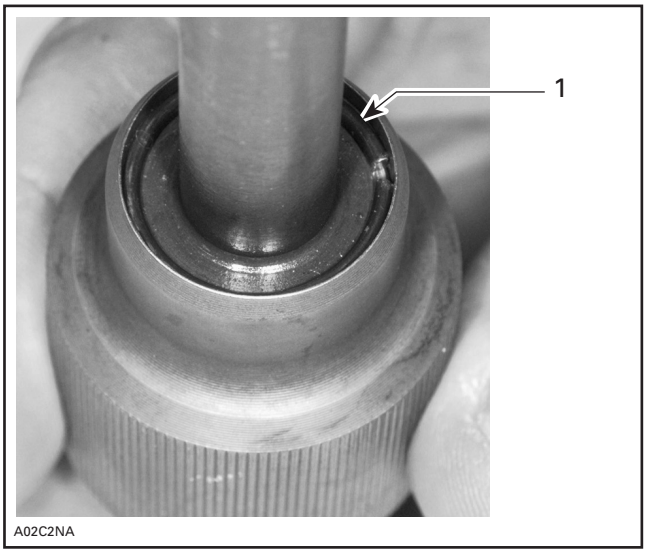


1. Circlip

Continue to square it up using round end of circlip installer.


A02C2MA

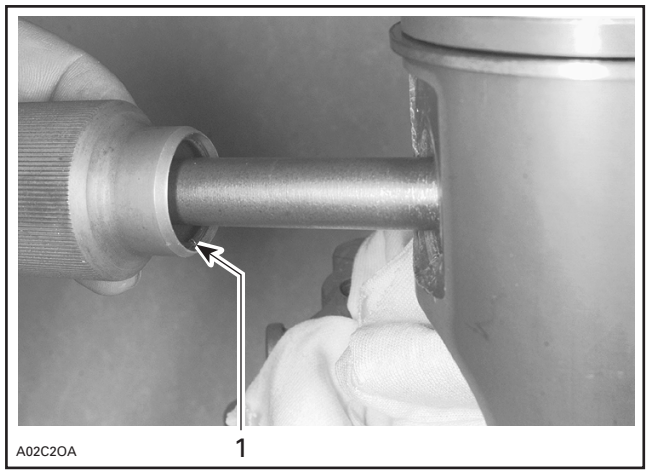
Using square end of tool, push circlip in until it rests in groove.



A02C2NA

1. Circlip in groove

Mount tool in piston making sure that circlip break is facing down.



A02C2OA

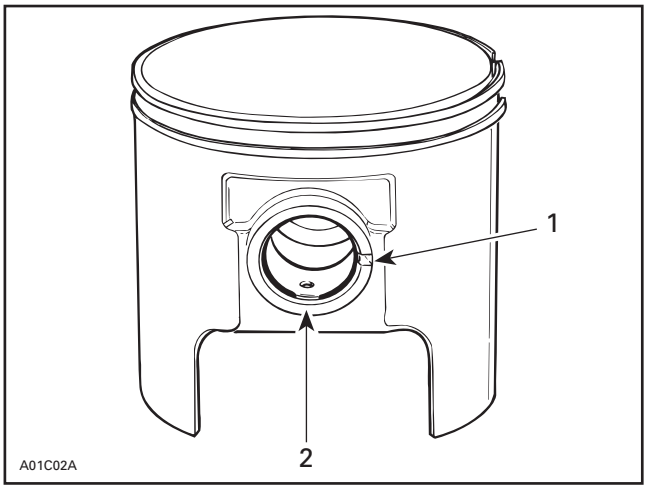
TYPICAL

1. Circlip break facing down

Hold tool firmly against piston then strike on round end of tool. Circlip will move from tool groove to piston groove.


A02C2PA

TYPICAL



1. Piston notch
2. Circlip break

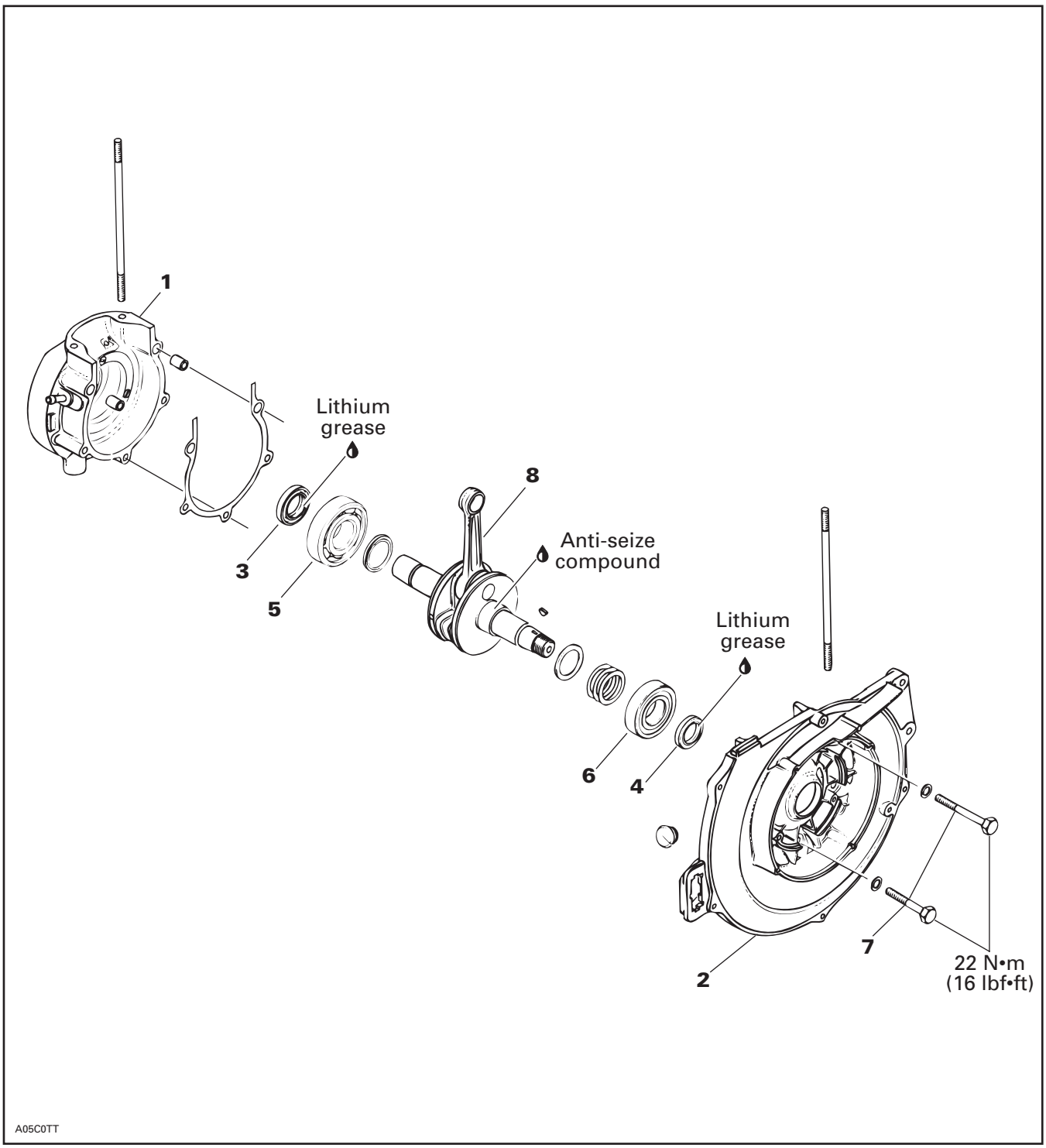
▼ CAUTION

Circlips must not move freely in the groove after installation. If so, replace them.

Before inserting piston in the cylinder, lubricate the cylinder with new injection oil or equivalent.

Position cylinder head on cylinder with fins in line with crankshaft center line. Cross torque retaining nuts to 26 N•m (19 lbf•ft).

BOTTOM END


1
Lithium grease
3
5
8
Anti-seize compound
Lithium grease
6
4
7
2
22 N•m (16 lbf•ft)
A05C0TT

NOTE: Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all oil seals and gaskets.

Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

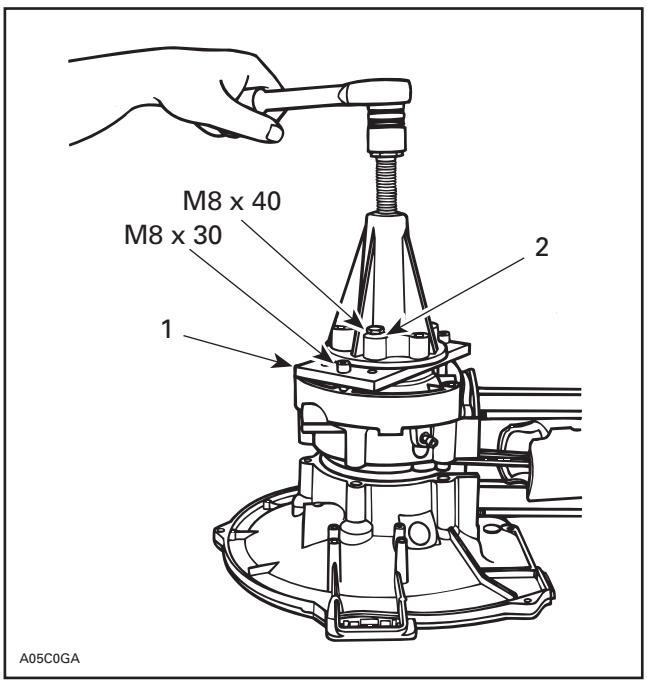
General

To remove drive pulley, refer to DRIVE PULLEY 05-03.

To remove magneto, refer to MAGNETO 04-05.

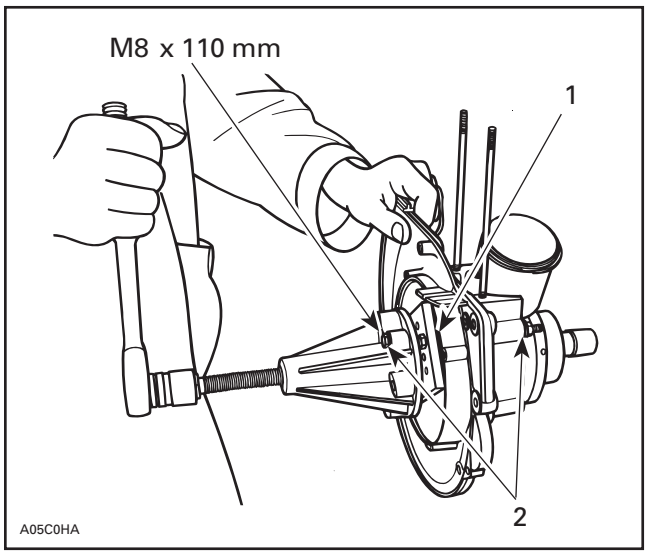
2,6, Crankcase Half

Heat to 110-120°C (230-248°F) all around bearing seat on PTO side. Install puller (P/N 420 876 298) to plate (P/N 529 024 900) with washer under screw heads and extract PTO side crankcase half no. 1.



1. Plate
2. Flat washer

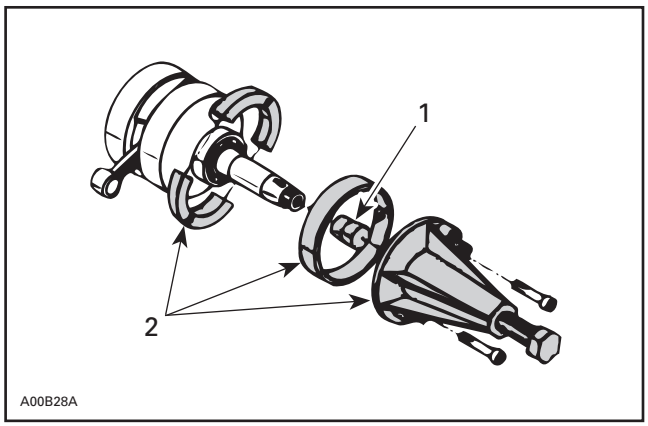
Heat to 110-120°C (230-248°F) all around bearing seat on MAG side. Install puller with plate, long bolts M8 x 110 mm and flat washers. Extract MAG side crankcase half no. 2.



1. Plate
2. Flat washers

To remove seals nos. 3 and 4, push from outside the crankcase towards the inside.

To remove bearings nos. 5 and 6 from crankshaft use a protective cap and special puller as illustrated.



1. Protective cap
2. Special puller

INSPECTION

Refer to ENGINE DIMENSIONS MEASUREMENT 04-04.

ASSEMBLY

Install connecting rod with its lubrication slot on big end facing exhaust side.

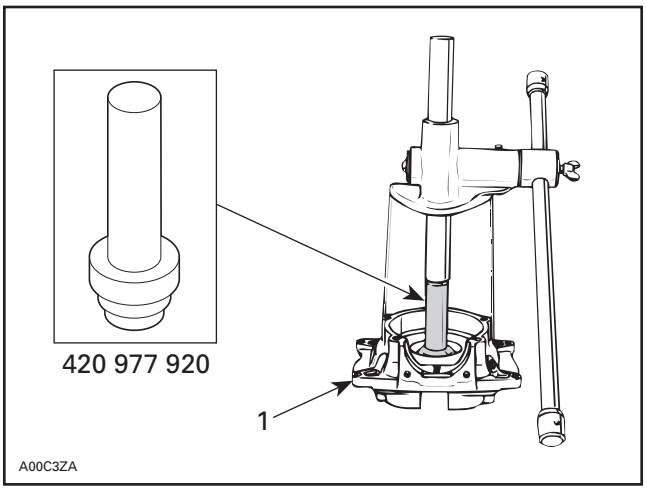
Smear anti-seize lubricant (P/N 413 701 000) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container and heat the oil to 75°C (167°F) for 5 to 10 min. This will expand bearings and ease installation.

Install bearings with groove outward.

NOTE: Crankshaft end play requires adjustment only when crankshaft and/or crankcase is replaced. Prior to magneto side bearing installation, determine crankshaft end play and install required shim(s) on crankshaft extension. For the crankshaft end play adjustment procedure, refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT 04-04.

To install new seal **nos. 3** and **4** into crankcase use oil seal pusher (P/N 420 977 920).



1. Crankcase half

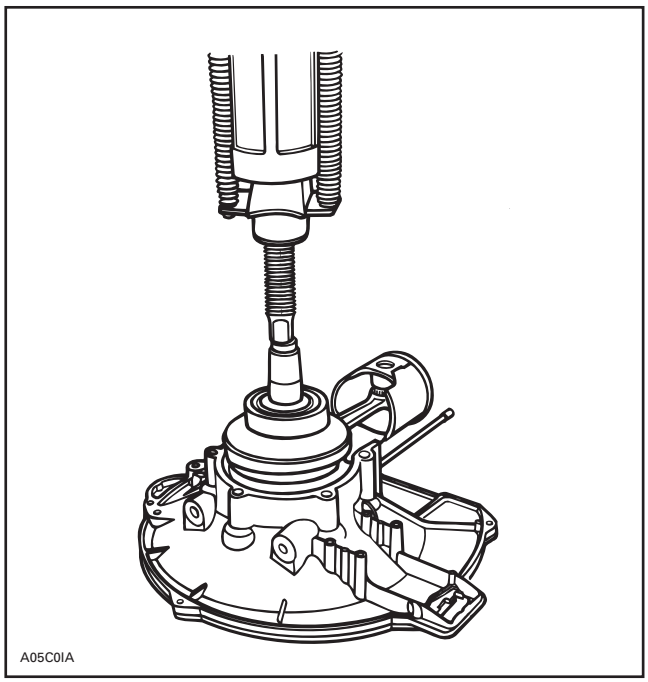
Prior to crankcase adjoining, install a protector sleeve on each crankshaft extension to prevent oil seal damage. Apply a light coat of lithium grease on seal lip. Spray some new injection oil on all moving parts of the crankshaft.

Install crankshaft seals with pusher (P/N 420 277 875) for MAG side seal **no. 4** and (P/N 420 876 660) for PTO side seal **no. 3**.

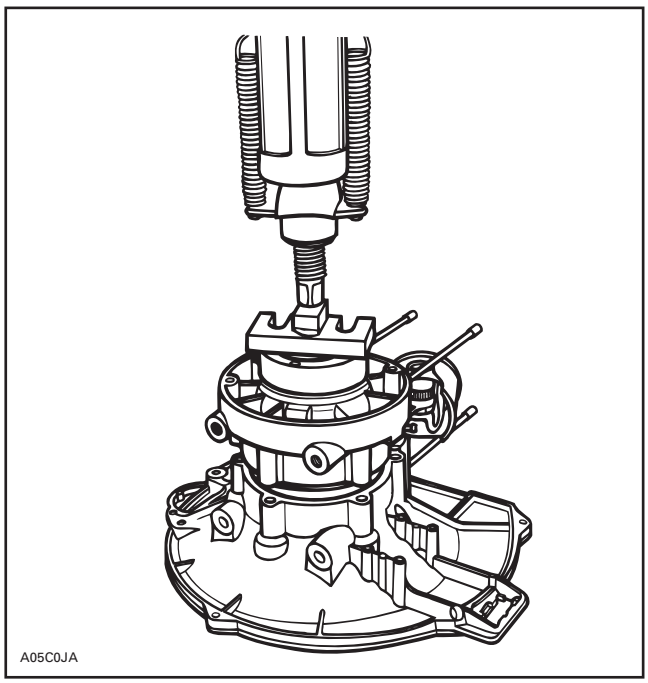
▼ CAUTION

To ensure appropriate crankshaft bearing lubrication, seal outer surface must be pressed on seal crankcase shoulder.

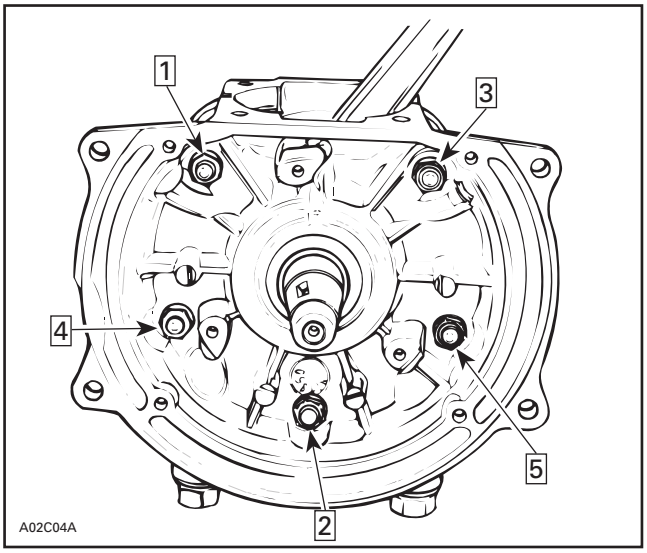
Using a press, install crankshaft into MAG side crankcase half.



Press down PTO side crankcase half onto crankshaft using appropriate spacer(s).



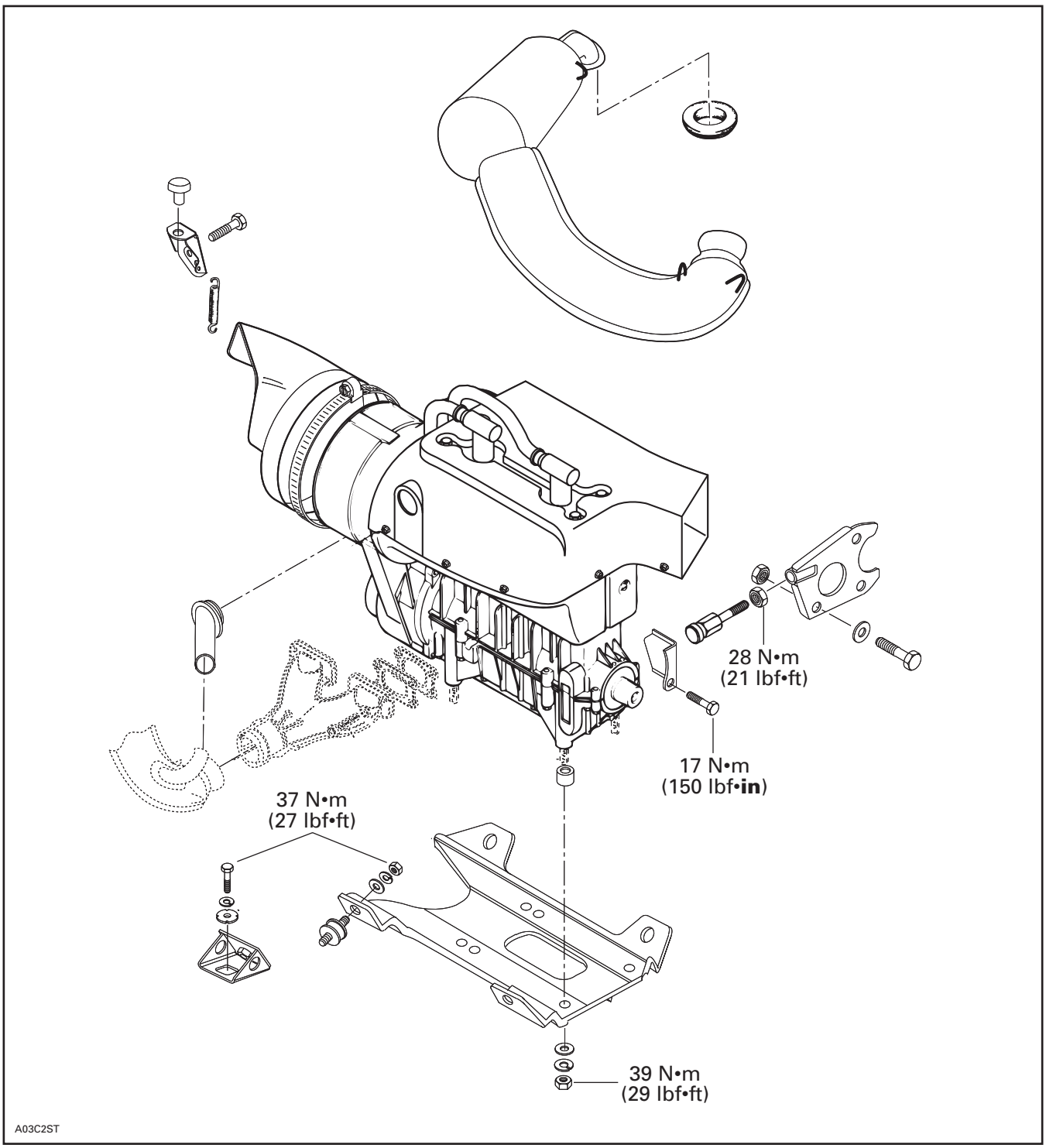
Torque the screws **no. 7** to 22 N•m (16 lbf•ft) following illustrated sequence.



377, 443 AND 503 ENGINE TYPES

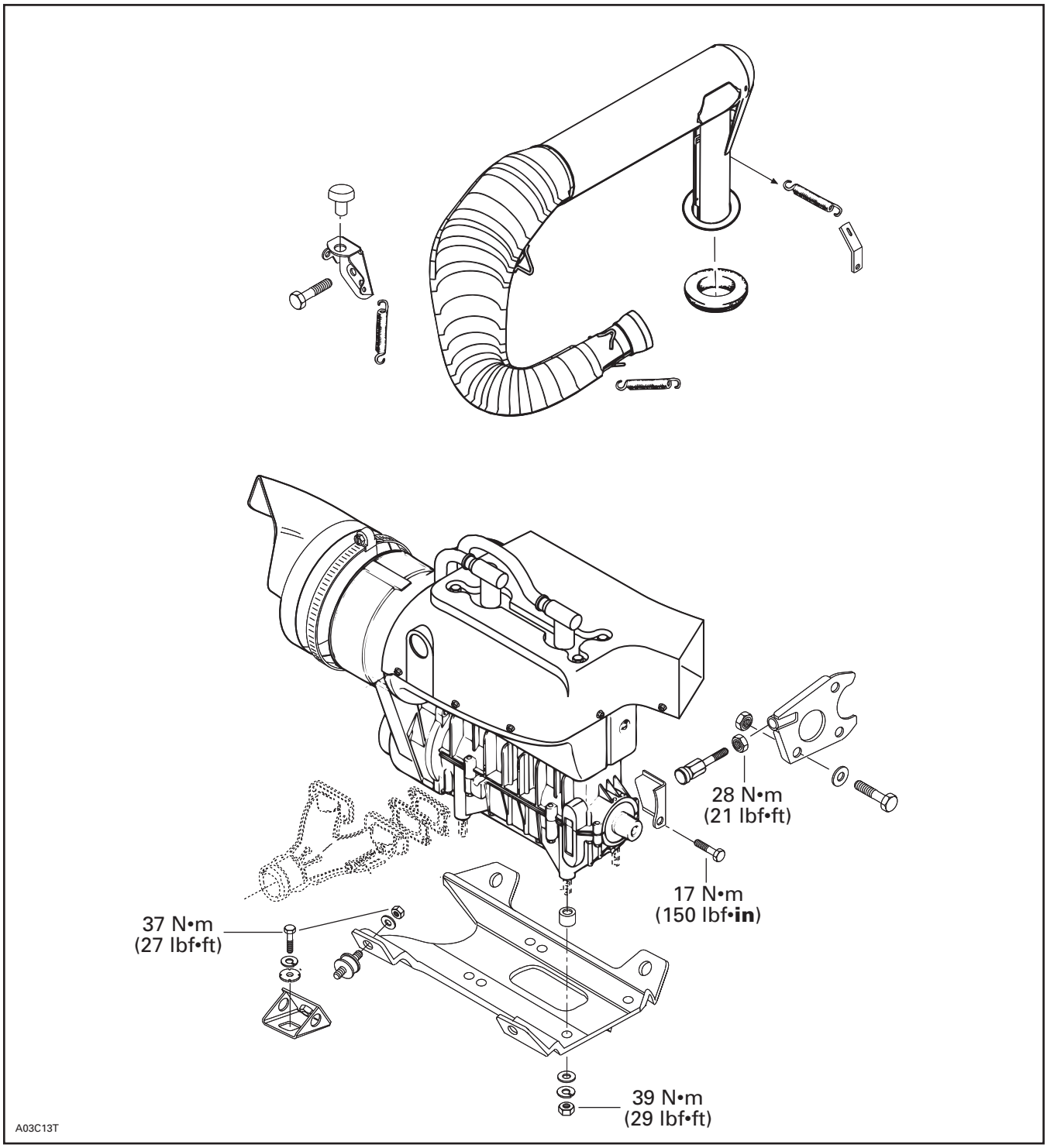
ENGINE REMOVAL AND INSTALLATION

377 and 443 Engine Types



PARTS

503 Engine Type



PARTS

ENGINE REMOVAL AND INSTALLATION

Disconnect or remove the following:

◆ WARNING

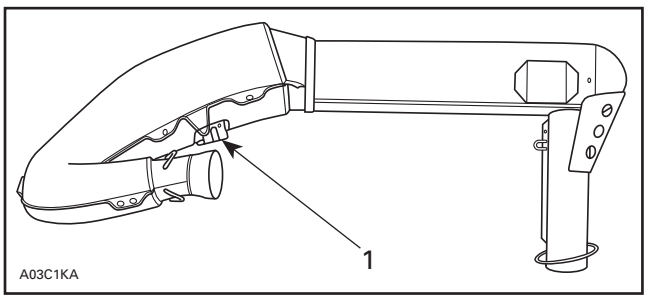
Before disconnecting any electrical wire in starter system always first disconnect the BLACK negative battery cable (on electric starting models).

- negative cable from battery (on electric starting models)
- belt guard
- drive belt
- drive pulley using appropriate puller, refer to 05-03 DRIVE PULLEY
- air silencer and carburetors
- impulse line from engine crankcase
- 4-connector housing
- exhaust pipe and exhaust cooling hose on so equipped models
- oil pump inlet line and plug it
- oil pump cable

TUNED PIPE IDENTIFICATION

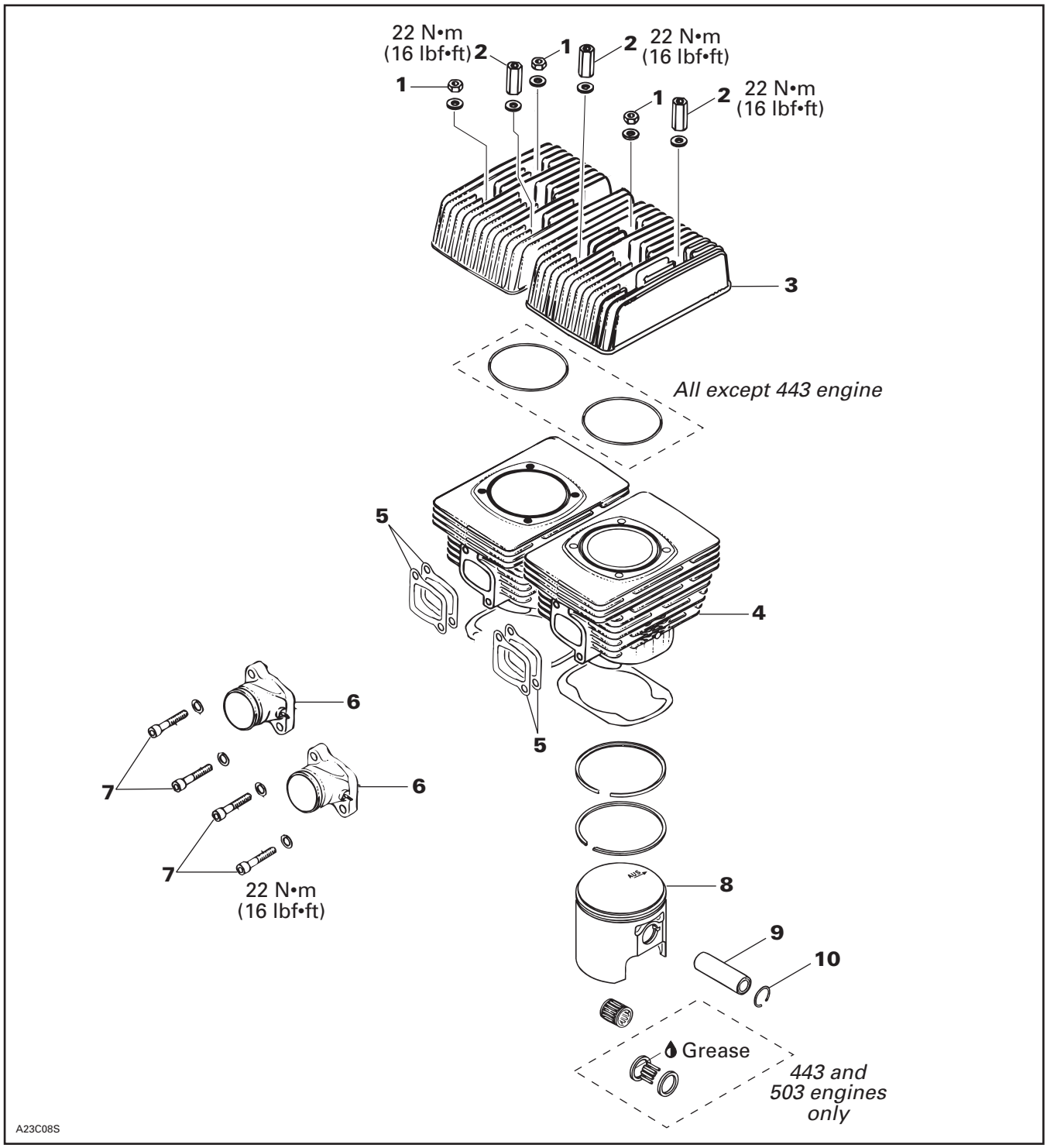
This part is identified on welded support.

Second number sequence of P/N is stamped on part.



1. Identification: 0467 for 514 046 700

TOP END



PARTS

NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

Discard all gaskets. Use Gasket Remover (P/N 413 708 500) to clean mating surfaces.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

NOTE: The letters "AUS" and arrow on the piston dome must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

DISASSEMBLY

Remove top fan cowl, intake sockets and lower fan cowl.

Remove cylinder heads.

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase to prevent circlips **no. 10** from falling into crankcase. Then with a pointed tool inserted in piston notch, remove both circlips from piston **no. 8**.



TYPICAL

377 Engine

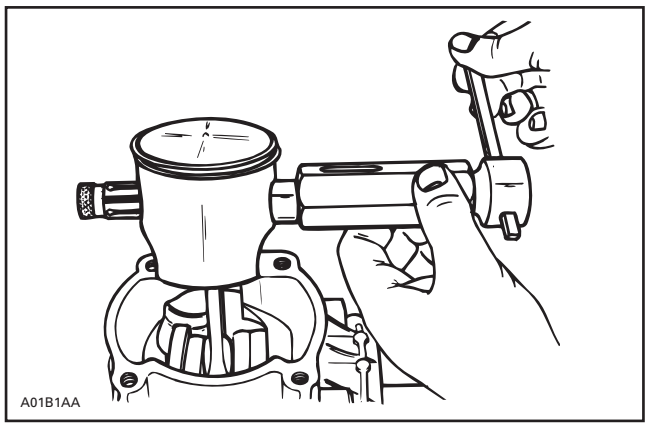
To remove piston pin **no. 9**, use piston pin puller (P/N 529 035 503).

Fully screw puller handle.

Insert puller end into piston pin.

Screw (LH threads) extracting nut.

Hold puller firmly and rotate puller handle counterclockwise to pull piston pin.



TYPICAL

NOTE: The PTO cylinder or fan housing have to be removed to give access to MAG piston pin with the puller.

443 and 503 Engines

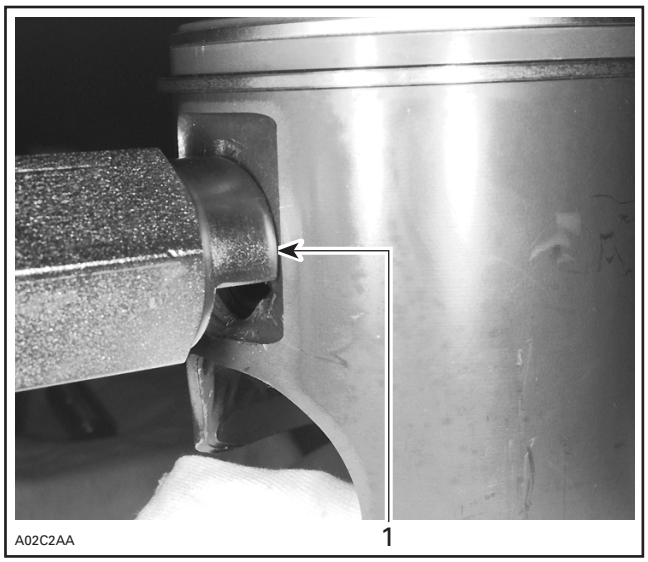
On these engines, piston pin needle bearing is mounted without a cage.

Use piston pin puller (P/N 529 035 503) along with 18 mm sleeve kit (P/N 529 035 541) and locating sleeve (P/N 529 023 800).

NOTE: The locating sleeve is the same that contains new cageless bearing.

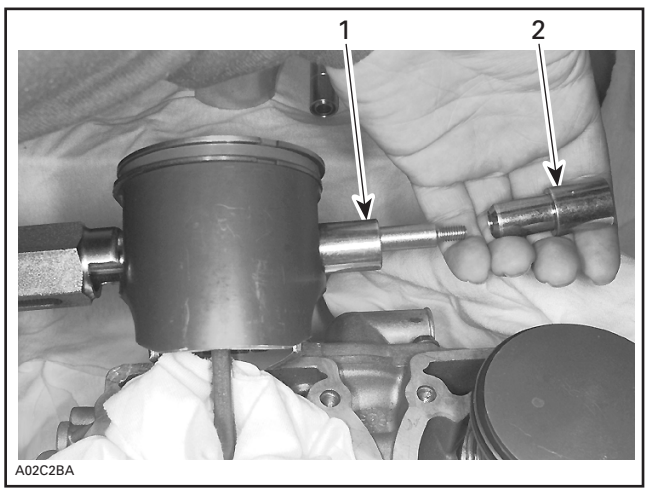
Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase to prevent circlips **no. 10** from falling into crankcase. Then with a pointed tool inserted in piston notch, remove both circlips from piston **no. 8**.

Insert piston pin puller (P/N 529 035 503) making sure it sits squarely against piston.



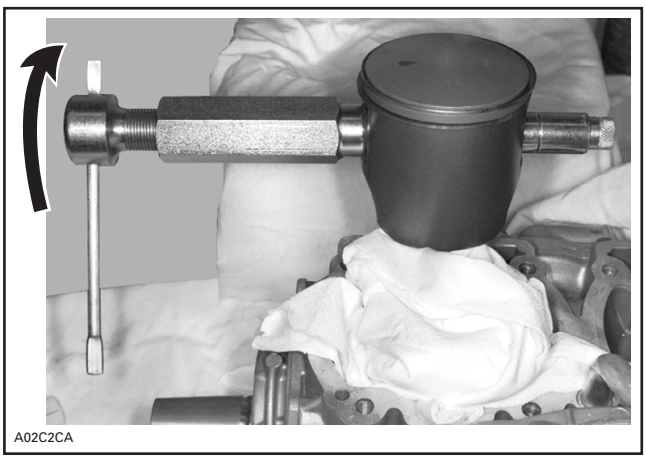
TYPICAL
1. *Properly seated all around*

Install sleeve then shouldered sleeve over puller rod.

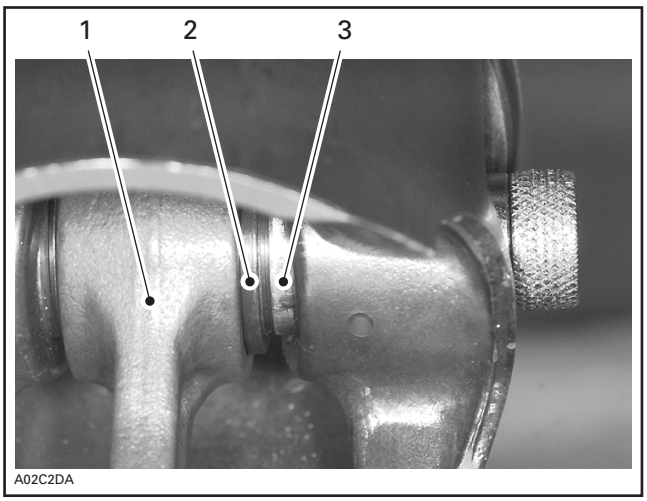


TYPICAL — INSTALLATION OF SLEEVE KIT
1. *Sleeve*
2. *Shouldered sleeve*

Pull out piston pin no. 10 by unscrewing puller until shouldered sleeve end is flush with thrust washer of piston pin bearing.

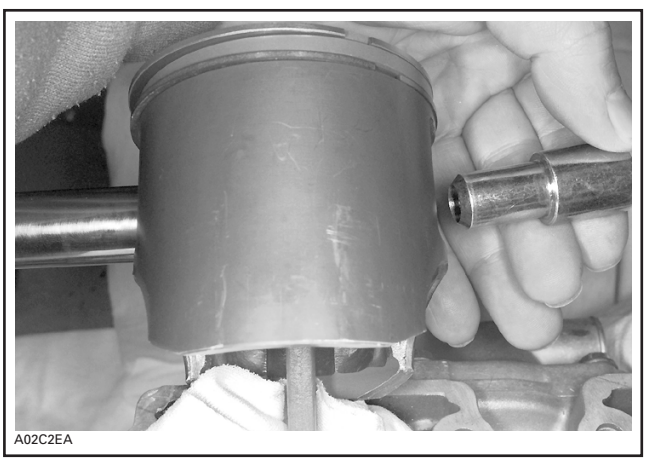


TYPICAL — PISTON PIN EXTRACTION



TYPICAL
1. *Sleeve inside bearing*
2. *Thrust washer*
3. *Shouldered sleeve end*

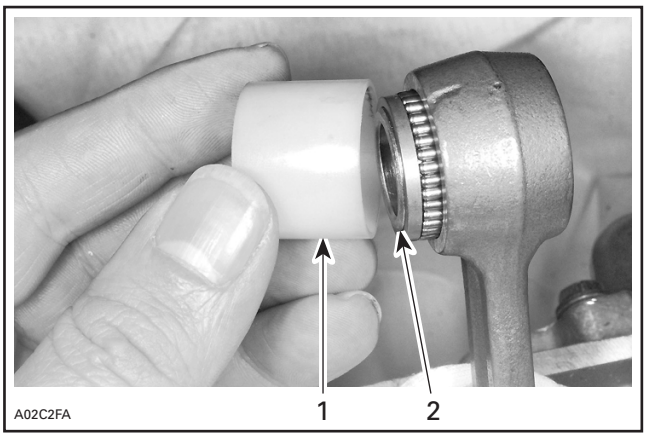
Remove puller. Pull out shouldered sleeve carefully.



TYPICAL

Remove piston from connecting rod.

Install locating sleeve. Then push needle bearings along with thrust washers and sleeve.



TYPICAL

1. *Locating sleeve*
2. *Sleeve*

NOTE: 0.25 and 0.5 mm oversized piston and rings are available if necessary.

Use a locking tie to fasten all needles and thrust washers along with locating sleeve.

INSPECTION

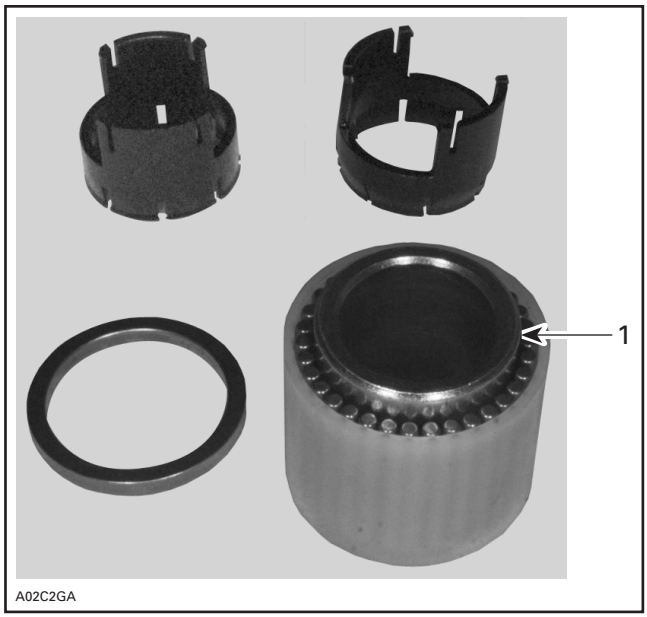
Refer to ENGINE DIMENSIONS MEASUREMENT 04-04.

ASSEMBLY

443 and 503 Engines

When reinstalling original needle bearings, make sure that 31 needles are inserted between sleeve and locating sleeve.

When installing a new cageless bearing, replace half plastic cages by sleeve.



TYPICAL

1. *Sleeve*

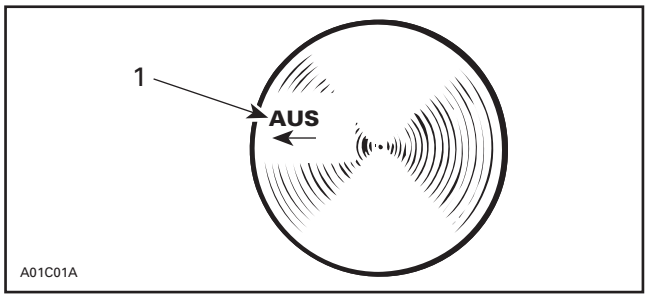
Grease thrust washers and install them on each end of needles.

Insert cageless bearing into connecting rod.



TYPICAL — CAGELESS BEARING AND SLEEVE INSTALLED

Mount piston over connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in the direction of exhaust port.



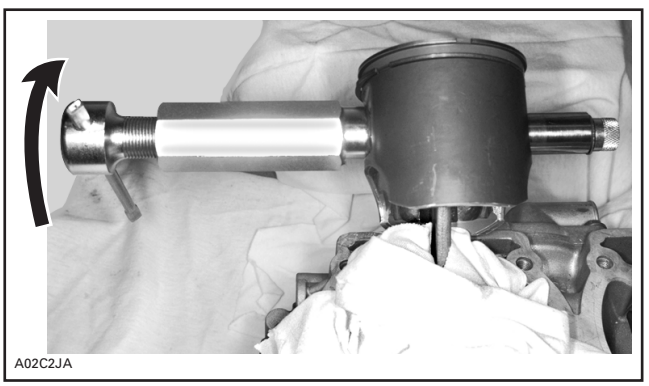
1. Exhaust

Install shouldered sleeve.



TYPICAL — SHOULDERED SLEEVE INSTALLATION

Install piston pin puller and turn handle until piston pin is correctly positioned in piston.

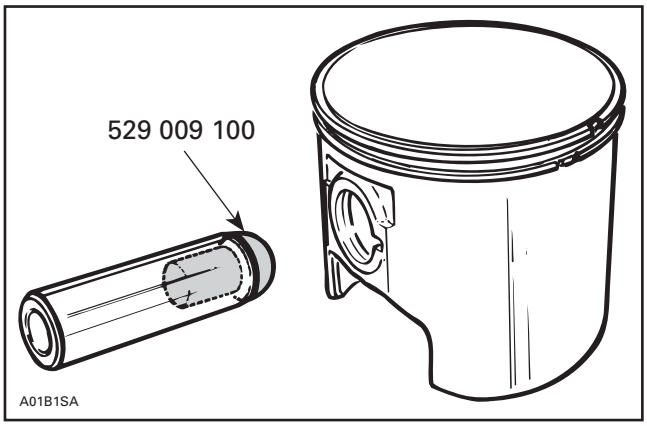


TYPICAL

– Remove piston pin puller and sleeve kit.

377 Engine

To center the piston pin with the connecting rod bearing, use centering tool (P/N 529 009 100).



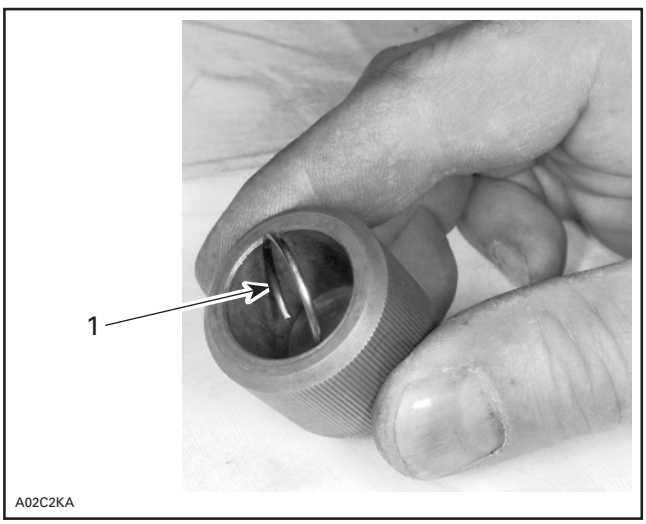
NOTE: The circlip on the opposite side can be installed before pin installation, the tool will easily go out.

Use piston pin puller (P/N 529 035 503) to install a piston pin that cannot be installed as described above.

All Models

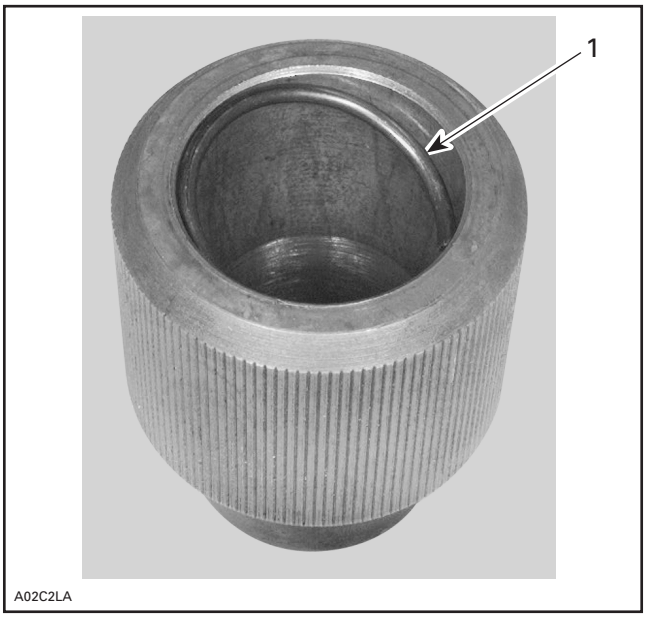
To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 035 561).

Insert circlip in tool at an angle.



1. Circlip

Square it up using a finger.



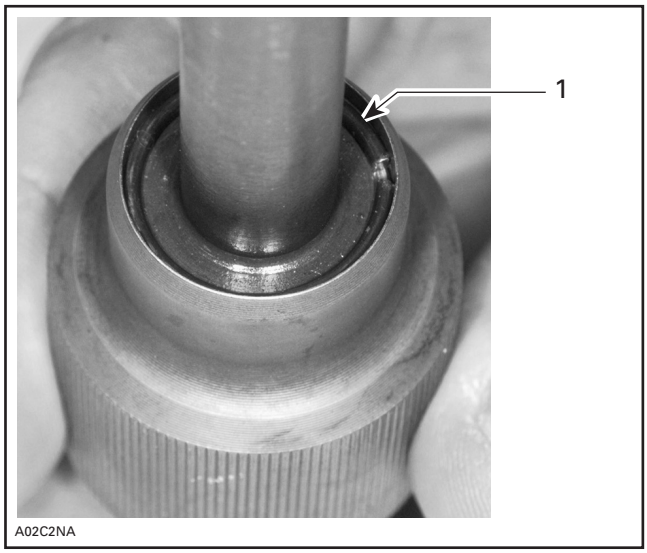
1. Circlip

Continue to square it up using round end of circlip installer.



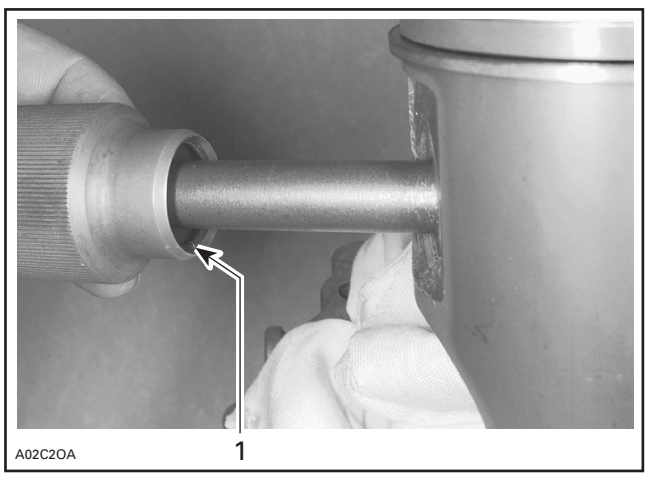
1. Circlip

Using square end of tool, push circlip in until it rests in groove.



1. Circlip in groove

Mount tool in piston making sure that circlip break is facing down.



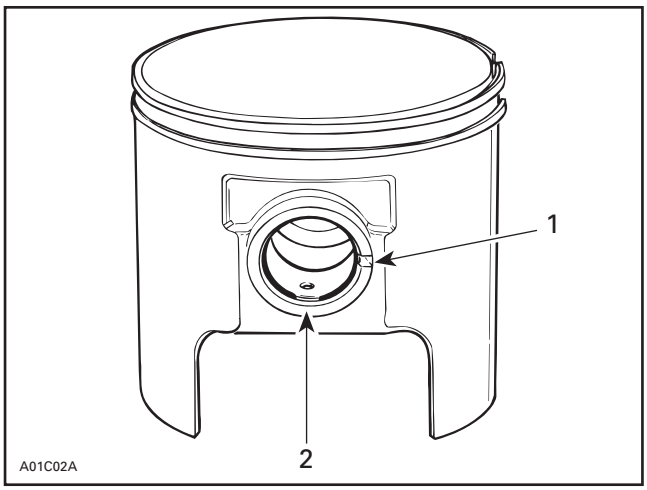
TYPICAL

1. Circlip break facing down

Hold tool firmly against piston then strike on round end of tool. Circlip will move from tool groove to piston groove.


A02C2PA

TYPICAL



1. *Piston notch*
2. *Circlip break at 6 o'clock*

▼ CAUTION

Circlips must not move freely in the groove after installation. If so, replace them.

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.

Before inserting piston in cylinder **no. 4**, lubricate the cylinder with new injection oil or equivalent.

Install proper ring compressor on piston assembly.

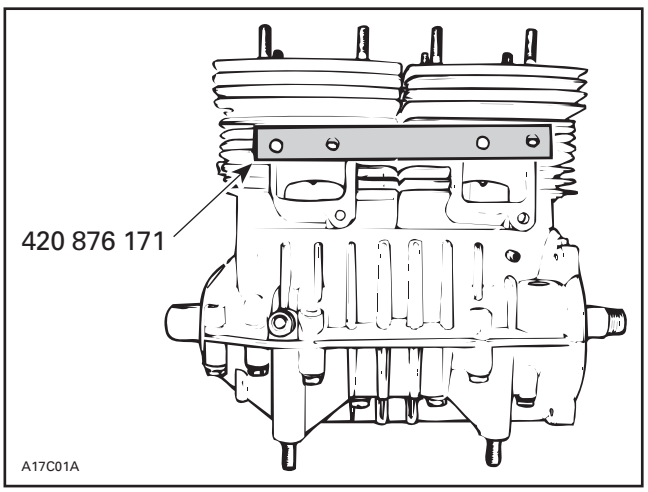
ENGINE TYPE	RING COMPRESSOR P/N
377 and 443	420 876 090
503	420 876 970

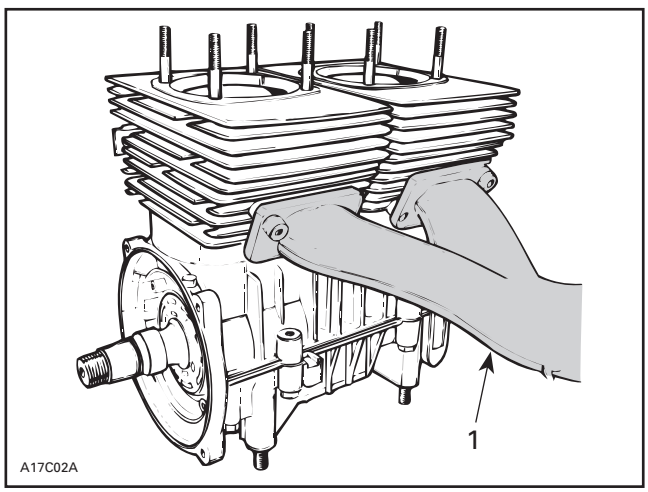
NOTE: The ring compressor will not fit on over size pistons.

Check flatness of intake sockets **no. 6**. Refer to ENGINE DIMENSION MEASUREMENT 04-04 and look for **checking surface flatness**.

At cylinder **no. 4** and/or cylinder head **no. 3** installation, use aligning tool or exhaust manifold itself to ensure sealing of intake manifold and exhaust before tightening cylinder head nuts.

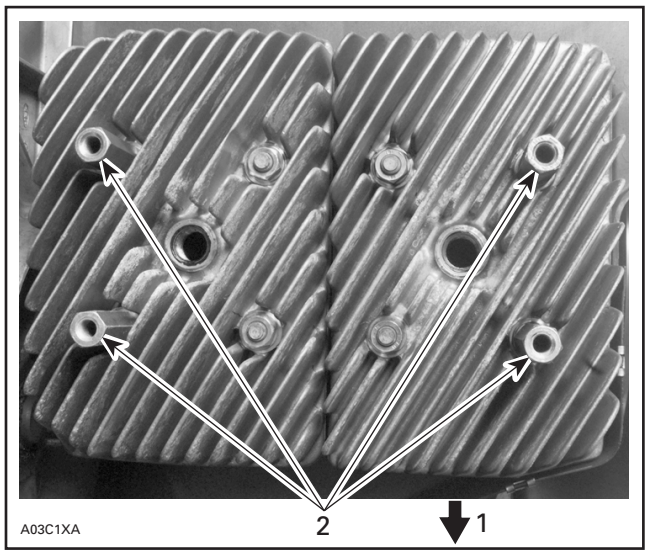
ENGINE TYPE	ALIGNING TOOL P/N
377, 443 and 503	420 876 171





1. *Or use exhaust manifold to align cylinders*

Position distance nuts **no. 2** as illustrated.



1. Exhaust
2. Distance nuts

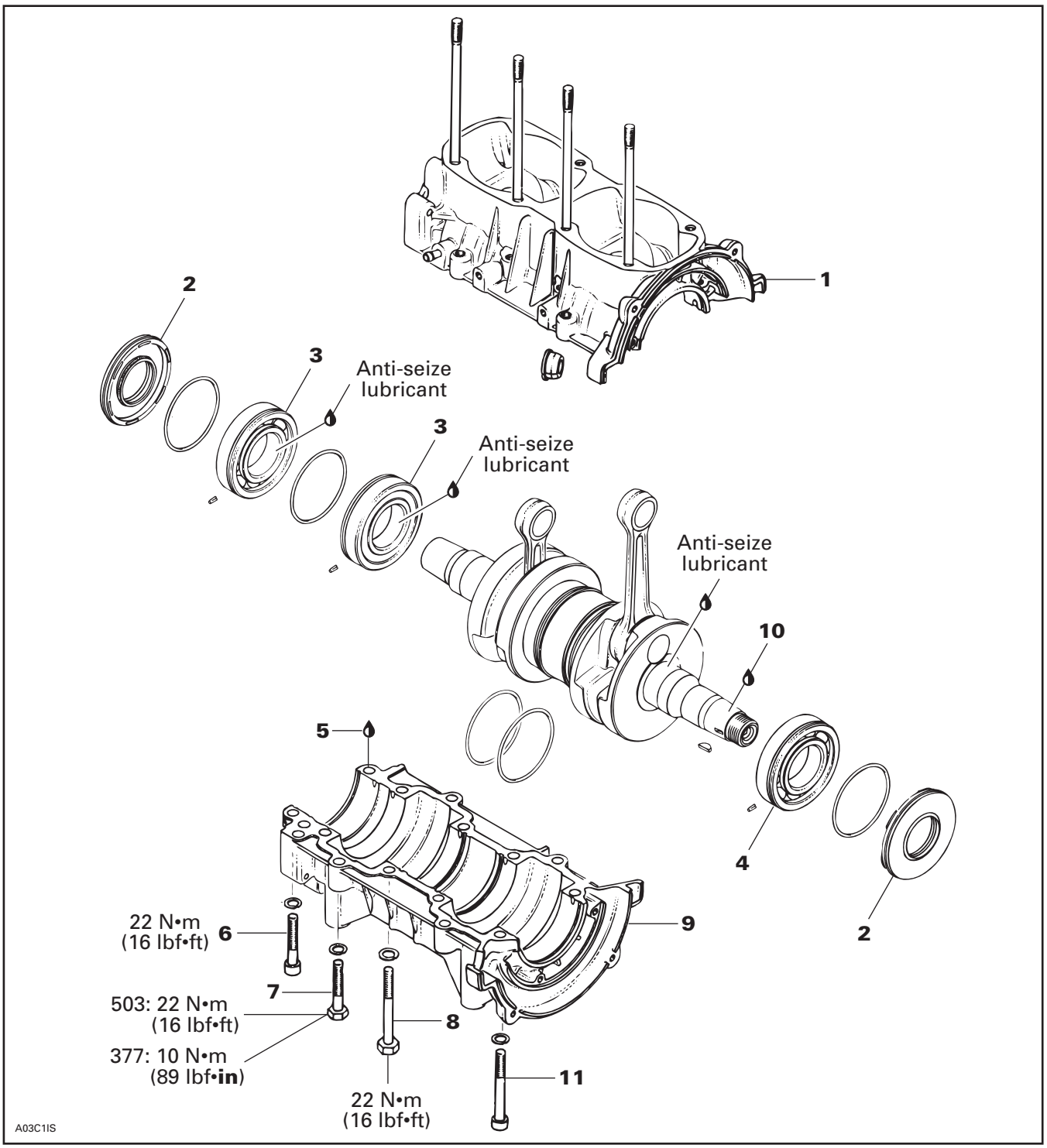
Cross torque cylinder head nuts **nos. 1** and **2** to 22 N•m (16 lbf•ft); torque each cylinder head individually.

Install armature plate, fan housing and then air deflector.

Install a gasket on each side of the air deflector.

Torque intake socket bolts to 22 N•m (16 lbf•ft).

BOTTOM END



PARTS

NOTE: Engine must be removed from chassis to perform the following procedures.

Remove engine from chassis.

Remove fan guard, rewind starter, starting pulley, trigger coil wire from 4-connector housing, magneto flywheel then fan housing.

Remove stator plate.

CLEANING

Discard all seals, gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner. Use gasket remover (P/N 413 708 500) accordingly.

Remove all trace of Loctite 242 from crankshaft taper.

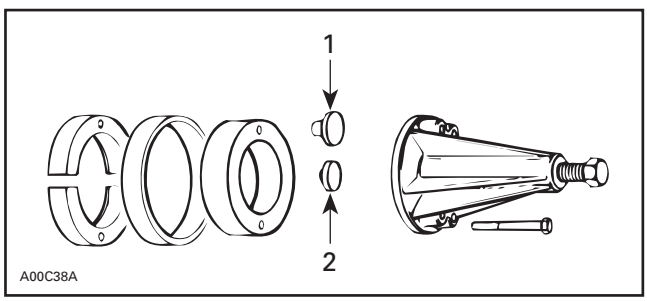
Remove old sealant from crankcase mating surfaces with Bombardier gasket remover (P/N 413 708 500).

▼ CAUTION

Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

DISASSEMBLY

To remove bearings **nos. 3** and **4** from crankshaft, use a protective cap and a special puller, as illustrated.



1. PTO side
2. MAG side

INSPECTION

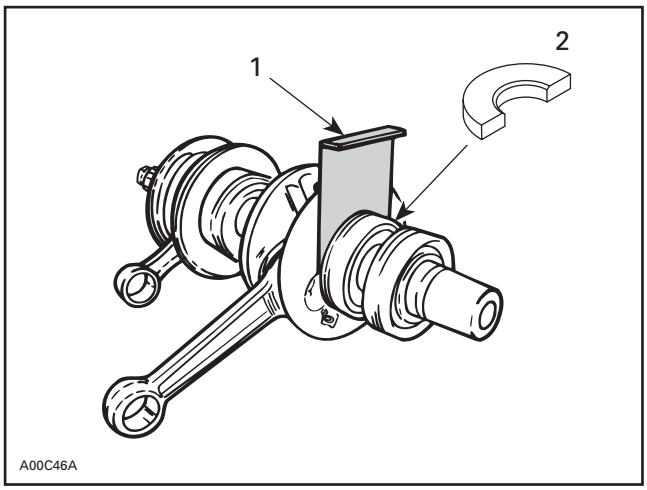
Refer to ENGINE DIMENSIONS MEASUREMENT 04-04.

ASSEMBLY

Smear anti-seize lubricant (P/N 413 701 000) on part of crankshaft where bearing fits.

To check proper clearance between bearing **no. 3** and counterweight, use feeler gauge (P/N 420 876 620).

Mount second bearing with distance gauge (P/N 420 876 822) for 377 and 443 and (P/N 420 876 824) for 503 for proper positioning.



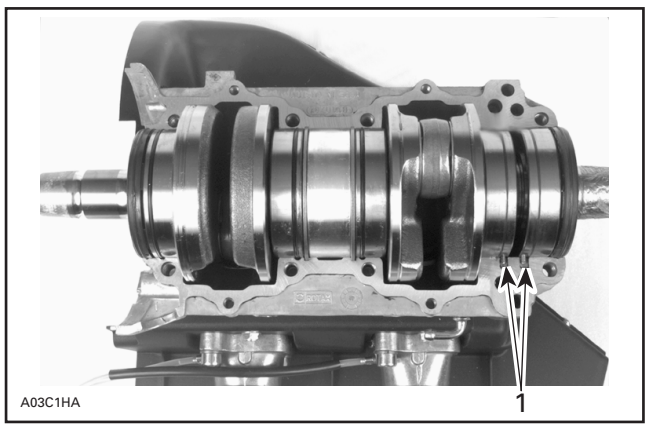
1. Feeler gauge
2. Distance gauge

Prior to installation, place bearings into an oil container filled with oil heated to 75°C (167°F).

This will expand bearings and ease installation. Install bearings with groove as per exploded view.

Bearings are pressed on crankshaft until they rest against radius. These radius maintain the gap needed for bearings lubrication.

When installing crankshaft, position drive pins **no. 10** as illustrated.

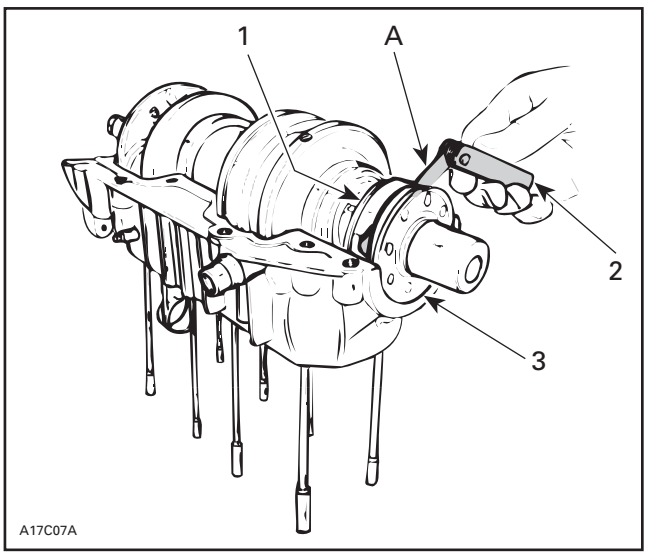


TYPICAL
1. Drive pins

At seal **no. 2** assembly, apply a light coat of lithium grease on seal lip.

For bearing lubrication purpose, a gap of 1.0 mm (.040 in) must be maintained between seals and bearings.

When installing plain oil seals (seal without locating ring or without spacing legs), ensure to maintain 1.0 mm (.040 in) gap.



1. Bearing
2. Feeler gauge
3. Plain oil seal
A. 1 mm (.040 in)

Crankcase halves **nos. 1** and **9** are factory matched and therefore, are not interchangeable as single halves.

Prior to joining of crankcase halves, spray some new injection oil (or equivalent) on all moving parts of the crankshaft. Spray Primer N (P/N 413 708 100) on one of mating surfaces. Let it dry for 10 to 20 minutes.

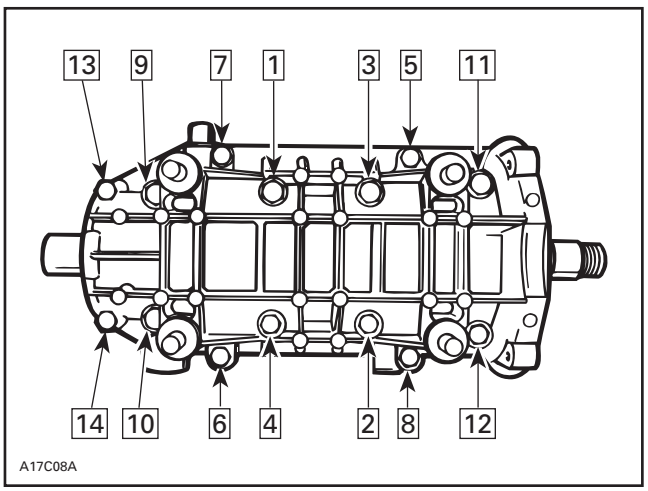
Apply paste gasket (P/N 413 702 700) **no. 5** on the other mating surface.

NOTE: Primer N allows Loctite 515 to fully cure on aluminum surfaces. It increases filling capacity and reduce curing time.

Position the crankcase halves together and tighten bolts by hand then install and tighten armature plate on magneto side to correctly align the crankcase halves.

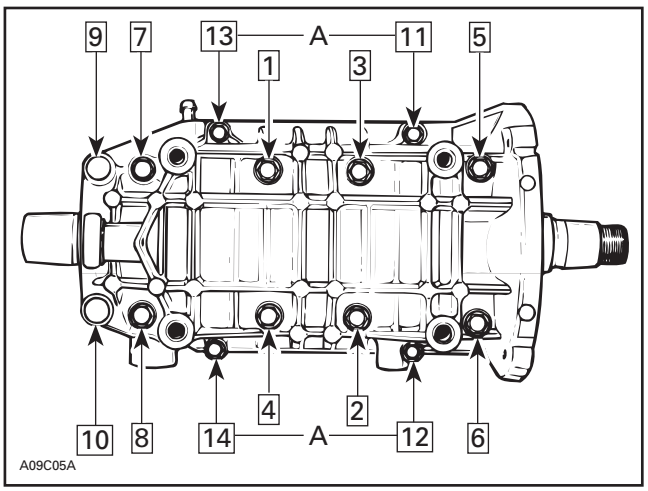
503 Engine Type

Torque screws **nos. 6, 7, 8** and **11** to 10 N•m (89 lbf•**in**) then to 22 N•m (16 lbf•ft) following illustrated sequence.



377 and 443 Engines

Torque screws to proper torque in the following sequence.



*A. 10 N•m (89 lbf•**in**)*
All the other screws are torqued to 21 N•m (15 lbf•ft)

All Engines

To install magneto, refer to CDI MAGNETO 04-05.

LEAK TEST AND ENGINE DIMENSION MEASUREMENT

LEAK TEST

The following gives verification procedures for liquid cooled engines though it also applies to fan cooled engines. For FC engines, do not consider information pertaining to coolant system and crankcase rotary valve gear reservoir/components.

On twin-cylinder engines, each cylinder cannot be verified individually due to leakage from one cylinder to the other through rotary valve (except on engines with separate intake manifolds). Besides, on FC engines, leak will occur through labyrinth sleeve in center of crankshaft.

PREPARATION

1. Remove tuned pipe/muffler and exhaust manifold.
2. Install plug(s) over exhaust flange(s). Tighten with previously removed screws.
3. On engines with RAVE system, remove RAVE valves and install plugs over flanges. Tighten with previously removed screws.
4. Remove carburetor(s).
5. Insert plug(s) in intake rubber boot(s). Tighten with clamps already there.
6. Using a hose pincher(s) (P/N 529 009 900), block impulse hose(s).

NOTE: Do not block large hoses of rotary valve gear lubrication system.

7. Install air pump on any valve of exhaust plug.

NOTE: If necessary, lubricate air pump piston with mild soap.

▼ CAUTION

Using hydrocarbon lubricant (such as engine oil) will damage rubber seal of pump piston.

8. Rotate crankshaft so that piston goes to BDC (Bottom Dead Center) on side where the pump is installed. This will open exhaust port.
9. Activate pump and pressurize engine to 34 kPa (5 PSI). Do not exceed this pressure.
10. Engine must stand this pressure during 3 minutes. If pressure drops before 3 minutes, check tester kit by spraying a soapy solution on pump piston, all plugs and fittings.

– If tester kit is leaking, bubbles will indicate where leak comes from.

– If tester kit is not leaking, check engine as per following procedure.

PROCEDURE

NOTE: A flow chart has been prepared as a visual reference. See last page of this chapter.

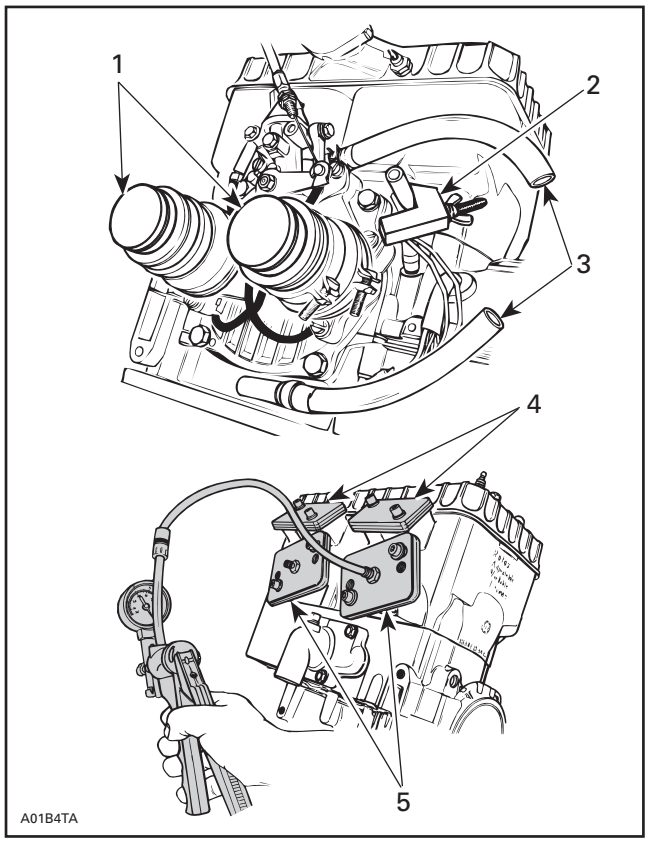
Using flow chart and following text, pressurize area to be tested and spray soapy solution at the indicated location.

TEST PRESSURE: 34 kPa (5 PSI)
for 3 minutes

– If there is a leak at the tested location, it is recommended to continue testing next items before overhauling engine. There is a possibility of more than one leak.

– If there is no leak at the tested location, continue pumping to maintain pressure and continue with next items until leak is found.

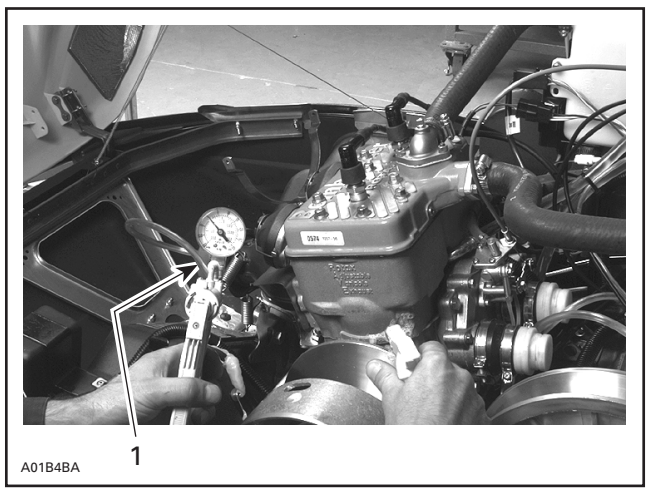
Engine



TYPICAL

1. *Blocked intake flanges*
2. *Blocked impulse fitting*
3. *Open ends (if applicable)*
4. *Blocked RAVE valve flanges (if applicable)*
5. *Blocked exhaust flanges*

When exhaust manifold is installed, use rubber plug. (In this case it is not necessary to move piston to BDC).

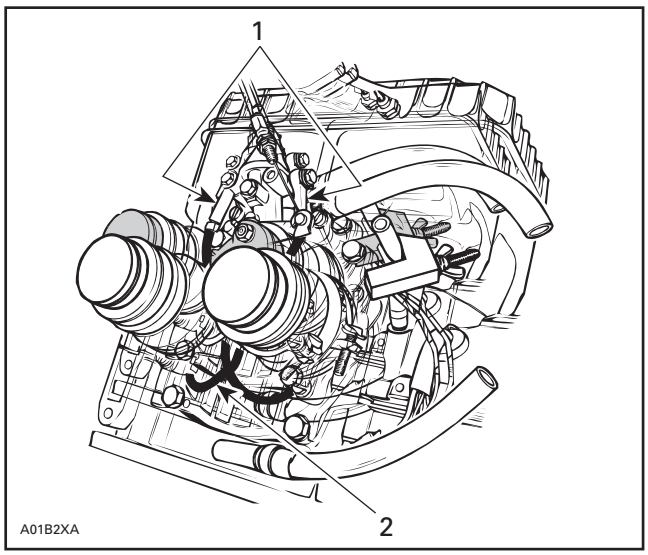


TYPICAL

1. *Rubber plug*

Check the following:

1. All jointed surfaces and screw/stud threads of engine:
   - spark plug base, insulator
   - cylinder head
   - cylinder base
   - crankcase halves (joint)
   - rotary valve cover
   - oil injection pump mounting flange (O-ring, seal)
   - coolant pump housing
   - bleed screws/plugs
2. Small injection oil lines coming from pump.



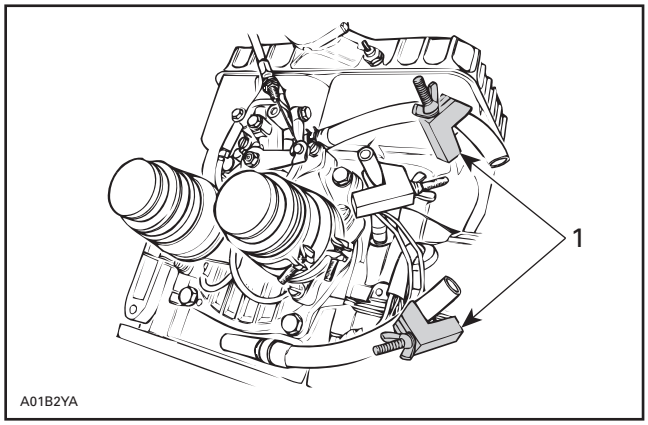
1. *Banjo fittings*
2. *Small injection oil lines*

Check for air bubbles or oil column going toward pump. It indicates defective check valve in banjo fitting (or lines).

3. Remove cooling system cap.

Check for air bubbles in antifreeze. It indicates defective cylinder head O-ring or cylinder base gasket.

4. Block both hoses of rotary valve gear lubrication system with hose pinchers.



1. Block both hoses

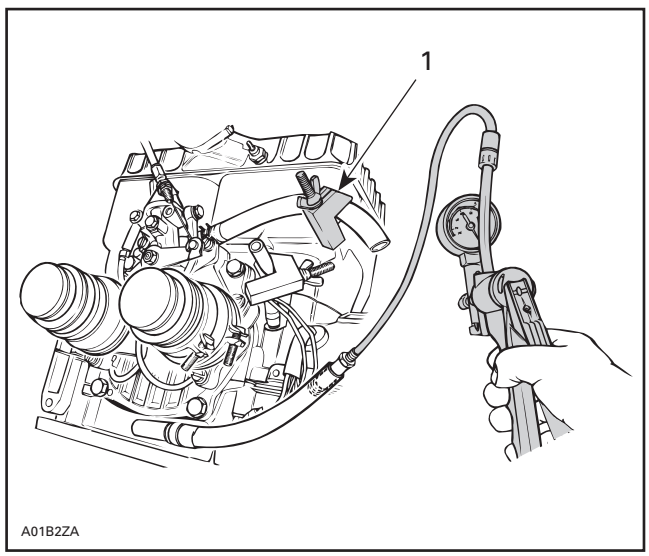
If leakage stops, ignore remaining items and check crankcase rotary valve gear reservoir as per **Crankcase Rotary Valve Gear Reservoir** of this section.

5. Remove drive pulley then check crankshaft outer seal.
6. Remove rewind starter and magneto system then check crankshaft outer seal.
7. Check crankcase rotary valve gear reservoir.

Crankcase Rotary Valve Gear Reservoir

Block one hose of rotary valve gear lubrication system with a hose pincher and install an adapter in remaining hose.

Install air pump on adapter and pressurize as before.

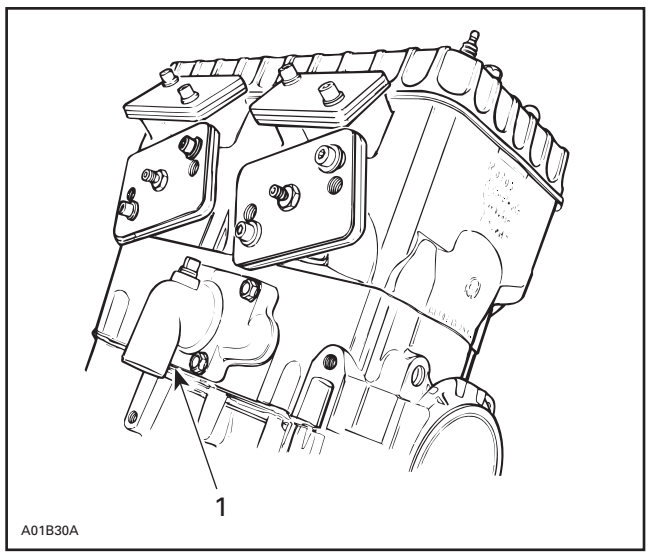


1. Blocked hose

1. Remove a spark plug or any plug of leak tester kit on PTO side.

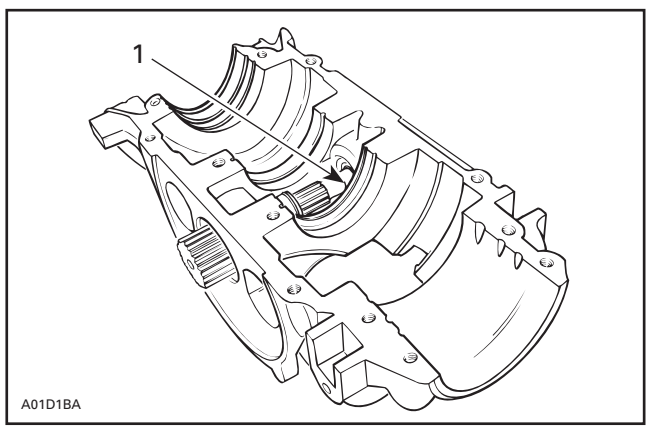
   If pressure drops, it indicates defective crankshaft inner seal on PTO side.
2. Remove a spark plug or any plug of leak tester kit on MAG side.

   If pressure drops, it indicates defective crankshaft inner seal on MAG side.
3. Check drain hole below coolant pump housing with soapy water.



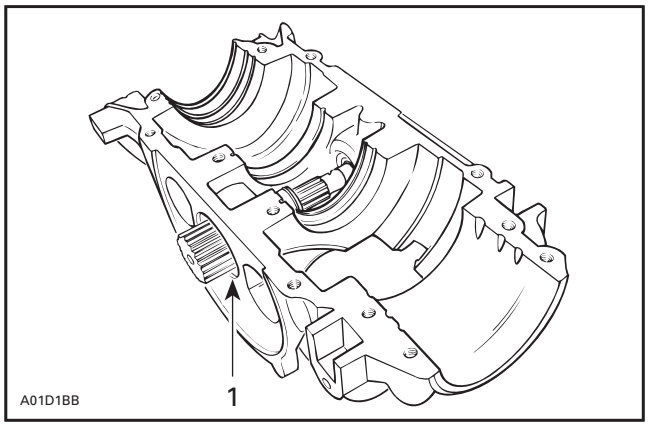
1. Drain hole

If there is a leak, it indicates defective seal of rotary valve shaft (oil seal beside coolant seal).



1. Oil seal

4. Remove rotary valve cover and check for leak of rotary valve seal with soapy water.



1. Seal

5. If leak still persists, it indicates a defective casting somewhere in engine.

   Disassemble engine and carefully check for defects in castings. Pay attention to tapped holes which may go through engine sealed area and thus leading to leakage.

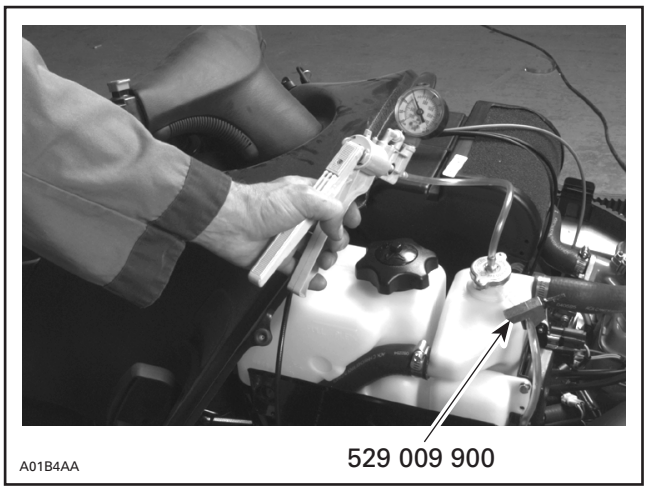
FINALIZING REASSEMBLY

After reassembling engine, always recheck for leakage.

COOLING SYSTEM LEAK TEST

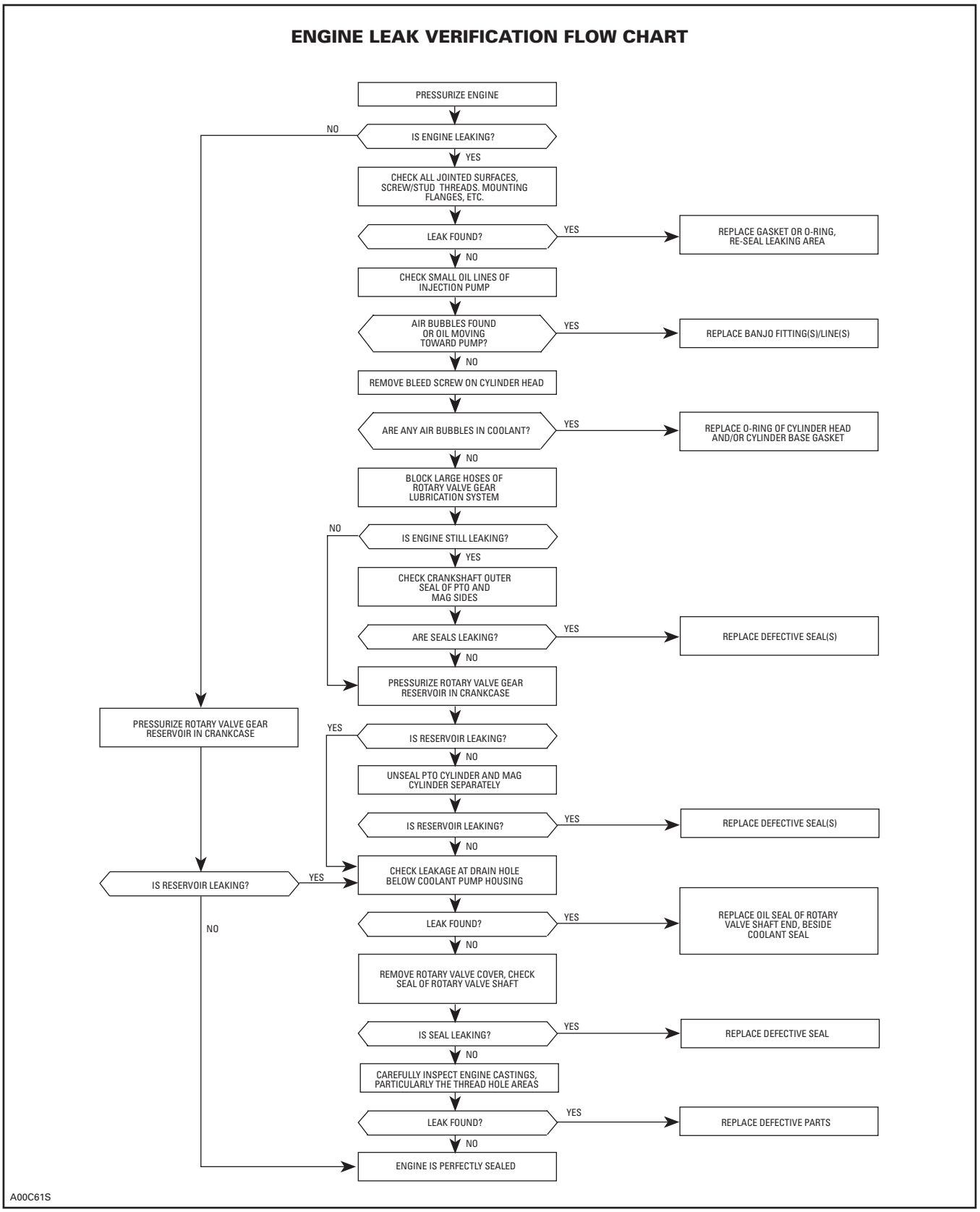
Install special plug (radiator cap) (P/N 529 021 400) and hose pincher (P/N 529 009 900) on overflow hose. Pressurize all system through coolant reservoir to 15 PSI.

Check all hoses and cylinder/base for coolant leaks. Spray a soap/water solution and look for presence of air bubbles.



TYPICAL

ENGINE LEAK VERIFICATION FLOW CHART



ENGINE DIMENSION MEASUREMENT

This section covers all engine types.

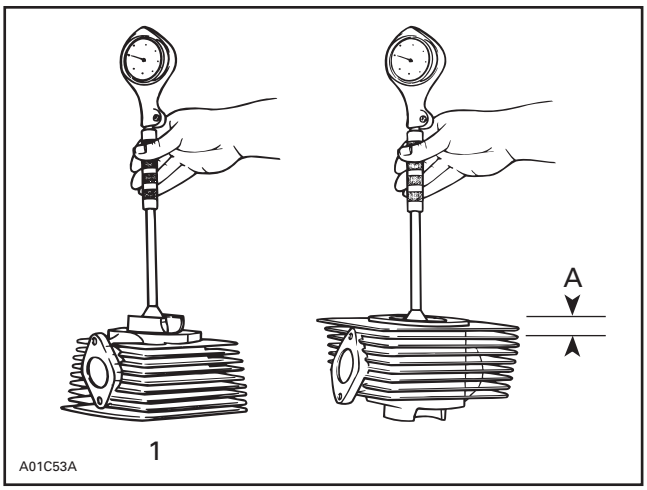
CYLINDER TAPER

ENGINE TYPE	MAXIMUM
All	0.08 mm (.003 in)

Compare cylinder diameter 16 mm (5/8 in) from top of cylinder to just below its intake port area.

On rotary valve engines, measure just below auxiliary transfer port, facing exhaust port. If the difference exceeds the specified dimension the cylinder should be rebored and honed or should be replaced.

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



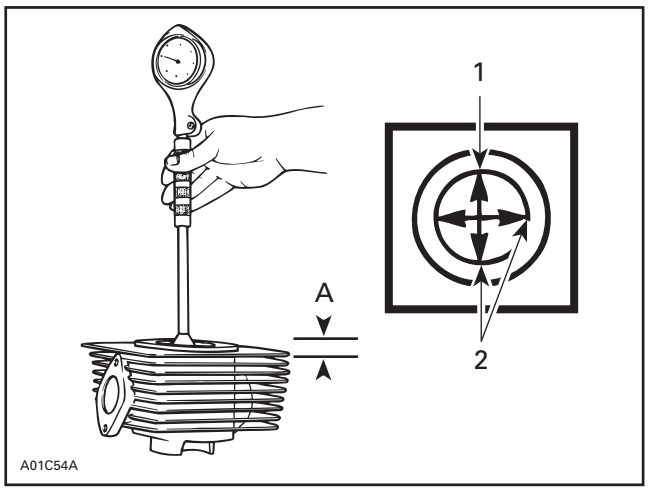
1. Below the intake port
A. 16 mm (5/8 in) from top

CYLINDER OUT OF ROUND

ENGINE TYPE	MAXIMUM
All	0.05 mm (.002 in)

Measuring 16 mm (5/8 in) from top of cylinder with a cylinder gauge, check if the cylinder out of round is more than the specified dimension. If larger, cylinder should be rebored and honed or should be replaced.

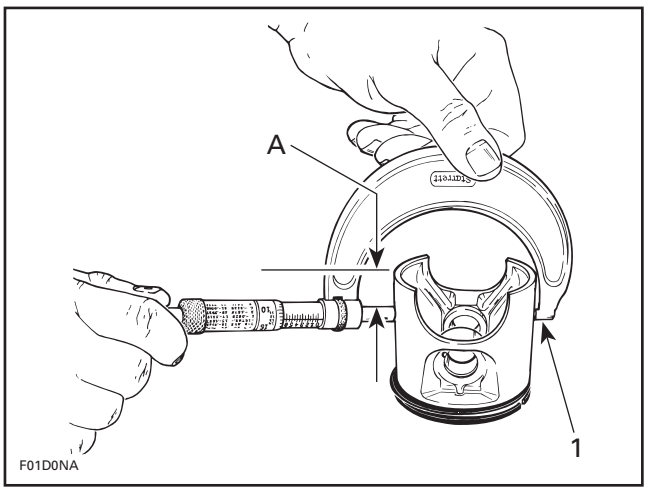
NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



1. Piston pin position
2. Measures to be compared
A. 16 mm (5/8 in)

USED PISTON MEASUREMENT

Using a micrometer, measure piston at A perpendicularly (90°) to piston pin.



1. Measuring perpendicularly (90°) to piston pin axis
A. See table below

ENGINE TYPE	DIMENSION A mm (in)
277 and 503	18 (.71)
337 and 443	20.8 (.82)

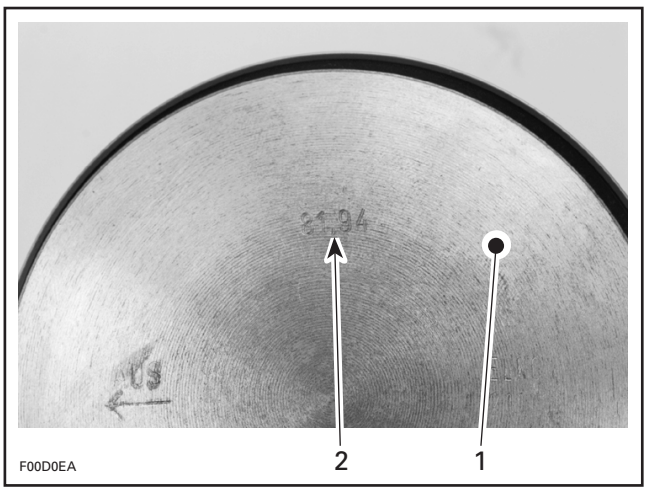
The measured dimension should be the same as the one scribed on piston dome. If not, install a new piston.

CYLINDER/PISTON CLEARANCE

Used and New Pistons

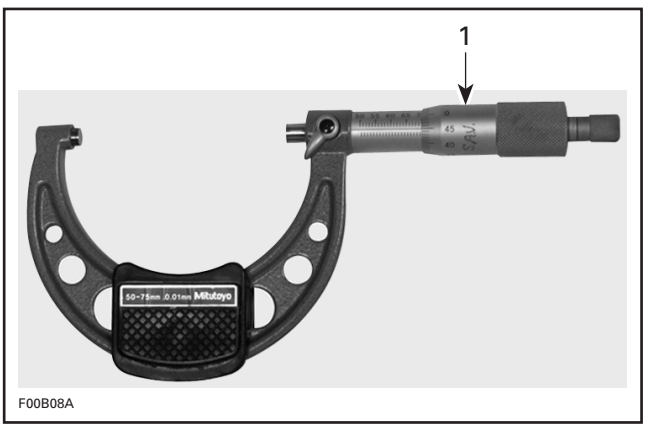
NOTE: Make sure used piston is not worn. See USED PISTON MEASUREMENT above.

Take the measurement on the piston dome.



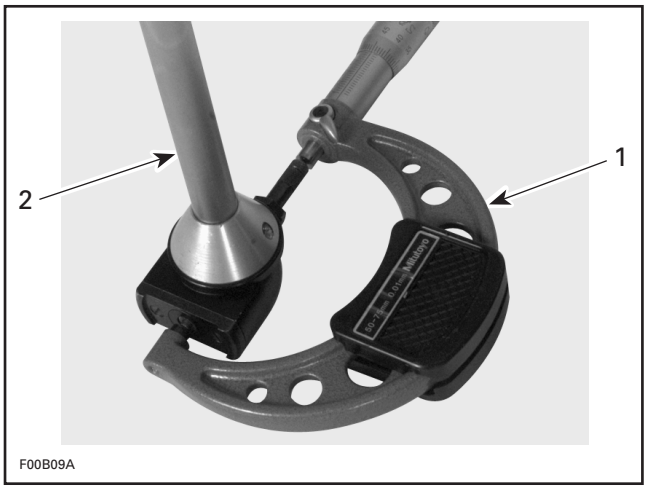
1. Piston dome
2. Piston measurement

Adjust and lock a micrometer to the specified value on the piston dome.

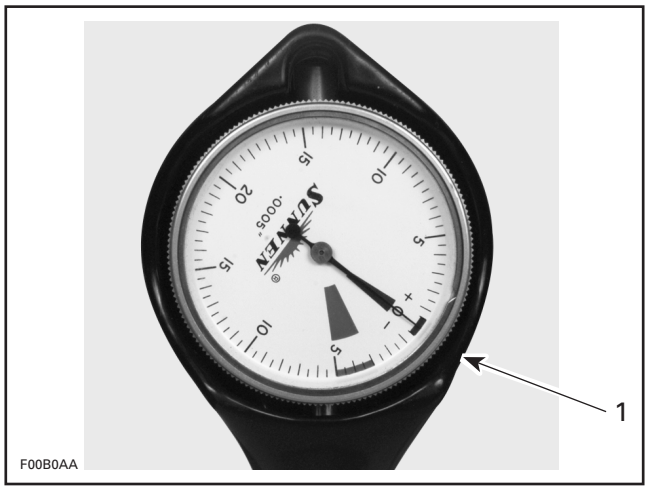


1. Micrometer set to the piston dimension

With the micrometer set to the piston dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0.

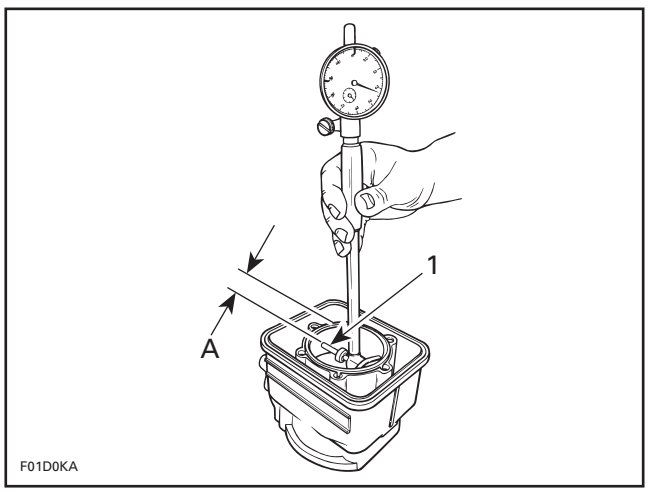


1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



1. Indicator set to 0

Position the dial bore gauge at 16 mm (5/8 in) below cylinder top edge.



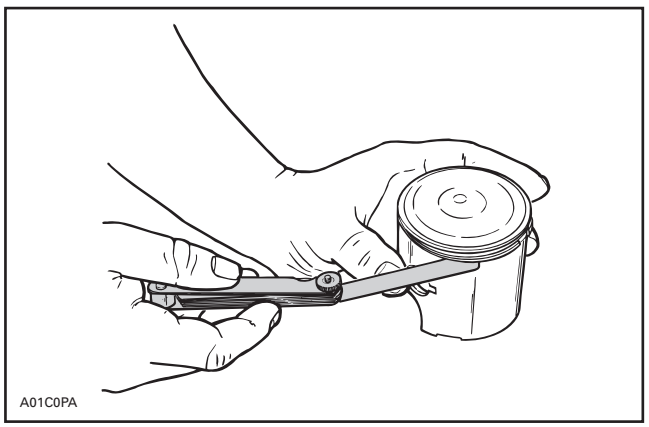
1. Measuring perpendicularly (90°) to piston pin axis
A. 16 mm (5/8 in)

Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance. If clearance exceeds specified tolerance, replace cylinder or rebore. Refer to TECHNICAL DATA 10.

NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.

RING/PISTON GROOVE CLEARANCE

Using a feeler gauge check clearance between ring and groove. Replace piston if clearance exceeds specified tolerance. Refer to TECHNICAL DATA 10.

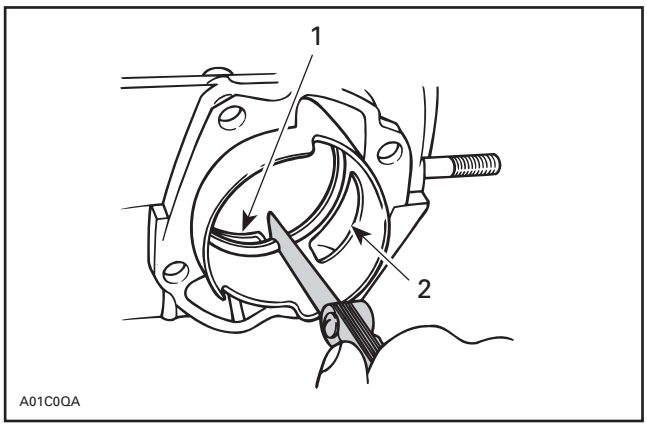


RING END GAP

Position ring half way between transfer ports and intake port. On rotary valve engines, position ring just below transfer ports.

NOTE: In order to correctly position the ring in the cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. Replace ring. If gap exceeds specified tolerance, refer to TECHNICAL DATA 10.



1. Transfer port
2. Intake port

CRANKSHAFT DEFLECTION

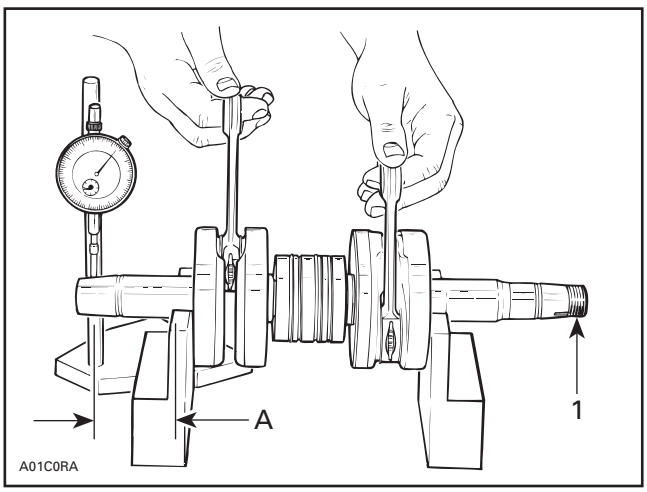
Crankshaft deflection is measured with a dial indicator.

Measuring (in engine)

First, check deflection with crankshaft in engine. If deflection exceeds the specified tolerance, recheck deflection using V-shaped blocks to determine the defective part(s). See below.

Measuring (on bench)

Once engine is disassembled, check crankshaft deflection on V-shaped blocks. If deflection exceeds the specified tolerance, it can be worn bearings or a bent crankshaft. Remove crankshaft bearings and check deflection again on V-shaped blocks to determine the defective part(s). See measurement A in following illustration.



TYPICAL

1. Measure at mid point between the key and the first thread
A. See table below

Crankshaft Deflection on PTO Side

ENGINE TYPE	DISTANCE A mm (in)	MAXIMUM ON PTO SIDE mm (in)
377, 443	75.5 (2.972)	0.06 (.002)
503	82.5 (3.248)	

Crankshaft Deflection on MAG Side

ENGINE TYPE	MAXIMUM ON MAG SIDE mm (in)
All	0.03 (.001)

Crankshaft Deflection in Center of Crankshaft

ENGINE TYPE	MAXIMUM IN CENTER OF CRANKSHAFT
All	0.08 mm (.0031 in)

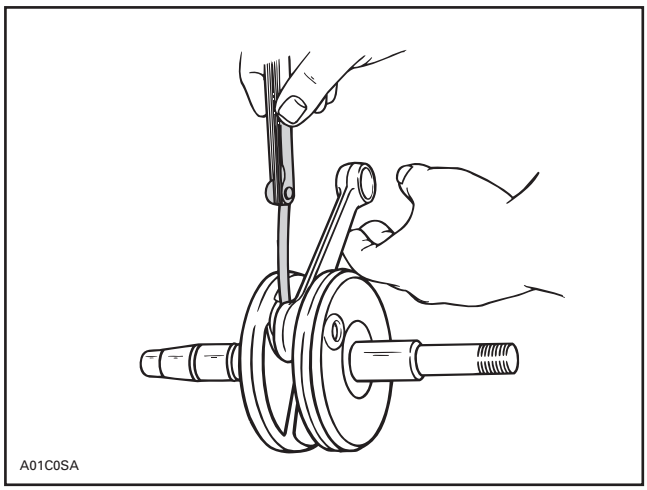
NOTE: Crankshaft deflection can not be correctly measured between centers of a lathe.

If the deflection exceeds the specified tolerance, crankshaft should be repaired or replaced.

CONNECTING ROD BIG END AXIAL PLAY

ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
277, 377 443 and 503	0.20 - 0.53 mm (.008 - .021 in)	1.00 mm (.039 in)

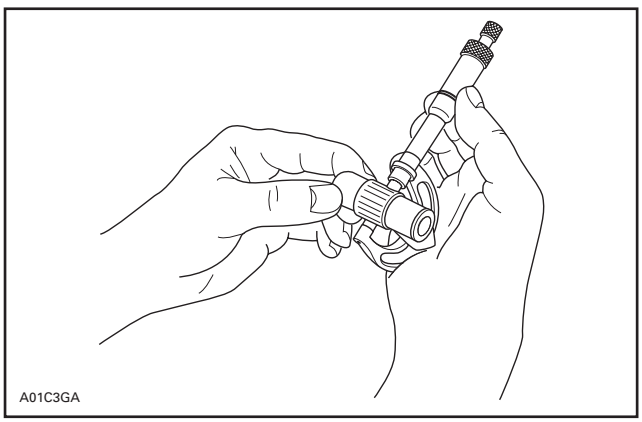
Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight. If the distance exceeds specified tolerance, repair or replace the crankshaft.

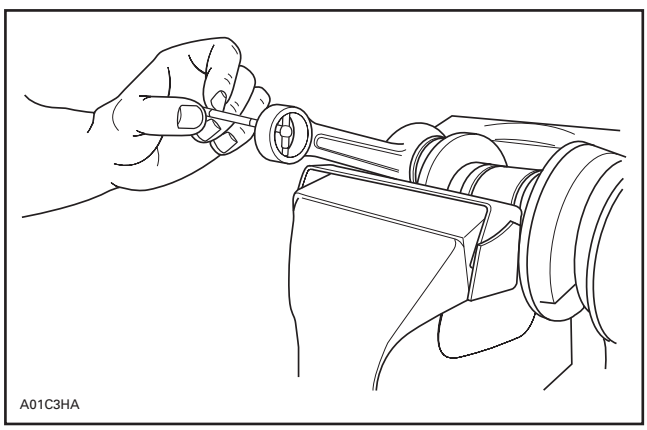


TYPICAL

CONNECTING ROD/PISTON PIN CLEARANCE

Measure piston pin with its needle bearing. Compare to inside diameter of connecting rod.





ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
All	0.03 - 0.012 mm (.0001 - .0005 in)	0.015 mm (.0006 in)

CONNECTING ROD/CRANKPIN CLEARANCE

ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
All	0.020 - 0.033 mm (.0008 - .0013 in)	0.05 mm (.0020 in)

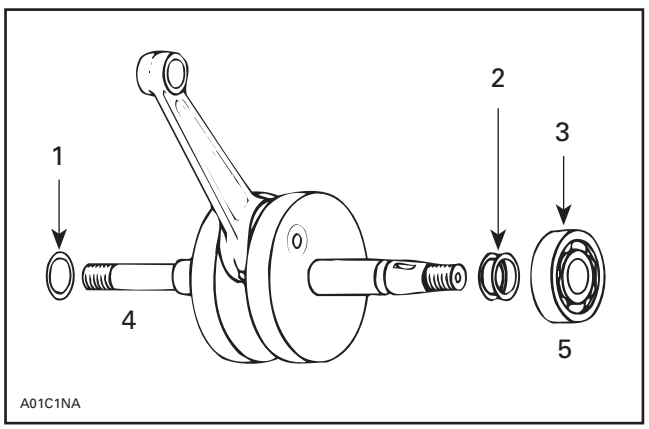
CRANKSHAFT END-PLAY

277 Engine Type

ENGINE TYPE	MINIMUM	MAXIMUM
277	0.10 mm (.004 in)	.030 mm (.012 in)

Adjustment

Crankshaft end-play is adjusted with shims located between crankshaft and magneto side bearing.



1. Distance ring
2. Shim location
3. Bearing
4. PTO
5. MAG

▼ CAUTION

Always install end-play adjustment shims on the magneto side between bearing and crankshaft counterweight.

The following is required for the adjustment procedure:

– adjustment shims (refer to parts catalog)

thicknesses available: 0.10 mm (.004 in)
0.20 mm (.008 in)
0.30 mm (.012 in)
0.50 mm (.020 in)
1.00 mm (.040 in)

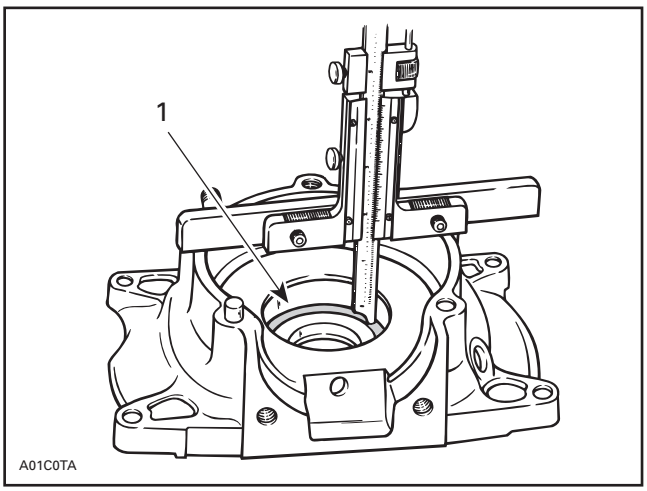
– micrometer

– caliper

Total shim thickness needed for the end-play adjustment is determined with the following procedure:

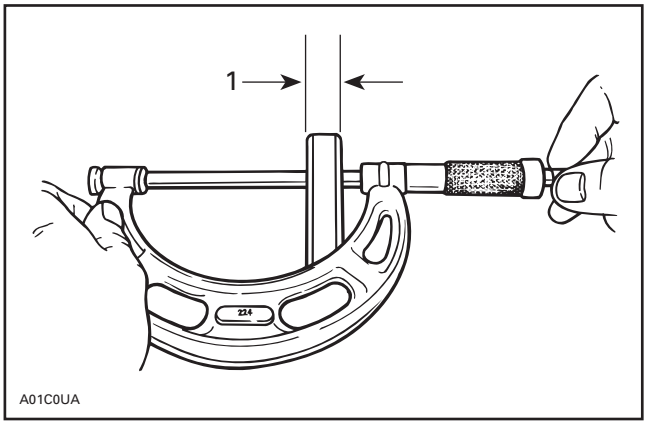
a. Measure crankcase halves as illustrated (M_1 and M_2).

A standard compressed crankcase gasket will have a 0.30 mm (.012 in) thickness (M_3). **Add these measurements to obtain dimension A**.



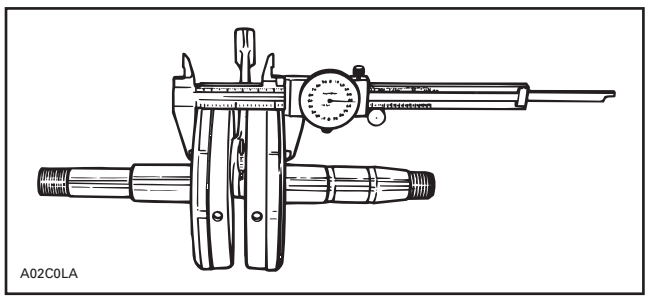
MEASURING M_1 AND M_2
1. Bearing seat

b. Measure the thickness of each bearing (M_4 and M_5).



MEASURING M_4 AND M_5
1. Bearing thickness

c. Measure distance between bearing shoulders on crankshaft (M_6).



MEASURING M_6

d. Measure the distance ring (M_7) and adjustment shims thickness (M_8). Add these measurements to obtain dimension B.

e. From dimension A, subtract dimension B.

The result is the actual crankshaft end-play that must be within specification.

If the result is over specification, add adjustment shim(s) to reach this specification.

If the result is under specification, remove adjustment shim(s) to reach this specification.

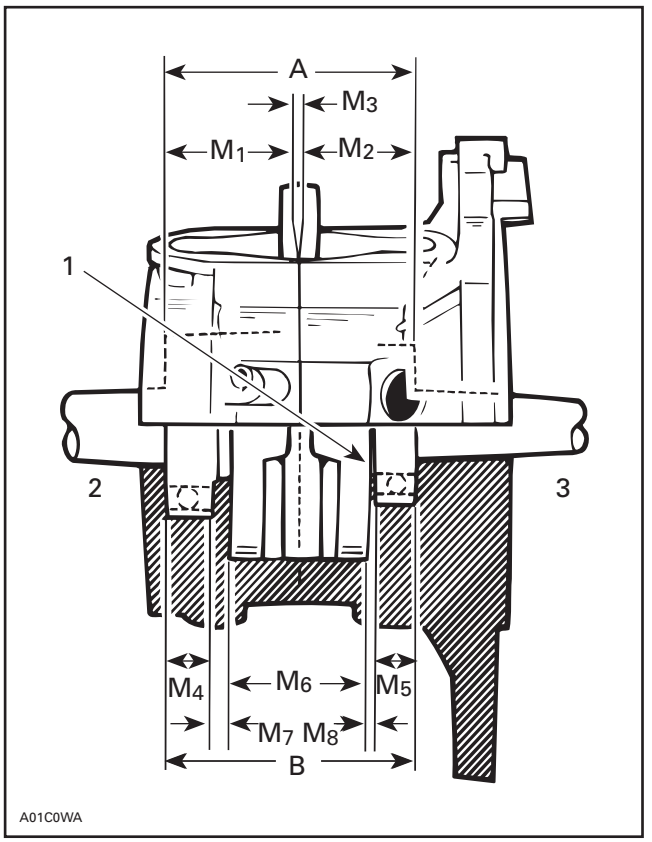
To Summarize

A = $M_1 + M_2 + M_3$

B = $M_4 + M_5 + M_6 + M_7 + M_8$

A – B = Actual end-play that must be within specification.

M_8 is the dimension that must be adjusted to obtain the specified crankshaft end-play.



1. End-play is adjusted with shims
2. PTO
3. MAG

377, 443, 503 Engine Types

End-play is not adjustable but it should be between 0.10 - 0.30 mm (.004 - .012 in).

CHECKING SURFACE FLATNESS

Intake manifold, intake manifold cover, rotary valve cover can be checked for perfectly mating surfaces.

Lay part on a surface plate (marble, mirror or thick glass plate).

Holding down one end of part, try pushing down the other end.

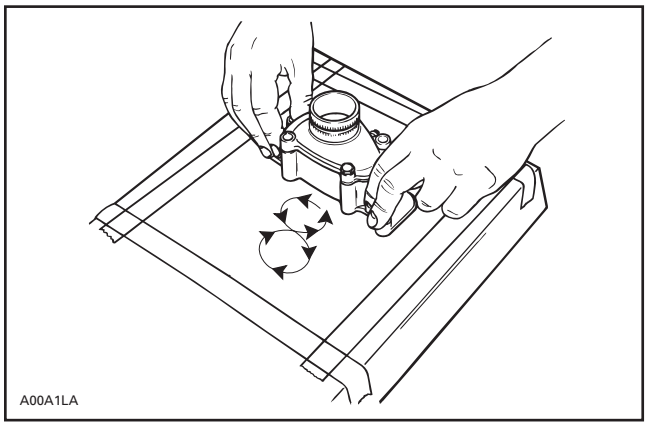
If any play is felt, part must be rectified.

RECTIFYING SURFACES

Stick a fine sand paper sheet on the surface plate then lightly oil the sand paper.

Rub manifold mating surface on sand paper using 8-figure movements.

Sand until mating surface is perfectly straight.



CHECKING CRANKSHAFT ALIGNMENT

Install a degree wheel (P/N 295 000 007) on crankshaft end.

Remove both spark plugs.

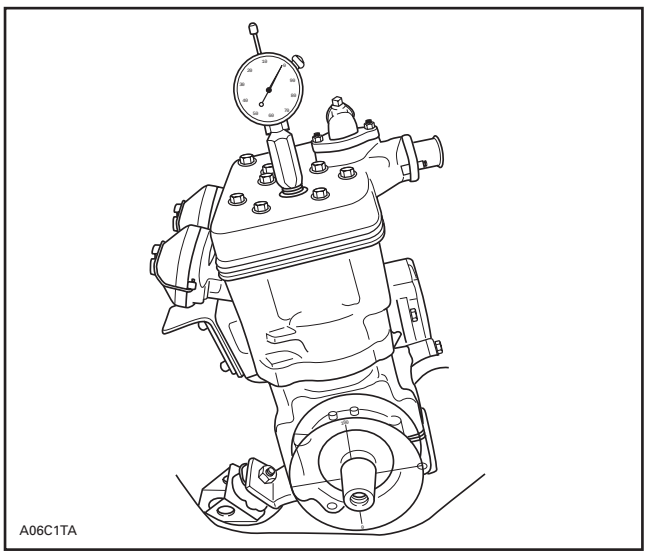
Install a TDC gauge (P/N 414 104 700) in spark plug hole on MAG side.

Bring MAG piston at top dead center.

Rotate degree wheel (not crankshaft) so that 360° mark aligns with center of crankcase. Scribe a mark on crankcase.

Remove TDC gauge and install it on PTO side.

Bring PTO piston to top dead center.



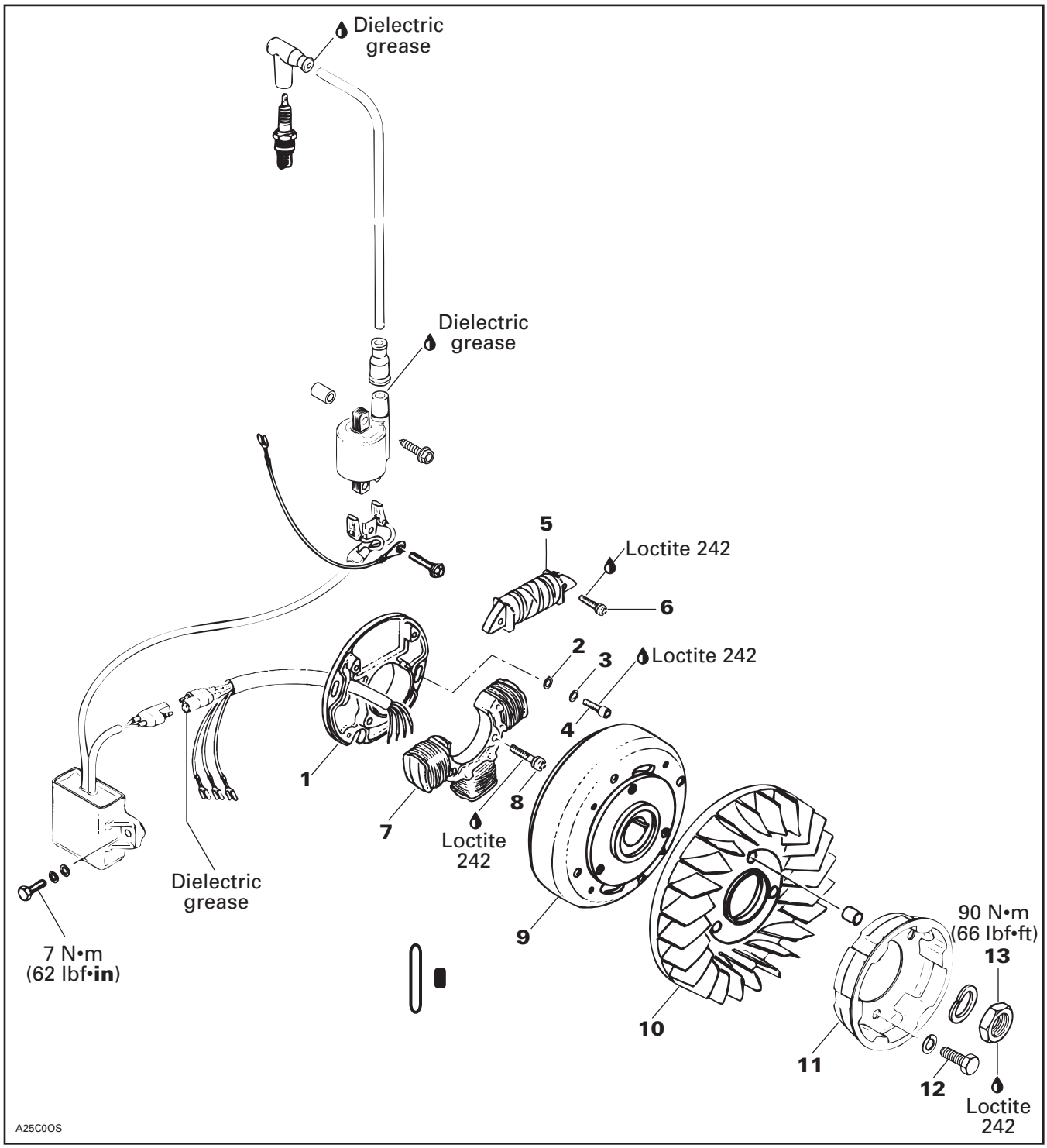
Interval between cylinders must be exactly 180°.

Any other reading indicates a misaligned (twisted) crankshaft.

CDI SYSTEM

NIPPONDENSO IGNITION SYSTEM WITH SINGLE GENERATING COIL

Tundra



NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ CAUTION

Clean armature and magneto using only a clean cloth.

DISASSEMBLY

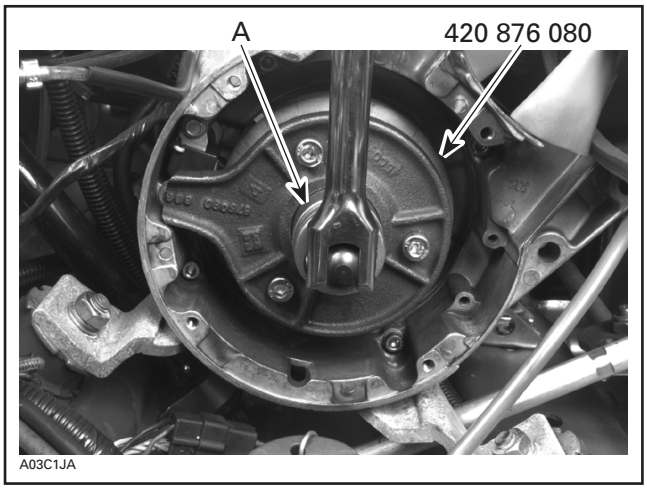
To gain access to magneto assembly, remove the following parts as needed on different engines:

– tuned pipe and muffler
– oil injection pump mounting plate from rewind starter
– rewind starter
– starting pulley no. 11 and fan no. 10

To remove magneto flywheel retaining nut no. 13, install puller ring (P/N 420 876 080) and M8 x 20 screws.

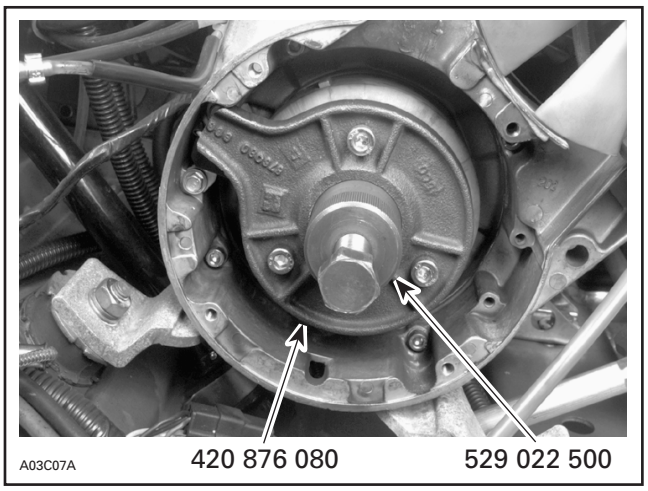
– Remove magneto flywheel nut, using a 30 mm socket machined to 40 mm (1.580 in) outside diameter by 16 mm (5/8 in) long.

NOTE: To correctly remove a threadlocked fastener it is first necessary to tap on the fastener to break threadlocker bond. This will eliminate the possibility of thread breakage.



TYPICAL
A. 30 mm socket

To remove magneto flywheel no. 9, install the magneto puller (P/N 529 022 500).



TYPICAL

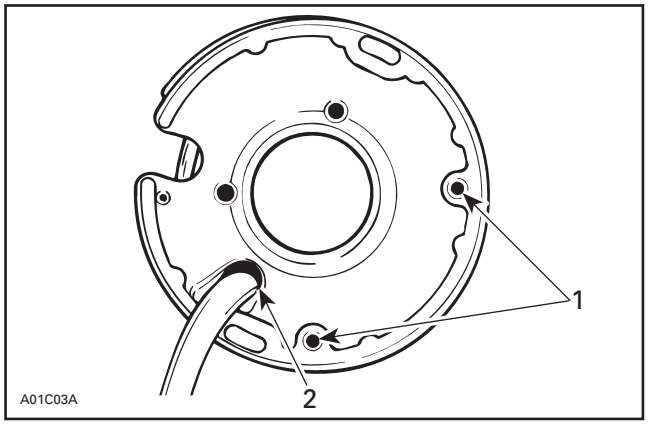
– Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto flywheel from its taper.

NOTE: Before disassembling armature plate, indexing marks should be scribed to facilitate reassembly.

REPAIR

To replace generator coil no. 2:

– Heat the armature plate to 93°C (200°F) around the screw holes to break the threadlocker bond.

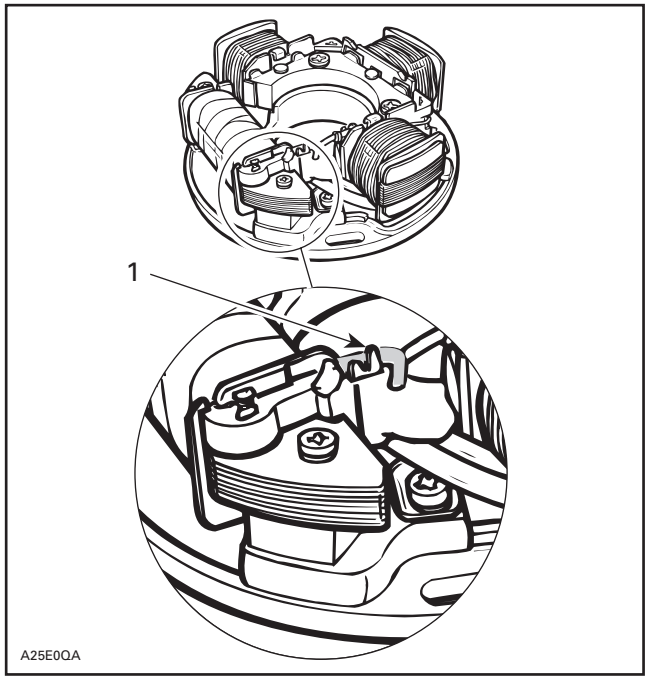


1. Heat
2. Protect harness from flame

▼ CAUTION

Protect harness from flame.

– Remove screws.
– Uncrimp and unsolder BLACK/RED wire from coil terminal.

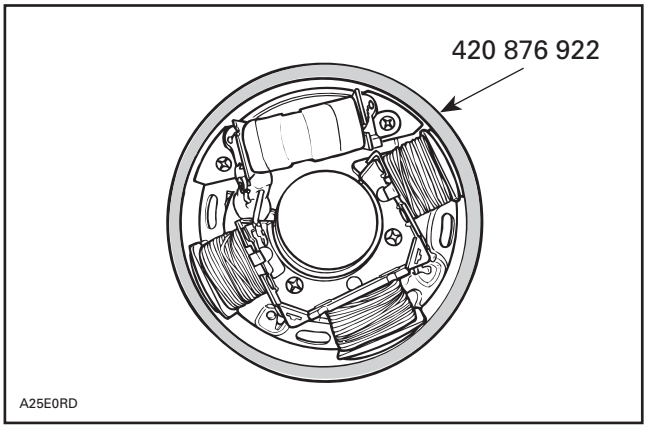


1. Uncrimp and unsolder wire here

– Strip end of old wire then crimp and solder on new coil.

Apply Loctite 242 (blue) to screws **nos. 6** and **8** then install the new coil on armature plate.

Use magneto coil centering tool (P/N 420 876 922) and install it so that it fits around armature plate before tightening screws.

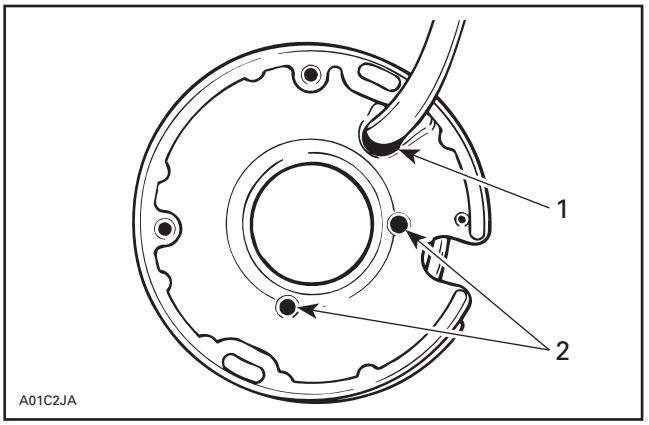


▼ CAUTION

Before reinstalling the magneto, remove the loose epoxy from harness.

To replace lighting generator coil **no. 7**:

– Heat the armature plate to 93°C (200°F) around the screw holes to break the threadlocker bond.

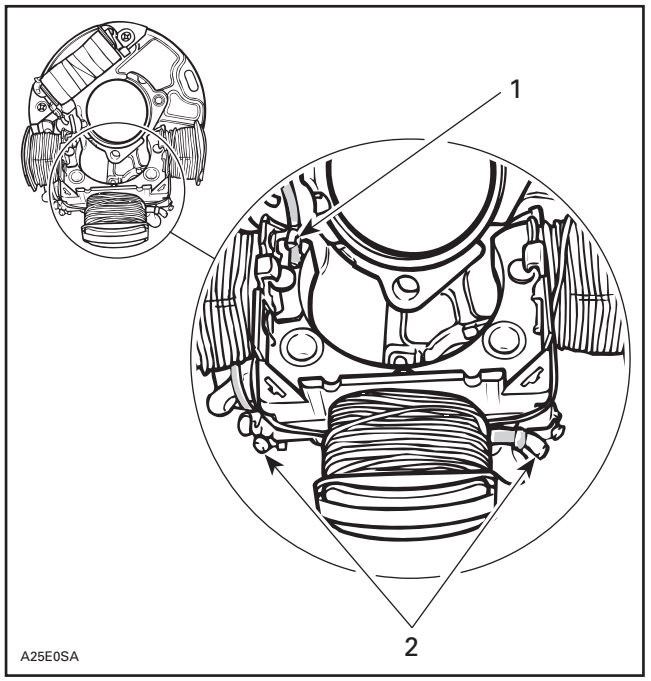


1. Protect harness from flame
2. Heat

▼ CAUTION

Protect harness from flame.

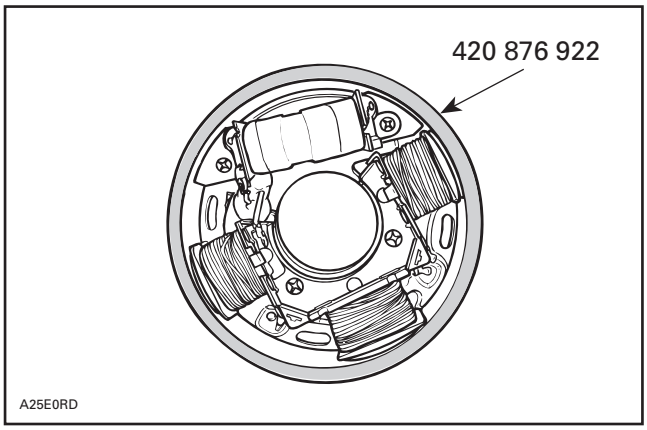
– Remove screws.
– Uncrimp and unsolder YELLOW and YELLOW/BLACK wires from coil terminals.
– Uncrimp and unsolder ground wire (BLACK) from coil core.



1. Uncrimp and unsolder ground wire (BLACK) here
2. Uncrimp and unsolder YELLOW and YELLOW/BLACK wires here

– Position new coil, crimp and solder all wires.
– Prior to assembly, apply Loctite 242 (blue).

Use magneto coil centering tool (P/N 420 876 922) and install it so that it fits around armature plate before tightening screws.



▼ CAUTION

Before reinstalling magneto, remove the loose epoxy from harness.

ASSEMBLY

Position the armature plate **no. 1** on the crankcase, aligning the marks on both parts.

Put a drop of Loctite 242 (blue) on screw threads and tighten.

Clean crankshaft extension (taper).

Apply Loctite 242 (blue) on taper.

Position Woodruff key, magneto flywheel **no. 9** and lock washer **no. 12** on crankshaft.

Clean nut threads and apply Loctite 242 (blue) before tightening nut **no. 13**.

Torque nut to 90 N•m (66 lbf•ft).

At reassembly coat all electric connections with silicone dielectric grease (P/N 413 701 700) to prevent corrosion or moisture penetration.

▼ CAUTION

Do not use silicone "sealant", this product will corrode contacts.

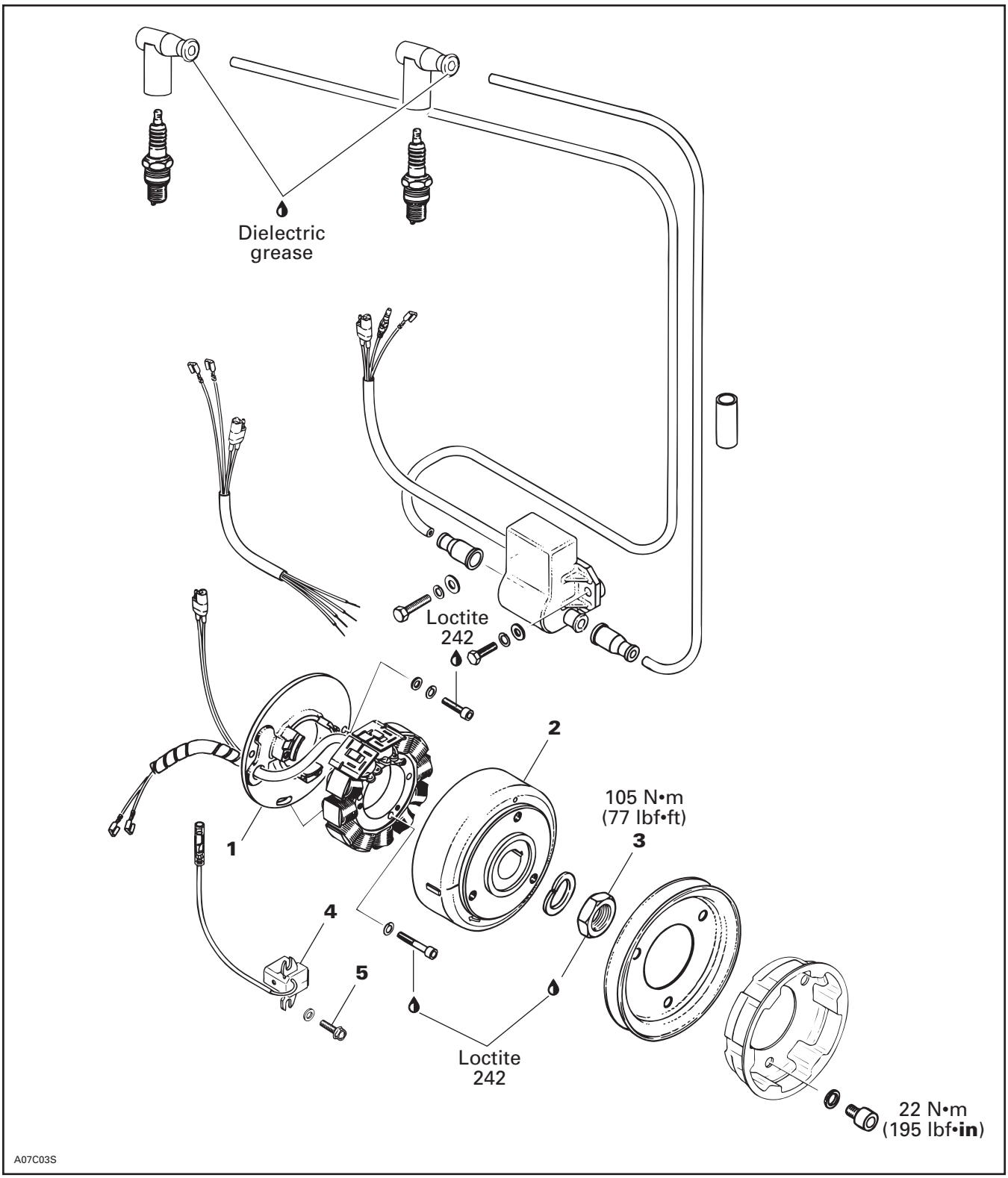
Reinstall fan and starting pulley. Make sure yellow fin of fan is aligned with timing hole when piston is at TDC.

Ignition Timing

Check ignition timing as described in IGNITION TIMING 06-03.

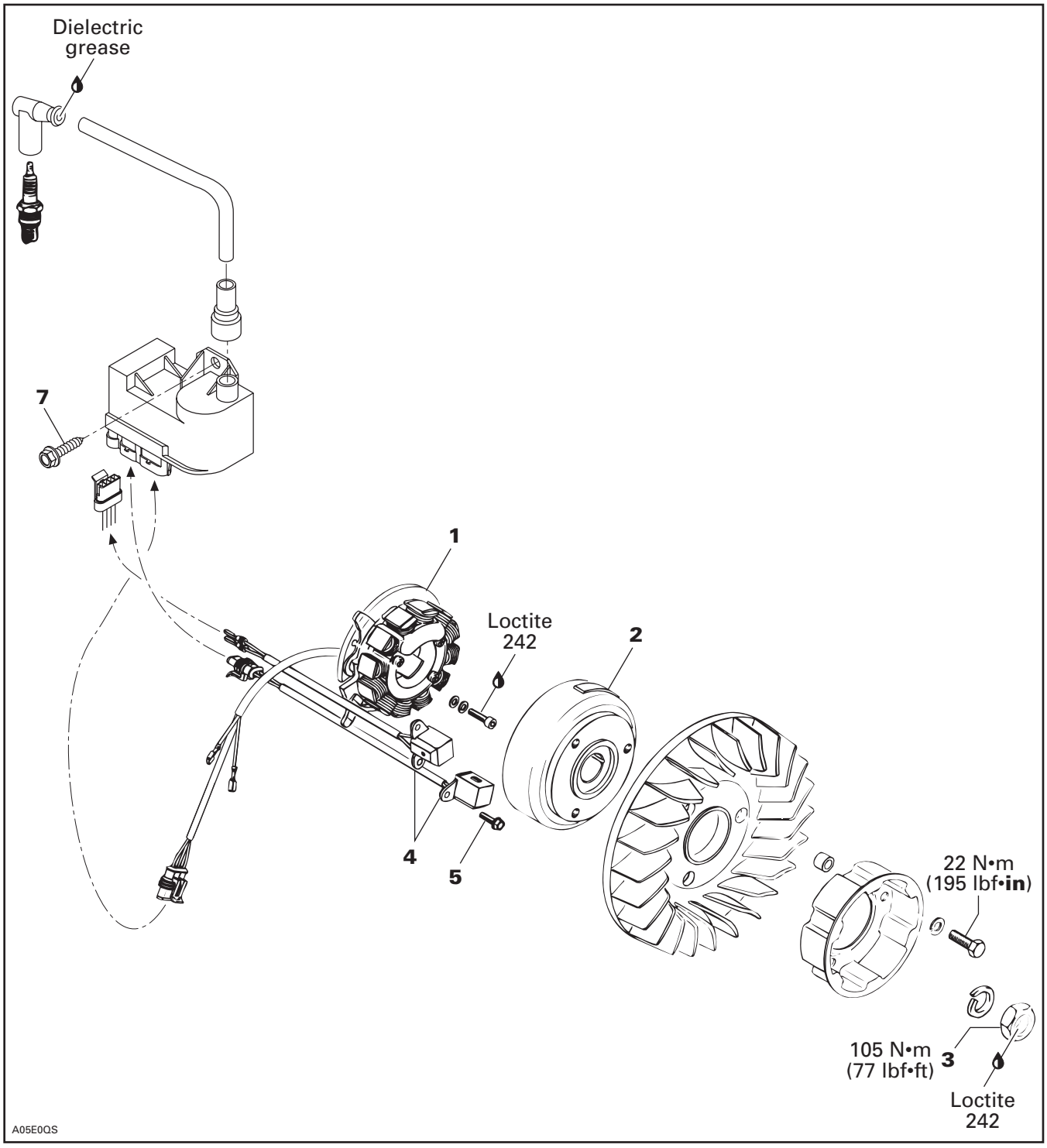
DUCATI IGNITION SYSTEM

Formula S/SL

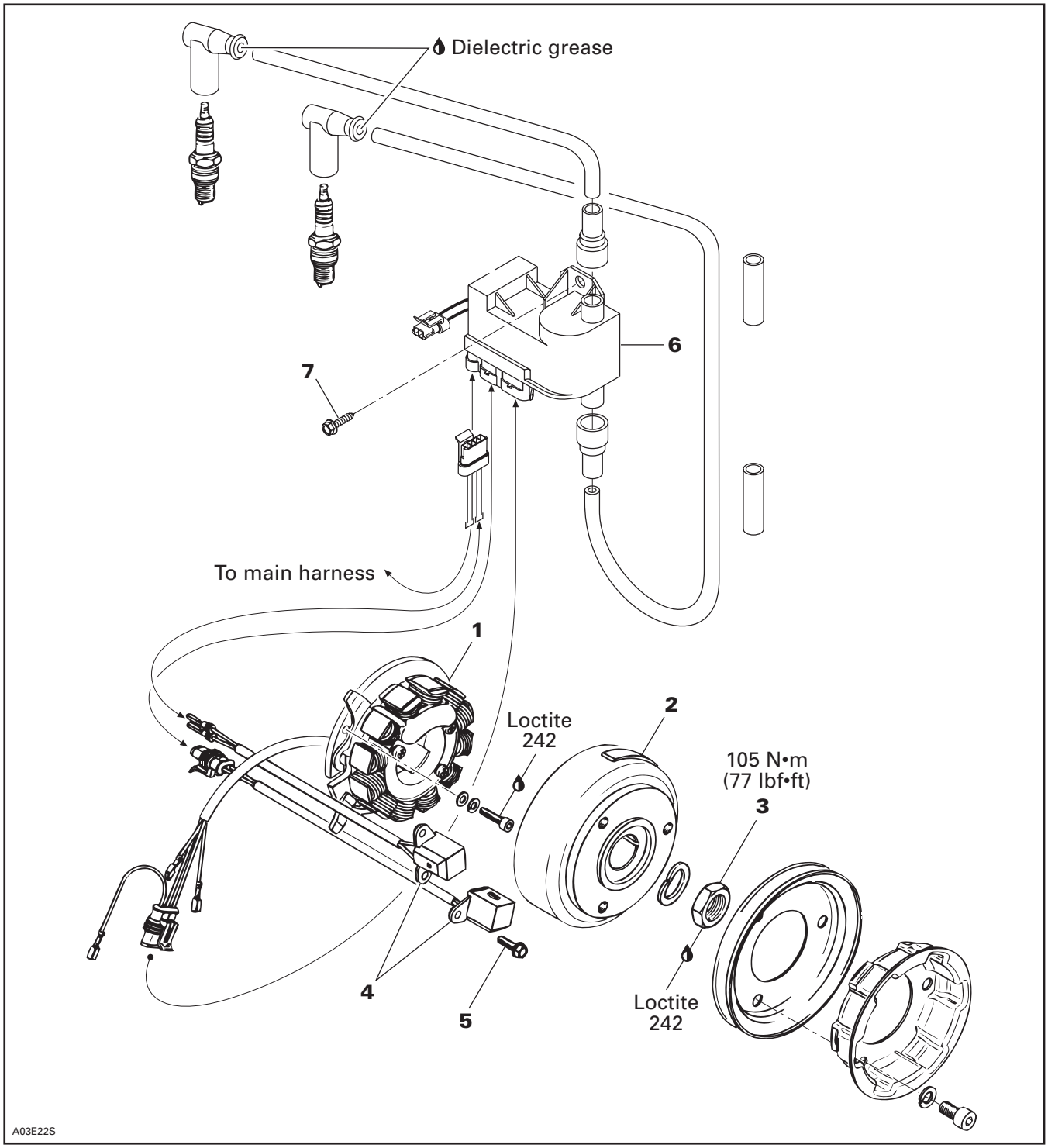


RER IGNITION SYSTEM

Tundra R



Skandic 380/500, Touring E/LE/SLE and Formula DLX 380/500



NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ CAUTION

Clean armature and magneto using only a clean cloth.

DISASSEMBLY

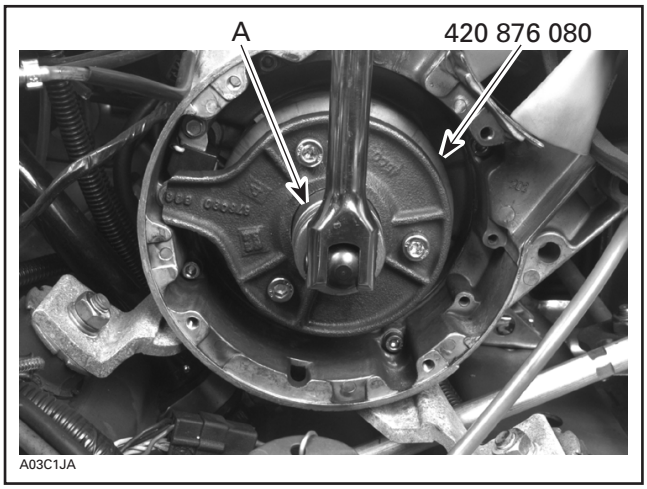
To gain access to magneto assembly, remove the following parts as needed on different engines:

– tuned pipe and muffler
– oil injection pump mounting plate from rewind starter
– rewind starter
– starting and V-belt pulleys

To remove magneto flywheel retaining nut **no. 3**, install puller ring (P/N 420 876 080) and M8 x 20 screws.

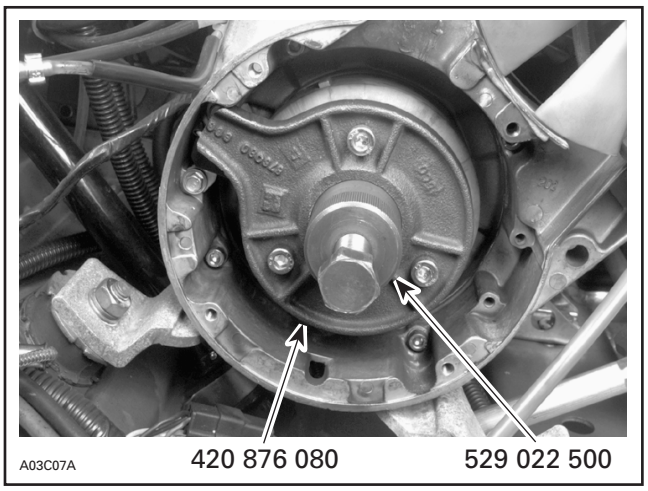
– Remove magneto flywheel nut, using a 30 mm socket machined to 40 mm (1.580 in) outside diameter by 16 mm (5/8 in) long.

NOTE: To correctly remove a threadlocked fastener it is first necessary to tap on the fastener to break threadlocker bond. This will eliminate the possibility of thread breakage.



TYPICAL
A. 30 mm socket

To remove magneto flywheel **no. 2**, install the magneto puller (P/N 529 022 500).



TYPICAL

– Tighten puller bolt and at the same time, tap on bolt head using a hammer to release magneto flywheel from its taper.

NOTE: Before disassembling armature plate, indexing marks should be scribed to facilitate reassembly.

To replace generator coil **no. 1**:

– Heat the armature plate to 93°C (200°F) around the screw holes to break the threadlocker bond.

To replace trigger coil **no. 4**:

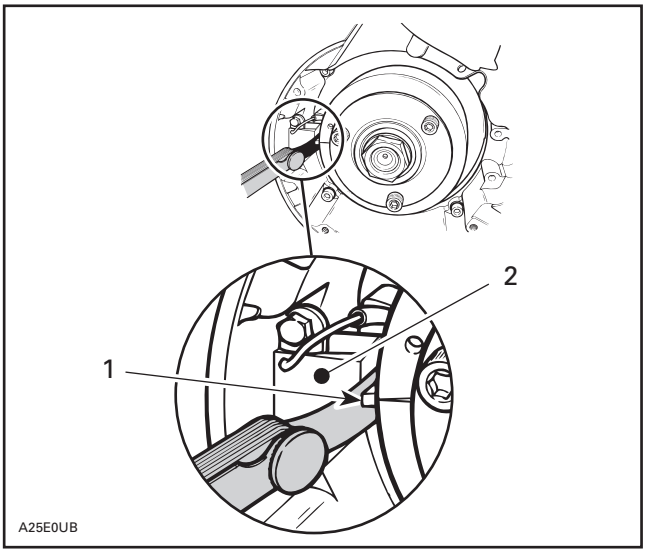
– Disconnect trigger coil wire (RED).
– Remove grommet from crankcase where trigger coil wire exits magneto housing.
– Remove retaining screws **no. 5**.
– Remove trigger coil and carefully pull wire.
– Install new trigger coil and other parts removed.

ADJUSTMENT

Whenever the trigger coil or the magneto flywheel is removed or replaced, the air-gap between the trigger coil and the flywheel protrusion must be checked and adjusted. The purpose of this adjustment is to obtain the minimum clearance between these parts — without touching at any RPM — so that the trigger coil produces its proper electrical output. Ignition timing must also be checked. Refer to IGNITION SYSTEM 06-02.

Proceed as follows:

1. Rotate flywheel so that one protrusion aligns with trigger coil.
2. Using a feeler gauge of 0.45 mm (.018 in) to 0.55 mm (.022 in) thick, check air-gap between center pole of trigger coil and flywheel protrusion.
3. If necessary, adjust by slackening retaining screws and moving trigger coil toward or away of protrusion.
4. Retighten screws and recheck air-gap.



ADJUSTING TRIGGER COIL AIR-GAP

1. Flywheel protrusion
2. Trigger coil

To replace armature:

– Disconnect the 2-wire connector (GREEN and WHITE wires).
– Disconnect YELLOW/BLACK and YELLOW wires.
– Remove grommet from crankcase where magneto harness exits magneto housing.
– Remove armature plate retaining screws.
– Remove armature plate with armature and carefully pull wires.
– Install new parts and other parts removed.

ASSEMBLY

Clean crankshaft extension (taper).

Apply Loctite 242 (blue) on taper.

Position Woodruff key, flywheel and lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue) before tightening nut to 105 N•m (77 lbf•ft).

At reassembly coat all electric connections with silicone dielectric grease (P/N 413 701 700) to prevent corrosion or moisture penetration.

▼ CAUTION

Do not use silicone "sealant", this product will corrode contacts.

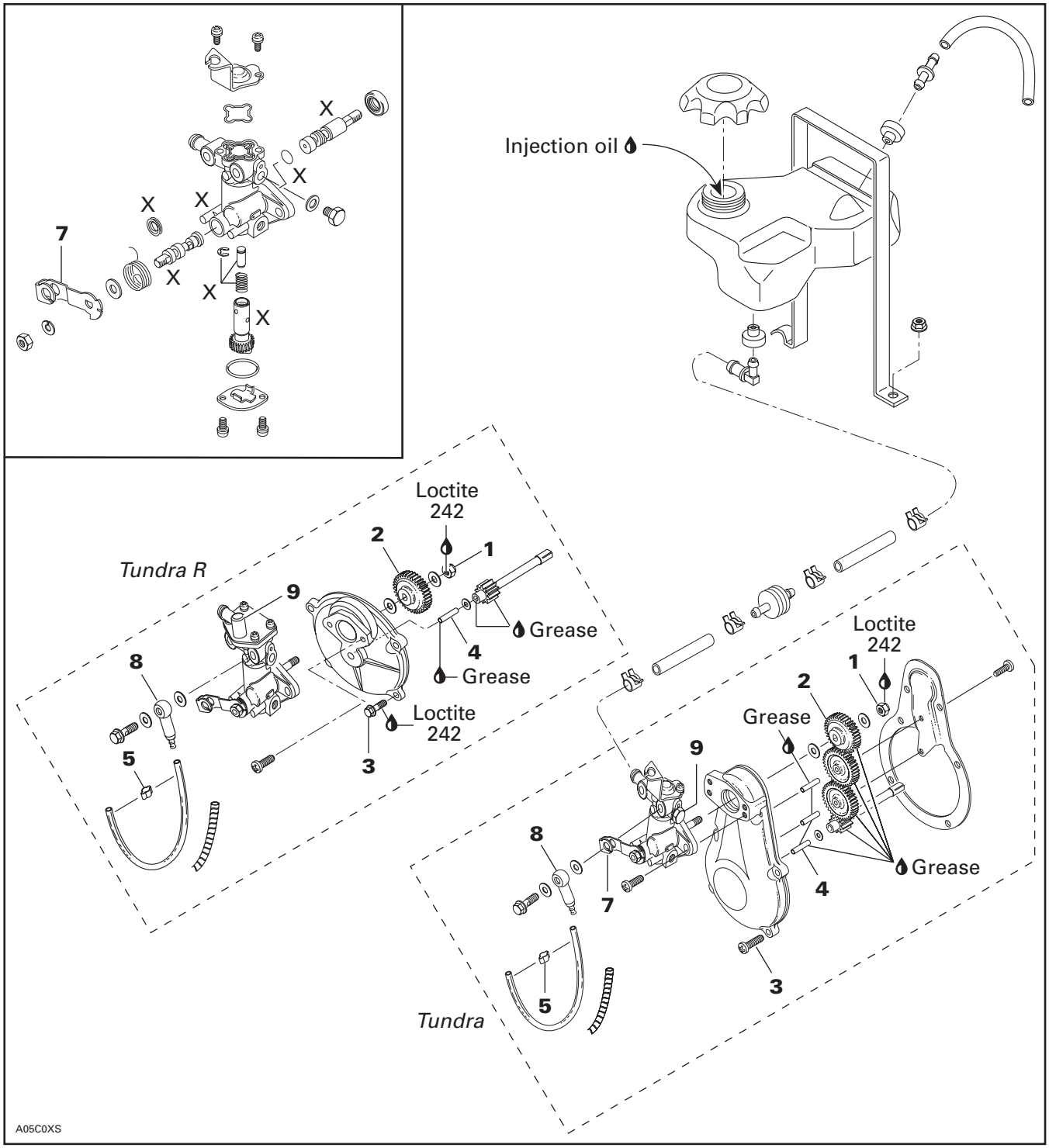
Ignition Timing

Check as described in IGNITION TIMING 06-02.

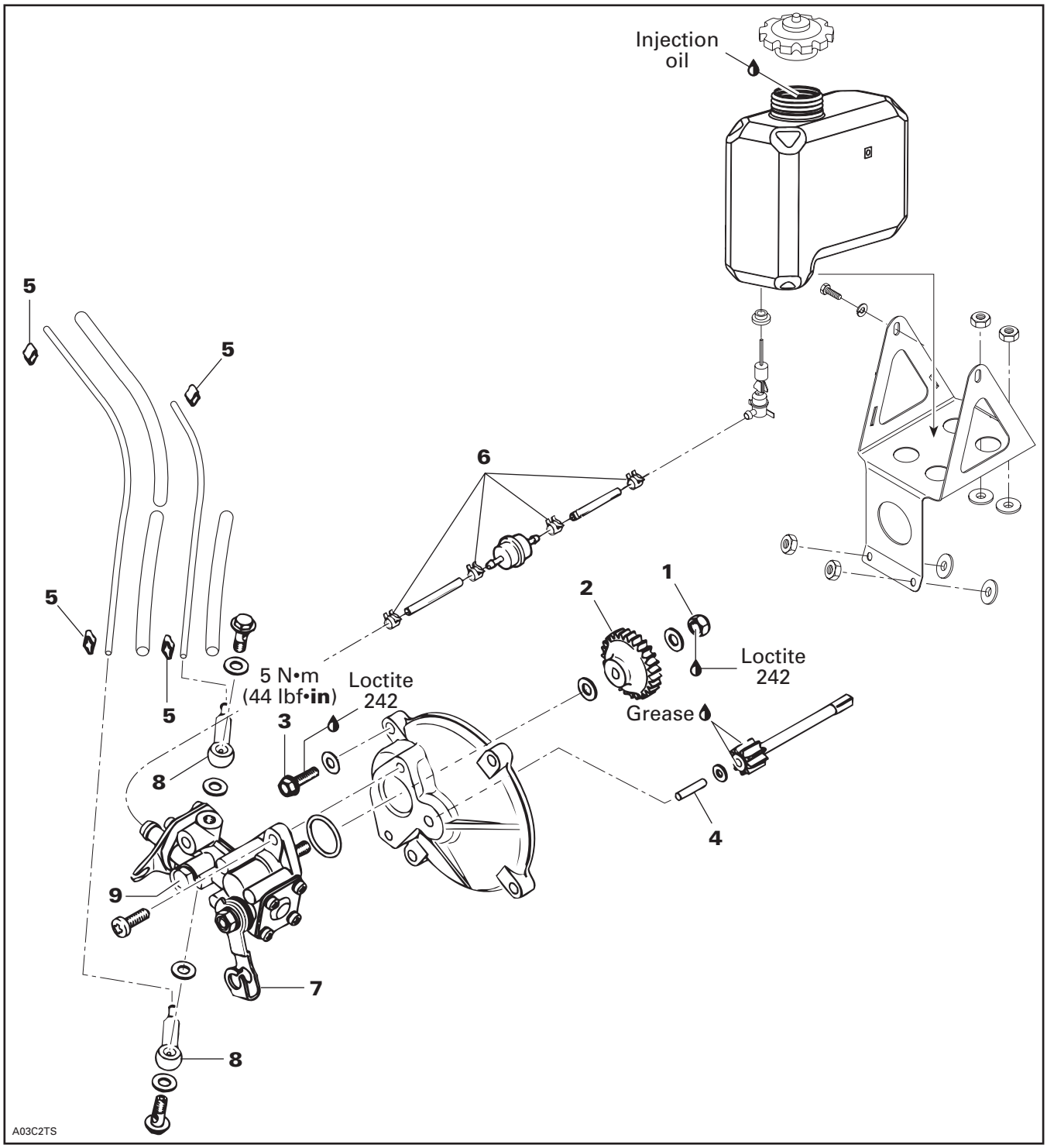
OIL INJECTION SYSTEM

OIL INJECTION PUMP

277 Engine



377, 443 and 503 Engines



OIL SYSTEM LEAK TEST

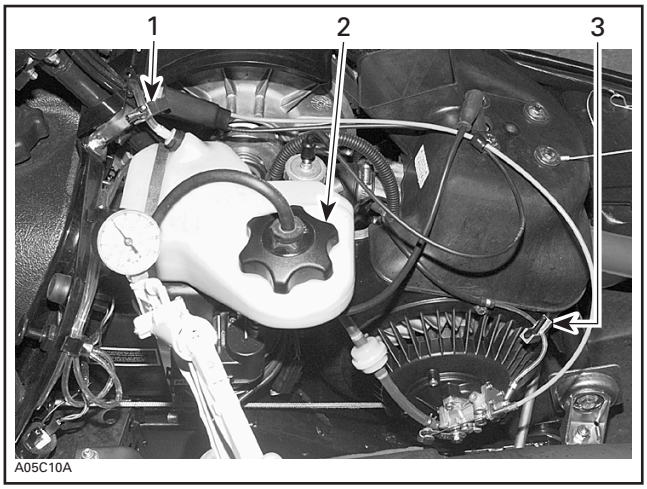
All Models

The following test will indicate any leak from oil reservoir to the banjo fitting(s).

Install on oil reservoir special cap of leak testing kit (P/N 529 033 100).

Tundra Series

Install hose pinchers (P/N 295 000 076) on oil reservoir vent line and outlet hose.

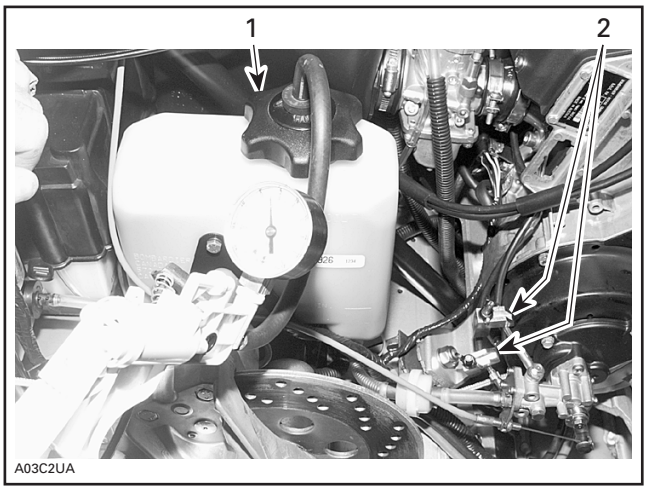


TUNDRA SERIES

1. *Hose pincher on vent line*
2. *Special cap on reservoir*
3. *Hose pincher on outlet hose*

S-Series

Install hose pinchers (P/N 295 000 076) on outlet hoses.



S-SERIES

1. *Special cap on reservoir*
2. *Hose pinchers on outlet hoses*

All Models

Connect pump of leak testing kit to special cap.

Pressurize oil system to 34 kPa (5 PSI). That pressure must not drop during 3 minutes.

If pressure drops, locate leak(s) and repair/replace leaking component(s). To ease locating leak(s) spray soapy water on components, bubbles will indicate leak location(s).

OIL PUMP IDENTIFICATION

Different engines need different pumps. See identification on pump lever **no. 7**.

▼ CAUTION

Always mount proper pump on engine.

ENGINE TYPE	OIL PUMP IDENTIFICATION
277 (Tundra)	135 T
277 (Tundra R)	132 J*
377 (Formula S)	L4 or L5*
377 (Formula DLX 380, Touring E and Skandic 380)	L6*
503 (Formula SL)	E6*
503 (Skandic 500, Touring SLE and Formula DLX 500)	E7*

* These oil pumps do not supply any oil at idle. They are called zero oil delivery at idle.

NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

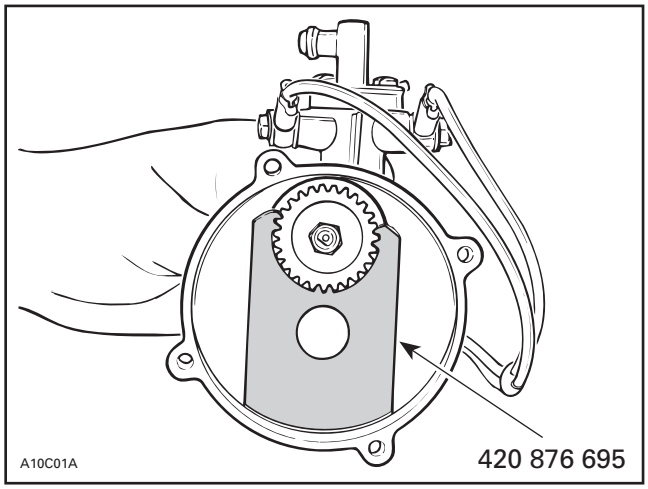
Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

NOTE: Some oil pump components are not available as single parts.

To remove gear retaining nut **no. 1**, first extract the needle roller **no. 4** with pliers then lock gear **no. 2** in place using the following gear holder:

ENGINE TYPE	TOOL P/N
377/443/503	420 876 695



ASSEMBLY

At gear **no. 2** assembly, apply a light coat of synthetic grease (P/N 413 711 500) on gear teeth.

The needle roller **no. 4** must be engaged as deep as possible in the pump mounting flange.

Always check for spring clips **no. 5** and clamps **no. 6** tightness.

Torque screws **no. 3** to 5 N•m (44 lbf•**in**).

Make sure cable barrel is well seated in oil pump lever.

Secure barrel with plastic washer and circlip.

Verify cable and oil pump lever operation.

ADJUSTMENT

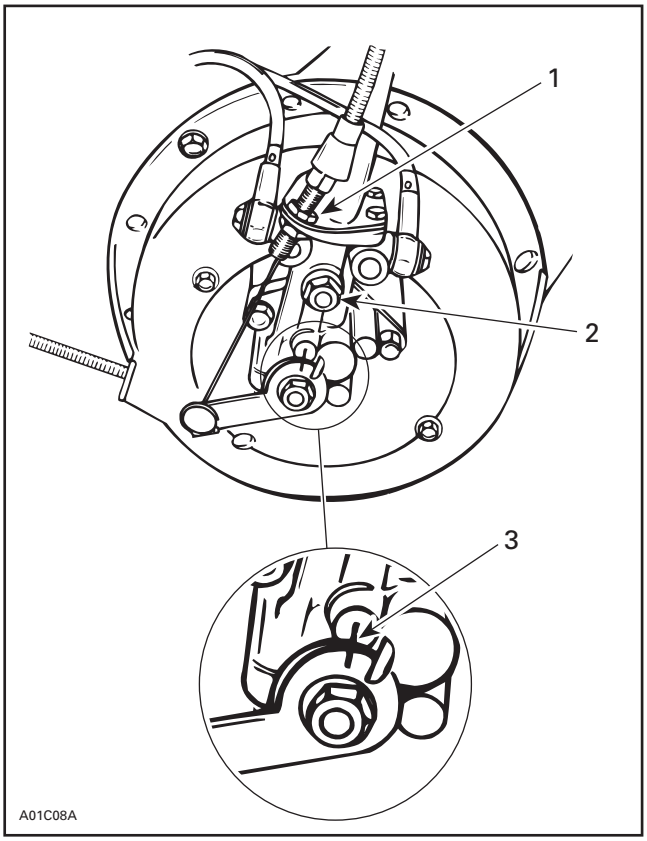
Prior to adjusting the pump, make sure all carburetor adjustments are completed.

Synchronizing Pump with Carburetor

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place.

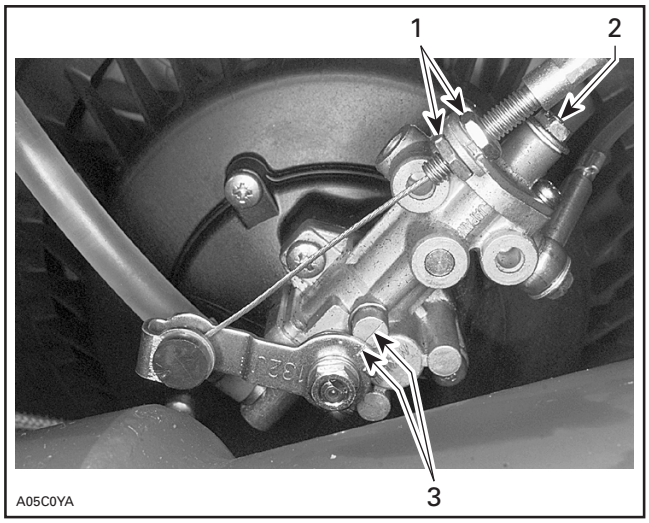
The marks on the pump casting and on the lever must align. Pump lever mark may be up to 2 mm (.080 in) at right of casting mark. So pump may be partially opened at idle. Loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.



TYPICAL — S-SERIES AND TUNDRA

1. *Adjuster nuts*
2. *Bleeder screw*
3. *Marks must align*



TYPICAL — TUNDRA R

1. *Adjuster nuts*
2. *Bleeder screw*
3. *Marks must align*

▼ CAUTION

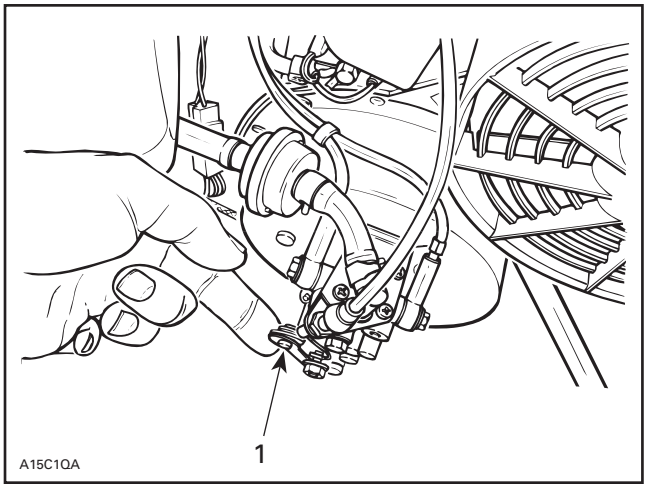
Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

BLEEDING

All oil lines should be full of oil. If required, bleed the main oil line (between tank and pump) by loosening the bleeder screw no. 9 until all air has escaped from the line.

Make sure the tank is sufficiently filled.

Check the small oil lines (between pump and intake manifold). If required, fill the lines by running the engine at idle speed while holding the pump lever in fully open position.



TYPICAL — ENGINE AT IDLE

1. Fully open position

◆ WARNING

Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

CHECKING OPERATION

Oil Pump

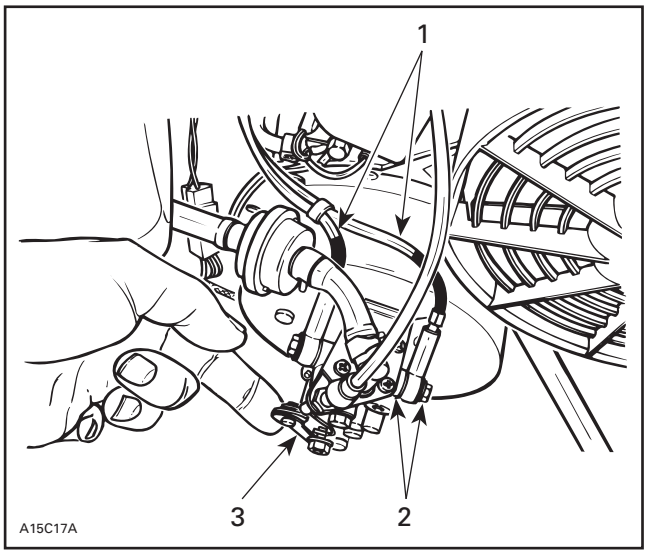
On Vehicle

NOTE: Main oil line must be full of oil. See bleeding procedure above.

Lift rear of vehicle and support with a mechanical stand. Unbolt banjo fittings from pump. Start engine and stop it as soon as it fires.

Check that oil level in small oil lines is passed banjo fittings end by about 25 mm (1 in) (this will be indicated by a clear section of small oil lines of about 25 mm (1 in)). Repeat the procedure until this condition is attained.

Reconnect banjo fittings with a washers on each side, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.



TYPICAL — ENGINE AT IDLE

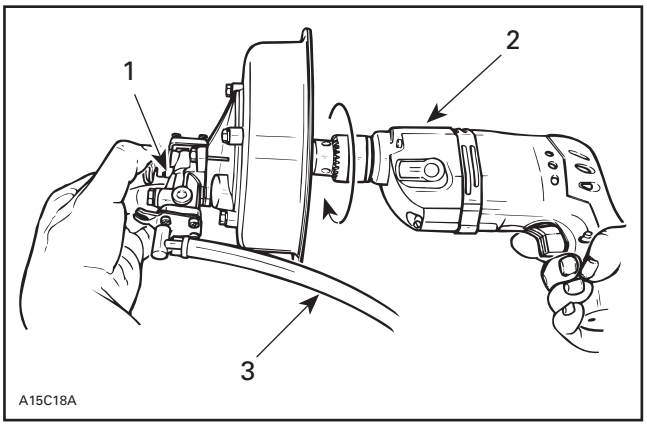
1. Oil columns advancing
2. Washer on each side
3. Fully open position

If not, remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as describes below.

NOTE: Through normal use, oil level must not drop in small tubes. If oil drops, verify check valve operation in banjo fittings. Replace as necessary.

Test Bench

Connect a hose filled with injection oil to main line fitting. Insert other hose end in an injection oil container. Using a counterclockwise rotating drill rotate pump shaft. Oil must drip from outer holes while holding lever in a fully open position. If not replace pump.



TYPICAL

1. *Fully open position*
2. *Counterclockwise rotating drill*
3. *Main line*

Banjo Fitting

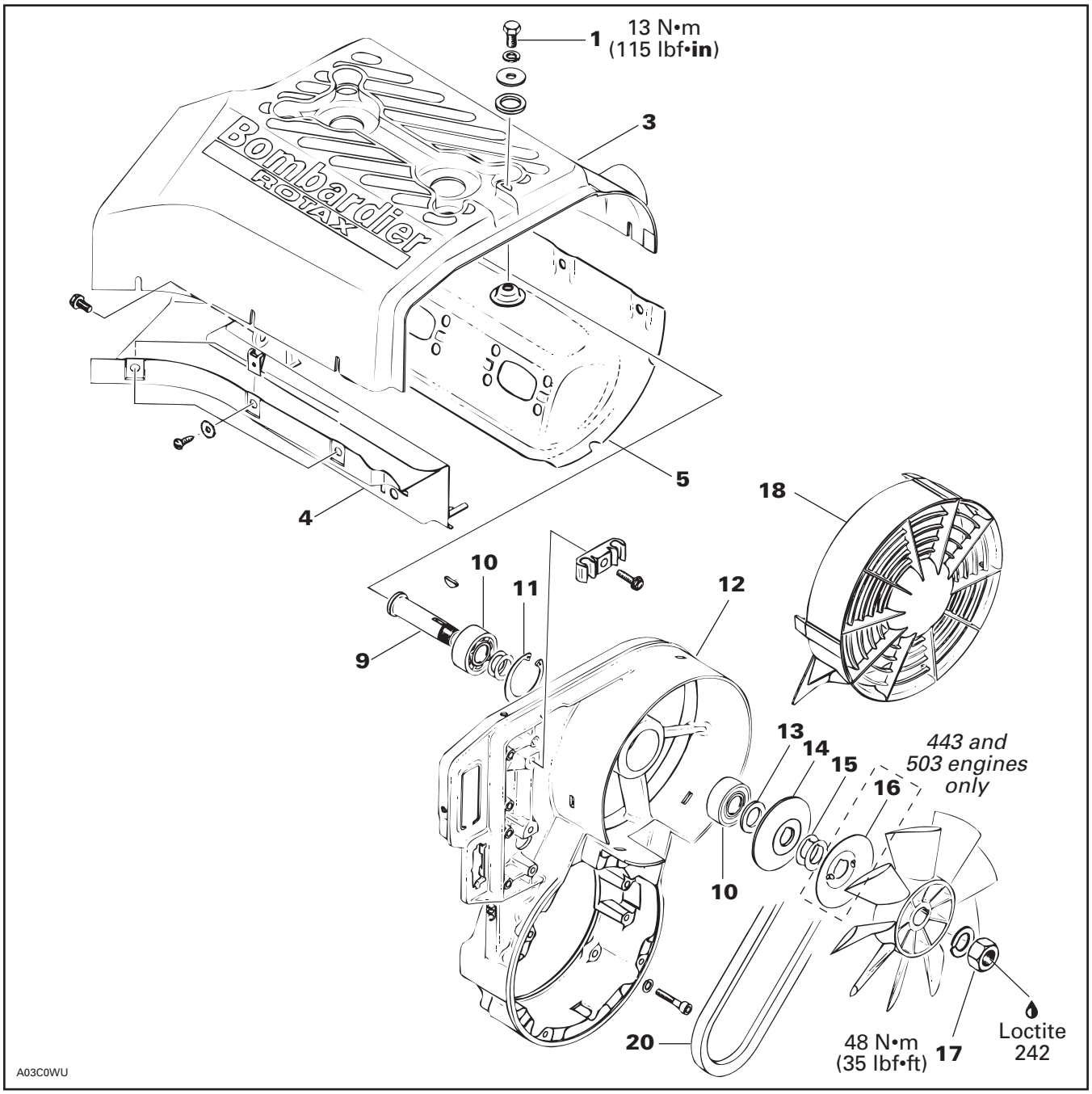
Inside the banjo fitting, there is a ball that acts as a check valve. To verify this check valve, proceed the same as for checking pump operation on vehicle. First unbolt banjo fitting from pump. After restarting the engine, check that a clear section in small oil line is present. Reconnect banjo fitting.

Run engine at idle. Oil column must advance. If the check valve is faulty, oil column will go back and forth. Replace if so.

AXIAL FAN COOLING SYSTEM

NOTE: For 277 engine radial fan cooling system, refer to CDI SYSTEM 04-05.

377, 443 and 503 Engines

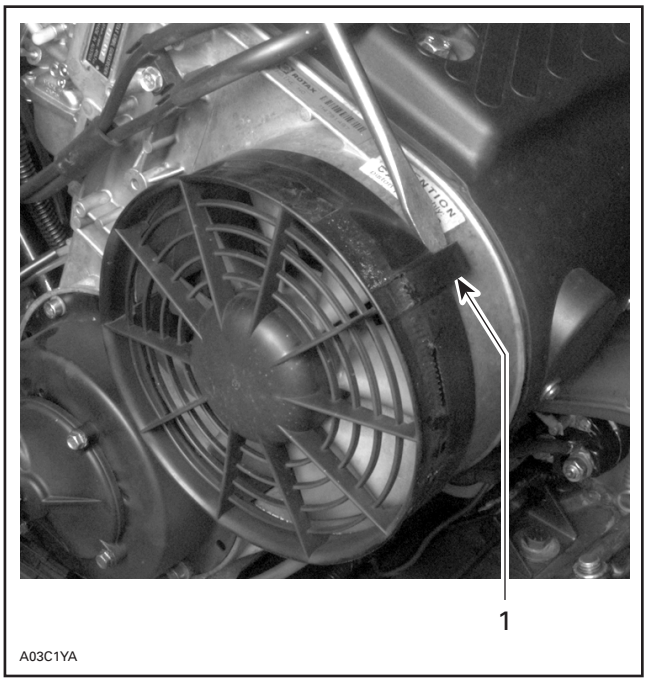


NOTE: The following procedures can be done without removing engine from chassis.

REMOVAL

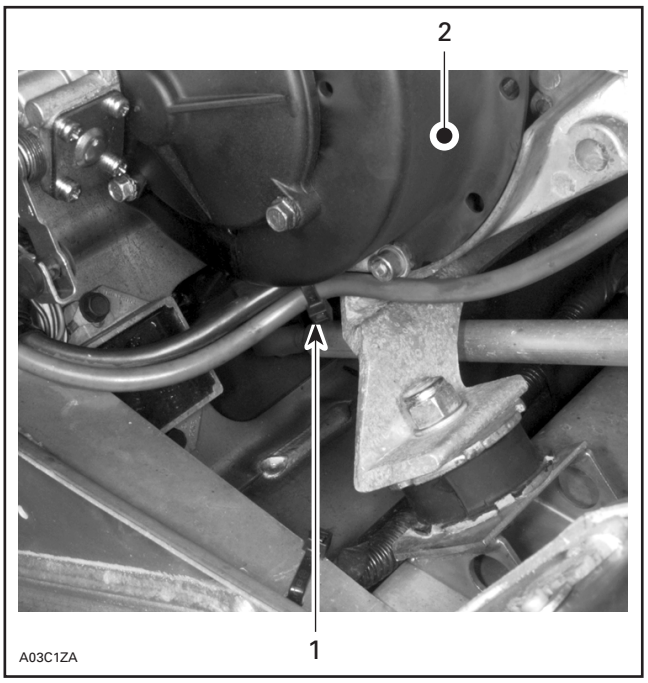
Remove muffler.

Using a flat screwdriver, lift fan protector tabs as shown in the following photo, then remove fan protector.



1. Lift tab and remove fan protector

Cut locking tie located under rewind starter (electric start models only).

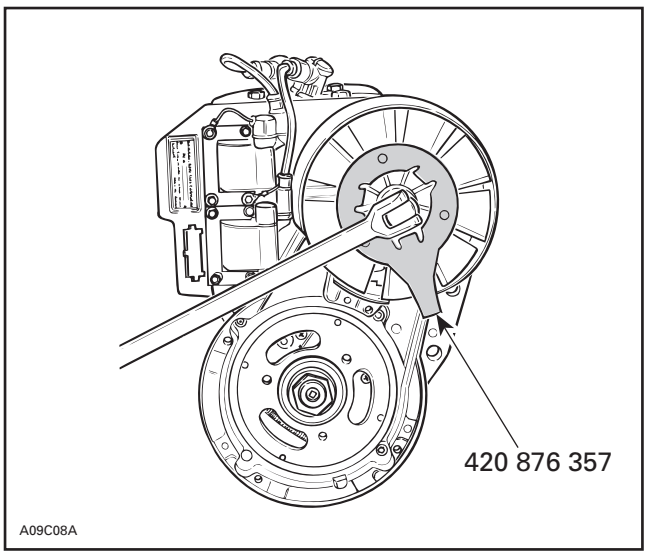


ELECTRIC START MODELS ONLY

1. Cut this locking tie
2. Rewind starter

Remove rewind starter and put it aside. On models so equipped remove connecting flange bolted to fan housing.

Using fan holder tool (P/N 420 876 357), unscrew fan shaft nut.



TYPICAL

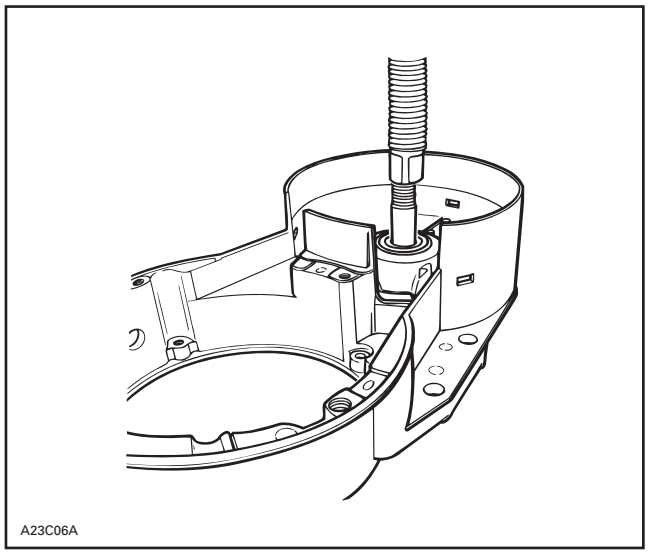
Unplug trigger coil(s) then remove fan housing ass'y.

CLEANING

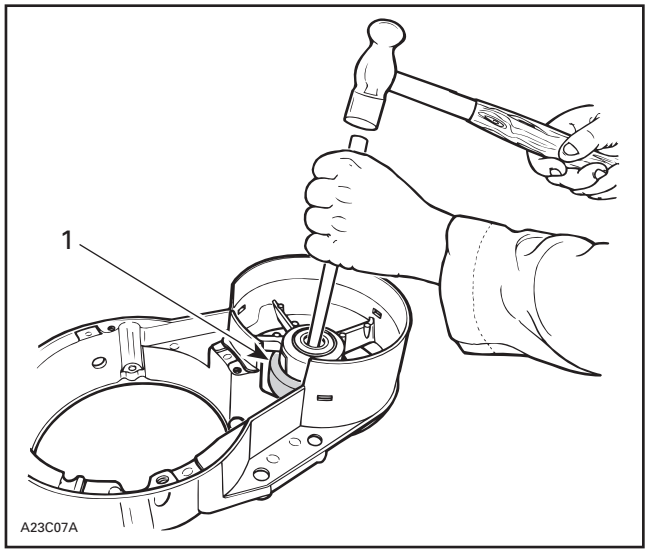
Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY AND ASSEMBLY

Using a press, drive the fan shaft **no. 9** out.



Support fan housing **no. 12** with a ring. With a punch, working all around bearing **no. 10** inner race, drive bearing out of fan housing. Keep shims for installation.



1. Ring supporting fan housing

Remove circlip **no. 11** then remaining bearing.

To install, press one bearing in place then install circlip and shims. Press the other bearing from opposite side until it is flush with housing. Press fan shaft from engine side of fan housing. Check for free rolling action.

INSTALLATION

At assembly, apply a light coat of Loctite 242 (blue) on screw **no. 1** threads.

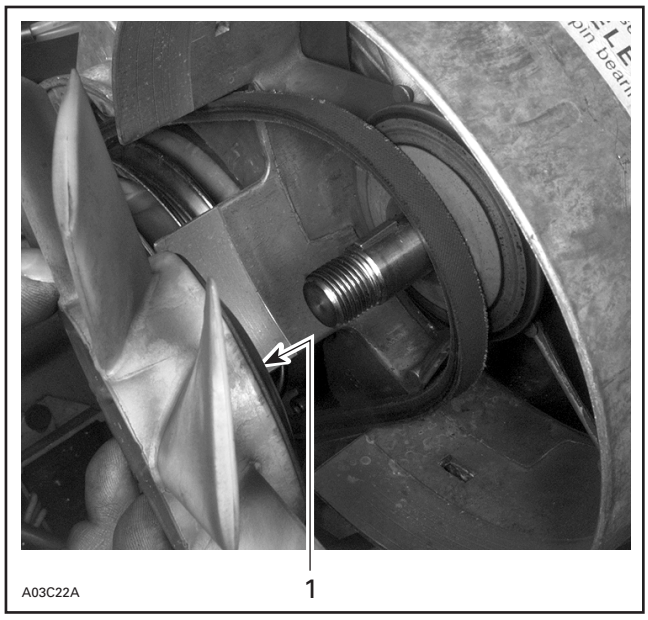
A gasket must be placed on both sides (inner and outer) of intake and exhaust holes of cylinder cowl **nos. 4** and **5**.

FAN BELT REPLACEMENT AND DEFLECTION ADJUSTMENT

Remove muffler, rewind starter and on so equipped models connecting flange. Following procedure described above.

Using fan holder tool (P/N 420 876 357), remove fan nut.

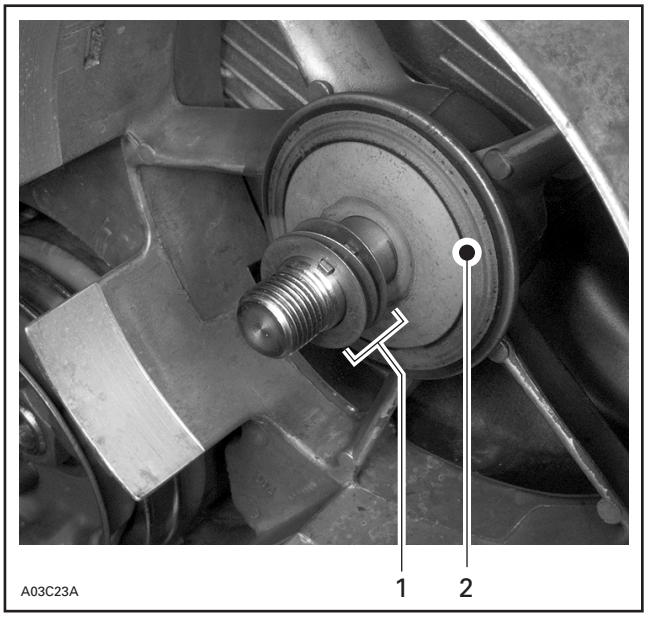
Remove fan with pulley half.



1. Remove fan with pulley half

Remove fan belt.

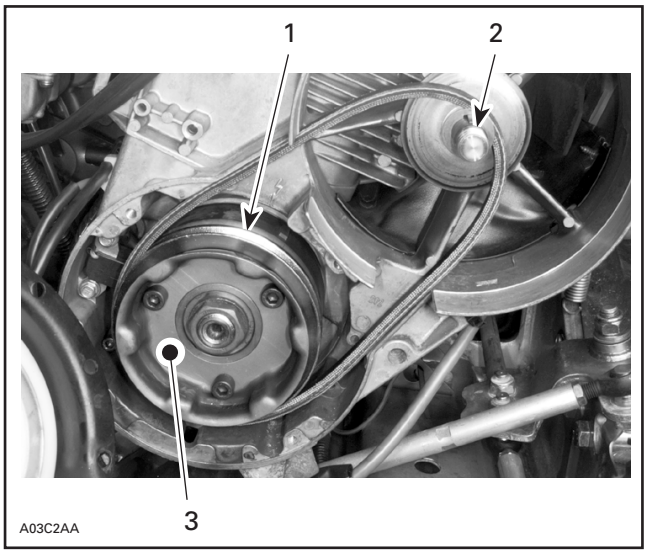
Leave shims and second half pulley in place. Refer to the following photo.



1. Keep shims
2. Leave second half pulley in place

Reassembly

Install fan belt on bottom pulley first then position onto fan shaft, as shown in the next photo.



FAN BELT PROPERLY INSTALLED ON BOTTOM PULLEY AND FAN SHAFT

1. Bottom pulley
2. Fan shaft
3. Starting pulley

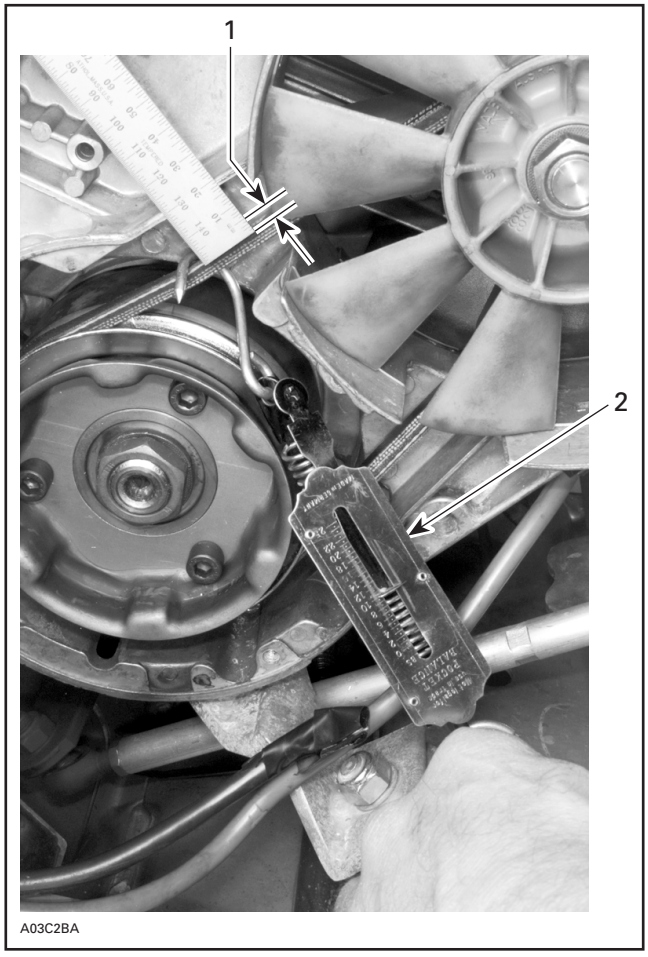
Reinstall fan assembly on fan shaft. Temporarily tighten fan nut.

▼ CAUTION

When reinstalling fan assembly, ensure that key is properly positioned into fan shaft keyway.

Fan Belt Deflection Adjustment

Check fan belt deflection using a ruler and a fish scale positioned midway between pulleys as per following photo.



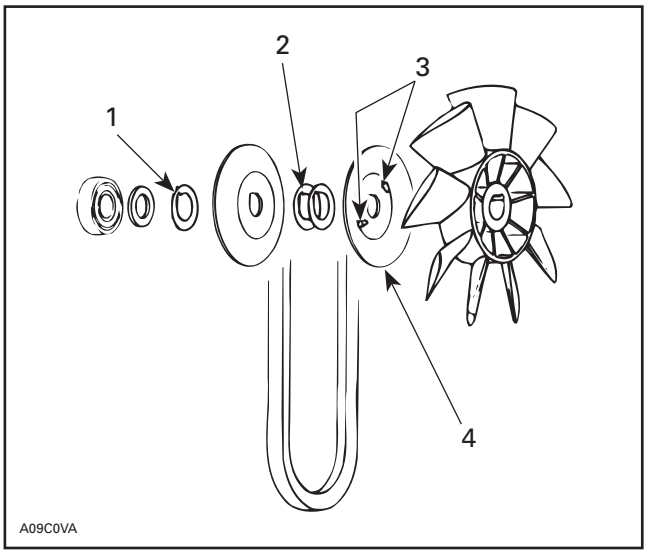
TYPICAL

1. Measure deflection here
2. Fish scale

Belt deflection must be according to the following specifications:

ENGINE TYPE	BELT DEFLECTION	FORCE APPLIED
377	8.5 mm (11/32 in)	5 kg (11 lb)
443 and 503	9.5 mm (3/8 in)	

To adjust deflection tension, add or remove shim(s) **no. 15** between pulley halves **nos. 14** and **16**. Install excess shim(s) between distance sleeve **no. 13** and half pulley **no. 14** (housing side).

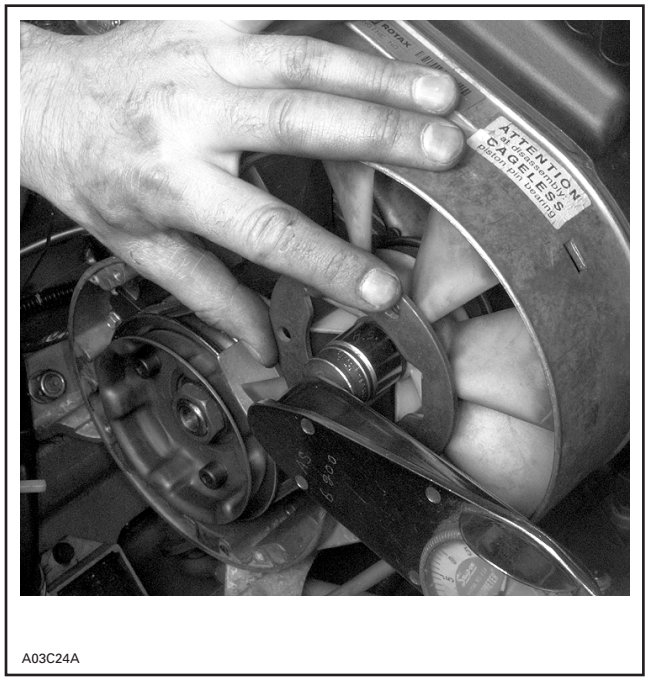


1. Unused shim(s) here
2. Adjust here
3. Positioning noses
4. Some engines only

Some engines have a separate metal pulley half instead of using back of fan as pulley half. On first mentioned engines, select pulley halves so that the one with 2 positioning noses will be on fan side. Ensure to insert these noses into fan notches.

Once fan belt is properly adjusted, torque fan nut to 48 N•m (35 lbf•ft) using fan holder tool (P/N 420 876 357), as shown in the following photo.

NOTE: Apply Loctite 242 (blue) on fan nut threads.



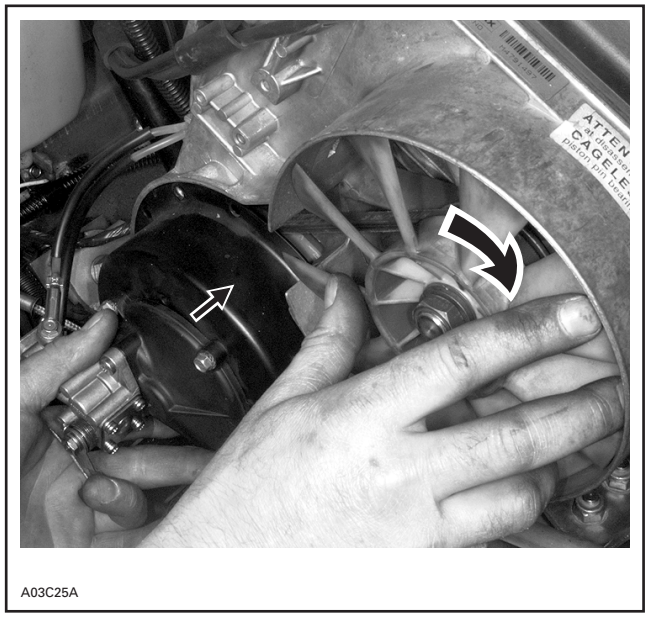
TORQUE FAN NUT USING FAN HOLDER TOOL

Finalizing Reassembly

Reinstall rewind starter.

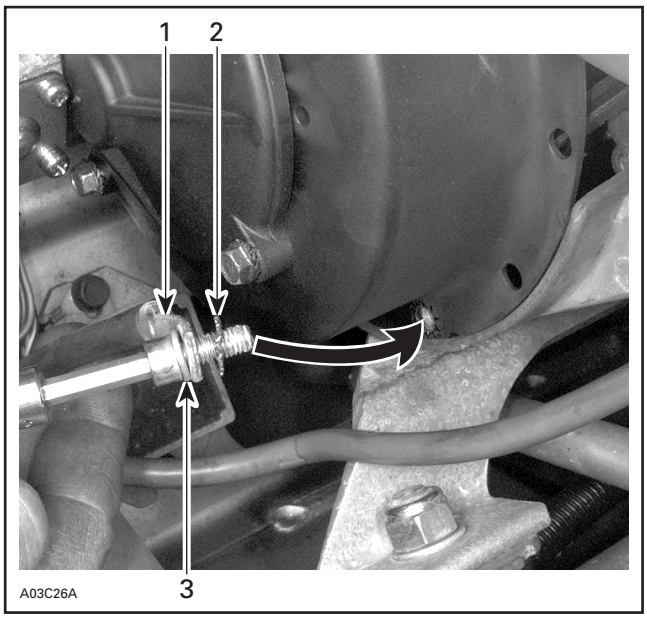
▼ CAUTION

When installing rewind starter, ensure that oil pump shaft is properly positioned. Do not force shaft insertion. Turn fan until oil pump shaft slides in place, as shown in the following photo.



TURN FAN TO SLIDE OIL PUMP SHAFT IN PLACE

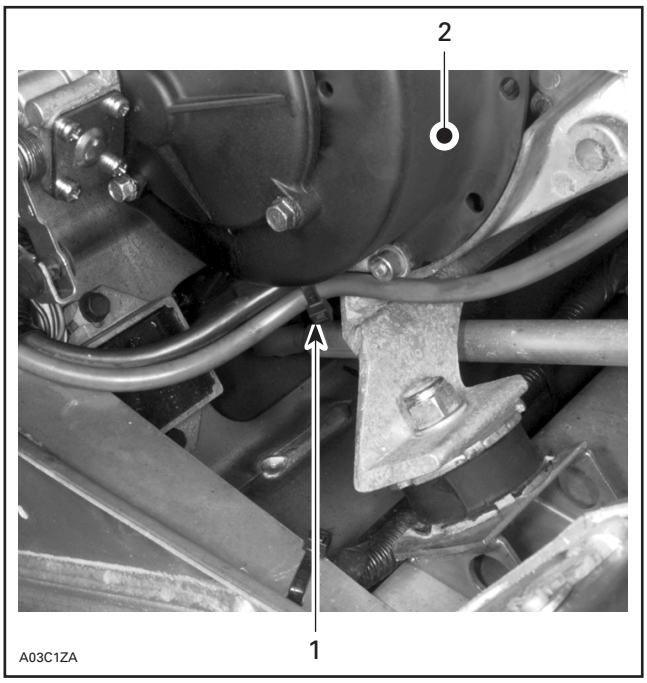
Secure rewind starter with original screws and ensure that ground cable (electric start models only) is properly installed, as shown in the following photo.



ELECTRIC START MODELS ONLY

1. *Ground cable*
2. *Tooth washer*
3. *Washer*

On electric start models, secure cables with a locking tie.



ELECTRIC START MODELS ONLY

1. *Secure cables with a locking tie*
2. *Rewind starter*

Reinstall fan protector no. 18 properly.

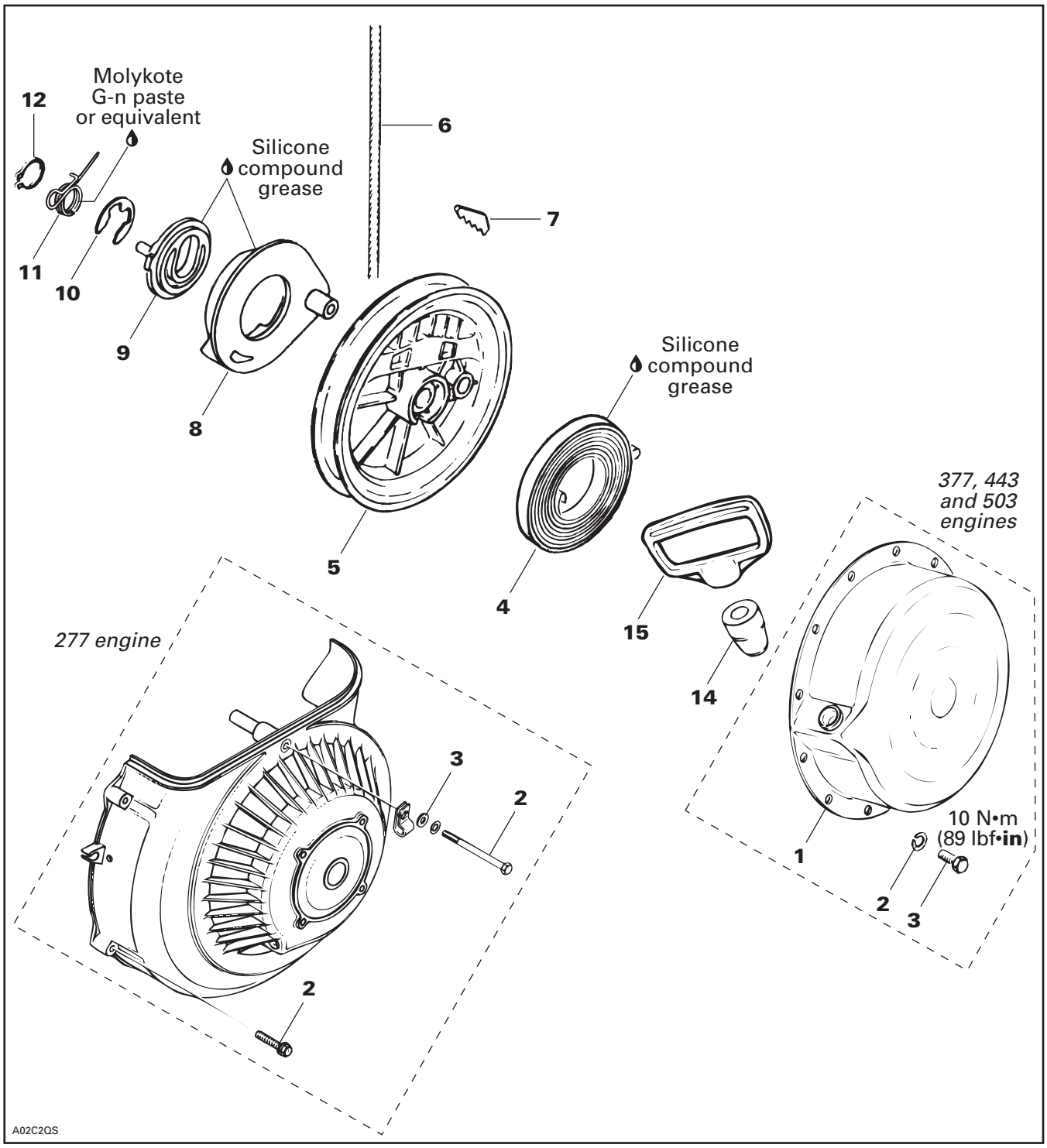
◆ WARNING

Always reinstall fan protector after servicing.

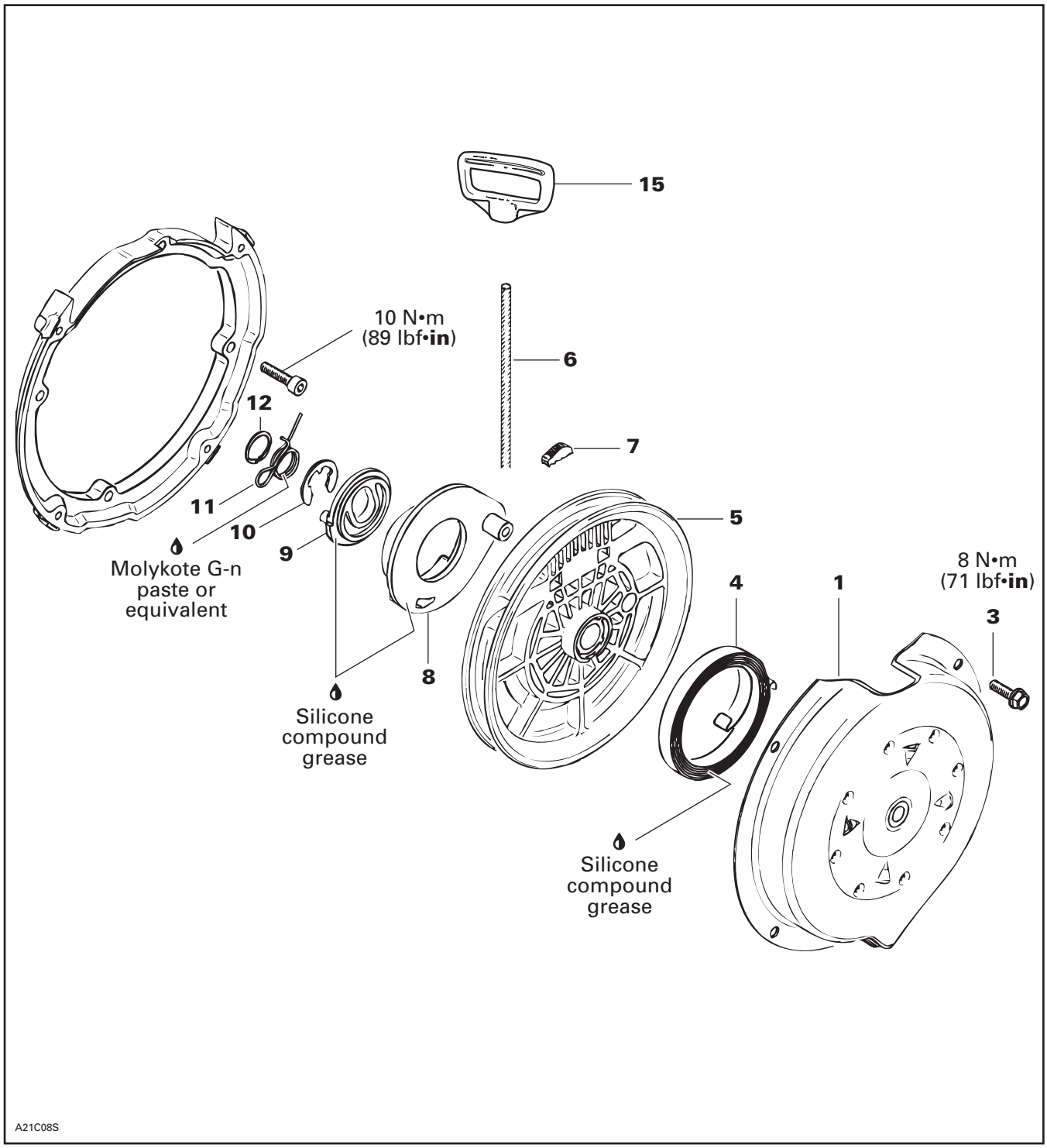
Reinstall muffler.

REWIND STARTER

277, 377, 443 and 503 on Touring SLE Engines



503 Engine on Skandic 500 and Formula SL



PARTS

REMOVAL

Using a small screwdriver, extract rope knot from starter grip no. 15. Cut rope close to knot. Tie a knot near starter.

Tundra Series

Slightly lift cylinder cowl. Remove screws no. 3, lock washer, washer no. 2 and clip. Remove fan cowl that contains rewind starter.

S-Series

Remove screws no. 3 and washers no. 2 securing rewind starter no. 1 to engine then remove rewind starter.

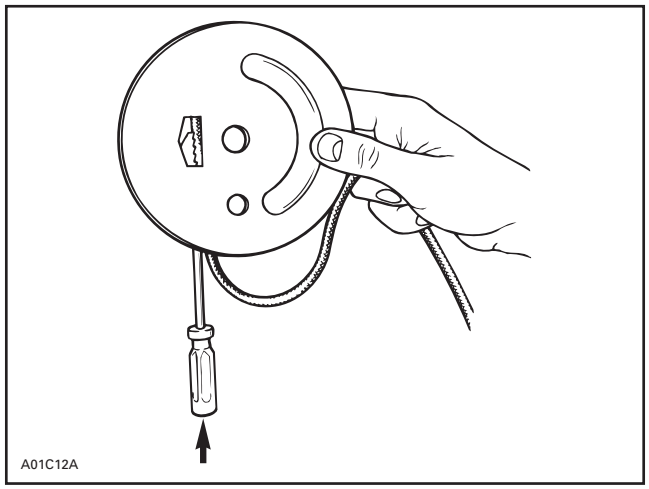
All Models

Remove pump from rewind starter cover.

DISASSEMBLY

To remove rope from rewind starter mechanism:

– First remove locking ring no. 12, locking spring no. 11, circlip no. 10, pawl lock no. 9 and pawl no. 8.
– Remove sheave no. 5 from starter housing no. 1.
– Disengage key no. 7 and pull out rope no. 6.



GENTLY TAP ON KEY

INSPECTION

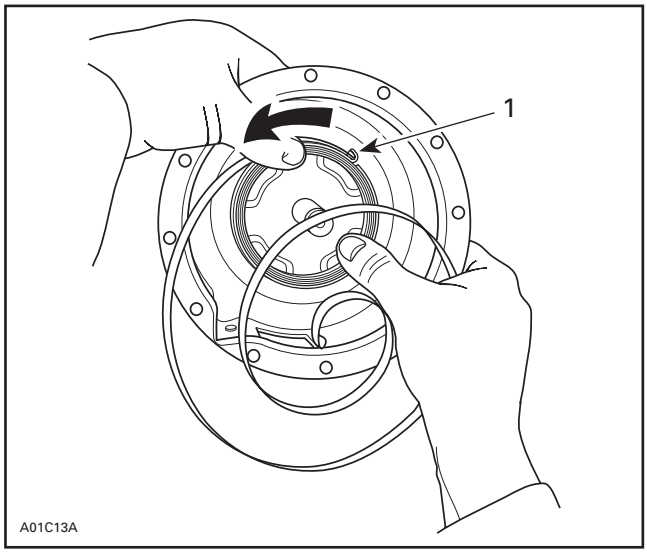
Check rope no. 6 for fraying. Replace if so.

ASSEMBLY

At assembly, position spring no. 4 outer end into spring guide notch then wind the spring counterclockwise into guide.

◆ WARNING

Since the spring is tightly wound inside the guide it may fly out when rewind is handled. Always handle with care.



1. Outer end into guide notch

NOTE: Due to dust accumulation, rewind starter must be periodically cleaned, inspected and relubricated.

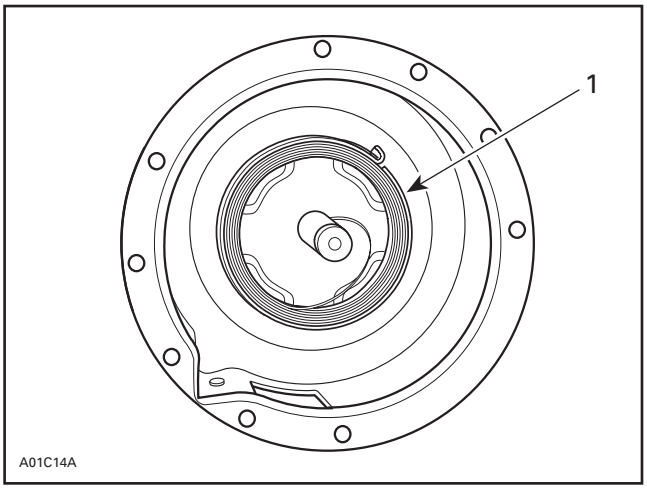
▼ CAUTION

It is of the utmost importance that the rewind starter spring(s) be lubricated periodically using specific lubricants. Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Lubricate spring assembly with silicone compound grease (P/N 420 897 061) and position into starter housing as illustrated.

▼ CAUTION

This lubricant must NOT be used on rewind starter locking spring as it does not stay on under vibration.

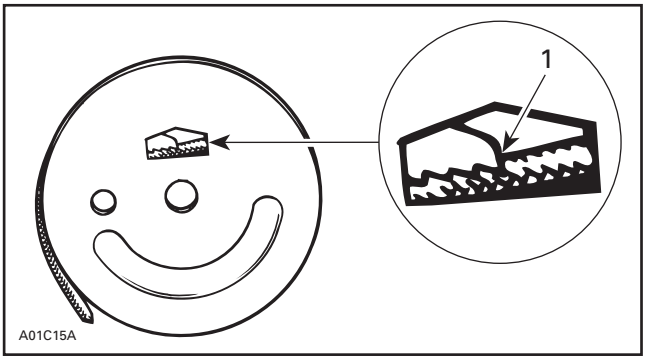


1. Grease inside spring guide

▼ CAUTION

The use of standard multi-purpose grease could result in rewind starter malfunction.

To install a new rope **no. 6**: insert rope into sheave **no. 5** orifice and lock it with the key **no. 7** as illustrated.



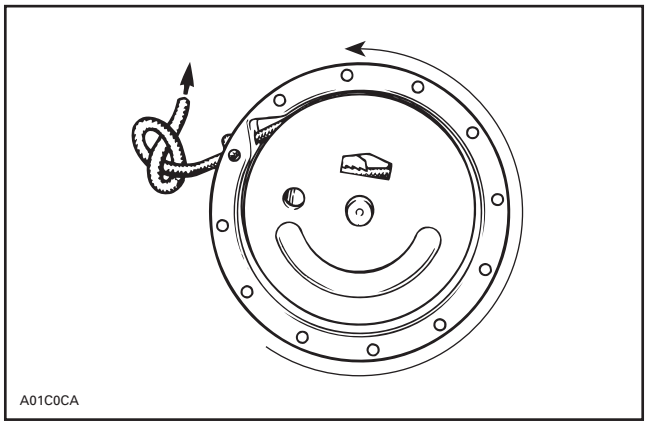
1. Push to lock

To adjust rope tension:

Wind rope on sheave and place rope sheave into starter housing making sure that the sheave hub notch engages in the rewind spring hook.

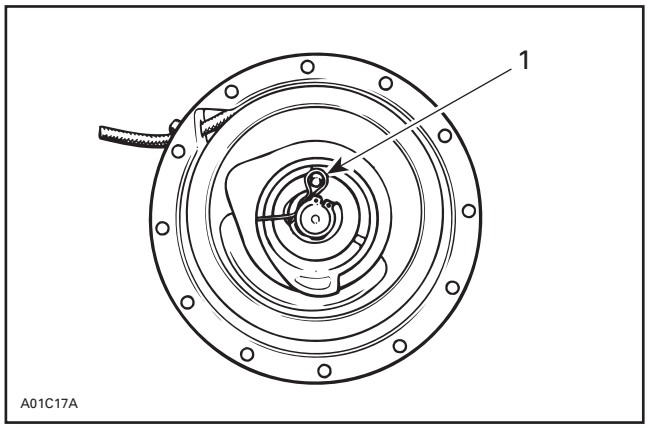
Rotate the sheave counterclockwise until rope end is accessible through starter housing orifice.

Pull the rope out of the starter housing and temporarily make a knot to hold it. One turn preload will give 7 turns of tension when fully extended.



Position pawl **no. 8**, pawl lock **no. 9** and circlip **no. 10**.

Install locking spring **no. 11** and lubricate with MOLYKOTE G-n paste from Dow Corning® or equivalent.



1. Spring coated with MOLYKOTE G-n paste

Install locking ring.

▼ CAUTION

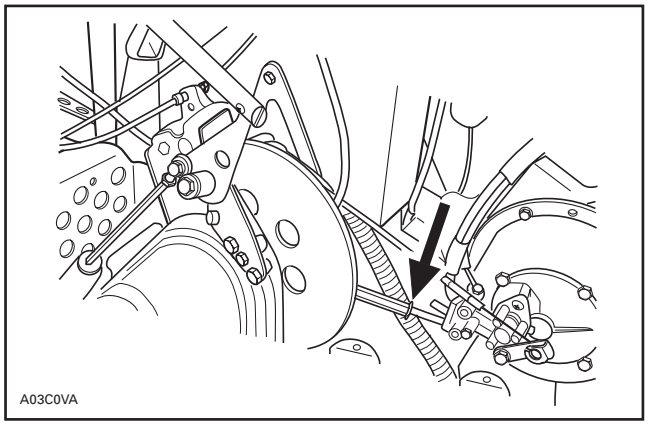
This lubricant must NOT be used on rewind springs as it does not stay on when dry.

INSTALLATION

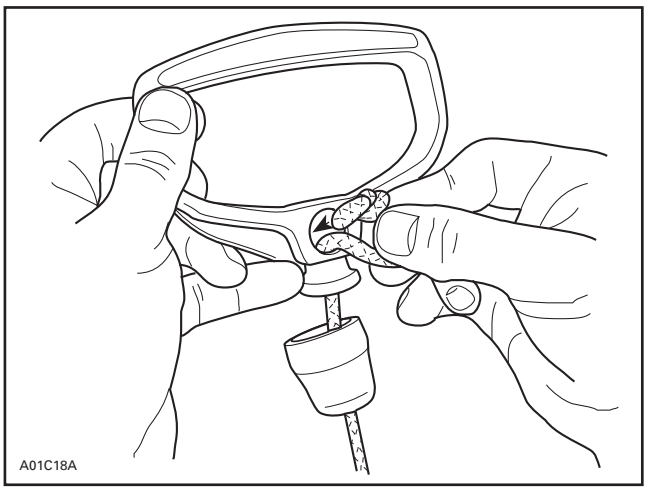
On fan cooled models with oil injection pump, reinstall oil pump on rewind starter assembly.

Reinstall rewind starter assembly on engine.

Thread starter rope **no. 6** through rope guide when applicable.

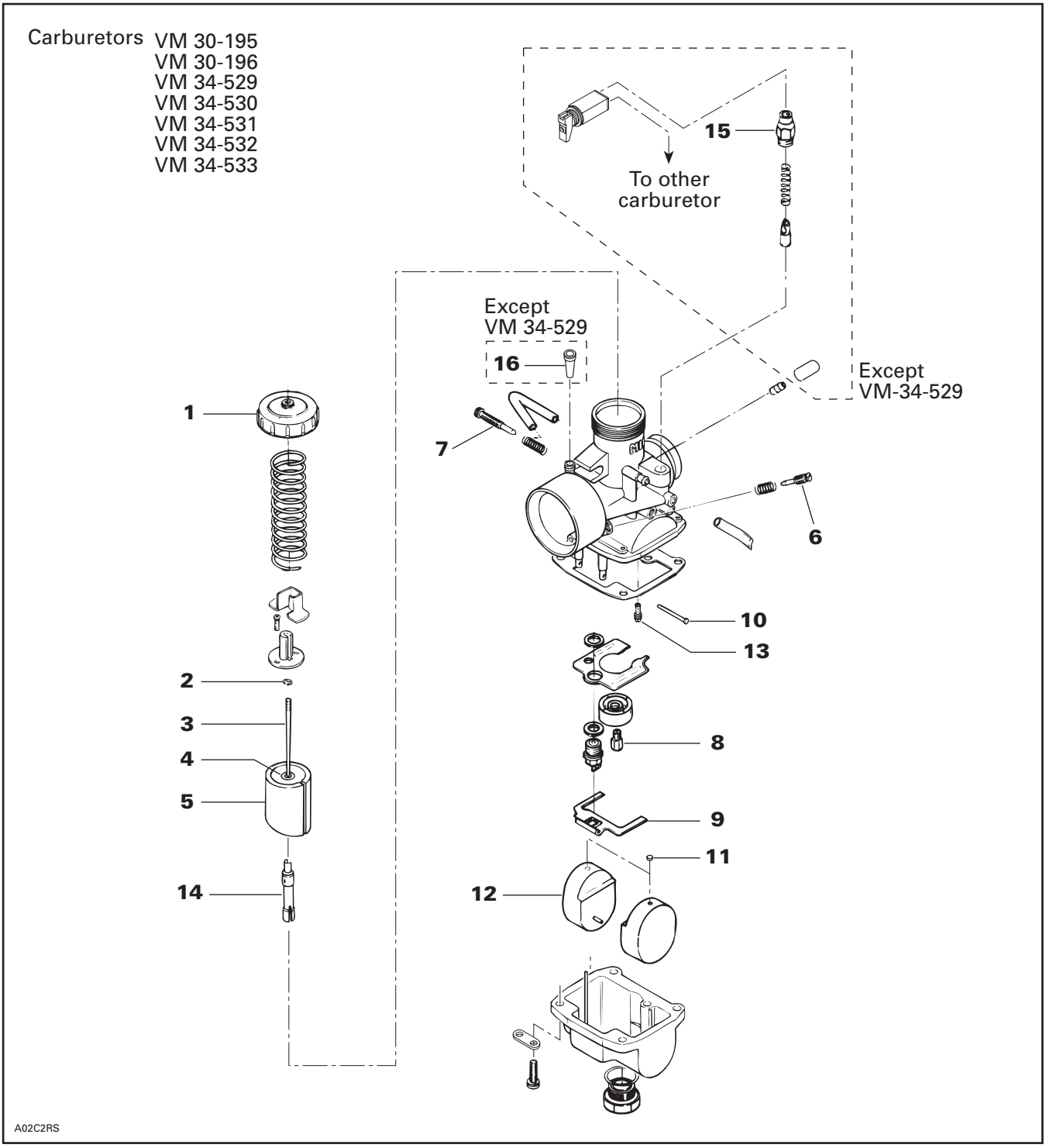


Prior to installing starter grip **no. 15** on new rope, it is first necessary to fuse the rope end with a lit match. pass rope through rubber buffer **no. 14** and starter grip and tie a knot in the rope end. Fuse the knot with a lit match then insert rope end down and pull the starter grip over the knot.



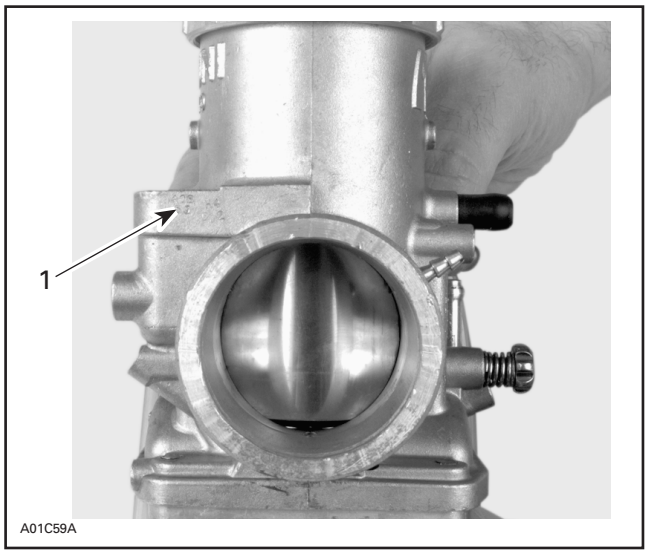
TYPICAL

CARBURETOR AND FUEL PUMP



IDENTIFICATION

All carburetors are identified on their body.

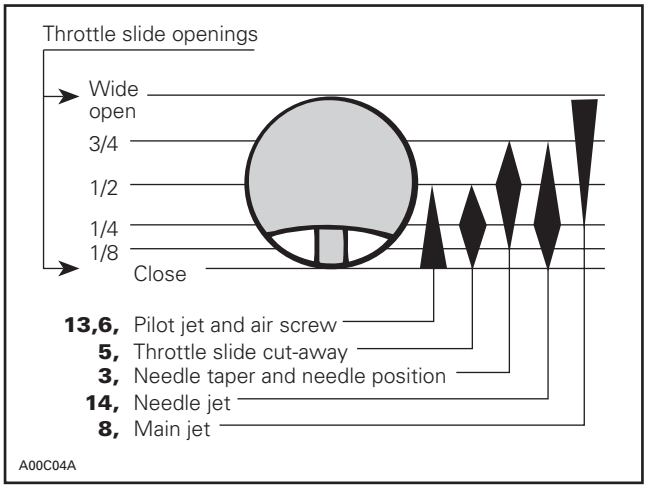


1. Identification: 34-482

CARBURETOR CIRCUIT OPERATION VERSUS THROTTLE OPENING

The following illustration shows the part of the carburetor which begins and stops to function at different throttle slide openings.

Note that the wider part of symbol corresponds to the opening mostly affected. For instance, throttle slide cutaway begins to function at closed position but it is most effective at 1/4 opening and decreases up to 1/2 opening.



VIEW FROM AIR INTAKE OPENING

NOTE: For fine tuning refer to TECHNICAL DATA 10 and to SPARK PLUG 06-03.

NOTE: For high altitude regions, the *High Altitude Technical Data Booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude and temperature.

REMOVAL

Remove air silencer(s). For S-Series, see BATTERY 06-05.

Disconnect fuel inlet line.

Disconnect primer line from carburetor on some models.

Disconnect choke cable on some models.

Unscrew carburetor cover **no. 1** then pull out throttle slide **no. 5** from carburetor.

◆ WARNING

Exercise care when handling throttle slide. Scratches incurred may cause throttle slide to stick open in operation.

Disconnect throttle cable from throttle slide.

Untighten rubber flange clamps then remove carburetor from engine.

CLEANING AND INSPECTION

Inspect throttle cable and housing for rubbing damages, kinks or rust. Check for free sliding action. Replace cable as required.

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

▼ CAUTION

Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O-rings, etc. Therefore, it is recommended to remove those parts prior to cleaning.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions.

◆ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

16, Filter

Check for clogged filter. Clean or replace as required.

Check inlet needle tip condition. If worn, the inlet needle and seat must be replaced as a matched set.

NOTE: Install needle valve for snowmobile carburetor only. It is designed to operate with a fuel pump system.

Check throttle slide for wear. Replace as necessary.

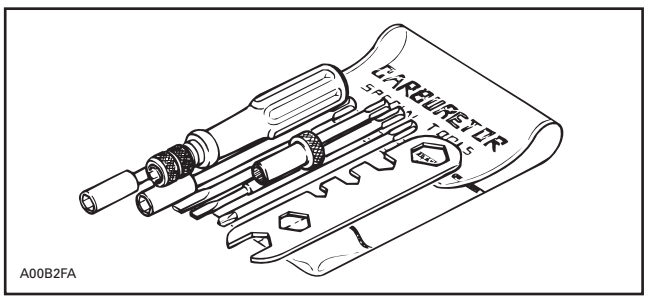
Check idle speed screw straightness. Replace as necessary.

Check for fuel soaked into float no. 12. Replace as necessary.

Check float for cracks or other damages affecting free movement. Replace as necessary.

DISASSEMBLY AND ASSEMBLY

NOTE: To ease the carburetor disassembly and assembly procedures it is recommended to use carburetor tool kit (P/N 404 112 000).

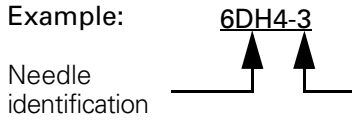


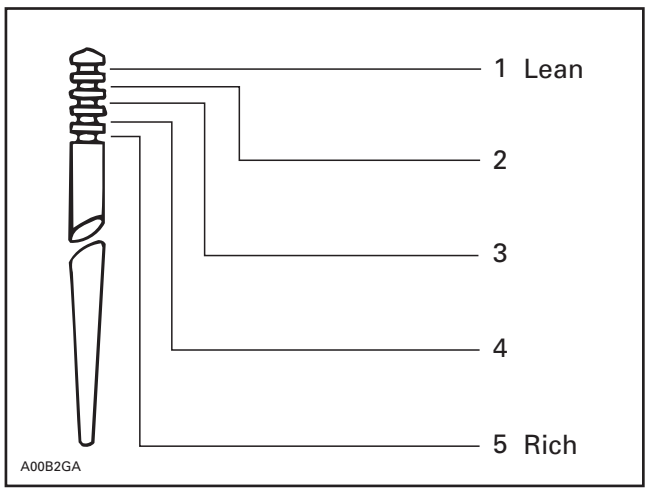
2,3, E-Clip and Needle

Remove screws from needle retaining plate to withdraw the needle.

The position of the needle in the throttle slide is adjustable by means of an E-clip inserted into 1 of 5 grooves located on the upper part of the needle. Position 1 (at top) is the leanest, 5 (at bottom) the richest.

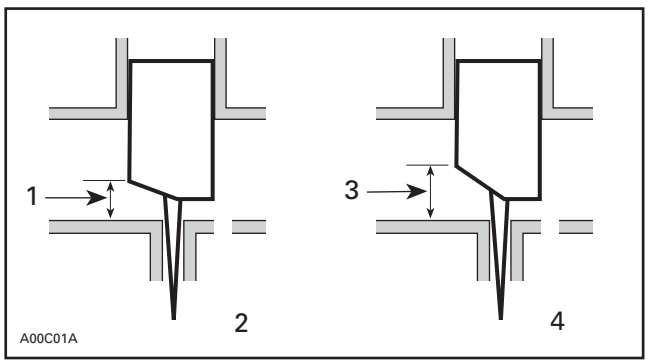
NOTE: The last digit of the needle identification number gives the recommended position of the E-clip **from the top** of the needle.





CLIP POSITIONS

The size of the throttle slide cutaway affects the fuel mixture between 1/8 to 1/2 throttle opening.



1. *Low cut-away (high air speed)*
2. *Rich mixture*
3. *High cut-away (low air speed)*
4. *Lean mixture*

8, Main Jet

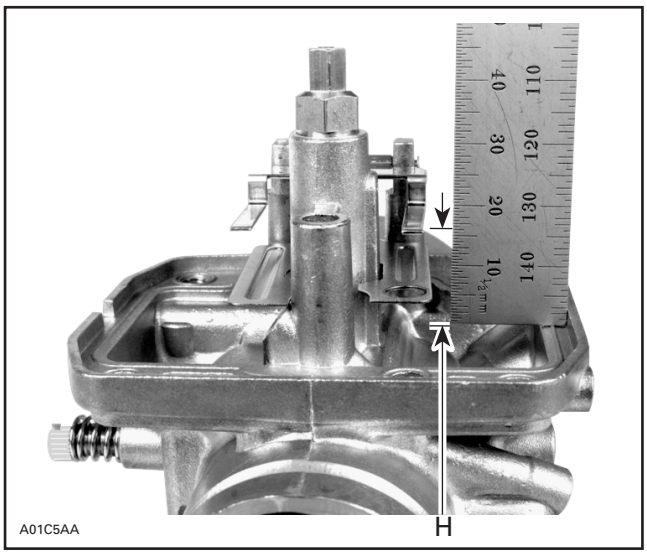
The main jet installed in the carburetor has been selected for a temperature of -20°C (0°F) at sea level. Different jetting can be installed to suit temperature and/or altitude changes. Always check spark plug tip and/or piston dome color to find out correct jetting.

CARBURETOR FLOAT LEVEL ADJUSTMENT

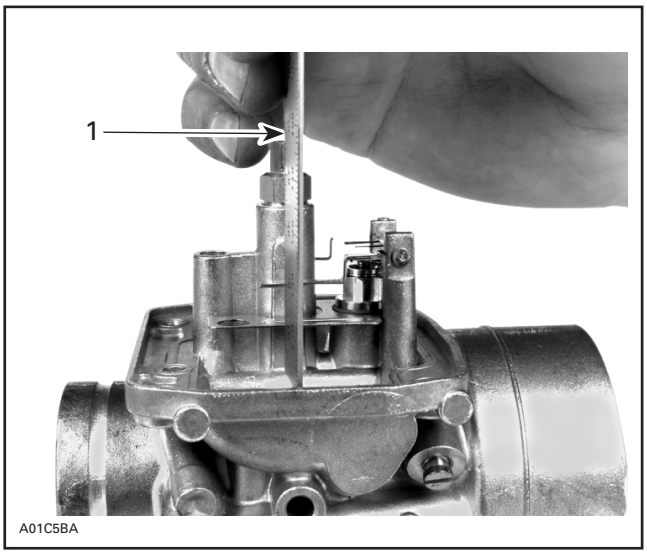
9,10, Float Arm and Float Arm Pin

Correct fuel level in float chamber is vital toward maximum engine efficiency. To check for correct float level proceed as follows:

– Remove float bowl and gasket from carburetor.
– Make sure that float arm is symmetrical — not distorted.
– With carburetor chamber upside-down on a level surface, measure height H between bowl seat and top edge of float arm. Keep ruler perfectly vertical and in line with main jet hole.



TYPICAL
H: Float height

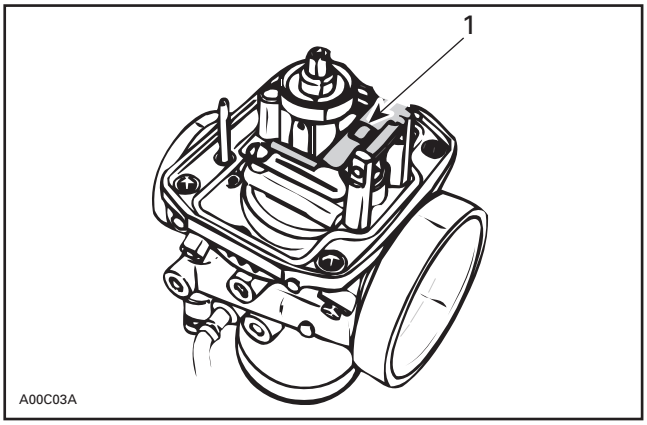


1. Ruler vertical and in line with main jet

CARBURETOR MODEL	FLOAT HEIGHT H	
	± 1 mm	(± .040 in)
VM 30 VM 34	23.9	(.941)

To Adjust Height H

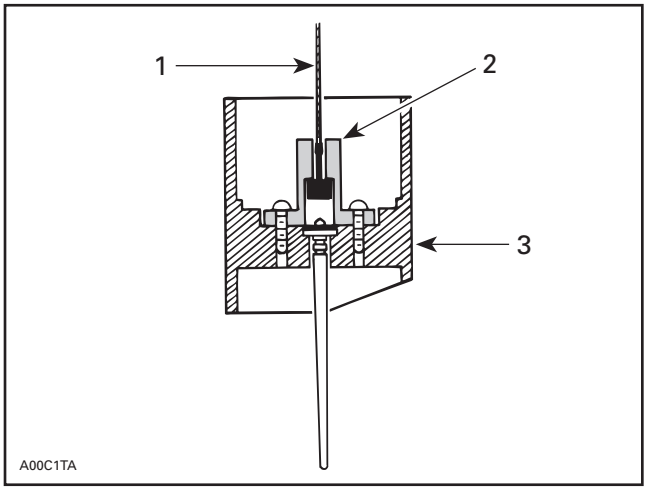
– Bend the contact tab of float arm until the specified height is reached.



1. Contact tab

Hook throttle cable into the needle retainer plate.

NOTE: Do not obstruct hole in throttle slide when installing needle retaining plate. This is important to allow air escaping through and thus allowing a quick response.



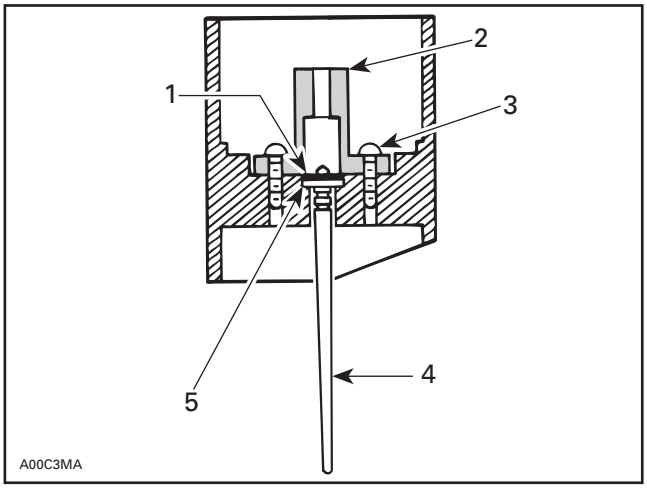
CENTER POST TYPE

1. *Throttle cable*
2. *Needle retaining plate*
3. *Throttle slide*

Make sure the nylon packing **no. 4** is installed on all applicable throttle slides.

▼ CAUTION

Serious engine damage can occur if this notice is disregarded.



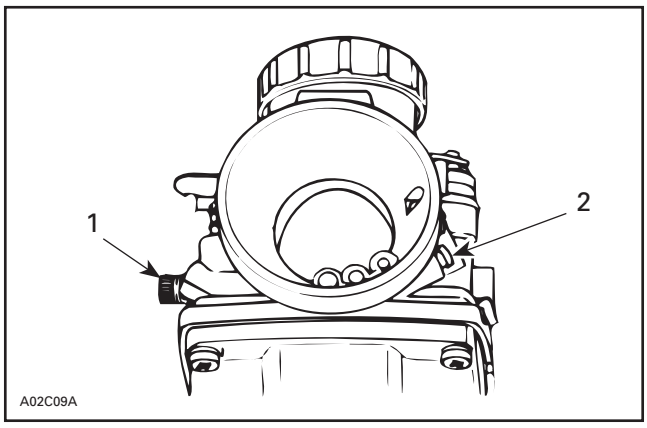
CENTER POST TYPE

1. *E-clip*
2. *Needle retaining plate*
3. *Screw*
4. *Needle*
5. *Nylon packing*

CARBURETOR ADJUSTMENTS

Adjustments should be performed following this sequence:

– air screw adjustment
– throttle slide height (preliminary idle speed adjustment)
– throttle cable adjustment
– carburetor synchronization (dual carburetor models)
– final idle speed adjustment (engine running)
– oil pump with carburetor synchronization



1. *Idle speed screw*
2. *Air screw*

6, Air Screw

Completely close the **air screw** (until a slight seating resistance is felt) then back off as specified.

Turning screw in clockwise enrichners mixture and conversely, turning it out counterclockwise leans mixture.

Refer to TECHNICAL DATA 10 for the specifications.

7, Idle Speed Screw

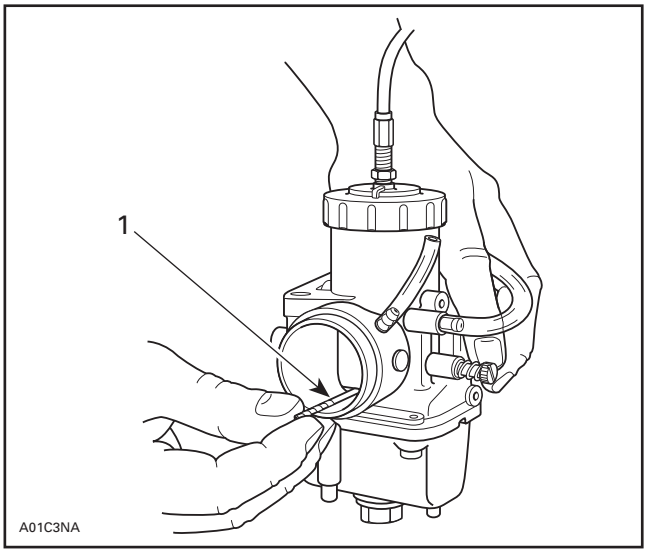
Throttle Slide Opening (preliminary idle speed adjustment)

Adjust throttle slide height (see following table) by turning idle speed screw **no. 7**. Throttle slide height is measured on **outlet** side of carburetor (engine side).

NOTE: Make sure that throttle cable does not hold throttle slide. Loosen cable adjuster accordingly. Throttle cable adjustment will be done during adjustment of throttle-slide-to-cover free play.

Final idle speed adjustment (engine running at idle speed) should be within 1/2 turn of idle speed screw from preliminary adjustment.

MODELS	THROTTLE SLIDE HEIGHT mm (in)
Tundra Skandic 380, Touring E, Formula S/DLX 380	1.3 (.051)
Tundra R Skandic 500, Formula SL/DLX 500, Touring LE/SLE	1.5 (.059)



TYPICAL
1. Drill bit used as gauge for throttle slide height

INSTALLATION

▼ CAUTION

Never allow throttle slide(s) to snap shut.

Prior to install carburetor, adjust air screw and preliminary idle speed as described above.

To install carburetor on engine, inverse removal procedure.

However, pay attention to the following:

On applicable models, make sure to align tab of carburetor and air intake silencer (if applicable) with notch of adaptor(s). On applicable models, install adaptor with UP mark facing up.

▼ CAUTION

The rubber flange must be checked for cracks and/or damage. At assembly, the flange must be perfectly matched with the air intake manifold or severe engine damage will occur.

Install clamps in a way that their tightening bolts are staggered — not aligned.

Throttle Cable Adjustment

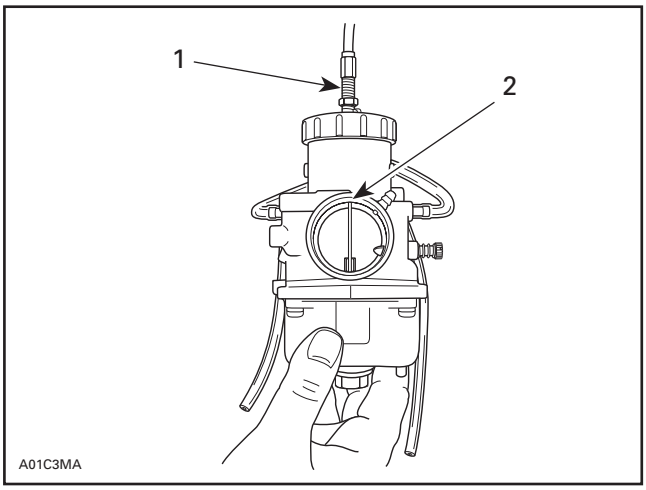
◆ WARNING

Ensure the engine is turned OFF, prior to performing the throttle cable adjustment.

For maximum performance, correct cable adjustment is critical.

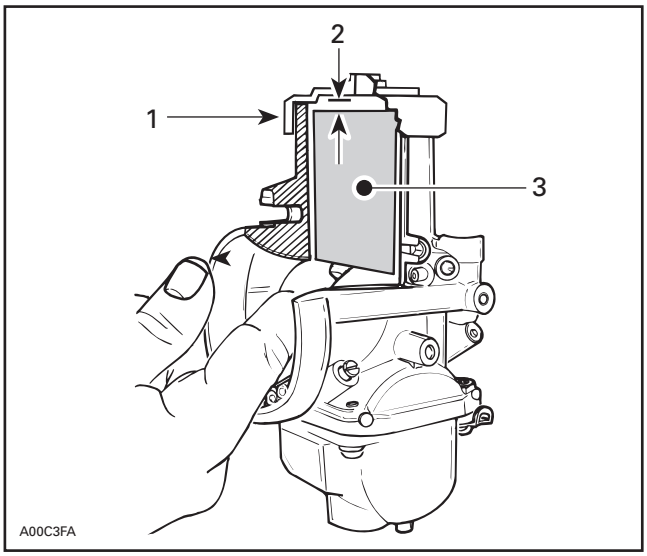
At full opening throttle slide must be flush or 1.0 mm (.040 in) lower than the top of carburetor **outlet** bore (engine side).

First loosen adjuster nut then turn throttle cable adjuster accordingly.



FULL OPENING (THROTTLE LEVER AGAINST HANDLE GRIP)
1. Throttle cable adjuster
2. Throttle slide flush or 1.0 mm (.040 in) lower than carburetor oulet bore (engine side)

Check that **with the throttle lever fully depressed**, there is a free play between the carburetor cover and top of throttle slide.



FULL OPENING (THROTTLE LEVER AGAINST HANDLE GRIP)

1. *Cover*
2. *Free play*
3. *Throttle slide*

◆ WARNING

This gap is very important. If the throttle slide rests against the carburetor cover at full throttle opening, this will create too much strain and may damage the throttle cable or other components in throttle mechanism.

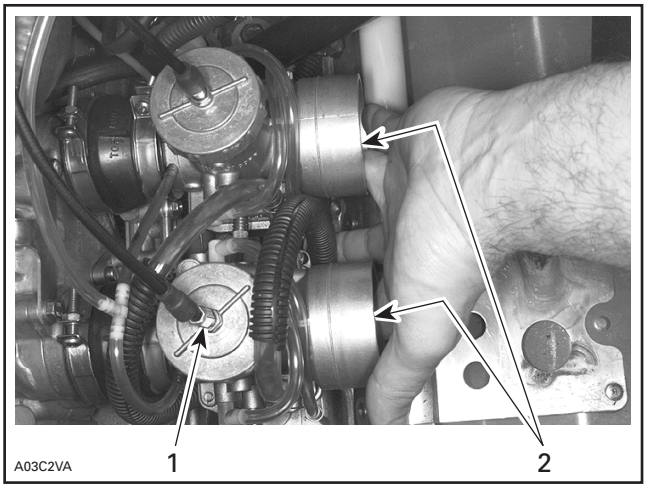
Carburetor Synchronization

Dual Carburetor Models Only

When depressing throttle lever, both carburetor slides must start to open at the same time.

Unlock cable adjustment lock nut on one carburetor.

Screw or unscrew cable adjuster until both carburetor slides start to open at same time. Cable play will be identical on both carburetors. Retighten jam nut.



TYPICAL

1. *Screw or unscrew adjuster*
2. *Check that both slides start to open at the same time*

Check throttle slide position at wide open throttle. Throttle slide must be flush or 1 mm (.040 in) lower than carburetor **outlet** bore. At that same position, check that throttle slide does not contact carburetor cover. Turn cable adjuster and recheck synchronization.

▼ CAUTION

If the throttle slide rests against the carburetor cover at full throttle opening, this will create too much strain and may damage the throttle cable or other components in throttle mechanism.

▼ CAUTION

On dual carburetor models, make sure both carburetors start to operate simultaneously. Beside do not interchange carburetors, the jetting may be different on each side. A red dot is printed on one carburetor and on the engine. Match the carburetor and the engine dots when applicable.

▼ CAUTION

On oil injection models, the oil injection pump adjustment must be checked each time carburetor is adjusted. Refer to OIL INJECTION SYSTEM 04-06.

IDLE SPEED FINAL ADJUSTMENT

7, Idle Speed Screw

▼ CAUTION

Before starting engine for the final idle adjustment, make sure that oil pump is adjusted. The oil injection pump adjustment must be checked each time carburetor is adjusted. Refer to OIL INJECTION SYSTEM 04-06.

Start engine and allow it to warm then adjust idle speed to specifications by turning **idle speed** screw clockwise to increase engine speed or counterclockwise to decrease it.

NOTE: On twin-carburetor models: Turn adjustment screw the same amount to keep carburetors synchronized.

Refer to TECHNICAL DATA 10 for the specifications.

▼ CAUTION

Do not attempt to set the idle speed by using the air screw. Severe engine damage can occur.

CHOKE

S-Series

Choke Plunger Adjustment

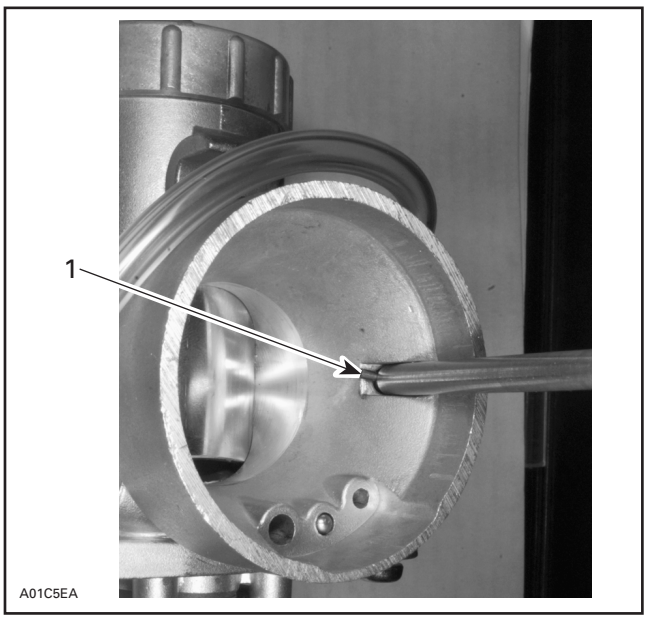
Set choke lever to fully open position.



CHOKE LEVER — FULLY OPEN POSITION

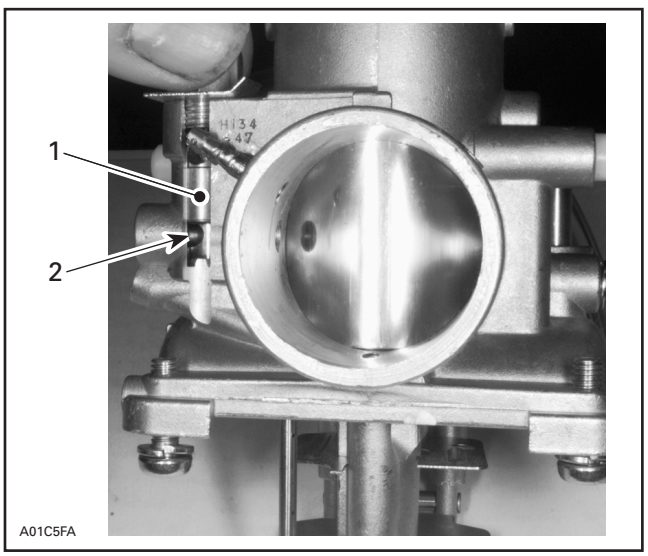
Use small diameter of tool for VM 34 carburetors.

Insert choke plunger tool into choke air inlet of each carburetor. Tool stopper may not lean against recess wall. Though it must be within 1 mm (.040 in) of recess wall.



AIR SILENCER SIDE SHOWN

1. *Tool stopper within 1 mm (.040 in) of recess wall*



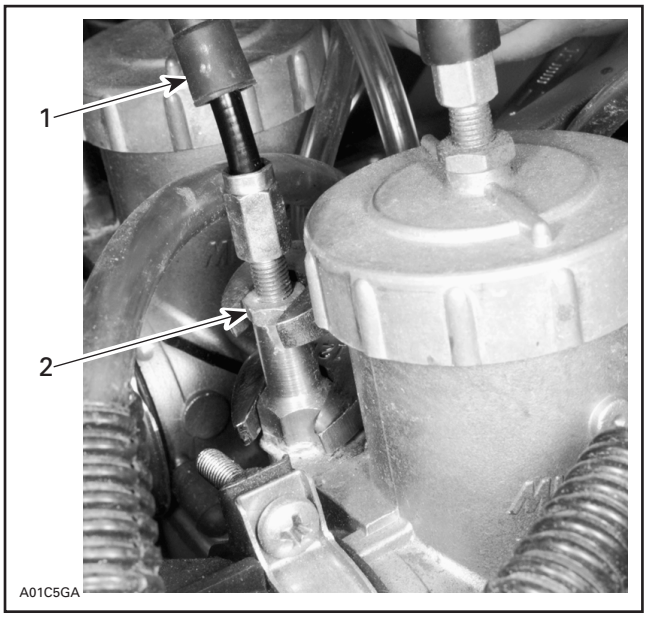
CUTAWAY (ENGINE SIDE SHOWN)

1. *Choke plunger*
2. *Tool properly seated under choke plunger*

If tool tip does not seat under choke plunger **no. 15**, adjust as follows:

Make sure choke lever is at fully open position.

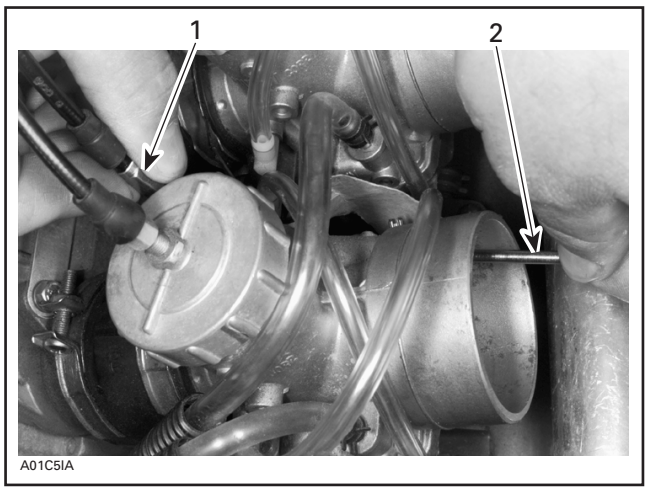
Lift up protector cap and loosen choke cable lock nut, as shown in the next photo.



1. Lift up protector cap
2. Loosen lock nut

Turn choke cable adjustment nut by hand until tool properly seats under choke plunger.

NOTE: A light pressure should be needed to position tool under plunger.



1. Choke cable adjustment nut
2. Choke plunger tool

Tighten choke cable lock nut and reinstall protector cap.

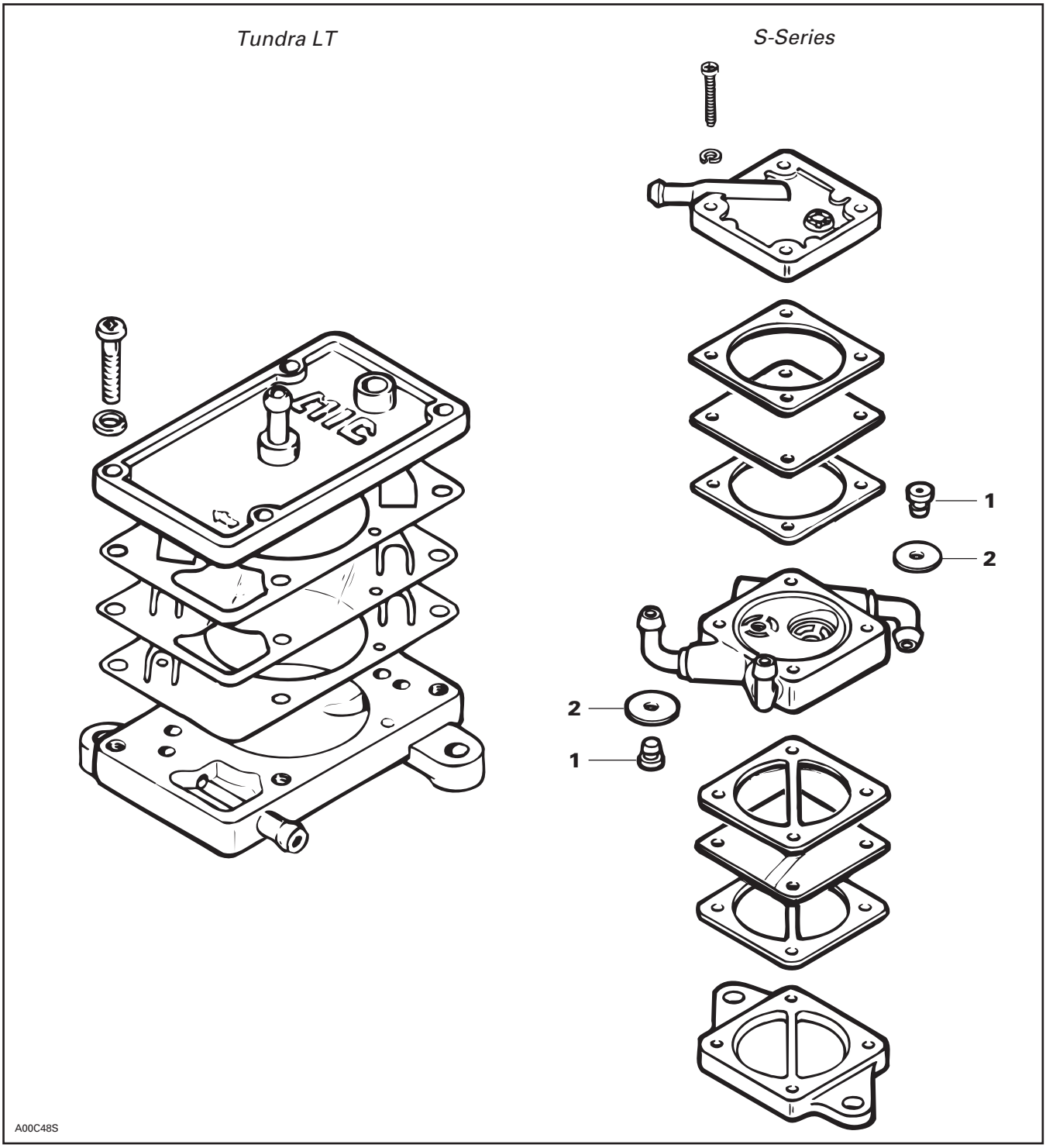
Set choke lever to close and open positions and ensure that tool properly seats under plunger **only** when lever is set to fully open position.

Set choke lever to close position and, by pulling and pushing choke lever, make sure there is no tension on cable (free play).



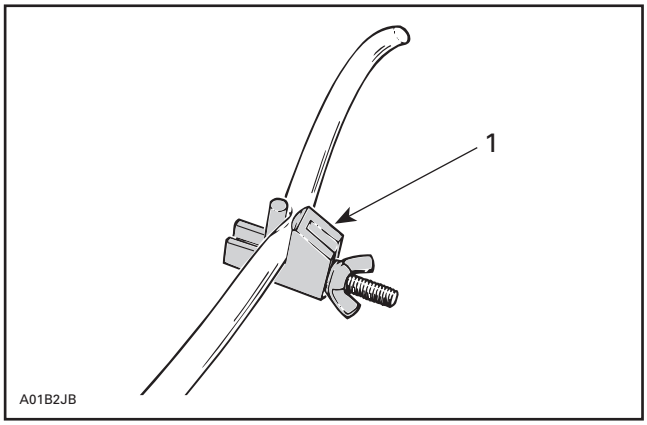
CHOKE LEVER — CLOSED POSITION

FUEL PUMP



REMOVAL

Install a hose pincher (P/N 529 009 900) on fuel supply line close to pump inlet.

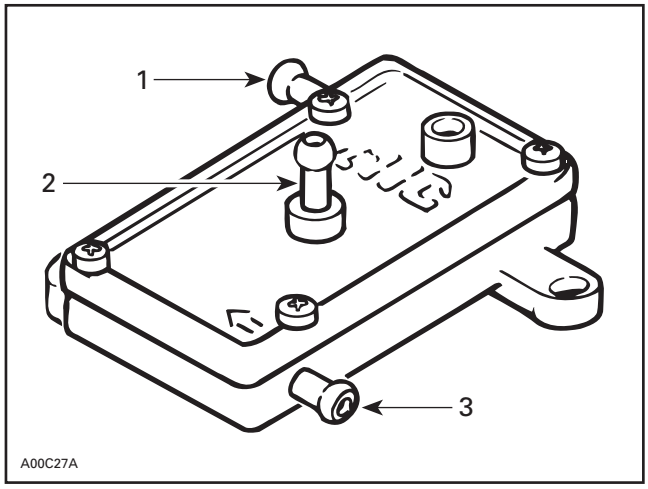


1. Hose pincher (P/N 529 009 900)

Disconnect fuel outlet line(s).

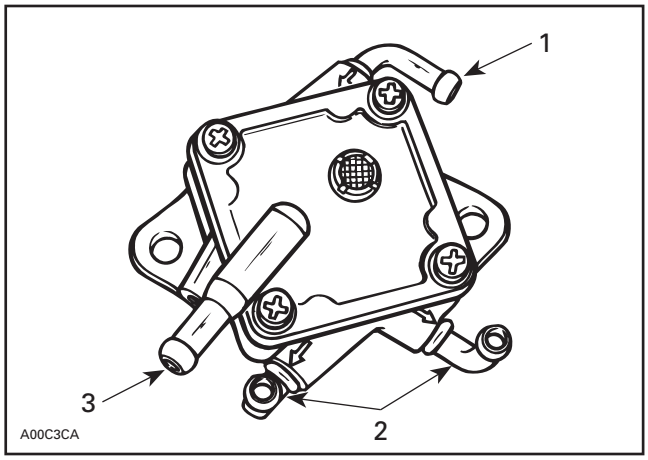
Disconnect impulse line.

Remove screws (or nuts if applicable) securing fuel pump.



LOW-SUPPLY FUEL PUMP WITH SINGLE OUTLET

1. Fuel outlet line
2. Impulse line
3. Fuel inlet line



HIGH-SUPPLY FUEL PUMP WITH TWIN OUTLETS

1. Inlet
2. Outlets
3. Impulse

PUMP VERIFICATION

Check fuel pump valves operation as follows:

Connect a clean plastic tubing to the inlet nipple and alternately apply pressure and vacuum with pump of leak test kit. The inlet valve should release with pressure and hold under vacuum.

Repeat the same procedure at the outlet nipple. This time the outlet valve should hold with pressure and release under vacuum.

NOTE: On model fitted with 2 outlets, plug 1 outlet with finger while checking outlet valve.

Check impulse diaphragm and gasket on high-supply fuel pump with twin outlets as follows:

Connect a clean plastic tubing to the impulse nipple and plug vent hole on top cover. Either apply pressure or vacuum. The diaphragm/gasket must not leak.

DISASSEMBLY

1,2, Grommet and Valve (high-supply pump with twin outlets only)

Do not disassemble valves unless replacement is necessary.

CLEANING AND INSPECTION

The entire pump should be cleaned with general purpose solvent before disassembly.

Fuel pump components should be cleaned in general purpose solvent and dried with compressed air.

◆ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as each is flammable and explosive.

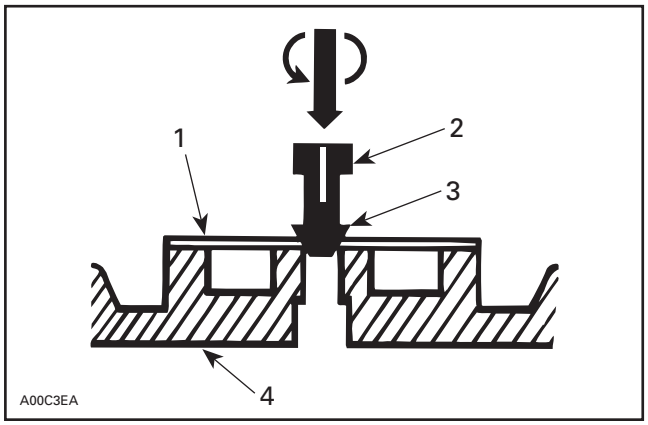
Inspect diaphragm. The pumping area should be free of holes, tears or imperfections. Replace as needed.

High-supply pump with twin outlets: Thoroughly clean filter on top cover. Replace filter if necessary.

ASSEMBLY

To install a new valve, proceed as follows:

– Place new valve flat on its seat.
– Slightly oil taper tip of grommet.
– Push grommet with a rotational movement until it crosses its housing.



1. Valve
2. Grommet
3. Lubricate tip
4. Pump body

When assembling pump, ensure to properly position stages together. Refer to previous illustrations if necessary.

INSTALLATION

To install, inverse removal procedure.

◆ WARNING

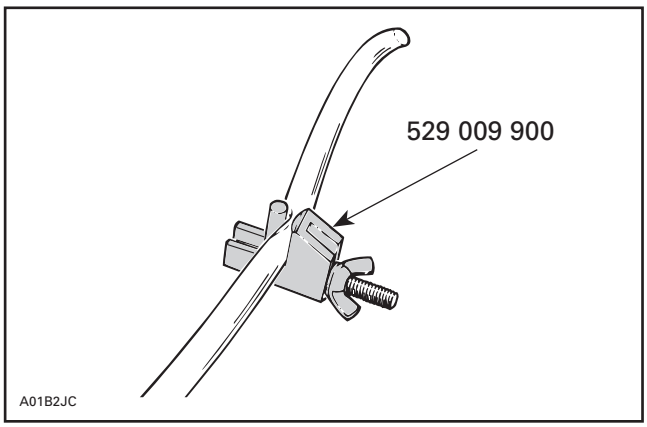
Pressure test to ensure there is no leak in fuel system.

FUEL TANK AND THROTTLE CABLE

Fuel Tank Lines

◆ WARNING

When draining a fuel tank or when-ever a fuel line is disconnected, obstruct line with a hose pincher (P/N 529 009 900) or equivalent device. Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.



Impulse/Fuel Lines Spring Clips

Always reposition spring clips after any repair to prevent possible leaks.

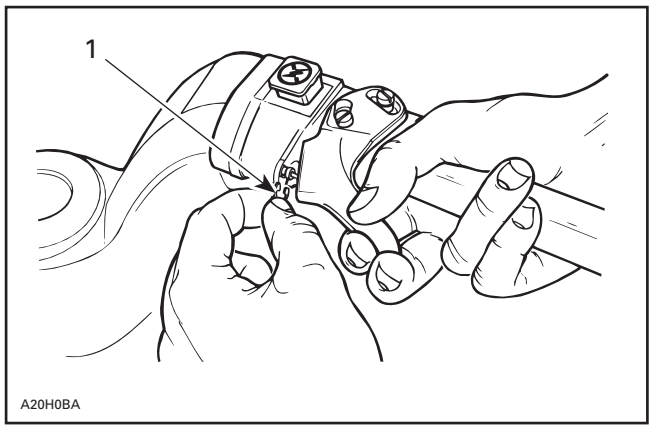
Throttle Cable Circlip at Handlebar

Put silicone grease (P/N 413 701 700) around cable barrel. Locate circlip as per illustration.

◆ WARNING

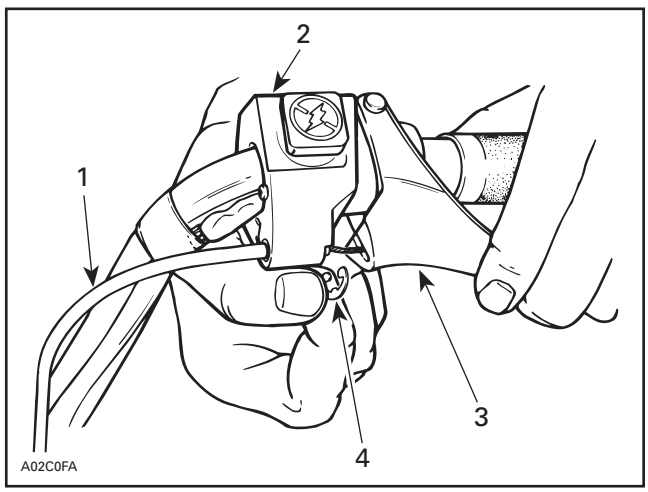
If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

Models with Easy Action Throttle Lever



TYPICAL
1. Circlip

Other Models



1. Throttle cable housing
2. Throttle handle housing
3. Throttle handle
4. Circlip

FUEL SYSTEM LEAK TEST

All Models

The following test will indicate any leak from fuel tank to carburetor(s).

Fill up fuel tank.

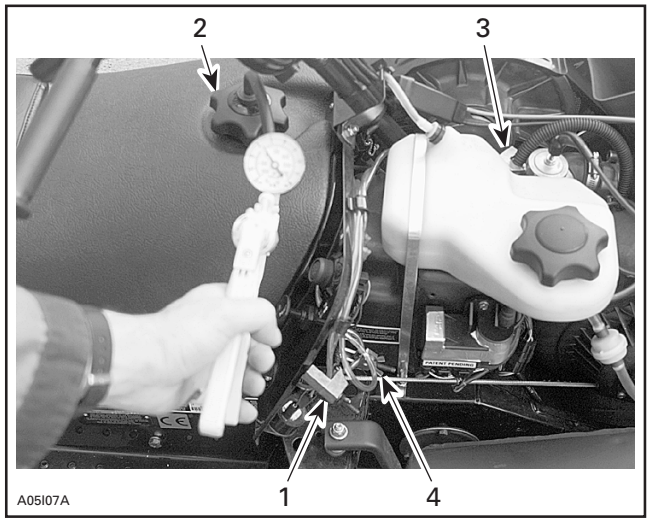
Install on fuel tank special cap of leak testing kit (P/N 529 033 100).

Install hose pinchers (P/N 295 000 076) on fuel tank vent line and fuel pump outlet hose at carburetor(s).

Tundra Series Only

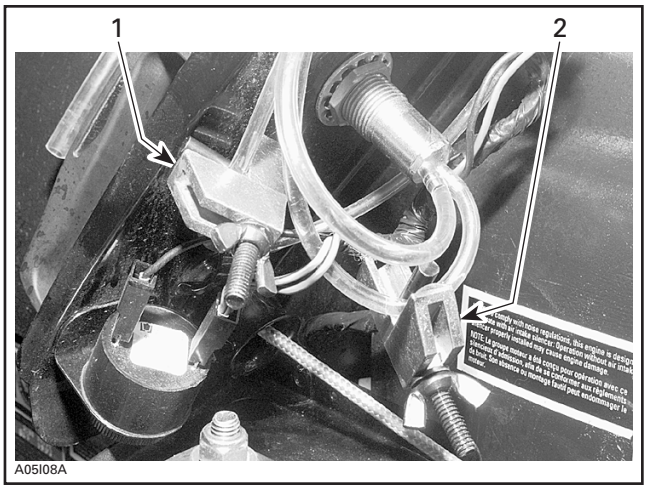
Install a hose pincher (P/N 295 000 076) on primer outlet hose.

NOTE: To verify leaks up to carburetor fitting, install hose pincher on primer outlet hose near carburetor.



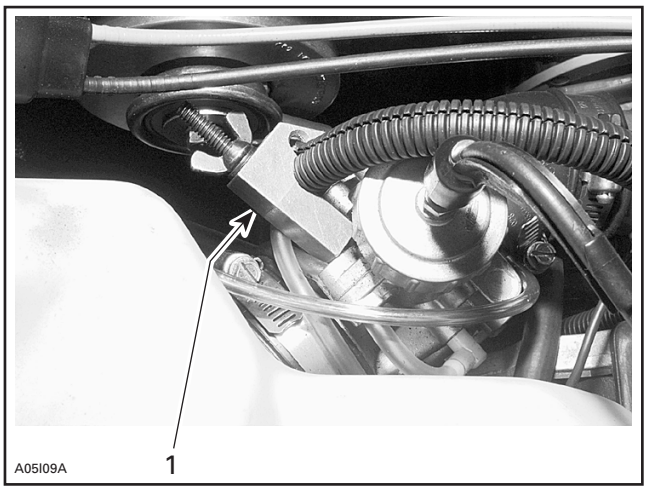
TUNDRA SERIES

1. *Hose pincher on fuel tank vent line*
2. *Special cap on tank*
3. *Hose pincher on fuel pump outlet hose*
4. *Hose pincher on primer outlet hose*



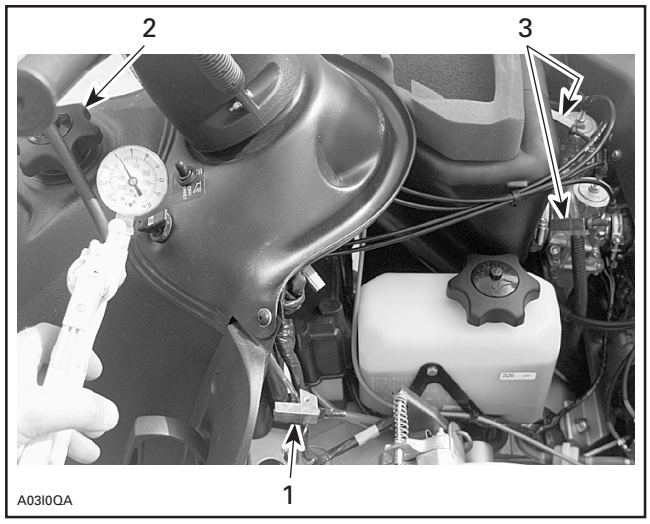
TUNDRA SERIES

1. *Hose pincher on fuel tank vent line*
2. *Hose pincher on primer outlet hose*



TUNDRA SERIES

1. *Hose pincher on fuel pump outlet hose*



S-SERIES

1. *Hose pincher on fuel tank vent line*
2. *Special cap on tank*
3. *Hose pinchers on fuel pump outlet hoses*

All Models

Using air pump from engine leak test kit (P/N 861 749 100) inject air into fuel tank.

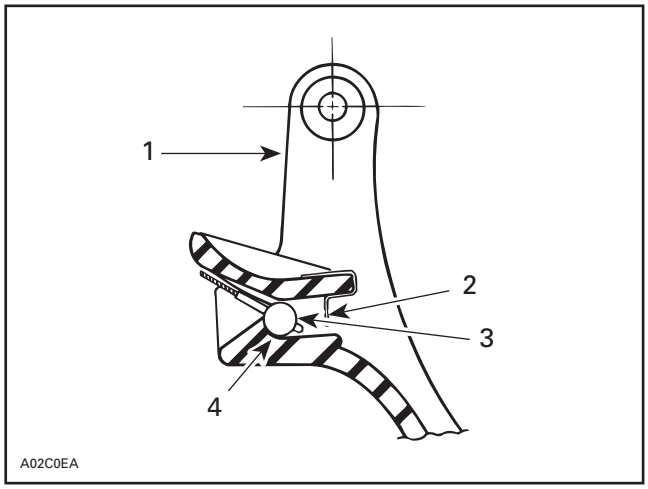
Pressurize fuel system to 21 kPa (3 PSI). That pressure must not drop during 3 minutes.

If pressure drops, locate leak(s) and repair/replace leaking component(s). To ease locating leak(s) spray soapy water on components, bubbles will indicate leak location(s).

Throttle Cable Retainer

Tundra Series

The retainer must be pushed on the throttle handle tab until it sits properly.



1. *Throttle handle*
2. *Retainer*
3. *Cable barrel*
4. *Silicone grease*

Adjust throttle cable as specified in CARBURETOR AND FUEL PUMP 04-09.

Throttle Cable Routing

▼ CAUTION

Check that throttle cable is routed away from sharp, edges, hot or vibrating parts. When turning steering while engine is running, idle speed must not vary.

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DRIVE BELT

1999 APPLICATION CHART

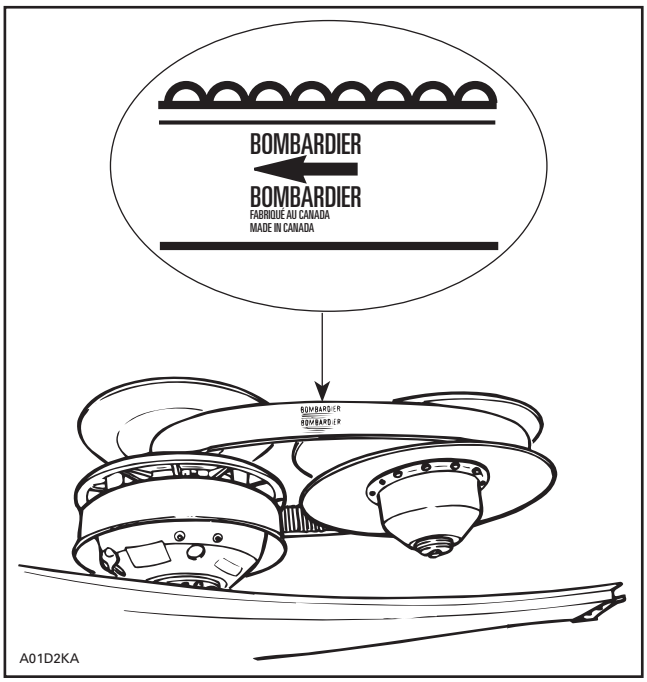
MODEL	PART NUMBER	WIDTH (NEW) ± 0.25 mm (.010 in)	MINIMUM WIDTH (WEAR LIMIT)
Tundra/R	414 827 600	33.30 mm (1.311 in)	30.00 mm (1.181 in)
S-Series	415 060 600	34.70 mm (1.366 in)	32.30 mm (1.272 in)

CLEANING

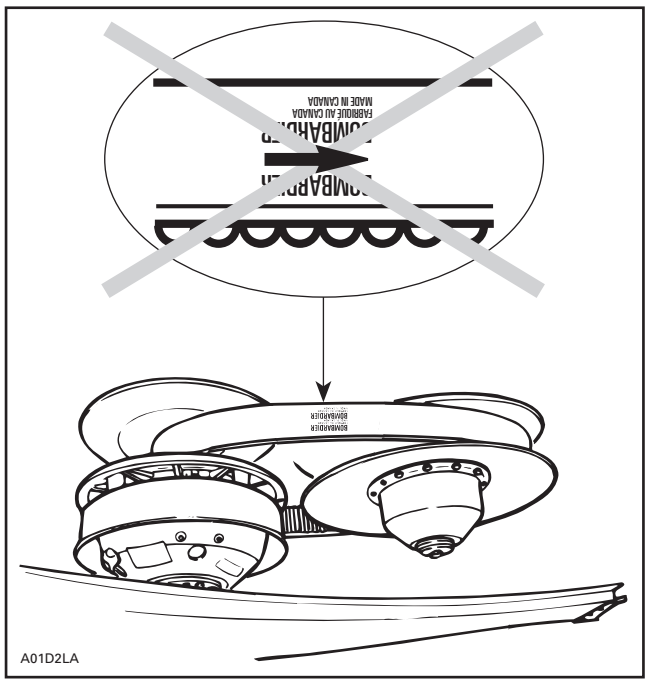
Use Bombardier Cleaner (P/N 293 110 001) to remove rubber residue from drive belt.

ROTATION DIRECTION

The maximum drive belt life span is obtained when the drive belt is installed as shown. This will ensure that correct direction of rotation is respected.



CORRECT



INCORRECT

NOTE: For used drive belt, mark and reinstall in the same position.

DRIVE BELT DEFLECTION MEASUREMENT

NOTE: The drive belt deflection measurement must be performed each time a new drive belt is installed.

NOTE: To obtain an accurate drive belt deflection measurement, it is suggested to allow a break-in period of 50 km (30 mi).

Before checking the belt deflection, ensure vehicle has the proper belt (Refer to the application chart).

Adjust pulley distance and alignment. Refer to PULLEY DISTANCE AND ALIGNMENT 05-05.

To obtain maximum vehicle performance, the belt tension must be adjusted according to specifications shown in the accompanying chart.

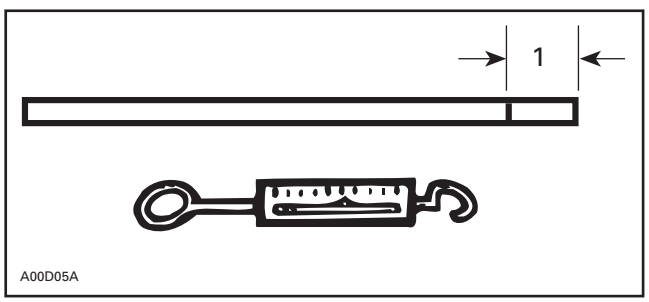
MODEL	DEFLECTION mm (in)	FORCE kg (lb)	HEIGHT† OVER DRIVEN PULLEY
Tundra/R	32 ± 5 (1-1/4 ± 13/64)	6.8 (15)	0 - 1.5 mm (0 - 1/16 in)
S-Series	32 ± 5 (1-1/4 ± 13/64)	11.3 (25)	0 - 1.5 mm (0 - 1/16 in)

†For reference only

To Check Tension

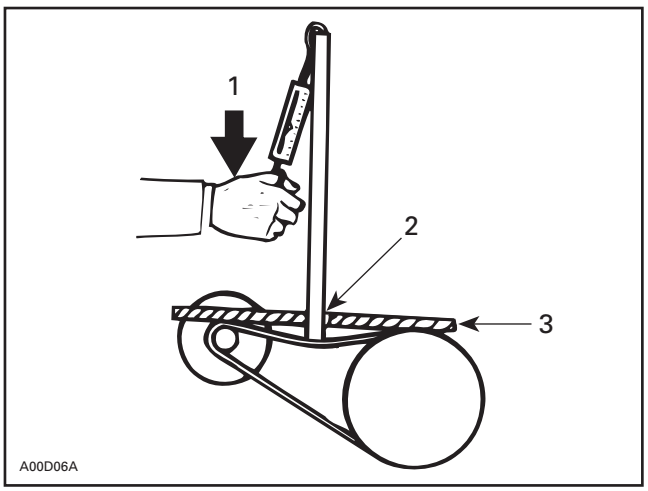
Position a reference rule on drive belt.

Wooden Stick and Spring Scale Method



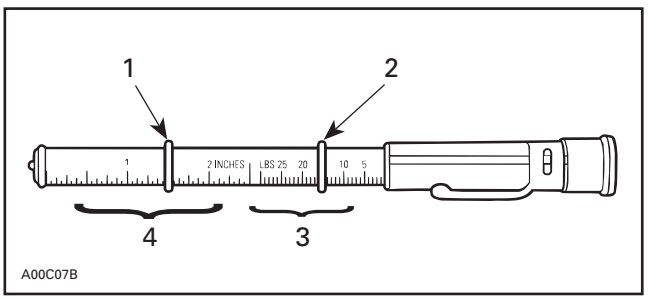
1. Mark specified deflection

Using spring scale and stick, apply specified force on drive belt halfway between pulleys as shown.



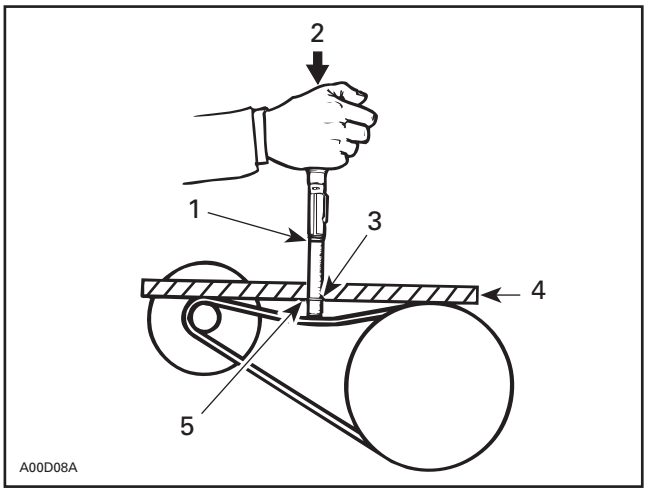
1. Force
2. Read deflection here
3. Reference rule

Or use the belt tension tester (P/N 414 348 200).



1. Lower O-ring
2. Upper O-ring
3. Force (read down)
4. Deflection (read up)

1. Slide lower O-ring of deflection scale to specified measure.
2. Slide upper O-ring to zero on the force scale.
3. Apply pressure until lower O-ring is flush with edge of rule and read force on the upper scale at top edge of O-ring.

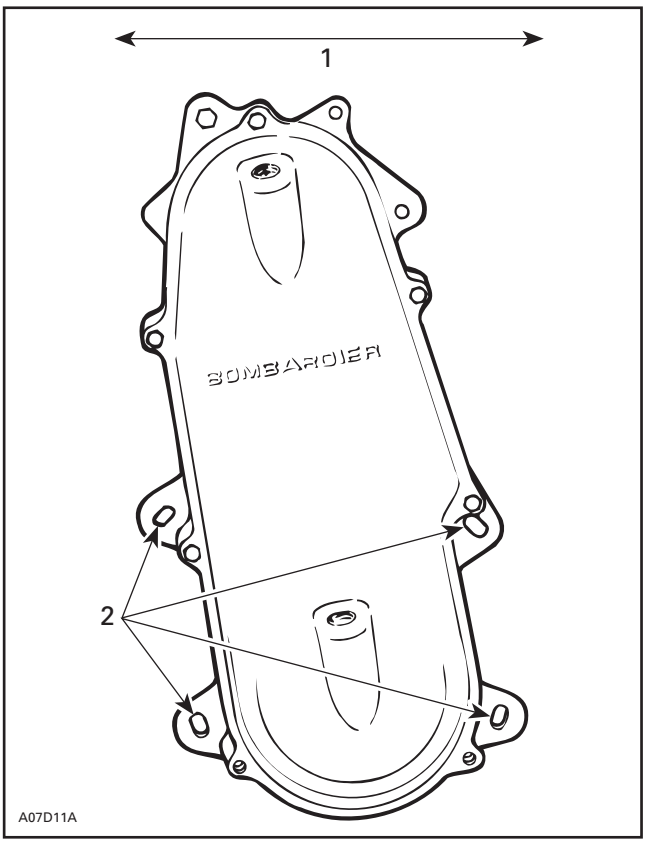


1. *Upper O-ring — force*
2. *Force applied*
3. *Lower O-ring — deflection*
4. *Reference rule*
5. *Deflection*

DEFLECTION ADJUSTMENT

Tundra/R

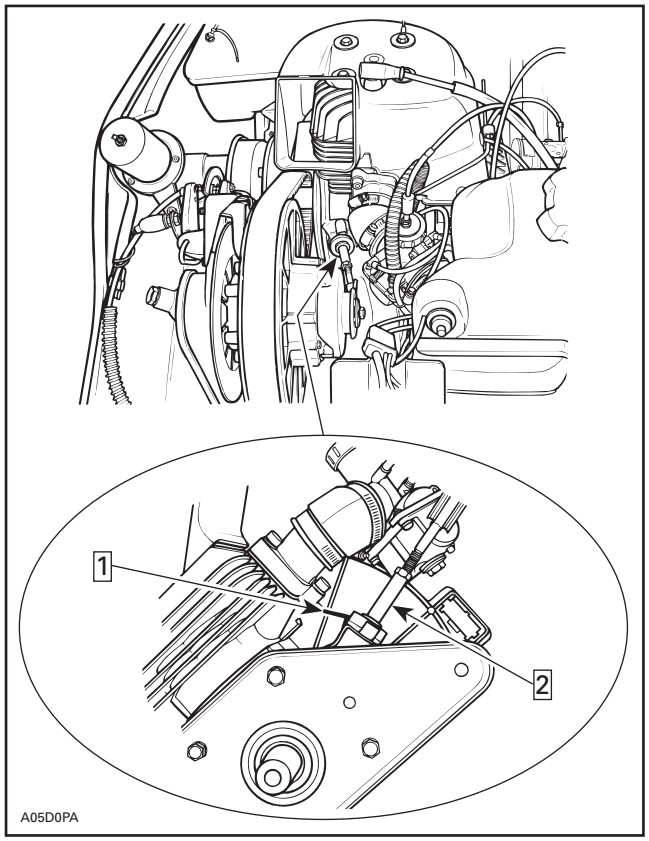
Drive belt deflection is adjusted by moving chaincase.



TYPICAL

1. *Movement*
2. *Retaining nuts*

To do so, loosen the 4 chaincase retaining nuts, unlock and raise driven pulley support.



TUNDRA II LT

Step 1 : Push and hold
Step 2 : Raise support

Adjust pulley distance according to specifications, refer to PULLEY DISTANCE AND ALIGNMENT 05-05 and measure drive belt deflection. Readjust pulley distance if required, then tighten the 4 nuts. Adjust driven pulley support and lock it to engine.

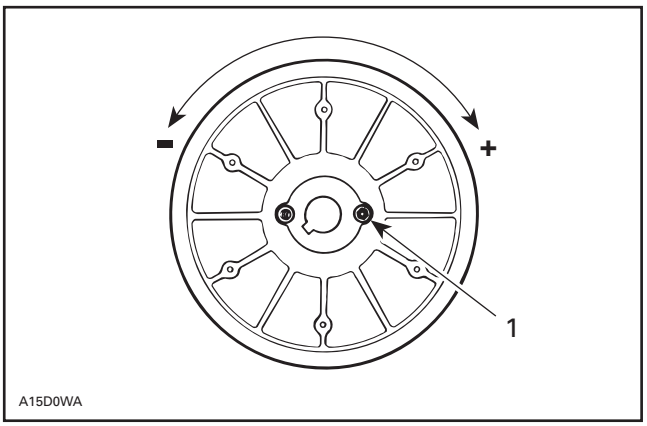
S-Series

Adjust pulley distance according to specification, refer to PULLEY DISTANCE AND ALIGNMENT 05-05, then adjust drive belt deflection using Allen screws, as shown.

To increase deflection: turn Allen screws clockwise.

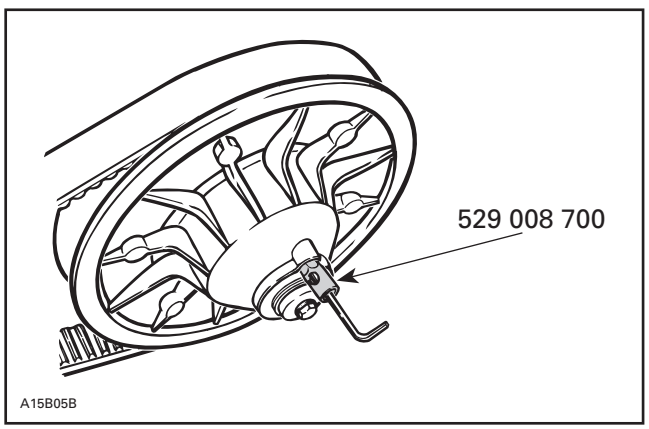
To decrease deflection: turn Allen screws counterclockwise.

NOTE: Turn Allen screws 1/4 turn at a time, then rotate driven pulley to allow drive belt to settle in pulley. Check deflection, repeat as required.



1. Allen screw with jam nut

Allen screws should be restrained while tightening jam nut to prevent throwing adjustment out. Use drive belt tension adjuster (P/N 529 008 700).



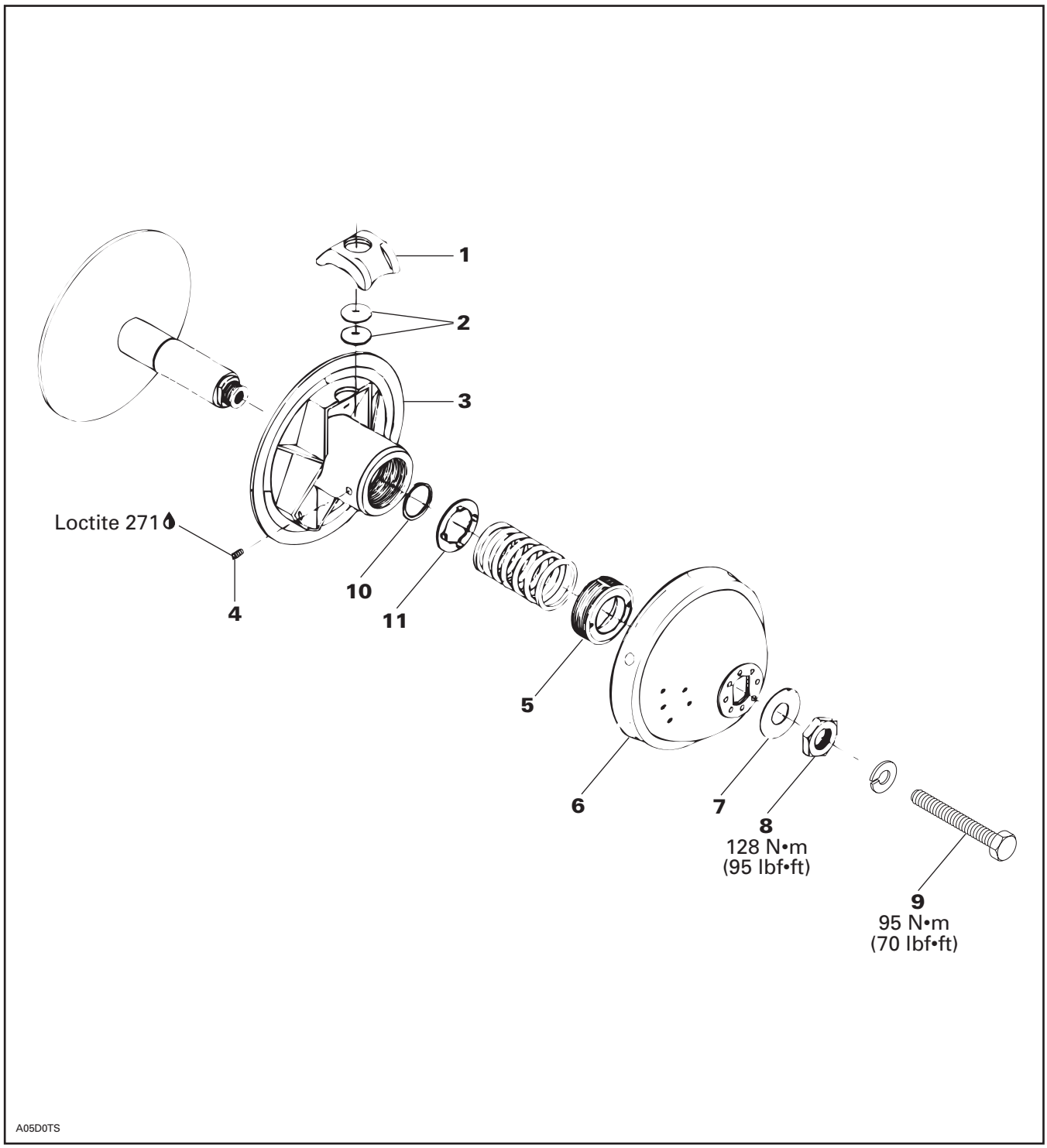
Restrain Allen screws with the wrench and tighten nut with the socket using socket handle provided in tool box.

DRIVE PULLEY

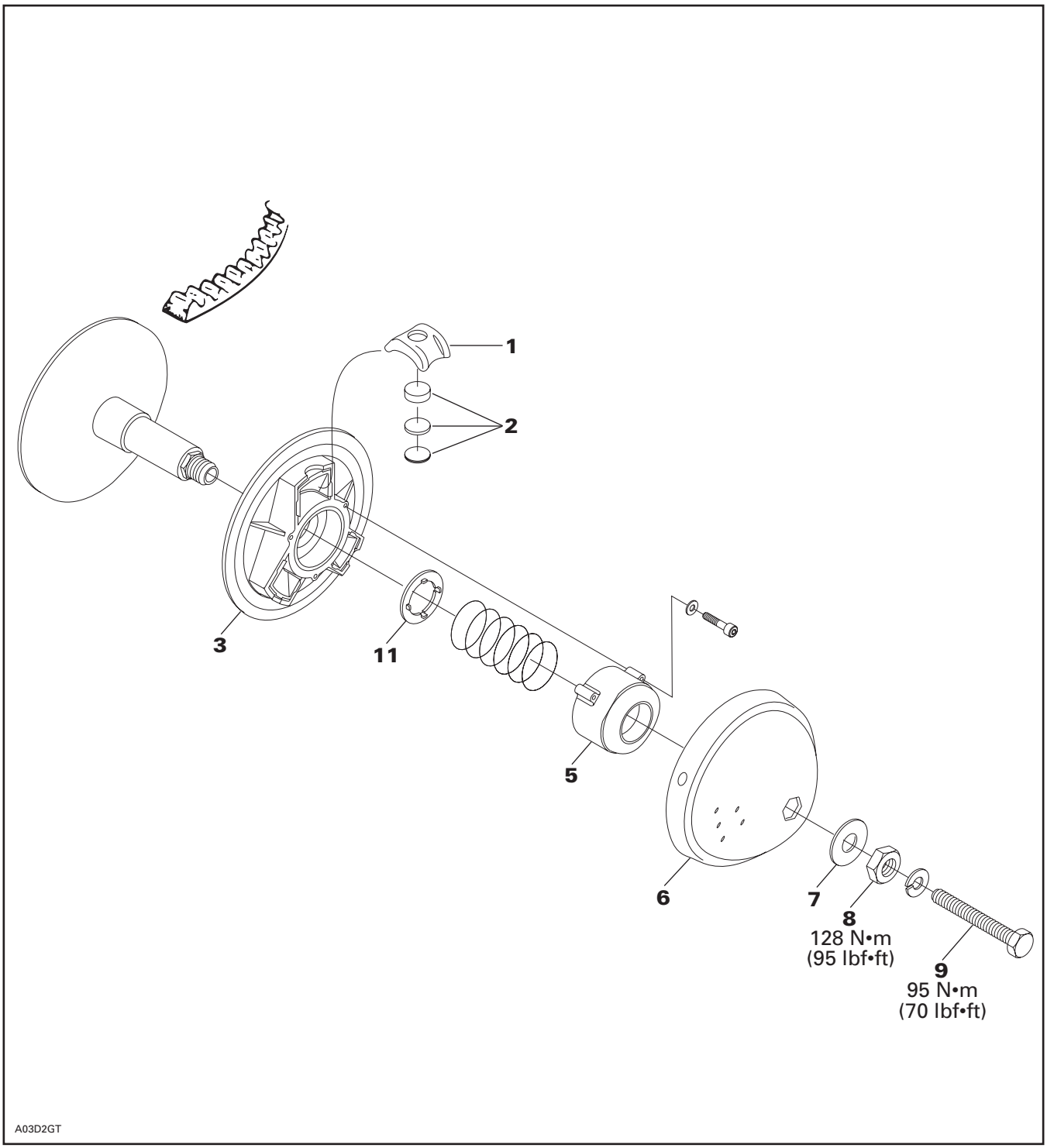
BOMBARDIER LITE

NOTE: This is a lubrication free drive pulley.

Tundra/R



377 Engine S-Series



GENERAL

Some drive pulley components (return spring, calibration disk) can be changed to improve vehicle performance in high altitude regions. The *High Altitude Technical Data booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude.

▼ CAUTION

Such modifications should only be performed by experience mechanics since they can greatly affect vehicle performance.

◆ WARNING

Any drive pulley repairs must be performed by an authorized Bombardier snowmobile dealer, or other such qualified person. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

REMOVAL

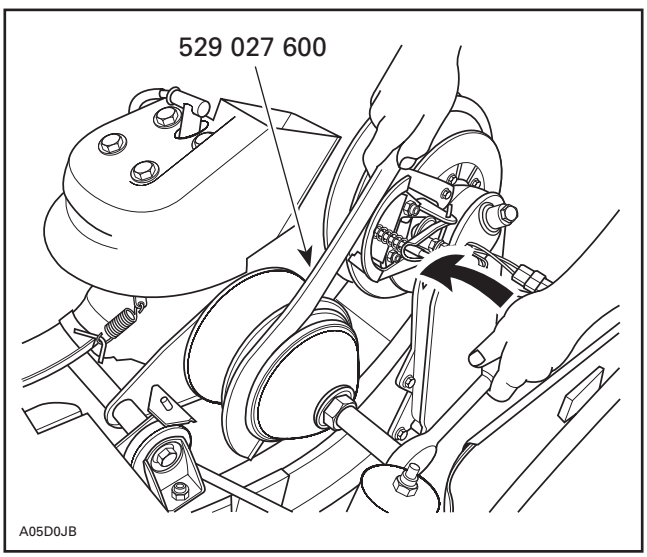
NOTE: If disassembling drive pulley, first straighten tab washer no. 7 then untighten nut no. 8.

◆ WARNING

Never use an impact wrench to remove or install the drive pulley.

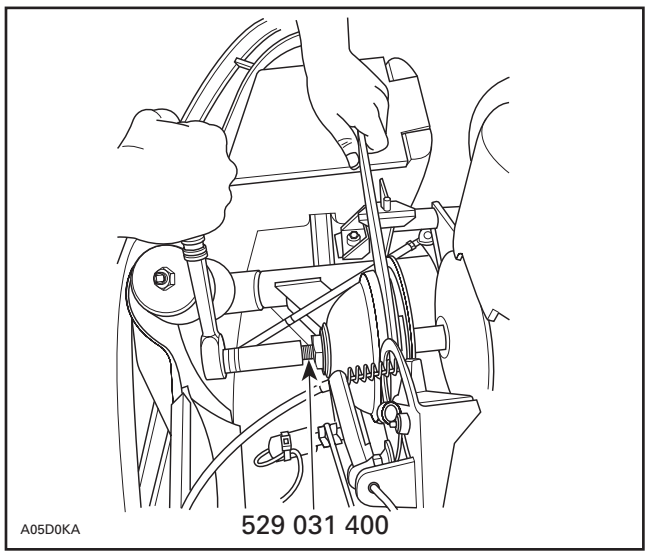
Use holder (P/N 529 027 600).

Remove retaining screw no. 9.



TYPICAL

Insert drive pulley puller (P/N 529 031 400) then remove drive pulley.

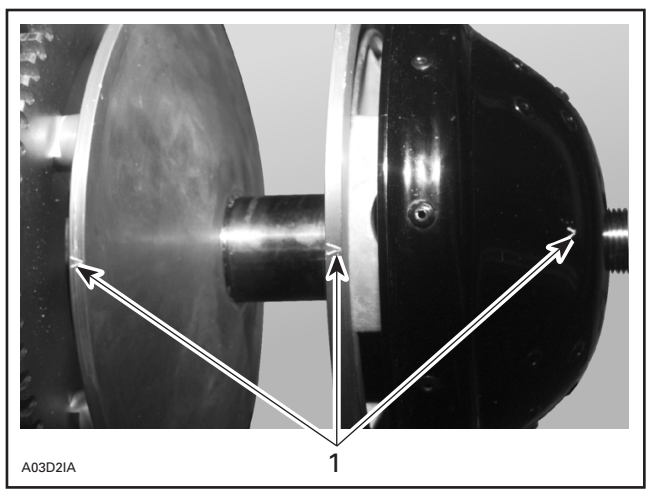


TYPICAL

DISASSEMBLY

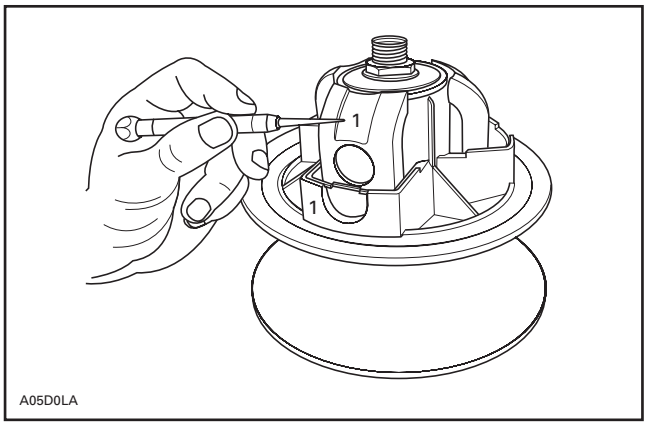
Unscrew nut. Remove tab washer.

Check for alignment marks for proper indexing at reassembly.



1. Alignment marks

Identify blocks no. 1 and their respective positive positions for reassembly.



1. Identify

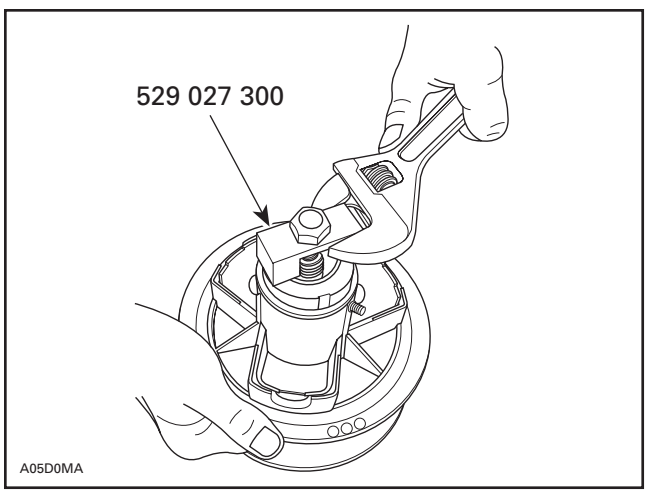
2, Cap, Washer and Disk

These are calibration parts. Refer to TECHNICAL DATA 10.

Tundra/R

Unscrew set screw **no. 4** then use spring cover tool (P/N 529 027 300) to unscrew spring cover **no. 5**.

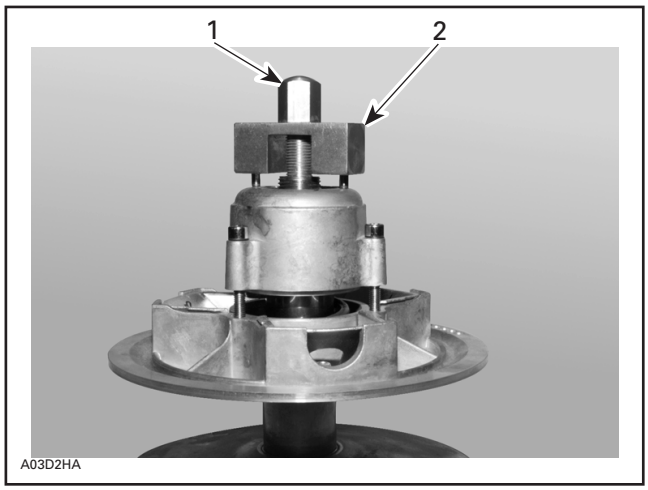
Mount tool in a vise for cover hand-unscrewing.



Remove washer **no. 10** then circlip **no. 11**.

377 Engine S-Series

Install spring cover tool (P/N 529 027 300) with puller (P/N 529 031 400) on spring cover.



1. Puller tool
2. Spring cover tool

Screw puller (hand tight) to hold spring cover and remove screws holding spring cover.

Slowly unscrew puller to release spring pressure.

Remove spring cover **no. 5**, spring and washer **no. 11**.

CLEANING

All Models

Clean pulley faces and shaft with fine steel wool and clean dry cloth. Clean sliding half bushing with clean dry cloth.

INSPECTION

Check sliding half for excessive lateral play and fixed half shaft for scratches. Replace as required.

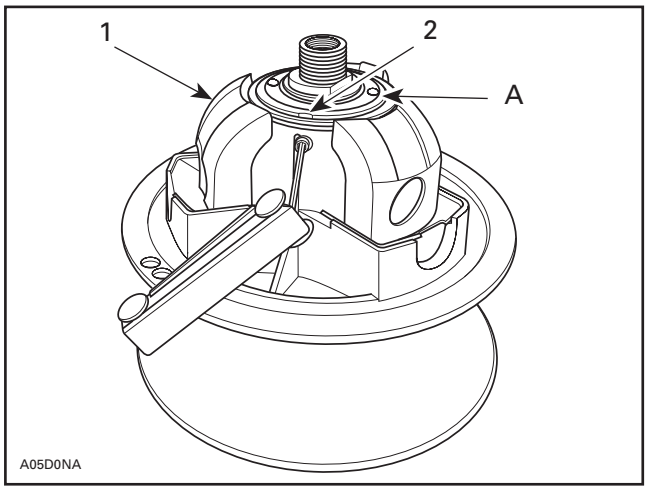
ASSEMBLY

Install circlip **no. 11** then washer **no. 10**.

Make sure to install blocks at their original position and with their curved end toward governor cup. See following illustration.

Tundra/R

Screw spring cover to 2 to 3 mm (1/16 to 1/8 in) down below sliding half end. Apply Loctite 271 on screw threads. Install set screw aligned with spring cover slot.



1. Curved end
2. Spring cover slot
A. 2 to 3 mm (1/16 to 1/8 in)

All Models

Tighten nut no. 8 to 128 N•m (95 lbf•ft).

INSTALLATION

Torque screw to 90 to 100 N•m (66 to 74 lbf•ft).

Install drive belt and belt guard.

Raise and block the rear of the vehicle and support it with a mechanical stand.

◆ WARNING

Ensure that the track is free of particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure nobody is standing near the vehicle.

Accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake, repeat 5 times.

Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

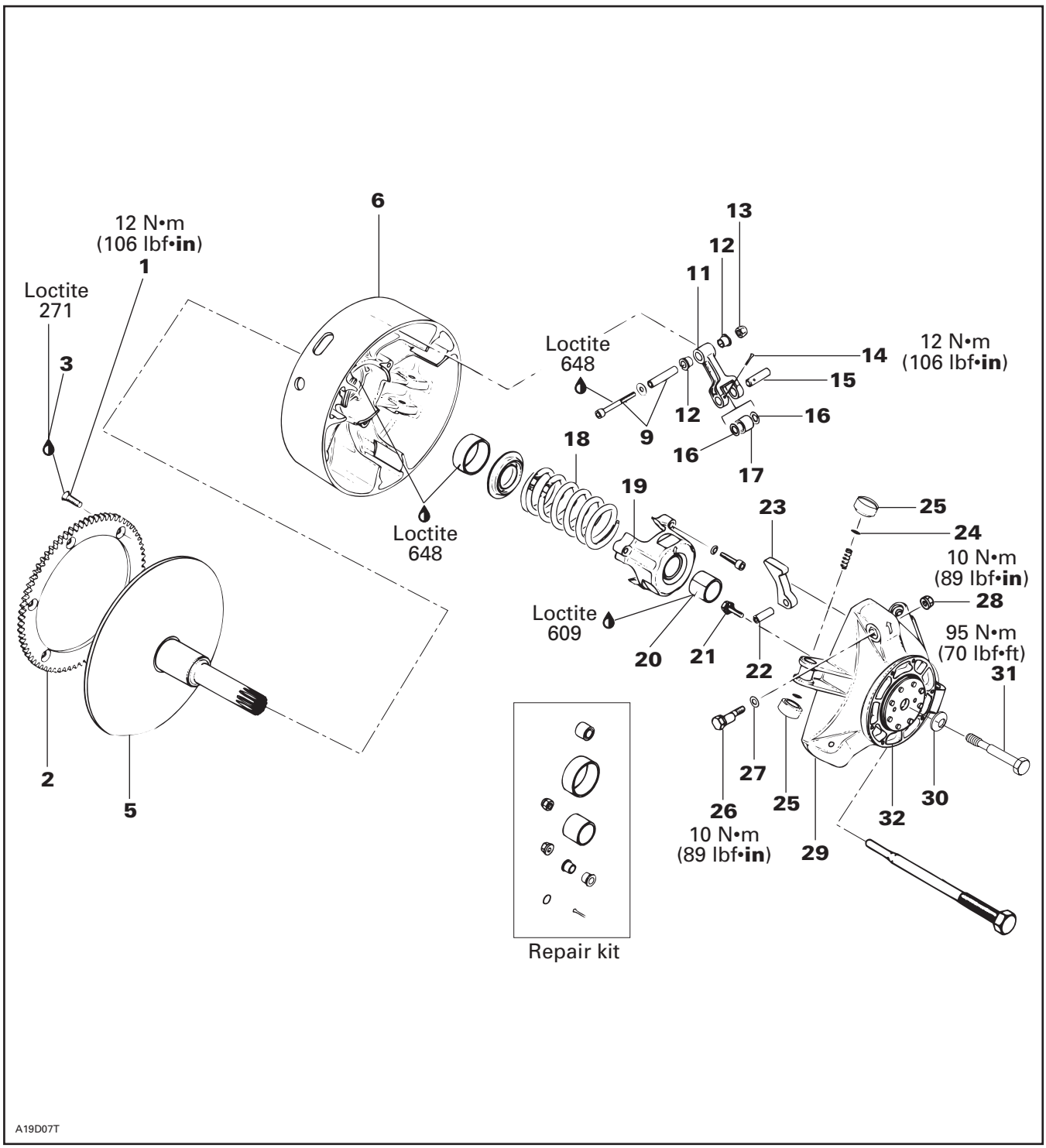
◆ WARNING

After 10 hours of operation the transmission system of the vehicle must be inspected to ensure the retaining screw is properly torqued.

TRA

All Models

NOTE: This is a lubrication free drive pulley.



GENERAL

Some drive pulley components (return spring, ramp) can be changed to improve vehicle performance in high altitude regions. The *High Altitude Technical Data Booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude.

▼ CAUTION

Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance. Verify spring specifications before installation. Do not only refer to the spring color code.

NOTE: TRA drive pulley stands for Total Range Adjustable drive pulley.

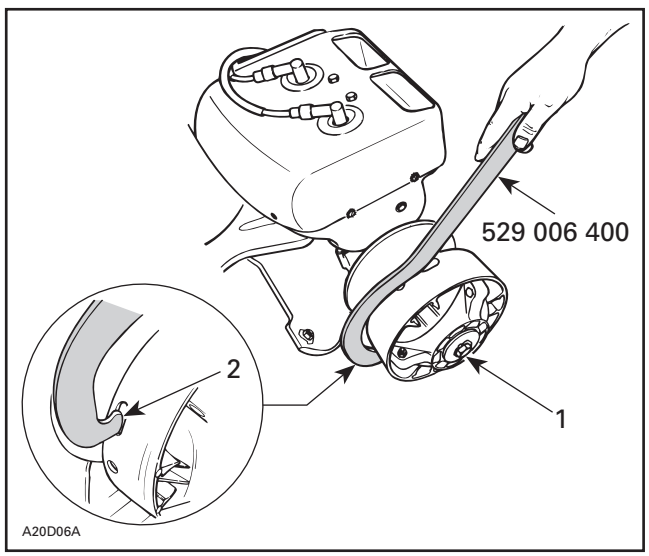
◆ WARNING

Any drive pulley repairs must be performed by an authorized Bombardier snowmobile dealer, or other such qualified person. Subcomponent installation and assembly tolerances require strict adherence to procedures detailed.

REMOVAL

30,31, Conical Spring Washer and Screw

Use holder (P/N 529 006 400).



TYPICAL

1. *Retaining screw*
2. *Insert in any slot*

NOTE: Sliding half can be removed while fixed half remains on crankshaft.

◆ WARNING

Never use any type of impact wrench at drive pulley removal and installation.

Remove retaining screw.

To remove drive pulley ass'y and/or fixed half from engine, use puller (P/N 529 007 900).

▼ CAUTION

These pulleys have metric threads. Do not use imperial threads puller. Always tighten puller by hand to ensure that the drive pulley have the same type of threads (metric vs imperial) prior to fully tighten.

To Remove Drive Pulley Ass'y:

Retain drive pulley with holder.

Install puller in pulley shaft then tighten.

DISASSEMBLY

1,2, Screw and Ring Gear

▼ CAUTION

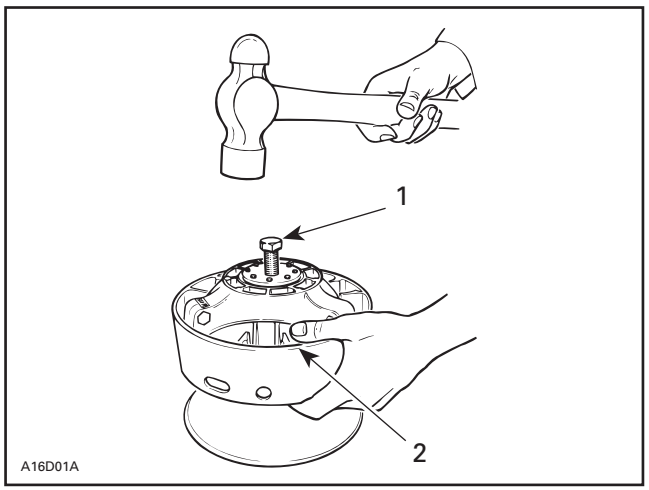
Retaining screws must be heated before disassembly.

5,6, Fixed and Sliding Half

▼ CAUTION

Do not tap on governor cup.

Screw puller into fixed half shaft about 13 mm (1/2 in). Raise drive pulley and hold it by the sliding half while knocking on puller head to disengage fixed half.



1. Puller
2. Holding sliding half

NOTE: No components marking is required before disassembling this drive pulley since it has factory mark and arrows as indexing reference.

25,29, Slider Shoe and Governor Cup

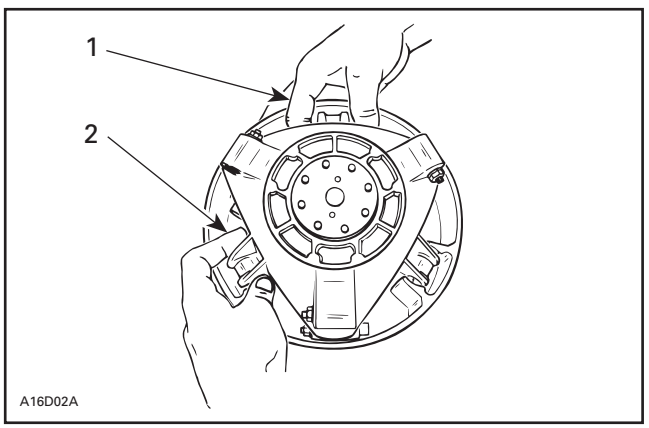
Carefully lift governor cup until slider shoes come at their highest position into guides.

Hold a slider shoe set then carefully lift its housing and remove them. Proceed the same way for other housings lifting 1 at a time.

32, Cushion Drive

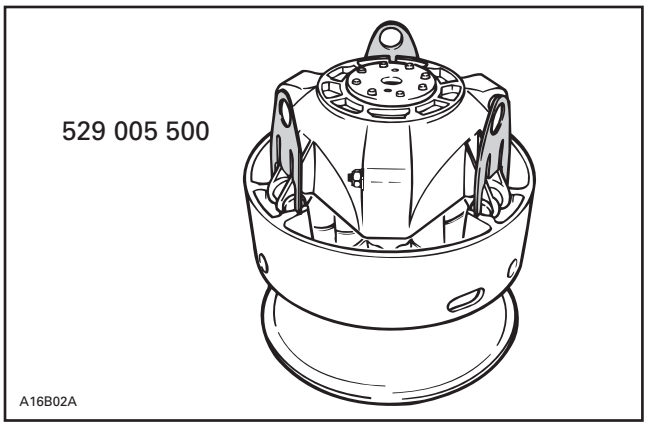
▼ CAUTION

Do not disassemble cushion drive. Governor cup and cushion drive are factory balanced as an assembly.



1. Hold slider shoes
2. Lift one housing at a time

NOTE: To ease disassembly, forks (P/N 529 005 500) should be used to hold slider shoes prior to removing governor cup.



19, Spring Cover Ass'y

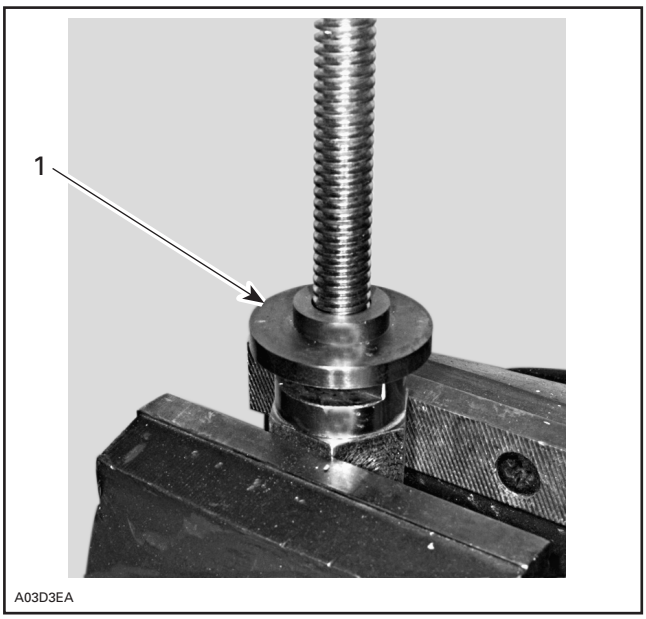
It is pushed by spring pressure.

◆ WARNING

Spring is very strong. Never attempt to remove spring cover without the recommended tools.

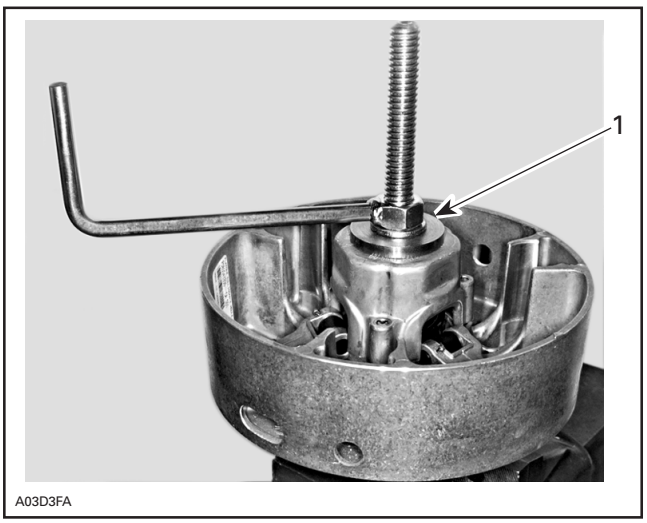
Use spring compressor (P/N 529 035 524).

Install support guide.



1. Support guide

Install sliding half then a second support guide. These support guides will prevent bushing damages.



1. Support guide

Remove 3 Allen screws retaining spring cover then unscrew compressor.

CLEANING

5,6, Fixed and Sliding Half

Clean pulley faces and shaft with fine steel wool and dry cloth.

5, Fixed Half and Crankshaft End

Parts must be at room temperature before cleaning.

Using a paper towel with cleaning solvent, clean crankshaft tapered end and the taper inside the fixed half of the drive pulley, crankshaft threads and retaining screw threads.

◆ WARNING

This procedure must be performed in a well ventilated area.

▼ CAUTION

Avoid contact between cleaner and crankshaft seal because damage may occur.

Remove all harden oil deposits that have baked on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper no. 600.

▼ CAUTION

Do not use any other type of abrasive.

Reclean mounting surfaces with paper towel and cleaning solvent.

Wipe off the mounting surfaces with a clean, dry paper towel.

▼ CAUTION

Mounting surfaces must be free of any oil, cleaner or towel residue.

4,20, Bushing

Only use petrol base cleaner when cleaning bushings.

▼ CAUTION

Do not use acetone to clean bushing.

INSPECTION

Drive pulley should be inspected annually.

16,17, Thrust Washer and Roller

Check roller for roundness of external diameter. Check thrust washer for thickness wear. Replace as required.

▼ CAUTION

Ensure rollers are in good condition. Replace as required.

9,12, Fitting Bolt Ass'y and Flanged Bushing

Check for wear, replace as required. When installing old style flanged bushing (made of black plastic), use a size "O" (letter) drill bit to ream inside diameter.

24,25, O-Ring and Slider Shoe

Check if O-rings are cracked, cut or crushed. Replace as required.

Check slider shoes for wear. Replace if groove is not apparent on top.

5,29, Fixed Half and Governor Cup

Inspect splines and free play between both parts. Maximum free-play is 0.5 mm (.020 in) measured at calibration screw radius. Replace if required.

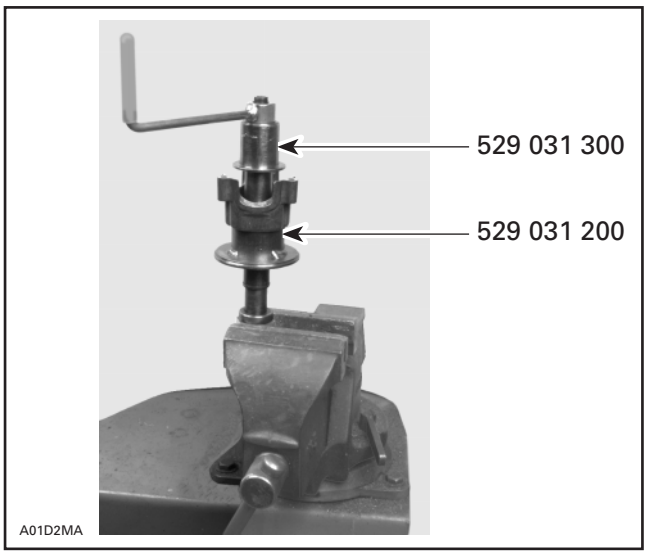
20, Spring Cover Bushing

Visually inspect coating. Replace if worn.

Under normal use there is no need to replace this bushing.

Mount compressor (P/N 529 035 524) in a vise.

Use tools (P/N 529 031 300 and 529 031 200) to remove old bushing.



▼ CAUTION

Bushing must be bonded with retaining compound.

Apply retaining compound outside of bushing then press it down to counterbore from sliding half side.

▼ CAUTION

Insert bushing from sliding half side (inner) of spring cover.

ASSEMBLY

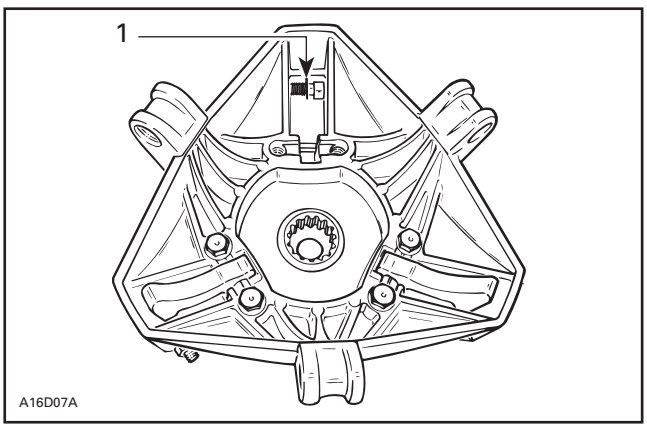
NOTE: This drive pulley is lubrication free. **Do not lubricate** any component.

1,2,3, Screw, Ring Gear and Loctite 271

Apply Loctite 271 (P/N 413 702 900) on threads and under head then torque to 15 N•m (133 lbf•**in**).

26,27,28, Calibration Screw, Washer and Locking Nut

When installing calibration screw, make sure to install washer as shown.



1. Washer

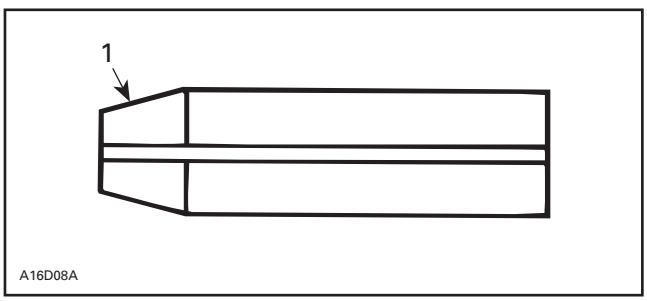
Torque locking nut to 10 N•m (89 lbf•**in**).

15, Pin

Always use the same type of pin as originally installed when servicing. Different types have different weights for calibration purpose. Refer to TECHNICAL DATA 10.

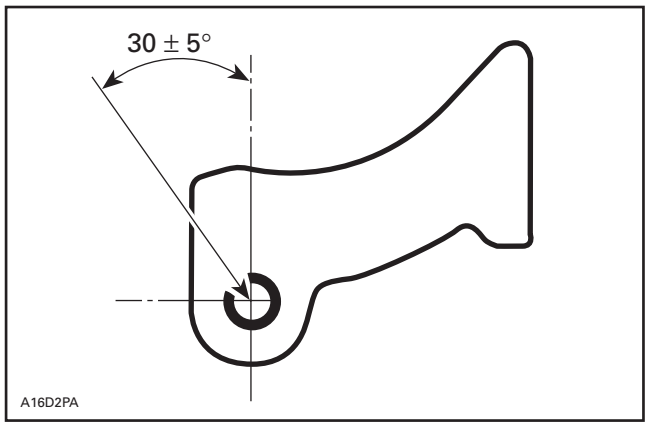
21,22,23, Ramp, Dowel Tube and Screw

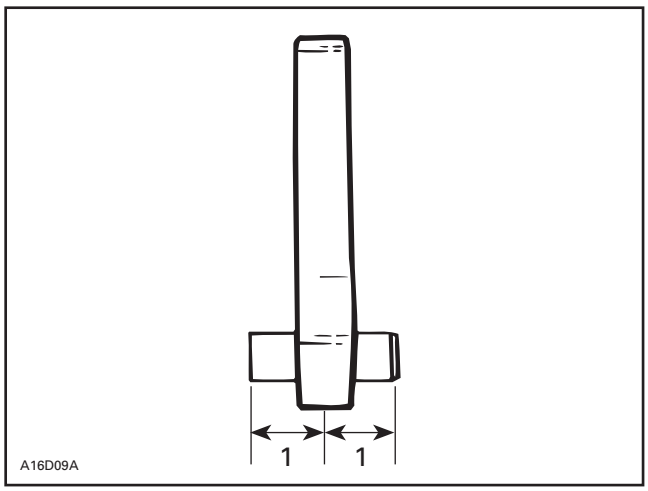
Insert dowel tube from chamfered side. Make sure ramp is centered on dowel tube.



1. Chamfered side

Position dowel tube split at the illustrated angle.





1. Equal distance

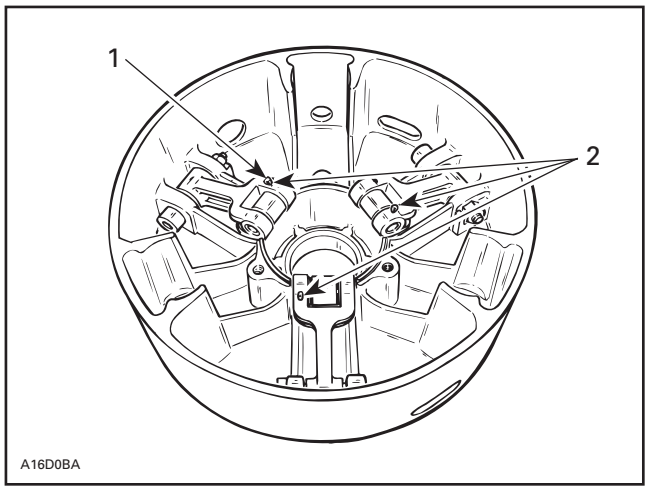
Torque screws to 10 N•m (89 lbf•**in**).

9,11,13,14, Screw, Lever Ass'y, Nut and Cotter Pin

Always install lever assemblies so that cotter pins are at the shown side. Besides install cotter pin head on top when lever is sat at bottom of sliding half. Bend cotter pin ends to sit perfectly against lever.

◆ WARNING

Whenever replacing centrifugal levers, always replace all 3 at the same time. Otherwise, drive pulley misbalancing will occur because of levers difference.



1. Head on top
2. All on the same side

▼ CAUTION

Lever assemblies must be installed so that cotter pins are on the same side.

Torque nuts to 12 N•m (106 lbf•**in**).

▼ CAUTION

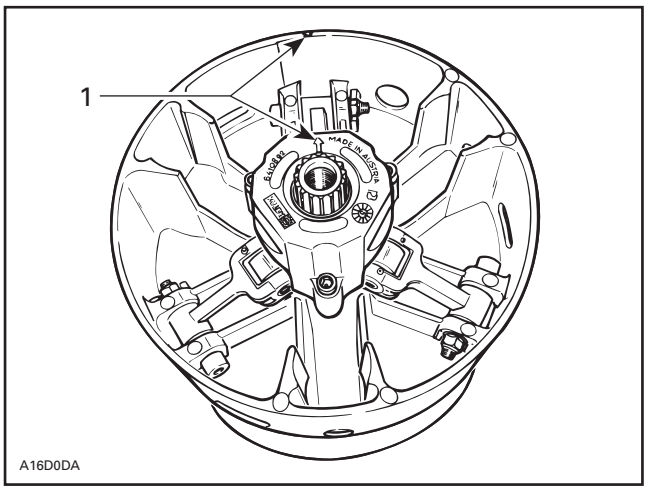
Lever ass'y and rollers must move easily after installation.

5,6,18,19, Fixed Half, Sliding Half, Spring, Spring Cover and Screw

To install spring cover, use spring compressor (P/N 529 035 524).

Assemble fixed and sliding halves. Note that fixed halves have different cone angle. Match cone angle with crankshaft.

Lift sliding half against spring cover and align spring cover arrow with sliding half mark.

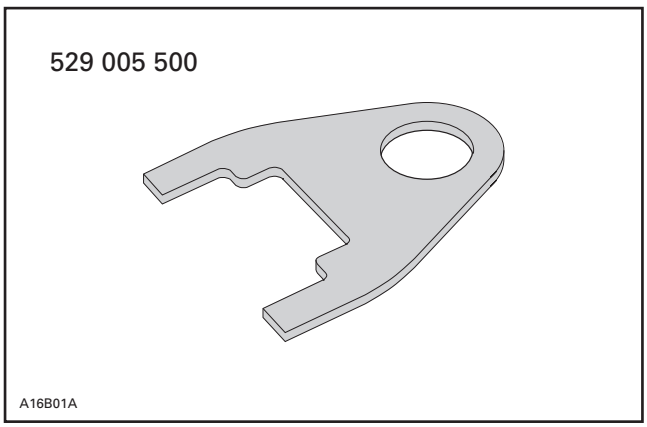


1. Align

Install and torque screws to 10 N•m (89 lbf•**in**).

6,25,29, Sliding Half, Slider Shoe and Governor Cup

To install governor cup, use following tool:

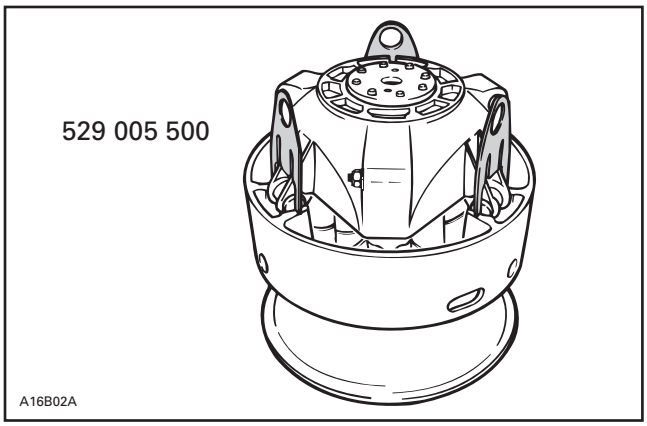


Insert spring and slider shoes into governor cup so that groove in each slider shoe is vertical to properly slide in guides.

▼ CAUTION

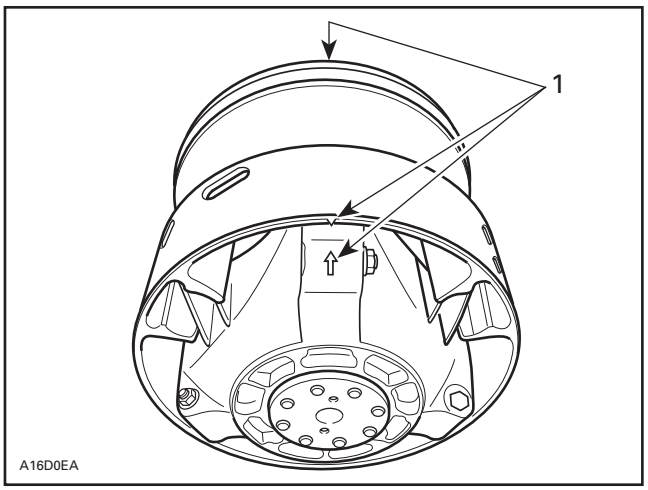
Make sure O-rings are installed on slider shoes and their grooves are positioned vertically.

Install fork (P/N 529 005 500) into slider shoe grooves to maintain them for governor cup installation. Proceed on 3 set of slider shoes.



Make sure to align governor cup arrow with sliding half and fixed half mark.

NOTE: If fixed half has no mark, align governor cup mark with segment no. 1 of inner half. Segments are identified on engine side.



1. Align

Carefully slide governor cup into sliding half. Align mark of governor cup with mark of fixed half.

Remove forks and push governor cup so that its splines engage with fixed half shaft splines.

▼ CAUTION

Make sure splines of both parts are fully engaged.

INSTALLATION

◆ WARNING

Do not apply anti-seize or any lubricant on crankshaft and drive pulley tapers.

◆ WARNING

Never use any type of impact wrench at drive pulley removal and installation.

Clean mounting surfaces as described in CLEANING above.

Drive Pulley Ass'y

The installation procedure must be strictly adhered to as follows.

Lock crankshaft in position as explained in removal procedure.

Install drive pulley on crankshaft extension.

Install conical washer with its concave side towards drive pulley then install screw.

◆ WARNING

Never substitute lock washer and/or screw with jobber ones. Always use Bombardier genuine parts for this particular case.

Torque screw to 90 to 100 N•m (66 to 74 lbf•ft).

Install drive belt and belt guard.

Raise and block the rear of the vehicle and support it with a mechanical stand.

◆ WARNING

Ensure that the track is free of particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure nobody is standing near the vehicle.

Accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake, repeat 5 times.

Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

◆ WARNING

After 10 hours of operation the transmission system of the vehicle must be inspected to ensure the retaining screw is properly torqued.

DRIVE PULLEY ADJUSTMENT

The drive pulley is factory calibrated to transmit maximum engine power at a predefined RPM. Factors such as ambient temperature, altitude or surface condition may vary this critical engine RPM thus affecting snowmobile efficiency.

This adjustable drive pulley allows setting maximum engine RPM in the vehicle to maintain maximum power.

Calibration screws should be adjusted so that actual maximum engine RPM in vehicle matches with the maximum horsepower RPM given in TECHNICAL DATA 10.

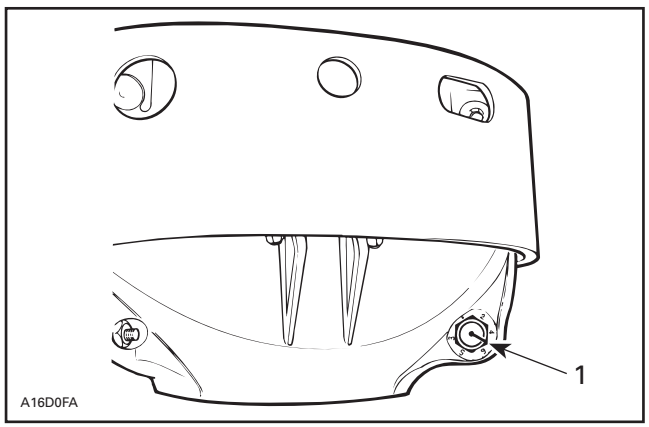
NOTE: Use precision digital tachometer for engine RPM adjustment.

NOTE: The adjustment has an effect on high RPM only.

To adjust, modify ramp end position by turning calibration screws.

26,28,29, Calibration Screw, Locking Nut and Governor Cup

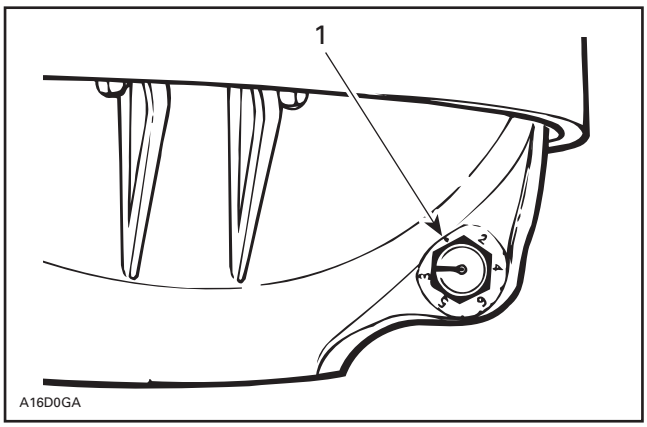
Calibration screw has a notch on top of its head.



1. Notch

Governor cup has 6 positions numbered 2 to 6. Note that in position 1 the number is substituted by a dot (due to its location on casting).

See TECHNICAL DATA 10 for original setting.



1. Position 1 (not numbered)

Each number modifies maximum engine RPM by about 200 RPM.

Lower numbers decrease engine RPM in steps of 200 RPM and higher numbers increase it in steps of 200 RPM.

Example:

Calibration screw is set at position 4 and is changed to position 6. So maximum engine RPM is increased of 400 RPM.

To Adjust:

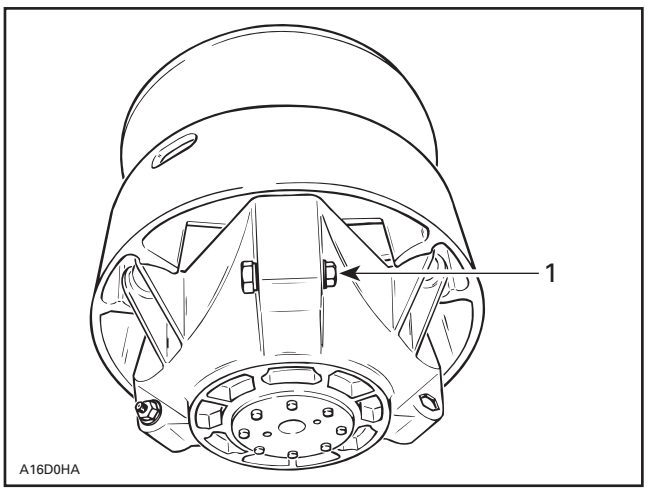
Just loosen locking nut enough to pull calibration screw **partially** out and adjust to desired position. Do not completely remove the locking nut. Torque locking nuts to 10 N•m (89 lbf•**in**).

▼ CAUTION

Do not completely remove calibration screw or its inside washer will fall off.

▼ CAUTION

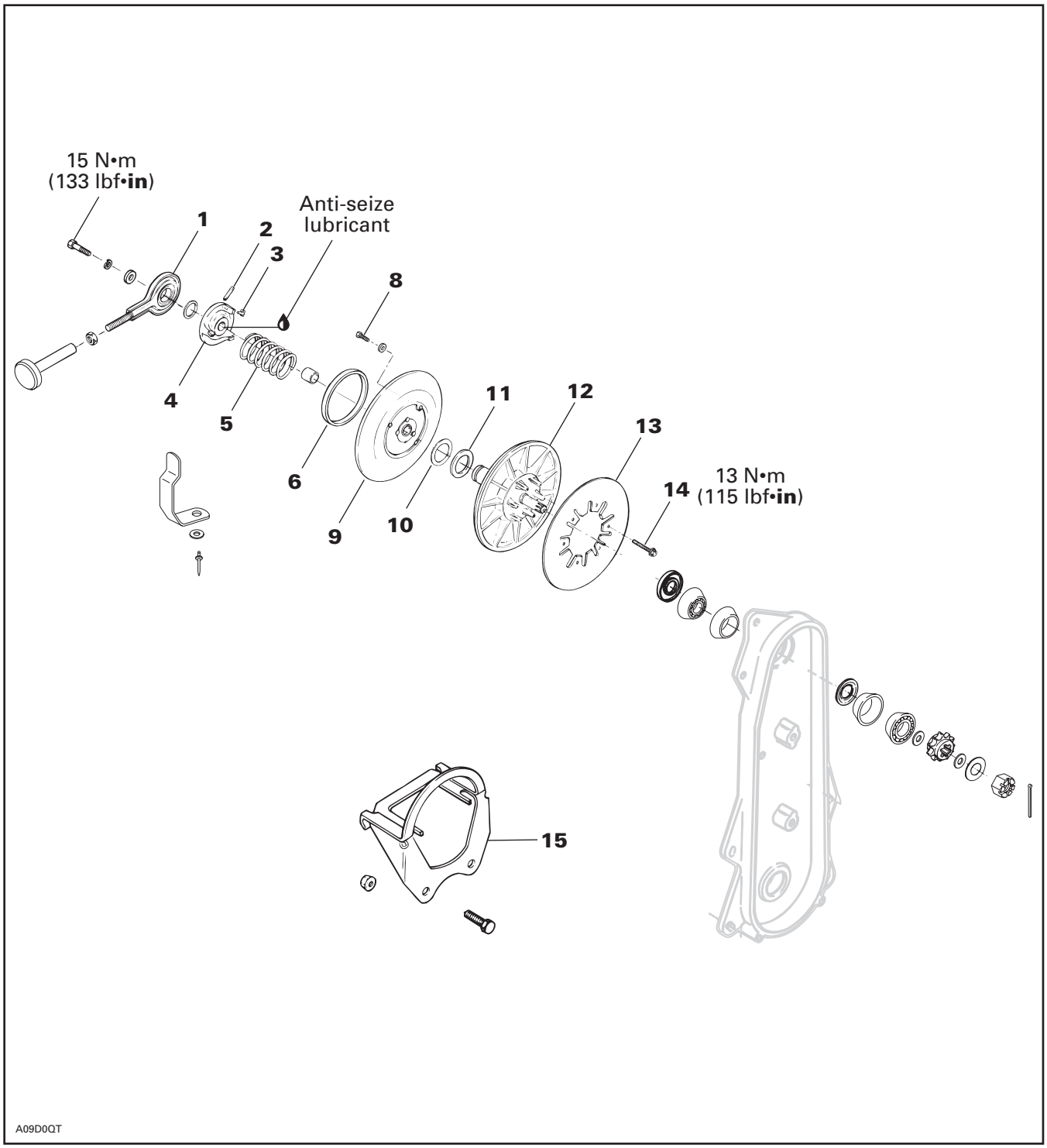
Always adjust all 3 calibration screws and make sure they are all set at the same number.



1. Position 1 (not numbered)

DRIVEN PULLEY

Tundra



NOTE: Driven pulley components (support, cam, shoes, etc.) can be serviced without removing the whole driven pulley from chaincase. Refer to the following procedures but neither remove brake caliper nor open chaincase for those cases.

REMOVAL

To remove driven pulley from chaincase, follow this procedure.

Remove guard and drive belt from vehicle.

Remove brake support **no. 15** from chaincase with brake ass'y.

Free countershaft support **no. 1** from support clamp.

Chaincase

Open chaincase and drain oil. Unlock and remove upper sprocket.

The following is required to have enough space to remove driven pulley from chaincase:

Loosen upper retaining screws of steering column.

Disconnect carburetor boots from intake manifold and air intake silencer.

Disconnect impulse hose from engine.

Disconnect oil injection supply line at injection pump and plug line to prevent draining.

Remove screws retaining rear engine support to chassis.

Tip engine forward just enough to allow driven pulley removal from chaincase. Block in this position.

NOTE: In some cases, chaincase retaining screws might have to be slackened to allow pivoting of chaincase. In this case, note position of alignment shims. Besides, air intake silencer and oil injection reservoir might have to be slightly moved to get enough space to pull driven pulley.

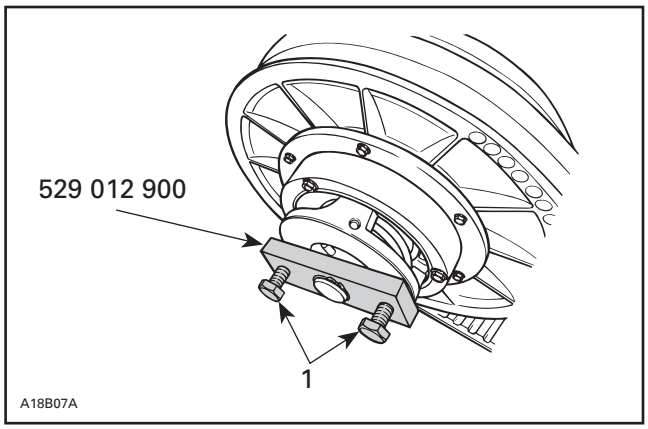
Remove bearing cone.

Knock driven pulley shaft with a plastic hammer and pull driven pulley out.

DISASSEMBLY

Remove support **no. 1** using a suitable puller.

Install cam pusher (P/N 529 012 900), reinstall circlip. Tighten cam pusher screws alternately then remove roll pin.



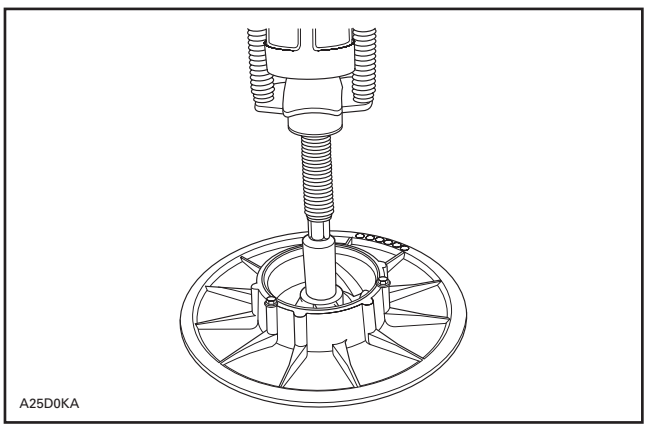
1. Tighten alternately

Loosen cam pusher screws, remove circlip then cam pusher. Remove cam.

Note spring original setting (adjusting hole in sliding half).

6,9, Sliding Half Bushing and Bushing

To disassemble a worn bushing (small), use a press and a suitable pusher.



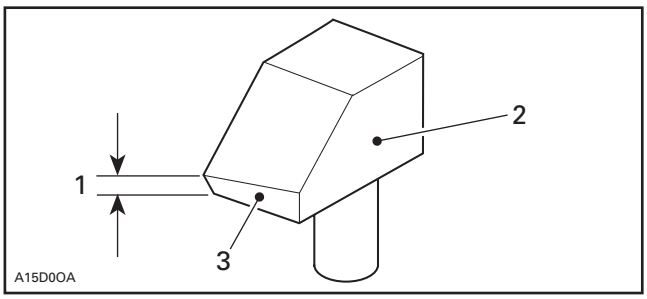
TYPICAL

Remove 3 screws and washers and pry large bushing out.

INSPECTION

3, Slider Shoe

Check cam slider shoes for wear. Replace when inside edge of cam slider shoe slope base is worn to 1 mm (.039 in) or less.

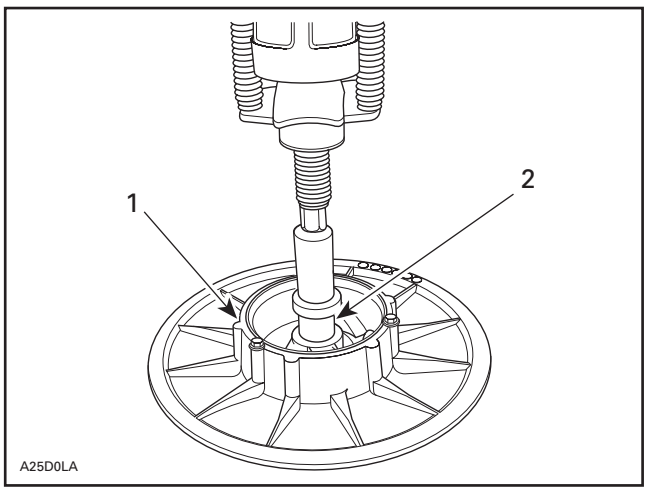


1. Measure thickness of slope base here
2. Sliding pulley side
3. Slope base

ASSEMBLY

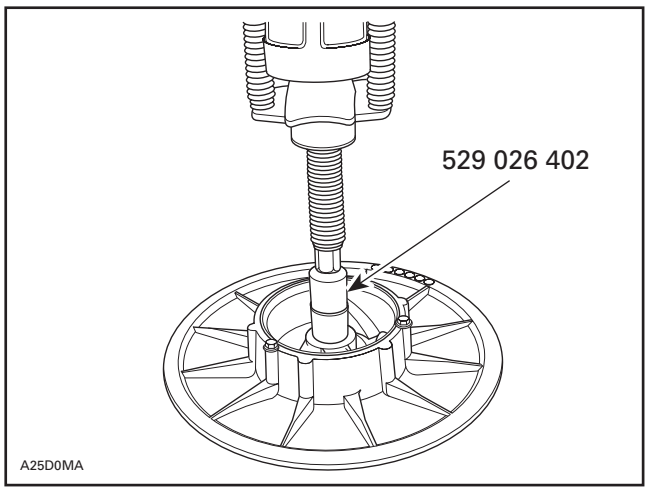
6, Sliding Half Bushing

Clean mounting surfaces with Loctite Safety Solvent. Using a press and a suitable pusher, install bushing as illustrated.



1. Install bushing from this side of sliding half
2. Bushing

After bushing installation, try fixed half shaft inside bushing. If it is too tight, use burnishing bar (P/N 529 026 402) then retry. If it is still too tight, use burnishing bar with oil on it.



8,9, Screw and Bushing

Align notches with screw positions and press down. Torque screws to 5 N•m (44 lbf•**in**).

3, Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on cam.

12, Fixed Half Shaft

Thoroughly clean the fixed half shaft. Remove rust with no. 320 grit sand paper.

Apply a light film of anti-seize lubricant (P/N 413 701 000) on the shaft. Always wipe off surplus.

NOTE: Activate the sliding half several times to distribute lubricant over full length of shaft. Be careful that lubricant does not get on inner halves of pulley.

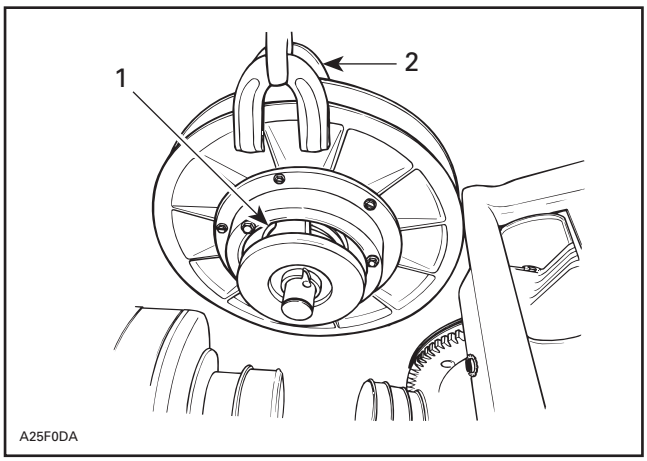
13,14, Brake Disc and Screw

Install brake disc on fixed half and torque screws to 13 N•m (115 lbf•**in**).

Assemble driven pulley components by reversing the disassembly procedure.

2,4,5, Roll Pin, Outer Cam and Spring

One of its ramps facing upwards, hold sliding half with welding clamps. Install spring into sliding half at its original setting (previously noted adjusting hole). Insert other spring end in outer cam and turn clockwise until a slider shoe corresponds with the ramp facing upwards. Push cam all the way in then install roll pin coated with anti-seize lubricant (P/N 413 701 000).



TYPICAL

1. *A ramp facing upwards*
2. *Welding clamp*

INSTALLATION

Driven Pulley and Chaincase

Install a new upper chaincase oil seal and a new chaincase cover seal.

Reinstall the driven pulley on vehicle by reversing the removal procedure.

NOTE: If chaincase screws have been loosened, chaincase can be reinstalled to its initial position by securing driven pulley support before tightening chaincase retaining screws. Make sure to install alignment shims as noted at removal.

▼ CAUTION

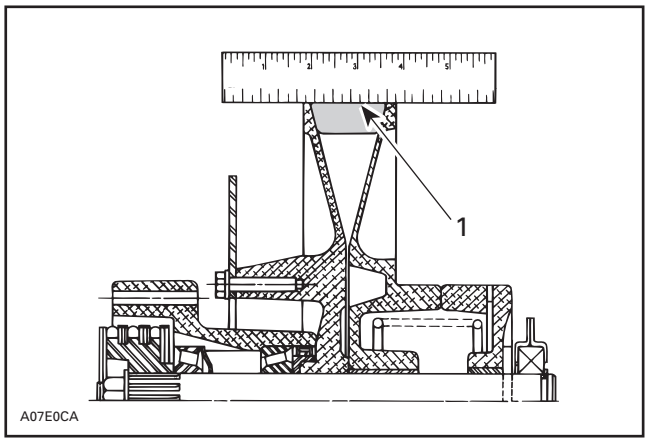
Bleed oil injection pump on models that have had their injection oil supply line removed. Refer to INJECTION OIL SYSTEM 04-06.

ADJUSTMENT

10,11, Shim

NOTE: The following adjustment must be performed with a new drive belt.

For best performance, particularly at starting, top of drive belt should be flush with top of driven pulley halves.



TYPICAL

1. *Belt flush with the top of the pulley halves*

Shim(s) no. 10 and no. 11 provide belt height adjustment between pulley halves. Adding shims will lower the belt in driven pulley, while removing shims will raise the belt. Adjust properly.

5, Spring

General

It is usual to experience spring setting during breaking period of a new spring. The factory spring preload is slightly higher (about 1 kg (2 lb)) to compensate for spring setting. Specifications in TECHNICAL DATA 10 are applicable after break-in period (about 10 hours of use).

Spring Torsional Pre-Load

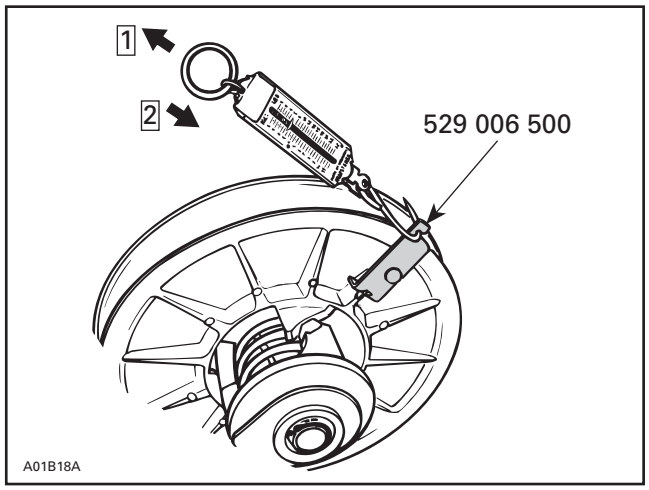
To check spring pre-load adjustment, use spring scale hook (P/N 529 006 500) and a spring scale.

Install the hook on the sliding half, making sure the spring scale is perpendicular to the pulley axle.

Take a measurement when opening driven pulley and another one when driven pulley begins to close after a rotation of 10 mm (3/8 in). Spring pre-load is the average measurement between these 2.

$$\frac{1^{st}\text{ measurement (when opening)} + 2^{nd}\text{ measurement (when closing)}}{2} = \text{Spring pre-load}$$

$$\text{Example: } \frac{3.8\text{ kg (8.4 lb) (when opening)} + 3.4\text{ kg (7.5 lb) (when closing)}}{2} = \text{3.6 kg (8 lb) Actual spring pre-load}$$

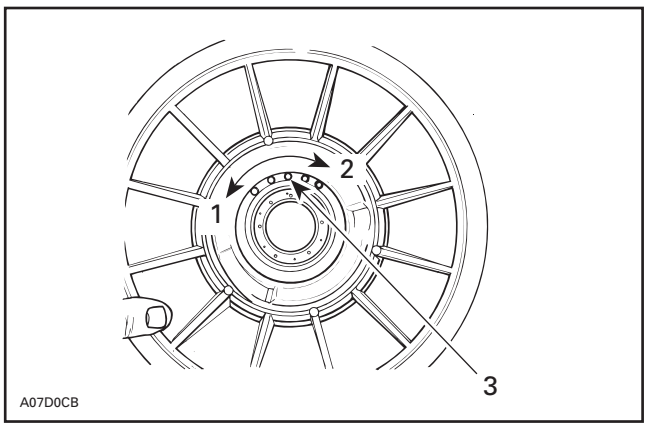


TYPICAL

Step 1 : 1st measurement
Step 2 : 2nd measurement

Spring pre-load should be as TECHNICAL DATA section 10.

To adjust spring pre-load relocate spring end in sliding pulley, moving it clockwise to decrease the pre-load and counterclockwise to increase it.



1. *Decrease*
2. *Adjusting holes*
3. *Increase*

NOTE: Always recheck torsional pre-load after adjusting.

Chaincase

Check oil level and refill as required. Refer to CHAINCASE 05-07.

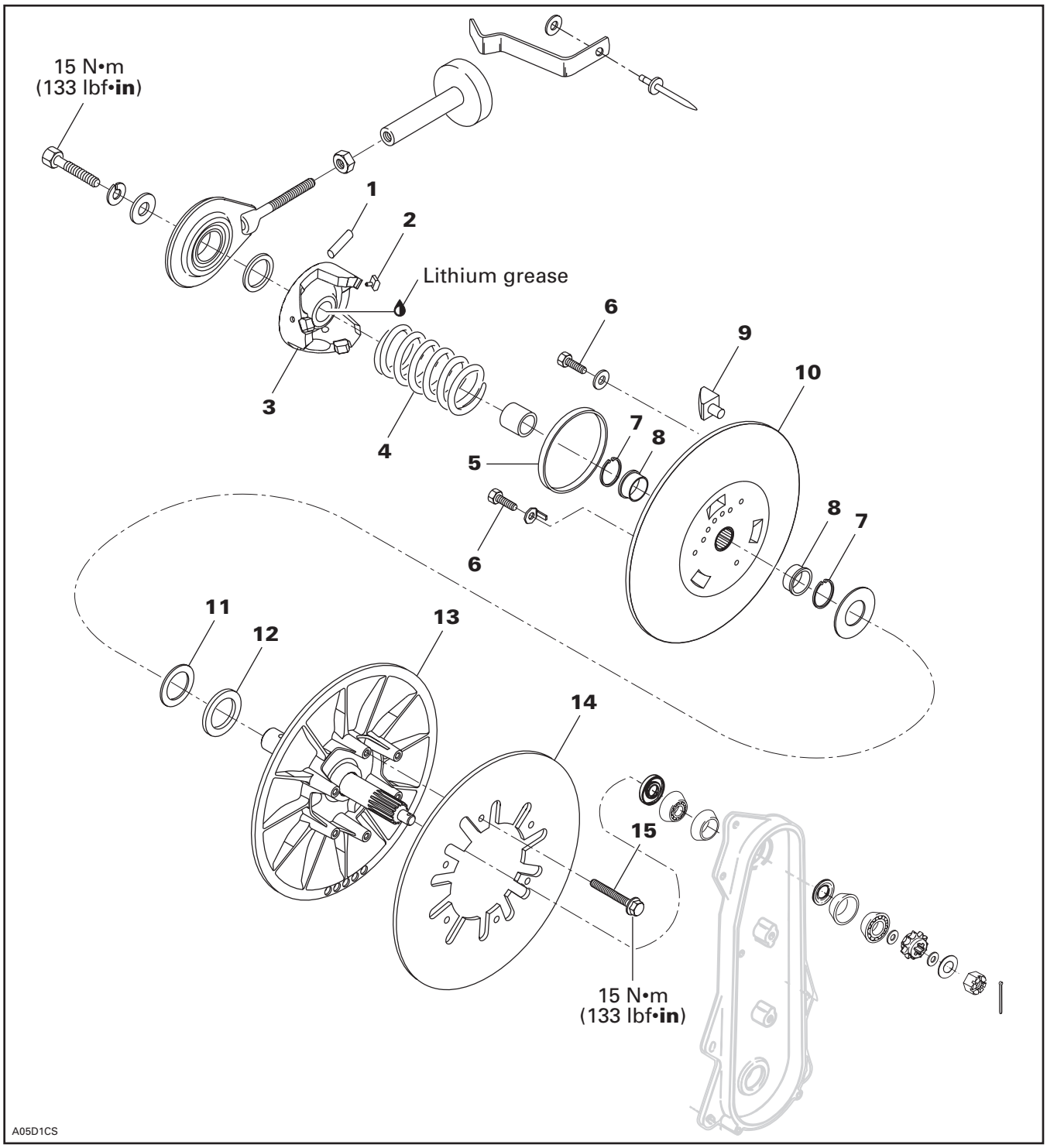
Pulley Alignment and Drive Belt Deflection

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 and DRIVE BELT 05-02 to perform adjustments.

▼ CAUTION

Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

Tundra R


15 N•m
(133 lbf•in)
1
2
Lithium grease
3
4
5
6
6
7
8
9
10
8
7
11
12
13
14
15
15 N•m
(133 lbf•in)
A05D1CS

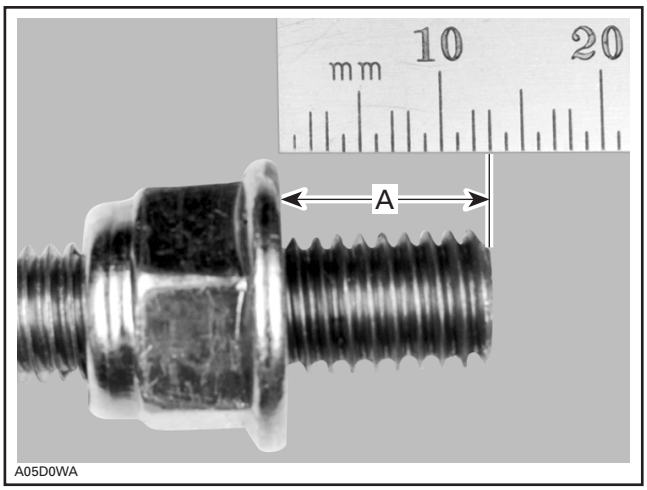
REMOVAL

Follow removal procedure for Tundra driven pulley at beginning of this subsection.

DISASSEMBLY

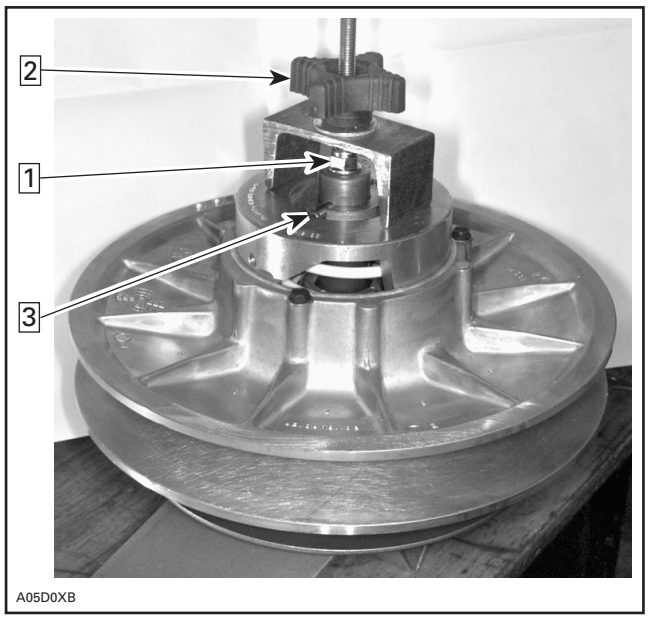
To disassemble driven pulley, driven pulley spring compressor (P/N 529 035 300) must be used. See following procedure.

Position stop nut 13 mm (1/2 in) from threaded rod end, as shown in the next photo.



A. 13 mm (1/2 in)

Install driven pulley spring compressor (P/N 529 035 300). Fully tighten the 13 mm (1/2 in) exposed threads in driven pulley. Tighten stop nut. Tighten tool knob to compress spring then remove roll pin no. 2.

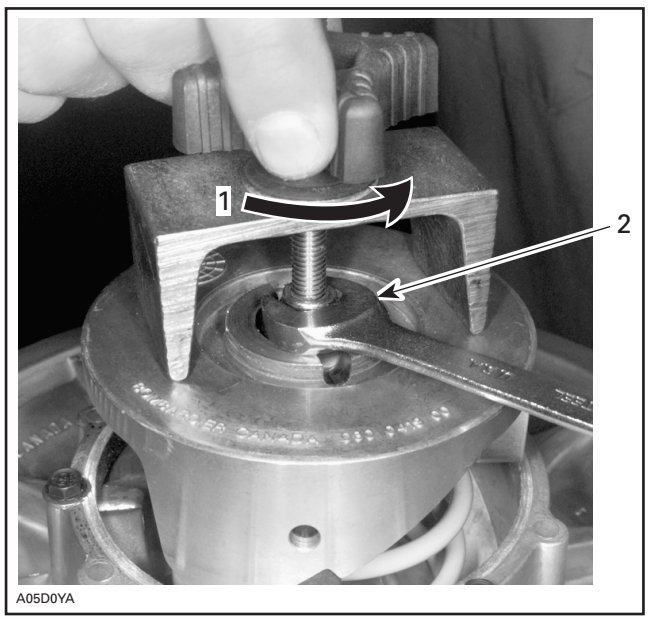


Step 1 : Tighten stop nut
Step 2 : Tighten knob to compress spring
Step 3 : Remove roll pin

Once roll pin has been removed, loosen knob until spring pressure is completely released.

◆ WARNING

To avoid injuries always hold stop nut with a key when loosening knob, as shown in the next photo.

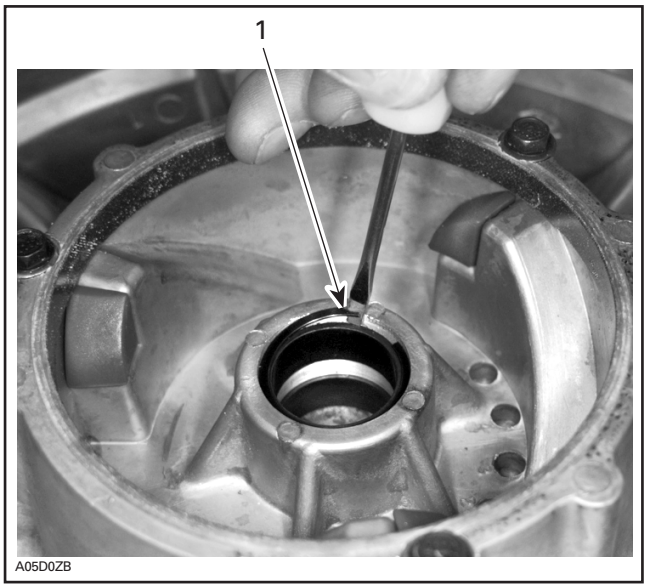


1. When loosening knob
2. Hold stop nut with a key

Remove tool and cam **no. 3**. Remove spring **no. 4** and sliding half **no. 10**.

8, Sliding Half Small Bushing

To remove a worn bushing **no. 8**, use a screwdriver and pull out circlip **no. 7**.



1. Remove circlip

Reverse pulley half **no. 10** then remove bushing using a punch, as shown in the next photo.

▼ CAUTION

Small bushings will be damaged at removal. Always replace with new ones.



5, Large Bushing

Remove 3 screws **no. 6** with washers and pry bushing **no. 5** out.

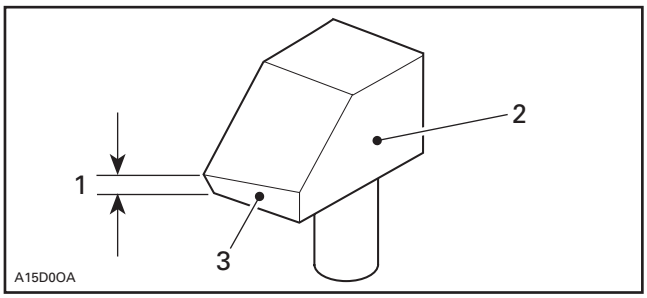
INSPECTION

2,9, Slider Shoe

Black slider shoe = forward

Red slider shoe = reverse

Check cam slider shoes for wear. Replace when inside edge of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



1. Measure thickness of slope base here
2. Sliding pulley side
3. Slop base

ASSEMBLY

Assemble driven pulley components by reversing the disassembly procedure except for the following:

8, Bushing

Clean mounting surfaces with Loctite Safety Solvent. Using a press and pusher (P/N 420 876 512), install bushing as shown in the next photo.

▼ CAUTION

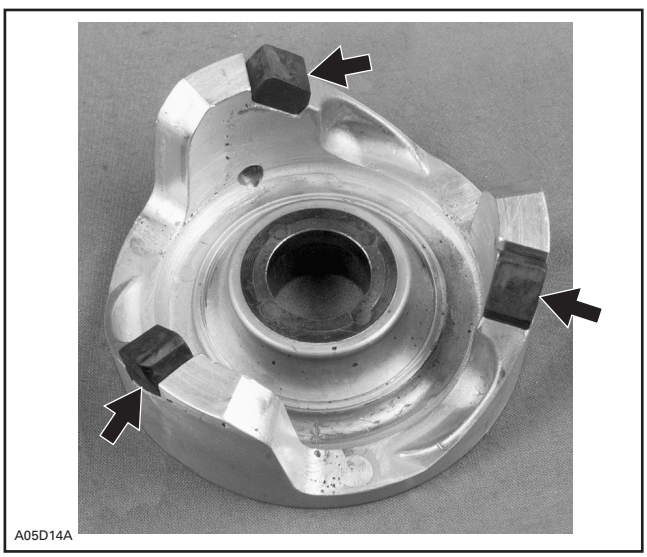
To avoid bushings damage, use extreme caution when inserting new bushings.



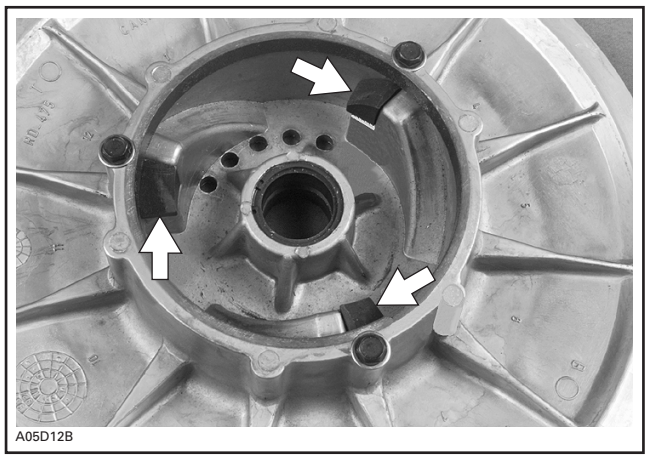
2,9, Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Install slider shoes as per following photo. Red slider shoes are being used for reverse and black ones for forward.



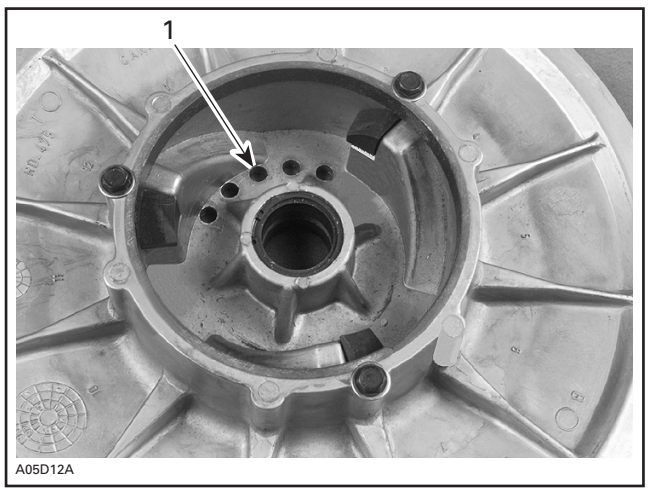
BLACK SLIDER SHOES ON CAM



RED SLIDER SHOES ON PULLEY HALF

2,4,5, Roller Pin, Outer Cam and Spring

Insert spring in adjusting hole no. 3 into sliding half, as illustrated.



1. Adjusting hole no. 3

Insert other spring end in cam. Mount driven pulley spring compressor (P/N 529 035 300) as in disassembly procedure.

Push cam all the way in then install roll pin coated with anti-seize lubricant (P/N 413 701 000).

13,14,15, Fixed Pulley Half, Brake Disc and Screw

Install brake disc on fixed pulley half and torque screws to 15 N•m (115 lbf•**in**).

INSTALLATION

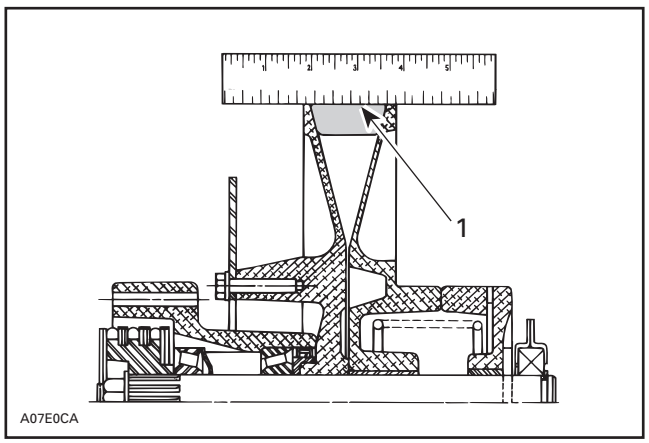
Follow installation procedure for Tundra driven pulley at beginning of this subsection.

ADJUSTMENT

11,12, Shim

NOTE: The following adjustment must be performed with a new drive belt.

For best performance, particularly at starting, top of drive belt should be flush with top of driven pulley halves.



TYPICAL

1. Belt flush with the top of the pulley halves

Shim(s) no. 11 and no. 12 provide belt height adjustment between pulley halves. Adding shims will lower the belt in driven pulley, while removing shims will raise the belt. Adjust properly.

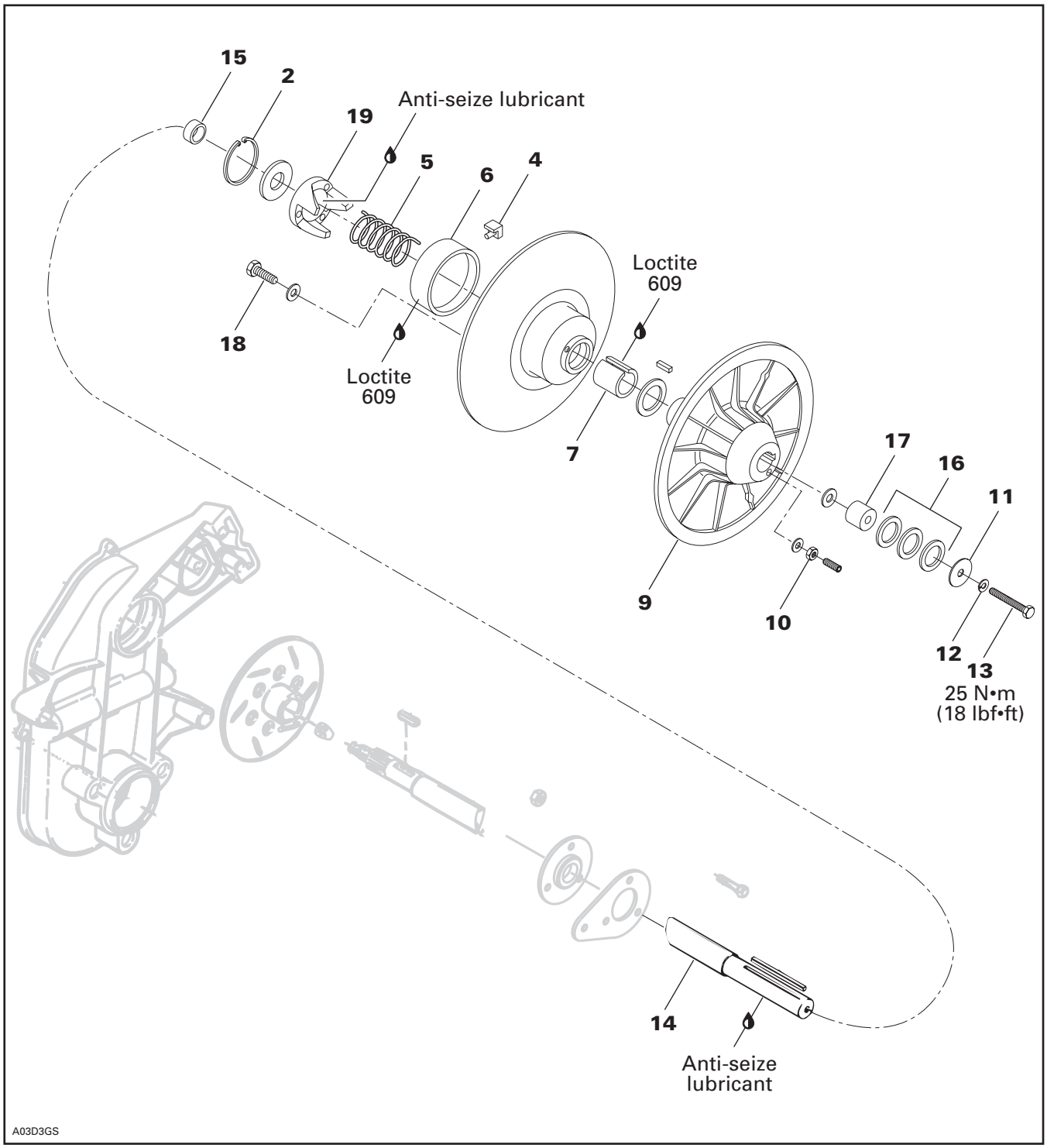
Pulley Alignment and Drive Belt Deflection

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 and DRIVE BELT 05-02 to perform adjustments.

▼ CAUTION

Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

Formula S/SL


15
2
19
Anti-seize lubricant
5
6
4
18
Loctite
609
Loctite
609
7
17
16
11
9
10
12
13
25 N•m
(18 lbf•ft)
14
Anti-seize
lubricant
A03D3GS

REMOVAL

Remove belt guard and drive belt from vehicle.

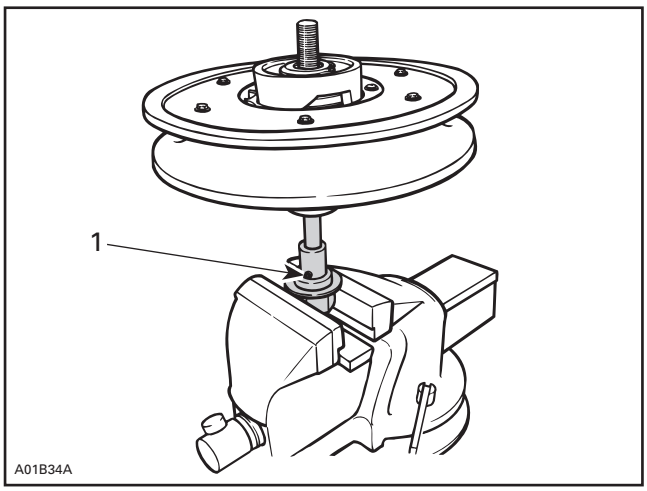
Remove the cap screw **no. 13**, lock washer **no. 12**, washer **no. 11**, extension **no. 17** and shims **no. 16** then pull the driven pulley from the countershaft.

14, Countershaft

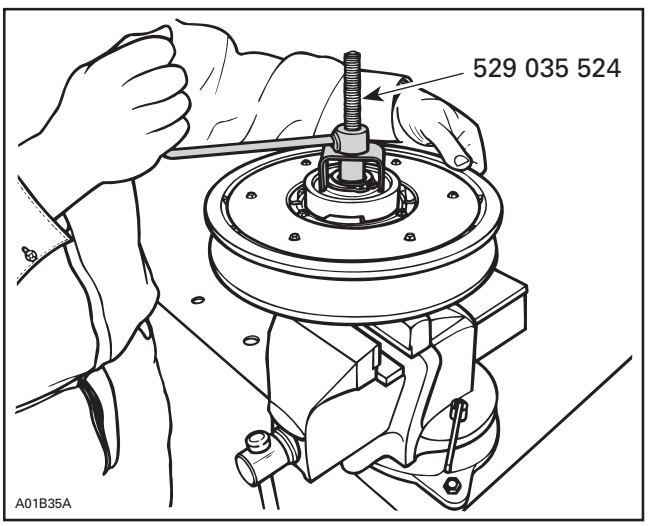
Should countershaft **no. 14** removal be required, refer to BRAKE 05-06 then look for **Countershaft and Brake Disc Removal**.

DISASSEMBLY

Use spring compressor (P/N 529 035 524).



TYPICAL
1. Insert this pin in keyway



TYPICAL

Remove snap ring **no. 2** to disassemble the outer cam and the 2 pulley halves.

◆ WARNING

Driven pulley cam is spring loaded, use above mentioned tool.

CLEANING

6,7, Large Bushing and Small Bushing

During break-in period (about 10 hours of use), teflon from bushing moves to cam or shaft surface. A teflon over teflon running condition occurs, leading to low friction. So it is normal to see gray teflon deposit on cam or shaft. Do not remove that deposit, it is not dust.

When a dust deposit has to be removed from the cam or the shaft, use dry cloth to avoid removing transferred teflon.

Pulley Half Cleaning

Use cleaning solvent.

INSPECTION

6,7, Bushings

Check for cracks, scratch and for free movement when assembled to fixed half.

Using a dial bore gauge measure bushing diameter. Measuring point must be at least 5 mm (1/4 in) from bushing edge.

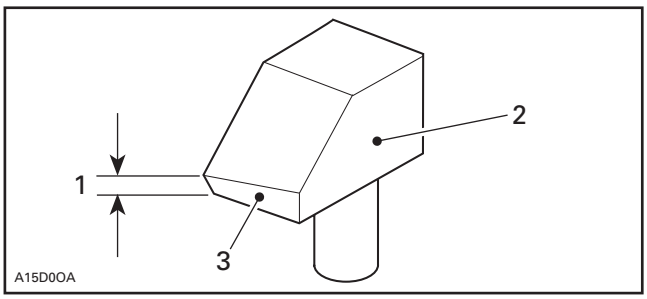


Replace bushing(s) if worn more than specified.

DRIVEN PULLEY BUSHING WEAR LIMIT mm (in)	
Small bushing	38.30 (1.508)
Large bushing	89.15 (3.510)

4, Slider Shoe

Check cam slider shoes for wear. Replace when inside edge of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



1. Measure thickness of slope base here
2. Sliding pulley side
3. Slope base

Bushing Replacement

Large Bushing

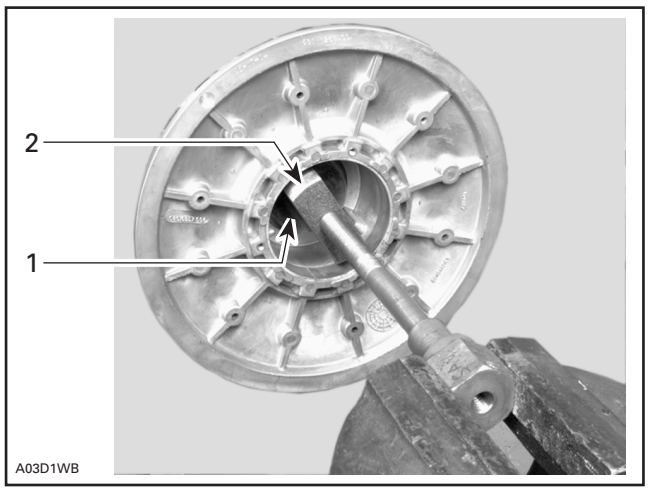
Remove Allen screws if applicable. Heat to break Loctite bond.

Remove all 3 slider shoes.



Install support plate included in tool (P/N 529 031 100) inside sliding half.

Place extractor included in tool (P/N 529 031 100) below bushing.



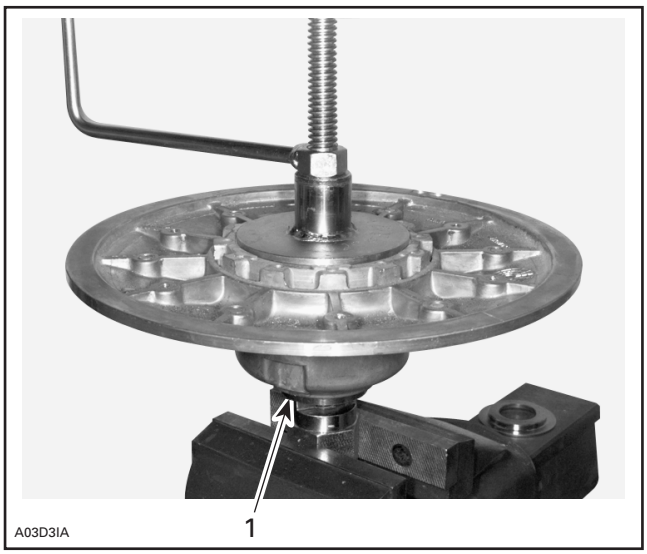
1. Support plate
2. Extractor

Mount screw head of puller (P/N 529 018 600) in a vise.

Turn pulley half by hand to extract old bushing.

Before bushing installation, file sliding half bore to remove burrs from crimping areas.

Coat bushing outside diameter with Loctite 609 (P/N 413 703 100). Place new bushing on sliding half and slightly tap to engage squarely the bushing in the sliding. Use tools (P/N 529 031 200) and new puller (P/N 529 035 524) with one of its shouldered washer to install bushing.



1. Shouldered washer

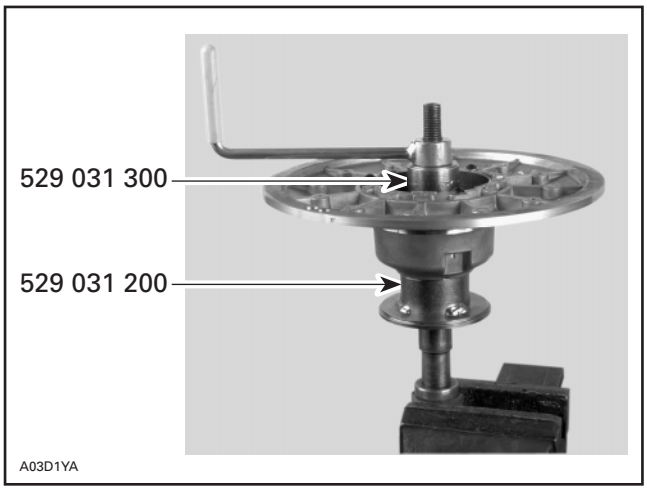
Small Bushing

NOTE: Following procedure can be done with a press using the same tools.

Install puller in a vise.

Heat bushing area.

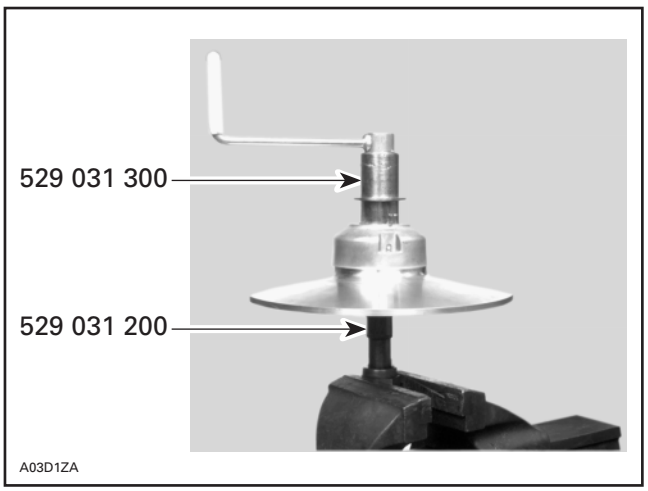
Turn puller handle and sliding half at once to extract the bushing.



IMPORTANT: Large bushing retaining screws and washers must be removed before small bushing installation.

Coat bushing outside diameter with Loctite 609 (P/N 413 703 100).

Install bushing as following photo.



ASSEMBLY

4, Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

19, Cam

Coat cam interior with anti-seize lubricant.

INSTALLATION

14, Countershaft

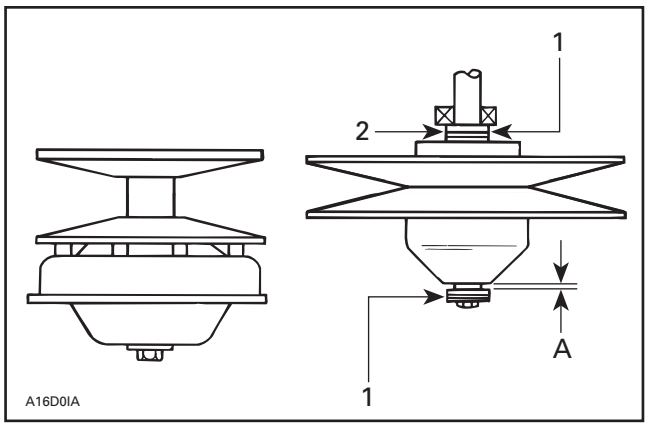
▼ CAUTION

Always apply anti-seize lubricant (P/N 413 701 000) on the countershaft before final pulley installation.

Should installation procedure be required, refer to BRAKE 05-06 then look for **Brake Disc** and **Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

Check end play of driven pulley on countershaft by pushing pulley towards outer housing so that the inner shims (P/N 504 108 200) contact it. Measure end play at the mounting screw end between shim(s) and pulley. See illustration.



TYPICAL — TOP VIEW

1. Shim (P/N 504 108 200) (as required)
2. Contact
A. 0 to 1 mm (0 to 3/64 in)

13, Pulley Retaining Screw

Torque to 25 N•m (18 lbf•ft).

ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 to adjust pulley distance. Adjust drive belt height between pulley halves to obtain specified belt deflection.

5, Spring

General

It is usual to experience spring setting during breaking period of a new spring. The factory spring preload is slightly higher (about 1 kg (2 lb)) to compensate for spring setting. Specifications in TECHNICAL DATA 10 are applicable after break-in period (about 10 hours of use).

Spring Torsional Pre-Load

To check spring pre-load adjustment, use spring scale hook (P/N 529 006 500) and a spring scale.

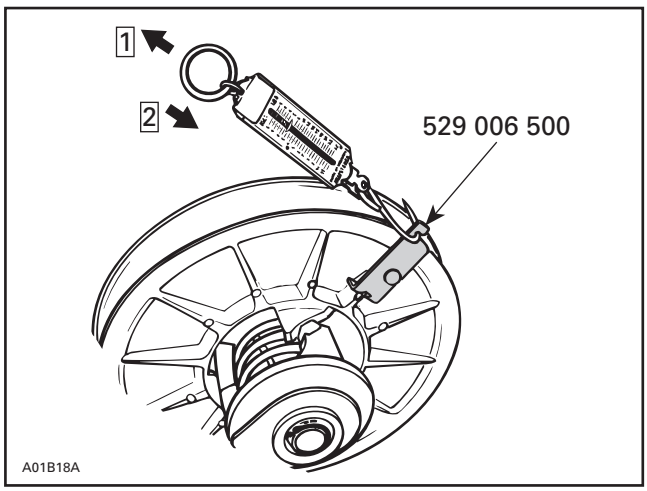
Remove drive belt.

Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicularly with pulley axle.

Take 1st measurement when sliding half begins to turn. Rotate sliding half to 10 mm (3/8 in) of rotation. Hold fish scale at this position. Slowly release tension from fish scale and take 2nd measurement when sliding half begins to return. Spring pre-load is the average measurement between these 2.

$$\frac{\text{1st measurement (when opening)} + \text{2nd measurement (when closing)}}{2} = \text{Spring pre-load}$$

Example: $\frac{\text{3.8 kg (8.4 lb) (when opening)} + \text{3.4 kg (7.5 lb) (when closing)}}{2} = \text{3.6 kg (8 lb) Actual spring pre-load}$

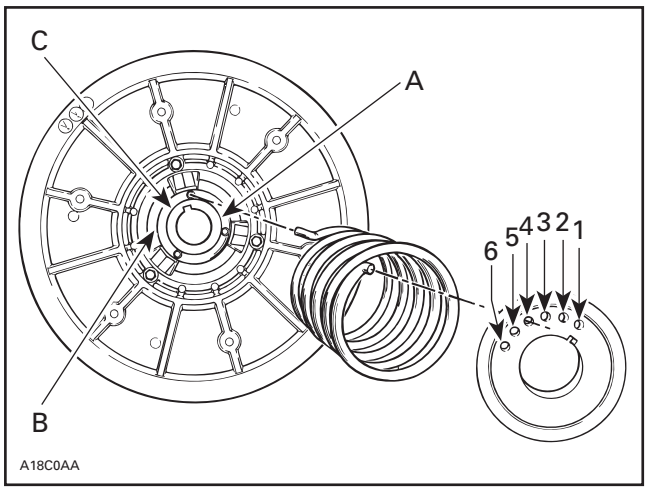


TYPICAL

Step 1 : 1st measurement
Step 2 : 2nd measurement

To adjust spring pre-load, relocate spring end in cam, moving it clockwise to increase the pre-load and counterclockwise to decrease it. Refer to TECHNICAL DATA 10.

NOTE: If spring pre-load can not be adjusted, try to relocate the other end of spring in sliding pulley (holes A, B, C).



Letters and numbers shown in illustration are actual letters and numbers embossed on parts

NOTE: Always recheck torsional pre-load after adjusting.

Pulley Alignment and Drive Belt Deflection

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 and DRIVE BELT 05-02 to perform adjustments.

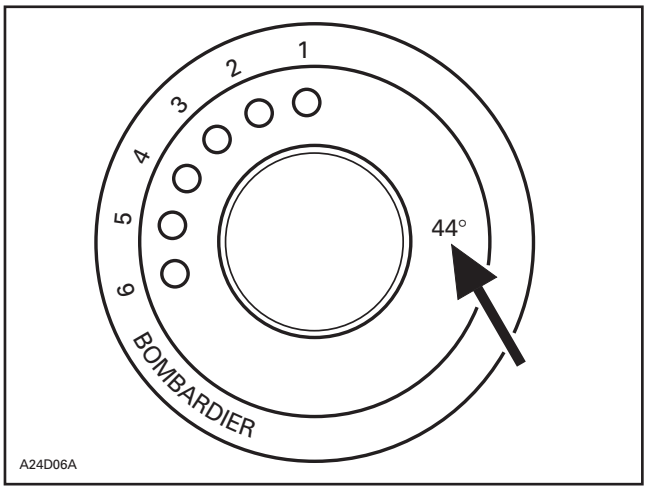
▼ CAUTION

Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

3, Cam

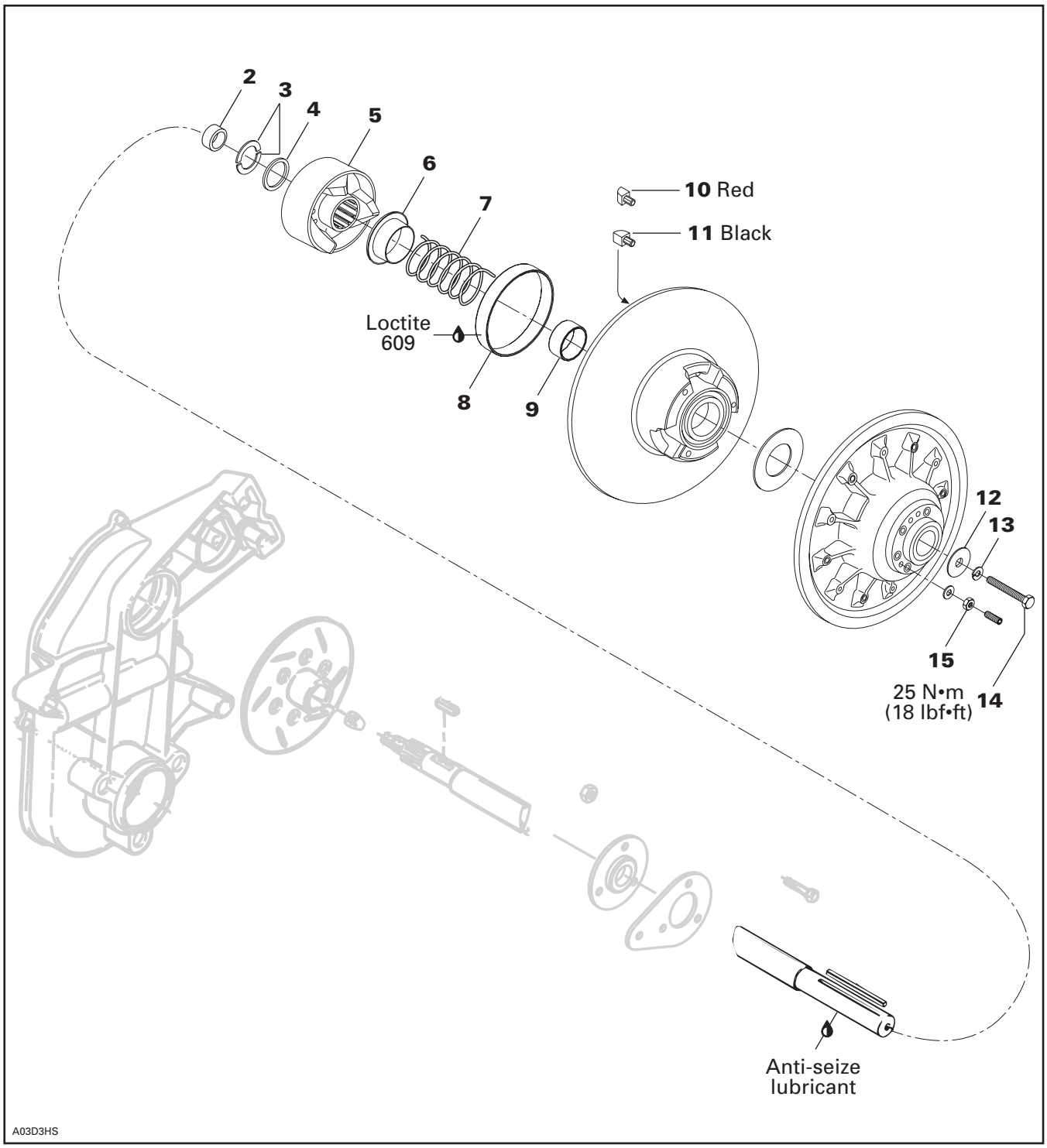
Make sure to install proper cam. Refer to TECHNICAL DATA 10.

Cam angle is identified on cam.



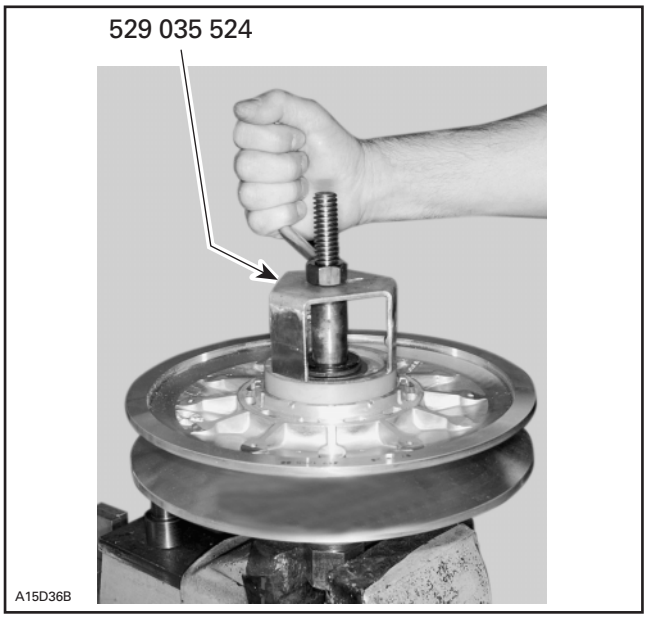
NOTE: For high altitude regions, the *High Altitude Technical Data Booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude.

Skandic 380/500, Touring E/LE/SLE and Formula DLX 380/500



DISASSEMBLY

Use spring compressor (P/N 529 035 524).



TYPICAL

Remove half keys no. 3 and spacer no. 4 to disassemble the outer cam and the 2 pulley halves.

◆ WARNING

Driven pulley cam is spring loaded, use above mentioned tool.

INSPECTION

Replace bushing(s) if worn more than specified.

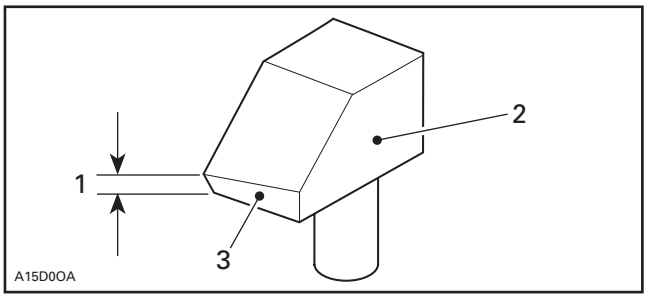
DRIVEN PULLEY BUSHING WEAR LIMIT mm (in)	
Small bushing	38.30 (1.508)
Large bushing	108.2 (4.260)

10,11, Slider Shoe

Black slider shoe = forward

Red slider shoe = reverse

Check cam slider shoes for wear. Replace when inside edge of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



1. *Measure thickness of slope base here*
2. *Sliding pulley side*
3. *Slope base*

Bushing Replacement

Large Bushing

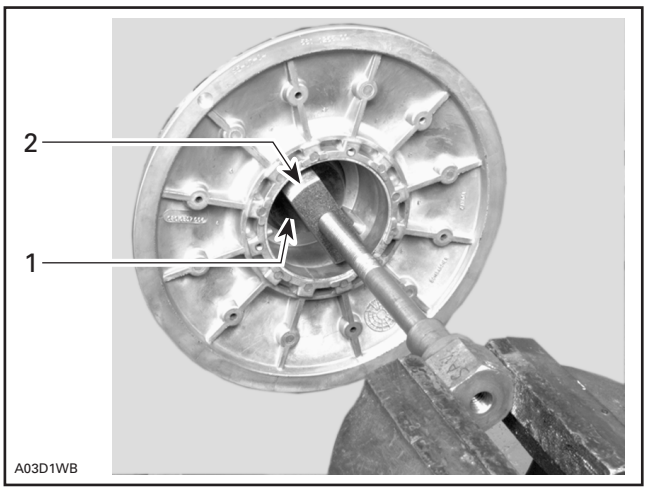
Remove Allen screws if applicable. Heat to break Loctite bond.

Remove all 3 slider shoes.



Install support plate included in tool (P/N 529 031 100) inside sliding half.

Place extractor (P/N 529 035 575) below bushing.



TYPICAL

1. *Support plate*
2. *Extractor*

Mount screw head of new puller (P/N 529 035 524) in a vise.

Turn pulley half by hand to extract old bushing.

Before bushing installation, file sliding half bore to remove burrs from crimping areas.

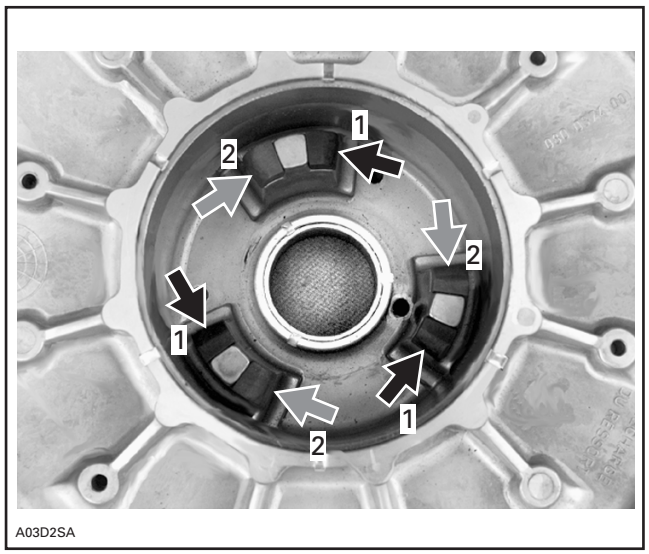
Coat bushing outside diameter with Loctite 609 (P/N 413 703 100). Place new bushing on sliding half and slightly tap to engage squarely the bushing in the sliding.

ASSEMBLY

10,11, Cam Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Install slider shoes as per following photo. Red slider shoes are being used for reverse and black ones for forward.



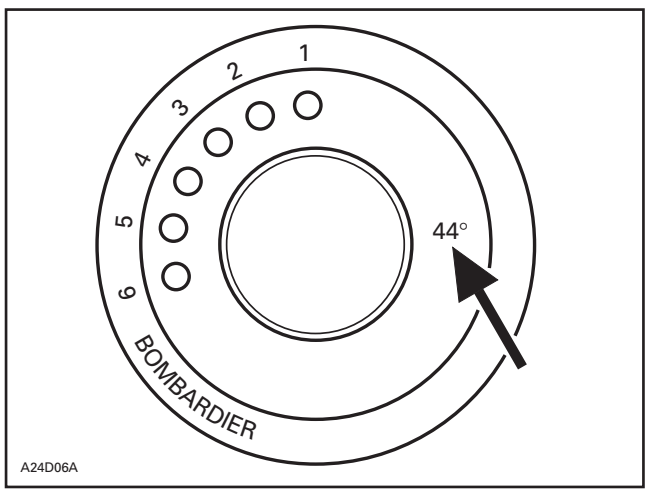
1. *BLACK slider shoe*
2. *RED slider shoe*

Assemble driven pulley components by reversing the disassembly procedure.

5,6,7, Cam, Guard and Spring

Make sure to install proper cam. Refer to TECHNICAL DATA.

Cam angle is identified on cam.



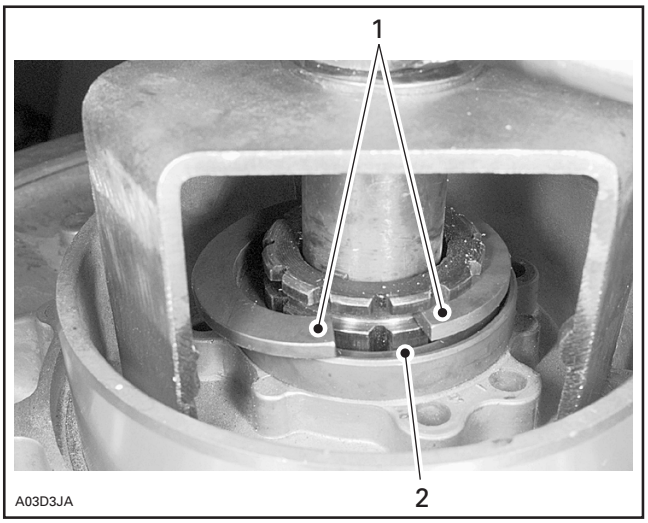
Position guard **no. 6** in cam **no. 5** then insert spring in adjusting hole no. 3 (mid-hole) into outer cam.

Compress outer cam using spring compressor (P/N 529 035 524).

Install spacer **no. 2** then secure outer cam with half keys **no. 1**, as shown in the next photo.

▼ CAUTION

Ensure that half keys are properly inserted into shaft groove and that spacer recess is facing half keys.



1. Half keys inserted into shaft groove
2. Spacer recess facing half keys

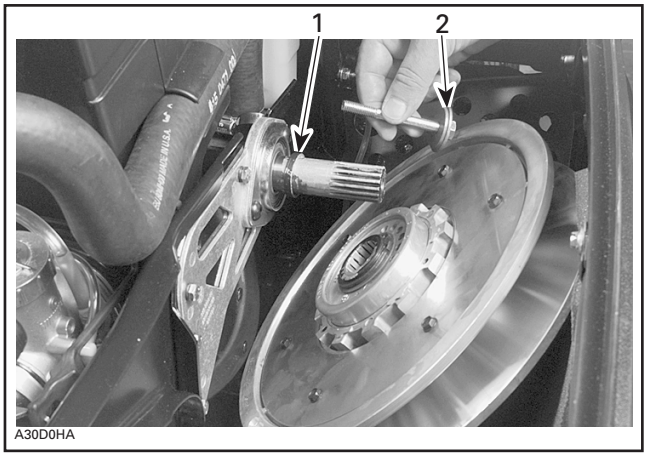
INSTALLATION

14, Countershaft

▼ CAUTION

Always apply anti-seize lubricant (P/N 413 701 000) on the countershaft before final pulley installation.

Make sure that spacer **no. 2** is on countershaft before installing driven pulley. Note also that washer shoulder is facing driven pulley.



TYPICAL

1. Spacer
2. Shoulder on this side

Should installation procedure be required, refer to BRAKE 05-06 then look for **Brake Disc and Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

1, Pulley Retaining Screw

Torque to 25 N•m (18 lbf•ft).

ADJUSTMENT

Pulley Alignment and Drive Belt Deflection

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 and DRIVE BELT 05-02 to perform adjustments.

▼ CAUTION

Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

PULLEY DISTANCE AND ALIGNMENT

GENERAL

The pulley distance we will refer to in this section, is the space separating the drive and driven pulley outside diameters (Z measurement).

This basic distance is provided as an assembly guide and indicates the dimensions between which satisfactory belt deflection will be obtained.

Both pulley distance adjustment and pulley alignment must be carried out to ensure the highest efficiency of the transmission system. Furthermore, optimum drive belt operation and minimal wear will be obtained only with proper pulley alignment.

▼ CAUTION

Before checking pulley adjustment, the rear suspension must be mounted on the vehicle.

◆ WARNING

Failure to correctly perform pulley alignment may cause the vehicle to creep forward at idle.

All Pulley Alignment Specifications Refer to:

X = Distance between straight bar and drive pulley fixed half edge, **measured between pulleys**.

Y = Distance between straight bar and drive pulley fixed half edge, **measured at the end of straight bar**.

Z = Distance between outside diameter of pulleys.

GENERAL PROCEDURE

Remove guard.

Tundra

By turning and pushing the sliding half, open the driven pulley.

Tundra R

Use driven pulley opening tool (P/N 529 034 200).

S-Series without RER

Use driven pulley opening tool (P/N 529 035 500).

S-Series with RER

Use driven pulley opening tool (P/N 529 035 501).

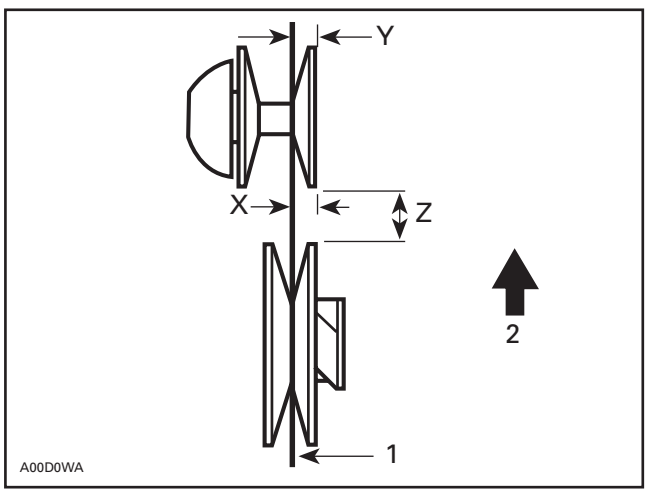
All Models

Remove drive belt. Insert a straight bar 9.5 mm (.375 in) square, 48 cm (19 in) long or the proper alignment template into the opened driven pulley.

Measuring Procedure

Using Straight Bar:

Always measure distances X and Y from the farther straight bar side (including its thickness to the fixed half edge).



1. Straight bar
2. Front of vehicle

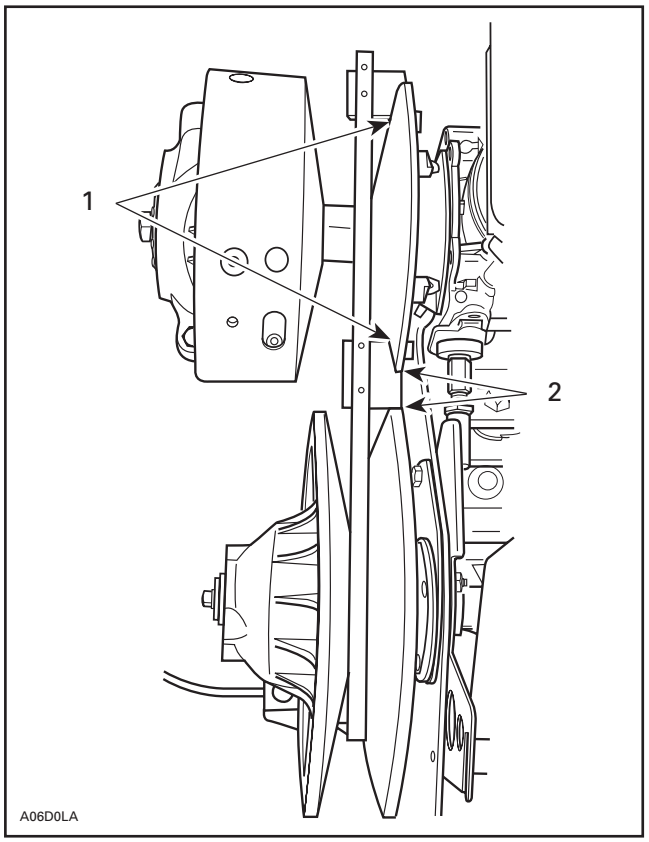
The distance Y **must** exceed distance X to compensate for the twist due to the engine torque.

Nominal Dimension Procedure and Quick Alignment and Distance Check

Alignment template tabs must fully contact fixed half of drive pulley.

Pulley distance is correct when tab contacts both pulley halves.

Refer to below chart for proper alignment template.

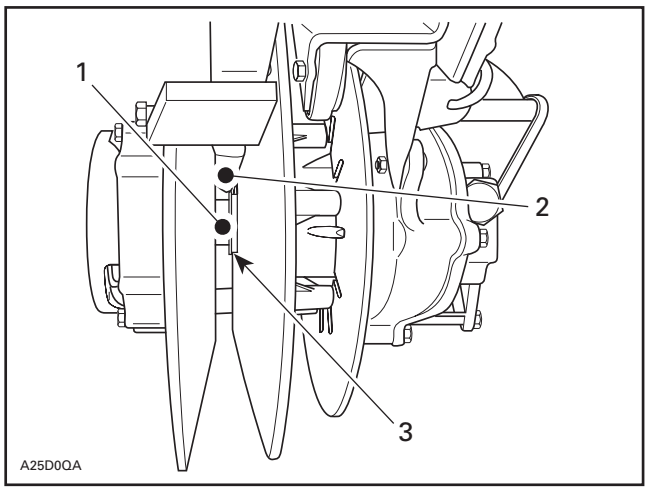


TYPICAL

1. *Contact (alignment)*
2. *Contact (distance)*

Tundra/R Only

Bottom of alignment template must not seat on shaft nor fixed half shoulder and shim(s).



TYPICAL

1. *Shaft*
2. *Alignment template*
3. *Fixed half shoulder and shim(s)*

Drive Belt Deflection

NOTE: When pulley distance and alignment are adjusted to specifications, refer to DRIVE BELT 05-02 to adjust drive belt deflection.

▼ CAUTION

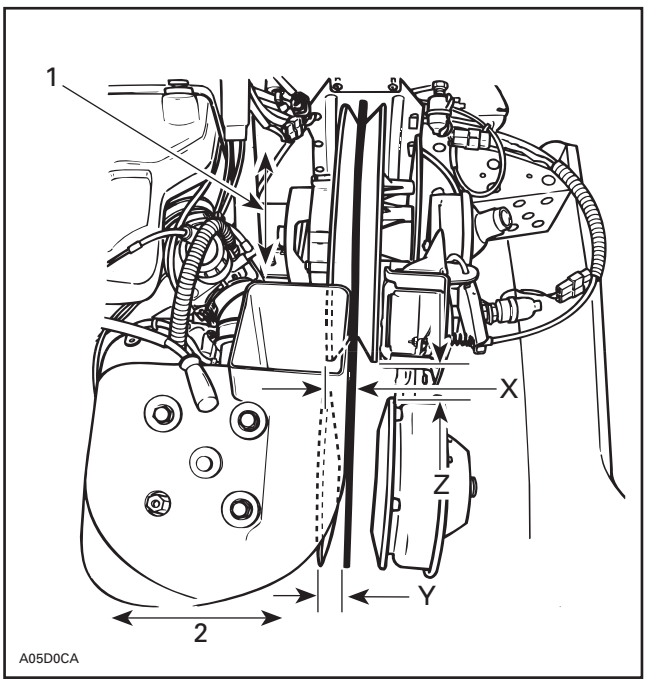
This section deals mainly with adjustment procedures. For complete assembly requirements, refer to the proper ENGINE or TRANSMISSION installation section.

PULLEY ALIGNMENT AND DISTANCE SPECIFICATIONS CHART

MODEL	PULLEY DISTANCE	OFFSET		ALIGNMENT TEMPLATE ①
	Z	X	Y-X	
	1 mm (in)	mm (in)	mm (in)	P/N
Tundra/R	37.0 + 0, - 1.5 (1.457 + 0, - .059)	36.0 ± 1 (1.417 ± .039)	0 to 1.5 (0 to .059)	529 026 900
Formula S	26.0 + 0, - 1.0 (1.024 + 0, - .039)	33.4 ± 0.5 (1.315 ± .020)	0.5 to 1.5 (.020 to .059)	529 030 000
Skandic 380, Touring E, Formula DLX 380	26.0 ± 0.5 (.1.024 ± .020)	33.4 ± 0.5 (1.315 ± .020)	0.5 to 1.5 (.020 to .059)	529 035 586
Formula SL	17.0 + 0, - 1.0 (.669 + 0, - .039)	35.5 ± 0.5 (1.398 ± .020)	0.5 to 1.5 (.020 to .059)	529 026 700
Skandic 500, Touring LE/SLE, Formula DLX 500	17.0 ± 0.5 (.669 ± .020)	35.5 ± 0.5 (1.398 ± .020)	0.5 to 1.5 (.020 to .059)	529 035 530

① Alignment templates have been made according to pulley alignment nominal dimensions. However, they do not take into account allowed tolerances for alignment specifications. They are used as GO/NO GO gauges for quick alignment and pulley distance check and as templates to reach alignment nominal values.

Tundra/R



1. Driven pulley movement
2. Engine movement

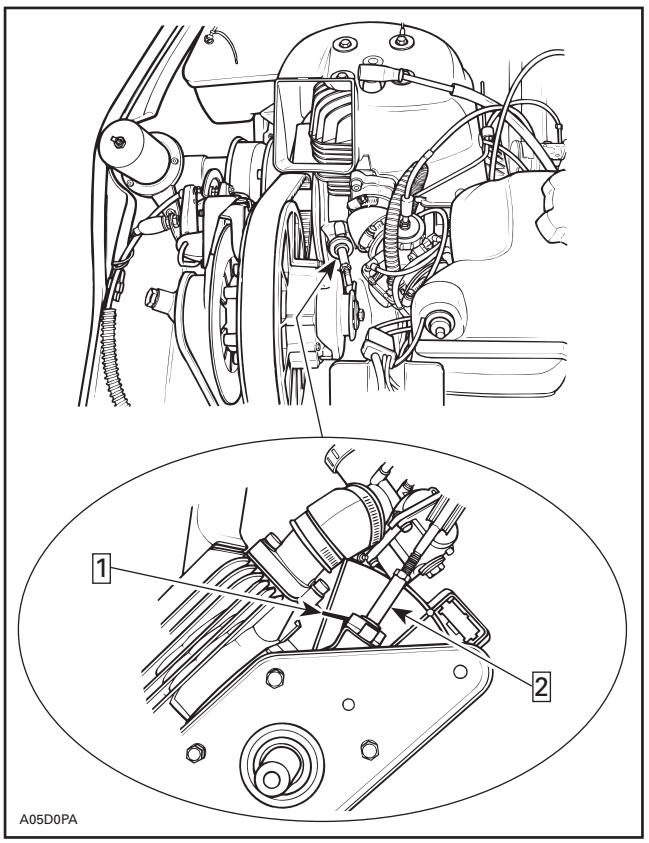
▼ CAUTION

The rear suspension must be mounted on the vehicle and track tension and alignment must be done to provide the right frame width.

Pulley Distance Adjustment Method

Loosen the 4 chaincase retaining bolts, unlock and raise pulley support.

Move chaincase to obtain specific adjustment and adjust driven pulley support length accordingly (light contact).

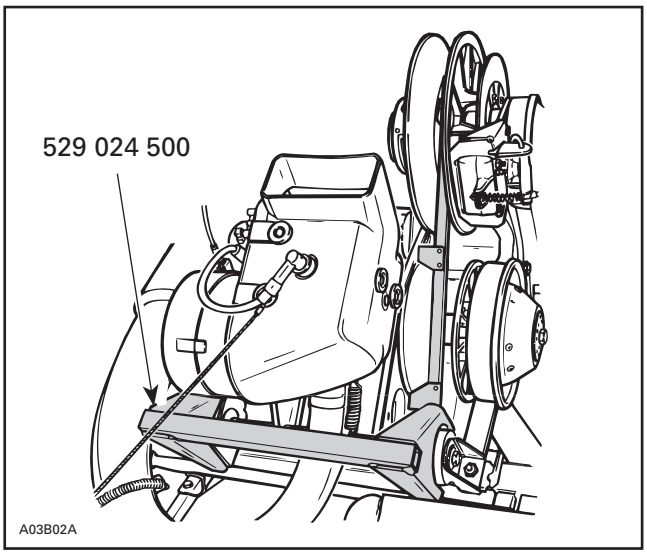


Step 1 : Push and hold
Step 2 : Raise support

Pulley Alignment Method

Engine Movement

Loosen the support retaining bolts and install engine support positioner (P/N 529 024 500) to keep from altering distance between both supports.



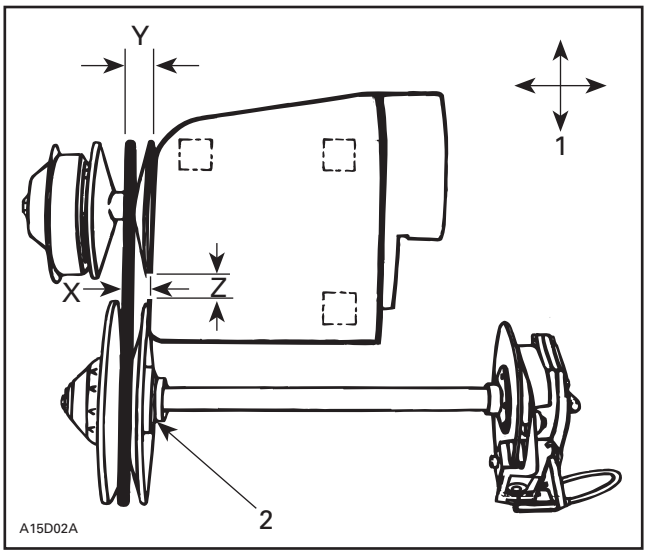
TYPICAL

Move the engine to obtain specified pulley alignment, torque engine support bolts to 55 N•m (41 lbf•ft) and remove engine support positioner.

Driven Pulley Movement

Shims can be mounted between chaincase and frame. Use shim (P/N 504 039 800), 0.53 mm (.021 in) thick.

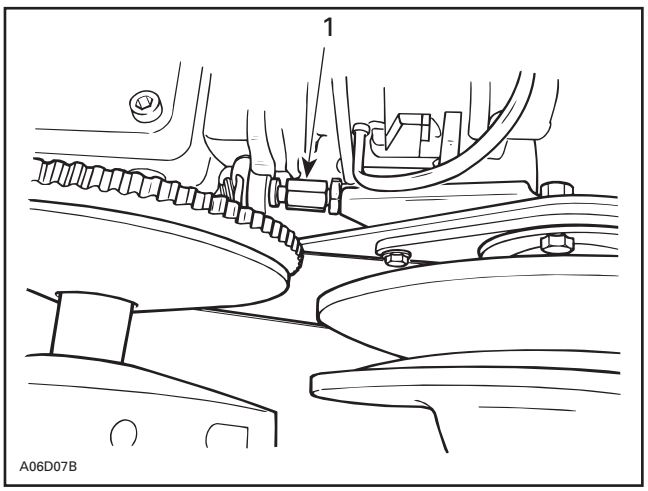
S-Series



TYPICAL

1. Engine movement
2. Contact

NOTE: Prior to performing pulley adjustment, loosen torque rod nut to allow engine movement. Engine supports have tendency to stick to frame, work engine loose prior to aligning.



1. Loosen

Pulley Distance Adjustment Method

Engine Movement

The engine support has slotted mounting holes. Move engine to obtain specified distance between pulleys.

Pulley Alignment Method

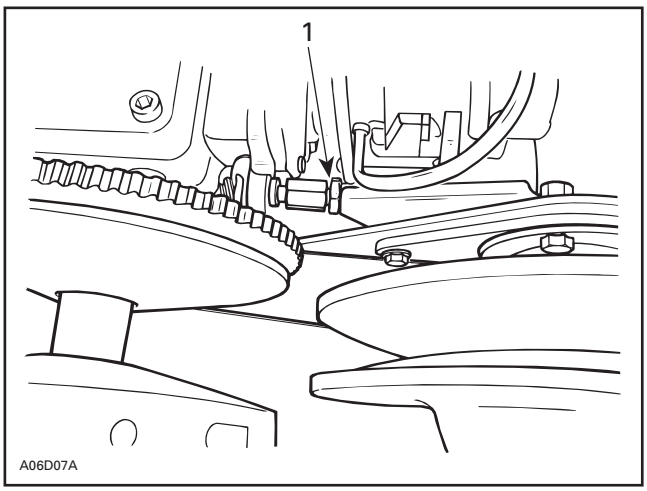
Driven Pulley Movement

When engine slotted mounting holes do not allow to set proper pulley offset X, adjust with shims (P/N 504 108 200) between pulley and countershaft bearing support (pulley pushed toward brake disc).

Engine Movement

Loosen the 4 bolts retaining engine support to the frame. Position engine to obtain the specified alignment.

NOTE: After alignment, adjust torque rod so it slightly contacts stopper plate. Do not over tighten, it will disalign pulleys.

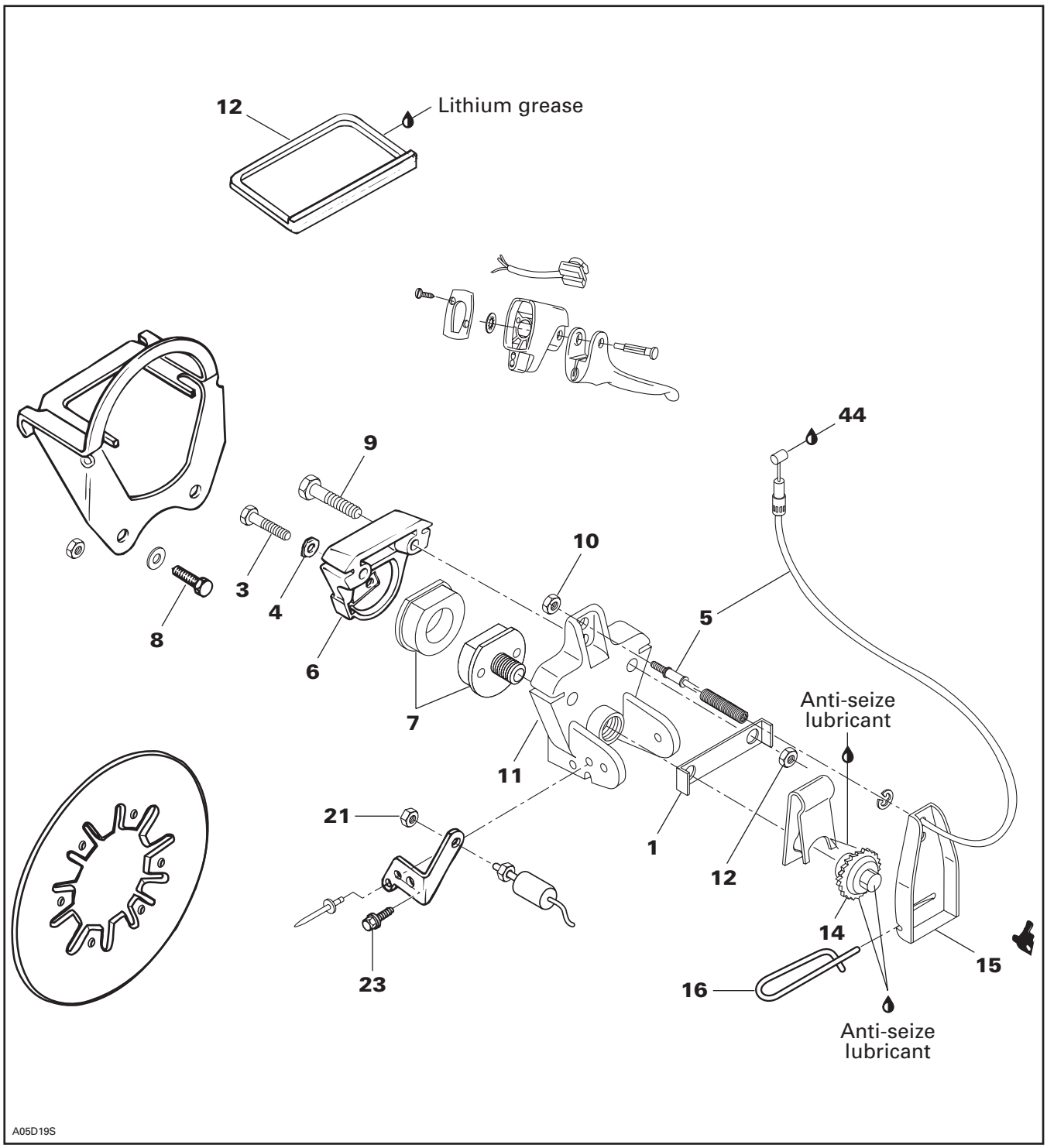


1. Retighten

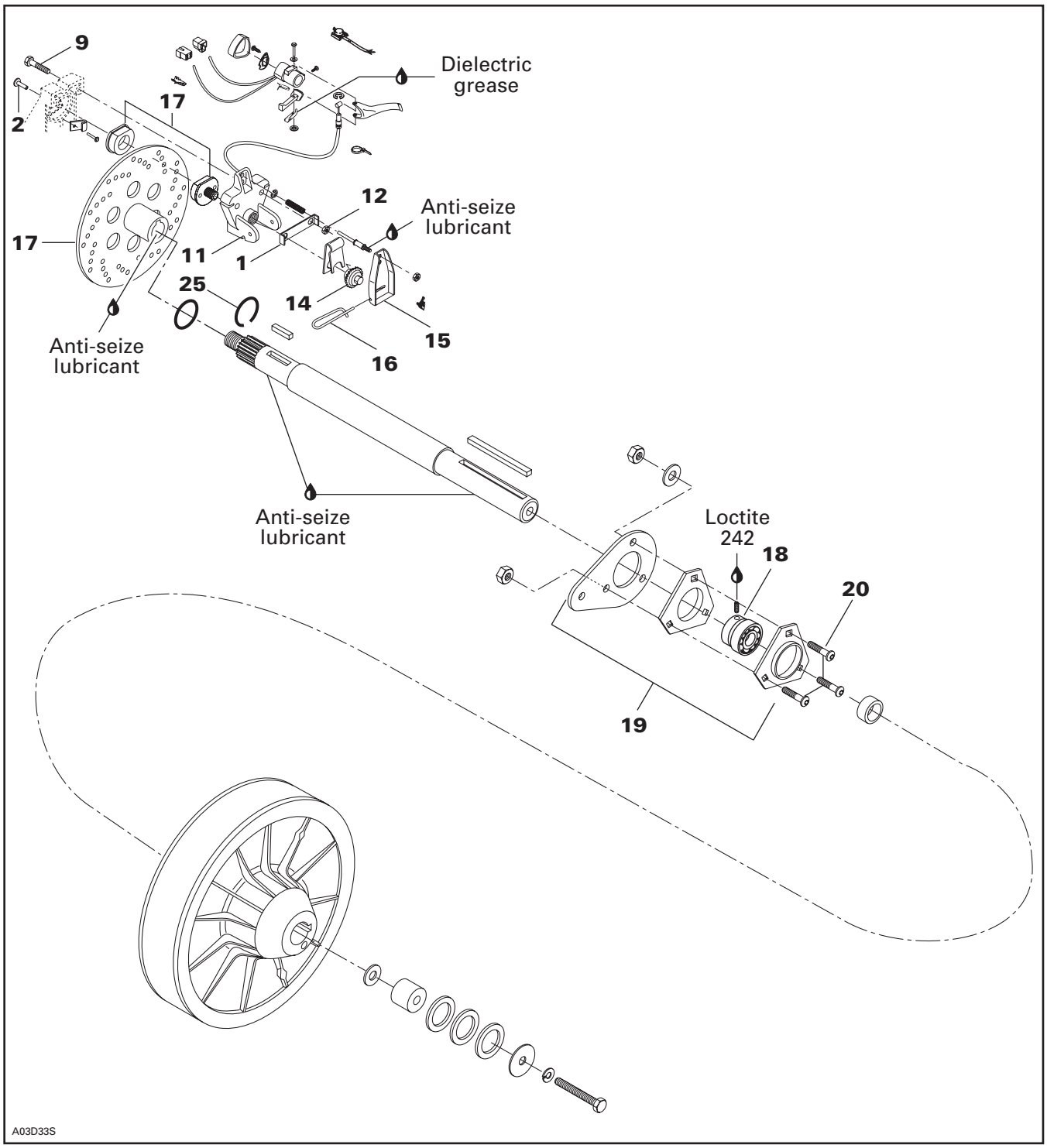
BRAKE

MECHANICAL BRAKE

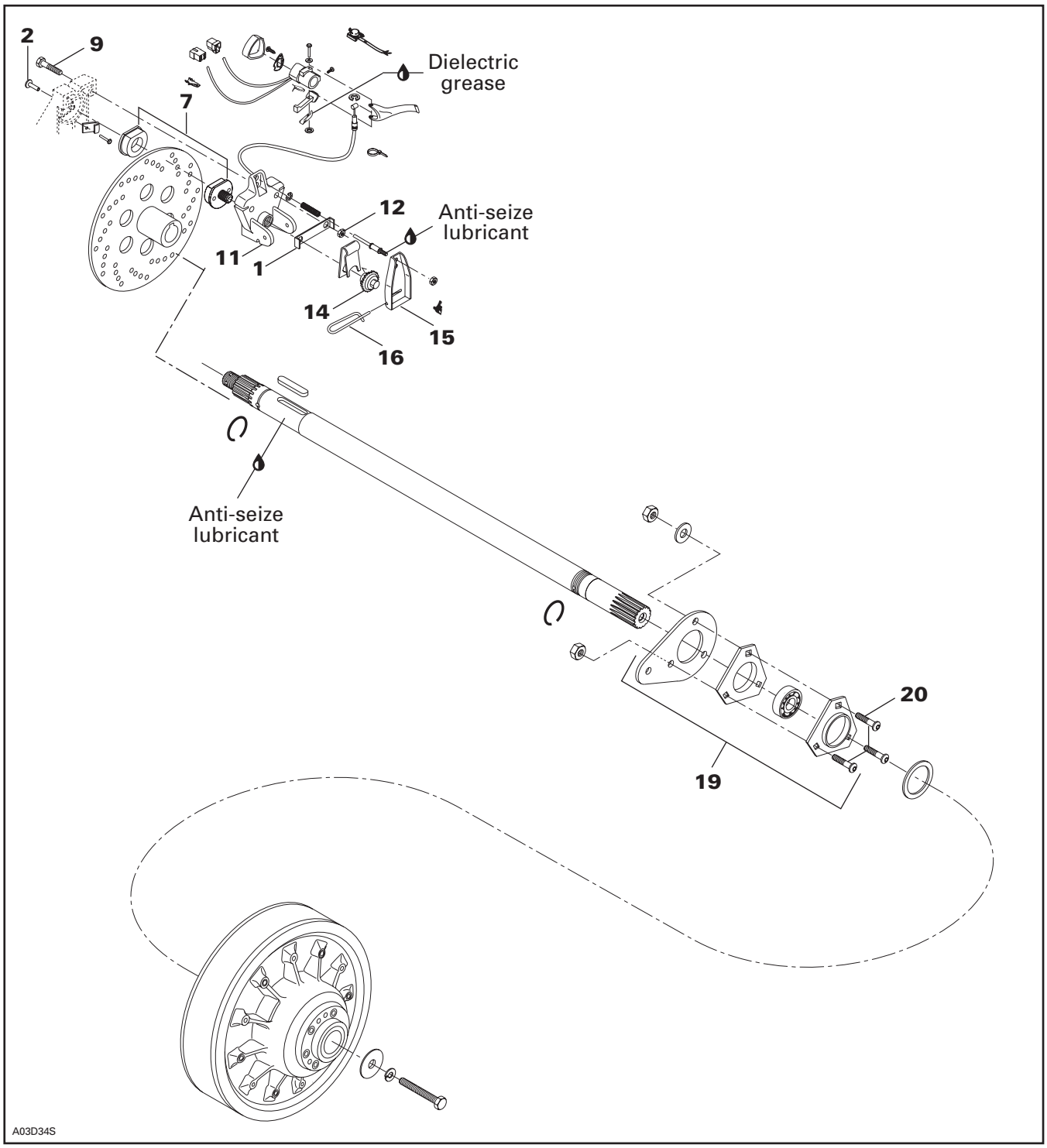
Tundra/R



Formula S

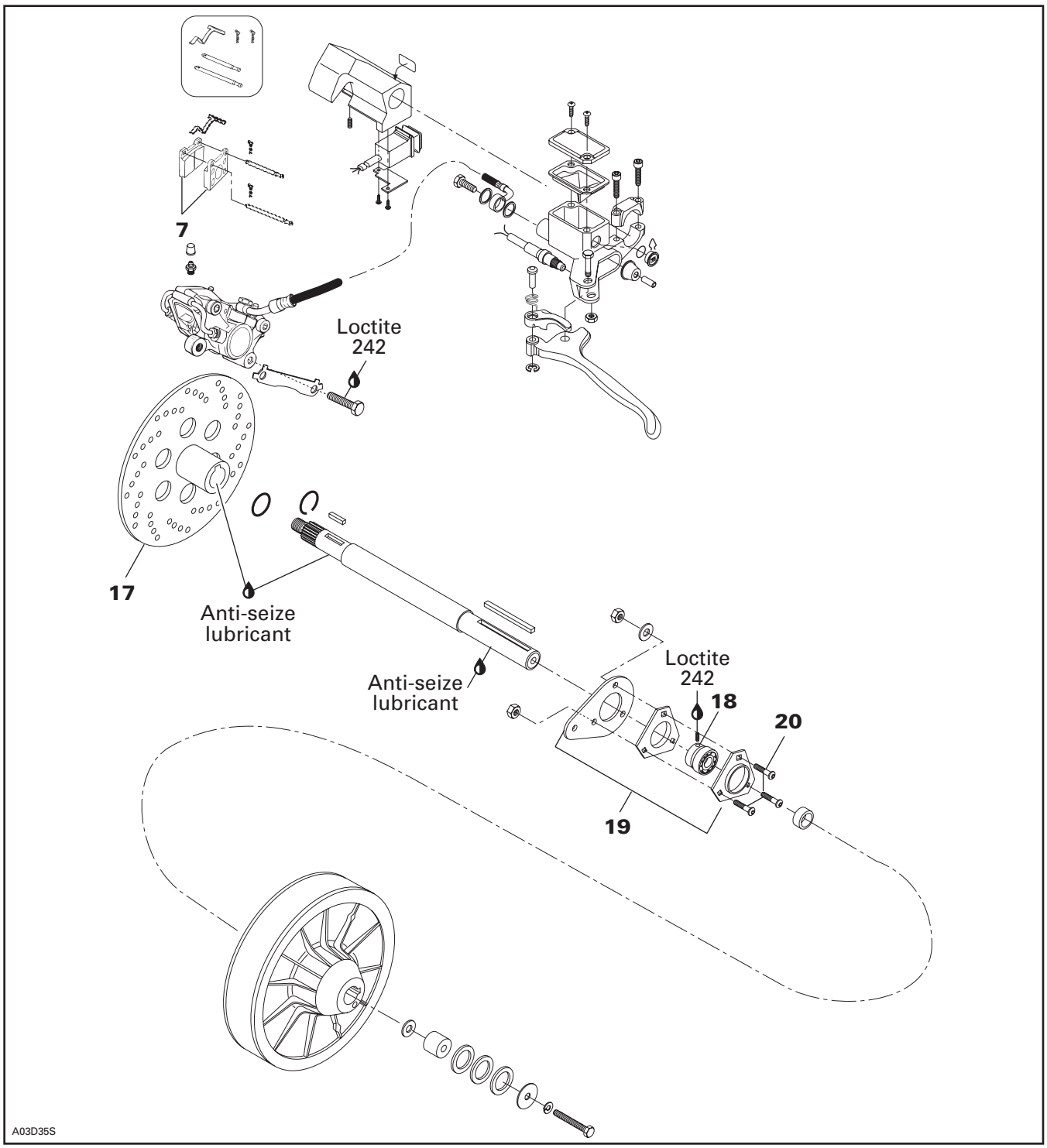

9
2
17
Dielectric grease
12
Anti-seize lubricant
17
11
1
25
14
15
16
Anti-seize lubricant
Anti-seize lubricant
Loctite 242
18
20
19
A03D33S

Formula DLX 380, Touring E and Skandic 380

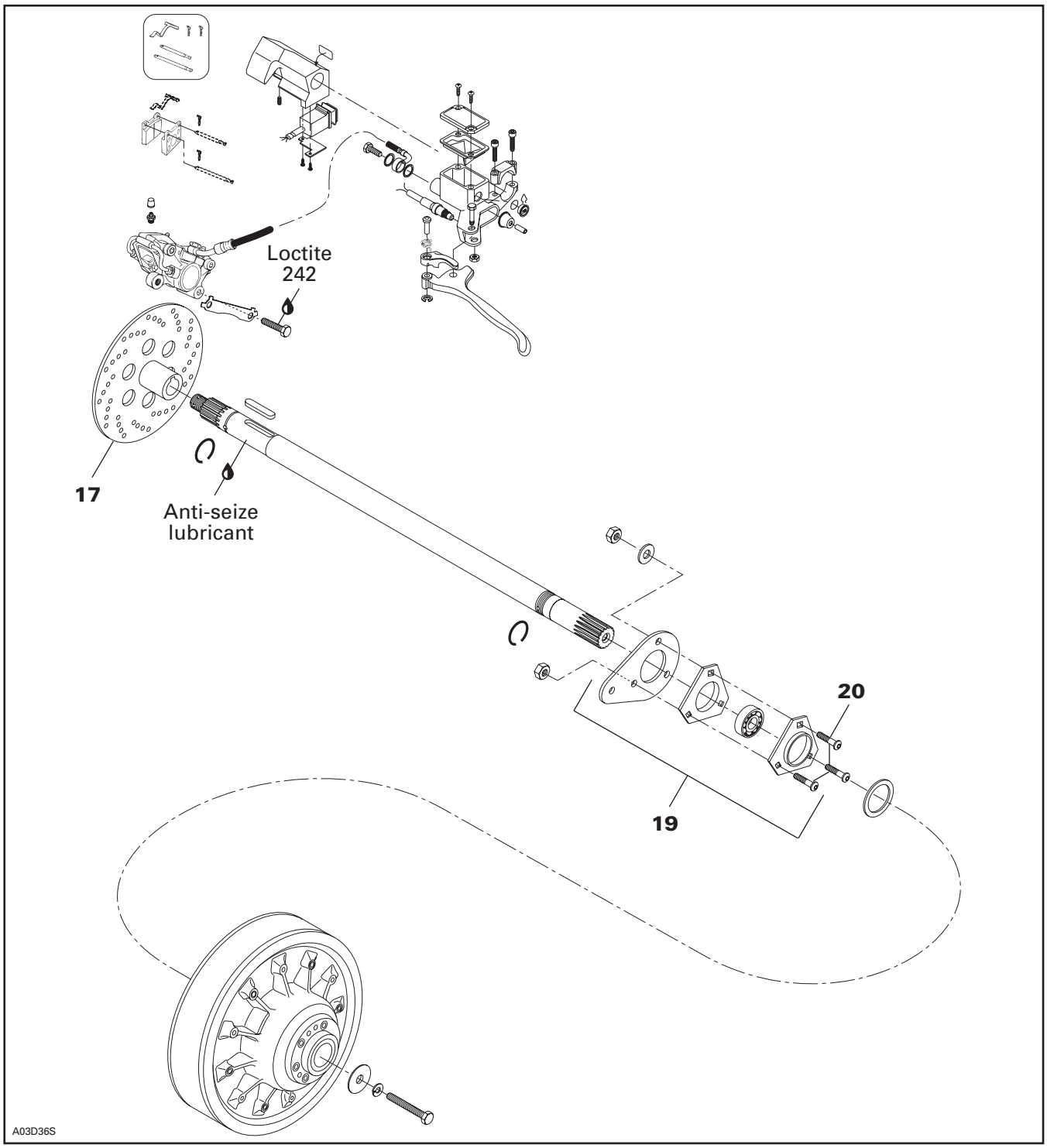


HYDRAULIC BRAKE

Formula SL



Formula DLX 500, Touring LE/SLE and Skandic 500



REMOVAL

Tundra/R

The split caliper type brake should be removed from chaincase as an assembly. Proceed as follows:

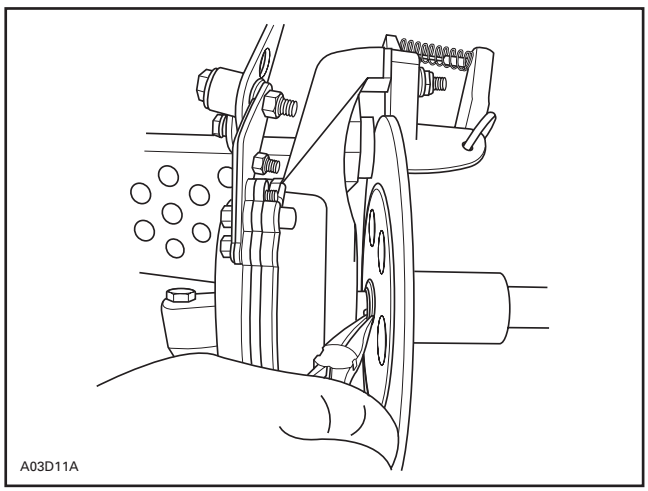
– Remove belt guard.
– Disconnect brake cable.
– Remove bolts no. 8 securing brake support to chaincase.
– Slide brake caliper ass'y out of brake support.
– To remove brake disc, refer to DRIVEN PULLEY 05-04.

Brake Disc Removal

S-Series with Mechanical Brake

Brake disc can be withdraw without removing caliper. Proceed as follows:

– Remove belt guard, belt and driven pulley.
– Remove air silencer.
– Unbolt bearing support from chassis.
– Open chaincase and remove upper sprocket.
– Pull countershaft ass'y toward driven pulley side to gain access to clip no. 25.
– Remove clip no. 25 on countershaft.



– Pull countershaft toward driven pulley side to free from chaincase and disc.
– Remove disc.

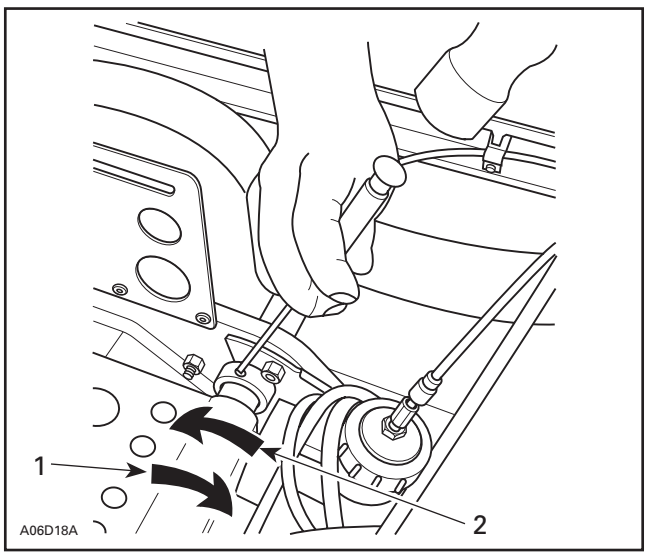
Countershaft Removal

S-Series with Mechanical Brake

Proceed the same as for brake disc removal and to the following.

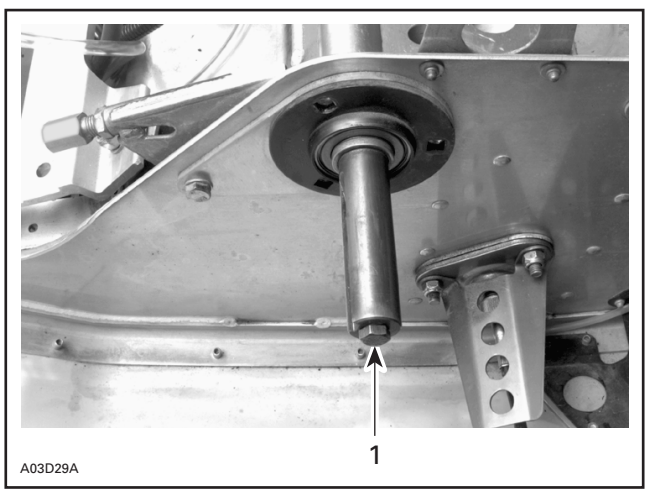
Formula S

Unlock bearing collar on driven pulley side.



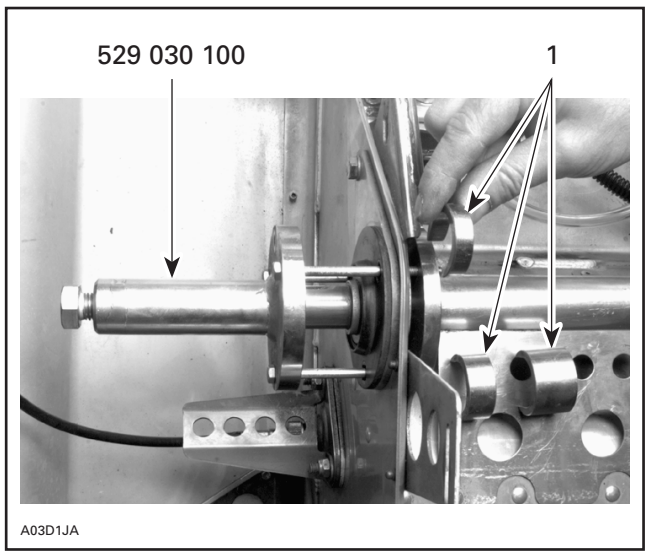
1. Lock
2. Unlock

Unbolt bearing support. Install screw included with remover (P/N 529 030 100) on countershaft.



1. Screw included with remover

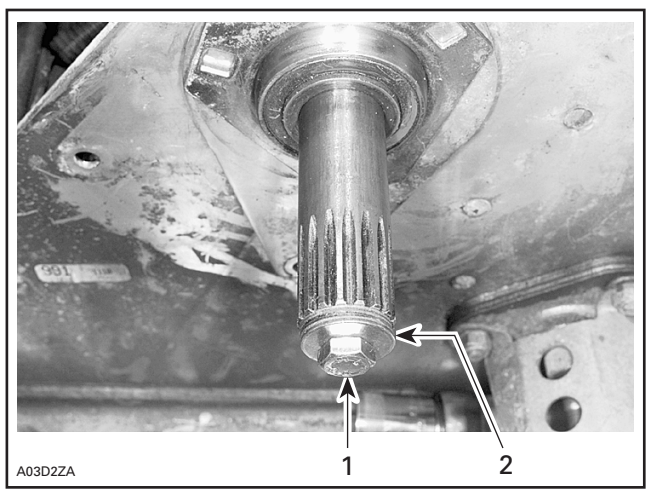
Pull bearing to driven pulley side out of countershaft, using remover (P/N 529 030 100). Begin with only the remover then add a spacer of different width as the bearing comes out.



1. Spacers

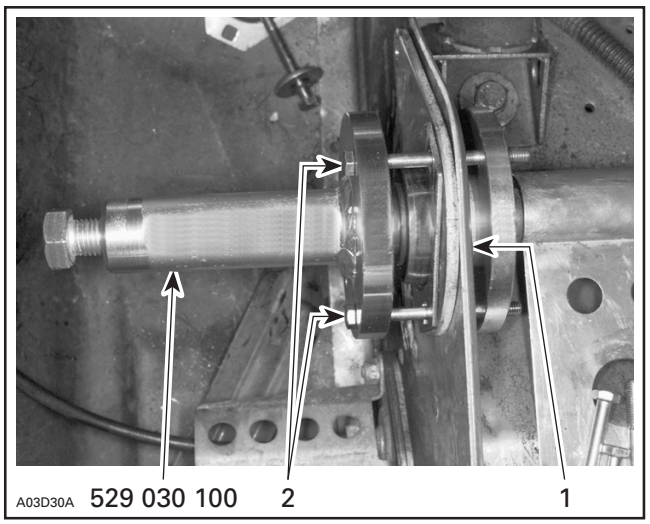
Skandic 380 and Touring E

Unbolt bearing support and triangular support. Install screw from remover (P/N 529 030 100) and some flat washers of 3 mm (1/8 in) total thickness.



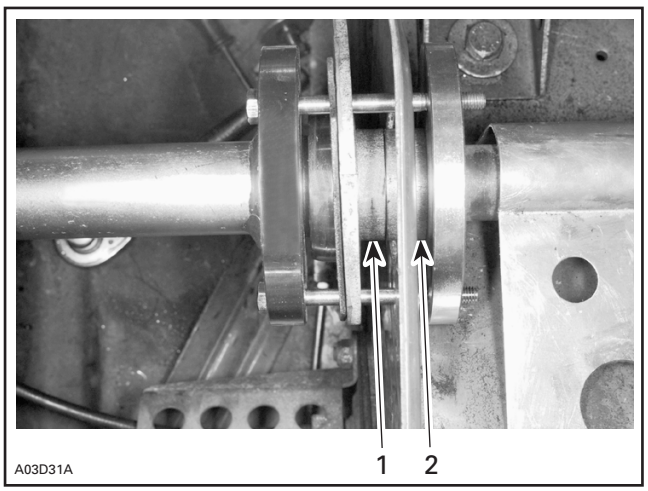
1. Screw from tool
2. Washers use as a 3 mm (1/8 in) spacer

Install remover (P/N 529 030 100) on countershaft and medium thickness spacer. Use M6 x 70 mm screws instead of screws supplied with remover.



1. Medium thickness spacer
2. M6 x 70 mm screws

Add the thin spacer to complete bearing removal.



1. Thin spacer
2. Medium thickness spacer

Countershaft and Brake Disc Removal

S-Series with Hydraulic Brake

– Remove muffler.
– Refer to CHAINCASE 05-07 in order to remove chaincase cover.
– Remove upper sprocket castellated nut.
– Remove belt guard, drive belt and driven pulley referring to DRIVEN PULLEY 05-04.

Formula SL Only

– Loosen set screw and unlock collar no. 18 if bearing is needed to be disassembled. See above S-Series illustration and procedure.

S-Series with Hydraulic Brake and RER

If bearing is needed to be disassembled follow Skandic 380 and Touring E procedure above.

S-Series with Hydraulic Brake

– Remove 3 retaining screws no. 20 from countershaft bearing housing.
– Unbolt oil reservoir support to make room for countershaft or brake disc removal.
– Pull countershaft toward driven pulley side to gain access to clip no. 25.
– Remove clip no. 25 on countershaft.
– Pull countershaft toward driven pulley side to free from chaincase. Withdraw countershaft toward chaincase.
– Remove connecting pipe between tuned pipe and after muffler.
– Disconnect brake line from caliper and plug it.
– Unbolt caliper from chaincase.
– Remove brake disc from countershaft.

DISASSEMBLY

7,15,16,23, Brake Pad, Brake Lever, Pin and Screw

All Models with Mechanical Brake

Pull pin out of caliper and remove lever.

On Tundra/R, remove self-tapping screw. Unscrew ratchet wheel in order to remove moving pad.

Remove fixed pad.

S-Series with Mechanical Brake

Fixed pad is riveted to chaincase on these models. Caliper must be split to remove moving pad. To removed fixed pad, drill out its rivet then pry disc in order to free fixed pad.

All Models with Hydraulic Brake

Only brake pads are available as spare parts. If caliper or master cylinder are damaged, replace each of them as an assembly.

CLEANING

Clean all metal components in a general purpose solvent. Thoroughly dry all components before assembling.

▼ CAUTION

Do not clean brake pads in solvent. Soiled brake pads must be replaced by new ones.

INSPECTION

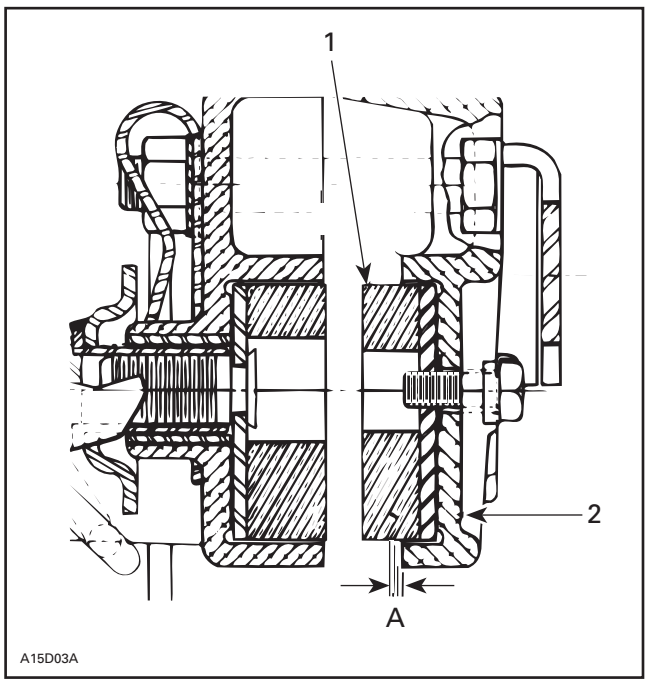
7, Brake Pad

Models with Mechanical Brake

Brake pads must be replaced when fixed pad projects only 1 mm (1/32 in) from caliper.

▼ CAUTION

Brake pads must always be replaced in pairs.



TYPICAL

1. Fixed pad
2. Inner caliper
A. 1 mm (1/32 in) minimum

Models with Hydraulic Brake

Brake pads must be replaced when lining is 1 mm (1/32 in) thick.

▼ CAUTION

Brake pads must always be replaced in pairs.

Brake Disc

All Models

Check for scoring, cracking or heat discoloration, replace as required. Refer to DRIVEN PULLEY 05-04 for replacement procedures on Tundra/R.

▼ CAUTION

Brake disc should never be machined.

ASSEMBLY

14, Ratchet Wheel

Apply synthetic grease (P/N 413 711 500) on threads and spring seat prior to installing. Fully tighten then back off one turn.

16, Pin

Install so that it can only be removed upward. Lock it in the caliper casting notch.

7, Fixed Brake Pad

Tundra/R

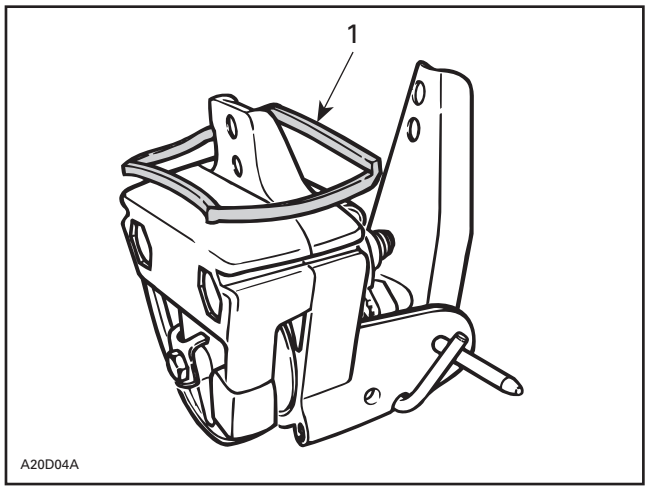
Torque screw **no. 3** to 4 N•m (35 lbf•**in**). Bend locking tab **no. 4** over a flat of screw head.

1,6,11,12, Locking Tab, Inner, Outer Caliper and Nut

Tundra/R

Assemble both caliper halves. Insert bolts **no. 9**, locking tab **no. 20**, then nuts. Torque nuts to 24 N•m (18 lbf•ft). Caliper half side slots must align to allow proper sliding in brake support. Bend locking tab over a flat of each nut.

Install rubber slider **no. 12** lubricated with lithium grease into side slots of caliper. It must be installed so that the raised edge is upward and on the same side of nuts as shown.



1. Raised edge upward and same side of nuts

▼ CAUTION

Positioning of rubber slider is important to avoid the possibility of damage against locking tab edges.

INSTALLATION

To install brake, reverse removal procedure paying attention to the following.

◆ WARNING

Avoid getting oil on brake pads. Do not lubricate or apply antirust or antifreeze solution in brake cable.

17, Brake Disc

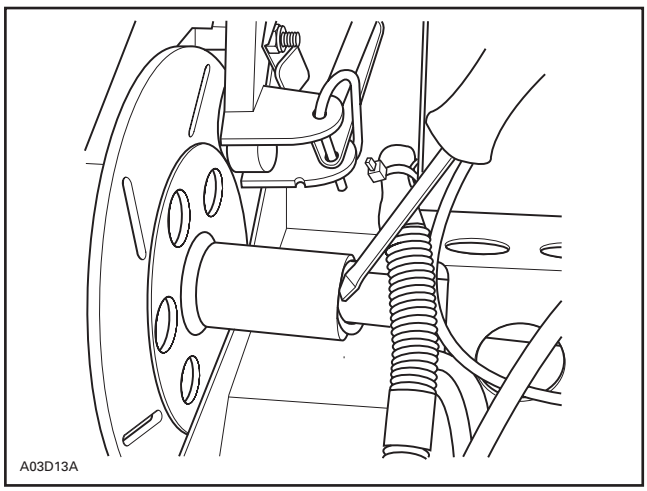
S-Series

The brake disc must be floating on countershaft for efficient operation of brake.

Apply anti-seize lubricant (P/N 413 701 000) on shaft and check that disc slides freely.

The disc hub exceeds the disc more from one side than from the other. Install disc with the longer exceeding portion toward driven pulley.

Push O-rings inside disc hub.

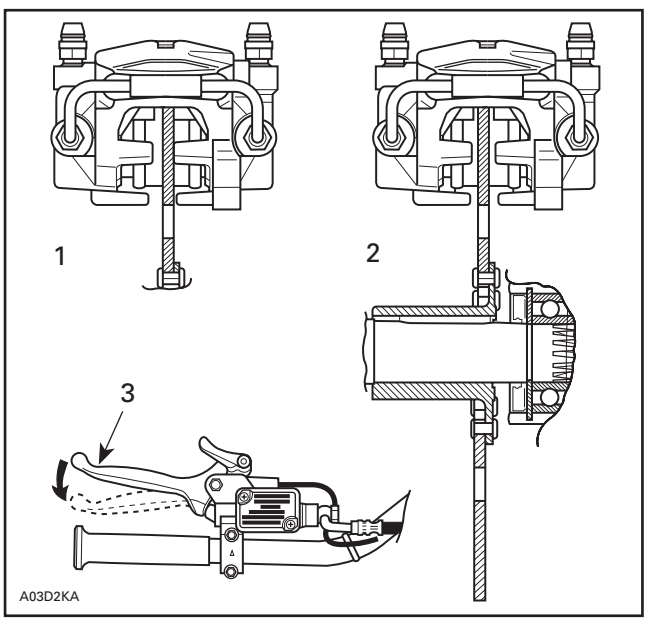


7, Brake Pad

Models with Hydraulic Brake

After brake pads installation, brake disc must be centered in caliper. Apply brake then check for proper brake disc positioning.

Push on appropriate caliper piston in order to move pad inward allowing proper brake disc positioning.



1. Brake disc not centered
2. Brake disc centered
3. Apply brake before checking

Apply brake then recheck.

Countershaft Bearing Adjustment

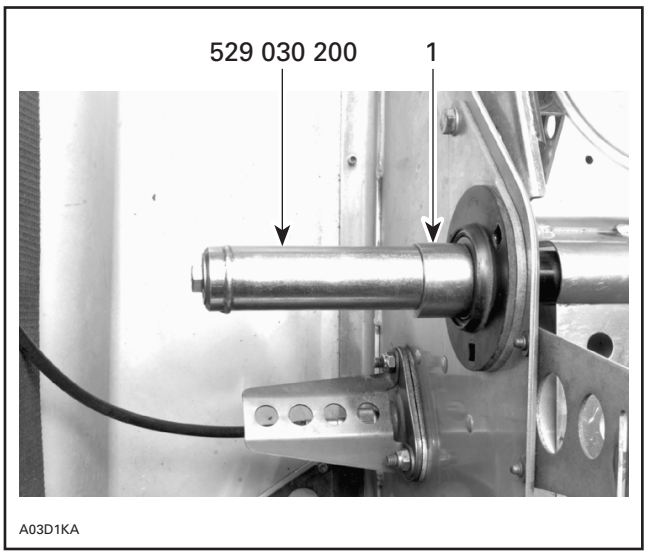
S-Series

Insert countershaft (with brake disc) from chaincase side through countershaft support (driven pulley side), then insert into chaincase.

Install countershaft bearing no. 19 using proper tool.

Formula S/SL

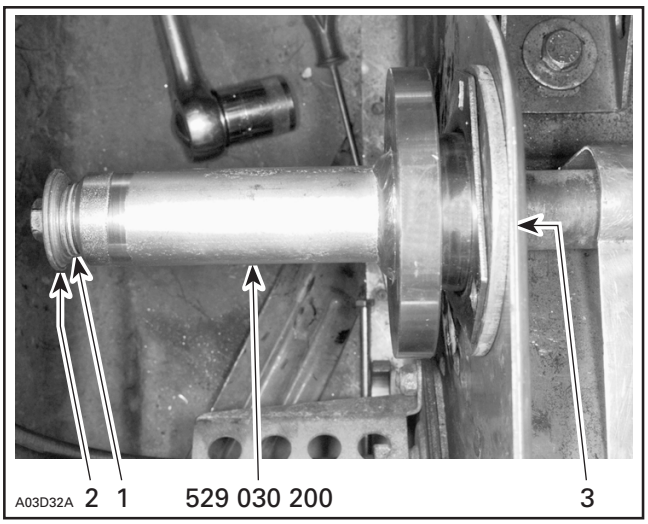
To install bearing on countershaft, use installer (P/N 529 030 200) and spacer(s) from remover as required.



1. Spacer

S-Series with RER

To install bearing on countershaft, use remover (P/N 529 030 100) and some flat washers of 3 mm (1/8 in) total thickness. Using original retaining screw and shouldered washer tighten until bearing rests against circlip.



1. *Washers use as a 3 mm (1/8 in) spacer*
2. *Original retaining screw and shouldered washer*
3. *Bearing against circlip*

S-Series

Ensure that countershaft is properly aligned, then tighten 3 retaining screws.

NOTE: A misaligned countershaft will result in difficulty to center the bearing in its support.

Refer to DRIVE AXLE 07-04 then look Chaincase Perpendicularity Adjustment.

Torque castellated nut of upper sprocket to 53 N•m (39 lbf•ft).

▼ CAUTION

Upper sprocket castellated nut must be tightened **before** adjusting bearing collar.

Formula S/SL

Slide collar no. 18 towards bearing and turn, by hand, to engage the eccentric. This should require about a quarter turn.

Turn collar in direction of countershaft rotation until collar and inner race lock together.

Insert a punch into collar hole and strike sharply in the same direction to lock firmly.

Apply Loctite 242 (P/N 413 703 000) on set screw threads, then tighten.

S-Series

Close chaincase referring to CHAINCASE 05-07.

1,11,12, Locking Tab, Outer Caliper and Nut

S-Series

Install caliper retaining bolts.

Assemble outer caliper. Install locking tab then nuts. Torque nuts to 24 N•m (18 lbf•ft). Bend locking tab over a flat of each nut.

5,10, Brake Cable and Nut

Insert brake cable into upper hole in brake lever and caliper. Install nut and tighten until a few threads exceed.

◆ WARNING

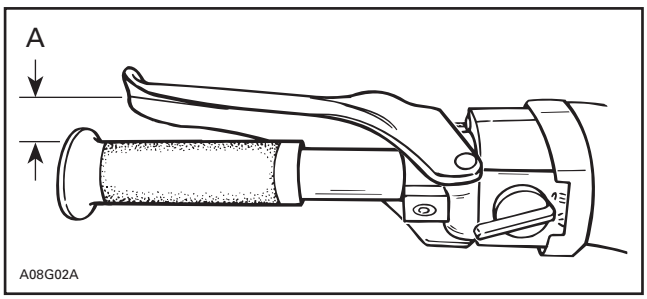
At least 3 threads must exceed the elastic stop nut.

ADJUSTMENT

Brake

Models with Mechanical Brake

Fully depress brake handle several times to obtain 13 mm (1/2 in) between brake handle and handlebar grip when brake is fully applied.



A. 13 mm (1/2 in)

Should this adjustment be unattainable, retighten nut no. 10 as needed.

Models with Hydraulic Brake

Change brake fluid once a year.

Bleed brake system as follows:

Keep sufficient DOT 4 brake fluid in reservoir at all times.

▼ CAUTION

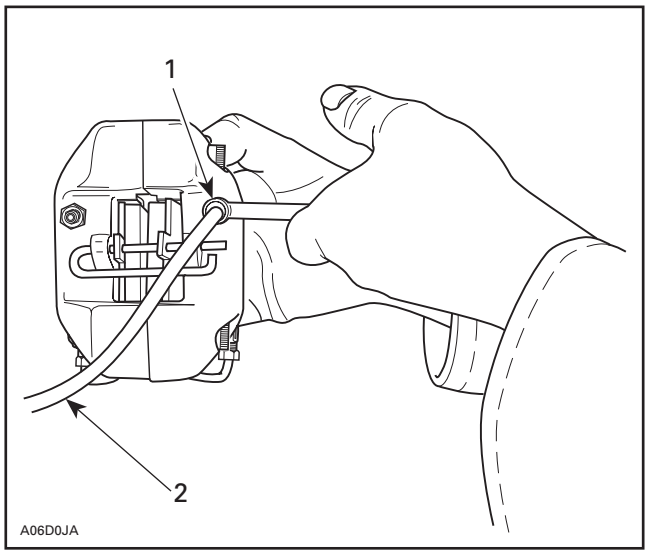
Use only DOT 4 brake fluid.

Install a hose on left side bleeder. Route this hose to a container.

Pump a few times brake lever and while holding brake lever depressed, open bleeder and check for air to escape.

Repeat with the same bleeder until no air appears in hose.

Proceed the same way with the right side bleeder.



TYPICAL

1. *Open bleeder*
2. *Clear hose to catch used brake fluid*

Brake Light

Models with Mechanical Brake Except Tundra/R

Brake light should light up before brake pads touch brake disc. To adjust, unscrew nut no. 10 until brake light goes on.

◆ WARNING

At least one full thread must exceed the elastic stop nut.

Check brake adjustment as described above.

NOTE: If brake light adjustment is unattainable while respecting brake adjustment, ratchet wheel may be too far out. If so, tighten ratchet wheel.

Tundra/R

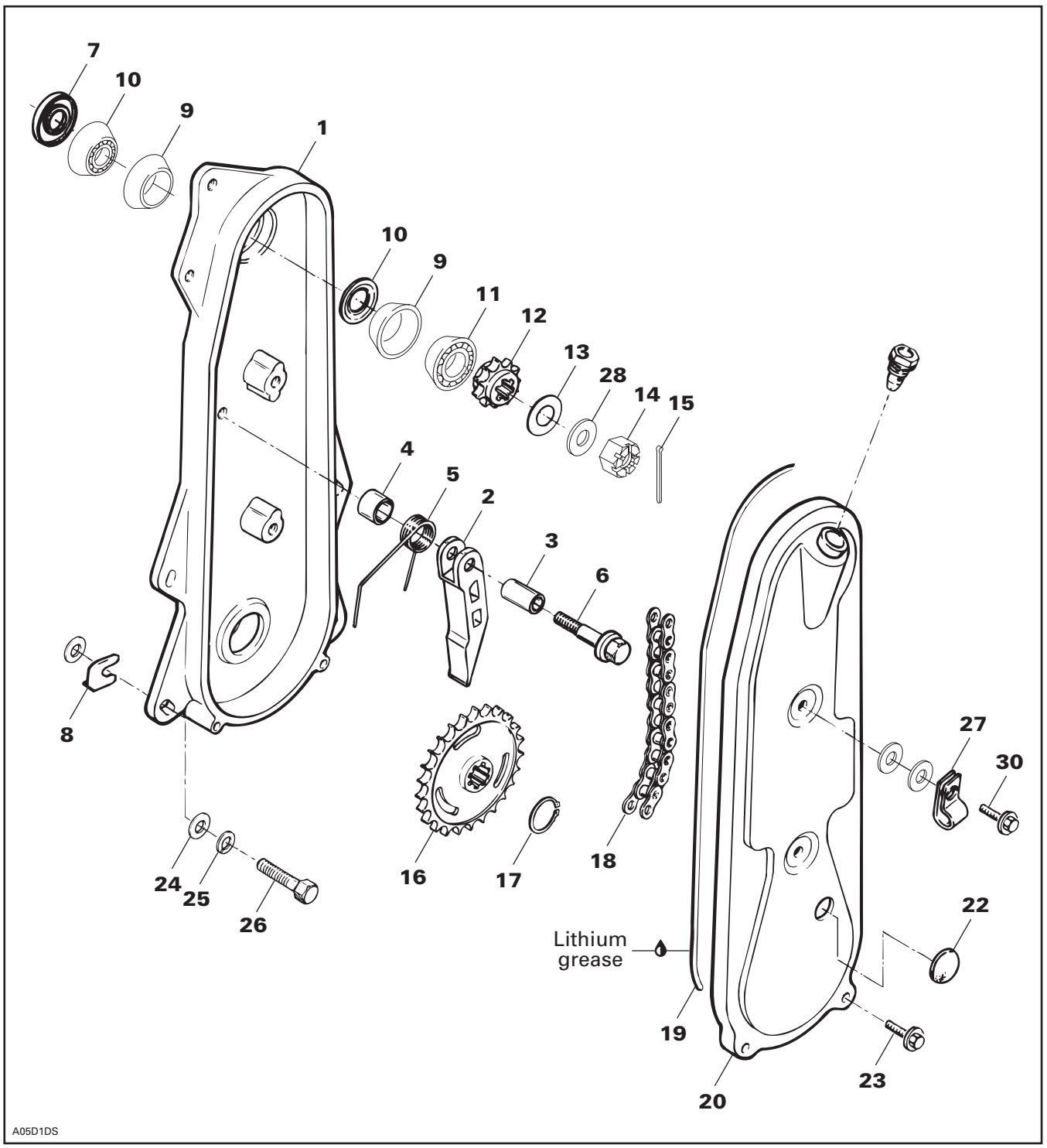
Brake light should light up before brake pads touch brake disc. To adjust, unlock nut no. 21 and turn brake switch no. 22 accordingly. Lock in position by tightening nut no. 21.

Models with Hydraulic Brake

There is no adjustment on these models. Check that switch is securely installed.

CHAINCASE

Tundra/R

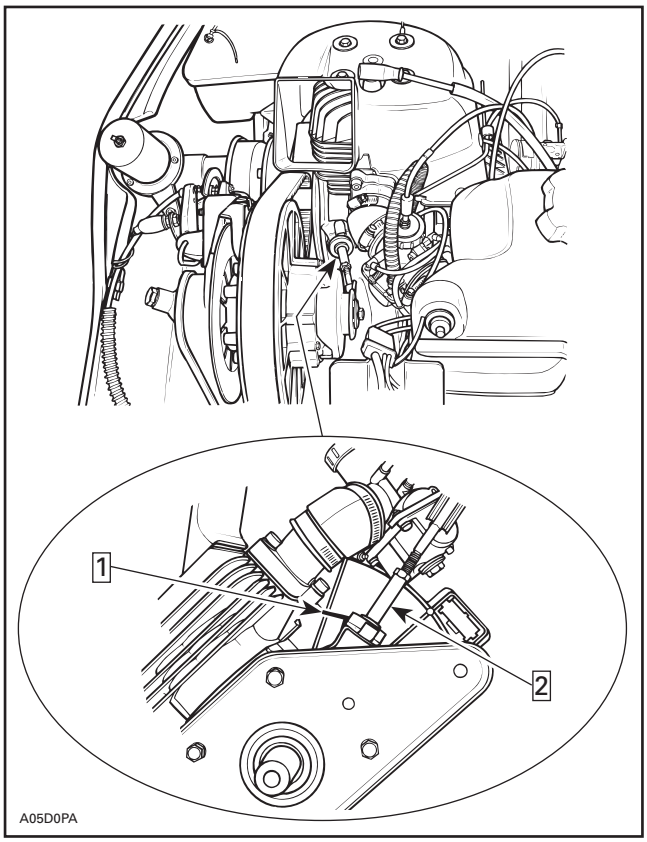


REMOVAL

Chaincase and driven pulley can be removed from the vehicle as an assembly.

Remove guard and drive belt.

Unlock and raise driven pulley support.



Step 1 : Push and hold
Step 2 : Raise support

▼ CAUTION

Be careful not to ground positive terminal with the chassis. Always disconnect BLACK negative cable first.

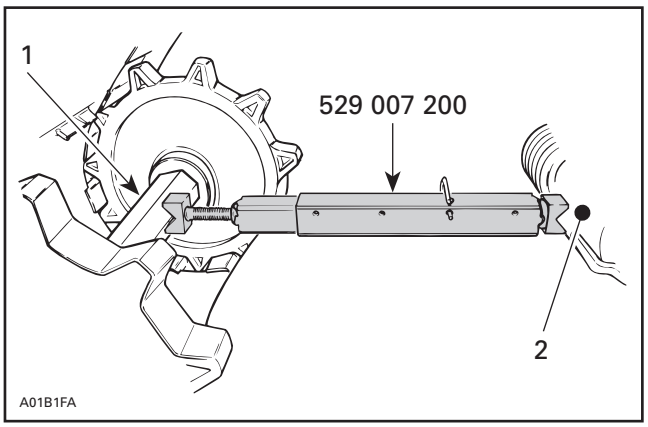
Remove chaincase cover **no. 21** and drain oil.

Pry out drive axle from chaincase.

Unscrew the nut **no. 14** on the upper sprocket **no. 12** and remove circlip **no. 17** on the bottom one **no. 16**. Remove chain tensioner assembly **nos. 2** to **6**, then simultaneously remove chain **no. 18** and both sprockets.

Remove the 4 cap screws **no. 26** securing chaincase to frame. Save alignment shims **no. 8** for installation.

Release track tension, use drive axle holder (P/N 529 007 200).



1. Drive axle
2. Suspension cross shaft

Chaincase and Driven Pulley Assembly

Using 2 large screwdrivers inserted between chaincase and frame, pry complete assembly from vehicle.

DISASSEMBLY

Disassemble driven pulley from chaincase. Refer to DRIVEN PULLEY 05-04.

INSPECTION

Visually inspect the chain for cracked, damaged or missing link rollers. Check for defective bearings, sprockets and worn chain tensioner components.

◆ WARNING

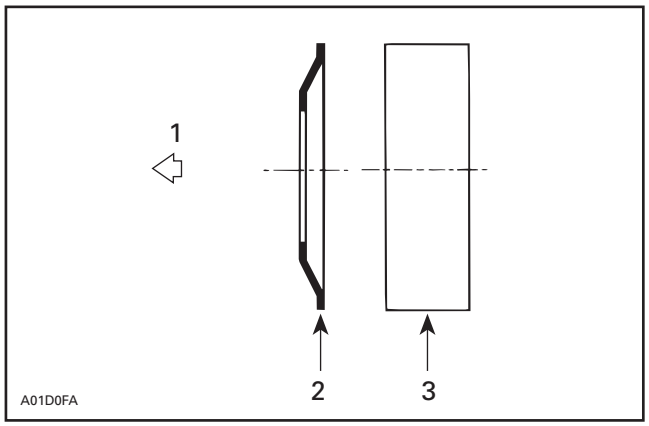
If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

GEAR RATIO MODIFICATION

NOTE: For high altitude regions, the *High Altitude Technical Booklet* (P/N 484 300 003 and P/N 484 054 500 for binder) gives information about calibration according to altitude.

ASSEMBLY

Position oil deflector ring **no. 10** then sit bearing in chaincase aperture. Install spacer then the other bearing.



1. Toward chaincase
2. Oil deflector
3. Bearing

1, Oil Seal

Using an appropriate pusher, press new oil seal **no. 7** into chaincase hub. Oil seal must sit flush with case hub edge.

INSTALLATION

Reverse removal procedure. Pay particular attention to the following:

Torque castellated nut **no. 7** to 14 N•m (124 lbf•**in**), slacken then retorque to 0.5 - 2.5 N•m (5 - 22 lbf•**in**).

In case of a vehicle equipped with an 11 teeth sprocket, check the wear of protectors **no. 8**. Replace if required.

Grease new gasket **no. 20** with petroleum jelly, or other suitable product, and install gasket making sure gasket it does not shift from its correct position. Tighten bolts evenly.

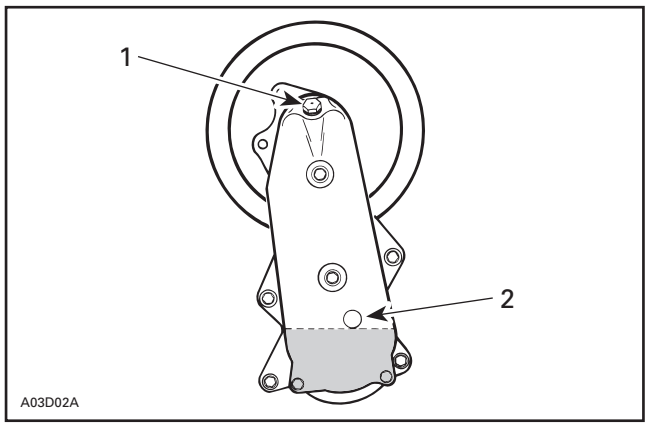
NOTE: Bottom pan has an emboss below chaincase housing to ease installation.

23, Chaincase Oil

Remove filler cap and pour 250 mL (8.5 fl. oz) of chaincase oil (P/N 413 801 900) into chaincase.

NOTE: Chaincase oil capacity is 250 mL (8.5 fl. oz).

Check the oil level by removing the chaincase oil level plug.



1. Filler cap
2. Oil level plug

The oil should be leveled with the bottom of the oil level orifice.

Reinstall battery and connect cables on electric starting model.

▼ CAUTION

Always connect positive RED cable first to prevent sparks.

ADJUSTMENT

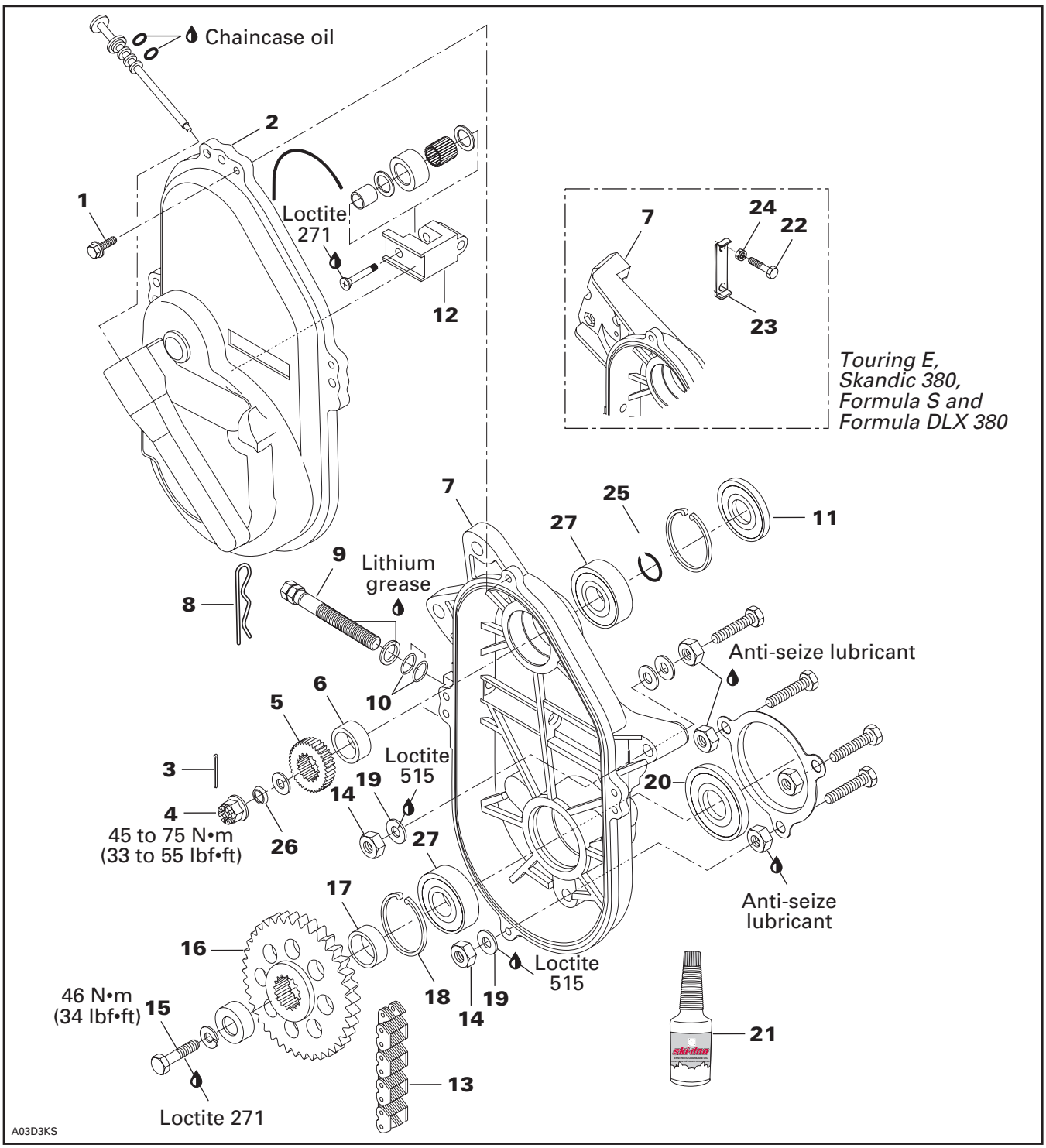
Pulley Alignment

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05.

Track Tension and Alignment

Refer to TRACK 07-05.

S-Series


Chaincase oil
2
1
Loctite 271
12
7
24
22
23
Touring E, Skandic 380, Formula S and Formula DLX 380
7
25
27
11
9
Lithium grease
8
6
10
5
3
4
45 to 75 N•m (33 to 55 lbf•ft)
26
Loctite 515
19
14
27
Anti-seize lubricant
20
Anti-seize lubricant
17
16
18
19
14
Loctite 515
46 N•m (34 lbf•ft)
15
Loctite 271
13
21
A03D3KS

REMOVAL

To remove chaincase proceed as follows.

Remove tuned exhaust pipe and muffler.

◆ WARNING

Never remove exhaust components when engine is hot.

Remove hair pin **no. 8**. Release drive chain tension by unscrewing tensioner adjustment screw.

Drain oil by removing chaincase cover **no. 2**.

Remove cotter pin **no. 3**, nut **no. 4**, washer **no. 26** retaining upper sprocket **no. 5** and screw **no. 15** retaining lower sprocket **no. 16**. Pull sprockets and drive chain simultaneously. Remove shims **nos. 6** and **17**.

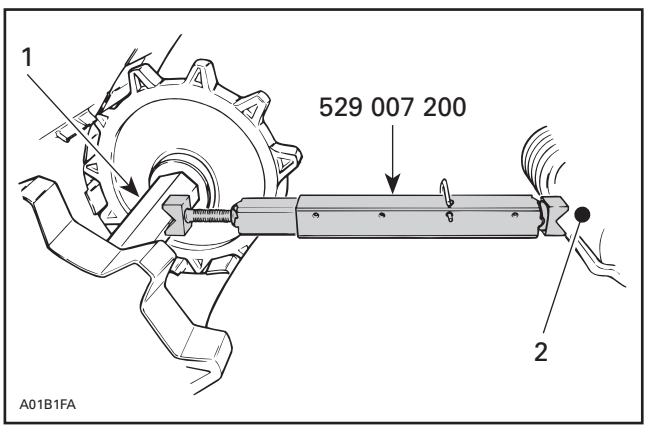
NOTE: Should countershaft removal be required, refer to BRAKE 05-06 then look for **Brake disc**.

Remove 5 nuts **no. 14**. Three nuts are behind the lower sprocket.

Skandic 380, Touring E, Formula S/DLX 380

Unfold locking tab **no. 23**, unscrew nuts **no. 24** then remove caliper retaining screws **no. 22**.

Release track tension, use drive axle holder (P/N 529 007 200).



TYPICAL

1. *Drive axle*
2. *Suspension cross shaft*

Pry out drive axle oil seal **no. 20** from chaincase.

Pull chaincase from drive axle and countershaft.

Using 2 large prybars inserted between chaincase **no. 7** and frame, pry chaincase from vehicle.

INSPECTION

Visually inspect the chain for cracked, damaged or missing links. Check for worn or defective bearings, sprockets and chain tensioner components.

◆ WARNING

If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

GEAR RATIO MODIFICATION

For particular applications, the number of teeth of the sprockets can be increased or decreased on lower and upper sprockets.

Refer to TECHNICAL DATA 10 for gear ratios.

▼ CAUTION

Gear ratio modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

NOTE: For high altitude regions, the *High Altitude Technical Booklet* (P/N 484 300 003 and P/N 484 054 500 for binder) gives information about calibration according to altitude.

INSTALLATION

Reverse removal procedure and pay attention to the following. Replace oil seals, gaskets and O-rings.

Refer to DRIVE AXLE 07-04 for drive axle axial play adjustment.

19, Washer

Apply Loctite 515 (P/N 410 702 700) on side of washer facing chaincase.

27, Bearing

Position both bearings in chaincase with their **sealed side** facing **inside** of chaincase.

11,20 Oil Seal

Using chaincase upper seal pusher (P/N 529 032 300), press the oil seal into chaincase hub.

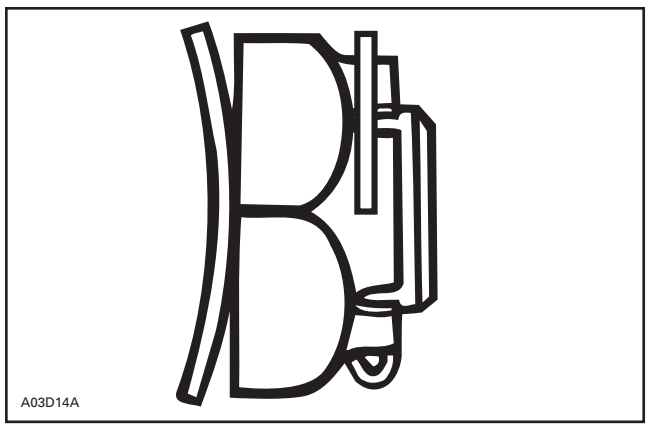
NOTE: Should installation procedure for countershaft be required, refer to BRAKE 05-06 then look for **Brake Disc and Countershaft Bearing Adjustment**.

5,16, Sprockets

Position the sprockets with the writing facing the chaincase cover.

26, Conical Spring Washer

Install washer with its concave side towards drive pulley.



4, Upper Sprocket Castellated Nut

Torque to 45 to 75 N•m (33 to 55 lbf•ft).

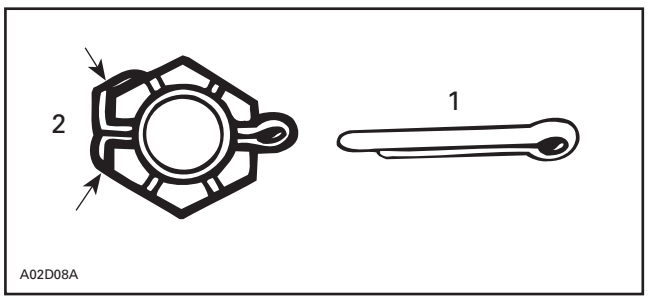
Install new cotter pin in the position shown.

▼ CAUTION

When removing a cotter pin always replace with a new one.

▼ CAUTION

Cotter pin will rub on chaincase cover if installed otherwise.



1. New
2. Fold cotter pin over castellated nut flats only

18, Circlip

▼ CAUTION

It is of the utmost importance to install the circlip otherwise damage to the chaincase components may occur.

DRIVE CHAIN ADJUSTMENT

10, O-Ring

Replace O-rings **no. 10** on tensioner adjustment screw. Apply lithium grease on O-rings.

Fully tighten tensioner adjustment screw **by hand**, then back off only far enough for hair pin to engage in locking hole.

This initial adjustment should provide 3-5 mm (1/8-13/64 in) free-play when measured at the outer circumference of the brake disc.

▼ CAUTION

Free-play must not exceed 5 mm (13/64 in), readjust if necessary.

◆ WARNING

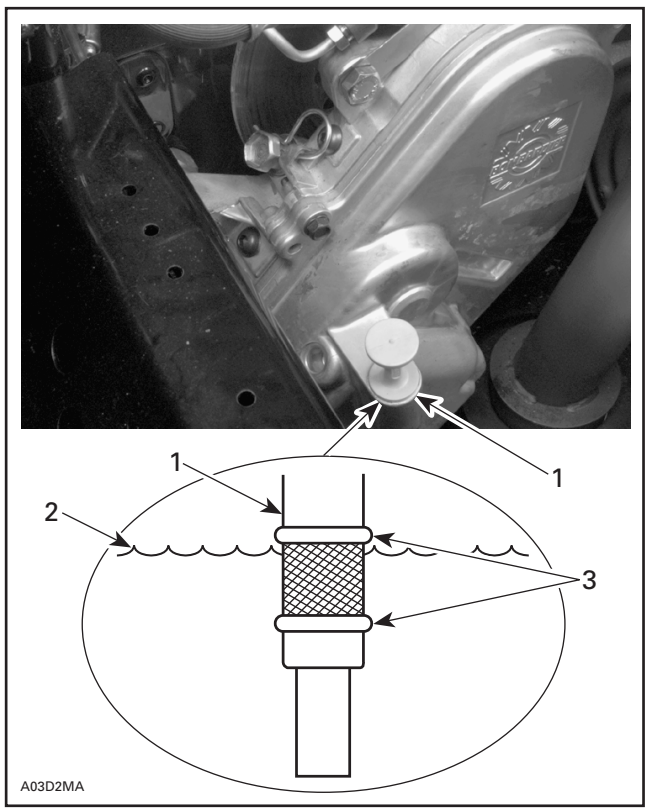
If the specified free-play is not reached with the tensioner screw fully tightened, replace chain and check the condition of sprockets.

21, Chaincase Oil

Pour 250 mL (8.5 fl. oz) of chaincase oil (P/N 413 801 900) into chaincase.

NOTE: Chaincase oil capacity is 250 mL (8.5 fl. oz).

Check oil level with the dipstick then add if required.



TYPICAL

1. *Dipstick*
2. *Oil level*
3. *Level between marks*

NOTE: Chaincase must be in its proper position when checking oil level.

ADJUSTMENT

Pulley Alignment

Refer to PULLEY DISTANCE AND ALIGNMENT 05-04.

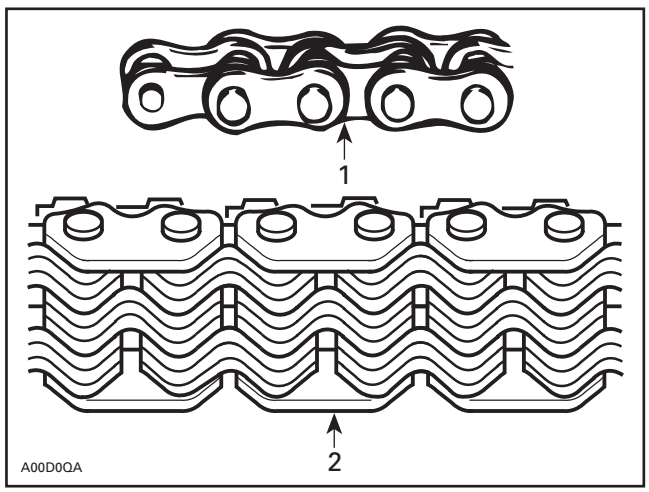
Track Tension and Alignment

Refer to TRACK 07-05.

DRIVE CHAIN

GENERAL

Bombardier drive chains exist in 2 types, for proper use refer to TECHNICAL DATA 10.



1. 1/2 in single
2. 3/8 in silent chain

SILENT CHAIN

There are 2 types of silent chain. One is 11-plate wide and the other (stronger) is 13-plate wide. Do not interchange sprockets. Fit chain on sprockets to make sure using right ones according to width. Refer to TECHNICAL DATA 10.

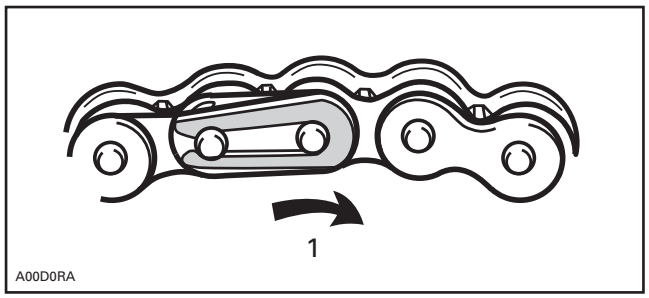
NOTE: No work (separation, lengthening) can be done on the silent chain type.

CHAIN ATTACHMENT

When joining chain ends, the open end of the circlip must be on opposite side of chain rotation. The circlip should also be facing the outer side of chaincase.

◆ WARNING

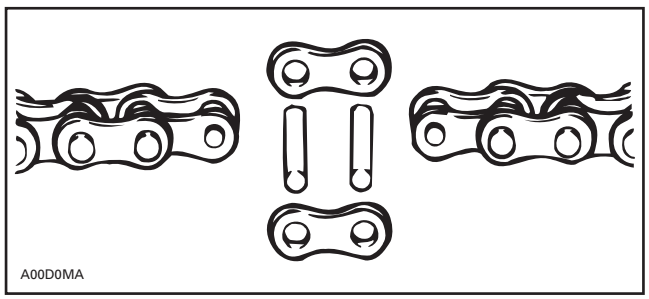
Always ensure that the connecting link circlip is in good condition and is properly secured.



TYPICAL
1. Rotation

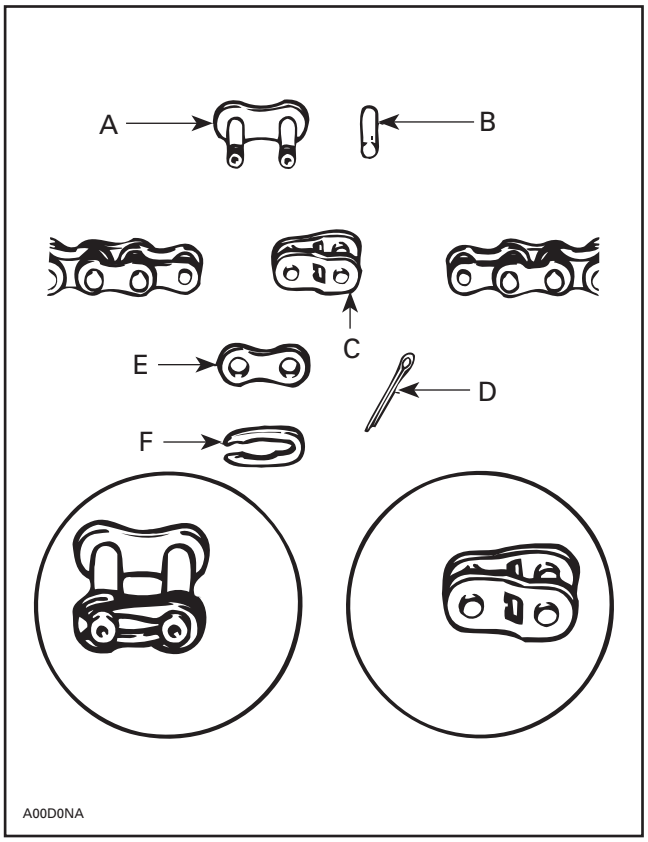
CHAIN SEPARATION

When separating an endless chain, always use a chain bearing pin extractor. Also, make sure to remove one complete link.



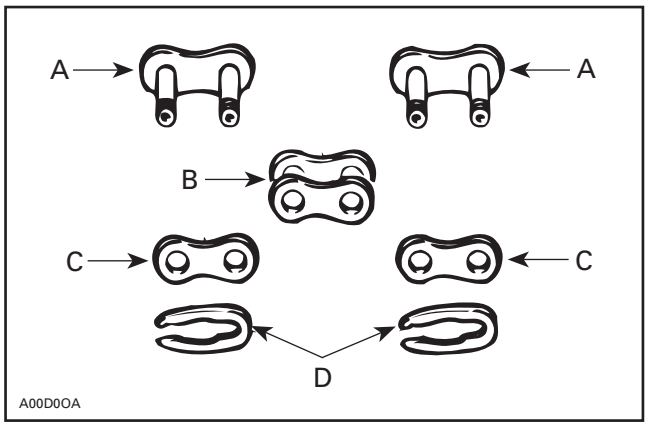
NOTE: Chain connecting link should only be used to lengthen or shorten a chain when changing the number of teeth of sprocket(s). A stretched chain must never be shortened because the chain pitch has changed (increased) and will not properly match the sprocket pitch, causing premature wear.

NOTE: Refer to TECHNICAL DATA 10, for chain length according to gear ratio of each specific vehicle.



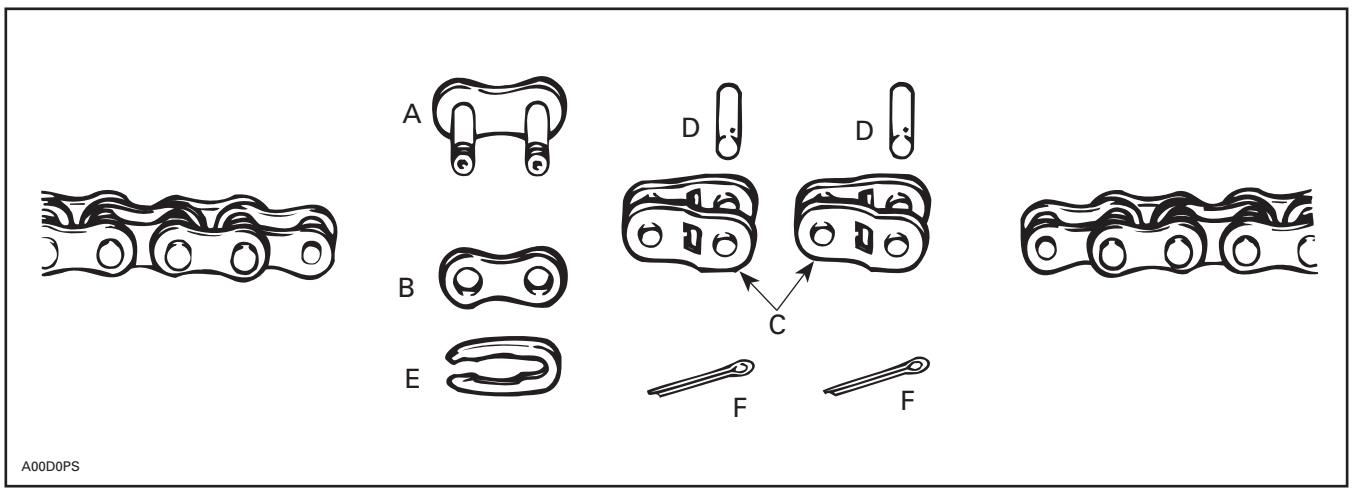
LENGTHENING 1/2 LINK

A. Connecting link
B. Link pin
C. Cranked link
D. Cotter pin
E. Outer link
F. Circlip



LENGTHENING 1 LINK

A. Connecting link
B. Inner link
C. Outer link
D. Circlip



LENGTHENING 1-1/2 LINKS

A. Connecting link
B. Outer link
C. Cranked link
D. Link pin
E. Circlip
F. Cotter pin

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IGNITION TIMING

NIPPONDENSO CDI SYSTEM (WITHOUT TRIGGER COIL)

Tundra 277 Engine Type

The 277 engine type uses a single coil ignition system. Refer to CDI SYSTEM 04-05 for more informations.

This section is mainly divided in 2 parts, the first one using a Top Dead Center gauge to verify the magneto flywheel timing mark position. The second one using a stroboscopic timing light to check ignition timing.

Flywheel timing mark position verification is required:

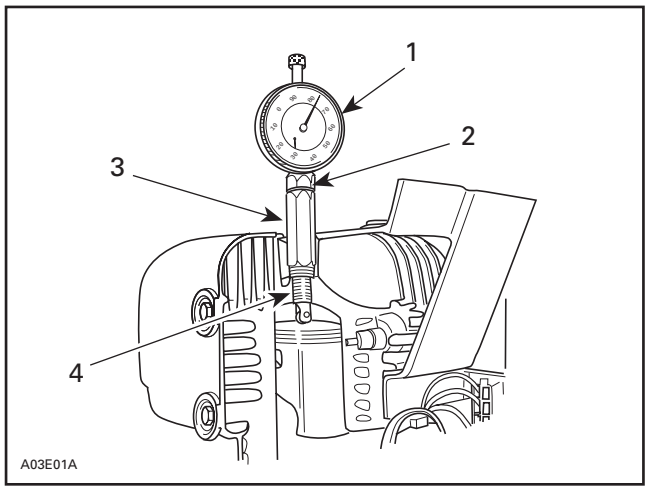
1. To detect a missing or broken magneto flywheel Woodruff key which would allow a change of timing to occur, with eventual break down of the engine.
2. To correctly locate and mark a timing mark on a new service magneto flywheel.
3. To verify the correct location of the factory timing mark.
4. To detect a wrong magneto flywheel corresponding to a different engine type.

Always verify magneto flywheel timing mark position before checking ignition timing.

Verifying Magneto Flywheel Timing Mark Position

1. Disconnect spark plug wire and remove spark plug.
2. Install and adjust TDC gauge on engine as follows:

– Rotate magneto flywheel clockwise until piston is just Before Top Dead Center.

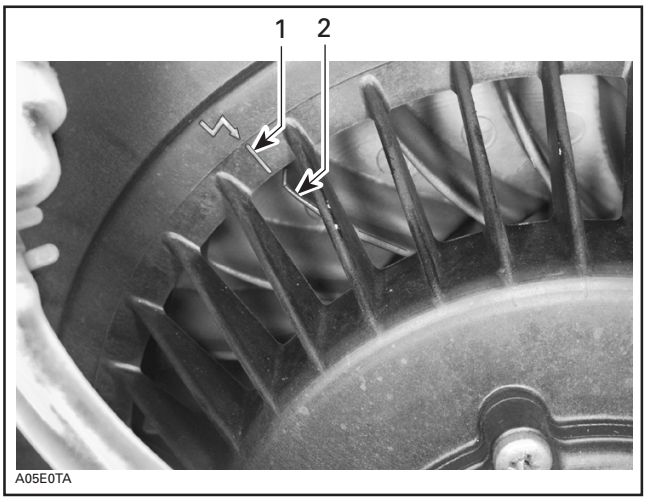


1. Outer ring
2. Adaptor lock nut
3. Roller lock nut
4. Adaptor

– Loosen adaptor lock nut then holding gauge with dial face toward magneto, screw adaptor in spark plug hole.
– Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.
– Rotate magneto flywheel clockwise until piston is at Top Dead Center.
– Unlock outer ring of dial and turn it until “0” (zero) on dial aligns with pointer.
– Lock outer ring in position.

3. From this point, rotate magneto flywheel back 1/4 turn then rotate it clockwise to reach the specified position. Refer to TECHNICAL DATA 10.

Check if red fin aligns with mark on fan cowl.



1. Fan cowl timing mark
2. Red fin

If marks do not align, there is something wrong with fan mounting. Check Woodruff key and fan.

▼ CAUTION

Always check the timing with a stroboscopic timing light at 6000 RPM after the marks have been checked.

Checking Ignition Timing

NOTE: To perform this procedure we strongly recommend a stroboscopic timing light which is able to exceed 6000 RPM.

To check ignition timing, use a timing light (P/N 529 031 900).

NOTE: This timing light is battery powered (2 alkaline batteries, type C) and therefore needs no auxiliary power supply. If a different timing light requiring auxiliary power supply is used on manual start models, use a separate battery to power timing light.

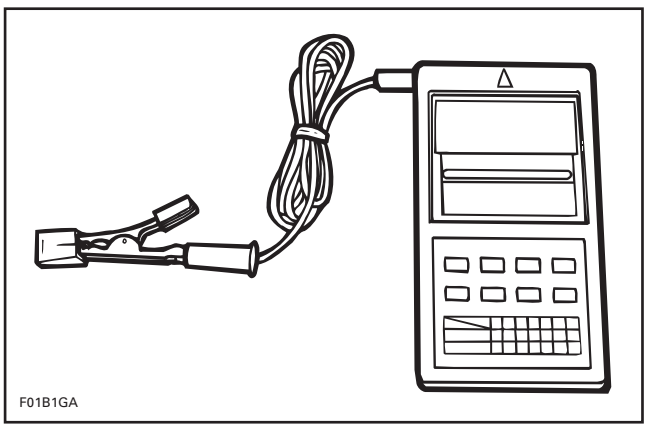


TIMING LIGHT (P/N 529 031 900)

The ignition components are affected by temperature variation, therefore, timing must be checked when engine is cold, after idling for a MAXIMUM of 20 seconds.

NOTE: On applicable models, turn heating grips off prior to checking ignition timing.

1. Connect timing light pick-up to the spark plug lead. Use a digital induction type tachometer (P/N 529 014 500).



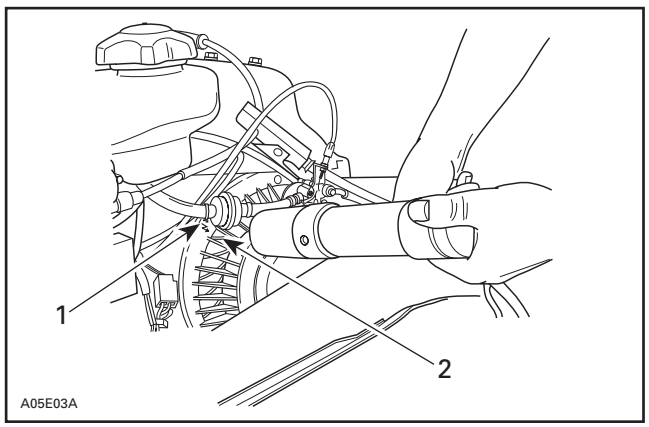
TACHOMETER (P/N 529 014 500)

Connect tachometer wire to spark plug wire or aim tachometer toward spark plug wire without using any connection wire.

◆ WARNING

Place ski tips against a wall, raise rear of vehicle on a stand so that track does not contact the ground. Do not allow anyone in front or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

2. Start the engine and point timing light straight in line with the fan cowl timing mark. Bring engine to 6000 RPM for a brief instant.



TUNDRA

1. *Fan cowl timing mark*
2. *Red fin*

3. Check if the red fin aligns with the fan cowl timing mark. Tolerance is 1°.

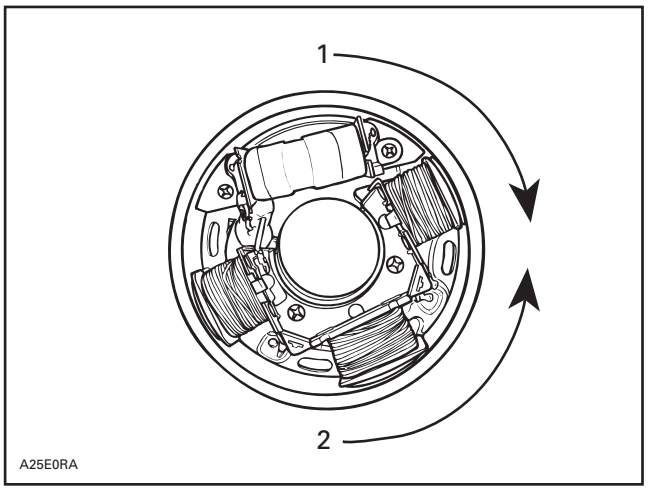
NOTE: On the NIPPONDENSO ignition system, timing advance decreases as engine speed increases. When marks are aligned at 6000 RPM, spark occurrence is still Before Top Dead Center.

If the red fin aligns with the fan cowl timing mark, timing is correct.

If timing adjustment is required, rewind starter and starter pulley have to be removed. For removal procedure, refer to CDI SYSTEM 04-05.

IGNITION TIMING ADJUSTMENT

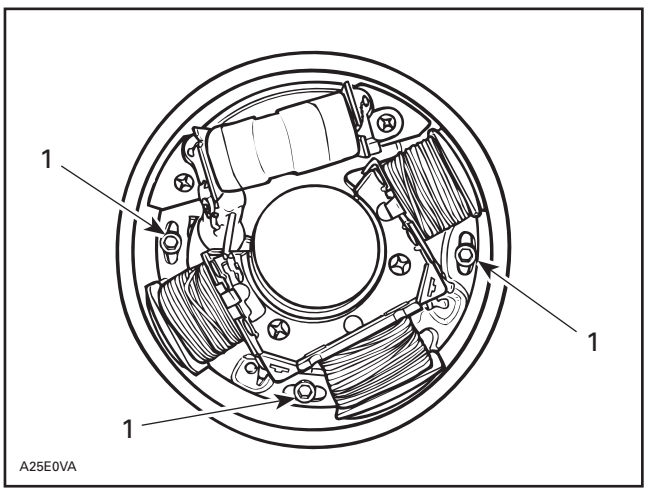
Timing is performed by moving armature plate, clockwise to retard spark occurrence, counterclockwise to advance.



TYPICAL

1. *To retard*
2. *To advance*

To adjust, loosen 3 armature plate retaining screws and lightly rotate armature plate in proper direction.

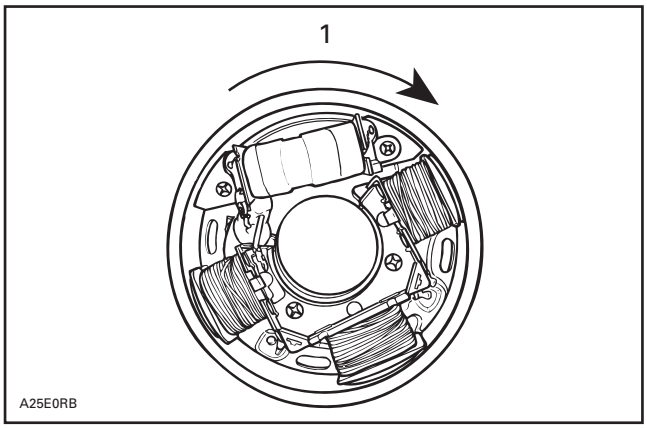


1. *Retaining screws*

Refer to the difference between the fan cowl timing mark and the red fin to determine the amount of rotation.

When the red fin is on **left** side of fan cowl timing mark, it indicates too **advanced** timing.

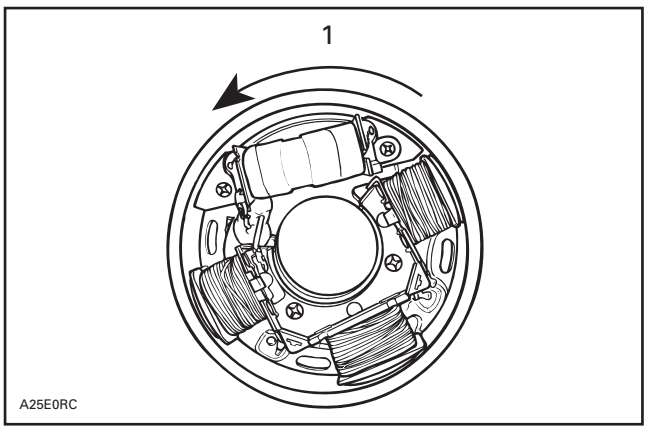
In this case, turn armature plate clockwise.



1. Turn clockwise to retard

When the red fin is on **right** side of fan cowl timing mark, it indicates **retarded timing**.

In this case, turn armature plate counterclockwise.



1. Turn counterclockwise to advance

After adjustment, tighten armature plate retaining screws.

▼ CAUTION

Make sure armature plate screws are well secured. Armature plate screws must have Loctite 242 (P/N 413 703 000) applied before tightening.

Reinstall removed parts.

Recheck ignition timing (make sure engine is cold).

RER CDI SYSTEM

Tundra R 277 Engine Type

This 277 engine type is equipped with a Rotax Electronic Reverse system (RER). It uses a single coil ignition system and 2 trigger coils. Refer to CDI SYSTEM 04-05 for more informations.

This section is mainly divided in 2 parts, the first one using a Top Dead Center gauge to verify the magneto flywheel timing mark position. The second one using a stroboscopic timing light to check ignition timing.

Flywheel timing mark position verification is required to:

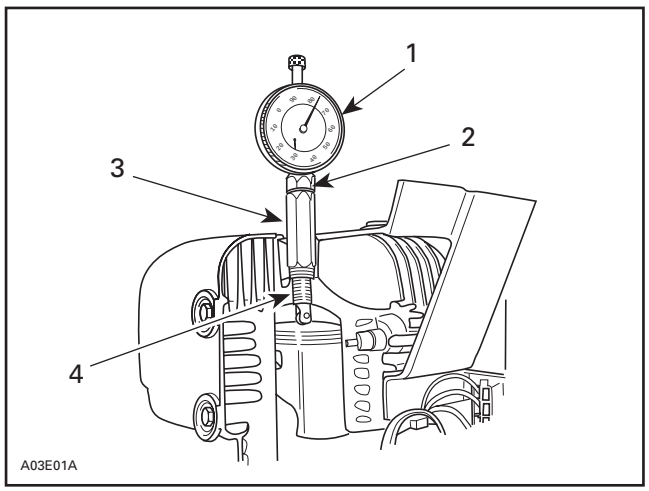
1. To detect a missing or broken magneto flywheel Woodruff key which would allow a change of timing to occur, with eventual break down of the engine.
2. To correctly locate and mark a timing mark on a new service magneto flywheel.
3. To verify the correct location of the factory timing mark.
4. To detect a wrong magneto flywheel corresponding to a different engine type.

Always verify magneto flywheel timing mark position before checking ignition timing.

Verifying Magneto Flywheel Timing Mark Position

1. Disconnect spark plug wire and remove spark plug.
2. Install and adjust TDC gauge on engine as follows:

– Rotate magneto flywheel clockwise until piston is just Before Top Dead Center.



1. Outer ring
2. Adaptor lock nut
3. Roller lock nut
4. Adaptor

– Loosen adaptor lock nut then holding gauge with dial face toward magneto, screw adaptor in spark plug hole.

– Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.

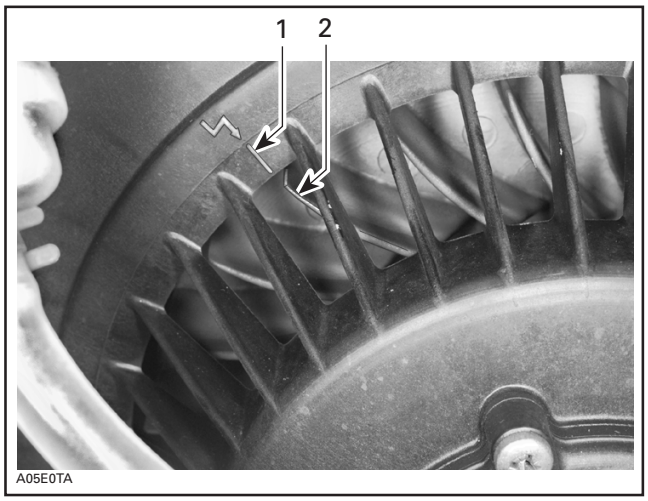
– Rotate magneto flywheel clockwise until piston is at Top Dead Center.

– Unlock outer ring of dial and turn it until "0" (zero) on dial aligns with pointer.

– Lock outer ring in position.

3. From this point, rotate magneto flywheel back 1/4 turn then rotate it clockwise to reach the specified position. Refer to TECHNICAL DATA 10.

Check if red fin aligns with mark on fan cowl.



1. Fan cowl timing mark
2. Red fin

If marks do not align, there is something wrong with fan mounting. Check Woodruff key and fan.

▼ CAUTION

Always check the timing with a stroboscopic timing light at 3500 RPM after the marks have been checked.

Checking Ignition Timing

NOTE: To perform this procedure we strongly recommend a stroboscopic timing light which is able to exceed 3500 RPM.

To check ignition timing, use a timing light (P/N 529 031 900).

NOTE: This timing light is battery powered (2 alkaline batteries, type C) and therefore needs no auxiliary power supply. If a different timing light requiring auxiliary power supply is used on manual start models, use a separate battery to power timing light.

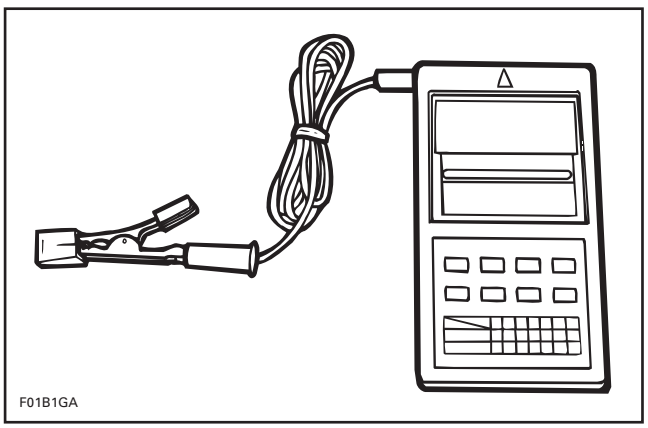


TIMING LIGHT (P/N 529 031 900)

The ignition components are affected by temperature variation, therefore, timing must be checked when engine is cold, after idling for a MAXIMUM of 20 seconds.

NOTE: On applicable models, turn heating grips off prior to checking ignition timing.

1. Connect timing light pick-up to the spark plug lead. Use a digital induction type tachometer (P/N 529 014 500).



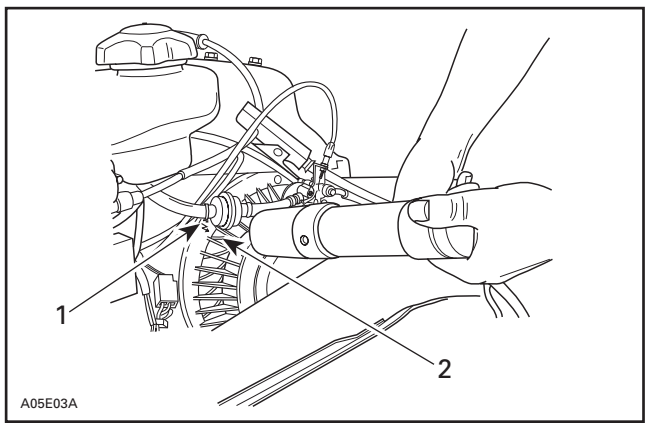
TACHOMETER (P/N 529 014 500)

Connect tachometer wire to spark plug wire or aim tachometer toward spark plug wire without using any connection wire.

◆ WARNING

Place ski tips against a wall, raise rear of vehicle on a stand so that track does not contact the ground. Do not allow anyone in front or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

2. Start the engine and point timing light straight in line with the fan cowl timing mark. Bring engine to 3500 RPM for a brief instant.



TYPICAL — TUNDRA R

1. *Fan cowl timing mark*
2. *Red fin*

3. Check if the red fin aligns with the fan cowl timing mark. Tolerance is 1°.

If the red fin aligns with the fan cowl timing mark, timing is correct. If not the case, check for proper flywheel, trigger coil position or MPEM.

The RER ignition system is not adjustable. Only trigger coil air gap can be verified. Refer to CDI SYSTEM 04-05.

DUCATI CDI SYSTEM

377 and 503 Engine Types on Formula S/SL

Proper ignition timing is determined by trigger coil position.

If for any reason, ignition timing accuracy is suspected, it can be verified as follows.

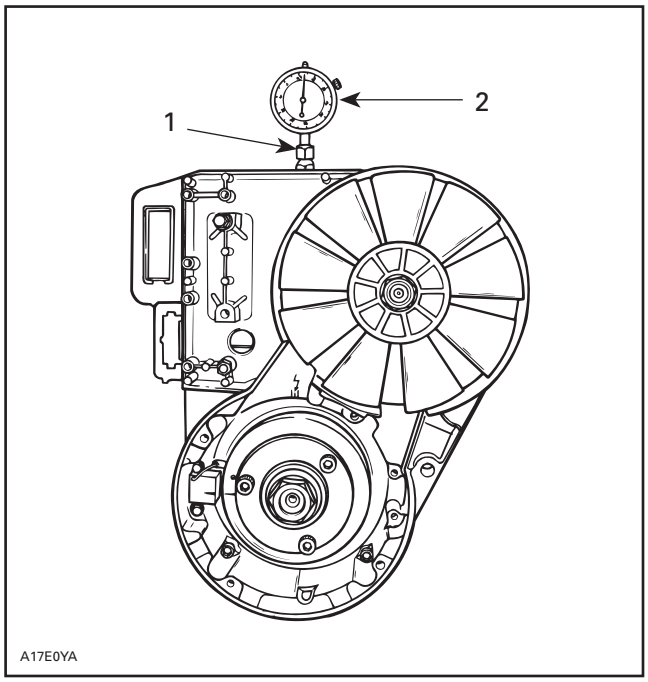
Verifying Magneto Flywheel Timing Mark Position

Prior to checking the timing, it may be necessary to verify the position of the timing mark on the magneto flywheel, for the following reasons:

1. To detect a missing or broken magneto flywheel Woodruff key which would allow a change of timing to occur, with eventual break down of the engine.
2. To correctly locate and mark a timing mark on a new service magneto flywheel.
3. To verify the correct location of the factory timing mark.
4. To detect a wrong magneto flywheel corresponding to a different engine type.

To verify the position of the timing mark on the magneto flywheel, proceed as follows:

1. Clean the area around the spark plugs, and remove them.
2. Remove the rewind starter from the engine.
3. Install the TDC gauge in the spark plug hole, (magneto/generator side) and adjust as follows:
   a. Position the magneto flywheel at approximately TDC.



INSTALLATION OF TDC GAUGE

1. Gauge on MAG side cylinder
2. Adaptor lock nut

   b. Assemble the gauge to the adaptor and tighten the roller lock nut. Do not tighten the adaptor lock nut.
   c. Screw the adaptor into the spark plug hole and tighten to prevent movement in the plug hole.
   d. Position the dial face toward the magneto/generator. Move the gauge down until the needle just begins to move, then move down a further 5 or 6 mm (approximately 1/4 in). Tighten adaptor lock nut by hand.
4. Locate the piston TDC position as follows:
   a. Slowly rotate the magneto flywheel back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
   b. Rotate the dial face so that "0" is in line with the needle when it stops moving.
   c. Again, slowly rotate the magneto flywheel back and forth across TDC and adjust the dial face to "0", until the needle always stops exactly at "0" before changing direction.
   d. "0" now indicates exact TDC.

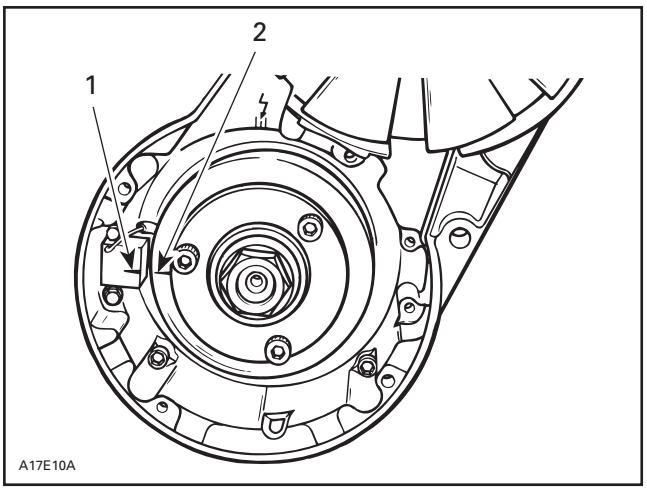
5. Verify the position of the timing mark on the magneto flywheel as follows:

NOTE: When checking timing, certain procedures require that the magneto flywheel be turned in a clockwise direction, viewed facing the magneto/generator. If it is necessary to turn back (counterclockwise) for any reason, rotate the magneto flywheel at least one-quarter turn counterclockwise, and then rotate it clockwise. The last magneto flywheel movement when making a critical check must always be in a clockwise direction, to ensure that the slack in engine moving parts is taken-up.

a. Rotate the magneto flywheel counterclockwise, one-quarter turn then carefully rotate it clockwise until the needle indicates the specified measurement. Refer to TECHNICAL DATA 10.

b. Verify that the magneto flywheel mark perfectly aligns with the mark on the trigger coil, refer to illustration.

c. If the marks do not align, check magneto flywheel and trigger coil part numbers and check Woodruff key condition. If all parts are the appropriate ones and if Woodruff key is in good condition, continue the procedure.



1. Trigger coil mark
2. Magneto flywheel mark

NOTE: These marks cannot be used to check dynamic (with engine running) ignition timing with a timing light: a new mark must be scribed on magneto flywheel for this purpose.

6. Scribe a new mark on magneto flywheel as follows.

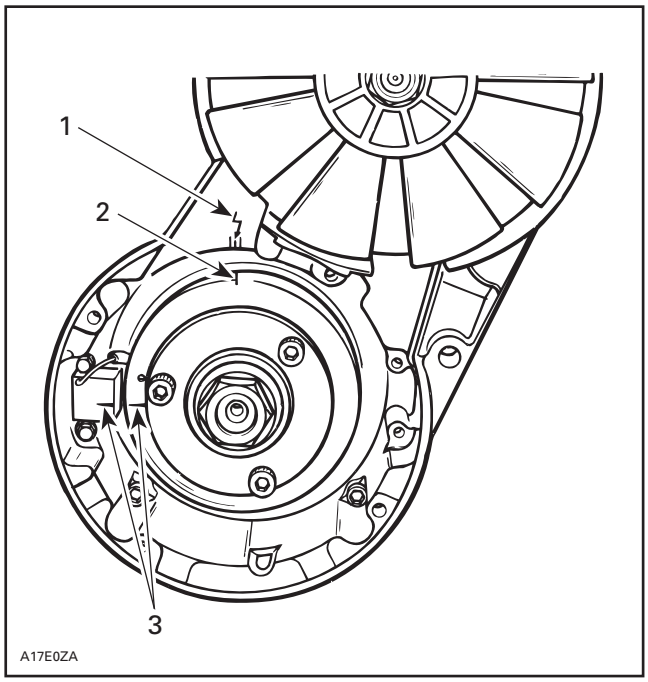
a. Remove the fan cover from the engine.

b. Maintain magneto flywheel so that previous marks remain aligned.

c. Scribe or punch a mark on magneto flywheel so that it perfectly aligns with the arrow on crankcase, refer to illustration. This new timing mark should be used for future timing checks (dynamic timing).

d. Reinstall rewind starter.

e. Check the timing with a timing light.



1. Crankcase arrow
2. Scribe a mark here
3. Maintain verified timing marks aligned (static timing)

Checking Ignition Timing

Use timing light (P/N 529 031 900).



TIMING LIGHT (P/N 529 031 900)

To check the ignition timing, refer to illustration and proceed as follows:

NOTE: Engine should be cold when checking timing. Do not idle engine for more than 20 seconds and make checks quickly.

◆ WARNING

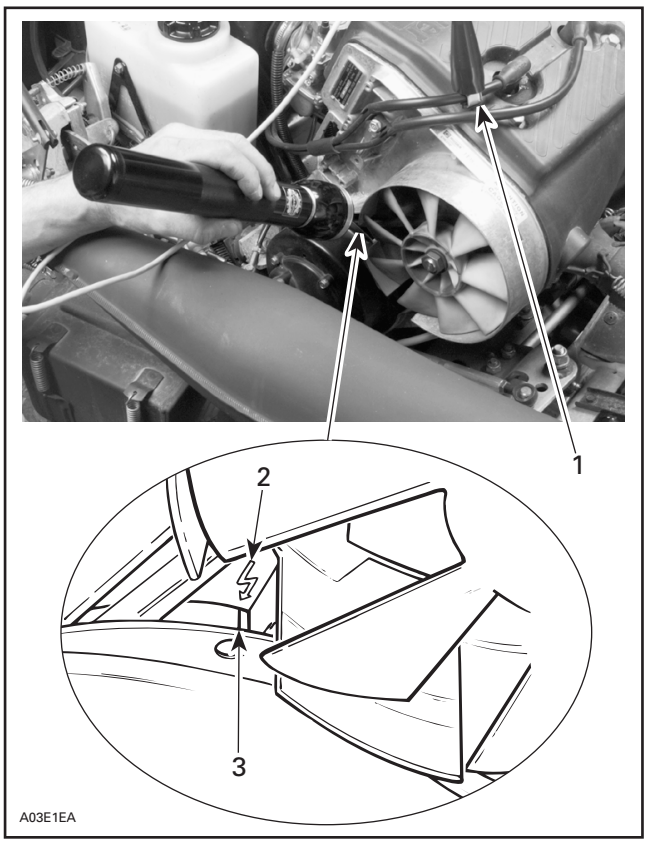
Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground. Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

1. Connect the timing light pick-up to a spark plug cable and the power connections to the battery.

NOTE: To avoid an incorrect reading due to parallax, view the magneto flywheel and the crankcase timing marks in a straight line.

2. Start the engine and raise the engine speed at least to 2000 RPM while observing the timing marks, refer to illustration. The magneto flywheel mark scribed previously and the crankcase arrow should be perfectly aligned. If the marks do not align, a faulty trigger coil (check proper grounding of coil) or a faulty CDI module could be the cause: substitute one part at a time and recheck timing marks (check connectors condition prior to substituting any part).

NOTE: Ignition timing may be verified when engine speed is anywhere within 2000-6000 RPM.



S-SERIES

1. Timing light pick-up on MAG side
2. Crankcase arrow
3. Magneto flywheel mark

3. Install parts which were removed.

CDI SYSTEM

377, 443 and 503 Engine Types on Skandic 380/500, Touring E/LE/SLE and Formula DLX 380/500

If for any reason, ignition timing accuracy is suspected, it can be verified as follows.

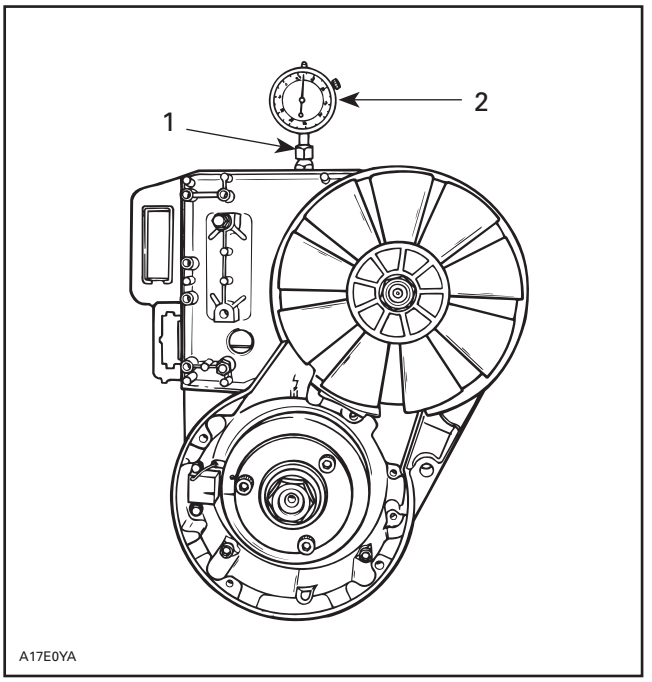
Verifying Magneto Flywheel Timing Mark Position

Prior to checking the timing, it may be necessary to verify the position of the timing mark on the magneto flywheel, for the following reasons:

1. To detect a missing or broken magneto flywheel Woodruff key which would allow a change of timing to occur, with eventual break down of the engine.
2. To correctly locate and mark a timing mark on a new service magneto flywheel.
3. To verify the correct location of the factory timing mark.
4. To detect a wrong magneto flywheel corresponding to a different engine type.

To verify the position of the timing mark on the magneto flywheel, proceed as follows:

1. Clean the area around the spark plugs, and remove them.
2. Remove the rewind starter from the engine.
3. Install the TDC gauge in the spark plug hole, (magneto/generator side) and adjust as follows:
   a. Position the magneto flywheel at approximately TDC.



TYPICAL — INSTALLATION OF TDC GAUGE

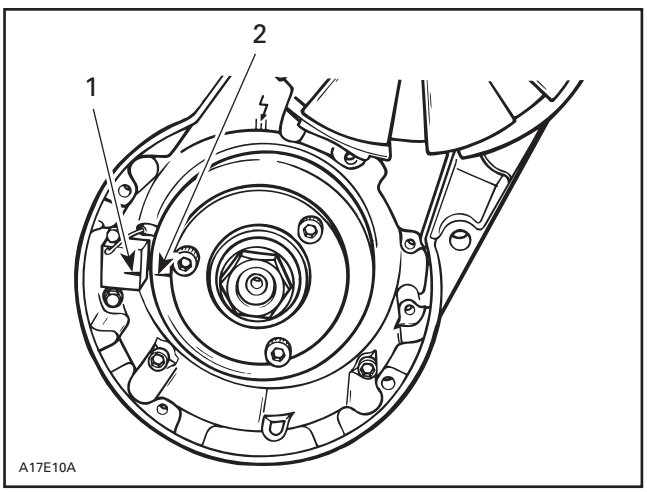
1. Gauge on MAG side cylinder
2. Adaptor lock nut

   b. Assemble the gauge to the adaptor and tighten the roller lock nut. Do not tighten the adaptor lock nut.
   c. Screw the adaptor into the spark plug hole and tighten to prevent movement in the plug hole.
   d. Position the dial face toward the magneto/generator. Move the gauge down until the needle just begins to move, then move down a further 5 or 6 mm (approximately 1/4 in). Tighten adaptor lock nut by hand.
4. Locate the piston TDC position as follows:
   a. Slowly rotate the magneto flywheel back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
   b. Rotate the dial face so that "0" is in line with the needle when it stops moving.
   c. Again, slowly rotate the magneto flywheel back and forth across TDC and adjust the dial face to "0", until the needle always stops exactly at "0" before changing direction.
   d. "0" now indicates exact TDC.

5. Verify the position of the timing mark on the magneto flywheel as follows:

NOTE: When checking timing, certain procedures require that the magneto flywheel be turned in a clockwise direction, viewed facing the magneto/generator. If it is necessary to turn back (counterclockwise) for any reason, rotate the magneto flywheel at least one-quarter turn counterclockwise, and then rotate it clockwise. The last magneto flywheel movement when making a critical check must always be in a clockwise direction, to ensure that the slack in engine moving parts is taken-up.

   a. Rotate the magneto flywheel counterclockwise, one-quarter turn then carefully rotate it clockwise until the needle indicates the specified measurement. Refer to TECHNICAL DATA 10.
   b. Verify that the magneto flywheel mark perfectly aligns with the mark on the trigger coil, refer to illustration.
   c. If the marks do not align, check magneto flywheel and trigger coil part numbers and check Woodruff key condition. If all parts are the appropriate ones and if Woodruff key is in good condition, continue the procedure.

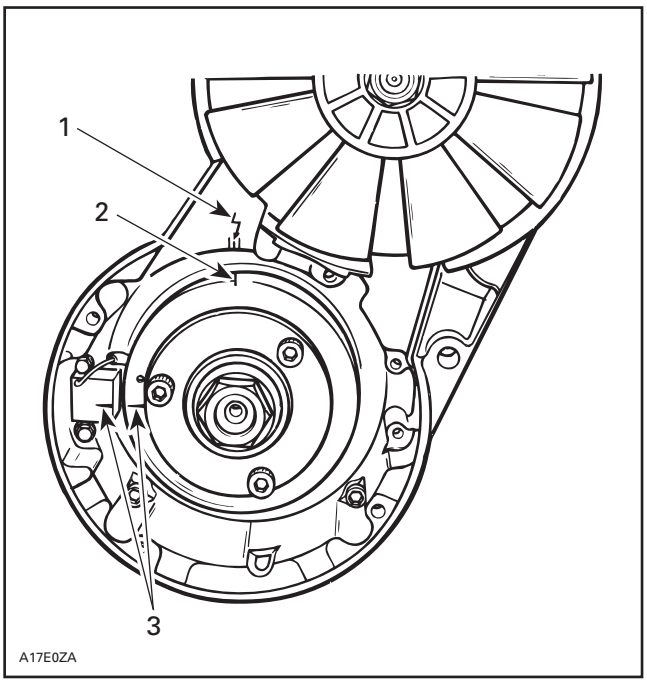


TYPICAL

1. *Trigger coil mark*
2. *Magneto flywheel mark*

NOTE: These marks cannot be used to check dynamic (with engine running) ignition timing with a timing light: a new mark must be scribed on magneto flywheel for this purpose.

6. Scribe a new mark on magneto flywheel as follows.
   a. Remove the fan cover from the engine.
   b. Maintain magneto flywheel so that previous marks remain aligned.
   c. Scribe or punch a mark on magneto flywheel so that it perfectly aligns with the arrow on crankcase, refer to illustration. This new timing mark should be used for future timing checks (dynamic timing).
   d. Reinstall rewind starter.
   e. Check the timing with a timing light.



TYPICAL

1. *Crankcase arrow*
2. *Scribe a mark here*
3. *Maintain verified timing marks aligned (static timing)*

Checking Ignition Timing

Use timing light (P/N 529 031 900).



TIMING LIGHT (P/N 529 031 900)

To check the ignition timing, refer to illustration and proceed as follows:

NOTE: Engine should be cold when checking timing. Do not idle engine for more than 20 seconds and make checks quickly.

◆ WARNING

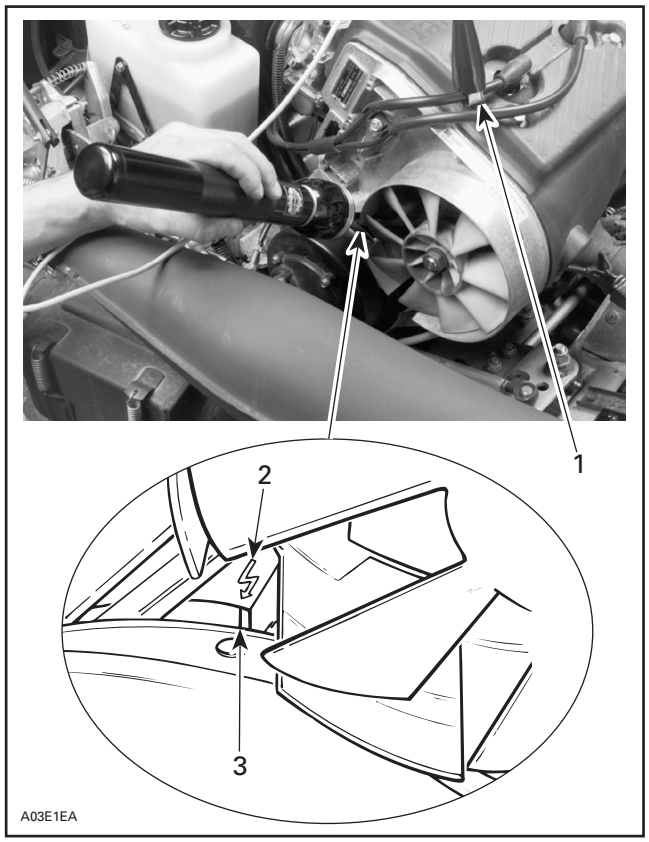
Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground. Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

1. Connect the timing light pick-up to a spark plug cable and the power connections to the battery.

NOTE: To avoid an incorrect reading due to parallax, view the magneto flywheel and the crankcase timing marks in a straight line.

2. Start the engine and raise the engine speed at least to 2000 RPM while observing the timing marks, refer to illustration. The magneto flywheel mark scribed previously and the crankcase arrow should be perfectly aligned. If the marks do not align, a faulty trigger coil (check proper grounding of coil) or a faulty CDI module could be the cause: substitute one part at a time and recheck timing marks (check connectors condition prior to substituting any part).

NOTE: Ignition timing may be verified when engine speed is anywhere within 2000-6000 RPM.



S-SERIES

1. *Timing light pick-up on MAG side*
2. *Crankcase arrow*
3. *Magneto flywheel mark*

3. Install parts which were removed.

SPARK PLUGS

NGK SPARK PLUG

All Models

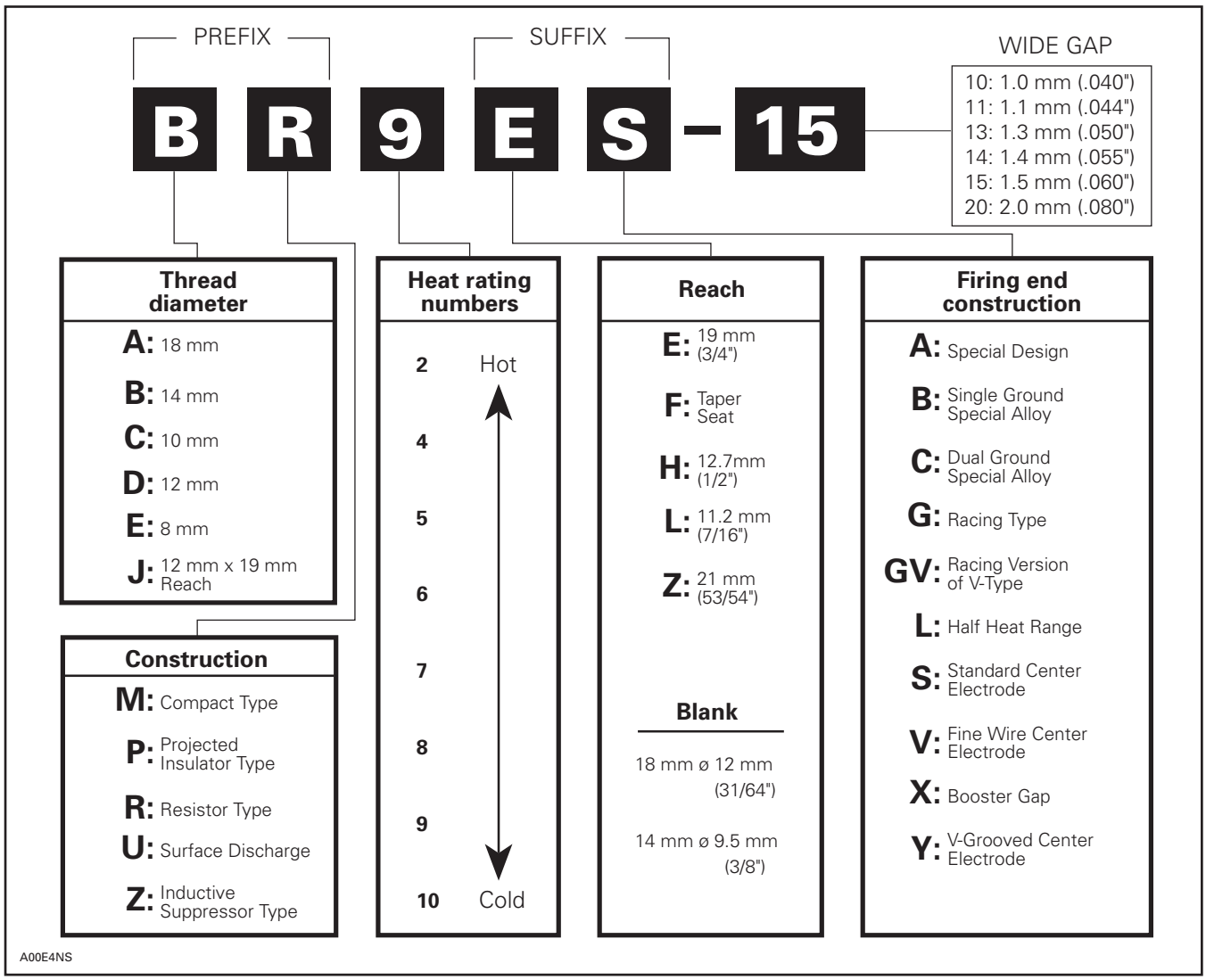
NGK SPARK PLUG NUMBERING SYSTEM

Bombardier is using the NGK spark plug type on all its snowmobile models.

The heat range identification system is:

Low number → hot plug
High number → cold plug

DESIGN SYMBOLS USED IN NGK SPARK PLUGS



CROSSCUTS AND GAP STYLES OF SPARK PLUGS



DISASSEMBLY

First unscrew the spark plug 1 turn.

Clean the spark plug and cylinder head with pressurized air, then completely unscrew.

◆ WARNING

Whenever using compressed air, always wear protective eye wear.

HEAT RANGE

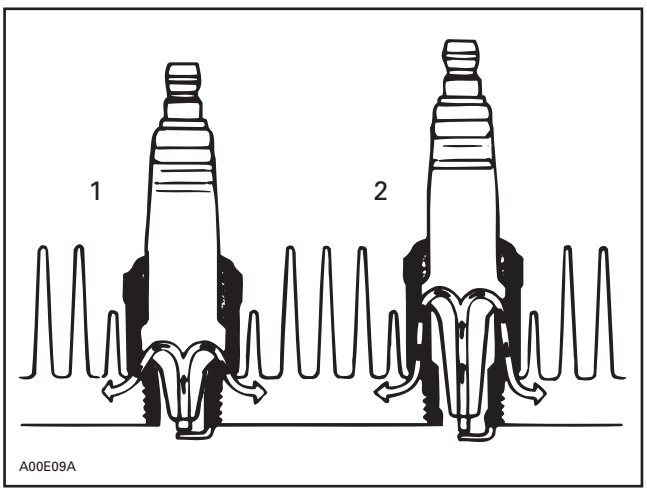
The proper operating temperature or heat range of the spark plugs is determined by the spark plug ability to dissipate the heat generated by combustion.

The longer the heat path between the electrode tip to the plug shell, the hotter the spark plug operating temperature will be — and inversely, the shorter the heat path, the colder the operating temperature will be.

A "cold" type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The "hot" type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.



1. Cold
2. Hot

▼ CAUTION

Severe engine damage might occur if a wrong heat range plug is used.

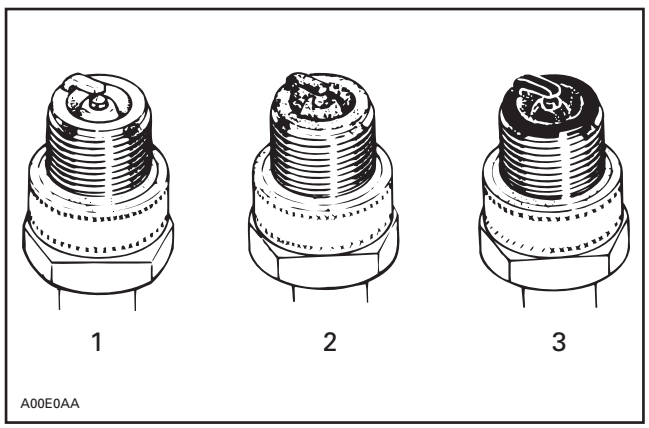
A too "hot" plug will result in overheating and pre-ignition, etc.

A too "cold" plug will result in fouling (shorting the spark plug) or may create carbon build up which can heat up red-hot and cause pre-ignition or detonation.

FOULING

Fouling of the spark plug is indicated by irregular running of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are: prolonged idling, or running on a too rich mixture due to a faulty carburetor adjustment or incorrect fuel and/or fuel mixing. The plug face of a fouled spark plug has either a dry coating of soot or an oily, glossy coating given by an excess either of oil or of oil with soot. Such coatings form a conductive connection between the center electrode and ground.

SPARK PLUG ANALYSIS



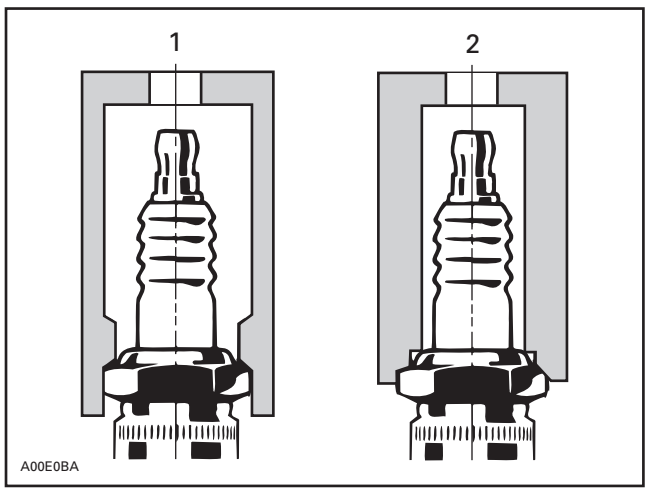
1. Overheated (light grey)
2. Normal (brownish)
3. Fouled (black)

The plug electrode and piston dome reveal the condition of the engine, operating condition, method of driving and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining the plug electrode and the piston dome.

SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

1. Using a wire feeler gauge, set electrode gap according to TECHNICAL DATA 10.
2. Apply anti-seize lubricant (P/N 413 701 000) over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



1. Proper socket
2. Improper socket

SPARK PLUG TIGHTENING TORQUE

MODELS	SPARK PLUGS	TORQUE N•m (lbf•ft)
All	NGK	27 (20)

BATTERY

REMOVAL

All Models

◆ WARNING

Battery BLACK negative cable must always be disconnected first and connected last.

◆ WARNING

Never charge or boost battery while installed on vehicle.

Remove belt guard.

All Models Except Formula S/SL

Remove throttle cable attachment from air silencer.

Loosen collar on carburetor adaptors. Remove air silencer.

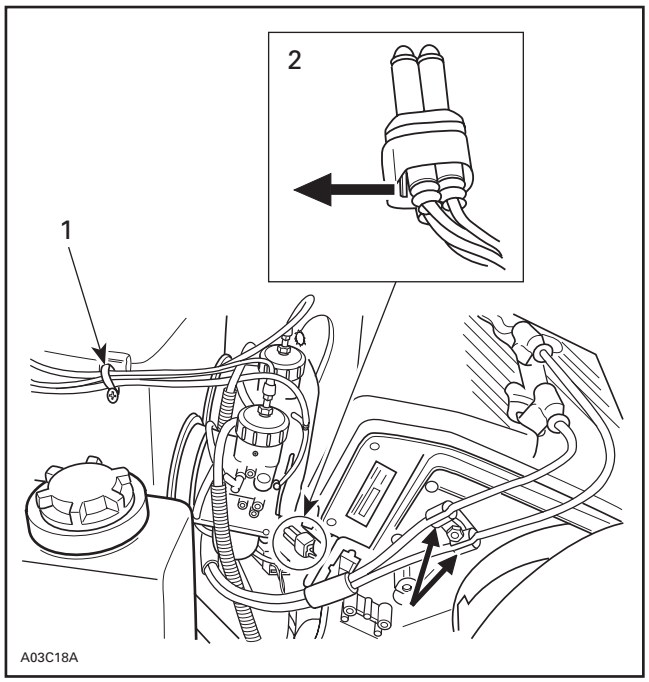
Formula S/SL

Unfasten spark plug cables from fan housing. Unplug spark plug caps.

Remove throttle cable attachment from air silencer.

Unplug CDI box harness connector.

Loosen collar on carburetor adaptors. Remove air silencer. CDI box will come along with.



TYPICAL

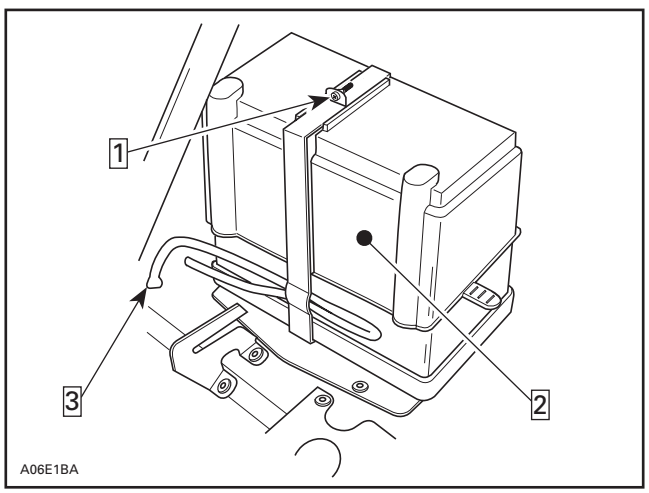
1. Attachment
2. CDI box harness connector on Formula S/SL only

All Models

Unfasten retaining strips.

Open strips and lift battery protective boot.

Remove vent tube.



Step 1 : Unfasten and open
Step 2 : Lift protective boot
Step 3 : Remove vent tube

Withdraw battery from vehicle being careful not lean it so that electrolyte flows out of vent tube.

▼ CAUTION

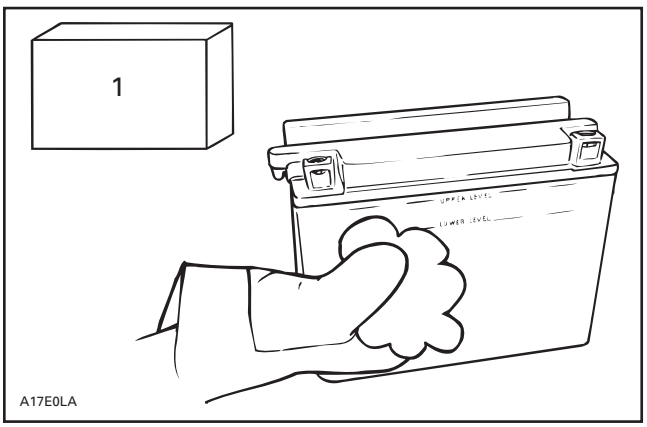
Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water to prevent damage to vehicle components.

CLEANING

Clean the battery, battery casing, vent tube, caps, cables and battery posts using a solution of baking soda and water.

▼ CAUTION

Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.



1. Baking soda

Remove corrosion from battery cable terminals and battery posts using a firm wire brush.

INSPECTION

Visually inspect battery casing for cracks or other possible damage. If casting is damaged, replace battery and thoroughly clean battery tray and close area with water and baking soda.

◆ WARNING

Should the battery casing be damaged, wear a suitable pair of non-absorbent gloves when removing the battery by hand.

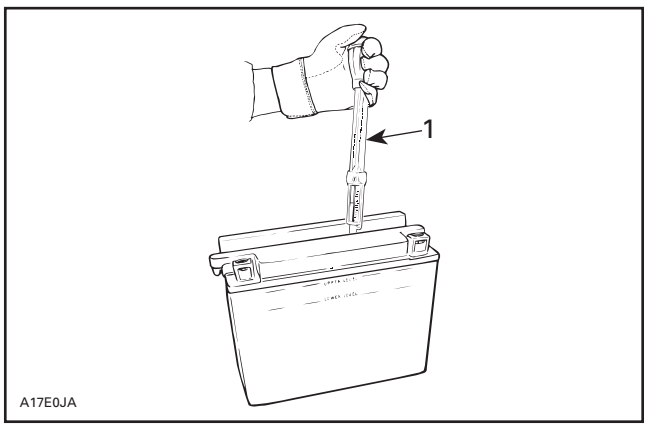
Inspect battery posts for security of mounting.

Inspect for cracked or damaged battery caps, replace defective caps.

◆ WARNING

Battery caps do not have vent holes. Make sure that vent tube is not obstructed.

HYDROMETER TEST



1. Specific gravity 1.260

A hydrometer measures the charge of a battery in terms of specific gravity of the electrolyte. Most hydrometers give a true reading at 27°C (80°F).

In order to obtain correct readings, adjust the initial reading by **adding** .004 points to the hydrometer readings for each 5.5°C (10°F) **above 27°C (80°F)** and by **subtracting** .004 point for every 5.5°C (10°F) **below 27°C (80°F)**.

This chart will be useful to find the correct reading.

ELECTROLYTE TEMPERATURE		OPERATION TO PERFORM		
°C	°F			
38 32	100 90	add	.008 .004	to the reading
27	**80**	**correct reading**		
21 16 10 4 -1 -7 -12 -18 -23 -29 -34 -40	70 60 50 40 30 20 10 0 -10 -20 -30 -40	subtract	.004 .008 .012 .016 .020 .024 .028 .032 .036 .040 .044 .048	from the reading

EXAMPLE NO. 1
Temperature below 27°C (80°F):
Hydrometer Reading: 1.250
Electrolyte temperature: -7°C (20°F)
Subtract .024 Sp. Gr.
Corrected Sp. Gr. is 1.226

EXAMPLE NO. 2
Temperature above 27°C (80°F):
Hydrometer Reading: 1.235
Electrolyte temperature: 38°C (100°F)
Add .008 Sp. Gr.
Corrected Sp. Gr. is 1.243

▼ CAUTION

Do not install a partially charged battery on a snowmobile since the casing might crack at freezing temperature. The following chart shows the freezing point of the electrolyte in relation to the charge of the battery.

TEMPERATURE CORRECTED SPECIFIC GRAVITY	BATTERY CHARGE	FREEZING POINT OF ELECTROLYTE
1.260	Fully charged	-59°C (-74°F)
1.230	3/4 charged	-40°C (-40°F)
1.200	1/2 charged	-27°C (-16°F)
1.170	1/4 charged	-18°C (0°F)
1.110	Discharged	-7°C (+19°F)

BATTERY STORAGE

Disconnect and remove battery from the vehicle.

Check electrolyte level in each cell, add distilled water up to upper level line.

▼ CAUTION

Do not overfill.

The battery must always be stored in fully charged condition. If required, charge until specific gravity of 1.260 is obtained.

▼ CAUTION

Battery electrolyte temperature must not exceed 50°C (122°F). The casing should not feel hot.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P/N 413 701 700) or petroleum jelly on terminals.

Clean battery casing and caps using a solution of baking soda and water. Do not allow cleaning solution to enter battery, otherwise it will destroy the electrolyte. Rinse battery with clear water and dry well using a clean cloth.

Store battery on a wooden shelf in a cool dry place. Such conditions reduce self-discharging and keep fluid evaporation to a minimum.

During the storage period, recheck electrolyte level and specific gravity readings at least every 40 days. As necessary, keep the battery at its upper level line and near full charge as possible (trickle charge).

ACTIVATION OF NEW BATTERY

◆ WARNING

Never charge or boost battery while installed on vehicle.

▼ CAUTION

Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

A new battery is factory fresh dry charged. For storage purposes, it is fitted with a temporary sealing tube.

Do not remove the sealing tube or loosen battery caps unless activation is desired.

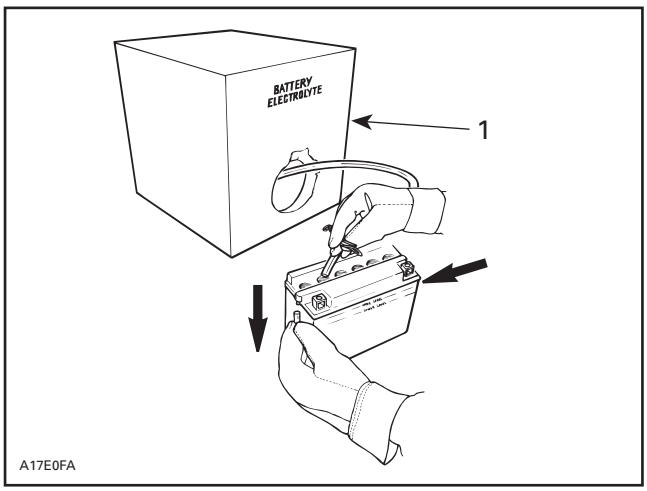
In case of accidental premature removal of caps or sealing tube, battery should be given a full charge.

Perform the following operations anytime a new battery is to be installed.

1. Remove the sealing tube from the vent elbow. Install vent tube, included in the battery kit, to battery elbow.

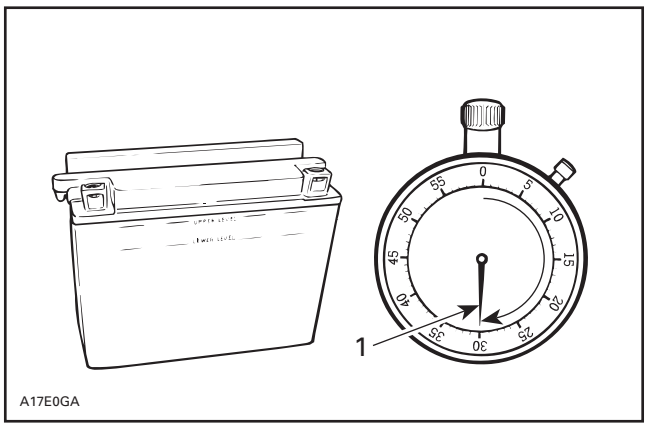
◆ WARNING

Failure to remove the sealing tube could result in an explosion.



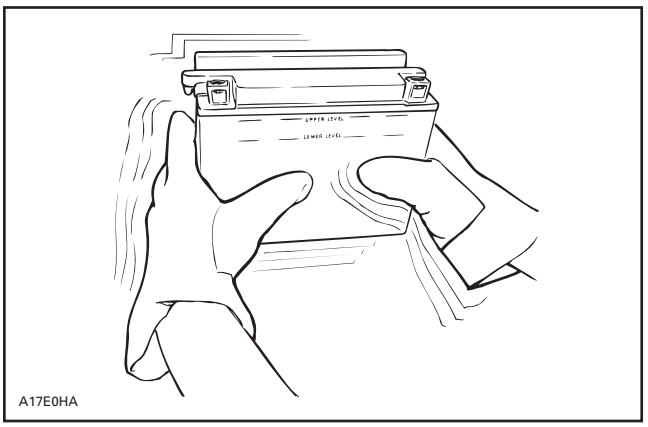
1. Battery electrolyte

2. Remove caps and fill battery to UPPER LEVEL line with electrolyte (specific gravity: 1.260 at 20°C (68°F)).
3. Allow the battery to stand for 30 minutes MINIMUM so that electrolyte soak through battery cells.

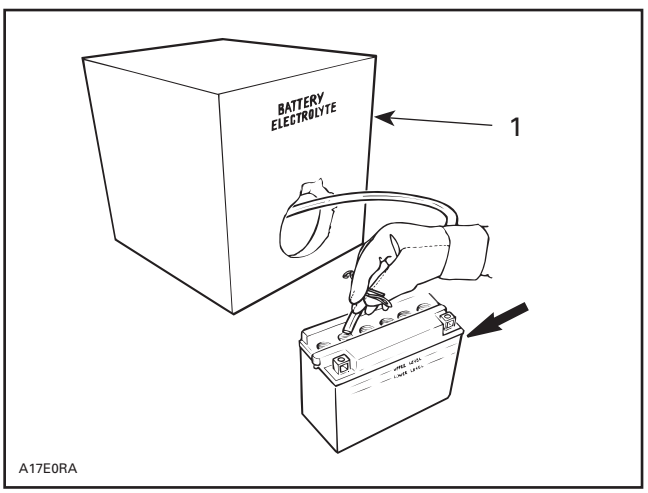


1. 30 minutes

4. Allow gas bubbles to escape by lightly shaking battery by hand.

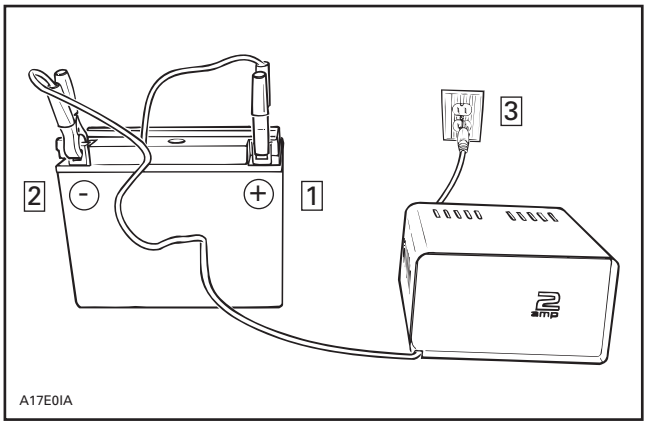


5. Readjust the electrolyte level to the UPPER LEVEL line.



1. Battery electrolyte

6. Connect a 2 A battery charger for 10 to 20 hours.



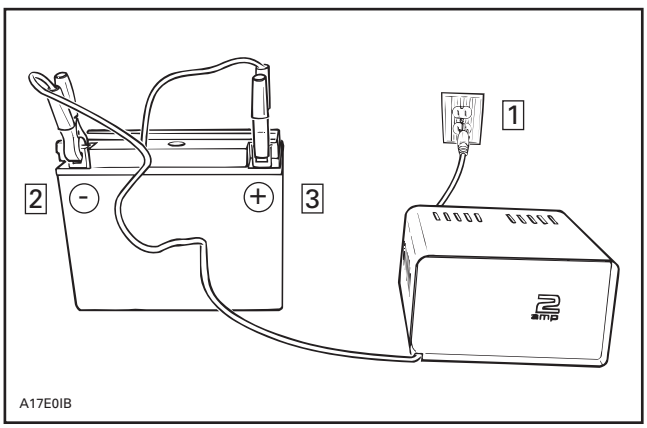
▼ CAUTION

If charging rate raises higher than 2.4 A reduce it immediately. If cell temperature rises higher than 50°C (122°F) (if the casing feels hot) discontinue charging temporarily or reduce the charging rate.

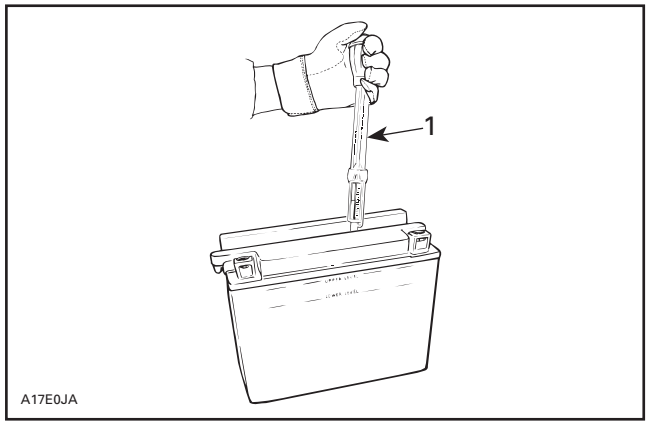
◆ WARNING

Gases given off by a battery being charged are highly explosive. Always charge in a well ventilated area. Keep battery away from cigarettes or open flames. Always turn battery charger off prior to disconnecting cables. Otherwise a spark will occur and battery might explode.

7. Disconnect battery charger.

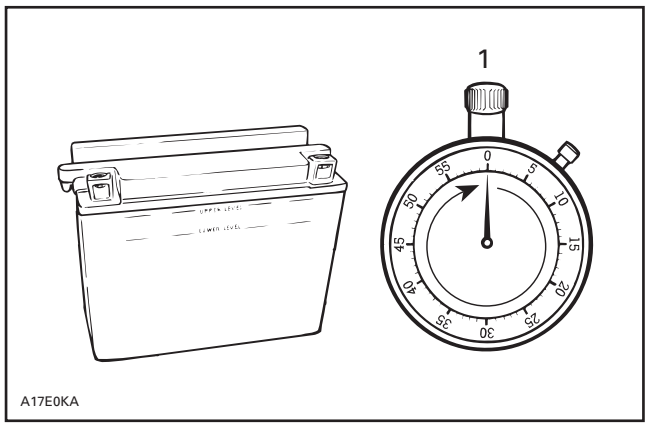


8. Test battery state of charge. Use a hydrometer.



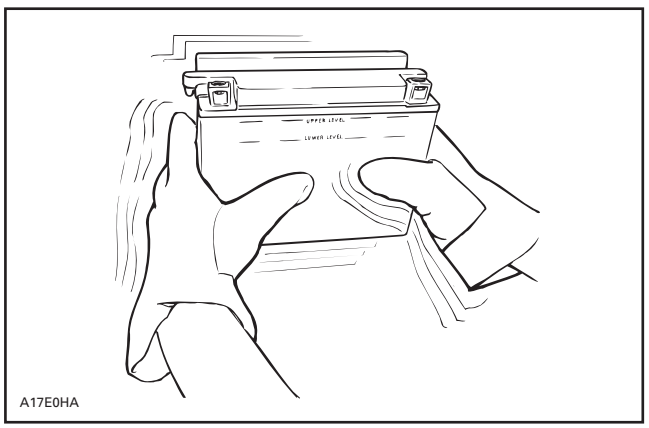
1. Specific gravity 1.260

9. Let battery settle for 1 hour.

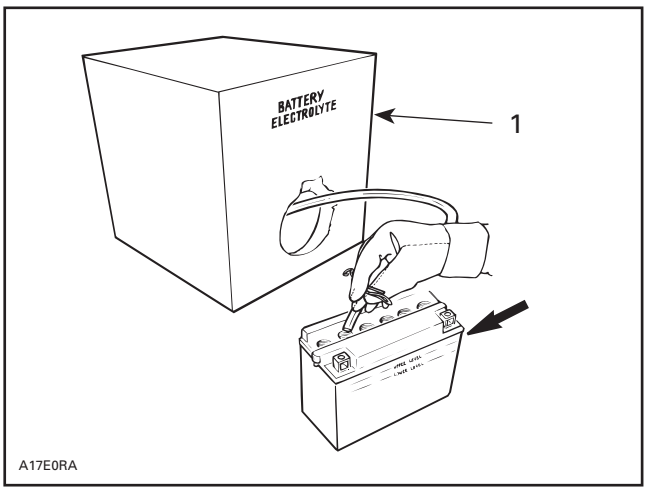


1. 60 minutes

10. Allow gas bubbles to escape by lightly shake battery.

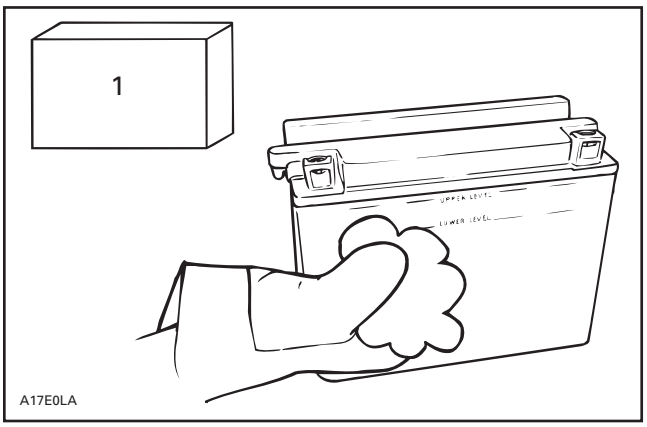


11. Readjust electrolyte level.



1. Battery electrolyte

12. Reinstall caps and clean any electrolyte spillage using a solution of baking soda and water.



1. Baking soda

▼ CAUTION

Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.

NOTE: It is recommended to verify the battery charge once a month. If necessary, fully charge battery.

SERVICING

Electrolyte Level

Since a battery has been activated (see above), add distilled water to top up electrolyte.

TIPS FOR CHARGING A USED BATTERY

▼ CAUTION

Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

For best results, battery should be charged when the electrolyte and the plates are at room temperature. A battery that is cold may not accept current for several hours after charging begun.

Do not charge frozen battery. If the battery charge is very low, the battery may freeze. If it is suspected to be frozen, keep it in a heated area for about 2 hours before charging.

◆ WARNING

Do not place battery near open flame.

Time required to charge a battery will vary depending some factors such as:

– Battery temperature: Charging time is increased as the temperature goes down. The current accepted by a cold battery will remain low. As the battery warms up, it will accept a higher rate of charge.
– State of charge: Because the electrolyte is nearly pure water in a completely discharged battery, it cannot accept current as well as electrolyte. This is the reason the battery will not accept current when the charging cycle first begins. As the battery remains on the charger, the current from the charger causes the electrolytic acid content to rise which makes the electrolyte a better conductor and then, the battery will accept a higher charging rate.
– Type of charger: Battery chargers vary in the amount of voltage and current that they can supply. Therefore, time required for the battery to begin accepting measurable current will also vary.

Charging a Very Flat or Completely Discharged Battery

Unless this procedure is properly followed, a good battery may be needlessly replaced.

– Measure the voltage at the battery posts with an accurate voltmeter. If it is below 10 volts, the battery will accept current at very low rate, in term of milliamperes, because electrolyte is nearly pure water as explained above. It could be some time before the charging rate increases. Such low current flow may not be detectable on some charger ammeters and the battery will seem not to accept any charge.

– Only for this particular case, set the charger to a high rate.

NOTE: Some chargers have a polarity protection feature which prevents charging unless the charger leads are connected to the correct battery terminals. A completely discharged battery may not have enough voltage to activate this circuitry, even though the leads are connected properly. This will make it appear that the battery will not accept a charge. Follow the charger manufacturer's instruction telling how to bypass or override this circuitry so that the charger will turn on and charge a low-voltage battery.

– Since the battery chargers vary in the amount of voltage and current they provide, the time required for the battery to accept measurable charger current might be up to approximately 10 hours or more.

– If the charging current is not up to a measurable amount at the end of about 10 hours, the battery should be replaced.

– If the charging current is measurable before the end or at the end of about 10 hours, the battery is good and charging should be completed in the normal manner as specified in **Activation of a new battery**.

– It is recommended that any battery recharged by this procedure be load tested prior to returning it to service.

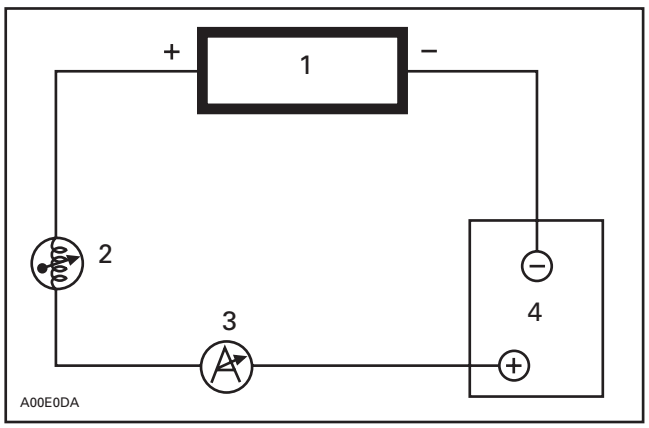
BATTERY CHARGING EQUIPMENT

The battery charger should have an adjustable charging rate. Variable adjustment is preferred, but a unit which can be adjusted in small increments is acceptable.

The battery charger must be equipped with an ammeter capable of accurately measuring current of less than one ampere.

If the present charger is not adjustable to the proper current values, a rheostat can be connected in series with the battery to provide adjustment. 12 Ohm, 50 watt rheostat, such as OHMITE — 0314 or MALLORY 50K 12P, are available from electronic parts supply shops and they are suitable for use with most chargers if the peak current is to be held below 2 amps.

If you need an accurate ammeter, we recommend the use of: SHURITE — 5202 (0 to 3 amps) or — 5203 (0 to 5 amps) available from electronic parts supply shops.



1. Charger
2. Rheostat 12 Ω 50 W
3. Ammeter
4. Battery

For a service application and a permanent installation, both ammeter and rheostat can be built into a small box adjacent to your charger.

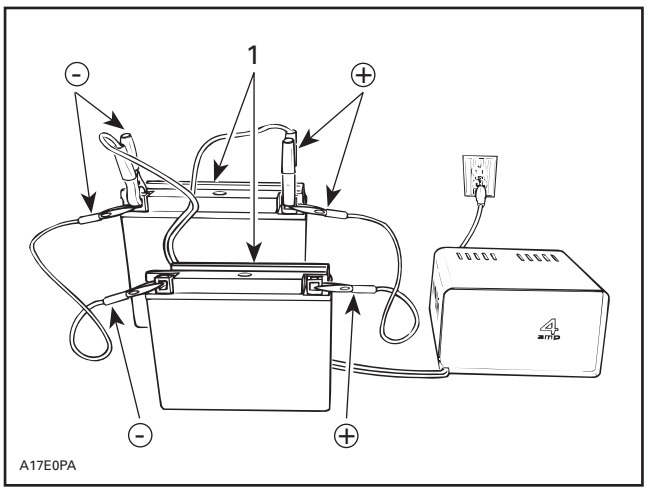
▼ CAUTION

Adequate ventilation MUST be provided to cool the rheostat.

Charging 2 or More Batteries at a Time

Connect all positives together and use a charger with a capacity (rated) equal to: number of battery to be charged multiply by 2 A.

For example: charging 5 batteries at a time requires a 10 A rated charger (5 × 2 A = 10 A).



TYPICAL
1. Two batteries = 4 A

INSTALLATION OF BATTERY

Ensure vent tube is properly installed on battery elbow.

Connect vent tube to vehicle fitting on front frame.

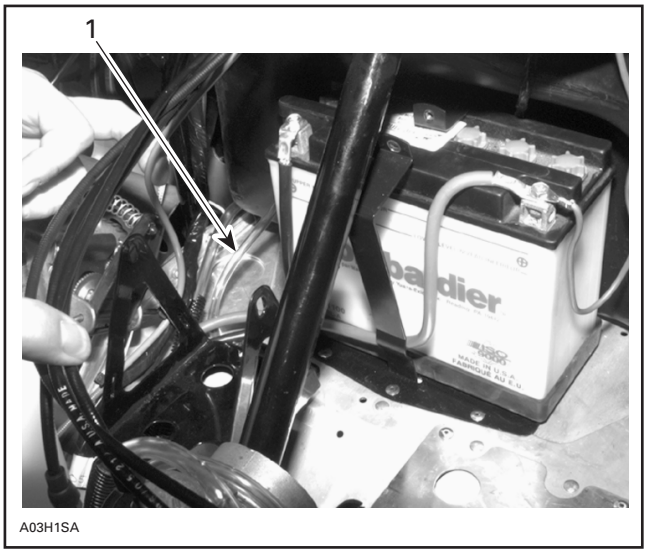
Route RED positive cable behind retaining strip and connect it to positive battery terminal. Connect RED wire (coming from ignition switch).

Connect BLACK negative cable LAST.

▼ CAUTION

Negative battery terminal should always be disconnected FIRST and reconnected LAST.

Apply silicone dielectric grease (P/N 413 701 700) on battery posts and connectors.



BATTERY CONNECTION
1. Vent tube on fitting

Ensure that vent tube is not kinked or blocked then install protective boot over battery.

Close and fasten retaining strips.

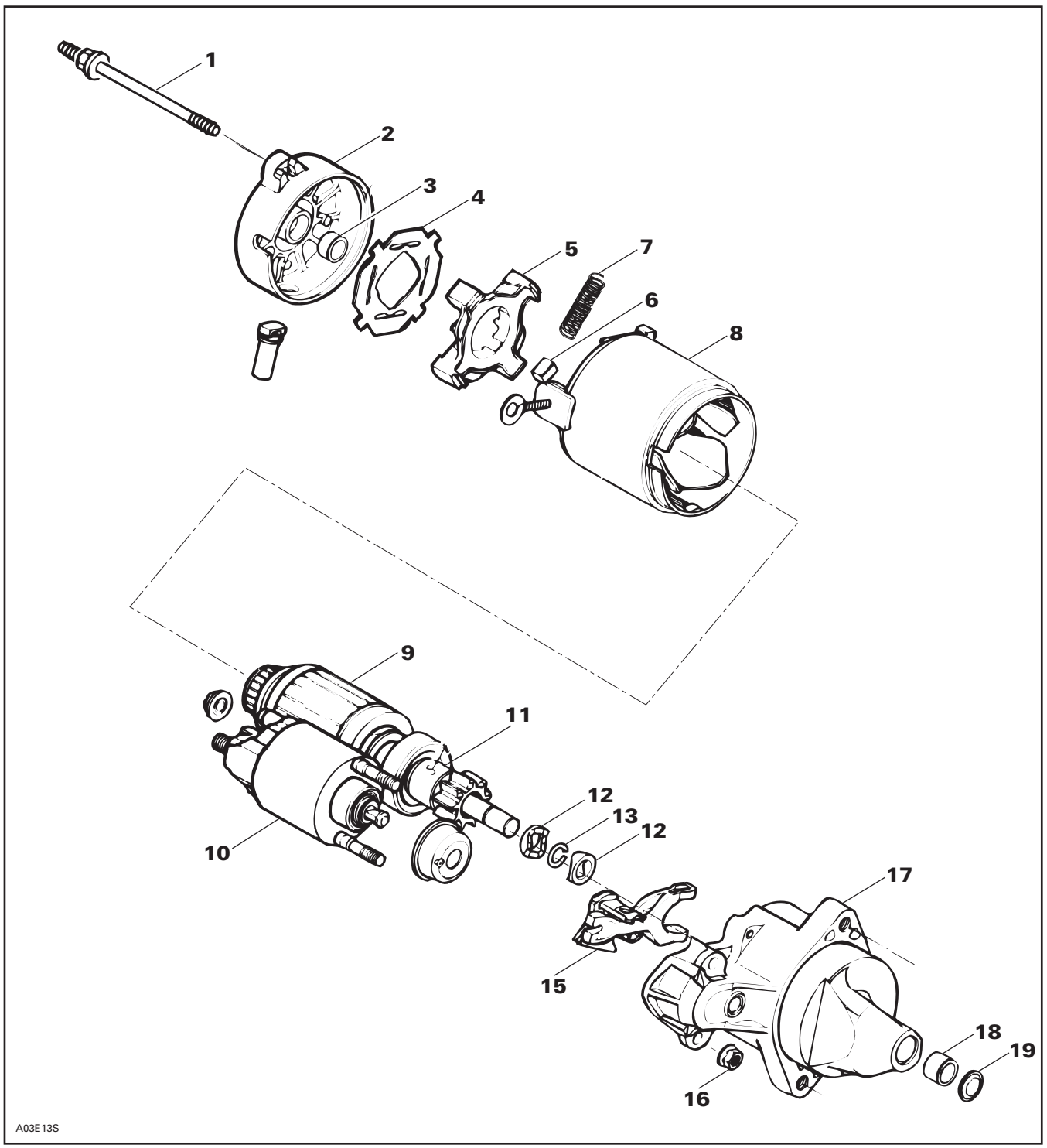
Reinstall air silencer.

Fasten spark plug cables to fan housing.

Reinstall throttle cable to air silencer. See removal illustration.

ELECTRIC STARTER

S-Series with Electric Starting



REMOVAL

– Disconnect BLACK ground cable from battery.
– Disconnect RED positive cable from battery.

◆ WARNING

Always disconnect ground cable first and connect last.

– Disconnect RED cable and RED/GREEN wire from starter solenoid switch.
– Remove starter from engine.

DISASSEMBLY

Disconnect bare wire linking starter and solenoid.

Remove nuts **no. 16** then solenoid switch **no. 10** by lifting and pulling to disengage from drive lever **no. 15**.

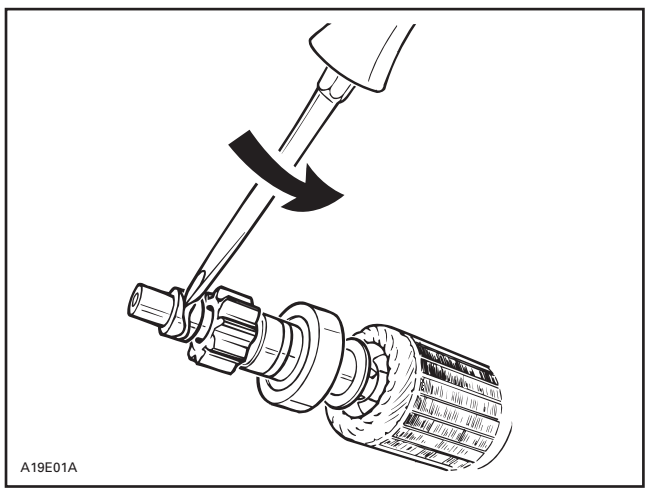
Unscrew starter longer screws **no. 1** then pull yoke **no. 8** with end frame **no. 2** to separate from drive housing **no. 17**.

Pull armature **no. 9** with drive lever **no. 15**.

Remove insulator **no. 4** then brush springs **no. 7** being careful not to lose them since they will be projected out.

Pull brush holder **no. 5** from yoke **no. 8**.

Insert blade of a small screwdriver between stop collars.



Twist screwdriver to separate stop collars **no. 12** thus giving access to circlip **no. 13**.

Remove outer collar, circlip then inner collar.

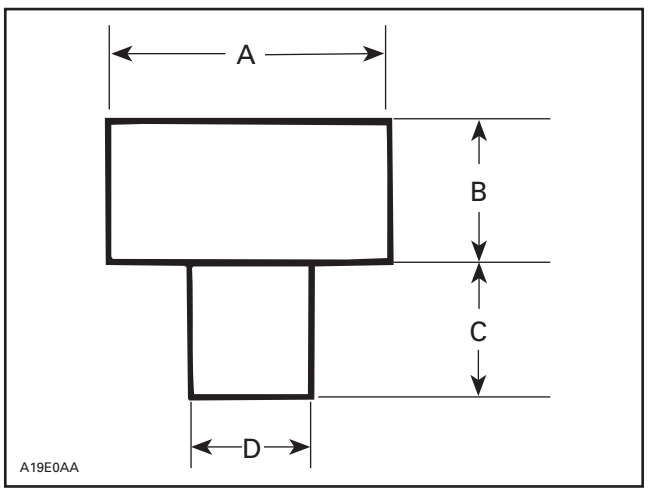
Remove overrunning clutch **no. 11**.

Check the wear on bushing **no. 18** by measuring the amount of radial play between the armature shaft and the bushing.

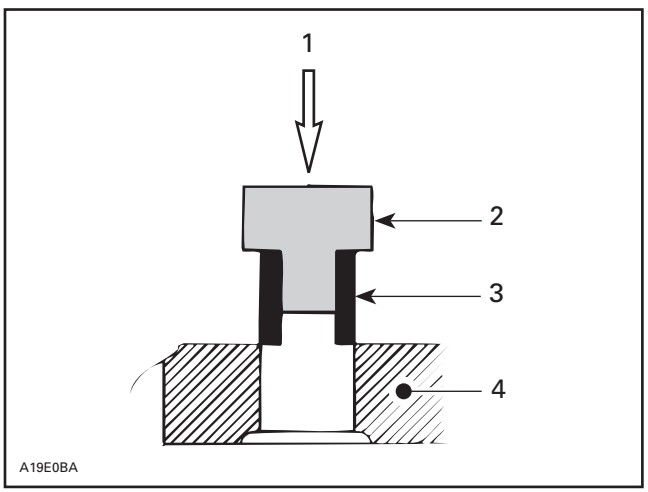
The radial play should not exceed 0.20 mm (0.008 in). If greater, replace the bushing. To replace, press out the old one toward bushing cover and press in a new one with a bushing pusher. The correct size of the bushing pusher to use is given on next illustration.

▼ CAUTION

Support drive housing adequately to prevent damage when pressing bushing.

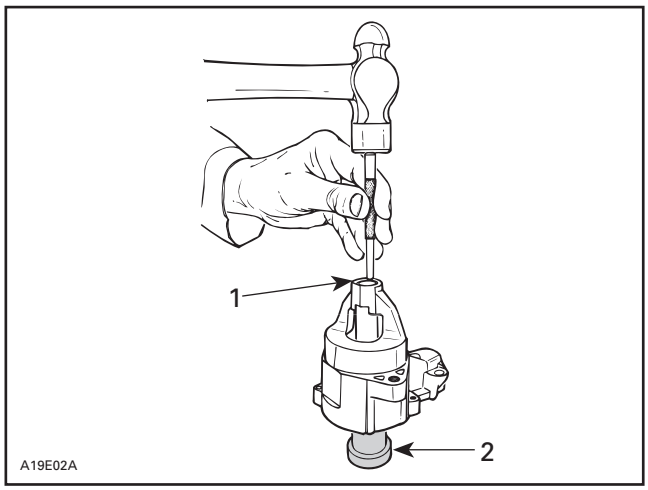


BUSHING PUSHER
A. 16 mm (5/8 in) dia.
B. 13 mm (1/2 in)
C. 11 mm (7/16 in)
D. 11 mm (.433 in)



1. Press-in
2. Bushing pusher
3. Bushing
4. Drive housing

Install bushing cover **no. 19** then, using a punch, stake bushing cover in place.



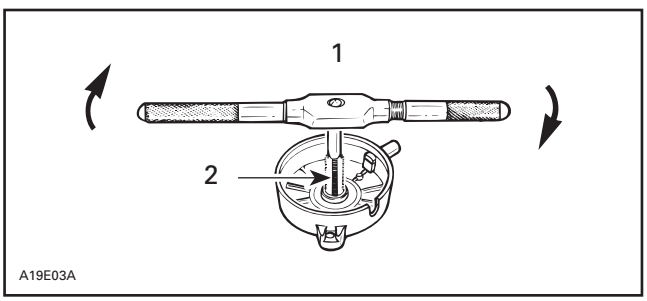
1. Stake bushing cover
2. Support

3, Bushing (end frame)

Check the wear on bushing **no. 3** by measuring the amount of radial play between the armature shaft and the bushing.

The radial play should not exceed 0.20 mm (.008 in). If greater, replace bushing as follows:

Using a 12 mm tap, cut threads into bushing so that the tap contacts the end frame. Continue to rotate tap until the bushing comes free.



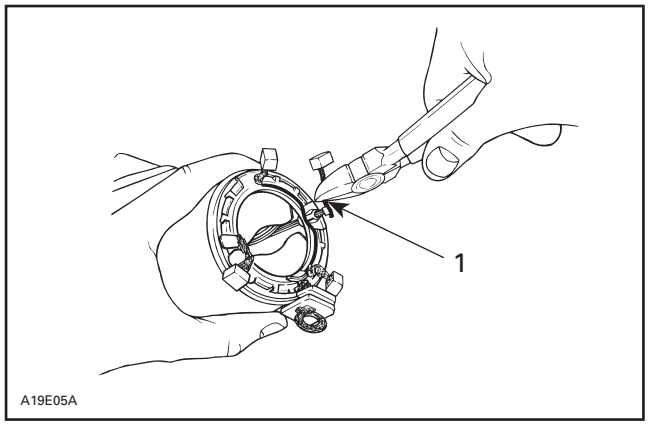
1. Turn until bushing goes out
2. 12 mm tap

To install new bushing, use the same bushing pusher as for drive housing bushing installation.

6, Brush

To replace brush **no. 6**, proceed as follows:

Cut brush wire close to connector at the welded portion.



1. Cut close to connector

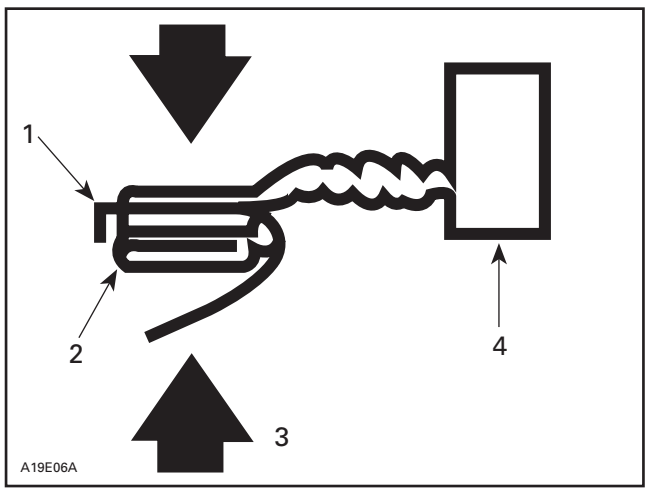
Remove burrs with a file on the remaining welded portion.

▼ CAUTION

Be careful not to damage plastic portion of yoke.

Place spare brush plate edge against yoke connector edge (welded portion).

Crimp plate over yoke connector with a pair of pliers.



1. Plate edge
2. Yoke connector
3. Crimp
4. Spare brush

Solder the crimped portion.

▼ CAUTION

Do not overheat and quickly perform soldering to prevent solder from flowing to the brush through the wire. Preferably use a heat sink.

CLEANING AND INSPECTION

Refer to the end of this subsection.

ASSEMBLY

Prior to assembling, coat sliding surfaces and moving parts on armature shaft splines, overrunning clutch, solenoid switch plunger, drive lever and bushings with G.E. Versilube G 321 (P/N 413 704 000) lubricant.

Proceed as follows for assembling.

Secure drive housing in a vise.

▼ CAUTION

Do not overtighten since housing might be damaged.

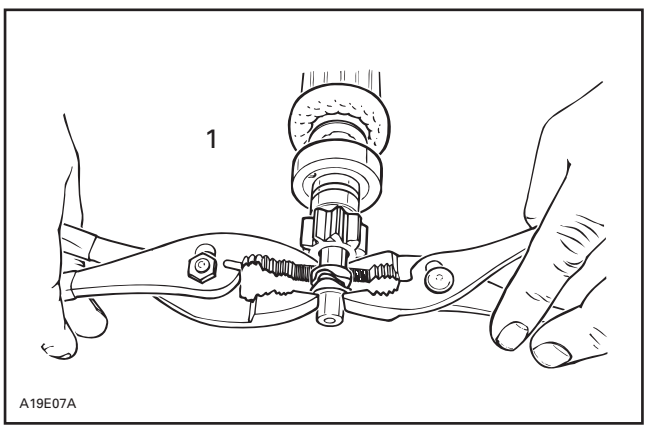
Install overrunning clutch onto armature shaft. Insert **inner** collar onto shaft. Install a new circlip.

▼ CAUTION

Always install a new circlip when servicing.

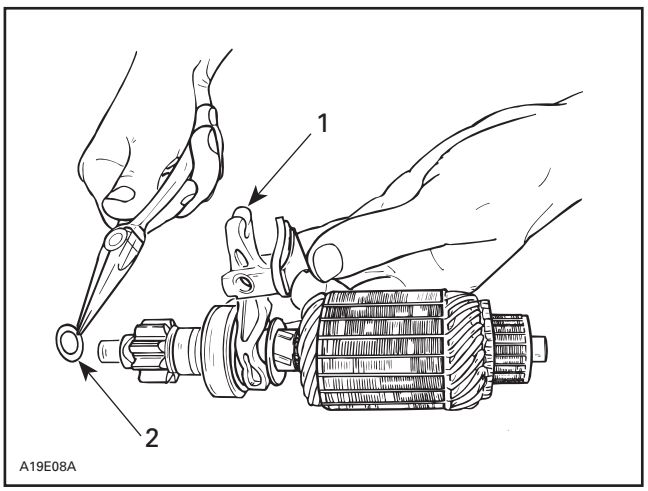
Insert **outer** collar being careful to match protrusions with notches of collars.

Using a pair of pliers on each side of stop collars, squeeze evenly until collars sit over circlip.



1. Squeeze evenly

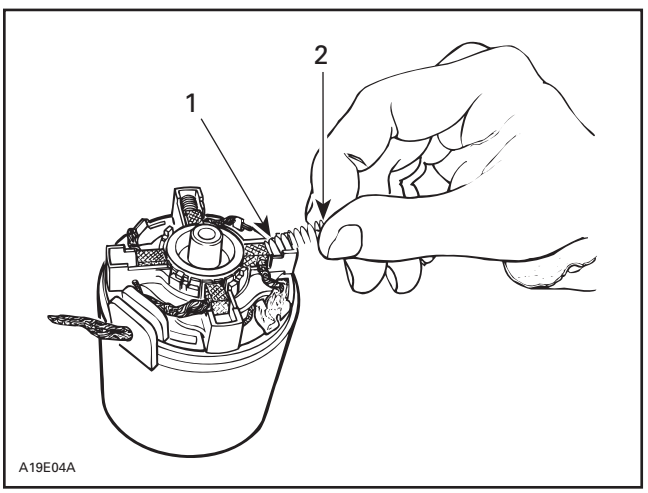
Install thrust washer against outer stop collar. Place drive lever onto overrunning clutch then insert into drive housing.



1. Install on overrunning clutch
2. Install thrust washer

Slide yoke over armature.

Install brush holder then brushes in their housings. Insert springs as follows: place one end of spring against brush, compress, then push the other end of spring onto its housing. Repeat for remaining springs.



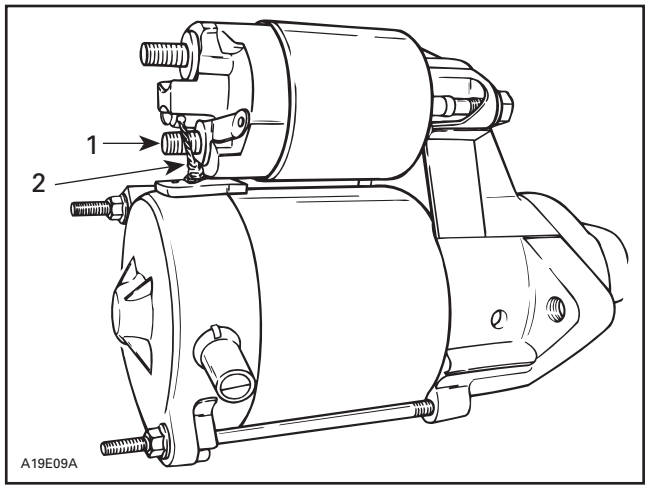
1. This end first
2. Push this end to complete

Secure insulator over brushes and springs. Properly install end frame and tighten screws.

Insert solenoid plunger inside of drive lever fork and secure to drive housing.

Connect starter bare wire to solenoid.

NOTE: Connect this wire on the **shorter** solenoid stud.



1. Shorter stud
2. Bare wire

INSTALLATION

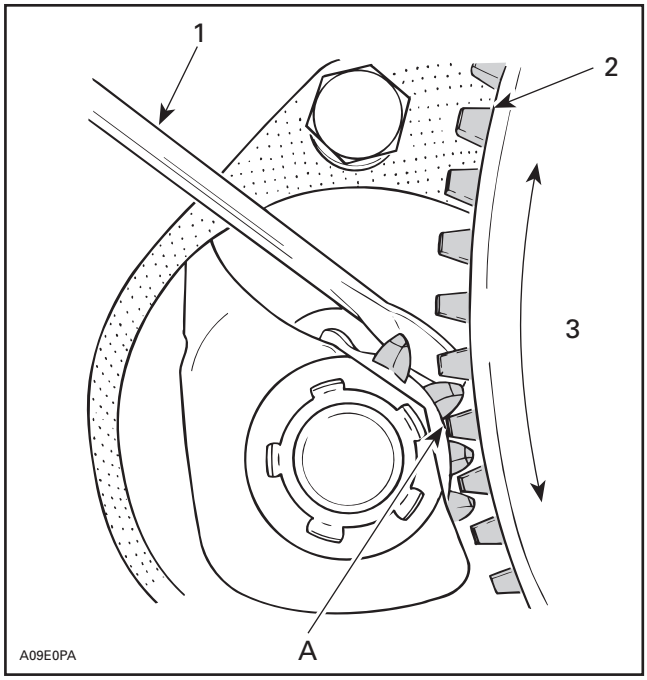
Make sure that starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.

Install starter.

NOTE: Check proper engaging depth of starter pinion teeth to ring gear teeth (see illustration). Install hardened washers (P/N 503 007 900) between engine and starter supports accordingly.

▼ CAUTION

All starter bracket fasteners must be secured with Loctite 271 (P/N 413 707 400).



1. Screwdriver pulling starter pinion
2. Ring gear
3. No excessive backlash
A. 0.5 to 1.5 mm (.020 to .060 in)

Connect the RED battery cable and the red wire to the large terminal of the solenoid. Connect RED/GREEN wire to small terminal of solenoid.

Connect BLACK cable to battery.

◆ WARNING

Always disconnect ground cable first and connect last.

CLEANING AND INSPECTION

CLEANING

▼ CAUTION

Armature starter yoke ass'y and drive unit assembly must not be immersed in cleaning solvent.

Clean brushes and holder with a clean cloth soaked in solvent. Brushes must be dried thoroughly with a clean cloth.

Blow brush holder clean using compressed air.

◆ WARNING

Always wear safety goggles when using compressed air.

Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean, dry cloth.

Clean engine starter gear teeth and drive unit (clutch).

NOTE: Bushings must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean, dry cloth.

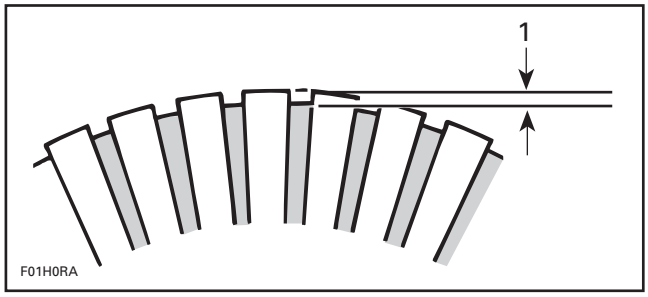
INSPECTION

Armature

NOTE: An ohmmeter may be used for the following testing procedures, except for the one concerning the shorted windings in the armature.

Check the commutator for roughness, burnt or scored surface. If necessary, turn the commutator on a lathe, enough to remove grime only.

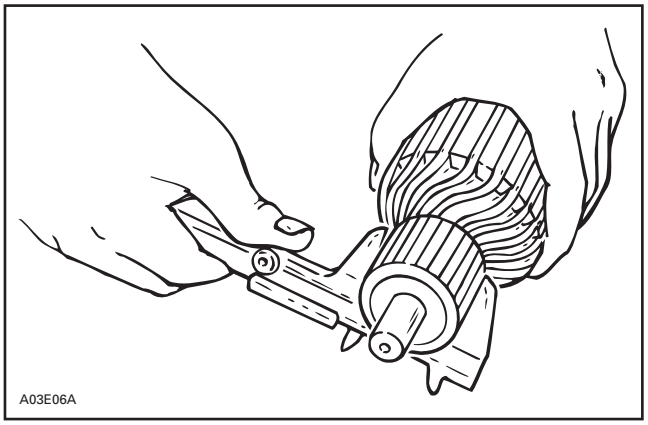
Check the commutator for mica depth. If the depth is less than 0.20 mm (.008 in), undercut the mica. Be sure that no burrs are left and no copper dust remains between the segments after the undercutting operation is completed.



1. Commutator undercut 0.20 mm (.008 in)

Check the commutator out-of-round condition with V Blocks and an indicator. If the commutator out-of-round is more than 0.40 mm (.016 in), the commutator should be turned on a lathe.

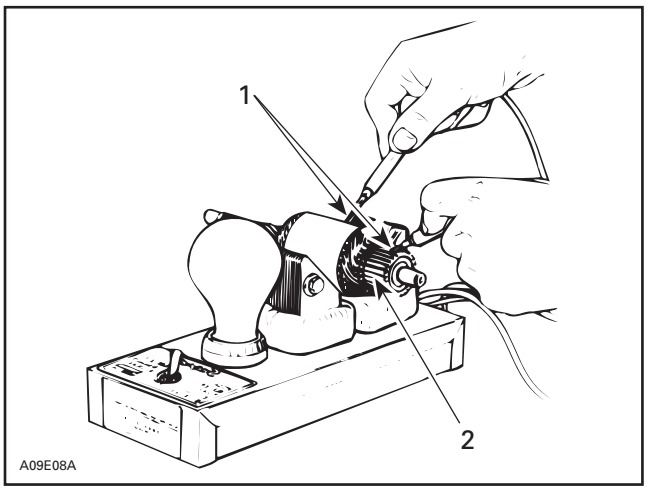
Check commutator outer diameter. If less than specified value, replace.



MODEL	WEAR LIMIT
S-Series	27 mm (1.063 in)

Test for Ground Circuit in the Armature:

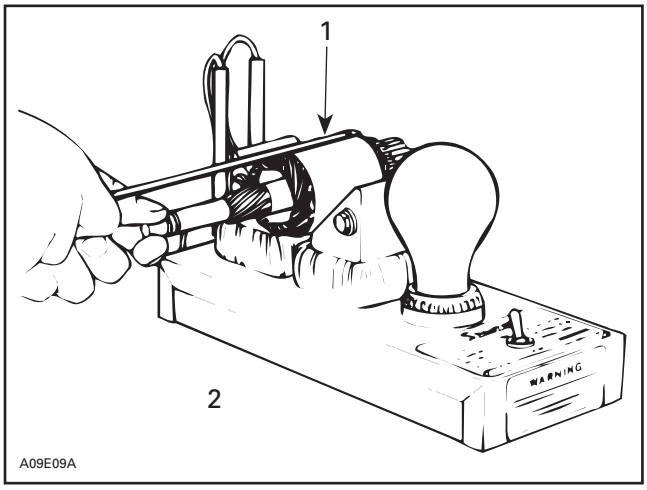
Use growler test probes. Check between armature core and the commutator bars. If growler lamp turns on, bars are grounded. Replace armature if so.



1. Test probes
2. Commutator bars

Test Armature for Shorted Winding

When the armature is rotated in the growler with a steel strip (hack-saw blade) held above it, the strip will vibrate over that area of the armature which has short circuit. Replace armature if so.



1. Steel strip (hack-saw blade)
2. Growler

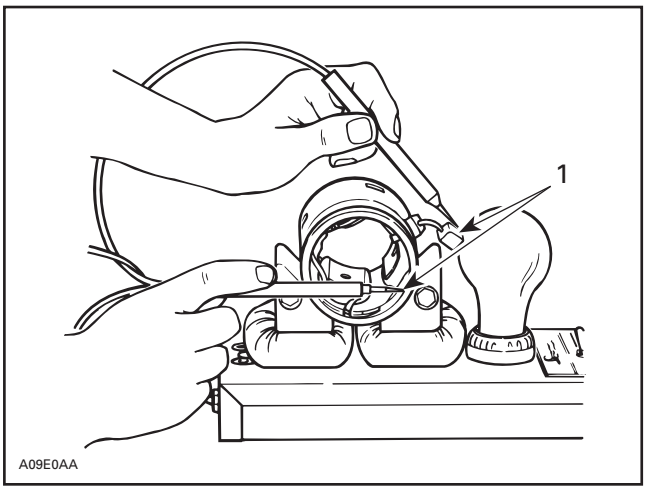
Test the Armature for Open Circuit

Use growler test probes. Place one test probe on a commutator bar and the other test probe on the neighboring bar. Repeat this operation for all bars, moving one test probe at a time. If the growler lamp does not turn on, the armature circuit between these 2 bars is opened. The armature should be replaced or repaired; open circuits most often occur at the commutator riser where coils are soldered. (Burnt commutator bars are usually an indication of an open-circuit armature coil.)

Field Windings and Brushes

Test the Field Winding for Open Circuit

Use growler test probes. Place one test probe on the negative brush and the other test probe on the yoke. If growler lamp does not turn on, the field winding has an open-circuit. The yoke has to be repaired or replaced.



1. Test probes

Check the dynamic brake winding for open circuit by placing one test probe on the positive brush and the other probe on the negative brush.

If growler lamp does not turn on, the winding circuit is open-circuit and the yoke has to be repaired or replaced.

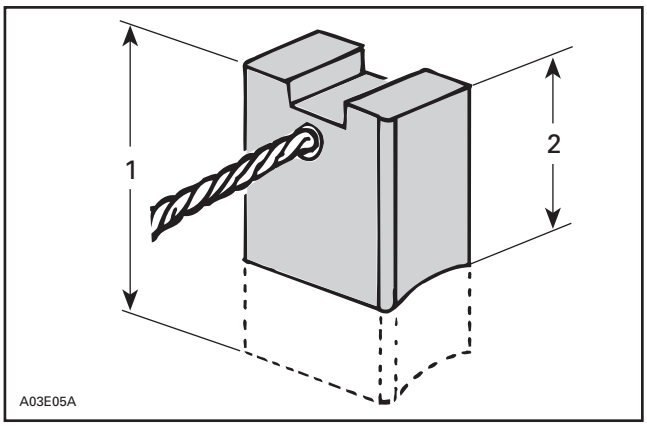
Brush Holder

Check the brush holder for insulation using growler test probes. Place one test probe on the insulated brush holder and the other test probe on the brush holder plate. If the growler lamp turns on, the brush holder has to be repaired or replaced.

Brush Length

Measure brush length. If less than the specified value, replace them.

MODEL	LENGTH	
	NEW	WEAR LIMIT
S-Series	10 mm (.400 in)	6 mm (.236 in)



TYPICAL

1. New
2. Wear limit

Overrunning Clutch

The pinion of the overrunning clutch should turn smoothly in the clockwise direction, and should not slip in a counterclockwise direction. If defective, replace.

Check the pinion teeth for wear and damage. If defective, replace.

SOLENOID SWITCH

Inspect connections and clean as necessary. Solenoid switch condition can be checked with an ohmmeter. Install test probes on large connectors of solenoid when it is activated (+ on RED/GREEN wire and – on solenoid body).

IMPORTANT: No current must be present on large cables when using ohmmeter, otherwise meter could be damaged.

TESTING PROCEDURE

GENERAL

Four types of ignition systems are found on ROTAX engines covered by this manual; all are Capacitor Discharge Ignition (CDI) systems. The following chart gives the engine types with their implemented system.

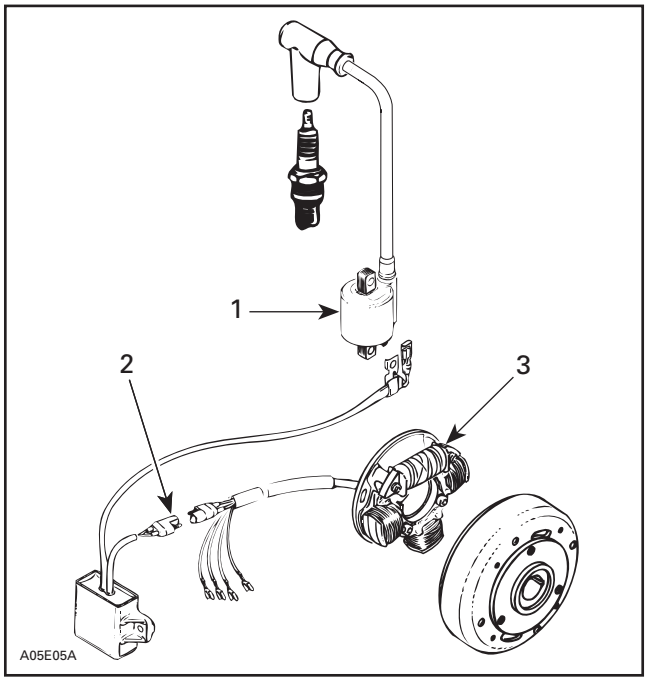
ENGINE TYPE	IGNITION SYSTEM	CHARGING SYSTEM OUTPUT
277 Tundra	① Nippondenso single coil CDI	160
277 Tundra R	② RER dual trigger coil CDI	240
377 and 503 Formula S/SL	③ Ducati trigger coil CDI	240
377, 443 and 503 S-Series with RER	④ RER dual trigger coil CDI	240

CDI System Identification

① Nippondenso Single Coil CDI

The Nippondenso single coil CDI system has a separate ignition coil which is mounted on fan housing.

Ignition module is connected to a single ignition generator coil via a 2-connector housing (BLACK and BLACK/RED wires).



① NIPPONDENSO SINGLE COIL CDI SYSTEM

1. *Separate ignition coil mounted on fan housing*
2. *4-02 housing (BLACK and BLACK/RED wires)*
3. *Single ignition generator coil*

② RER Dual Trigger Coil CDI

The RER dual trigger coil CDI system has an ignition coil integrated to the MPEM which is mounted on air silencer.

MPEM is programmed to recognize a signal sent by the switch located on snowmobile console.

When switch is activated, MPEM cuts off ignition and engine rev drops at approximately 700 RPM for 277 engine (Tundra R).

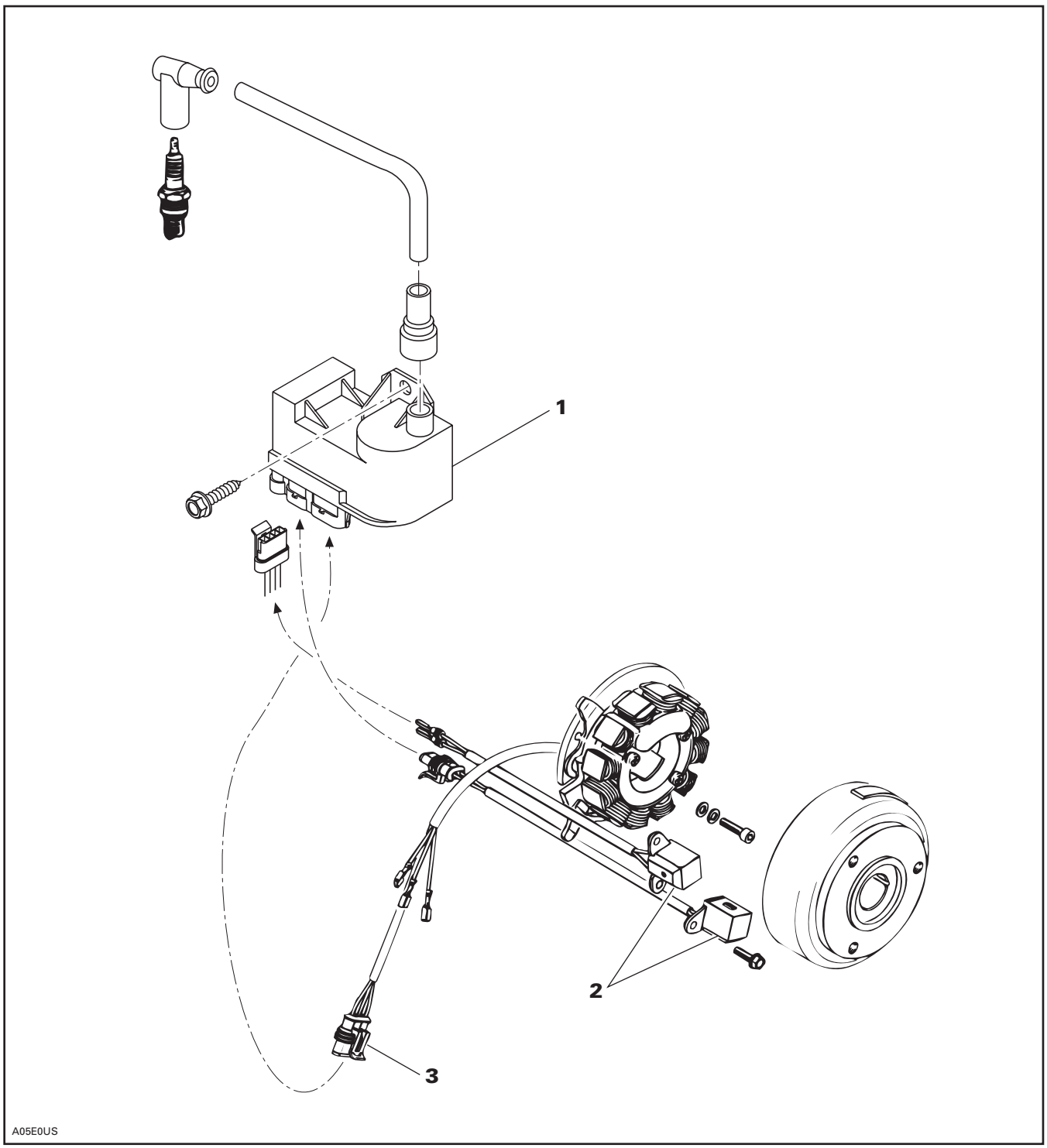
MPEM fires a spark at a great advance creating a thrust which reverses engine rotation.

Second trigger coil located on crankcase takes over to produce spark in reverse rotation.

A safety device is incorporated to MPEM preventing it from reading any signal coming from reverse switch at following engine revs.

Below 800 RPM and above 3500 RPM = No reverse signal.

MPEM is connected to a single ignition generator coil via a 4-connector housing (BLACK and RED wires).



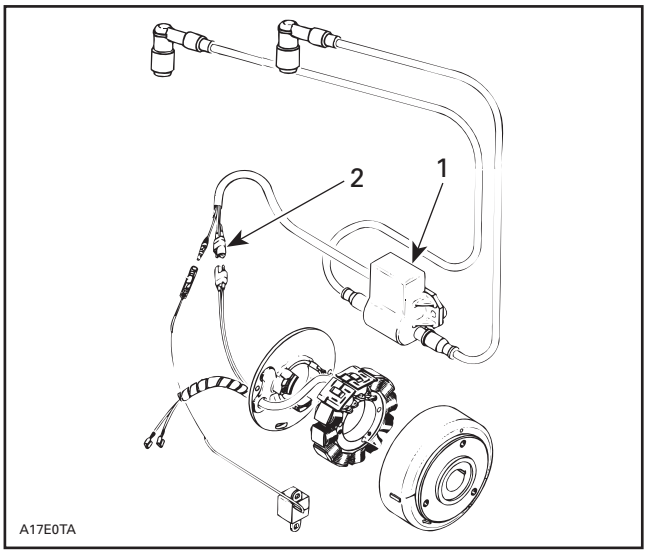
② *RER DUAL TRIGGER COIL CDI SYSTEM*

1. *MPEM*
2. *Trigger coils*
3. *4-04 housing (BLACK and RED wires)*

③ Ducati Trigger Coil CDI

The DUCATI trigger coil CDI system has a combined ignition module/ignition coil which is mounted on air silencer, below carburetors.

Ignition module is connected to the ignition generator coil via a 4-connector housing (GREEN and WHITE wires).



③ *DUCATI TRIGGER COIL CDI SYSTEM*

1. *Combined ignition module/ignition coil mounted on air silencer below carburetors*
2. *4-02 housing (GREEN and WHITE wires)*

④ RER Dual Trigger Coil CDI

The RER dual trigger coil CDI system has an ignition coil integrated to the MPEM which is mounted on oil reservoir.

MPEM is connected to a single ignition generator coil via a 2-connector housing (BLACK and RED wires).

MPEM is programmed to recognize a signal sent by the switch located on snowmobile console.

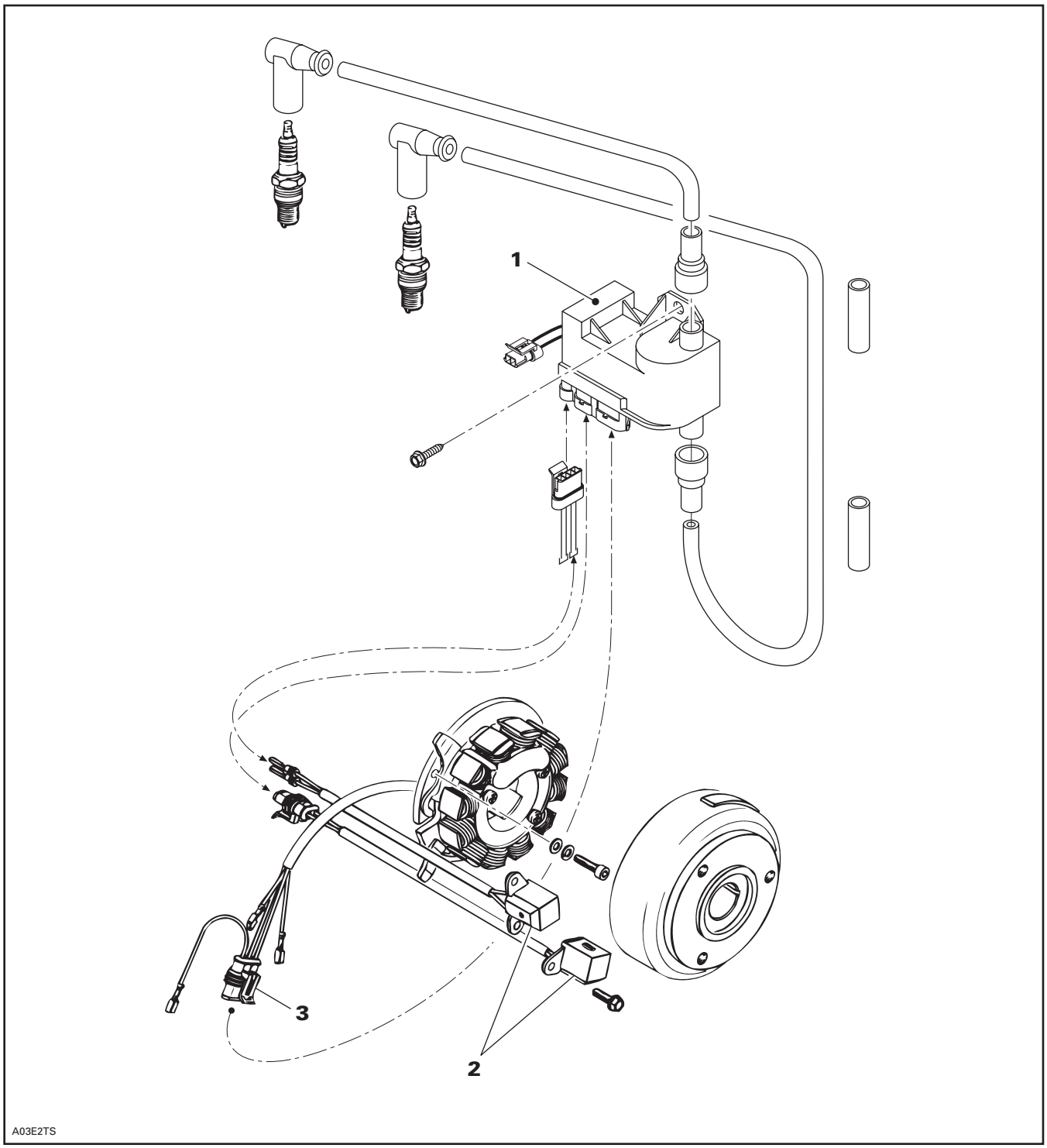
When switch is activated, MPEM cuts off ignition and engine rev drops at approximately 450 RPM for 503 engine (Touring SLE).

MPEM fires a spark at a great advance creating a thrust which reverses engine rotation.

Second trigger coil located on crankcase takes over to produce spark in reverse rotation.

A safety device is incorporated to MPEM preventing it from reading any signal coming from reverse switch at following engine revs.

Below 1000 RPM and above 3500 RPM = No reverse signal.



④ *RER DUAL TRIGGER COIL CDI SYSTEM*

1. *MPEM*
2. *Trigger coils*
3. *2-05 housing (BLACK and RED wires)*

NIPPONDENSO SINGLE COIL CDI SYSTEM TESTING

Tundra

IGNITION SYSTEM TESTING SEQUENCE

In the case of ignition problems, check the following in the prescribed order until the problem can be solved.

1. Sparking/spark plug condition;
2. Electrical connectors;
3. Ignition switches, tether cord cap switch and emergency switch;
4. Ignition coil output;
5. Ignition module output;
6. High voltage coil output.

LIGHTING SYSTEM TESTING SEQUENCE

1. Electrical connectors;
2. Magneto output (lighting generator coil).

Testing Conditions

Voltage measurements are always taken upon vehicle starting. Readings when the engine is running will be higher than indicated range. Part temperature must be approximately 20°C (room temperature), otherwise readings could be distorted.

Analysis of Readings

Voltage Readings

When testing the different magneto components, it is important to take into consideration that readings vary according to the force applied onto the manual starter. It is therefore important to employ enough force upon each trial.

The reading must be 3 times within or above the range indicated in the corresponding table. If the reading is too low, the part is considered to be defective and must be replaced.

Resistance Readings

Place multimeter selector switch to Ω in order to measure resistance. Readings must be within the indicated range. Otherwise, the part is considered to be defective and must be replaced.

▼ CAUTION

When taking measurements, it is useless to try to start the vehicle since readings would then be distorted.

Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing parts. Most problems cannot be detected when the engine is stopped.

Multiple Problems

As a matter of fact, more that one component can be defective. As a result, if the problem remains although a part was replaced, start over the whole verification from the beginning in order to identify the other defective component.

1. SPARKING

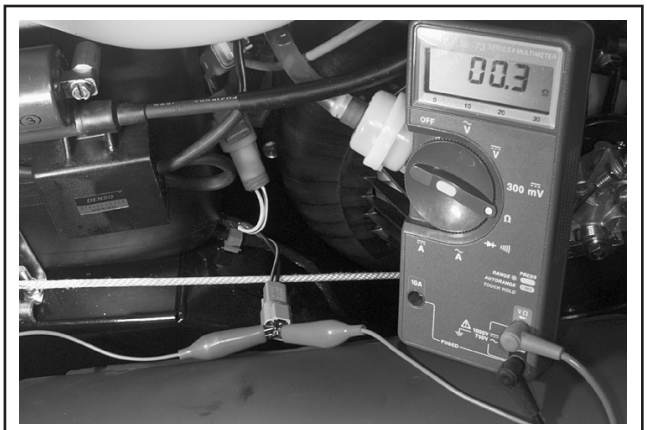
During this operation, it is important to use the snowmobile spark plug and not a new one. Bring the plug in contact with the engine. If no spark is produced, replace the spark plug with a new one and do the test again.

2. ELECTRICAL CONNECTOR TESTING

Make sure that none of the connectors are disconnected.

3. IGNITION SWITCH, TETHER CORD SWITCH AND EMERGENCY SWITCH TESTING

Disconnect connector housing 1-04 from engine and check resistance as indicated in IGNITION table.



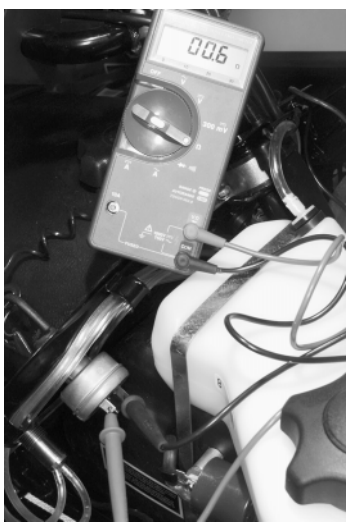
A05E06A

If readings are acceptable, go on to next step.

If readings are inadequate, individually check each switch as follows.

Ignition Switch (key)

Disconnect switch housing. Using a multimeter, check between "MAG" and "GRD" terminals if the circuit is open (0.L $_{M\Omega}$) in operating position and if the circuit is closed (0 $_{\Omega}$) in off position.



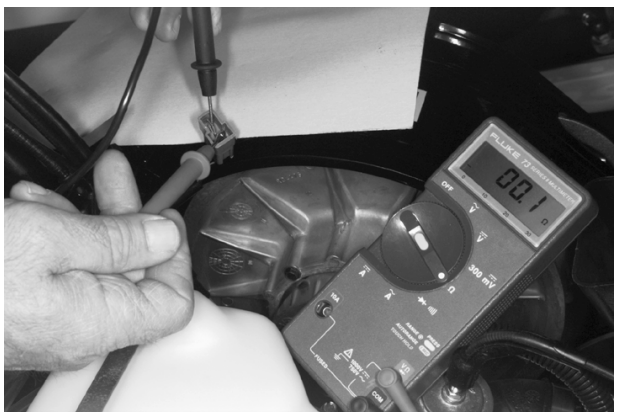
A05E07A

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Emergency Switch

Unplug switch block connected to main wiring harness. Check using a multimeter. Connect probes to BLACK/YELLOW and BLACK wires. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 Ω) in off position.



A05E08A

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Tether Cord Switch

Unplug switch block connected to main wiring harness. Check using a multimeter by connecting probes to BLACK/YELLOW and BLACK wires. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 Ω) in off position.



A05E09A

If readings do not correspond to the above mentioned indications, replace switch.

If readings are acceptable, check other switches.

If none of these verifications are conclusive, the problem finds its source in the main wiring harness. Proceed as follows:

NOTE: For the next step, no switch must be connected to the main wiring harness.

Disconnect all switches from the main wiring harness and check the continuity of each wire by connecting probes to the end of wires of the same color. Repeat with all other wires. It is important to mention that all wires of the same color within a given harness are connected together. These wires should therefore have a closed circuit. On the other hand, BLACK and BLACK/YELLOW wires must have an open circuit (0.L $_{M\Omega}$).

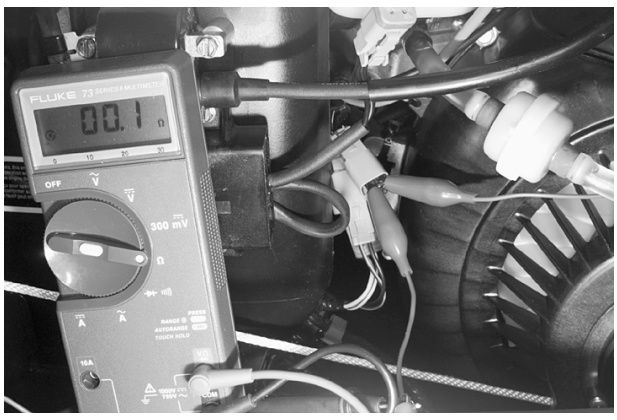
Repair or replace if necessary.

GENERAL

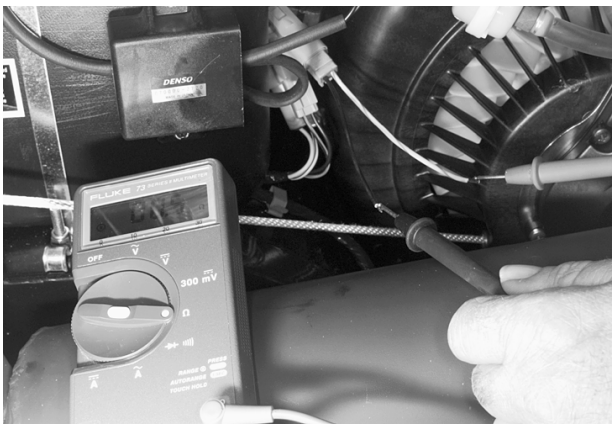
When manually starting the engine while the spark plug is installed, the engine will tend to accelerate beyond the compression point. This will result in higher magneto output power.

4. IGNITION GENERATOR COIL VOLTAGE TESTING

1. Disconnect the 2-wire housing between the ignition module and the magneto wiring harness.
2. Connect multimeter probes and bring the selector switch to $\tilde{V}$ and the scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.



A05E0AA



A05E0BA

5. Compare readings with those appearing in the IGNITION table.

5. IGNITION MODULE VOLTAGE TESTING

1. Disconnect WHITE/BLUE wire from high voltage coil.
2. Connect one multimeter probe to the screw, and the other one to the WHITE/BLUE wire. Place the selector switch to $\tilde{V}$ and the scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.

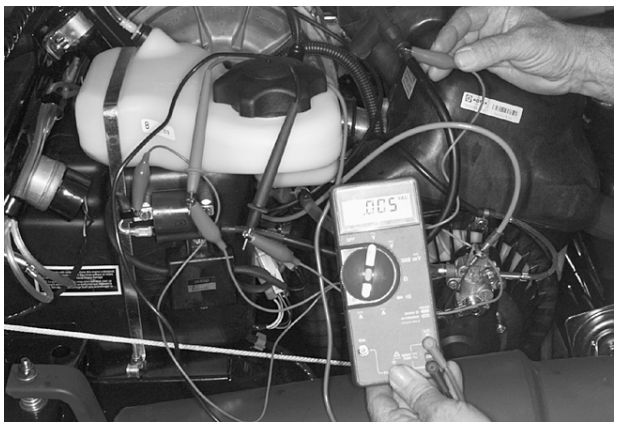


A05E0CA

5. Compare readings with those appearing in the IGNITION table.

6. HIGH VOLTAGE COIL VOLTAGE TESTING

1. Disconnect spark plug cap from spark plug.
2. Fasten alligator clip to spark plug cable, near the spark plug.
3. Connect other multimeter wire to high voltage coil screw, then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
4. Activate the manual starter and check values indicated by the multimeter.
5. Repeat operation 3 times.



A05E0DA

6. Compare readings with those appearing in the IGNITION table.

CONCLUSION

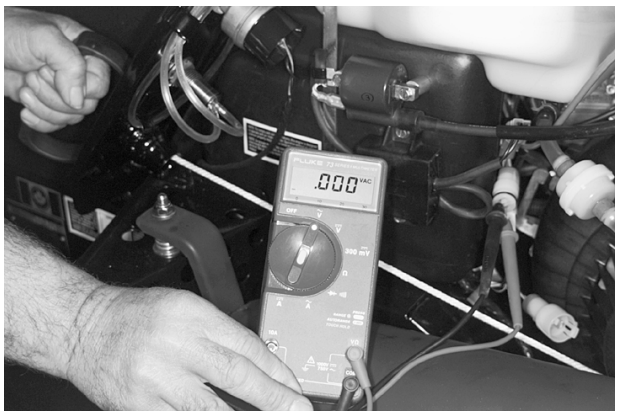
If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the IGNITION table.

Set the multimeter as indicated.

LIGHTING GENERATOR COIL VOLTAGE TESTING

NOTE: The lighting generator coil is not part of the ignition system. It is a self-contained system used to supply current to the lighting system and to other devices working on alternating current. However, this system can be tested using a multimeter.

1. Disconnect housing from engine (YELLOW and YELLOW/BLACK wires).
2. Connect multimeter wires, then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.



A05E0EA

5. Compare readings with those appearing in the LIGHTING table.

CONCLUSION

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the LIGHTING table.

Set the multimeter as indicated.

IGNITION SYSTEM TESTING (Tundra)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Stop switch	Running insulation	BK and BK/YL	2-02-2-M and 2-02-1-M	0.L	00.0 MΩ	—	—	No stop switch must be operational.
	Continuity in stop position	BK and BK/YL	2-02-2-M and 2-02-1-M	00.0 - 00.5	00.0 Ω	—	—	At least one stop switch must be operational.
Ignition generator coil	Output	BK and BK/RE	4-02-1-M and 4-02-2-M	40.0 - 76.0	00.0 Ω	18.0 - 30.0	00.0VAC	No stop switch must be operational.
	Stop wire continuity	BK/RE BK/YL	4-02-2-M and 2-02-1-F	00.0 - 00.5	00.0 Ω	—	—	—
	Ground continuity	BK and BK	4-02-1-M and 2-02-2-F	00.0 - 00.5	00.0 Ω	—	—	—
	Ground continuity	BK and BK	4-02-1-M and engine	00.0 - 00.5	00.0 Ω	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
Ignition module	Output voltage	BK and WH/BL	4-01-2 and 4-01-1-F	—	—	10.0 - 20.0	00.0VAC	Disconnect WH/BL wire from coil in order to take measurements.
High voltage coil	Primary winding resistance	BK	4-01-2 and 4-01-1-M	0.6	00.0 Ω	—	—	Disconnect WH/BL wire from coil in order to take measurements.
	Secondary winding resistance (spark plug cap included)	—	Spark plug cap and 4-01-2	8.9K - 13.5K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding resistance	—	Spark plug wire and 4-01-2	4.9K - 7.5K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding voltage	—	On spark plug cable and 4-01-2	—	—	0.3 - 1.2	0.00VAC	The measurement must be taken on the spark plug wire (without the spark plug).
Spark plug cap	Cap resistance	—	Spark plug side and wire side	4.0K - 6.0K	00.0 KΩ	—	—	—

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

LIGHTING SYSTEM TESTING (Tundra)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Lighting generator coil	Power	YL and YL/BK	2-01A-F and 2-01B-F	0.05 - 0.6	00.0 Ω	3.0 - 7.0	00.0 VAC	—
	Insulation	YL and engine	2-01A-F and engine	0.L	00.0 MΩ	—	—	—

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

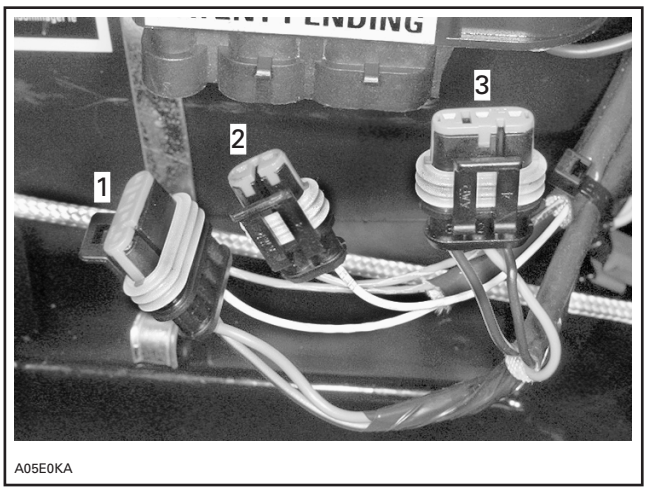
If not specified, the probe connecting sequence is not important.

M: Male connector

F: Female connector

RER DUAL TRIGGER COIL CDI SYSTEM TESTING

Tundra R and Touring SLE



MPEM

1. *Reverse switch, reverse indicator and trigger coil*
2. *Trigger coil*
3. *Generator output and cut-off switches*

IGNITION SYSTEM TESTING SEQUENCE

In case of ignition problems, check the following in the prescribed order until the problem can be solved.

1. Sparking/spark plug condition.
2. Electrical connectors.
3. Ignition switches, tether cord cap and emergency switch.
4. Ignition coil output.
5. Trigger coil output.
6. High voltage coil output.

NOTE: Refer to IGNITION SYSTEM TESTING TABLE at the end of this section for complete detailed testing procedure.

LIGHTING SYSTEM TESTING SEQUENCE

1. Electrical connectors.
2. Magneto output (lighting generator coil).

NOTE: Refer to LIGHTING SYSTEM TESTING TABLE at the end of this section for complete detailed testing procedure.

Testing Conditions

Voltage measurements are always taken upon starting the vehicle. Readings taken when the engine is running will be higher than indicated range.

Part temperature must be approximately 20°C (room temperature), otherwise readings could be distorted.

Analysis of Readings

Voltage Readings

When testing the different magneto components, it is important to take into consideration that readings vary according to the force applied onto the manual starter. It is therefore important to employ enough force upon each trial.

The reading must be 3 times within or above the range indicated in the corresponding table. If the reading is too low, the part is considered to be defective and it must be replaced.

Resistance Readings

Place multimeter selector switch to Ω in order to measure resistance. Readings must be within the indicated range. Otherwise, the part is considered to be defective and must be replaced.

▼ CAUTION

When taking measurements, it is useless to try to start the vehicle since readings would then be distorted.

Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing parts. Most problems cannot be detected when the engine is stopped.

Multiple Problems

As a matter of fact, more than one component can be defective. As a result, if the problem remains although a part was replaced, start over the whole verification from the beginning in order to identify the other defective component.

BUZZER TESTING

Using jumper wires, connect battery positive post to buzzer positive tab.

Connect battery negative post to buzzer negative tab. See next photo.

▼ CAUTION

To avoid buzzer damage, ensure that polarity is respected.

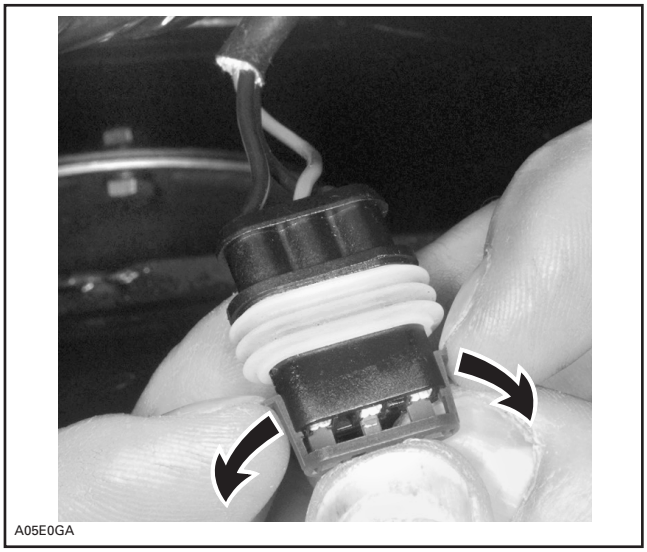


12-VOLT BATTERY PLUGGED TO BUZZER

MPEM CONNECTORS

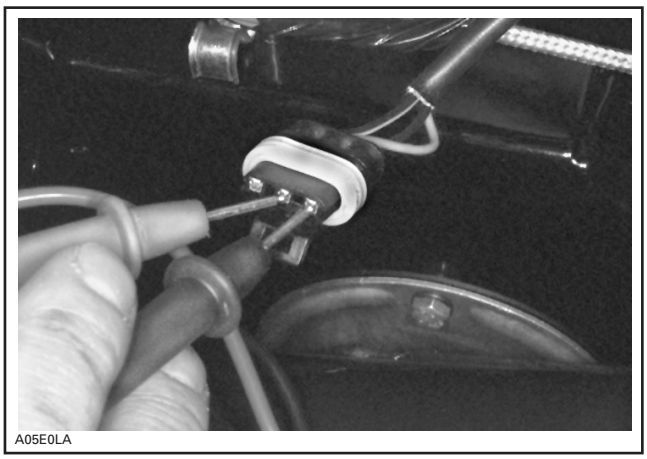
To ease electrical readings on MPEM connectors, connector cap must be removed.

Hold connector in hands then lift both tabs to remove connector cap.



LIFT TABS TO REMOVE CAP

Insert multimeter probes into connector.



TEST USING MULTIMETER PROBES

IGNITION SYSTEM TESTING (Tundra R 240 W)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Stop switch	Running insulation	BK BK/YL	4-01C-M 4-01D-M	0.L	00.0 MΩ	—	—	No stop switch must be operational.
	Continuity in running position	BK BK/YL	4-01C-M 4-01D-M	00.0 - 00.5	00.0 Ω	—	—	Only one stop switch must be operational. Test them one after the other.
Ignition generator coil	Output	RD BK	4-04-2-F 4-04-1-F	4,5 - 6,5	00.0 Ω	7.0 - 15.0	00.0VAC	—
	Ground continuity	BK engine	4-04-1-F engine	00.0 - 00.5	00.0 Ω	—	—	The term “engine” refers to the engine metal parts connected to the magneto housing.
Trigger coil	Front	WH/YL BL/YL	4-03-1-F 4-03-2-F	160 -180	00.0 Ω	.100 - .300	.000VAC	—
	Rear	WH/YL BL/YL	4-02-3-F 4-02-4-F	160 -180	00.0 Ω	.100 - .300	.000VAC	—
MPEM and high voltage coil	Secondary winding resistance with caps	Spark plug cap engine	In spark plug cap and on the engine	4.90K - 7.10K	0.00 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding resistance without caps	BK engine	Inside spark plug cable and on the engine	0.90K - 1.10K	0.00 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding voltage	BK engine	On spark plug cable housing and on the engine	—	—	.150 - .350	.000VAC	The measurement must be taken on the spark plug cable (without the spark plug).
Spark plug cap	Cap resistance	—	Spark plug side and cable side	4.0K - 6.0K	00.0 KΩ	—	—	—

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

LIGHTING SYSTEM TESTING (Tundra R 240 W)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Lighting generator coil	Power	YL YL/BK	4-01B-F 4-01A-F	00.0 - 00.6	00.0 Ω	3.0 - 7.0	00.0 VAC	—
	Insulation	YL engine	4-01(A,B)-F engine	0.L	00.0 MΩ	—	—	The term “engine” refers to the engine metal parts connected to the magneto housing.
	Ground continuity	BK engine	4-01C-F engine	00.0 - 00.5	00.0 Ω	—	—	—

NOTE: It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

IGNITION SYSTEM TESTING (S-Series with RER 240 W, 98)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Stop switch	Running insulation	BK BK/YL	2-01C-M 2-01D-M	0.L	00.0 MΩ	—	—	No stop switch must be operational.
	Continuity in running position	BK BK/YL	2-01C-M 2-01D-M	00.0 - 00.5	00.0 Ω	—	—	Only one stop switch must be operational. Test them one after the other.
Ignition generator coil	Output	RD BK	2-04-2-F 2-04-1-F	4,5 - 6,5	00.0 Ω	7,0 - 15,0	00.0VAC	—
	Ground continuity	BK engine	2-04-1-F engine	00.0 - 00.5	00.0 Ω	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
Front trigger coil	Resistance and output	WH/YL BL/YL	2-03-1-F 2-03-2-F	160 -180	00.0 Ω	.150 - .350	.000VAC	—
Rear trigger coil	Resistance and output	WH/YL BL/YL	2-02-3-F 2-02-4-F	160 -180	00.0 Ω	.150 - .350	.000VAC	—
MPEM and high voltage coil	Secondary winding resistance with caps	Spark plug cap Spark plug cap	In spark plug cap	8.90K - 13.1K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding resistance without caps	BK BK	Inside spark plug cable	0.90K - 1.10K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding voltage	BK engine	On spark plug cable housing and on the engine	—	—	.100 - .250	0.00VAC	The measurement must be taken on the spark plug cable (without the spark plug).
Spark plug cap	Cap resistance	—	Spark plug side and cable side	4.0K - 6.0K	00.0 KΩ	—	—	—

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

LIGHTING SYSTEM TESTING (S-Series with RER 240 W, 98)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Lighting generator coil	Power	YL YL/BK	2-01B-F 2-01A-F	00.0 - 00.6	00.0 Ω	3.0 - 7.0	00.0 VAC	—
	Insulation	YL engine	2-01(A,B)-F engine	0.L	00.0 MΩ	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
	Ground continuity	BK engine	2-01C-F engine	00.0 - 00.5	00.0 Ω	—	—	

NOTE: It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

DUCATI TRIGGER COIL CDI SYSTEM TESTING

Formula S/SL

IGNITION SYSTEM TESTING SEQUENCE

In case of ignition problems, check the following in the prescribed order until the problem can be solved.

1. Sparking/spark plug condition;
2. Electrical connectors;
3. Ignition switches, tether cord cap and emergency switch;
4. Ignition coil output;
5. Trigger coil output;
6. High voltage coil output.

LIGHTING SYSTEM TESTING SEQUENCE

1. Electrical connectors;
2. Magneto output (lighting generator coil).

Testing Conditions

Voltage measurements are always taken upon starting the vehicle. Readings taken when the engine is running will be higher than indicated range. Part temperature must be approximately 20°C (room temperature), otherwise readings could be distorted.

Analysis of Readings

Voltage Readings

When testing the different magneto components, it is important to take into consideration that readings vary according to the force applied onto the manual starter. It is therefore important to employ enough force upon each trial.

The reading must be 3 times within or above the range indicated in the corresponding table. If the reading is too low, the part is considered to be defective and it must be replaced.

Resistance Readings

Place multimeter selector switch to Ω in order to measure resistance. Readings must be within the indicated range. Otherwise, the part is considered to be defective and must be replaced.

▼ CAUTION

When taking measurements, it is useless to try to start the vehicle since readings would then be distorted.

Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing parts. Most problems cannot be detected when the engine is stopped.

Multiple Problems

As a matter of fact, more that one component can be defective. As a result, if the problem remains although a part was replaced, start over the whole verification from the beginning in order to identify the other defective component.

1. SPARKING

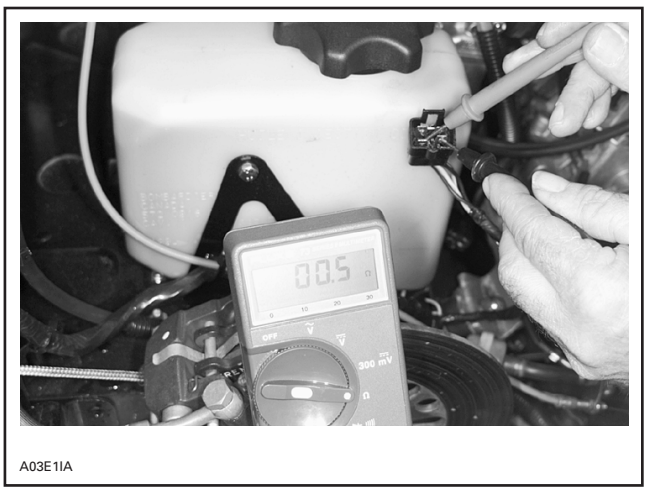
During this operation, it is important to use the snowmobile spark plug and not a new one. Bring the plug in contact with the engine. If no spark is produced, replace the spark plug with a new one and do the test again.

2. ELECTRICAL CONNECTOR TESTING

Make sure that none of the connectors are disconnected.

3. IGNITION SWITCH, TETHER CORD SWITCH AND EMERGENCY SWITCH TESTING

Disconnect connector housing 2-01 from engine, and using a multimeter, check resistance as indicated in IGNITION table.



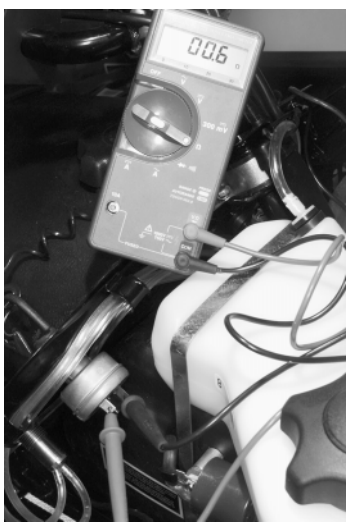
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If readings are acceptable, go on to next step.

If readings are inadequate, individually check each switch as follows.

Ignition Switch (key)

Disconnect switch housing. Using a multimeter, check between "MAG" and "GRD" terminals if the circuit is open (0.L $_{M\Omega}$) in operating position and if the circuit is closed (0 $_{\Omega}$) in off position.



A05E07A

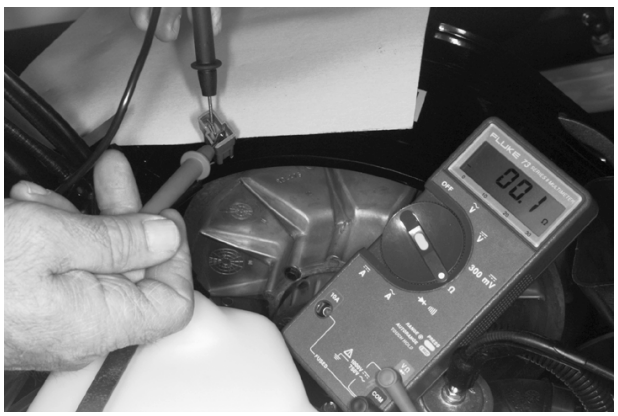
TYPICAL

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Emergency Switch

Unplug switch block connected to main wiring harness. Check using a multimeter. Connect probes to 6-02-C-M and 6-02-D-M terminals. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 Ω) in off position.



A05E08A

TYPICAL

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Tether Cord Switch

Unplug switch block connected to main wiring harness. Check using a multimeter by connecting probes to 6-03-B-M and 6-03-A-M wires. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 $_{\Omega}$) in off position.


A05E09A

TYPICAL

If readings do not correspond to the above mentioned indications, replace switch.

If readings are acceptable, check other switches.

If none of these verifications are conclusive, the problem finds its source in the main wiring harness. Proceed as follows:

NOTE: For this next step, no stop switch must be connected to the main wiring harness.

Disconnect all stop switches from the main wiring harness and check the continuity of each wire by connecting probes to the end of wires of the same color. Repeat with all other wires. It is important to mention that all wires of the same color within a given harness are connected together. These wires should therefore have a closed circuit. On the other hand, BLACK and BLACK/YELLOW wires must have an open circuit (0.L $_{M\Omega}$).

Repair or replace if necessary.

GENERAL

When manually starting the engine while the spark plug is installed, the engine will tend to accelerate beyond the compression point. This will result in higher magneto output power.

4. IGNITION GENERATOR COIL VOLTAGE TESTING

1. Disconnect the 4-wire 4-02 housing between the ignition module and the magneto wiring harness.
2. Connect multimeter probes to GREEN and WHITE wires (female end), then bring selector to $\tilde{V}$ and scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.



A03E1JA

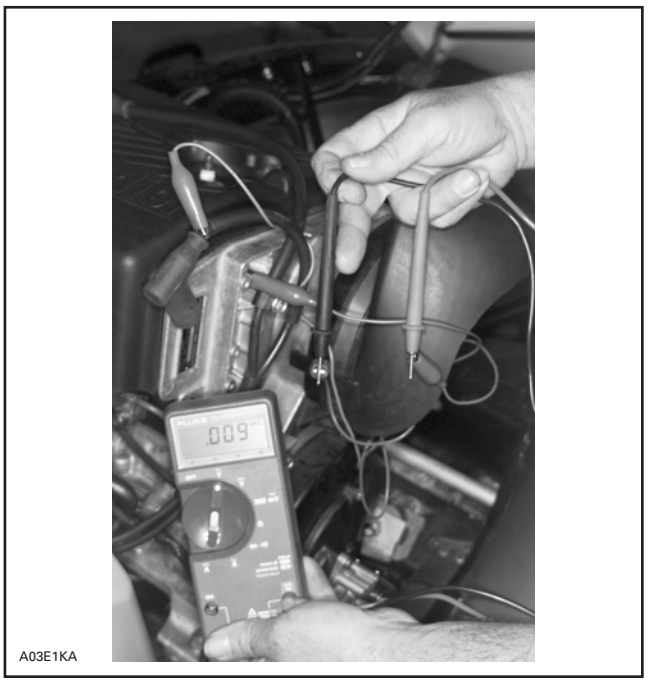
5. Compare readings with those appearing in the IGNITION table.

5. TRIGGER COIL VOLTAGE TESTING

1. Disconnect 4-wire 4-02 housing between the ignition module and the engine.
2. Connect multimeter probes to RED/WHITE wire (female side) and to the engine, then bring selector switch to $\tilde{V}$ and scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.
5. Compare readings with those appearing in the IGNITION table.

6. HIGH VOLTAGE COIL VOLTAGE TESTING

1. Disconnect spark plug cap from right spark plug (magneto side).
2. Fasten alligator clip to spark plug cable, near the spark plug.
3. Connect other multimeter wire to high voltage coil screw, then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
4. Activate the manual starter and check values indicated by the multimeter.
5. Repeat operation 3 times.



6. Compare readings with those appearing in the IGNITION table.

CONCLUSION

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the IGNITION table.

Set the multimeter as indicated.

LIGHTING GENERATOR COIL VOLTAGE TESTING

NOTE: The lighting generator coil is not part of the ignition system. It is a self-contained system used to supply current to the lighting system and to other devices working on alternating current. However, this system can be tested using a multimeter.

1. Disconnect 2-01 housing from engine.
2. Connect multimeter wires to YELLOW and YELLOW/BLACK wires (female side), then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.
5. Compare readings with those appearing in the LIGHTING table.

CONCLUSION

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the LIGHTING table.

Set the multimeter as indicated.

IGNITION SYSTEM TESTING (Formula S/SL)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Stop switch	Running insulation	BK and BK/YL	2-01-C-M and 2-01-D-M	0.L	00.0 MΩ	—	—	No stop switch must be operational.
	Continuity in stop position	BK and BK/YL	2-01-C-M and 2-01-D-M	00.0 - 00.5	00.0 Ω	—	—	At least one stop switch must be operational.
Ignition generator coil	Output	WH and GR	4-02-B-M and 4-02-A-M	230.0 - 330.0	00.0 Ω	30.0 - 60.0	00.0VAC	No stop switch must be operational.
	Ground continuity	WH and engine	4-02-B-M and engine	00.0 - 00.5	00.0 Ω	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
	Ground continuity	BR and engine	2-01-C-F and engine	00.0 - 00.5	00.0 Ω	—	—	
Trigger coil	Continuity	RE/WH and engine	4-02-D-M and engine	140.0 - 180.0	00.0 Ω	2.0 - 9.0	00.0VAC	
Ignition module and high voltage coil	Secondary winding resistance with caps	—	Between both spark plug wires	13.1K - 18.3K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
High voltage coil	Secondary winding resistance without caps	—	Between both spark plug wires	5.1K - 6.3K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding voltage	—	On spark plug wire and on the engine	—	—	0.1 - 0.4	00.0VAC	The measurement must be taken on the spark plug wire (without the spark plug).
	Module insulation	BK	In the cap and on 4-02-A-F	0.L	00.0 MΩ	—	—	—
	Module insulation	—	In the cap and on 4-02-A-F	0.L	00.0 MΩ	—	—	—
Spark plug cap	Cap resistance	—	Spark plug side and wire side	4.0K - 6.0K	00.0 KΩ	—	—	—

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

LIGHTING SYSTEM TESTING (Formula S/SL)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Lighting generator coil	Power	YL and YL/BK	2-01-B-F and 2-01-A-F	0.05 - 0.6	00.0 Ω	2.5 - 7.0	00.0 VAC	—
	Insulation	YL and engine	2-01-B-M and engine	0.L	00.0 MΩ	—	—	—
	Insulation	YL/BK engine	2-01-A-F and engine	0.L	00.0 MΩ	—	—	—

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

M: Male connector

F: Female connector

VOLTAGE REGULATOR INSPECTION

A faulty voltage regulator is often responsible for frequent burned bulbs.

▼ CAUTION

Never run an engine with a faulty or inoperative voltage regulator. This could damage the DUCATI CDI module.

TESTING PROCEDURE

The regulator ground must be checked to ensure the circuit is complete. If necessary, connect a good ground wire from the regulator to the engine.

A) Quick Test Without Voltmeter

▼ CAUTION

Do not perform this test on engines that have a DUCATI CDI system.

If a voltmeter is not available, a visual test can be performed with satisfactory results.

Disconnect **all** lights and electric equipment.

While engine is running, disconnect and connect regulator connector several times checking for a spark.

A spark on regulator terminal indicates a good and working regulator.

B) Voltmeter Test

NOTE: Use a voltmeter able to read alternating current (AC). For accurate reading, use a RMS voltmeter.

Connect a wire of the voltmeter to YELLOW/BLACK wire.

Connect the other wire of the voltmeter to YELLOW wire.

Lift the rear of vehicle and support with a mechanical stand.

Start the engine at an idle without opening the throttle.

◆ WARNING

Ensure the track is free of particles which might be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

Slowly open the throttle and accelerate the engine to increase the RPM.

If the meter reads over 15 volts, the regulator is defective and must be replaced.

▼ CAUTION

Do not increase the RPM so the voltage exceeds 15 V as the bulb(s) will burn.

NOTE: Whatever the voltmeter type used (peak voltage or RMS) the voltage must not exceed 15 V (a defective regulator will allow voltage to exceed 15 V as engine RPM is increased).

INSPECTION OF AC CIRCUIT ISOLATION

All Electric Start Models

If AC circuit is not isolated from frame, headlamp beam will weaken.

INSPECTION

Disconnect regulator/rectifier.

Connect one digital ohmmeter probe (needle ohmmeter will not offer enough precision) to frame and other probe to YELLOW or YELLOW/BLACK magneto wires.

Measured resistance must be infinite. If such is not the case, it means there is a connection between AC circuit and DC circuit.

Disconnect one accessory at the time to identify the faulty circuit.

INSPECTION OF HEATING ELEMENTS

All measurements must be performed at 21°C (70°F).

Throttle Lever Heating Element

Resistance Measurement

HIGH INTENSITY	YELLOW/BLACK wire BROWN wire	1.96 to 3.64 ohms
LOW INTENSITY	YELLOW/BLACK wire BROWN/YELLOW wire	8.05 to 14.95 ohms

Current Measurement

HIGH INTENSITY	BROWN wire	0.23 A minimum
LOW INTENSITY	BROWN/YELLOW wire	0.13 A minimum

Handlebar Grip Heating Element

HIGH INTENSITY	YELLOW/BLACK wire ORANGE wire	8.73 to 10.67 ohms
LOW INTENSITY	YELLOW/BLACK wire ORANGE/VIOLET wire	17.7 to 20.7 ohms

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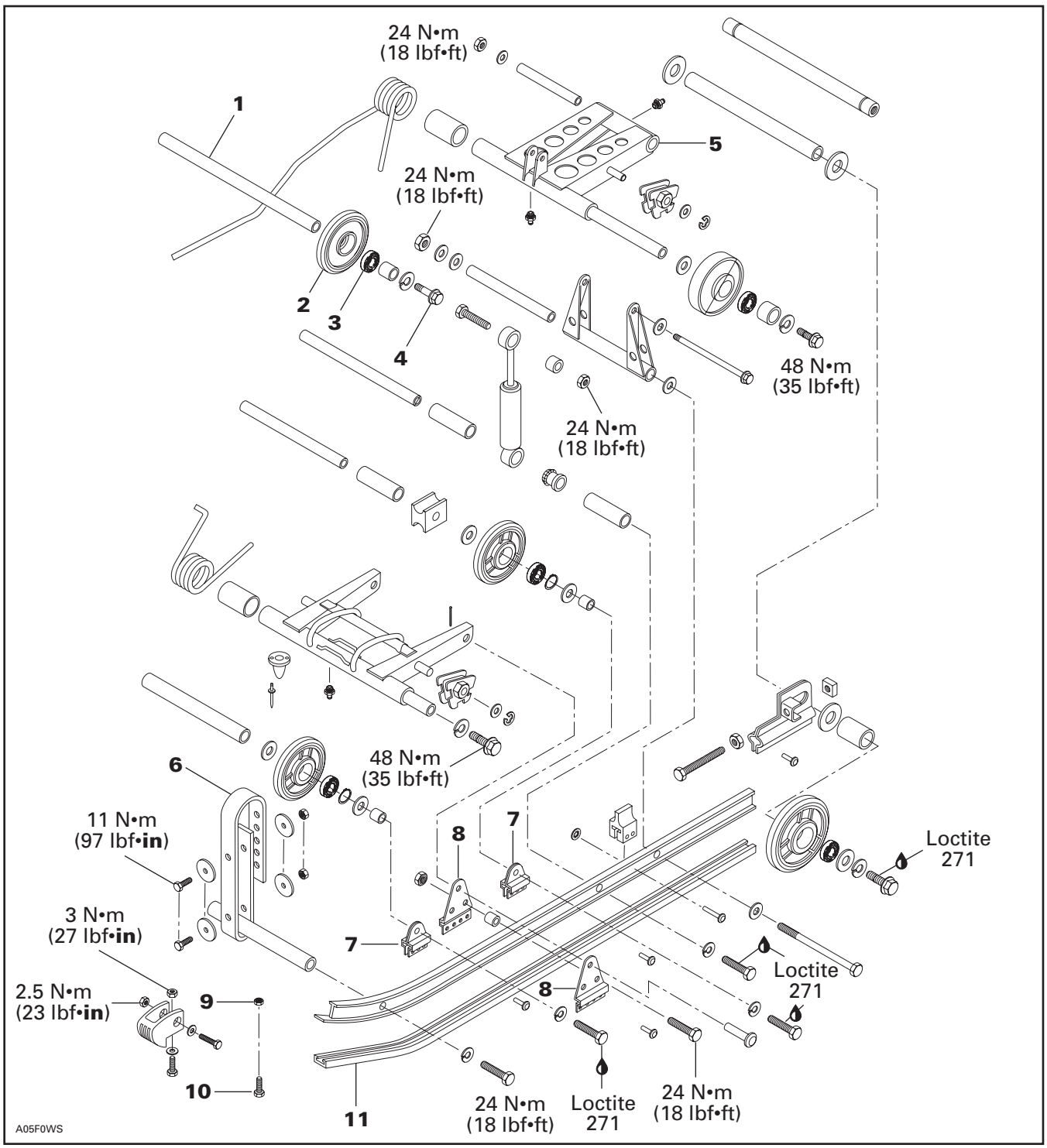
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TORQUE REACTION SUSPENSION

Tundra/R



COMPONENT REMOVAL

Lift rear of vehicle and support it off the ground.

5, Rear Arm

Release spring tension. Unfasten shock from rear arm. Remove 3 screws retaining rear arm.

REMOVAL

NOTE: To prevent cross shaft from turning when unscrewing screws assembled with threadlocker, proceed as follows:

– Loosen one screw then retighten.
– Remove the other screw.
– Remove the first one.

1,2,3,4, Cross Shaft, Idler Wheel, Spacer and Screw

Remove idler wheel ass'y.

Lift rear of vehicle and support it off the ground.

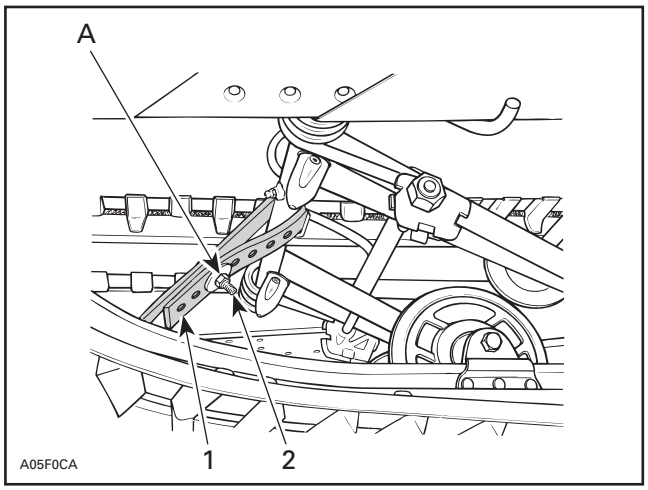
Unscrew 4 screws retaining front arm and rear arm to frame.

Remove suspension.

DISASSEMBLY AND ASSEMBLY

6, Stopper Strap

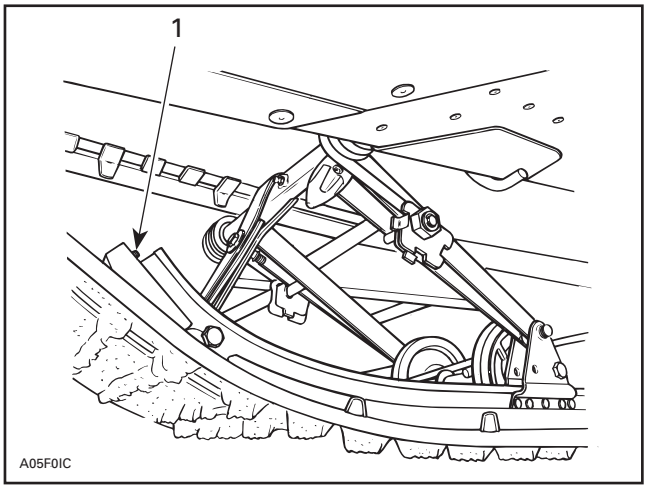
Inspect strap for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required. Make sure it is attached through the 3rd hole from the end. Torque nut to 11 N•m (97 lbf•**in**).



1. 1st hole
2. 3rd hole
*A. 11 N•m (97 lbf•**in**)*

9,10,12, Nut, Slotted Screw and Slider Shoe

To replace a worn shoe, remove the front screw and stop nut, then slide the shoe rearward out of the runner.



1. Front screw and nut

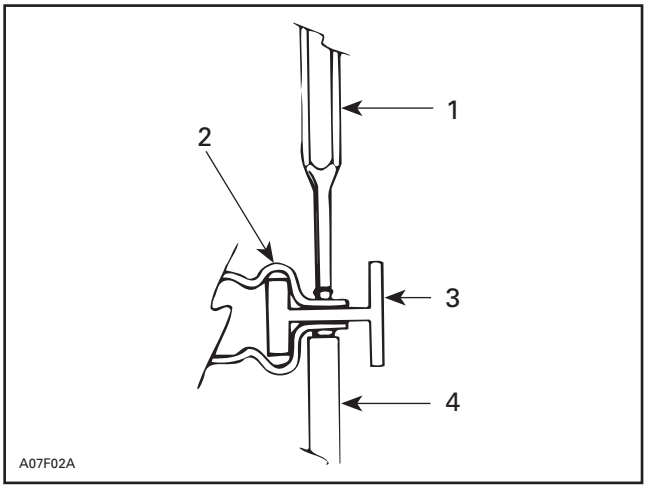
▼ CAUTION

Slider shoes must always be replaced in pairs.

7,8, Support and Front Arm Support

To remove rivets securing the supports, cut rivet heads off using a cold chisel.

At assembly, position the rivet head toward the outside of the assembly. Support the rivet head against a metal block, as shown, and use a flat head punch to secure the rivet in place.



1. Flat head punch
2. Support
3. Runner
4. Metal block

NOTE: Rivets can be substituted with 3/16 in x 3/4 in long screws and flanged elastic stop nuts. Always position screw head outside the assembly.

INSPECTION

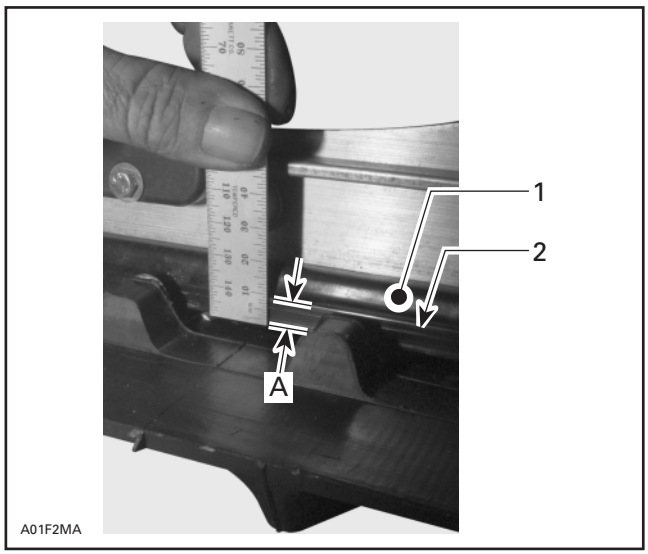
Shock Absorber

Refer to SUSPENSION AND SKI SYSTEM 08-03 for shock inspection.

11, Slider Shoe

Measure slider shoes from the bottom to the 0.5 mm (.020 in) radius as shown on the next photo.

Minimum thickness must be 2 mm (.080 in).



TYPICAL

1. *Slider shoe*
2. *Molding line (this line is not the wear limit)*

A. Wear measurement (must be at least 2 mm (.080 in))

Replace slider shoes when wear limit is reached.

▼ CAUTION

Slider shoes must always be replaced in pairs.

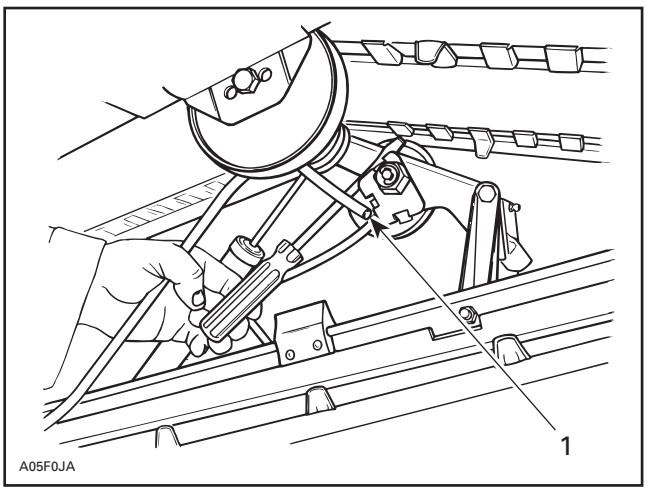
INSTALLATION

Release rear spring tension then install assembled suspension into track with front portion first.

Insert rear portion of suspension into track.

Bolt suspension to tunnel.

Pry rear spring end onto cam.



1. Spring end

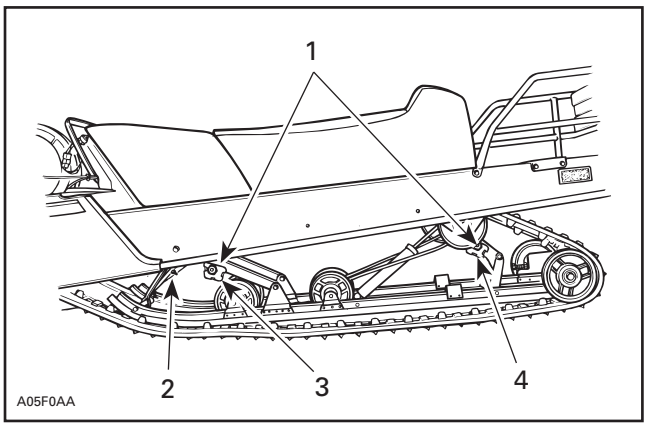
Adjust track tension/alignment. Refer to TRACK 07-05.

RIDE ADJUSTMENT

The front portion of rear suspension is adjustable for surface condition and steering effects.

The stopper strap is adjustable for vehicle weight transfer control.

The rear portion of rear suspension is adjustable for driver's weight.



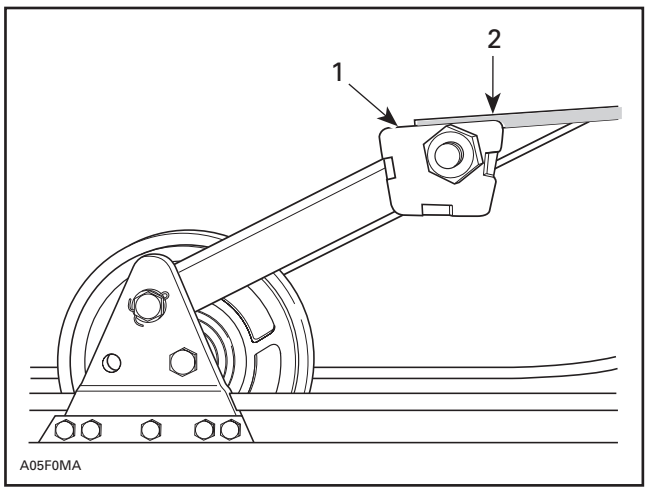
1. *Driver's weight*
2. *Stopper strap for weight transfer*
3. *Steering effect/surface condition*
4. *Adjustment cams*

Choice of suspension adjustments depends on carrying load, driver's weight, personal preference, riding speed and field condition.

Slight suspension bottoming occurring under the worst riding conditions indicates a good choice of spring preload.

To adjust rear suspension adjustment cams, use special key supplied in vehicle tool box.

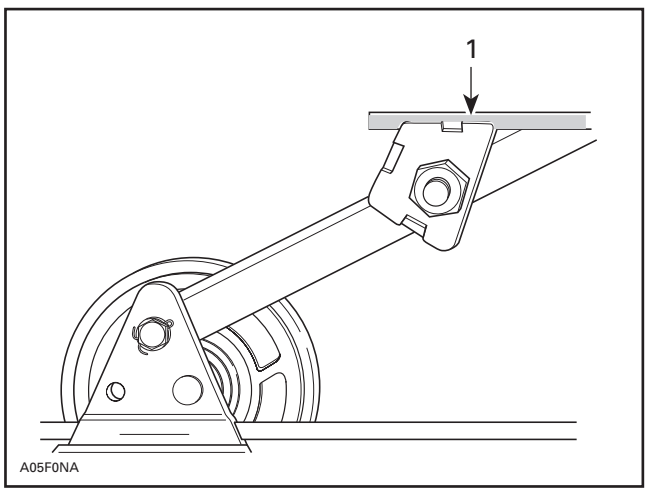
Turning adjustment cam moves edges of cam supporting spring rod. The softest adjustment is reached when the supporting edge of cam is the closest to hexagonal portion of cam.



SOFTEST ADJUSTMENT

1. *Supporting edge closest to hexagonal*
2. *Spring*

The stiffest adjustment is reached when the supporting edge of cam is the farthest to hexagonal portion of cam.

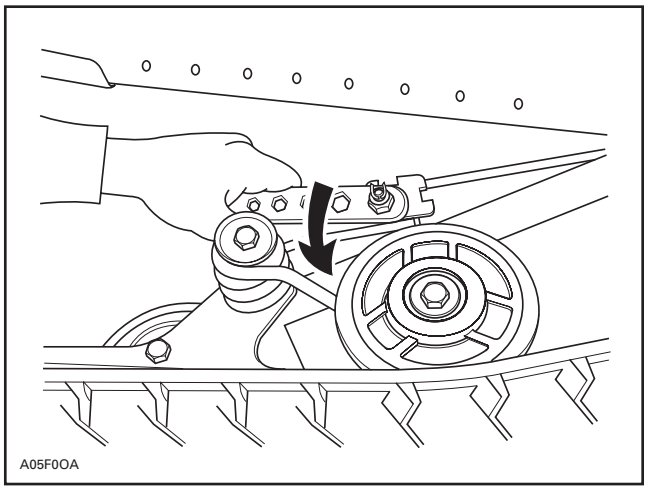


STIFFEST ADJUSTMENT

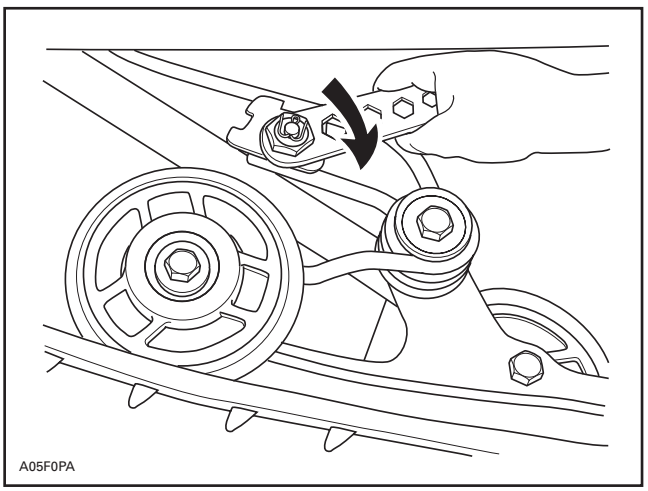
1. *Supporting edge farthest to hexagonal*

▼ CAUTION

Always turn the left side adjustment cams in a clockwise direction and the right side cams in a counterclockwise direction. Left and right adjustment cams must always be set at the same position.



RH SIDE

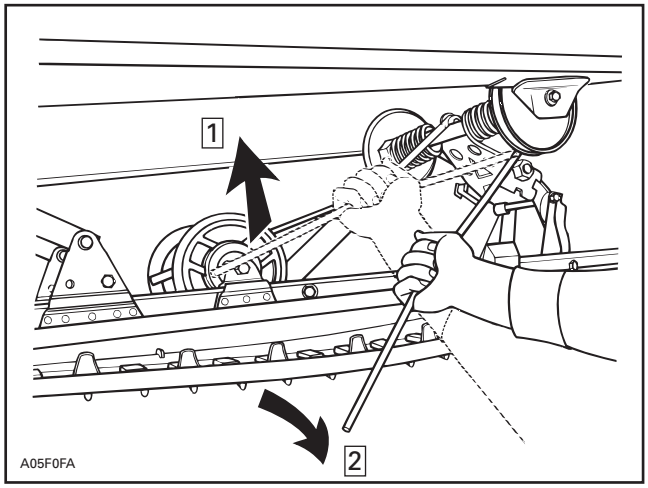


LH SIDE

NOTE: To quickly change rear cam position without using any tool:

– Lay vehicle on its side.

– Unhook rear spring by hand from lower idler wheel.



– Turn adjustment cam by hand to the desired position.
– Reinstall spring on its support making sure that it sits in the groove of support.

Stopper Strap

The function of the stopper strap is to control the transfer of vehicle weight during acceleration and to control track lead angle.

The longer the belt, the more the weight will be transferred to the track to provide a better traction. The shorter the belt, the lesser the weight transferred to the track, thus maintaining a more positive steering.

The longer the belt, the greater will be the track lead angle. A shorter belt will reduce track lead angle which may help when negotiating a particular snow condition.

Adjusting holes on the stopper strap allow to adjust it according to driver's requirements, field and/or snow conditions.

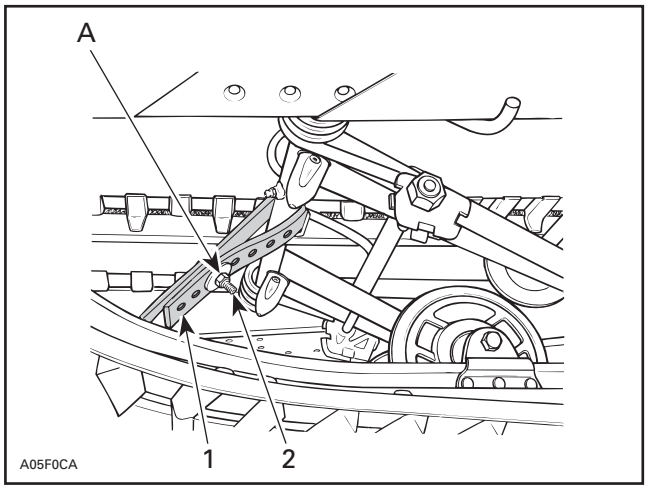
▼ CAUTION

Whenever stopper strap length is changed, track tension must be readjusted to prevent any possibility of operating vehicle with a too loose or too tight track tension.

For normal use, locate bolt through 3rd hole from strap end.

◆ WARNING

Always torque the nut to 11 N•m (97 lbf•**in**). Replace strap if worn or torn.



1. 1st hole
2. 3rd hole
*A. 11 N•m (97 lbf•**in**)*

NOTE: When towing a load, it is suggested to adjust stopper strap to its shortest length, soften front springs of rear suspension and stiffen rear springs. These adjustment will improve steering ability.

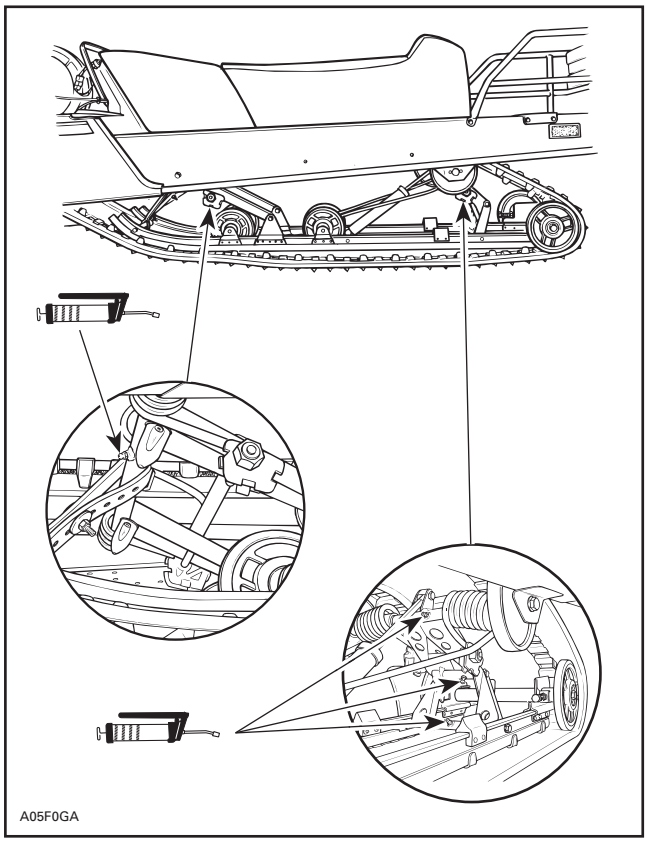
Deep Snow Operation

When operating the vehicle in deep snow, it may be necessary to change position of adjustment cams, stopper strap and/or driver's riding position, to change the angle at which the track rides on the snow. Operator's familiarly with the various adjustments as well as snow conditions will dictate the most efficient combination.

LUBRICATION

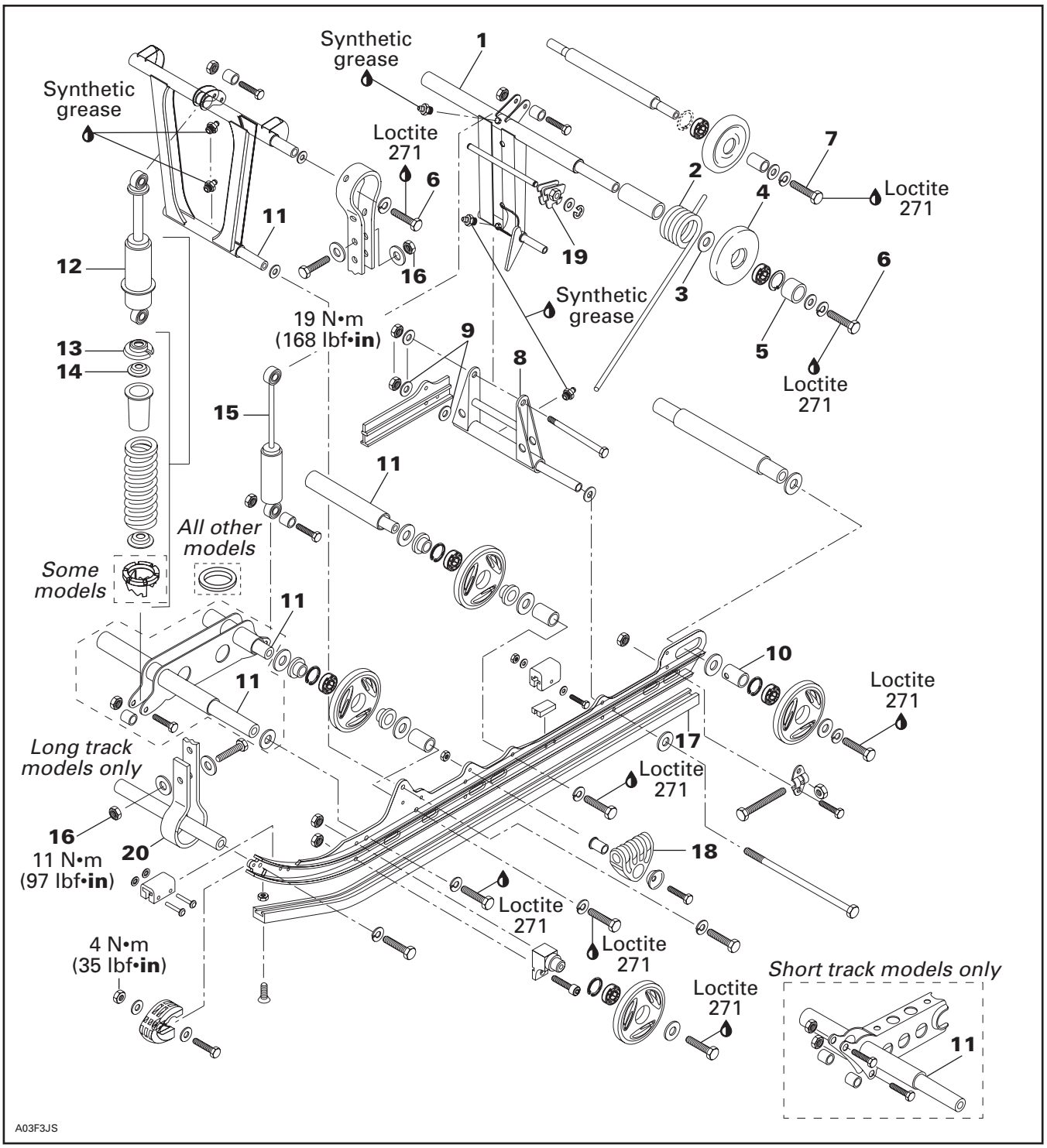
Lubricate front and rear arms at grease fittings using synthetic grease (P/N 413 711 500).

NOTE: There are 4 grease fittings.



SC-10 SPORT AND TOURING SUSPENSIONS

S-Series



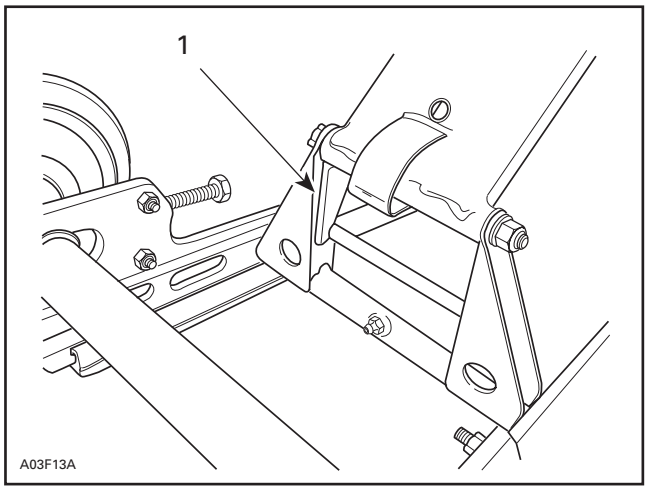
COMPONENT REMOVAL AND INSTALLATION

Lift rear of vehicle and support it off the ground.

1, Rear Arm

Release spring tension by unfastening spring support. Unfasten shock from rear arm. Remove 3 screws retaining rear arm.

At installation, rear arm stroke limiter must be behind shackle.

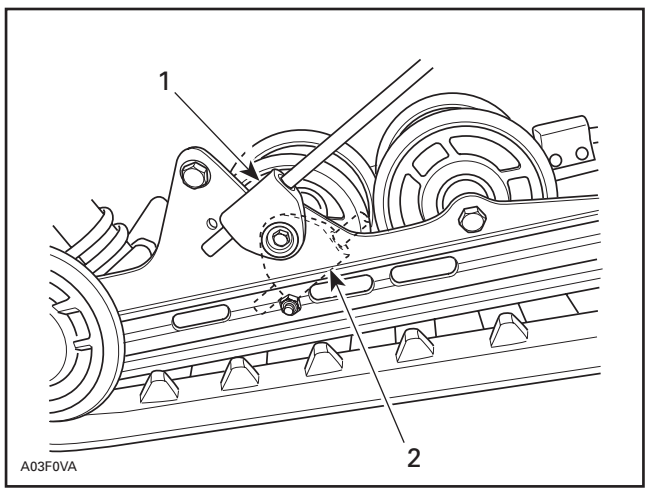


1. Stroke limiter on rear side

18, Spring Support

▼ CAUTION

To avoid track damage, spring supports must be mounted upward.



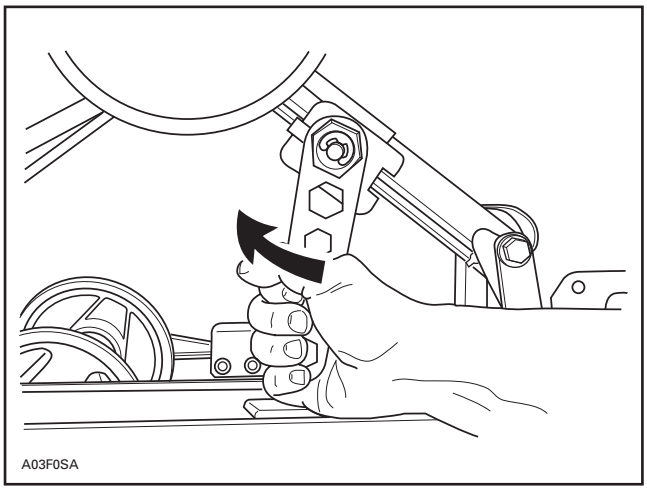
RIGHT SIDE SHOWN

1. Right position: upward
2. Wrong position

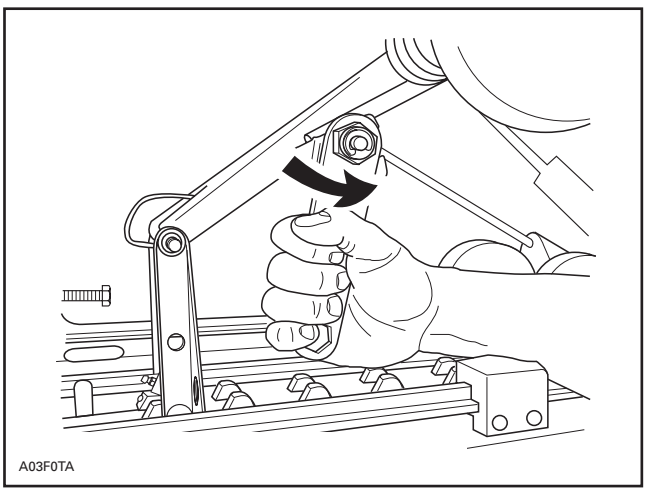
REMOVAL

19, Cam

Decrease spring preload by turning LH cam clockwise and RH cam counterclockwise.



LH SIDE SHOWN



RH SIDE SHOWN

Lift rear of vehicle and support it off the ground. Block suspension in place.

2,3,4,5,6,18, Spring, Washer, Idler Wheel, Spacer, Screw and Spring Support

Unbolt spring support from runner while retaining spring end. Move spring end rearward to completely release spring preload. Proceed with the other side.

Unscrew both rear arm screws.

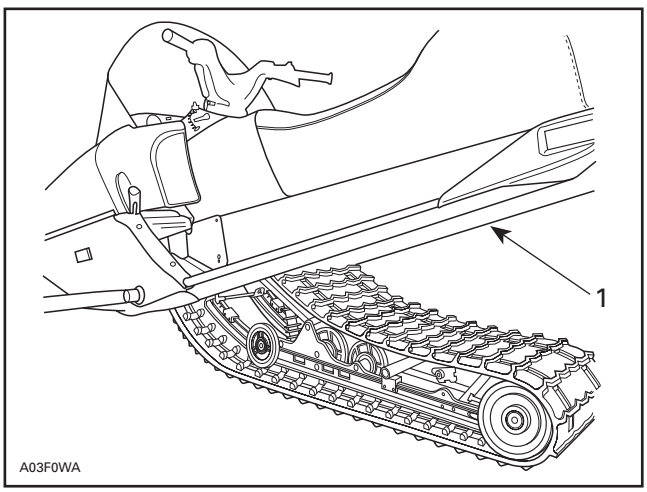
NOTE: To prevent cross shaft from turning when unscrewing screws assembled with threadlocker, proceed as follows:

– Knock on screw head and/or heat to break threadlocker bond.
– Loosen 1 screw then retighten.
– Remove the opposite screw.
– Remove the first one.

7, Screw

Unscrew center idler wheel axle from tunnel then remove.

Lift rear of vehicle until spacers, idler wheels, washers and springs can be removed.



1. Lift rear of vehicle

6, Screw

Remove both screws retaining front arm to tunnel.

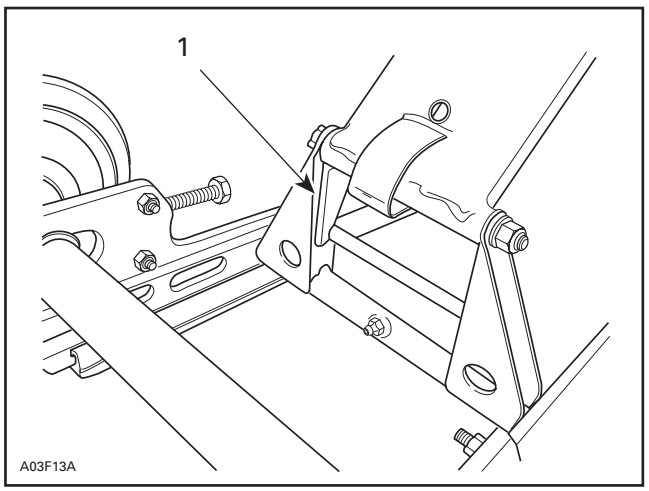
Remove suspension.

DISASSEMBLY AND ASSEMBLY

Inspect track thoroughly before reinstalling suspension. Refer to 07-05 TRACK.

1, Rear Arm

At installation, rear arm stroke limiter must be on rear side.



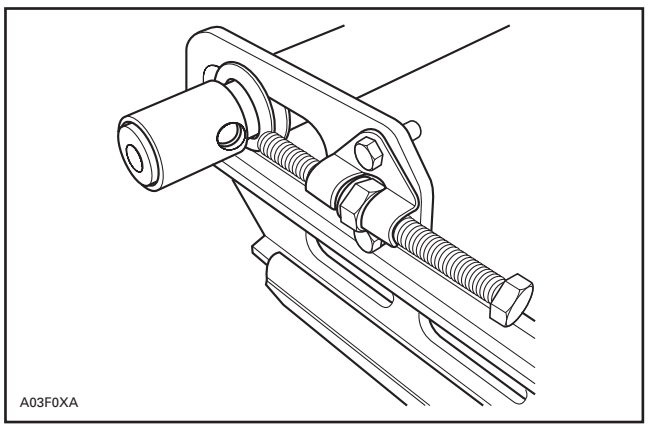
1. Stroke limiter on rear side

8,9, Pivot Arm and Flat Washer

At installation pivot arm grease fitting must face rearward. Small washer must be against nut. Large washers must be inside rails on both sides.

10, Outer Bushing

At installation, hole must face adjustment screw.



11, Axle

Note position of axles at disassembly. Axles with a paint stripe serve as idler wheel axles. These are more precise than those used as pivot axles. Idler wheel axles can be used as pivot axles but the opposite is not true.

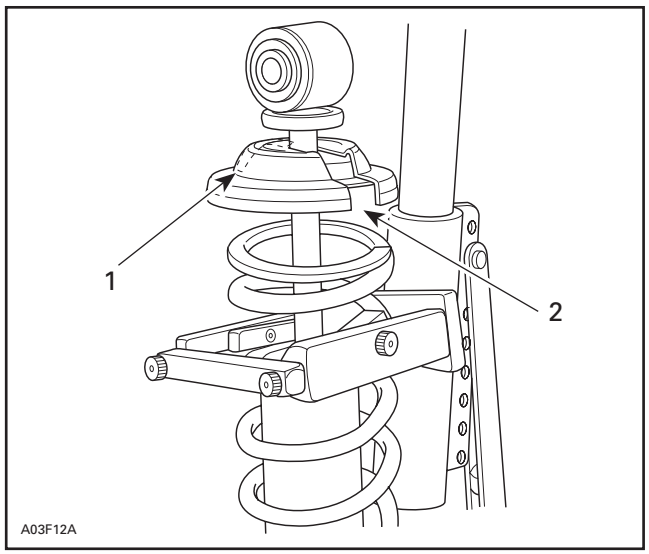
12,13,14, Front Shock, Spring Stopper and Cap

Use shock spring remover (P/N 529 027 100) in a vise. Mount shock in it and turn shock so that spring coils matched spring compressor.

Close and lock bar. Adjust handle horizontal by changing position of clevis pin.

Push down on handle until il locks. Remove spring stopper and cap then release handle.

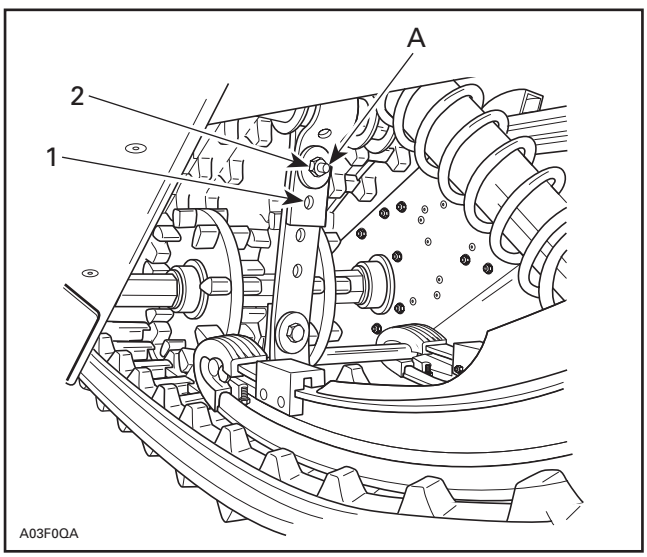
At installation, cap opening must be 180° from spring stopper opening.



1. Spring stopper opening
2. Cap opening

20, Stopper Strap

Inspect strap for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required. Make sure it is attached through the 2nd hole from the end. Torque nut to 11 N•m (97 lbf•**in**).



1. 1st hole
2. 2nd hole
*A. 11 N•m (97 lbf•**in**)*

INSPECTION

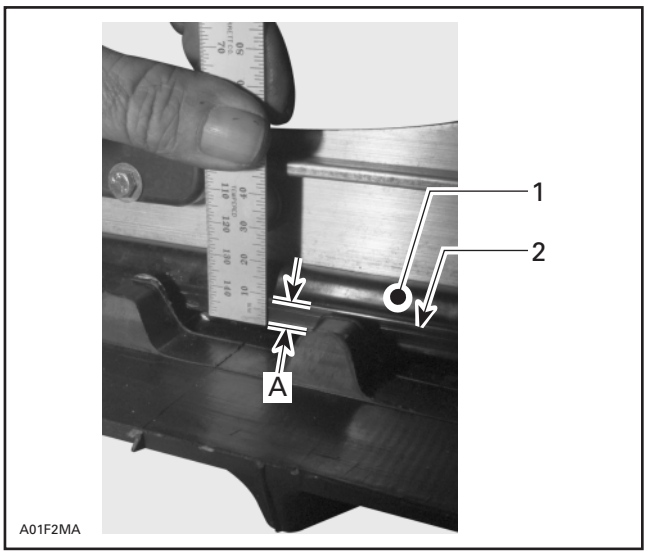
Shock Absorber

Refer to SUSPENSION AND SKI SYSTEM 08-03 then look for **Shock Inspection**.

17, Slider Shoe

Measure slider shoes from the bottom to the 0.5 mm (.020 in) radius as shown on the next photo.

Minimum thickness must be 2 mm (.080 in).



TYPICAL

1. Slider shoe
2. Molding line (this line is not the wear limit)
A. Wear limit measurement (must be at least 2 mm (.080 in))

Replace slider shoes when wear limit is reached.

▼ CAUTION

Slider shoes must always be replaced in pairs.

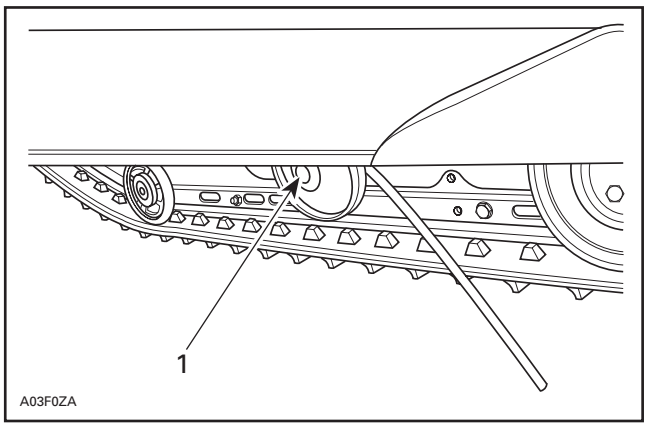
INSTALLATION

Do not install rear spring yet. Install assembled suspension into track with front portion first.

Insert rear portion of suspension into track.

2,3,4,5,6, Spring, Washer, Idler Wheel, Spacer and Screw

On each side, install rear spring, washer, idler wheel, spacer then bolt that axle to tunnel.



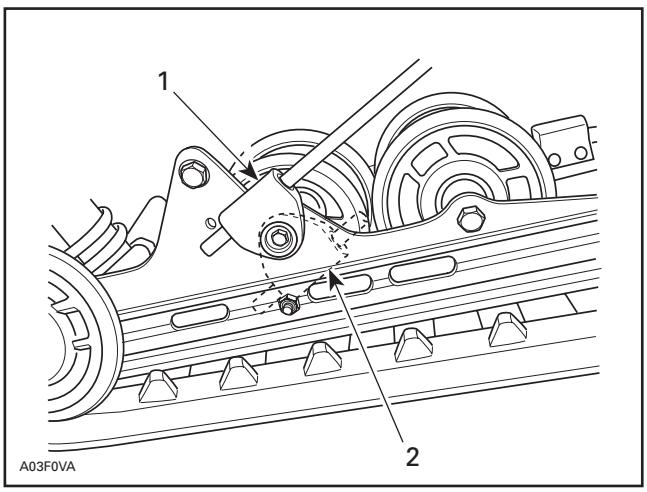
1. Spacer

18, Spring Support

Install spring supports to rails.

▼ CAUTION

To avoid track damage, spring supports must be mounted upward.



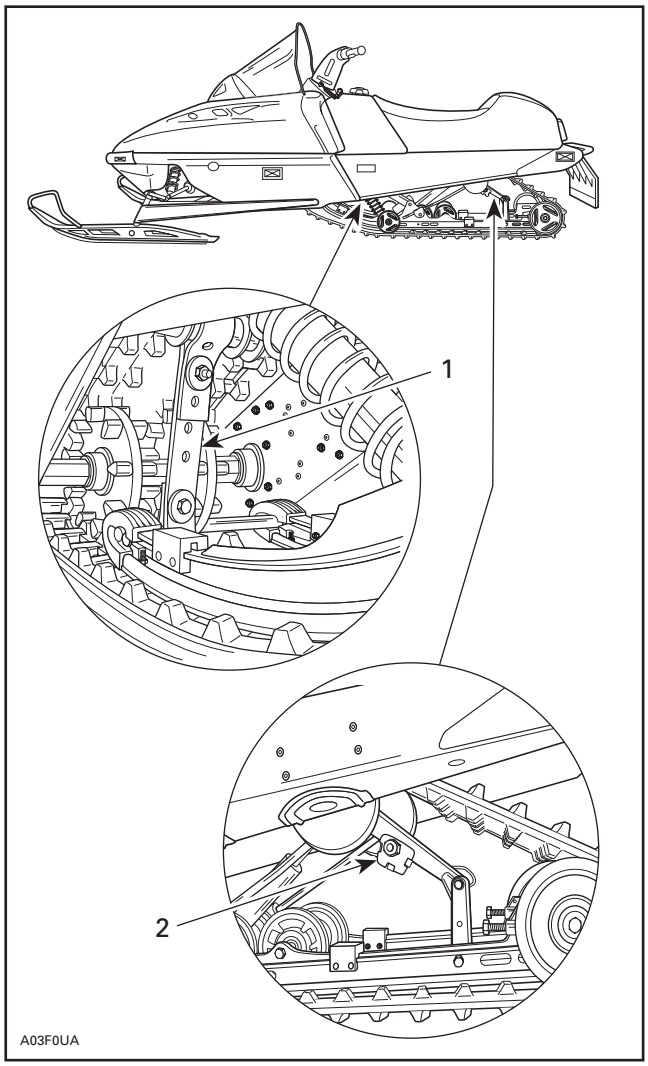
RIGHT SIDE SHOWN

1. Right position: upward
2. Wrong position

RIDE ADJUSTMENT

The stopper strap is adjustable for vehicle weight transfer control.

The rear portion of rear suspension is adjustable for driver's weight.



1. Stopper strap for weight transfer
2. Driver's weight

Choice of suspension adjustments depends on carrying load, driver's weight, personal preference, riding speed and field condition.

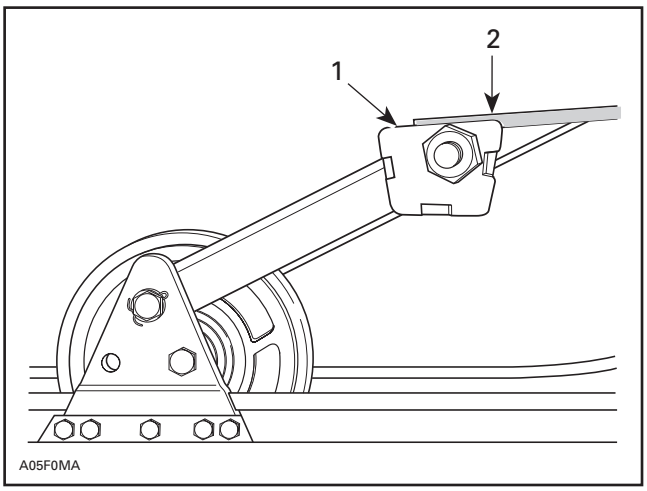
Rear Suspension Setting Table

Cam Position	Soft → Heavy
Operator's Weight	Light → High
Riding Speed	Low → High
Field Condition	Flat → Bumpy

Slight suspension bottoming occurring under the worst riding conditions indicates a good choice of springs preload.

To adjust rear suspension adjustment cams, use multi wrench supplied in vehicle tool box.

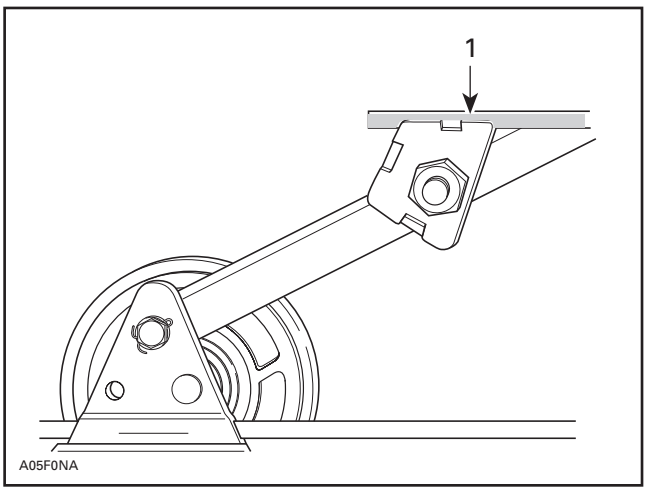
Turning adjustment cam moves edges of cam supporting spring rod. The softest adjustment is reached when the supporting edge of cam is the closest to hexagonal portion of cam.



SOFTEST ADJUSTMENT

1. *Supporting edge **closest** to hexagonal*
2. *Spring*

The stiffest adjustment is reached when the supporting edge of cam is the farthest to hexagonal portion of cam.

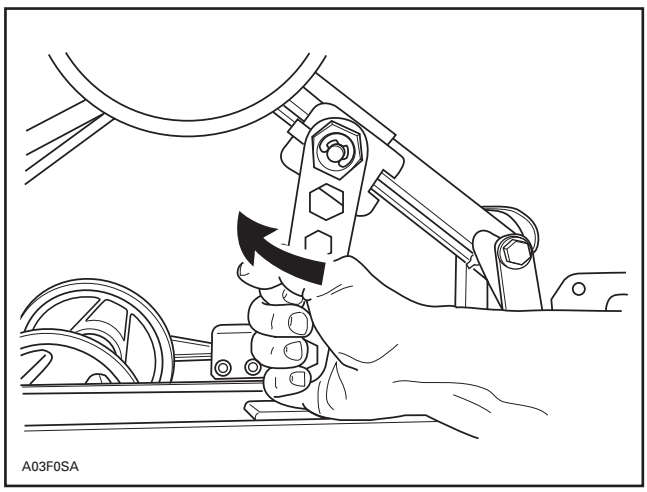


STIFFEST ADJUSTMENT

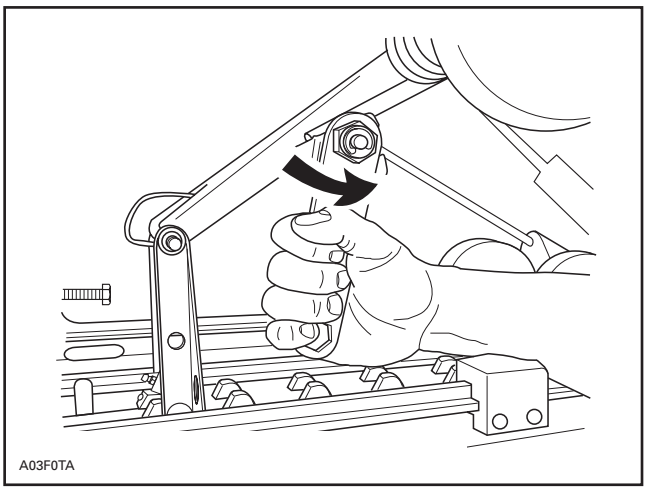
1. *Supporting edge **farthest** to hexagonal*

▼ CAUTION

Always turn the left side adjustment cams in a clockwise direction and the right side cams in a counterclockwise direction. Left and right adjustment cams must always be set at the same position.



LH SIDE SHOWN



RH SIDE SHOWN

Stopper Strap

The function of the stopper strap is to control the transfer of vehicle weight during acceleration and to control track lead angle.

The longer the belt, the more the weight will be transferred to the track to provide a better traction. The shorter the belt, the lesser the weight transferred to the track, thus maintaining a more positive steering.

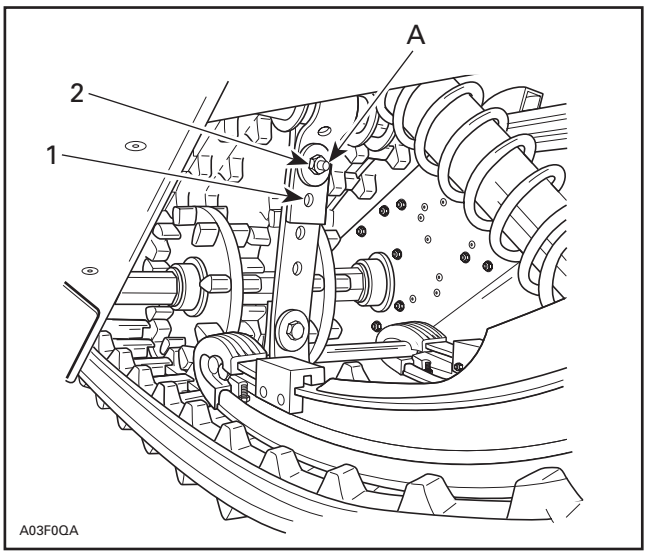
The longer the belt, the greater will be the track lead angle. A shorter belt will reduce track lead angle which may help when negotiating a particular snow condition.

Adjusting holes on the stopper strap allow to adjust it according to driver's requirements, field and/or snow conditions.

▼ CAUTION

Whenever stopper strap length is changed, track tension must be readjusted to prevent any possibility of operating vehicle with a too loose or too tight track tension.

For normal use, locate bolt through 2nd hole from strap end.



1. 1st hole
2. 2nd hole
*A. 11 N•m (97 lbf•**in**)*

◆ WARNING

Always torque the nut to 11 N•m (97 lbf•**in**). Replace strap if worn or torn.

NOTE: When towing a load, it is suggested to adjust stopper strap to a shorter length and stiffen rear springs. These adjustment will improve steering ability.

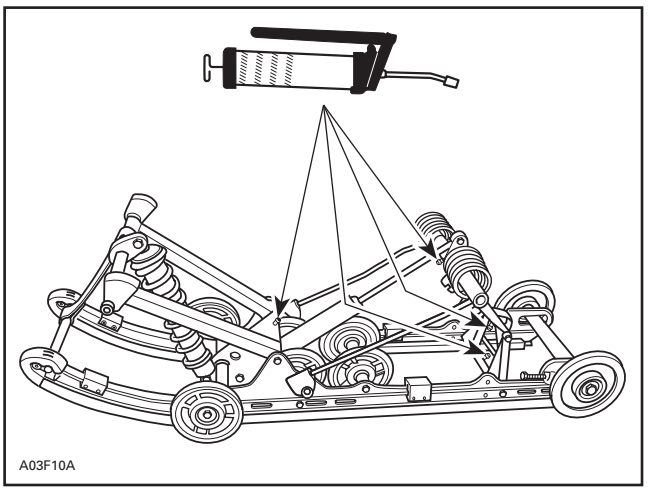
Deep Snow Operation

When operating the vehicle in deep snow, it may be necessary to change position of adjustment cams, stopper strap and/or driver's riding position, to change the angle at which the track rides on the snow. Operator's familiarly with the various adjustments as well as snow conditions will dictate the most efficient combination.

LUBRICATION

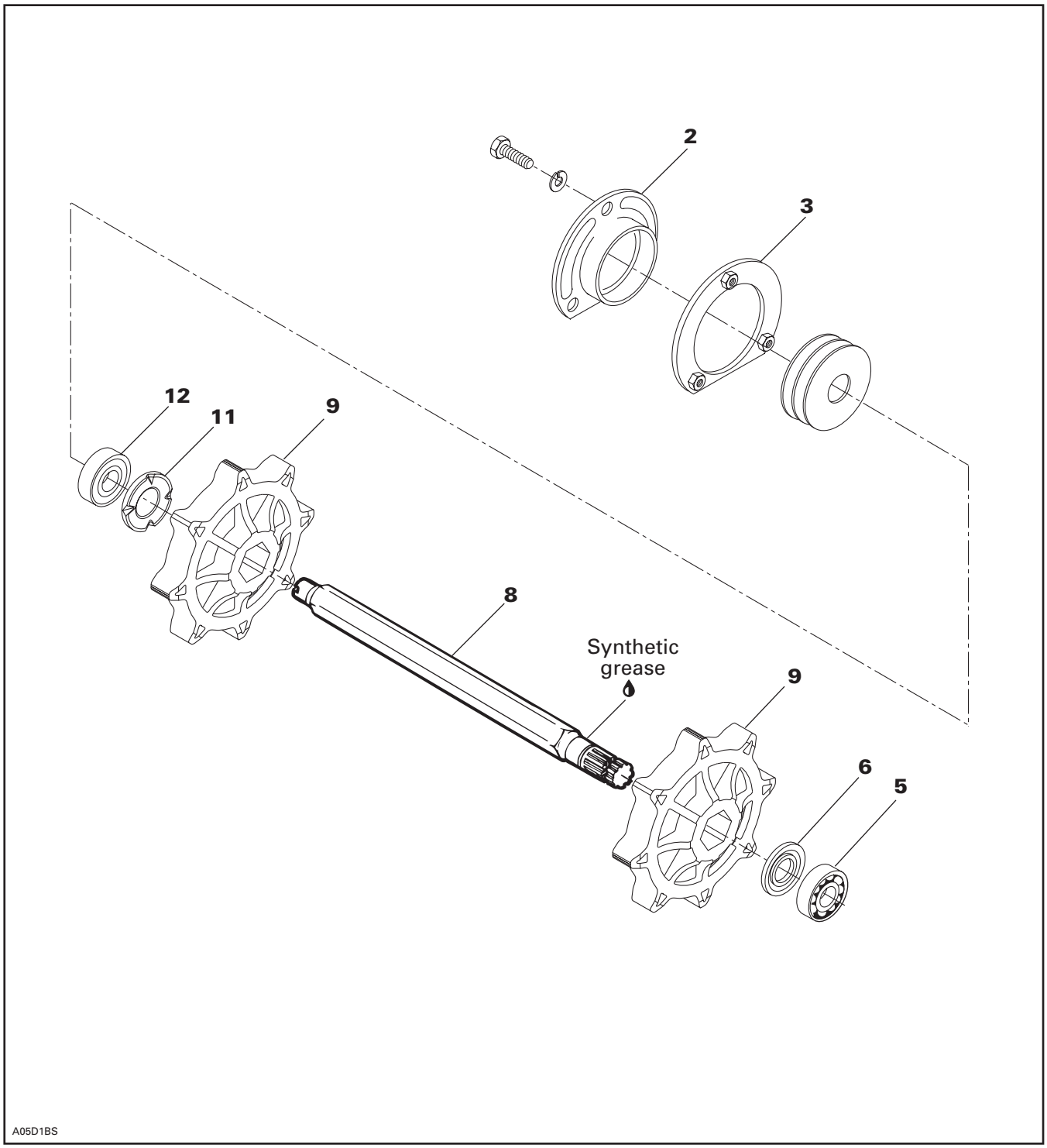
Lubricate front and rear arms at grease fittings using synthetic grease (P/N 413 711 500).

NOTE: There are 4 grease fittings.

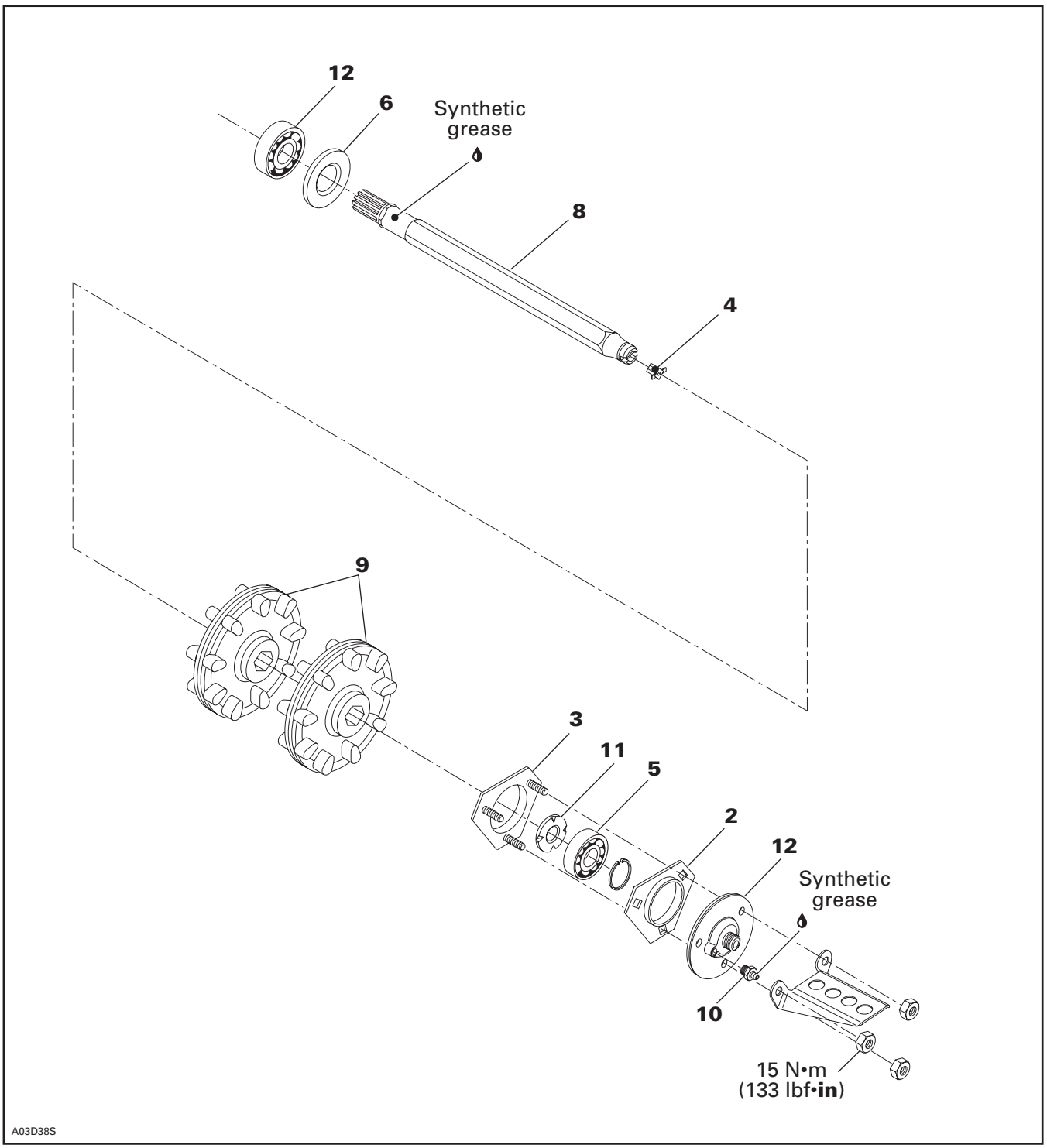


DRIVE AXLE

Tundra/R



S-Series


12
6
Synthetic grease
8
4
9
3
11
5
2
12
Synthetic grease
10
15 N•m
(133 lbf•in)
A03D38S

REMOVAL

All Models

Drain oil from chaincase. Remove chaincase cover and release drive chain tension (if applicable).

Raise and block rear of vehicle off the ground.

Remove suspension. (Refer to REAR SUSPENSION 07).

2,6, End Bearing Housing and Seal

NOTE: If vehicle is equipped with a speedometer, remove angle drive unit and coupling cable if necessary.

On all S-Series, remove chain and sprockets then circlip and bearing on drive axle.

Pry oil seals from chaincase and end bearing housing.

Unlock sprocket from drive axle and remove with its spacer (if applicable).

Push drive axle toward chaincase until end bearing housing studs clear off frame holes.

Release drive axle sprocket from track and at the same time, pulling the drive axle toward the end bearing housing side.

Remove drive axle from vehicle.

DISASSEMBLY

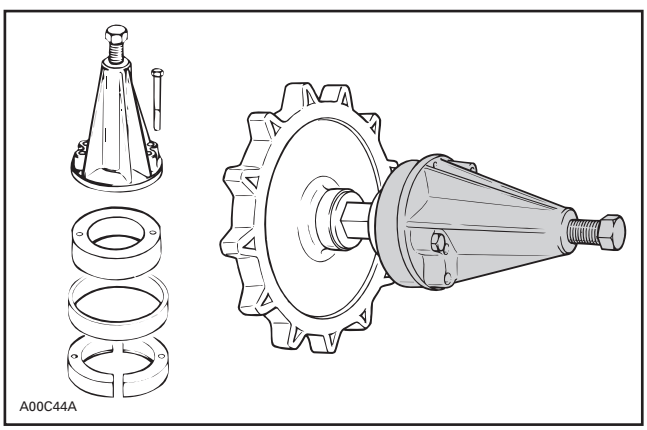
4, Speedometer Drive Insert

All Models

Remove speedometer drive insert (if applicable).

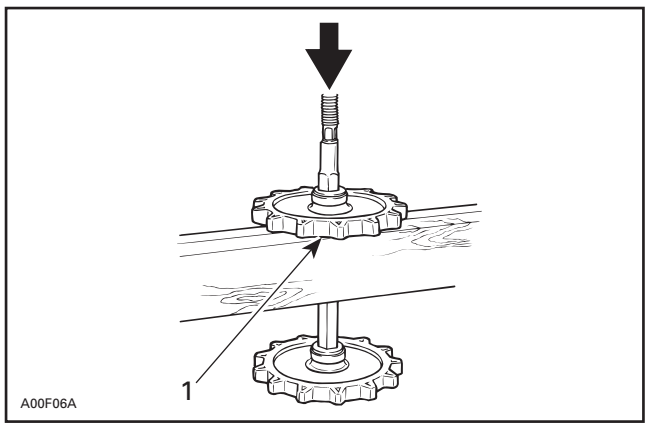
5,12, Bearing

To remove bearings, use puller assembly, ring and half rings as illustrated.



9,13, Sprocket and Half-Sprocket

To remove press fit sprockets, use a press and a suitable support as illustrated.

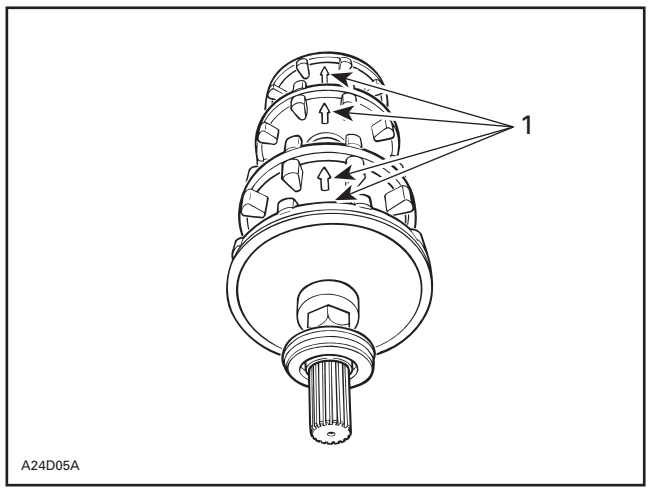


1. Support sprocket near hub

NOTE: Two different types of sprocket press fit can be found. Ensure to replace ring reinforced sprockets with the same type.

ASSEMBLY

Ensure to align indexing marks of each sprocket when assembling.

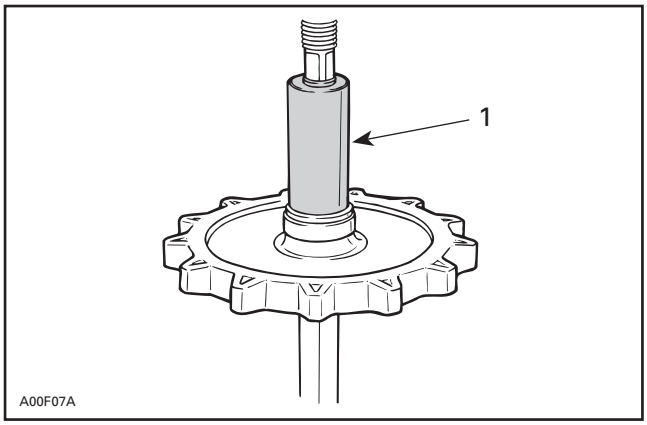


TYPICAL

1. Indexing marks aligned

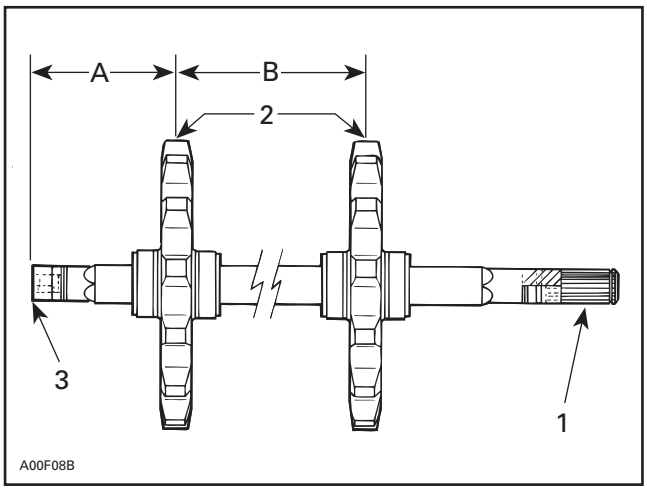
8,9,13, Drive Axle and Sprocket

To assemble press fit sprockets, use a press and a suitable pipe as illustrated. Sprockets must be assembled according to the following dimensions.



1. Pipe

Tundra/R

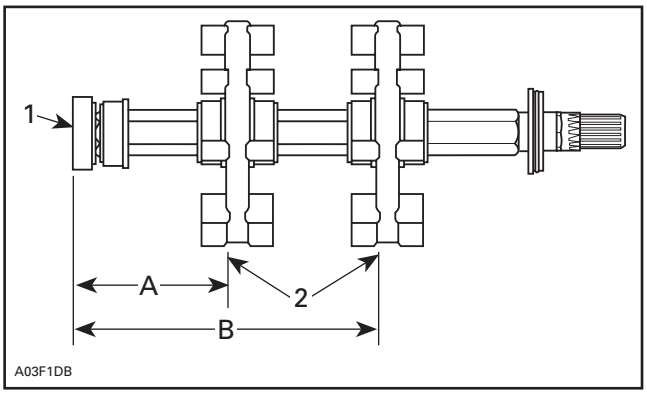


TYPICAL

1. Chaincase side
2. Center line of sprocket
3. Drive axle end

APPLICABLE MODEL	A mm (in)	B mm (in)
Tundra series	85.5 (3-23/64)	237 (9-21/64)

S-Series



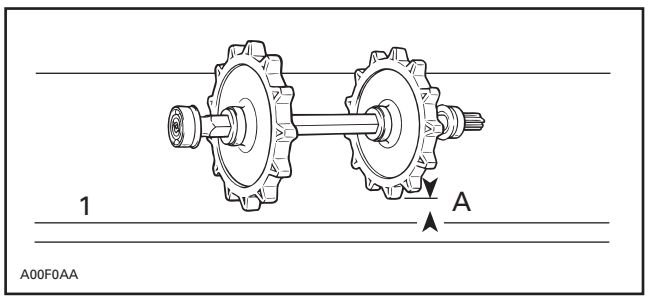
1. End of drive axle
2. Measure from sprocket side

APPLICABLE MODEL	A mm (in)	B mm (in)
S-Series	151.2 (5-15/16)	274.2 (10-51/64)

All Models

The maximum desynchronization for the sprockets is 1.5 mm (1/16 in).

To check this tolerance, place axle assembly on a plane surface and measure the gap between sprocket tooth and surface.



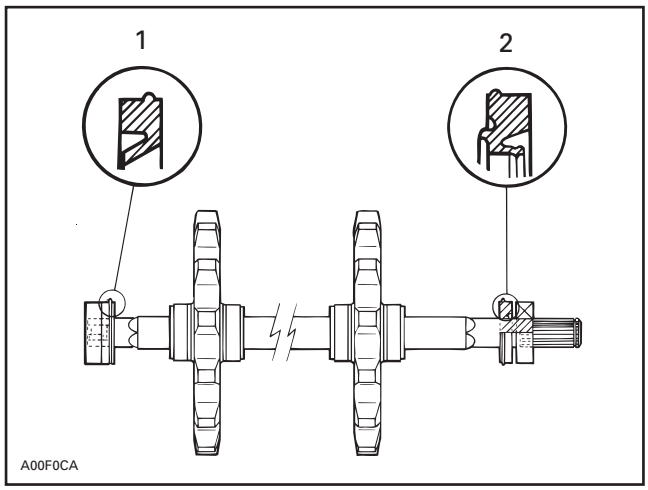
1. Plane surface
A. 1.5 mm (1/16 in) MAXIMUM

▼ CAUTION

The same sprocket must not be pressed twice on the axle. If synchronization is found to be defective, use a new sprocket.

6,8, Drive Axle and Seal

When assembling drive axle, always position a new seal on each end of drive axle (chaincase side only on Tundra series). Locate seal lip as illustrated.



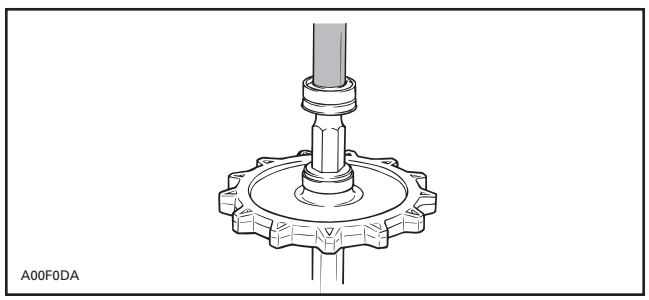
1. Grease seal type
2. Oil seal type

11, Bearing Protector

At assembly, flat side of bearing protector must be against bearing.

5,12, Bearing

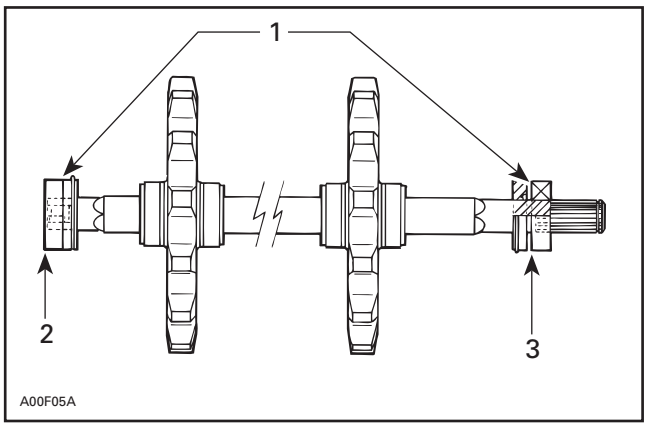
Always push bearing by inner race.



The bearing on the splined side of axle must be pushed until it is seated on shaft shoulder. On S-series bearing shield must face chaincase.

The end bearing housing bearing must be flush with end of drive axle. On S-Series bearing shield must face sprocket.

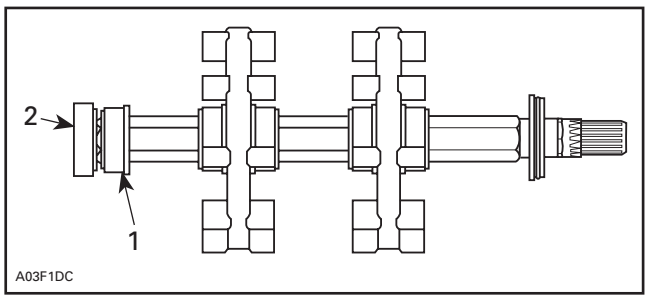
On Tundra series both bearings must have their shield facing the sprocket.



TUNDRA SERIES

1. Bearing shield on this side
2. Flush with drive axle
3. Seated on shaft shoulder

NOTE: On S-Series bearing on chaincase side is installed after the drive axle.



S-SERIES — TYPICAL

1. Bearing shield on this side
2. Flush with drive axle



S-SERIES — TYPICAL

1. Bearing shield on this side

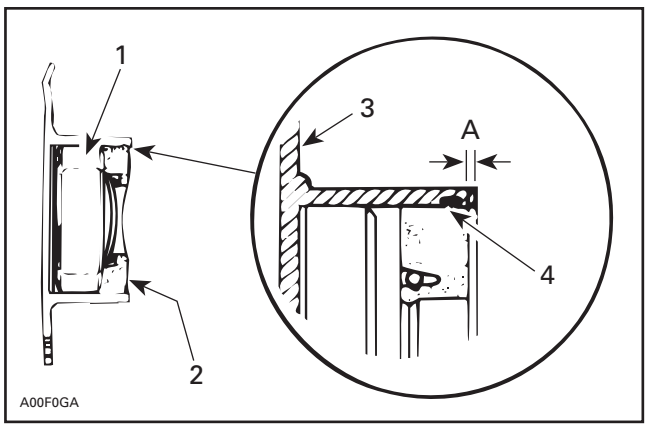
INSTALLATION

4, Speedometer Drive Insert

If the drive axle to be installed is a new part and the vehicle is equipped with a speedometer, a correct size speedometer drive insert must be installed into the axle end. Ensure that insert is flush with end of axle.

Position drive axle assembly into location. Install end bearing housing. Install spacer (if applicable) between bearing and lower chaincase sprocket.

Install chaincase and position seals (if applicable), making sure that a gap of approximately 2 mm (1/16 in) exists between end of bearing housing and each seal.



SIDE VIEW

1. *Bearing*
2. *Seal*
3. *Housing*
4. *Seal lip*

A. 2 mm approx.

3, Retainer Ring

Make sure that welded nuts are toward inside of tunnel.

Lock drive axle sprocket with a circlip.

Reinstall the chaincase cover (if applicable).

Refill with chaincase oil.

Install the suspension. Refer to TRACK 07-05 and adjust track tension and carry out track alignment procedure.

LUBRICATION

15, Grease Fitting

Lubricate end housing bearing with synthetic grease (P/N 413 711 500).

ADJUSTMENT

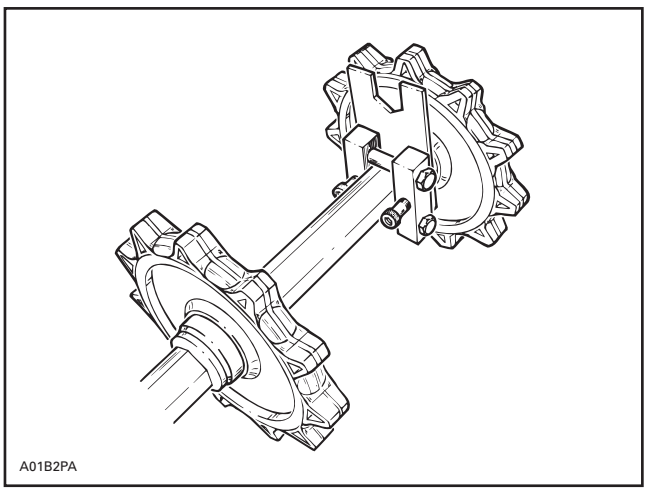
Sprocket/Track Alignment

▼ CAUTION

Do not temper with sprocket/track alignment if frame or suspension is damaged.

Sprockets might be repositioned to fit track holes (lugs on S-Series) without removing drive axle.

Use drive axle sprocket adjuster kit (P/N 861 725 700).



TYPICAL

TRACK

TRACK TYPE APPLICATION

Refer to TECHNICAL DATA 10.

GENERAL

This section gives guidelines for track removal. Some components require more detailed disassembly procedures. In these particular cases, refer to the pertaining section in this manual.

INSPECTION

Visually inspect track for:

– cuts and abnormal wear
– broken rods
– broken or missing track cleats

If track is damaged or rods are broken, replace track. For damaged or missing cleats, see procedure below.

◆ WARNING

Do not operate a snowmobile with a cut, torn or damaged track.

REMOVAL

Tundra/R

Remove the following items:

– chaincase cover, sprockets, chain
– muffler
– upper center idler ass'y
– suspension
– end bearing housing
– drive axle seal
– drive axle (outwards from end bearing housing)
– track

S-Series

Remove the following items:

– speedometer cable
– muffler
– chaincase cover
– suspension
– drive axle seal
– end bearing housing
– sprockets and chain
– drive axle (toward end bearing housing)
– track

INSTALLATION

All Models

Reverse the removal procedure.

NOTE: When installing the track, respect rotation direction indicated by an arrow on track thread.

Check sprocket/track alignment as described in DRIVE AXLE 07-04.

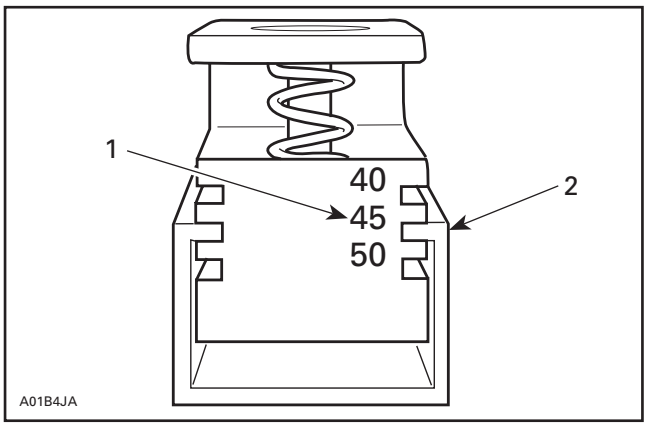
Track Tension and Alignment

Track tension and alignment are interrelated. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

Tension

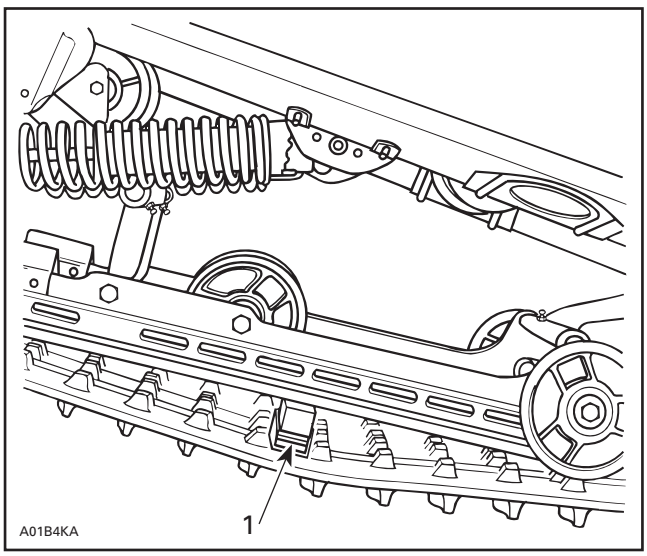
Lift the rear of vehicle and support with a mechanical stand. Allow the slide to extend normally. Check the gap half-way between front and rear idler wheels. Measure between slider shoe and bottom inside of track.

When using the track tension gauge (P/N 529 021 500), slide U shape extrusion to proper deflection.



1. Example 45 mm
2. Extrusion

Insert pre-setted gauge between slider shoe and track. Allow gauge to settle by forcing track up and down. Track tension is as specified when edge of gauge reaches line.

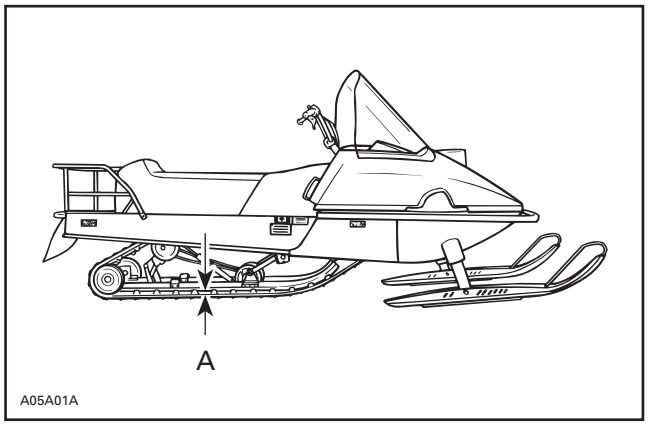


TYPICAL
1. Line

NOTE: Lightly oil track tension gauge center pin to avoid sticking.

Tundra/R

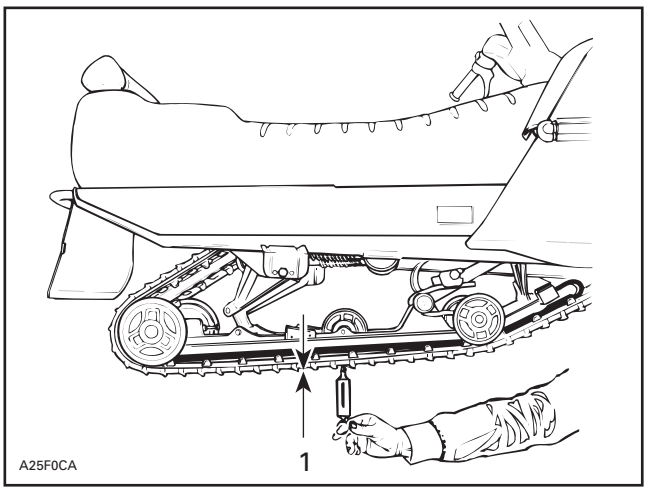
35 to 40 mm (1-3/8 to 1-9/16 in) when exerting a downward pull of 7.3 kg (16 lb).



A. 35 to 40 mm (1-3/8 to 1-9/16 in)

S-Series

35 to 40 mm (1-3/8 to 1-9/16 in) when exerting a downward pull of 7.3 kg (16 lb).



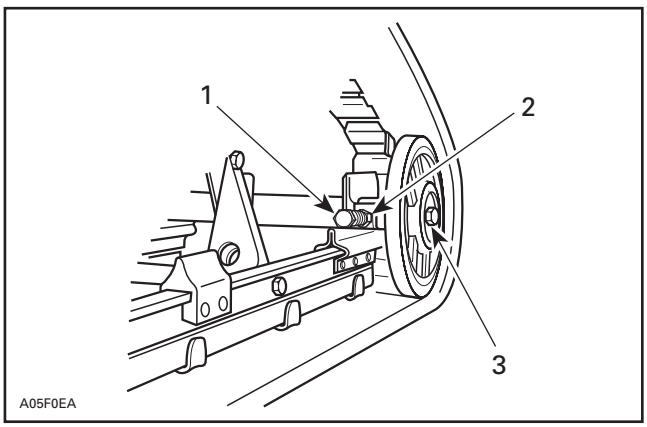
TYPICAL
1. 35 to 40 mm (1-3/8 to 1-9/16 in) with 7.3 kg (16 lb)

All Models

CAUTION

Too much tension will result in power loss and excessive stress on suspension components. If too loose, the track will have a tendency to thump.

To adjust, loosen the rear idler wheel retaining screws (1 side only on Tundra/R and S-Series) and the adjuster bolt lock nut; then loosen or tighten the adjuster bolts located on the inner side of the rear idler wheels.



TYPICAL

1. *Adjuster bolt*
2. *Lock nut (except S-Series)*
3. *Retaining screw*

Alignment

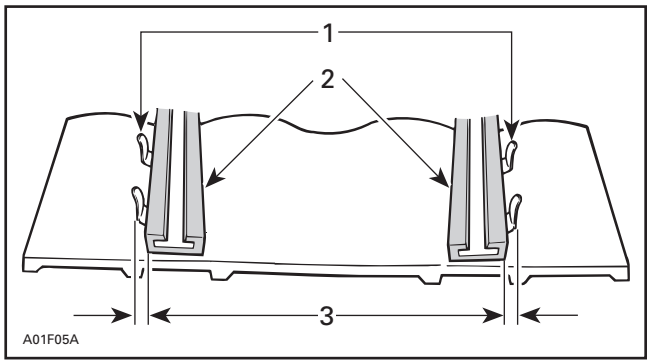
WARNING

Before checking track tension, ensure that the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

All Models

With rear of vehicle supported off the ground, start engine and allow the track to rotate **slowly**.

Check that the track is well centered; equal distance on both sides between edges of track guides and slider shoes.

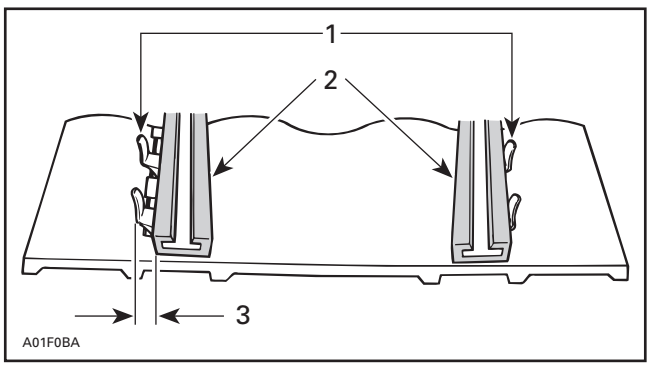


1. *Guides*
2. *Slider shoes*
3. *Equal distance*

WARNING

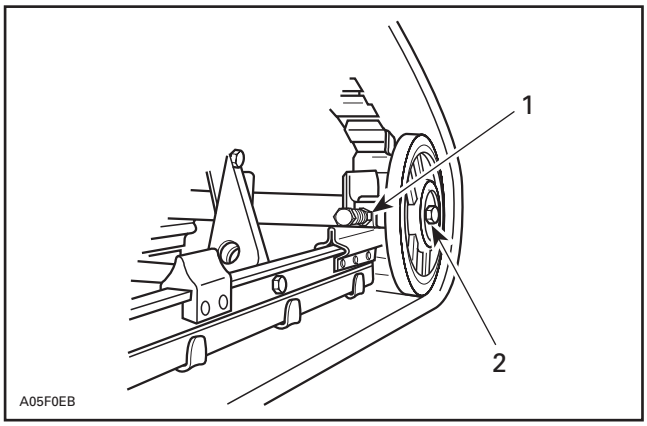
Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track.

To correct, stop engine then loosen the lock nuts and tighten the adjuster bolt on side where guides are farthest to slide. Tighten lock nuts and recheck alignment.



1. *Guides*
2. *Slider shoes*
3. *Tighten on this side*

Tighten lock nuts and the idler wheel retaining screws.



TYPICAL

1. *Retighten (except S-Series)*
2. *Retighten*

Restart engine, rotate track **slowly** and recheck alignment.

TRACK CLEAT

Removal

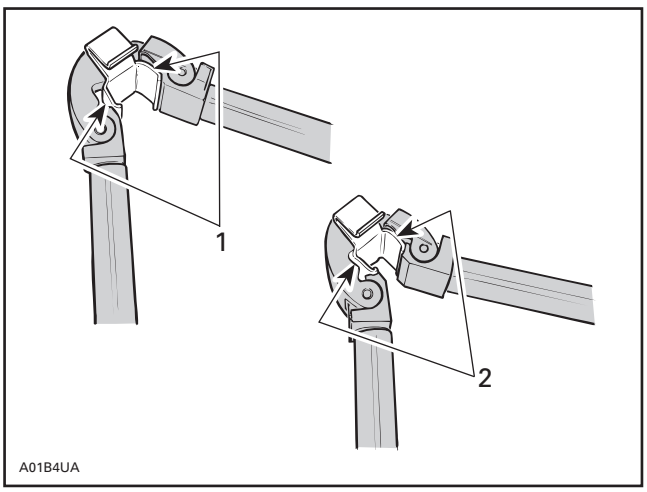
– Raise rear of vehicle off the ground and lift snow guard then rotate track to expose a cleat to be replaced.

– Using track cleat remover (P/N 529 008 200) for Tundra/R. Use (P/N 529 008 700) for all other models.

Installation

NOTE: Keep the same pitch between guide cleats.

– Place new cleat in position and using small track cleat installer (P/N 529 008 500) for Tundra/R or cleat installer (P/N 529 028 800) for S-Series, bend cleat then push tabs into rubber.



TYPICAL

1. *First step*
2. *Second step (to push tabs into rubber)*

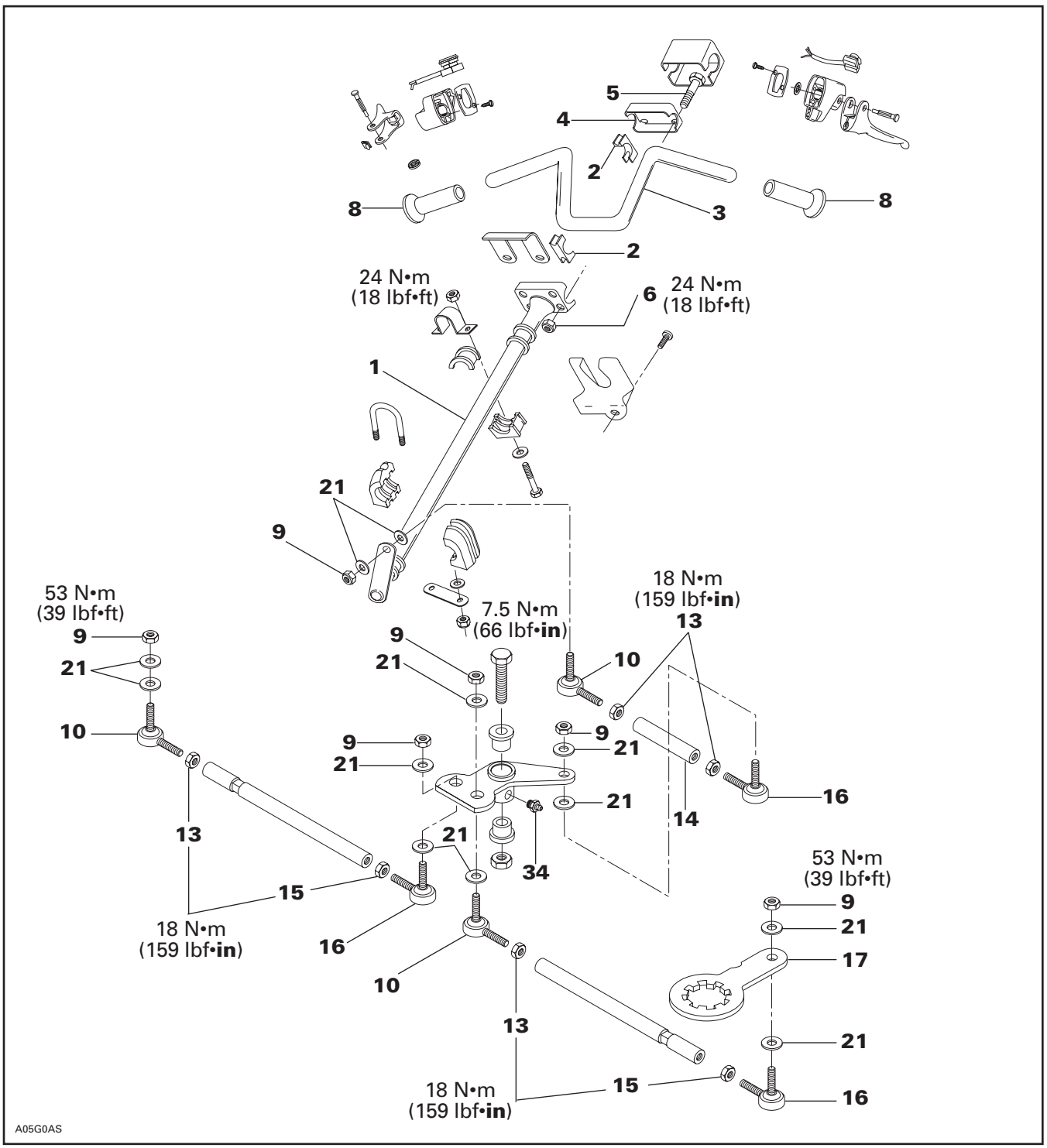
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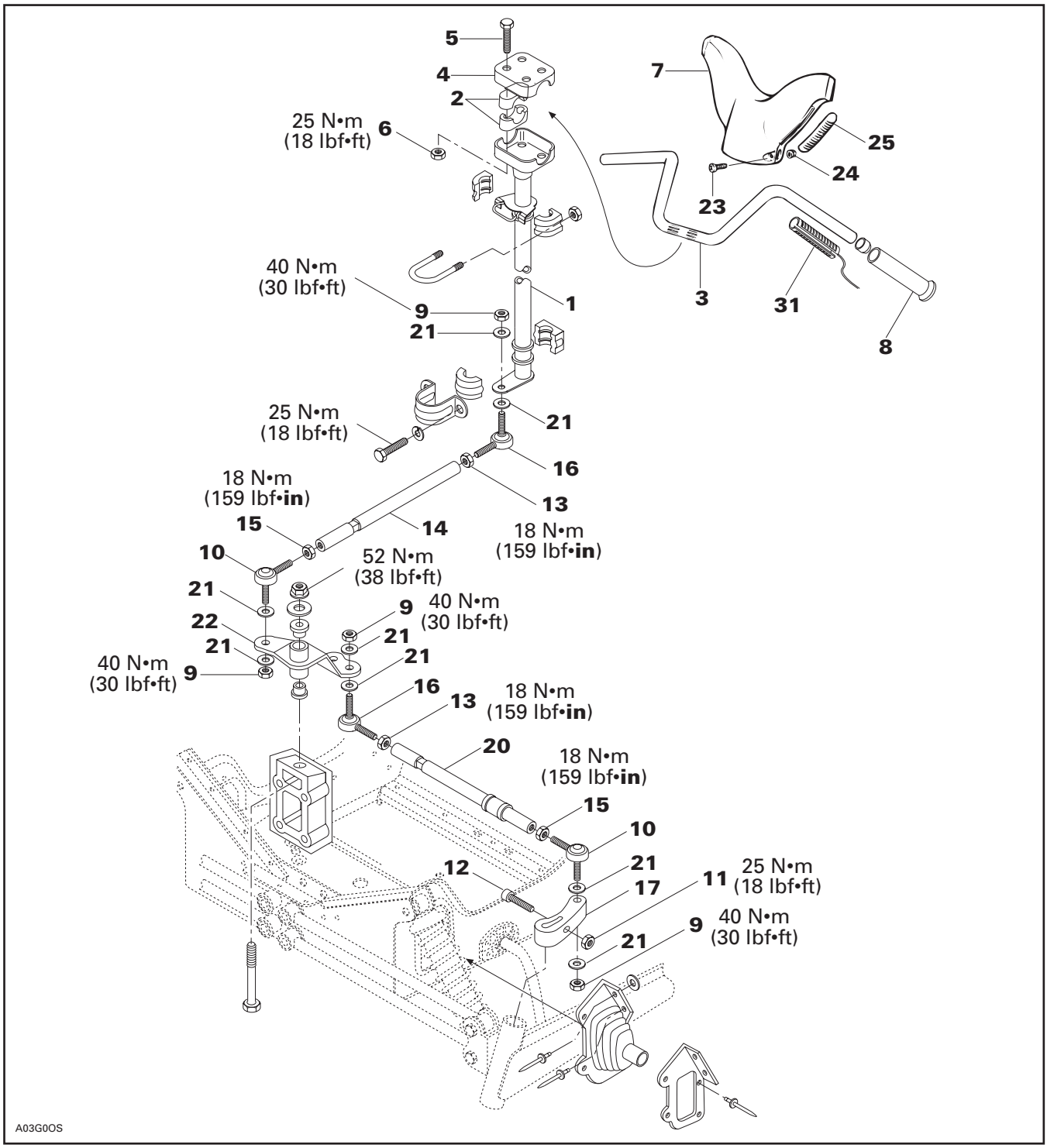
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STEERING SYSTEM

Tundra/R



S-Series



PARTS

INSPECTION

Check skis and runner shoes for wear, replace as necessary. Refer to SUSPENSION AND SKI SYSTEM 08-03.

17,36, Steering Arm and Ski Leg

Make sure steering arm and ski leg splines interlock (if applicable).

◆ WARNING

All parts having worn splines have to be changed by new ones.

Check general condition of steering system.

Check general condition of steering system components for wear and replace if necessary.

DISASSEMBLY AND ASSEMBLY

8, Grip

Grips can be removed and installed without any damage by injecting compressed air into the handlebar or by heating them with a heat gun.

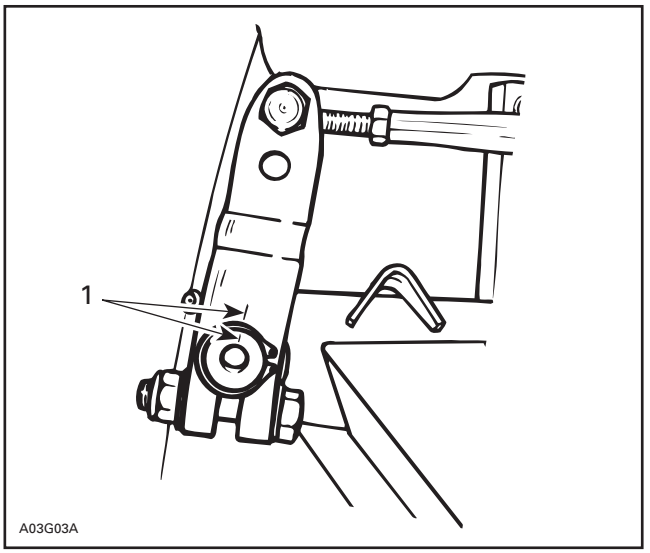
1, Steering Column

Remove steering pad then handlebar ass'y.

Detach short tie rod from steering column working under engine. On S-Series remove air intake silencer and carburetor(s) to gain access.

17, Steering Arm

To maintain correct steering geometry when reassembling, punch mark the steering arm and ski leg before removal.



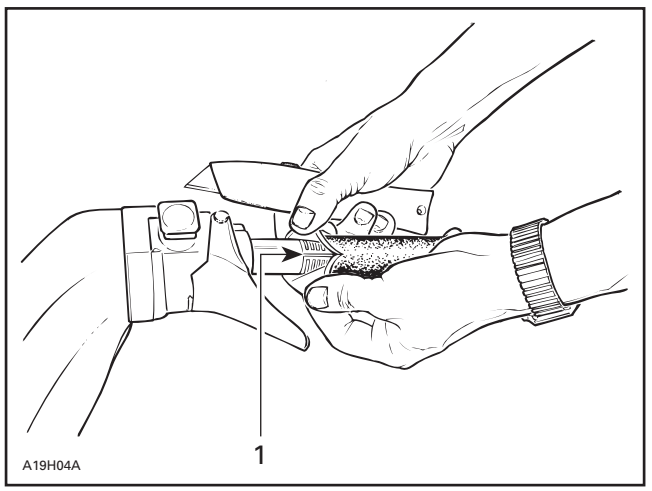
TYPICAL

1. Punch marks

31, Heating Grip Element

On vehicle equipped with heating grips, grips might be unremovable as explained earlier, in this case, carefully proceed as follows to prevent damaging heating elements.

Locate the grip heater wires inside handlebar; look through end of grip. Start cutting grip exactly opposite heater wires and immediately peel open to locate gap in heating element, as shown.



1. Gap in heating element opposite wires

Continue cutting along gap and remove grip. If required, slowly peel heating element from handlebar and remove.

To install, stick heating element to handlebar making sure wires do not interfere with operation of accelerator or brake handle.

◆ WARNING

Never use lubricants (e.g. soap, grease, etc.) to install handlebar grip, use instead a mix of soap and water. Mix 40 parts of water with one part of dish washing soap (recommended: Ultra Joy, Sunlight or Palmolive).

Insert new grip with a rubber mallet. Heat grip with a heater gun or a spot light to facilitate installation.

INSPECTION

To verify heating elements refer to TESTING PROCEDURE 06-07.

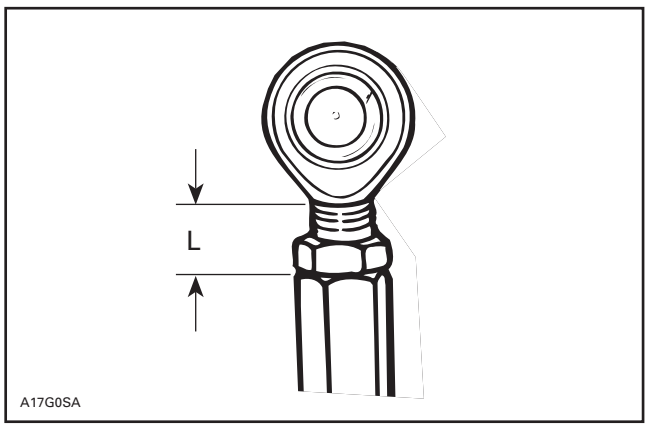
10,16, Ball Joint (left hand and right hand threads)

Inspect ball joint ends for wear or looseness, if excessive, replace.

Screw threaded end of ball joint into tie rod.

Tundra Series

The maximum external threaded length not engaged in tie rod must not exceed the value L in the following chart:

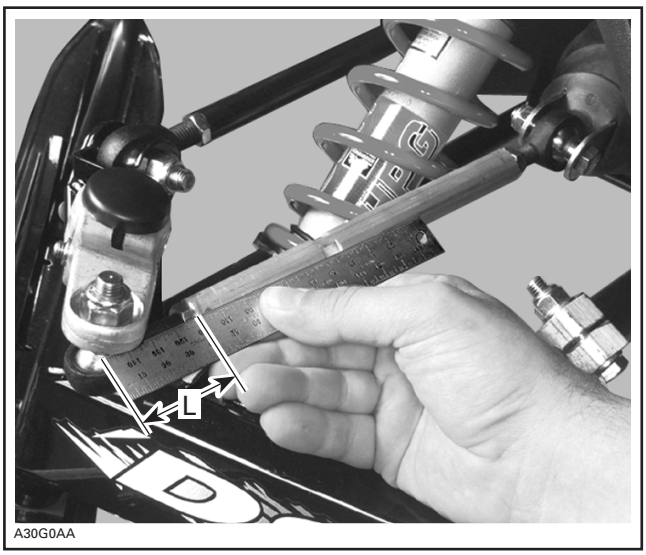


TYPICAL

MODEL	L	
	mm	(in)
Tundra series	17	(43/64)

S-Series

The maximum ball joint length exceeding tie rod is measured form tie rod to ball joint center. It must not exceed the value L in the following chart.

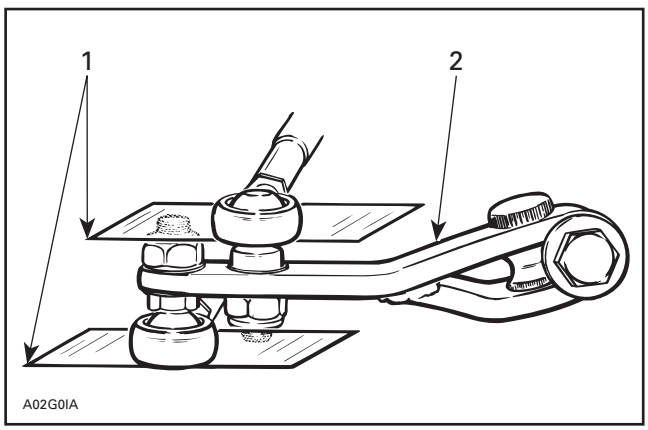


TYPICAL
L: Ball joint lentgh exceeding tie rod

MODEL	L	
	mm	(in)
S-Series	34	(1-11/32)

All Models

The cut-off section of the tie rod end must run parallel with the horizontal line of the steering arm when assembled on vehicle. The ball joint should be restrained when tightening tie rod end lock nut. For torque specifications see specific exploded view.



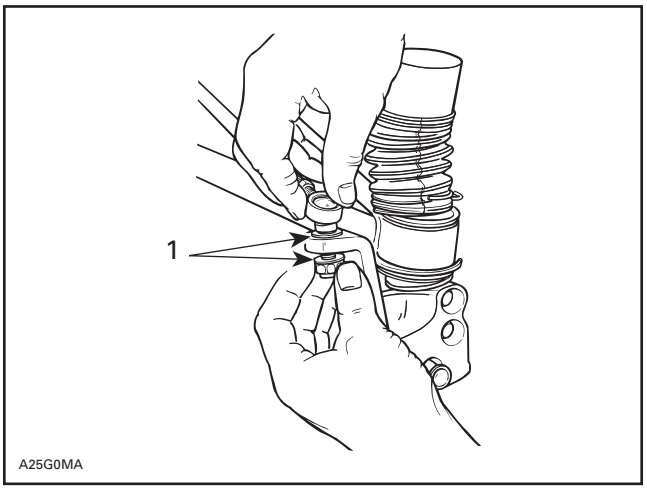
TYPICAL
1. *Steering arm*
2. *Parallel with steering arm*

◆ WARNING

The cut-off section of the ball joint must run parallel with the steering arm. When tightening lock nuts, restrain ball joint with appropriate size wrench. Ensure not too many threads are kept outside of the tie rod according to the thread length chart.

21, Hardened Washer

Install a hardened washer on each side.



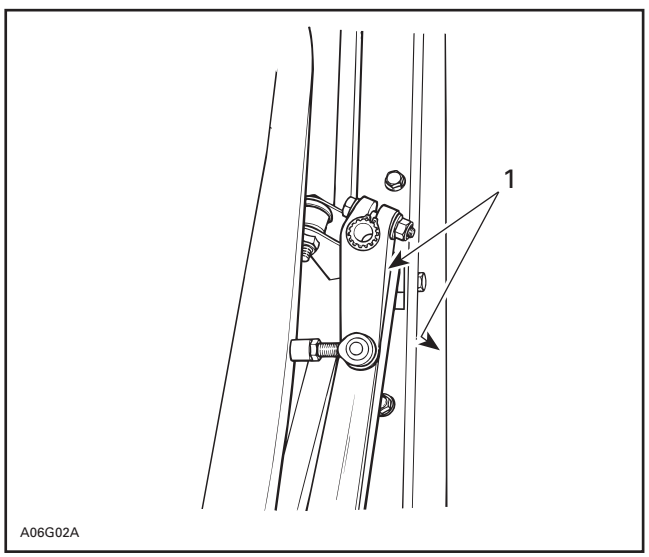
TYPICAL

1. Hardened washers

17,36, Steering Arm

The steering arm angles should be equal on both sides when skis are parallel with vehicle.

Steering arm must run parallel to ski.



1. Parallel

9,13,15, Ball Joint Nut and Jam Nut

Tighten ball joint jam nuts to specified torque (see illustration).

11,12, Steering Arm Nut and Bolt

Tighten steering arm nuts to specified torque (see illustration).

ADJUSTABLE HANDLEBAR

1,3, Steering Column and Handlebar

If applicable, remove the steering clamp and nuts holding the handlebar to the steering column. Tighten nuts to the specified torque (see illustration).

2,4,5,6, Handlebar Support, Steering Clamp, Bolt and Nut

Install the 4 handlebar support, steering clamp, the 4 screws and nuts to the column, as illustrated.

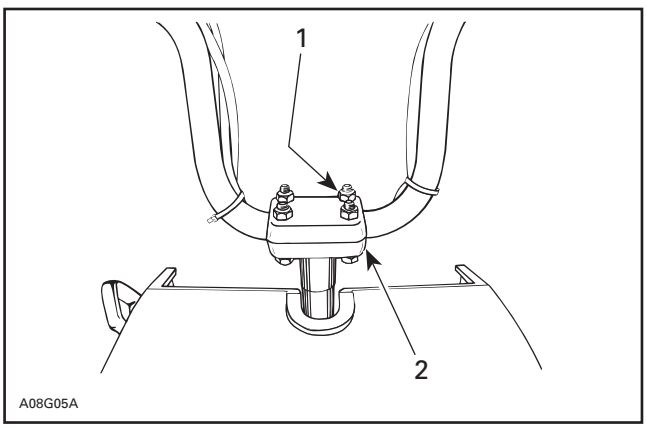
See applicable exploded view for each model.

Adjust the steering handle to the desired position.

Lock the handle in place by tightening the 4 nuts to 26 N•m (19 lbf•ft).

▼ CAUTION

Tighten the nuts equally in a criss-cross sequence and ensure there is an equal gap on each side of the clamps.



TYPICAL

1. Torque 26 N•m (19 lbf•ft)
2. Equal gap all around

◆ WARNING

Avoid contact between the brake handle and the windshield by **NOT** adjusting the handlebar too high.

◆ WARNING

Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.

▼ CAUTION

Plastic alloy components such as fuel tank, windshield, controls, etc. can be cleaned using mild detergents or isopropyl alcohol and a soft clean cloth. Never clean plastic parts with strong detergent, degreasing agent, paint thinner, acetone, etc. Do not apply isopropyl alcohol directly on decals.

7,23,24,25, Steering Pad, Bolt, Nut and Rubber Attachment

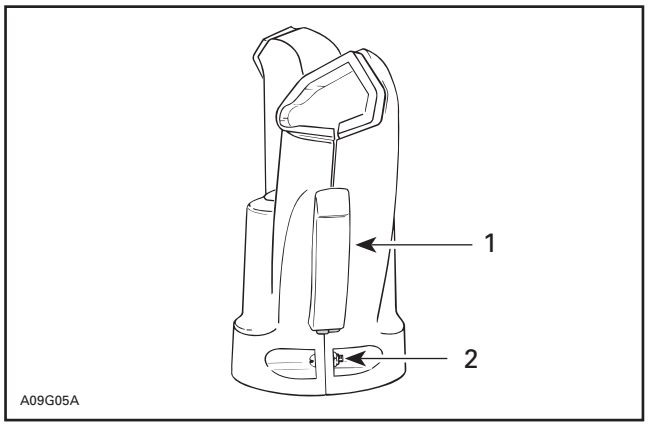
▼ CAUTION

Prior to installation, perform handlebar adjustment.

Properly fit the steering pad to the handlebar. Assemble using the 2 rubber attachments, nuts and bolts.

◆ WARNING

Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.

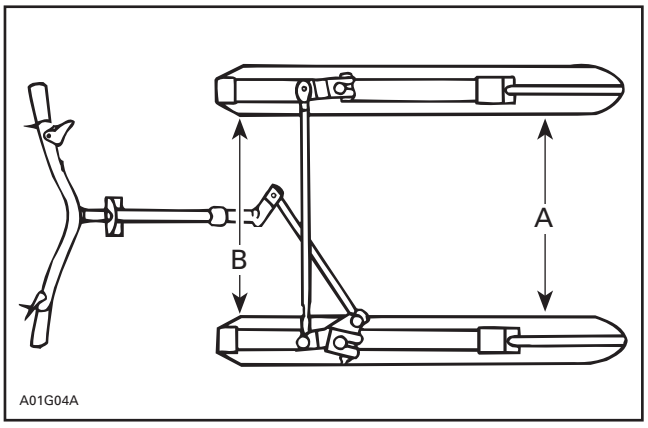


1. Rubber attachment
2. Nut and bolt

STEERING ADJUSTMENT DEFINITIONS (skis)

Toe-Out

A difference in measurement between front edge A and rear edge B of skis as viewed from top side of suspension system. It is adjustable.



Camber

A specific inward or outward tilt angle of ski leg compared to a vertical line when viewing vehicle from front. **This angle is not adjustable on these models.**

ADJUSTMENTS

Tundra/R

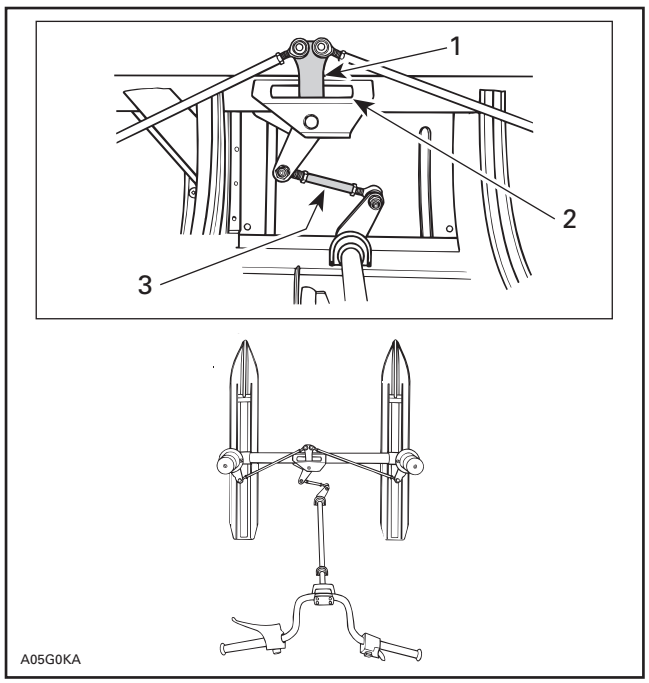
Adjustments should be performed following this sequence:

– Pivot arm centering/horizontal handlebar.
– Set toe-out.

Pivot Arm Centering/horizontal Handlebar

Turn handlebar until pivot arm is well centered in slot of its bracket.

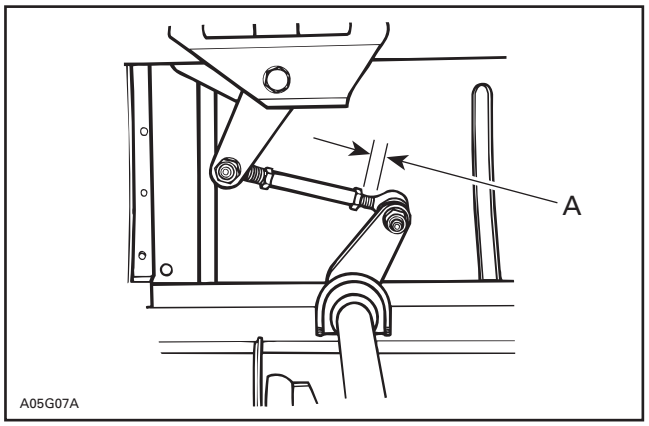
Check if handlebar is horizontal. To adjust, loosen lock nuts of short tie rod and turn it accordingly.



1. Pivot arm centered in slot
2. Slot
3. Turn to adjust

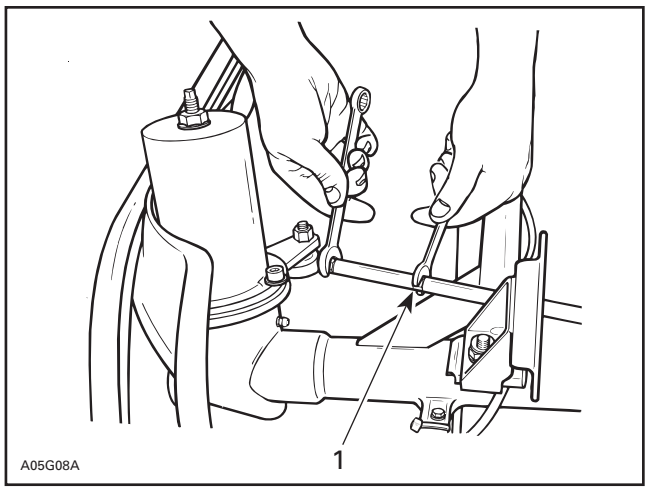
◆ WARNING

Maximum ball joint external threaded length not engaged in the tie rod end must not exceed 17 mm (43/64 in). Torque lock nut to 18 N•m (159 lbf•**in**).



A. 15 mm (19/32 in) max.

Restrain tie rod while firmly retighten nuts so that ball joint sockets run parallel with steering arm and pivot arm.

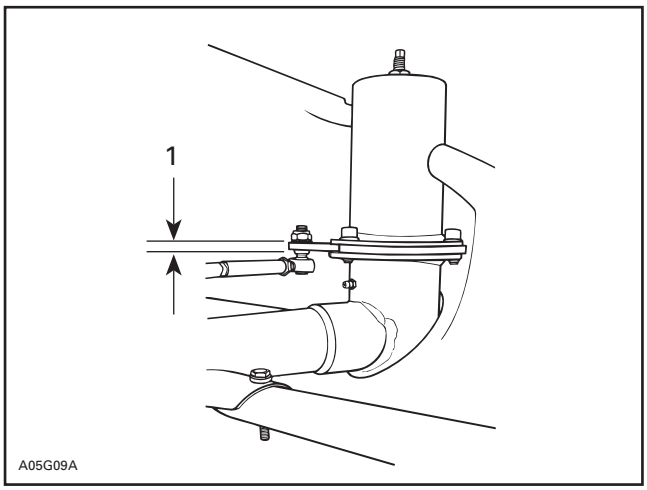


LONG TIE ROD SHOWN

1. Restrain tie rod to tighten lock nuts

◆ WARNING

Ball joint sockets must run parallel with steering arm and pivot arm. Tie rod must be restrained when tightening lock nuts.



LONG TIE ROD SHOWN
1. Ball joint parallel with arm

Ensure that pivot arm is still centered and check ski toe-out.

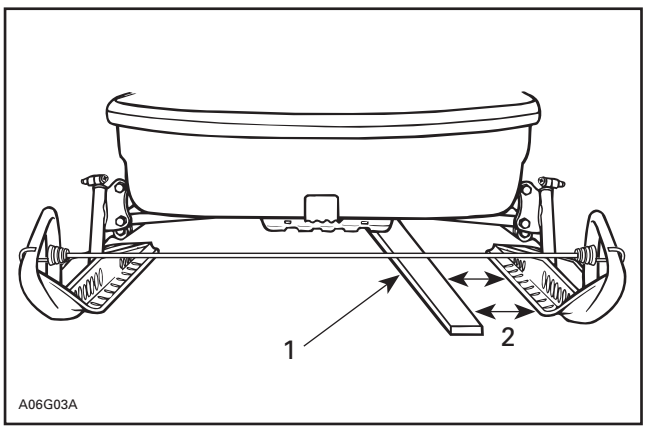
Toe-Out

Raise front of vehicle so that skis are off the ground.

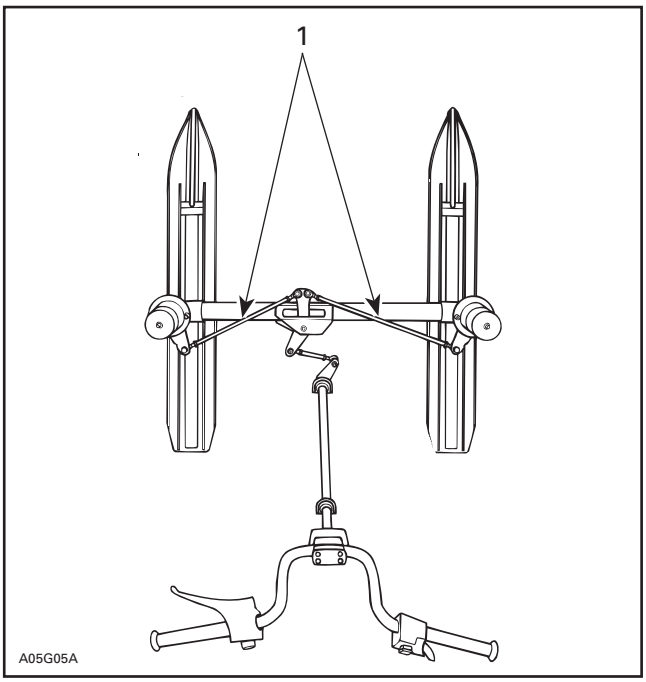
Loosen lock nuts of long tie rods and turn each tie rod so that skis are in a straight ahead position. To adjust toe-out, slightly turn both tie rods exactly the same amount.

Check external threaded length not engaged and firmly retighten nuts as specified above.

NOTE: To make sure skis are in straight-ahead position, place a straight edge against pre-adjusted track and measure distance between front and rear of skis and straight edge. Distances should be equal. After ski toe-out adjustment, distance at front of ski must be 3.0 mm (1/8 in) more than at rear on both sides for a total toe-out of 6 mm (1/4 in).



TYPICAL
1. Straight edge
2. 3.0 mm (1/8 in) more at front than at rear



1. Turn to adjust

S-Series

Adjustments should be performed following this sequence:

– Pivot arm centering.
– Check for horizontal handlebar.
– Set toe-out.

Pivot Arm Centering

◆ WARNING

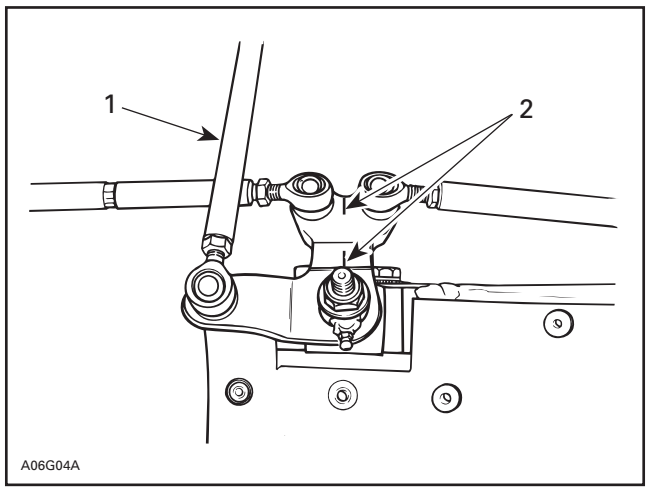
Do not attempt to adjust skis straight ahead position by turning ball joint on tie rod no. 14.

13,14,22, Jam Nut, Tie Rod and Pivot Arm

With handlebar in straight position, center of pivot arm must be in line with end of bolt. Loosen jam nuts on tie rod **no. 14** (LH threads on steering column end) and turn tie rod accordingly. Tighten jam nuts to 18 N•m (159 lbf•**in**).

◆ WARNING

Never lengthen tie rod so that portion of ball joint exceeds 34 mm (1-11/32 in). See photo in INSPECTION above.

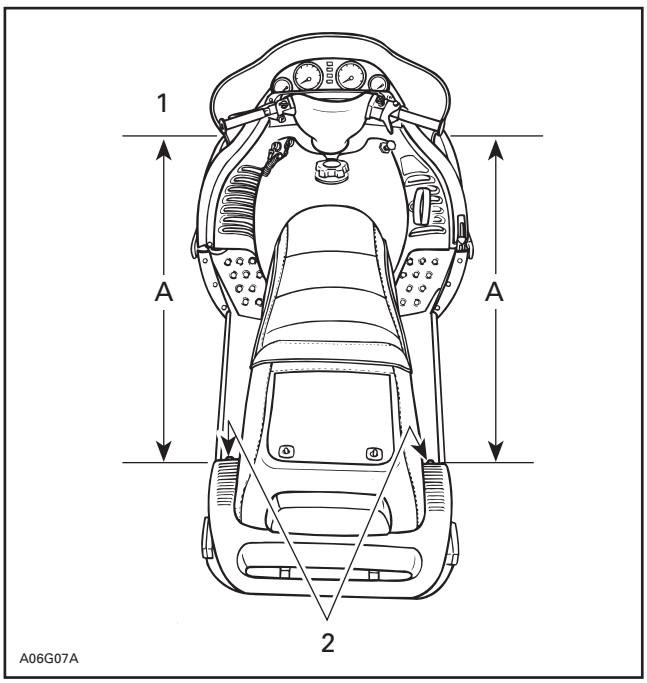


TYPICAL — S-SERIES
1. *Tie rod* ***no. 14***
2. *Center of pivot arm in line with bolt end*

Handlebar and Ski Toe-Out

Check that handlebar is horizontal when skis are in straight ahead position by measuring from the extremities of the grips to the rear most edge of the tunnel, as shown.

NOTE: The reference point must be the same relative to each side.



TYPICAL
1. *Equal distance A on each side*
2. *Same reference point (rivet)*

Adjustment is performed by adjusting length of left and right tie rods **no. 20**.

◆ WARNING

Do not attempt to adjust skis straight ahead position by turning ball joint on tie rod no. 14.

Procedure:

– Loosen jam nuts **no. 13** and **no. 15** of both tie rods **no. 20**.

– Turn the tie rod on one side to shorten its length.

– Lengthen the other one by turning it exactly the same amount, so that toe-out is not changed.

◆ WARNING

Never lengthen tie rod so that threated portion of ball joint exceeds 34 mm (1-11/32 in). See photo in INSPECTION above.

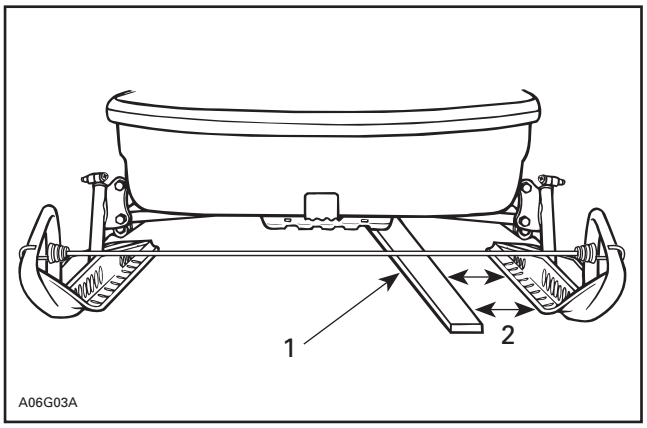
– Close front of skis manually to take all slack from steering mechanism.

NOTE: A rubber cord must be hooked in front of skis to keep them closed.

Toe-out is 0 mm (0 in) when skis are in a straight-ahead position and the front of vehicle is lifted off the ground.

NOTE: To make sure skis are in a straight-ahead position, place a straight edge against pre-adjusted track and measure the distance between front and rear of skis and straight edge. Distances should be equal. After the ski toe-out adjustment, distance must be equal.

To reduce tolerance when measuring, set one ski to proper toe-out then measure from that ski to the opposite ski.



TYPICAL

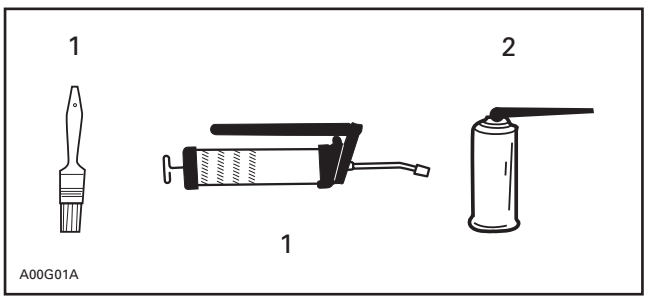
1. *Straight edge*
2. *Measure here*

LUBRICATION

◆ WARNING

Do not lubricate throttle and/or brake cable, housing and spring coupler bolts.

The following symbols will be used to show what type of lubricant should be used at the suitable locations.



1. *Synthetic grease (P/N 413 711 500)*
2. *BOMBARDIER LUBE (P/N 293 600 016)*

Grease Fitting and Ski Leg

Use synthetic grease only (P/N 413 711 500).

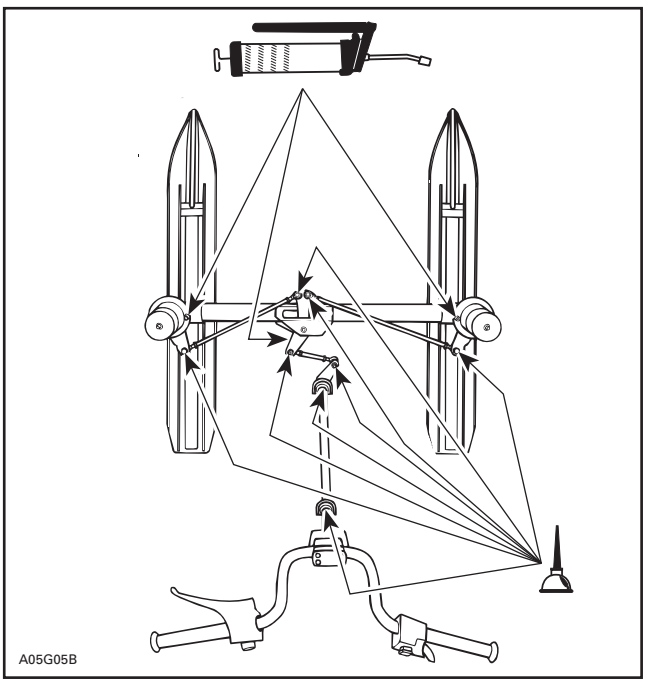
Tundra/R

Lubricate front suspension posts and pivot arm at grease fittings. Pump five strokes of grease gun on each post.

NOTE: There are 3 grease fittings.

Oil ball joints and steering column bushings.

NOTE: There are 8 lubrication points.

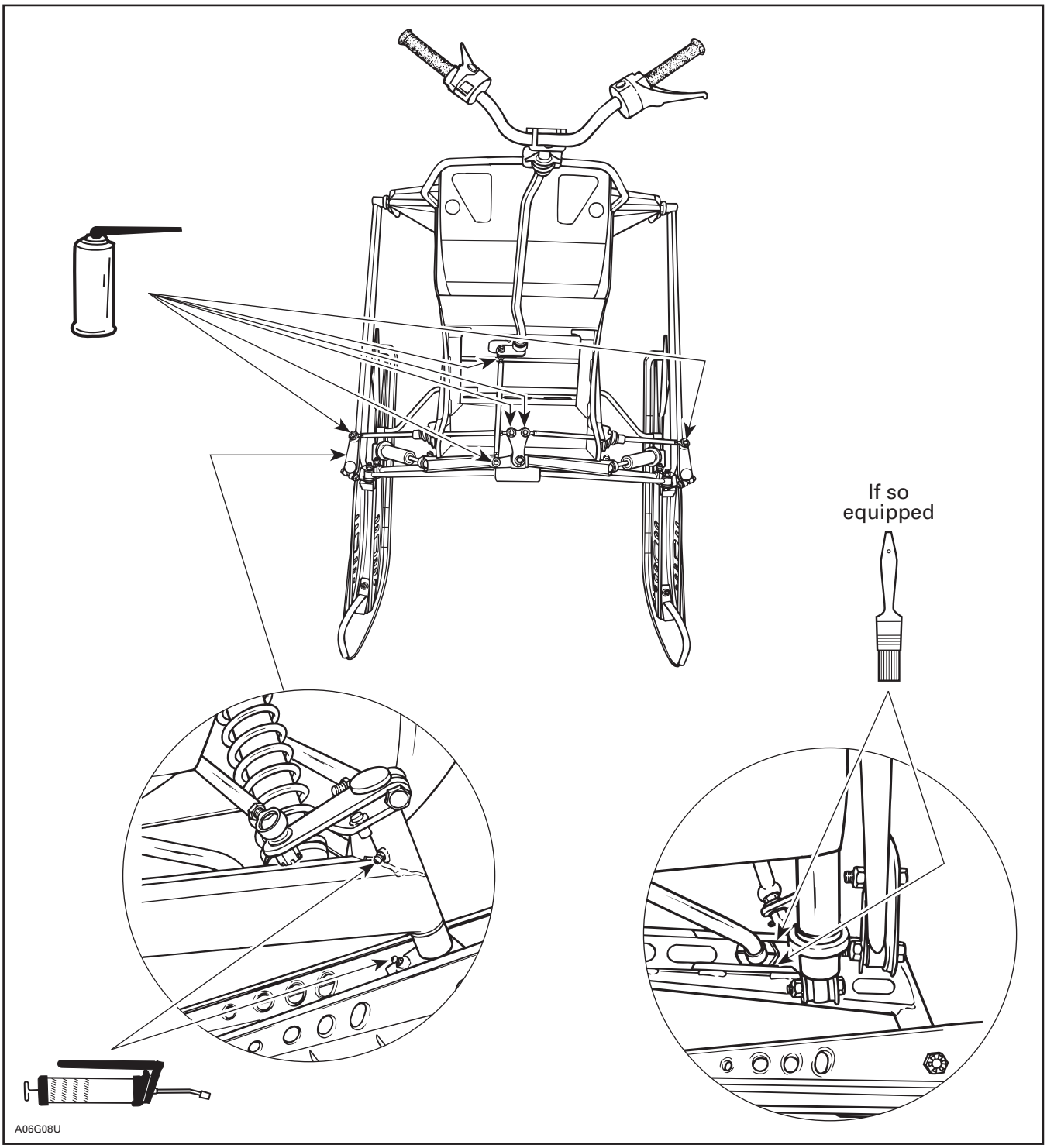


S-Series

Lubricate:

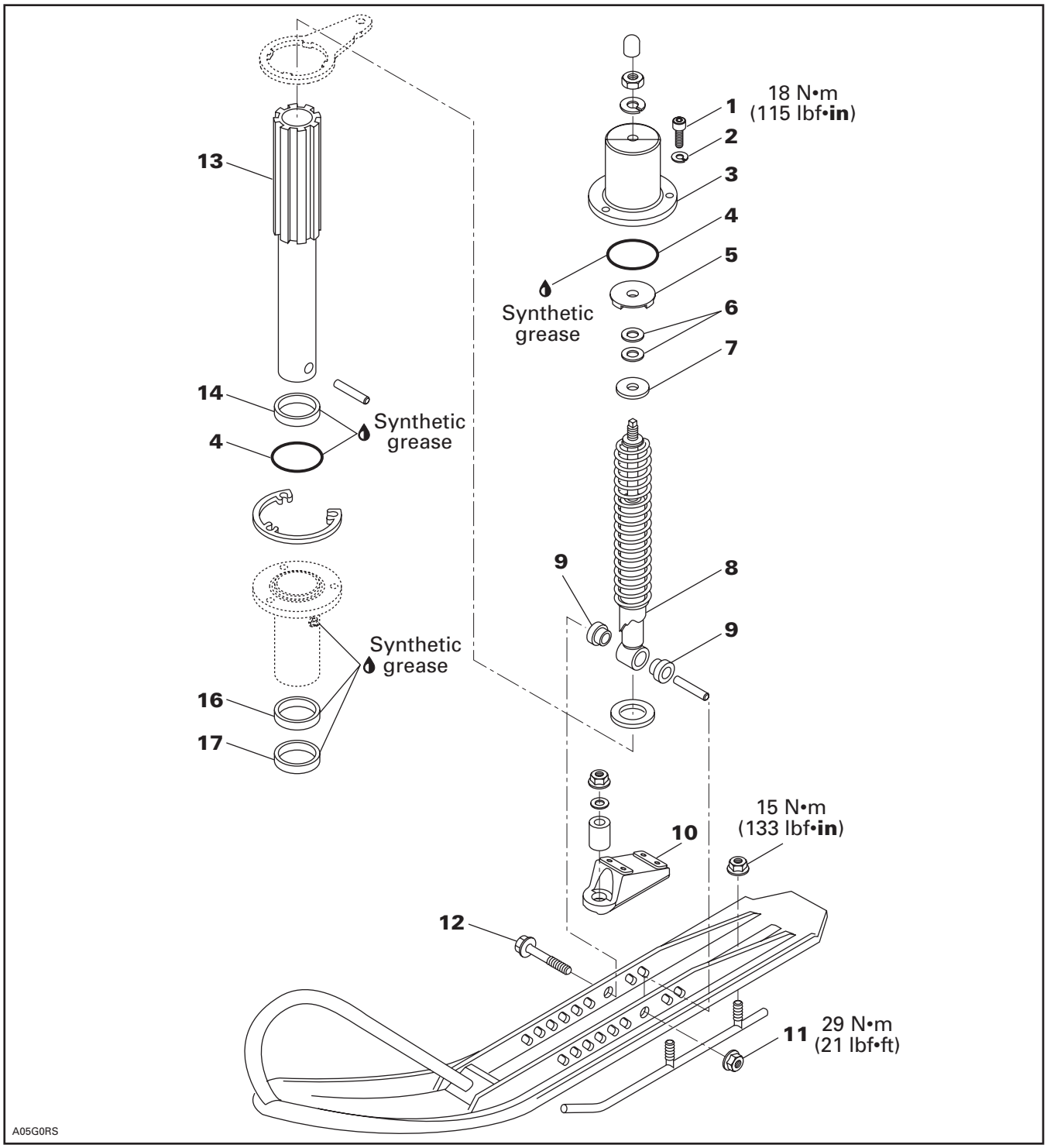
– Steering column.
– Ski legs, ski pivots and idler arm.
– Stabilizer sliders with grease, and oil their ball joints if so equipped.

S-Series



SUSPENSION AND SKI SYSTEM

Tundra/R

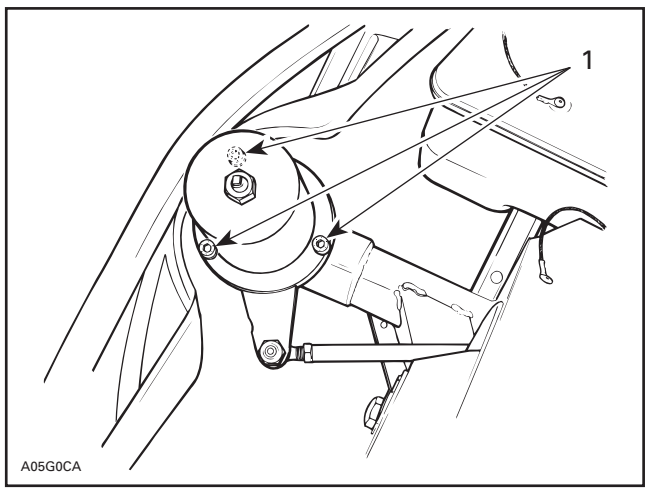


ON-VEHICLE COMPONENT REMOVAL

8, Shock

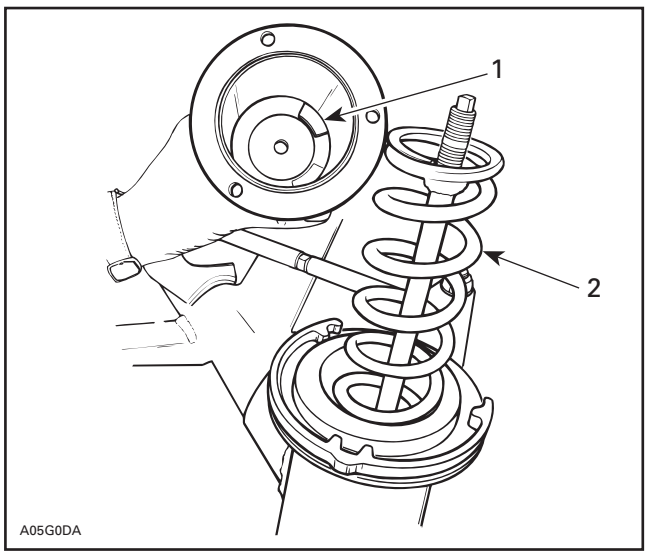
Lift front of vehicle and support off the ground.

Unscrew shock piston pin nut then remove washer. Unscrew 3 Allen screws retaining cover **no. 3**, then remove stopper **no. 5**, washers **no. 6**, washer **no. 7**.



1. Allen screws

NOTE: These washers and stopper can be wedged in cover.



1. Washers and stopper wedged in cover
2. Spring

Pull out spring then check shock as described below in **inspection**.

Suspension Free Operation

Remove cover and check for free movement of ski leg by lifting end of ski.

DISASSEMBLY

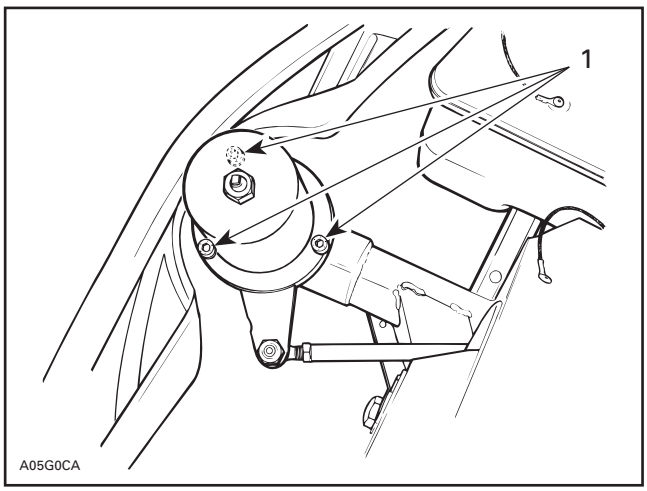
Lift front of vehicle and support off the ground.

1,2,3,5,6,7,9,11,12, Bolt, Lock Washer, Cover, Stopper, Bushing and Nut

Remove ski bolt, nut, bushings and ski.

Unscrew shock piston pin nut then remove washer. Shock with spring will fall off the ski leg.

Unscrew 3 Allen screws retaining cover, then remove stopper and washers.

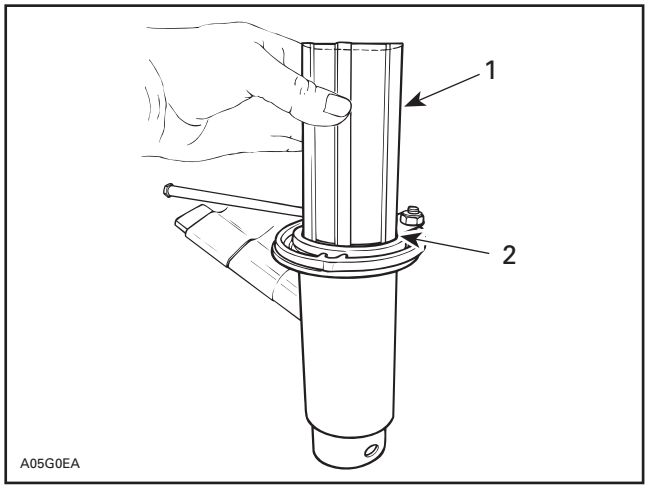


1. Allen screws

NOTE: These washers and stopper can be wedged in cover.

4,13,14,16,17, O-Ring, Ski Leg, Bushing and Seal

Pull up ski leg. Steering arm will not interfere.



1. Pull up ski leg
2. Steering arm in place

Remove seal and O-rings. Drive out bushing if worn out.

INSPECTION

13, Ski Leg

Check straightness of ski leg. Check for scored or scratched surface. Replace as required.

5, Stopper

Check condition of stopper. Replace it when deteriorated.

Grease Fitting

Ensure that grease fittings are not clogged.

10, Stopper

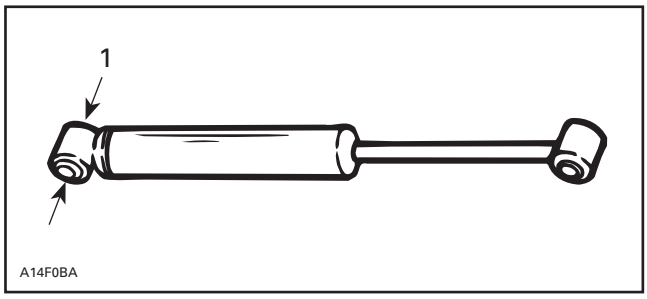
Check stopper for crack or deterioration. Replace as required.

13, Ski Leg

Check that splines on ski leg and steering arm interlock properly with no excessive free play. Renew as necessary.

8, Shock Absorber

Secure the shock body end in a vise.



1. Clamp

▼ CAUTION

Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke checking that it moves smoothly and with uniform resistance.

Pay attention to the following conditions that will denote a defective shock:

– A skip or a hang back when reversing stroke at mid travel.
– Seizing or binding condition except at extreme end of either stroke.
– Oil leakage.
– A gurgling noise, after completing one full compression and extension stroke.

Renew if any faults are present.

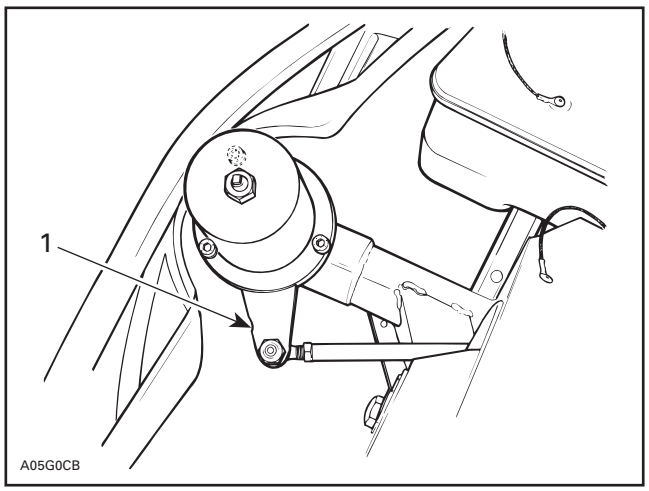
INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Apply synthetic grease (P/N 413 711 500) as illustrated in exploded view above.

Tighten nuts and screws to proper torque as mentioned in exploded view.

Steering arm notch must face outside of vehicle.

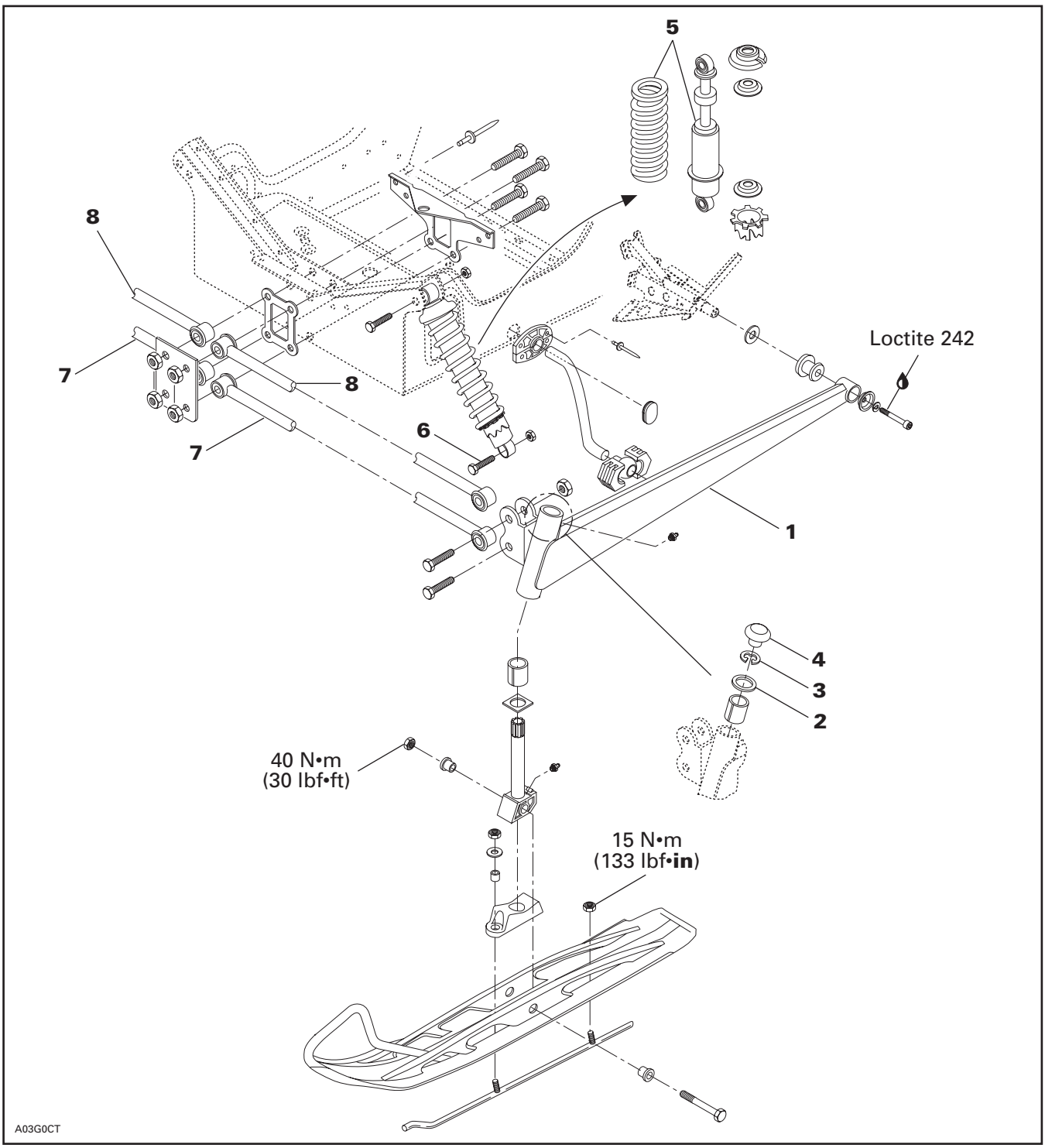


1. Recess facing outside

16,17, Seal

Install seal before reinstalling ski leg.

S-Series

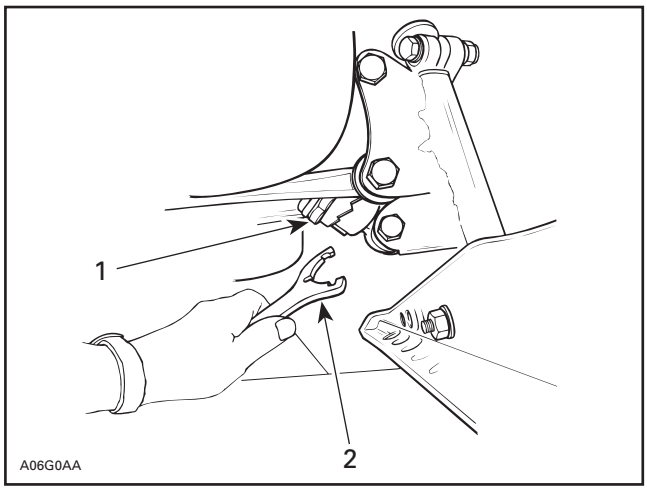

5
8
7
8
7
6
Loctite 242
1
4
3
2
40 N•m
(30 lbf•ft)
15 N•m
(133 lbf•in)
A03G0CT

DISASSEMBLY

5, Shock

Lift front of vehicle and support it off the ground.

On models so equipped reduce spring preload by turning adjusting ring accordingly with special key in vehicle tool box.



1. Shock cam
2. Special key

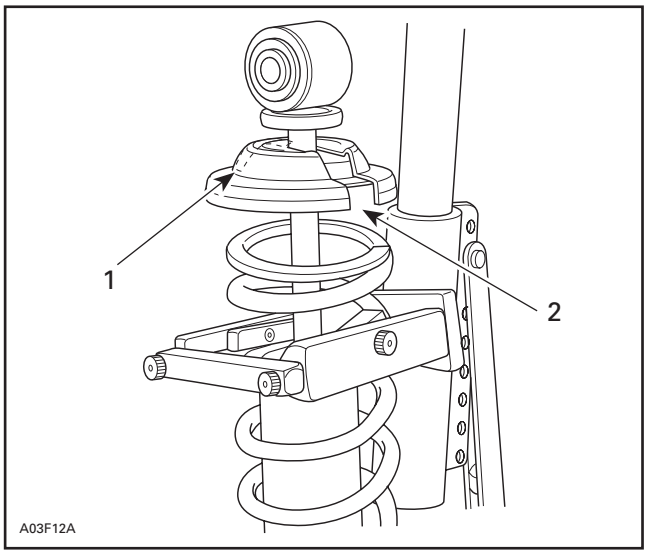
Remove lower bolt then upper bolt of shock.

For shock spring disassembly, use shock spring remover (P/N 529 027 100) in a vise. Mount shock in it and turn shock so that spring coils matched spring compressor.

Close and lock bar. Adjust handle horizontal by changing position of clevis pin.

Push down on handle until il locks. Remove spring stopper and cap then release handle.

At installation, cap opening must be 180° from spring stopper opening.



1. Spring stopper opening
2. Cap opening

1, Swing Arm

Lift front of vehicle and support it off the ground.

Unbolt ski.

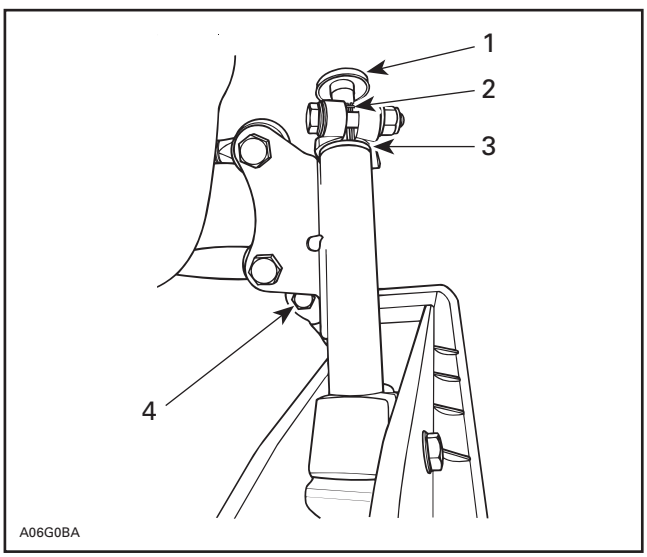
Remove cap, circlip then slacken steering arm bolt and pull up steering arm. Note shim positions. Ski leg may fall off from swing arm.

Unbolt lower end of shock from swing arm.

Unbolt half arms and tie rods.

Unbolt rear of swing arm from frame.

Pull swing arm off the vehicle. Stabilizer bar will disengage ball joint at swing arm inside rails.



*1. Cap **no. 4***
*2. Circlip **no. 3***
*3. Shims **no. 2***
*4. Bolt retaining lower end of shock **no. 6***

INSPECTION

Check all rubber cushions for crack and wear. Replace as required.

Check straightness of splines and proper interlocking with steering arm. Replace as required.

Check for straightness of swing arm. Replace as required.

Check if grease fittings are not clogged.

Check proper action of sliding blocks in swing arm.

Check skis and runners for wear, replace as necessary.

Check condition of ski stopper. Replace it when deteriorated.

To check condition of shock on all S-Series models, refer to Tundra shock inspection.

INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Apply synthetic grease (P/N 413 711 500) to ski leg components.

Tighten nuts and screws to proper torque as mentioned in exploded view.

7,8, Upper Half Arm and Tie Rod

Position half arms and tie rods horizontally before tightening nuts.

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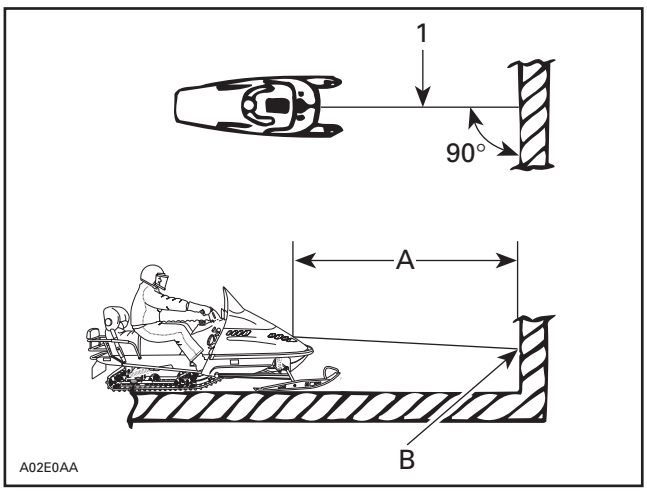
BODY

INSTALLATION AND ADJUSTMENT

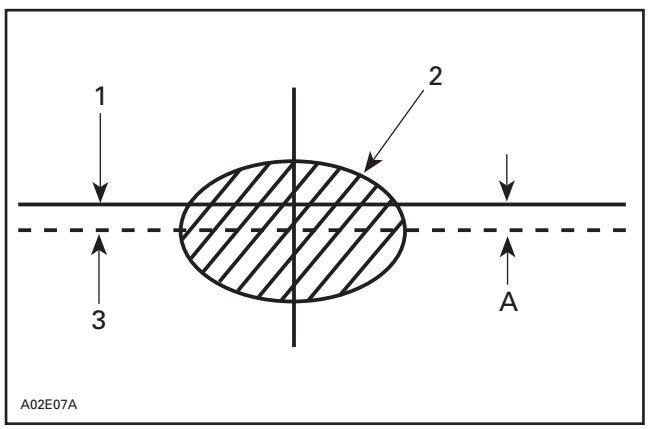
HEADLAMP BEAM AIMING

Beam aiming is correct when center of high beam is 25 mm (1 in) below the headlamp horizontal center line, scribed on a test surface, 381 cm (12 ft 6 in) away.

Measure headlamp center distance from ground. Scribe a line at this height on test surface (wall or screen). Light beam center should be 25 mm (1 in) below scribed line.



1. Headlamp center line
A. 381 cm (12 ft 6 in)
B. 25 mm (1 in) below headlamp center



1. Headlamp horizontal center line
2. Light beam (high beam) (projected on the wall)
3. Light beam center
A. 25 mm (1 in)

Required Conditions

Place the vehicle on a flat surface perpendicular to test surface (wall or screen) and 381 cm (12 ft 6 in) away from it.

Rider or equivalent weight must be on the vehicle.

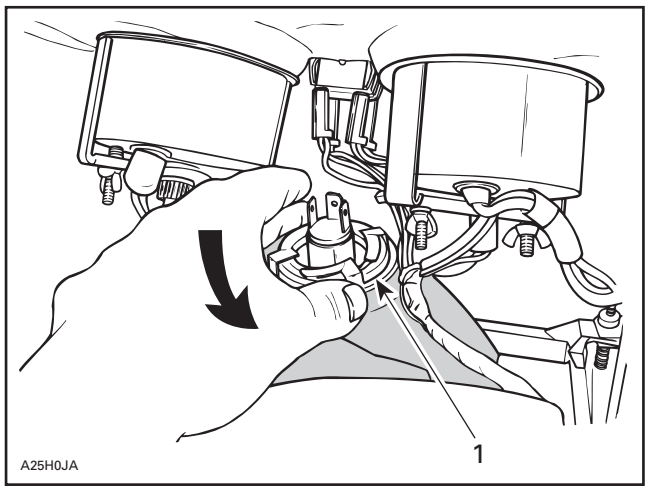
Select **high** beam.

Adjustment

Remove headlamp molding. Turn screws accordingly at upper headlamp attachment.

BULB REPLACEMENT

If headlamp bulb is burnt, tilt hood and unplug the connector from the headlamp. Remove the rubber boot and unfasten the bulb retainer clips or locking ring.



TYPICAL
1. Locking ring

Detach the bulb and replace. If the taillight bulb is burnt, expose the bulb by removing red plastic lens. To remove, unscrew the 2 retaining screws. Verify all lights after replacement.

▼ CAUTION

Never touch glass portion of an halogen bulb with bare fingers, as it shortens its operating life. If by mistake glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

DECAL

To remove a decal; heat old decal with a heat gun and peel off slowly.

Using isopropyl alcohol, clean the surface and dry thoroughly.

Apply liquid soap to new decal and carefully position the decal. Using a sponge or a squeegee, remove the air bubbles and surplus water working from the center toward the edges. Allow to air dry.

▼ CAUTION

Do not apply isopropyl alcohol or solvant directly on decals.

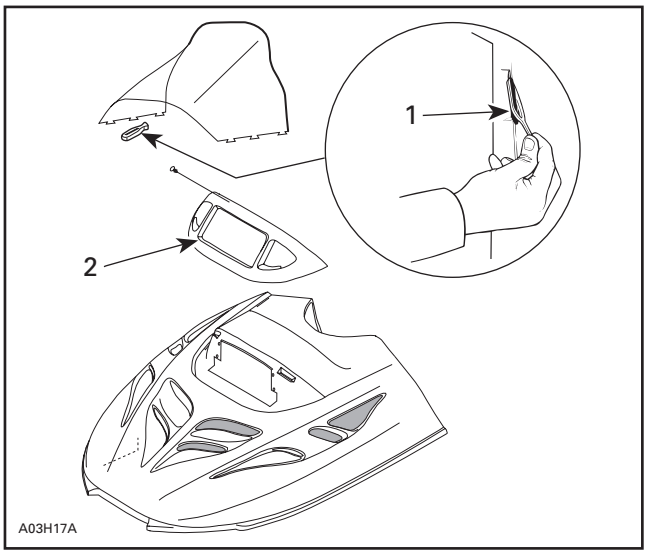
WINDSHIELD INSTALLATION

When peeling off the protective film some polyethylene particles may remain on the windshield. A soft clean cloth moistened with naphtha (camping equipment fuel) will easily remove the remaining particles.

◆ WARNING

Naphtha is flammable and explosive under certain conditions. Always manipulate in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity.

Position the windshield on the hood then push it down until the tabs are fully inserted into the hood slots. Lock the windshield tabs in position using latches as shown.



S-SERIES
1. *Latch*
2. *Temporary remove headlamp molding for windshield installation*

BELT GUARD

Disassembly and Assembly

NOTE: For additional information (ex.: exploded view) refer to the correspondent *Parts Catalog*.

◆ WARNING

Engine should be running only with guard well secured in place.

Inspection

Check guard mounting bosses, clips and retainers for wear.

NOTE: Guards are purposely made slightly oversize to maintain tension on their clips and retainers preventing undue noise and vibration. It is important that this tension be maintained when reassembling.

WIRING HARNESS

◆ WARNING

Ensure all terminals are properly crimped on the wires and that all connector housings are properly fastened. Keep wires away from any rotating, moving, heating and vibrating parts. Use proper fastening devices as required.

CABLES

◆ WARNING

Before installation, ensure that all cables are in perfect condition. Properly install the cable ends and secure them in place. Pay attention to route them properly, away from any rotating, moving, heating, or vibrating parts.

PIPING

◆ WARNING

Always ensure that the fuel, vent, primer, impulse, injection oil and rotary valve oil lines are properly fixed to their connectors, that they are not perforated or kinked and that they are properly routed away from any rotating, moving, heating or vibrating parts. Also check for leaks. Replace if required.

NOTE: Refer to proper *Parts Catalog* to find suitable clip part numbers.

PLASTIC REPAIR

REPAIR

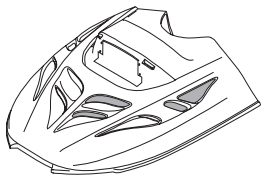
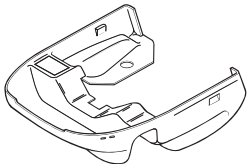
The very first step before repairing plastic materials is to find out exactly which type of material is involved. Refer to following chart.

▼ CAUTION

Consult chart and repair kit instructions carefully, some repair products are not compatible with certain plastics.

◆ WARNING

Polycarbonate windshields must **never** be repaired by welding or otherwise.

PART	MODEL	REPAIRABLE	IRREPARABLE	
		R.I.M. POLYURETHANE	HIGH DENSITY POLYETHYLENE	IMPACT COPOLYMER
HOOD  A03H0ZJ	Tundra/R			
	S-Series			
BOTTOM PAN  A06H1AJ	Tundra/R			
	S-Series			

MATERIAL REPAIR PROCEDURE

R.I.M. polyurethane is light colored (tan) on the inside with a smooth surface.

◆ WARNING

Material should be repaired and repainted in a well ventilated area only.

▼ CAUTION

Clean R.I.M. with isopropyl alcohol or Crest Hi-Solv product. **Never** use cleaners or products that contain **chlorine**.

▼ CAUTION

R.I.M. should never be exposed to temperatures exceeding 93°C (200°F).

NOTE: When working on a R.I.M. surface, never use a grinder or a high revolution tool such as an air or electric buffer. Use of such tools could overheat material and liberate agents in it thus causing a bad adhesion.

REPAIR PROCEDURE

For R.I.M. Polyurethane

Small Scratches

– Sand and scuff area.
– Feather out edges.
– Paint with a matching acrylic auto touch-up paint.

Deep Scratches

– Sand and scuff area.
– Make a V groove using a knife or a rough round file.
– Clean surface with isopropyl alcohol or Crest Hi-Solv stock no. AH-S product.
– Cover with TP-E epoxy mixed in equal quantities.
– Heat the surface with a heater lamp placed at 38 cm (15 in) for a period of 15 minutes.
– Sand the repair using a smooth dry sand paper.
– Use the same product if a final finish is required.
– Clean surface with Crest Hi-Solv product.
– Apply a flexible primer such as Crest Prima Flex stock no. AP-F.
– Wait 10 minutes.
– Repaint (air dry during 72 hours (approximately)).

Large Crack

– Sand and scuff outside and inside area by exceeding it 31.7 mm (1-1/4 in) on each side and 12.7 mm (1/2 in) at each end.
– Make a V groove (appr. 90°) on both sides of hood using a knife or a rough round file.
– Enlarge the crack to 2.4 mm (3/32 in) – 3.2 mm (1/8 in) using a sharp knife.
– Clean outside and inside surface with isopropyl alcohol or Crest Hi-Solv product.
– Apply aluminum tape RA-T from Crest to the damaged area **outside** surface. This will act as a back support during repair.
– Repair inside surface first.
– Apply Crest 50 mm (2 in) wide fiberglass tape to the damaged area **inside** surface.
– Apply Crest TP-E epoxy over the fiberglass tape.
– When epoxy is hardened, remove aluminum tape from outside surface.
– Cover outside surface with Crest TP-E epoxy filling the damaged area. Damaged area should be slightly higher.
– Heat surface with a heater lamp placed at 40 cm (15 in) for a period of 15 minutes.
– Sand outside repair area using a dry sand paper.
– Use Crest TP-E epoxy if a final finish is required.
– Sand repair area as needed.
– Clean surface to be painted with Crest Hi-Solv product.
– Apply a flexible primer such as Crest Prima Flex stock no. AP-F.
– Wait 10 minutes.
– Repaint (air dry during 72 hours approximately).

NOTE: R.I.M. material is high static plastics, painting must be done in a dust free area such as a paint booth.

Crest products used in R.I.M. repair procedure are available from following locations:

CREST MAIN OFFICE AND MANUFACTURING PLANT	
CREST INDUSTRIES, INC. 3841 13th Street Wyandotte, Michigan 48192	Phone: 313-283-4100 Toll Free: 1-800-822-4100 Fax: 1-800-344-4461 Fax: 313-283-4461

DISTRIBUTOR WAREHOUSE LOCATIONS		
UNITED STATES		CANADA
CREST EAST COAST, INC. P.O. Box 550 1109 Industrial Parkway Brick, New Jersey 08723 Phone: 908-458-9000 Fax: 908-458-5753 CREST PRODUCTS, INC. *Shipping Address:* 125 Production Drive Yorktown, Virginia 23693 Phone: 757-599-6572 Virginia: 1-800-572-5025 Outstate: 1-800-368-5033 Fax: 757-599-6630 *Mailing Address:* P.O. Box 2018 Grafton, Virginia 23692 CREST INDUSTRIES SOUTHEAST, INC. *Shipping Address:* 4300 Glen Haven Drive Decatur, Georgia 30035 Phone: 404-288-4658 Toll Free: 1-800-552-0876 Fax: 404-288-4658 *Mailing Address:* P.O. Box 254 Decatur, Georgia 30031	CREST INDUSTRIES, INC. (CREST MID-WEST) 231 Larkin Williams Ind. Court St. Louis, Missouri 63026 Phone: 314-349-4800 Toll Free: 1-800-733-2737 Fax: 314-349-4888 Toll Free Fax: 1-800-776-2737 **CREST MID WEST** **Regional Branch Warehouses** CREST INDUSTRIES, INC. P.O. Box 635 Mountain Home, Arkansas 72653 Phone: 501-491-5583 Toll Free: 1-800-733-2737 CREST INDUSTRIES, INC. 4200 Jackson Street, Unit 9 Denver, Colorado 80216 Phone: 303-320-3900 Toll Free: 1-800-733-2737 Fax: 303-320-6509 REM-CO DISTRIBUTING, INC. 5625 S. Adams Tacoma, Washington 98409 Phone: 206-474-5414 Toll Free: 1-800-735-7224 Fax: 206-474-7339	J2 PRODUCTS A Division of Sawill Ltd. 54 Audia Court, Unit 2A Concord, Ontario, L4K 3N4 *Phone:* Toronto: 416-665-1404 Concord: 905-669-9410 Montréal: 514-962-3932 *Fax:* Concord: 905-669-9419 Montréal: 514-962-3932 WHEEL-IN AUTOMOTIVE SUPPLY *Shipping Address:* No. 1, 3911A Brandon St. S.E. Calgary, Alberta, T2G 4A7 Office: 403-287-0775 *Mailing Address:* P.O. Box 40036 929-42nd Avenue S.E. Calgary, Alberta, T2G 5G5

FRAME

FRAME CLEANING

NOTE: For aluminum frames use only aluminum cleaner and follow instructions on container. (Dursol cleaner or equivalent).

Clean frame and tunnel with appropriate cleaners and rinse with high pressure hose.

Touch up all metal spots where paint has been scratched off. Spray all bare metal parts of vehicle with metal protector.

Seat Cleaning

For all models, it is recommend to clean the seat with a solution of **warm soapy water**, using a soft clean cloth.

▼ CAUTION

Avoid use of harsh detergents such as strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc. that may cause damage to the seat cover.

FRAME WELDING

Steel Frame:

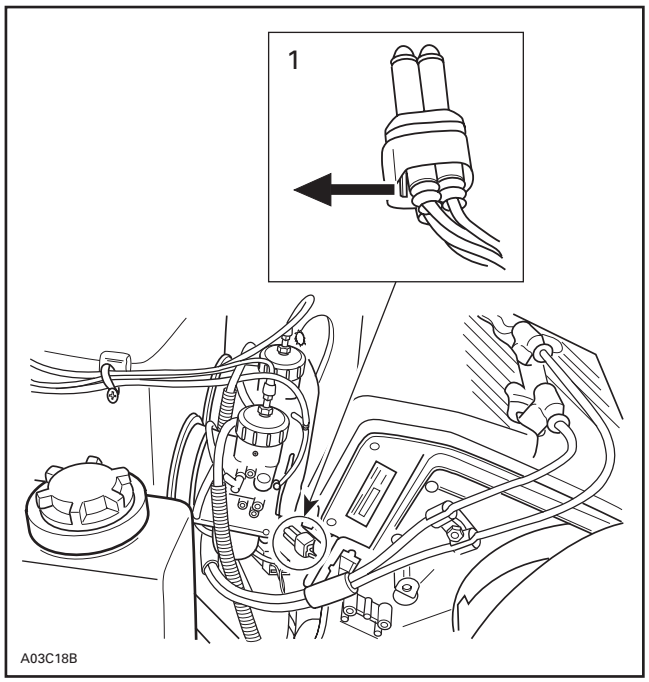
– electric welding
– amperage: 70-110 A
– voltage: 20-24 V
– rod: E-7014 (3/32 in)

Aluminum Frame: (refer to specialized welding shop)

– argon-oxygen/acetylene welding
– rod: ER-4043 (3/32 in)

▼ CAUTION

Before performing electrical welding anywhere on the vehicle, unplug the multiple connector at the electronic box. On models equipped with a battery, also unplug the negative cable. This will protect the electronic box and battery against damage caused by flowing current when welding.



TYPICAL

1. Unplug before electrical welding

▼ CAUTION

If welding is to be done near plastic material, it is recommended to either remove the part from the area or to protect it with aluminum foil to prevent damage.

FRAME COMPONENT REPLACEMENT

S-Series

Drilling Procedure

When drilling self-piercing rivets, use Supertanium™ drill bit (P/N 529 031 800), available in a 5 mm (3/16 in) size and shipped in packs of 2.

For proper drilling instructions and to prevent premature wear, follow the procedure below.

Always use a variable speed electric drill.

Partially drill rivet end — not the rivet head.


A03H2FA

Ground rivet end to the part retained by the rivet.

Remove part riveted.

Ground rivet to the chassis.

Drive out remaining rivet head using a punch.

Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant chip is ejected.

NOTE: To increase bit life, use Bombardier synthetic chaincase oil (P/N 413 803 300) as a cutting oil.

▼ CAUTION

High speed drilling will cause excessive heat which may destroy the cutting edge of the bit, therefore avoid using pneumatic drills.

TECHNICAL DATA

SI* METRIC INFORMATION GUIDE

BASE UNITS

DESCRIPTION	UNIT	SYMBOL
length	meter	m
mass	kilogram	kg
force	newton	N
liquid	liter	L
temperature	Celsius	°C
pressure	kilopascal	kPa
torque	newton•meter	N•m
speed	kilometer per hour	km/h

PREFIXES

PREFIX	SYMBOL	MEANING	VALUE
kilo	k	one thousand	1 000
centi	c	one hundredth	0.01
milli	m	one thousandth	0.001
micro	µ	one millionth	0.000001

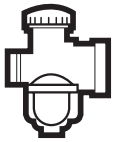
CONVERSION FACTORS

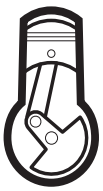
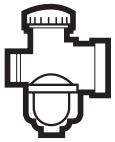
TO CONVERT	TO †	MULTIPLY BY
in	mm	25.4
in	cm	2.54
in^2	cm^2	6.45
in^3	cm^3	16.39
ft	m	0.3
oz	g	28.35
lb	kg	0.45
lbf	N	4.4
lbf•**in**	N•m	0.11
lbf•ft	N•m	1.36
lbf•ft	lbf•**in**	12
PSI (lbf/in^2)	kPa	6.89
imp. oz	U.S. oz	0.96
imp. oz	mL	28.41
imp. gal	U.S. gal	1.2
imp. gal	L	4.55
U.S. oz	mL	29.57
U.S. gal	L	3.79
MPH	km/h	1.61
Fahrenheit	Celsius	(°F – 32) ÷ 1.8
Celsius	Fahrenheit	(°C × 1.8) + 32

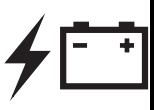
* The international system of units abbreviates SI in all languages.

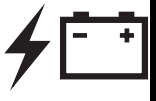
† To obtain the inverse sequence, divide by the given factor. To convert ''mm'' to ''in'', divide by 25.4.

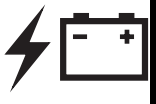
NOTE: Conversion factors are rounded off to 2 decimals for easier use.

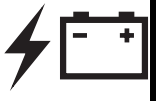
	VEHICLE MODEL			TUNDRA	TUNDRA R	FORMULA S	TOURING E, SKANDIC 380, FORMULA DELUXE 380
	ENGINE TYPE			**277**	**277**	**377**	**377**
	Number of Cylinders			1	1	2	2
	Bore		mm (in)	72.00 (2.835)	72.00 (2.835)	62.00 (2.441)	62.00 (2.441)
	Stroke		mm (in)	66.00 (2.598)	66.00 (2.598)	61.00 (2.402)	61.00 (2.402)
	Displacement		cm^3 (in^3)	268.70 (16.40)	268.70 (16.40)	368.30 (22.48)	368.30 (22.48)
	Compression Ratio (corrected)			6.7	6.7	6.8	6.8
	Maximum Power Engine Speed ①		± 100 RPM	6900	6900	6900	6900
	Piston Ring Type		1st/2nd	ST/R	ST/R	ST/R	ST/R
	Ring End Gap	(new) (wear limit)	mm (in) mm (in)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)
	Ring/Piston Groove Clearance	(new) (wear limit)	mm (in) mm (in)	0.04 (.0016) 0.2 (.008)	0.025 (.001) 0.2 (.008)	0.04 (.0016) 0.2 (.008)	0.04 (.0016) 0.2 (.008)
	Piston/Cylinder Wall Clearance	(new) (wear limit)	mm (in) mm (in)	0.090 (.0031) 0.2 (.008)	0.090 (.0031) 0.2 (.008)	0.060 (.0024) 0.2 (.008)	0.060 (.0024) 0.2 (.008)
	Connecting Rod Big End Axial Play	(new) (wear limit)	mm (in) mm (in)	0.20 (.0079) 1.0 (.0394)	0.20 (.0079) 1.0 (.0394)	0.20 (.0079) 1.0 (.0394)	0.20 (.0079) 1.0 (.0394)
	Maximum Crankshaft End-Play ②		mm (in)	0.3 (.0118)	0.3 (.0118)	0.3 (.0118)	0.3 (.0118)
	Maximum Crankshaft Deflection Measured at Center		mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)
	Rotary Valve Timing ③		Opening Closing	N.A.	N.A.	N.A.	N.A.
	Magneto Generator Output		W	160	240	240	240
	Ignition Type			CDI	CDI	CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES	NGK BR9ES
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ④		mm (in)	1.62 (.064)	3.04 (.120)	1.38 (.054)	2.79 (.110)
	Trigger Coil Air Gap		mm (in)	N.A.	0.40 – 1.10 (.016 – .043)	0.45 – 0.55 (.018 – .022)	0.40 – 1.10 (.016 – .043)
	Trigger Coil ⑤		Ω	N.A.	160 – 180	140 – 180	160 – 180
	Generating Coil ⑤	Low Speed	Ω	40 – 76	N.A.	N.A.	N.A.
		High Speed	Ω	N.A.	5.1 – 6.2	230 – 330	5.1 – 6.2
	Lighting Coil ⑤		Ω	0.05 – 0.6	0.17 – 0.21	0.23 – 0.28	0.17 – 0.21
	High Tension Coil ⑤	Primary	Ω	0.11 – 0.21	N.A.	N.A.	N.A.
		Secondary	kΩ	4.9 – 7.5	0.9 – 1.1	5.1 – 6.3	0.9 – 1.1
	Carburetor Type		PTO/MAG	VM 34-529	VM 34-537	2 x VM 30-195	2 x VM 30-196
	Main Jet		PTO/MAG	190	190	140/140	140/140
	Needle Jet			159 O-8	159 O-8	159 P-0	159 P-0
	Pilot Jet			40	40	40	40
	Needle Identification — Clip Position			6DH4-2	6DH4-2	6DP9-3	6DP9-3
	Slide Cut-Away			2.5	2.5	2.5	2.5
	Float Adjustment		± 1 mm (± .040 in)	23.9 (.94)	23.9 (.94)	23.9 (.94)	23.9 (.94)
	Air Screw Adjustment		± 1/16 turn	1	1	1-1/4	1-1/4
	Idle Speed RPM		± 200 RPM	1200	1650	1650	1650
	Gas Type/Pump Octane Number			Unleaded/87	Unleaded/87	Unleaded/87	Unleaded/87
	Gas/Oil Ratio			Injection	Injection	Injection	Injection
	Type			Radial Fan	Radial Fan	Axial Fan	Axial Fan
	Axial Fan Belt Adjustment	Deflection	mm (in)	N.A.	N.A.	8 – 9 (.31 – .35)	8 – 9 (.31 – .35)
		Force ⑥	kg (lbf)	N.A.	N.A.	5 (11)	5 (11)
	Thermostat Opening Temperature		°C (°F)	N.A.	N.A.	N.A.	N.A.
	Radiator Cap Opening Pressure		kPa (PSI)	N.A.	N.A.	N.A.	N.A.
	**ENGINE COLD N•m (lb•ft)**	Drive Pulley Retaining Screw ⑦		95 (70)	95 (70)	95 (70)	95 (70)
		Exhaust Manifold Nuts or Bolts		25 (18)	25 (18)	22 (16)	22 (16)
		Magneto Ring Nut		90 (66)	90 (66)	105 (77)	105 (77)
		Crankcase Nuts or Screws	M6 M8	— 22 (16)	— 22 (16)	10 (7) 22 (16)	10 (7) 22 (16)
		Crankcase/Engine Support Nuts or Screws		21 (15)	21 (15)	39 (29)	39 (29)
		Cylinder Head Nuts		26 (19)	26 (19)	22 (16)	22 (16)
		Crankcase/Cylinder Nuts or Screws		N.A.	N.A.	N.A.	N.A.
		Axial Fan Shaft Nut		N.A.	N.A.	48 (35)	48 (35)

	VEHICLE MODEL			FORMULA SL	TOURING LE	SKANDIC 500, TOURING SLE FORMULA DELUXE 500
	ENGINE TYPE			**503**	**443**	**503**
	Number of Cylinders			2	2	2
	Bore		mm (in)	72.00 (2.835)	67.5 (2.658)	72.00 (2.835)
	Stroke		mm (in)	61.00 (2.402)	61.00 (2.402)	61.00 (2.402)
	Displacement		cm^3 (in^3)	496.70 (30.31)	436.6 (26.64)	496.70 (30.31)
	Compression Ratio (corrected)			6.2	6.4	6.2
	Maximum Power Engine Speed ①		± 100 RPM	7000	7000	7000
	Piston Ring Type		$1^{st}/2^{nd}$	ST/R	ST/R	ST/R
	Ring End Gap	(new) (wear limit)	mm (in) mm (in)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)
	Ring/Piston Groove Clearance	(new) (wear limit)	mm (in) mm (in)	0.04 (.0016) 0.2 (.008)	0.04 (.0016) 0.2 (.008)	0.04 (.0016) 0.2 (.008)
	Piston/Cylinder Wall Clearance	(new) (wear limit)	mm (in) mm (in)	0.090 (.0035) 0.2 (.008)	0.070 (.0028) 0.2 (.008)	0.080 (.0031) 0.2 (.008)
	Connecting Rod Big End Axial Play	(new) (wear limit)	mm (in) mm (in)	0.2 (.0079) 1.0 (.0394)	0.20 (.0079) 1.0 (.0394)	0.2 (.0079) 1.0 (.0394)
	Maximum Crankshaft End-Play ②		mm (in)	0.3 (.0118)	0.3 (.0118)	0.3 (.0118)
	Maximum Crankshaft Deflection Measured at Center		mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)
	Rotary Valve Timing ③		Opening Closing	N.A.	N.A.	N.A.
	Magneto Generator Output		W	240	240	240
	Ignition Type			CDI	CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ④		mm (in)	1.66 (.065)	2.79 (.110)	2.76 (.109)
	Trigger Coil Air Gap		mm (in)	0.45 – 0.55 (.018 – .022)	0.40 – 1.10 (.016 – .043)	0.40 – 1.10 (.016 – .043)
	Trigger Coil ⑤		Ω	140 – 180	160 – 180	160 – 180
	Generating Coil ⑤	Low Speed	Ω	N.A.	N.A.	N.A.
		High Speed	Ω	230 – 330	5.1 – 6.2	5.1 – 6.2
	Lighting Coil ⑤		Ω	0.23 – 0.28	0.17 – 0..21	0.17 – 0.21
	High Tension Coil ⑤	Primary	Ω	N.A.	N.A.	N.A.
		Secondary	kΩ	5.1 – 6.3	0.9 – 1.1	0.9 – 1.1
	Carburetor Type		PTO/MAG	VM 34-532/533	VM 34-530/531	VM 34-532/533
	Main Jet		PTO/MAG	180/170	205/195	180/170
	Needle Jet			159 P-0	159 P-0	159 P-0
	Pilot Jet			40	35	40
	Needle Identification — Clip Position			6DH2-3	6DH2-3	6DH2-3
	Slide Cut-Away			2.5	2.5	2.5
	Float Adjustment		± 1 mm (± .040 in)	23.9 (.94)	23.9 (.94)	23.9 (.94)
	Air Screw Adjustment		± 1/16 turn	1-7/8	1-1/2	1-7/8
	Idle Speed RPM		± 200 RPM	1650	1650	1650
	Gas Type/Pump Octane Number			Unleaded/87	Unleaded/87	Unleaded/87
	Gas/Oil Ratio			Injection	Injection	Injection
	Type			Axial Fan	Axial Fan	Axial Fan
	Axial Fan Belt Adjustment	Deflection	mm (in)	9 – 10 (.35 – .39)	9 – 10 (.35 – .39)	9 – 10 (.35 – .39)
		Force ⑥	kg (lbf)	5 (11)	5 (11)	5 (11)
	Thermostat Opening Temperature		°C (°F)	N.A.	N.A.	N.A.
	Radiator Cap Opening Pressure		kPa (PSI)	N.A.	N.A.	N.A.
	**ENGINE COLD N•m (lb•ft)**	Drive Pulley Retaining Screw ⑦		95 (70)	95 (70)	95 (70)
		Exhaust Manifold Nuts or Bolts		22 (16)	22 (16)	22 (16)
		Magneto Ring Nut		105 (77)	105 (77)	105 (77)
		Crankcase Nuts or Screws	M6 M8	— 22 (16)	— 22 (16)	— 22 (16)
		Crankcase/Engine Support Nuts or Screws		39 (28)	39 (28)	39 (28)
		Cylinder Head Nuts		22 (16)	22 (16)	22 (16)
		Crankcase/Cylinder Nuts or Screws		N.A.	N.A.	N.A.
		Axial Fan Shaft Nut		48 (35)	48 (35)	48 (35)

	VEHICLE MODEL				TUNDRA	TUNDRA R	SKANDIC 380
	ENGINE TYPE				**277**	**277**	**377**
	Chain Drive Ratio				14/25	14/25	18/44
	Chain	Pitch		in	1/2	1/2	3/8
		Type/Links Qty/Plates Qty			Single/62	Single/62	Silent/70/11
	Drive Pulley	Type of Drive Pulley			Bombardier Lite	Bombardier Lite	Bombardier Lite
		Ramp Identification			N.A.	N.A.	N.A.
		Calibration Screw Position or Calibration Part ②			1143 2 x C	1143 2 x C	1181 1 x C, 1 x S21
		Spring Color			Turquoise	Turquoise	Green/Green
		Spring Length		± 1.5 mm (± .060 in)	85.3 (3.36)	85.3 (3.36)	72 (2.835)
		Clutch Engagement		± 200 RPM	3100	3100	2500
	Driven Pulley	Type of Driven Pulley			Tundra	Tundra Reverse	LPV27
		Spring Preload		± 0.7 kg (± 1.5 lb)	3.6 (7.9)	N.A.	N.A.
		Cam Angle		degree	37.8	37.8	47 – 44
	Pulley Distance Z			(+ 0, - 1) mm ((+ 0, - 1/32) in)	37.0 + 0, - 1.5 (1.457 + 0, - .060)	37.0 + 0, - 1.5 (1.457 + 0, - .060)	26.0 ± 0.5 (1.024 ± .020)
	Offset	X		mm (in)	36.0 ± 1.0 (1.417 ± .040)	36.0 ± 1.0 (1.417 ± .040)	33.4 ± 0.5 (1.315 ± .020)
		Y – X		MIN. MAX.	- 0 (- 0) + 1.5 (+ .059)	- 0 (- 0) + 1.5 (+ .059)	+ 0.5 (+ .020) + 1.5 (+ .059)
	Drive Belt Part Number (P/N)				414 827 600	414 827 600	415 060 600
	Drive Belt Width (new) ③			mm (in)	33.3 (1-5/16)	33.3 (1-5/16)	34.7 (1-3/8)
	Drive Belt Adjustment		Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)
			Force ④	kg (lbf)	6.8 (15)	6.8 (15)	11.3 (25)
	Track	Width		cm (in)	38.1 (15)	38.1 (15)	38.1 (15)
		Length		cm (in)	354 (139)	354 (139)	345 (136)
		Profile Height		mm (in)	18.4 (.724)	18.4 (.724)	23.2 (.913)
		Adjustment	Deflection	mm (in)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)
			Force ⑤	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type		Track		Torque Reaction Slide	Torque Reaction Slide	SC-10 Touring
			Ski		Telescopic Strut	Telescopic Strut	DSA
	Length			cm (in)	284.5 (112)	284.5 (112)	294 (115.7)
	Width			cm (in)	95.3 (37.5)	95.3 (37.5)	108 (42.5)
	Height			cm (in)	114 (44.9)	114 (44.9)	122 (48.0)
	Ski Stance			cm (in)	81.3 (32.0)	81.3 (32.0)	94 (37)
	Mass (dry)			kg (lb)	173 (380)	173 (380)	209 (459)
	Ground Contact Area			cm^2 (in^2)	7570 (1173)	7570 (1173)	7227 (1120)
	Ground Contact Pressure			kPa (PSI)	2.24 (.325)	2.24 (.325)	2.84 (.412)
	Frame Material				Steel	Steel	Aluminum
	Bottom Pan Material				Polyethylene High Density	Polyethylene High Density	Impact Copolymer
	Hood Material				Polyethylene High Density	Polyethylene High Density	RRIM Polyurethane
	Battery			V (A•h)	N.A.	N.A.	N.A.
	Headlight			W	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27	8/27
	Tachometer and Speedometer Bulb			W	N.A.	N.A.	3
	Fuel and Temperature Gauge Bulb			W	N.A.	N.A.	N.A.
	Fuse	Starter Solenoid		A	N.A.	N.A.	N.A.
		Tachometer		A	N.A.	N.A.	N.A.
	Fuel Tank			L (U.S. gal)	26 (6.9)	26 (6.9)	40 (10.6)
	Chaincase Gearbox			mL (U.S.oz)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System			L (U.S. oz)	N.A.	N.A.	N.A.
	Injection Oil Reservoir			L (U.S. oz)	1.9 (64)	1.9 (64)	2.55 (86)

	VEHICLE MODEL				SKANDIC 500	TOURING E	TOURING LE
	ENGINE TYPE				503	377	443
	Chain Drive Ratio				18/44	18/44	21/44
	Chain	Pitch		in	3/8	3/8	3/8
		Type/Links Qty/Plates Qty			Silent/70/11	Silent/70/11	Silent/72/11
	Drive Pulley	Type of Drive Pulley			TRA	Bombardier Lite	TRA
		Ramp Identification			292X ①	N.A.	284 ①
		Calibration Screw Position or Calibration Part ②			3	1181 1 x C, 1 x S21	2
		Spring Color			Red/Red	Green/Green	Red/Yellow
		Spring Length		± 1.5 mm (± .060 in)	97.2 (3.87)	72.0 (2.83)	87.9 (3.46)
		Clutch Engagement		± 200 RPM	2900	2500	2900
	Driven Pulley	Type of Driven Pulley			LPV27	LPV27	LPV27
		Spring Preload		± 0.7 kg (± 1.5 lb)	N.A.	N.A.	N.A.
		Cam Angle		degree	47 – 44	47 – 44	47 – 44
	Pulley Distance Z			mm (in)	17.0 ± 0.5 (.669 ± .020)	26.0 ± 0.5 (1.024 ± .020)	17.0 ± 0.5 (.669 ± .020)
	Offset	X		mm (in)	35.5 ± 0.5 (1.398 ± .020)	33.4 ± 0.5 (1.315 ± .020)	35.5 ± 0.5 (1.398 ± .020)
		Y – X		MIN. MAX.	+ 1 (+ .039) + 2 (+ .079)	+ 0.5 (+ .020) + 1.5 (+ .059)	+ 1 (+ .039) + 2 (+ .079)
	Drive Belt Part Number (P/N)				415 060 600	415 060 600	415 060 600
	Drive Belt Width (new) ③			mm (in)	34.7 (1-3/8)	34.7 (1-3/8)	34.7 (1-3/8)
	Drive Belt Adjustment		Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)
			Force ④	kg (lbf)	11.3 (25)	11.3 (25)	11.3 (25)
	Track	Width		cm (in)	38.1 (15)	38.1 (15)	38.1 (15)
		Length		cm (in)	345 (136)	345 (136)	345 (136)
		Profile Height		mm (in)	23..2 (.913)	18.4 (.724)	18.4 (.724)
		Adjustment	Deflection	mm (in)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)
			Force ⑤	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type		Track		SC-10 Touring	SC-10 Touring	SC-10 Touring
			Ski		DSA	DSA	DSA
	Length			cm (in)	294 (115.7)	294 (115.7)	294 (115.7)
	Width			cm (in)	108 (42.5)	115.6 (45.5)	120.7 (47.5)
	Height			cm (in)	122 (48.0)	122 (48.0)	122 (48.0)
	Ski Stance			cm (in)	94 (37)	101.6 (40)	106.7 (42)
	Mass (dry)			kg (lb)	225 (494)	193 (425)	202 (445)
	Ground Contact Area			cm^2 (in^2)	7227 (1120)	7227 (1120)	7227 (1120)
	Ground Contact Pressure			kPa (PSI)	3.05 (.442)	2.62 (.380)	2.74 (.397)
	Frame Material				Aluminum	Aluminum	Aluminum
	Bottom Pan Material				Impact Copolymer	Impact Copolymer	Impact Copolymer
	Hood Material				RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane
	Battery			V (A•h)	N.A.	12 (22)	12 (22)
	Headlight			W	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27	8/27
	Tachometer and Speedometer Bulb			W	3	3	3
	Fuel and Temperature Gauge Bulb			W	N.A.	N.A.	N.A.
	Fuse	Starter Solenoid		A	N.A.	30	30
		Tachometer		A	N.A.	N.A.	N.A.
	Fuel Tank			L (U.S. gal)	40 (10.6)	40 (10.6)	40 (10.6)
	Chaincase Gearbox			mL (U.S. oz)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System			L (U.S. oz)	N.A.	N.A.	N.A.
	Injection Oil Reservoir			L (U.S. oz)	2.55 (86)	2.55 (86)	2.55 (86)

	VEHICLE MODEL				TOURING SLE	FORMULA S	FORMULA SL
	ENGINE TYPE				**503**	**377**	**503**
	Chain Drive Ratio				21/44	18/44	21/44
	Chain	Pitch		in	3/8	3/8	3/8
		Type/Links Qty/Plates Qty			Silent/72/11	Silent/72/11	Silent/72/11
	Drive Pulley	Type of Drive Pulley			TRA	Bombardier Lite	TRA
		Ramp Identification			291X ①	N.A.	291 ①
		Calibration Screw Position or Calibration Part ②			3	1181 1 x C, 1 x S21	3
		Spring Color			Red/Red	Red/Blue	Yellow/Red
		Spring Length	± 1.5 mm (± .060 in)		97.2 (3.83)	96 (3.78)	121.1 (4.77)
		Clutch Engagement	± 200 RPM		2900	3500	3300
	Driven Pulley	Type of Driven Pulley			LPV27	Formula	Formula
		Spring Preload	± 0.7 kg (± 1.5 lb)		N.A.	4.8 (10.6)	4.8 (10.6)
		Cam Angle		degree	47 – 44	44	44
	Pulley Distance Z			mm (in)	17.0 ± 0.5 (.669 ± .020)	25.5 ± 0.5 (1 ± .020)	16.5 ± 0.5 (.650 ± .020)
	Offset	X		± 0.4 mm (± 1/64 in)	35.5 ± 0.5 (1.398 ± .020)	33.4 ± 0.5 (1.315 ± .020)	35.5 ± 0.5 (1.398 ± .020)
		Y – X		MIN. MAX.	+ 1 (+ .039) + 2 (+ .079)	+ 0.5 (+ .020) + 1.5 (+ .059)	+ 0.5 (+ .020) + 1.5 (+ .059)
	Drive Belt Part Number (P/N)				415 060 600	415 060 600	415 060 600
	Drive Belt Width (new) ③			mm (in)	34.7 (1-3/8)	34.7 (1-3/8)	34.7 (1-3/8)
	Drive Belt Adjustment	Deflection		± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)
		Force ④		kg (lbf)	11.3 (25)	11.3 (25)	11.3 (25)
	Track	Width		cm (in)	38.1 (15)	38.1 (15)	38.1 (15)
		Length		cm (in)	345 (136)	307 (121)	307 (121)
		Profile Height		mm (in)	18.4 (.724)	18.4 (.724)	18.4 (.724)
		Adjustment	Deflection	mm (in)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)
			Force ⑤	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type		Track		SC-10 Touring	SC-10 Sport	SC-10 Sport
			Ski		DSA	DSA	DSA
	Length			cm (in)	294 (115.7)	272.5 (107.3)	272.5 (107.3)
	Width			cm (in)	120.7 (47.5)	115.6 (45.5)	120.7 (47.5)
	Height			cm (in)	122 (48.0)	112 (44.1)	112 (44.1)
	Ski Stance			cm (in)	106.7 (42)	101.6 (40)	106.7 (42)
	Mass (dry)			kg (lb)	216 (475)	193 (425)	202 (445)
	Ground Contact Area			cm^2 (in^2)	7227 (1120)	6503 (1008)	6503 (1008)
	Ground Contact Pressure			kPa (PSI)	2.93 (.425)	2.91 (.422)	3.05 (.442)
	Frame Material				Aluminum	Aluminum	Aluminum
	Bottom Pan Material				Impact Copolymer	Impact Copolymer	Impact Copolymer
	Hood Material				RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane
	Battery			V (A•h)	12 (22)	N.A.	N.A.
	Headlight			W	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27	8/27
	Tachometer and Speedometer Bulb			W	3	5	3
	Fuel and Temperature Gauge Bulb			W	N.A.	N.A.	N.A.
	Fuse	Starter Solenoid		A	30	N.A.	N.A.
		Tachometer		A	N.A.	N.A.	N.A.
	Fuel Tank			L (U.S. gal)	40 (10.6)	40 (10.6)	40 (10.6)
	Chaincase Gearbox			mL (U.S. oz)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System			L (U.S. oz)	N.A.	N.A.	N.A.
	Injection Oil Reservoir			L (U.S. oz)	2.55 (86)	2.55 (86)	2.55 (86)

	VEHICLE MODEL				FORMULA DELUXE 380	FORMULA DELUXE 500
	ENGINE TYPE				**377**	**503**
	Chain Drive Ratio				18/44	21/44
	Chain	Pitch		in	3/8	3/8
		Type/Links Qty/Plates Qty			Silent/72/11	Silent/72/11
	Drive Pulley	Type of Drive Pulley			Bombardier Lite	TRA
		Ramp Identification			N.A.	291X ①
		Calibration Screw Position or Calibration Part ②			1181 1 x C, 1 x S21	3
		Spring Color			Red/Blue	Yellow/Red
		Spring Length		± 1.5 mm (± .060 in)	96 (3.78)	121 (4.77)
		Clutch Engagement		± 200 RPM	3500	3300
	Driven Pulley	Type of Driven Pulley			LPV27	LPV27
		Spring Preload		± 0.7 kg (± 1.5 lb)	N.A.	N.A.
		Cam Angle		degree	47 – 44	47 – 44
	Pulley Distance Z			mm (in)	26.0 ± 0.5 (1.024 ± .020)	17.0 ± 0.5 (.669 ± .020)
	Offset	X		mm (in)	33.4 ± 0.5 (1.315 ± .020)	35.5 ± 0.5 (1.315 ± .020)
		Y – X		MIN. MAX.	+ 0.5 (+ .020) + 1.5 (+ .059)	+ 0.5 (+ .020) + 1.5 (+ .059)
	Drive Belt Part Number (P/N)				415 060 600	415 060 600
	Drive Belt Width (new) ③			mm (in)	34.7 (1-3/8)	34.7 (1-3/8)
	Drive Belt Adjustment		Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)
			Force ④	kg (lbf)	11.3 (25)	11.3 (25)
	Track	Width		cm (in)	38.1 (15)	38.1 (15)
		Length		cm (in)	307 (121)	307 (121)
		Profile Height		mm (in)	18.4 (.724)	18.4 (.724)
		Adjustment	Deflection	mm (in)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)
			Force ⑤	kg (lbf)	7.3 (16)	7.3 (16)
	Suspension Type		Track		SC-10 Sport	SC-10 Touring
			Ski		DSA	DSA
	Length			cm (in)	272.5 (107.3)	272.5 (107.3)
	Width			cm (in)	115.6 (45.5)	120.7 (47.5)
	Height			cm (in)	116.9 (46)	116.9 (46)
	Ski Stance			cm (in)	101.6 (40)	106.7 (42)
	Mass (dry)			kg (lb)	202 (445)	211 (465)
	Ground Contact Area			cm^2 (in^2)	6503 (1008)	6503 (1008)
	Ground Contact Pressure			kPa (PSI)	3.05 (.442)	3.18 (.461)
	Frame Material				Aluminum	Aluminum
	Bottom Pan Material				Impact Copolymer	Impact Copolymer
	Hood Material				RRIM Polyurethane	RRIM Polyurethane
	Battery			V (A•h)	12 (22)	12 (22)
	Headlight			W	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27
	Tachometer and Speedometer Bulb			W	5	2 x 3
	Fuel and Temperature Gauge Bulb			W	N.A.	N.A.
	Fuse	Starter Solenoid		A	30	30
		Tachometer		A	N.A.	N.A.
	Fuel Tank			L (U.S. gal)	40 (10.6)	40 (10.6)
	Chaincase Gearbox			mL (U.S. oz)	250 (8.5)	250 (8.5)
	Cooling System			L (U.S. oz)	N.A.	N.A.
	Injection Oil Reservoir			L (U.S. oz)	2.55 (86)	2.55 (86)

ENGINE TECHNICAL DATA LEGEND

BTDC: Before Top Dead Center
CDI: Capacitor Discharge Ignition
K: Kilo (x 1000)
MAG: Magneto Side
N.A.: Not Applicable
PTO: Power Take Off Side
R: Rectangular
ST: Semi-trapez

① The maximum horsepower RPM is applicable on the vehicle. It may be different under certain circumstances and BOMBARDIER INC. reserves the right to modify it without obligation.

② Crankshaft end-play is not adjustable on these models except Tundra series. Specification is given for verification purposes only.

③ Rotary valve to crankcase clearance: 0.27 – 0.48 mm (.011 – .019 in).

④ At 6000 RPM (engine cold) with headlamp turned on.

⑤ All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.

⑥ Force applied midway between pulleys to obtain specified deflection.

⑦ Drive pulley retaining screw: torque to 90 to 100 N•m (66 to 74 lbf•ft), install drive belt, accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake; repeat 5 times. Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

VEHICLE TECHNICAL DATA LEGEND

DSA: Direct Shock Action
RRIM: Reinforced Reaction Injection Molding
TRA: Total Range Adjustable drive pulley
N.A.: Not Applicable

① Lever with roller pin (P/N 417 004 309) (Hollow).

② For Bombardier Lite drive pulleys:
1157 = Red block, push type 38 g (P/N 417 115 700).
1181 = Black block, screw type 39.6 g (P/N 417 118 100).
1143 = Red block, screw type 41.8 g (P/N 417 114 300).

W = Washer 1.8 g (P/N 417 115 800).
C = Cap 1.65 g (P/N 417 114 500).
S3.4 = Weight, screw type 3.4 g (P/N 417 114 400).
S21 = Weight, screw type 21 g (P/N 417 120 400).

③ Minimum allowable width may not be less than 3.0 mm (1/8 in) of a new drive belt.

④ Force applied midway between pulleys to obtain specified deflection.

⑤ Force or downward pull applied to track to obtain specified tension deflection.

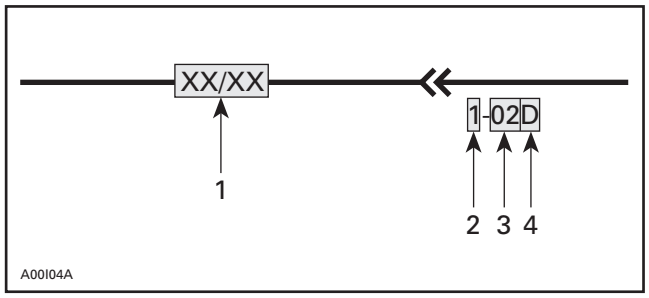
WIRING DIAGRAMS

MODEL	WIRING DIAGRAM PAGE	HEADLIGHT (watt)	TAILLIGHT (watt)	ELECTRICAL SYSTEM OUTPUT (watt)
Tundra	Annex 1	60/55 hal.	8/27	160
Tundra R	Annex 2	60/55 hal.	8/27	240
Skandic 380/500	Annex 3	60/55 hal.	8/27	240
Formula S/SL	Annex 4	60/55 hal.	8/27	240
Touring E/LE/SLE Formula Deluxe 380/500	Annex 5	60/55 hal.	8/27	240

WIRING DIAGRAM LEGEND

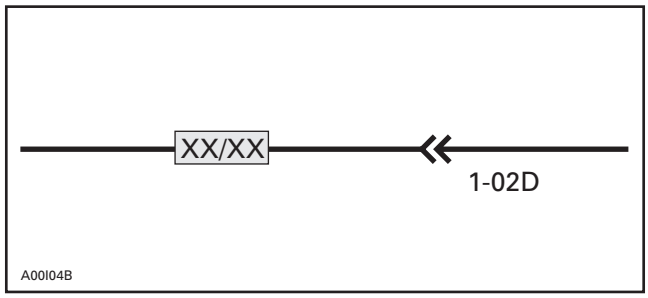
◆ WARNING

Ensure all terminals are properly crimped on the wires and all connector housings are properly fastened.



1. *Wire colors*
2. *Housing area*
3. *Housing number per area*
4. *Wire connector location in housing*

WIRE COLORS AND CIRCUIT



The first color of a wire is the main color, second color is the stripe.

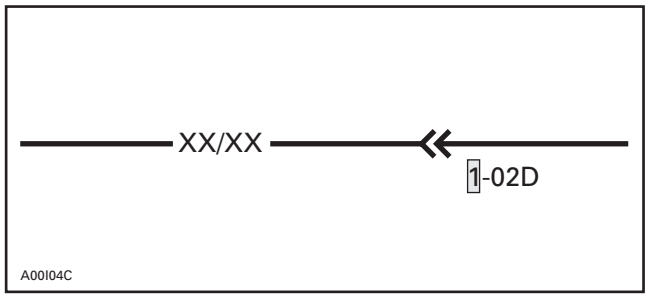
Example: YL/BK is a YELLOW wire with a BLACK stripe.

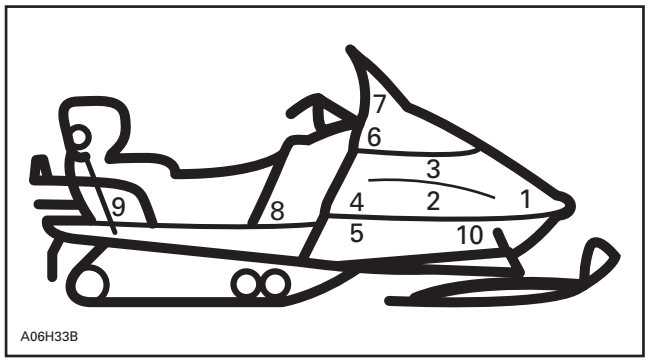
COLOR CODE	
BE – BEIGE BK – BLACK BL – BLUE BR – BROWN GN – GREEN GY – GREY	OR – ORANGE RD – RED VI – VIOLET WH – WHITE YL – YELLOW

Following table shows wire colors related to electrical circuits.

WIRE COLOR	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – key switch – tether cord switch – emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off, RER pilot lamp, beeper and beeper switch	
BLACK (big)	Ground for starter (–)	
BEIGE	RER switch	Must be grounded to activate RER.
BEIGE/BLACK	Reverse alarm and pilot lamp	Current returns by BLACK wire.
YELLOW YELLOW/BLACK	12 volts (AC)	If shorted, magneto stops producing electricity.
RED	12 volts (DC) (+) For starter motor	
RED/GREEN	12 volts (DC) (+) For starter solenoid	
RED/BLUE	12 volts (DC) (+) Rectifier output	
GREY	12 volts (AC) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (AC) Low beam	
WHITE	12 volts (AC) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (AC) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (AC) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (AC) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (AC) Heated grips (min.)	
BROWN	12 volts (AC) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (AC) Heated throttle lever (min.)	
GREEN	12 volts (AC) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (AC) Engine overheating light	

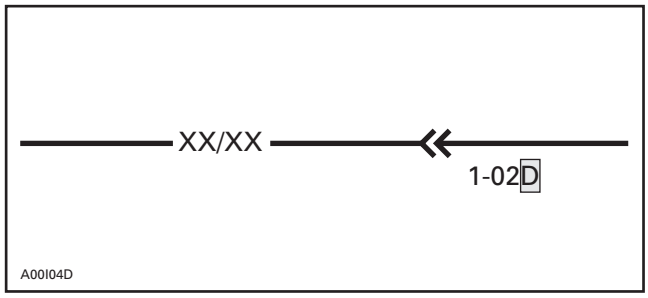
CONNECTOR HOUSING AREA

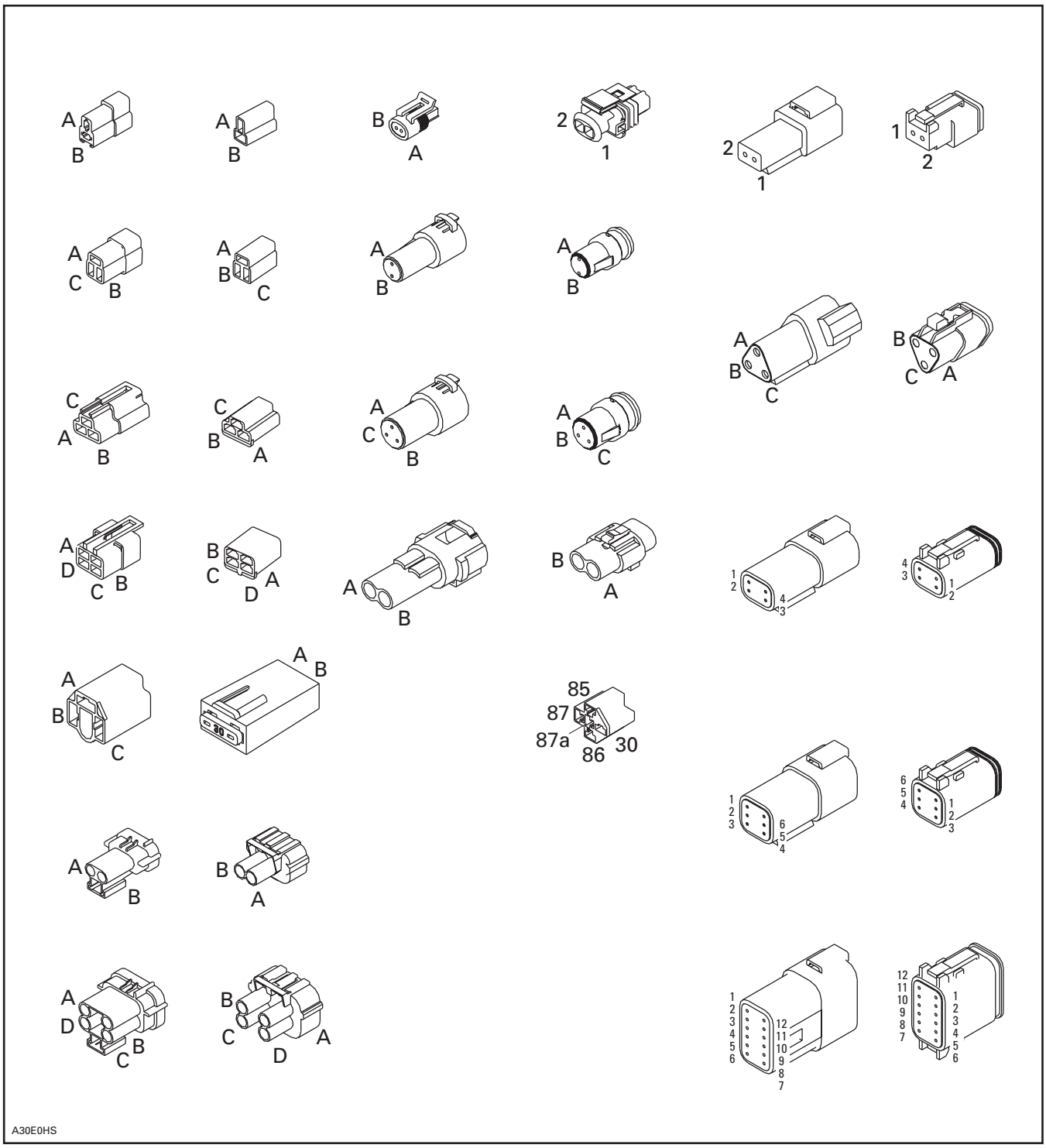




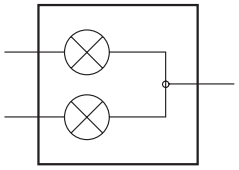
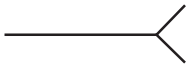
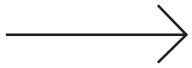
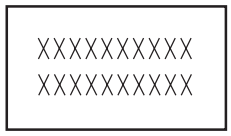
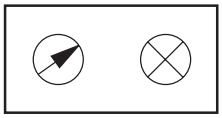
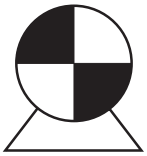
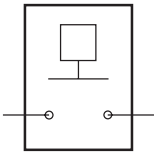
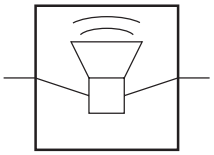
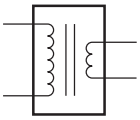
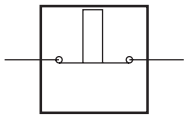
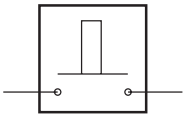
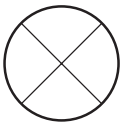
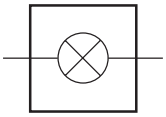
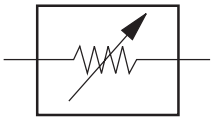
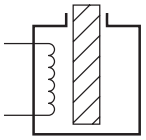
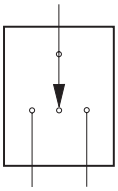
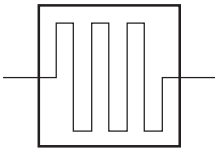
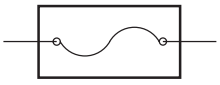
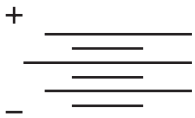
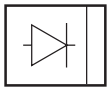
AREA	LOCATION
1	Front of engine compartment
2	Magneto
3	Carburetors
4	Near of intake silencer
5	Near driven pulley
6	Under console
7	Under hood
8	Near fuel tank
9	Rear of seat
10	Under engine

CONNECTOR LOCATION IN HOUSING




A
B
A
B
B
A
2
1
2
1
1
2
A
C
B
A
B
C
A
B
A
B
A
B
C
A
B
C
A
B
C

SYMBOLS DESCRIPTION

Beam and tail light 	Female terminal 	Male terminal 	Electronic module 
Meter 	Electric motor 	Low level sensor 	Buzzer 
Ignition coil 	Normally close switch 	Normally open switch 	Male terminal on instrument 
Engine ground 	Frame ground  Frame	Spark plug 	Meter movement 
Bulb 	Pilot lamp 	Analog sensor 	Solenoid valve 
Magneto 	3 position switch 	Heating element 	Fuse 
Trigger coil 	Battery 	Diode 	

A00E52S

UNPLUGING CONNECTORS

Always unplug connectors by pulling on housing not on wire.

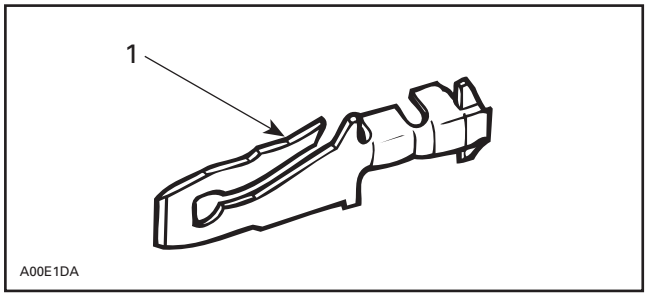


TYPICAL

TAB AND RECEPTACLE CONNECTORS REMOVAL

Tab Connector

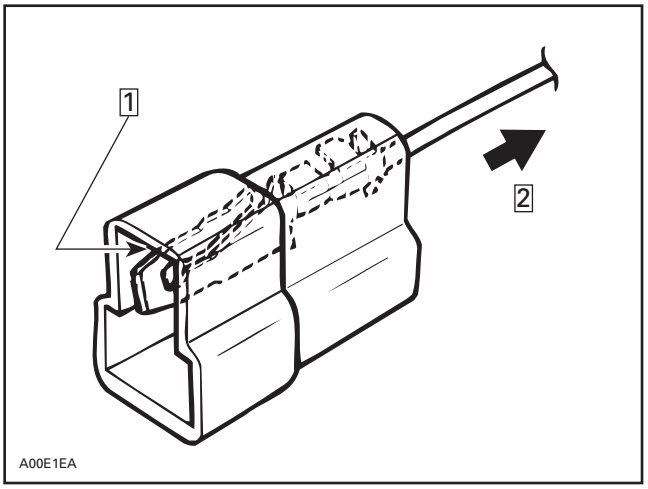
It is locked in its housing by a spring tab on its side. Removal is done by squeezing this tab.



TAB CONNECTOR
1. Locking tab

To remove:

– Insert a screwdriver or Snap-on TT 600-5 from opposite side of wire and pry locking tab.
– While holding locking tab pried, pull connector toward wire side.

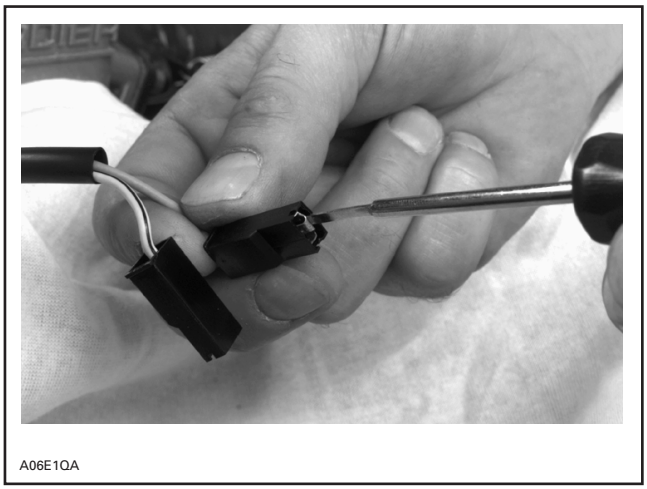


Step 1 : Insert screwdriver here
Step 2 : Pull this side

Locking Receptacle Connector

To remove:

– Insert tool Snap-on TT 600-5 in access opening then pull housing toward wire side.

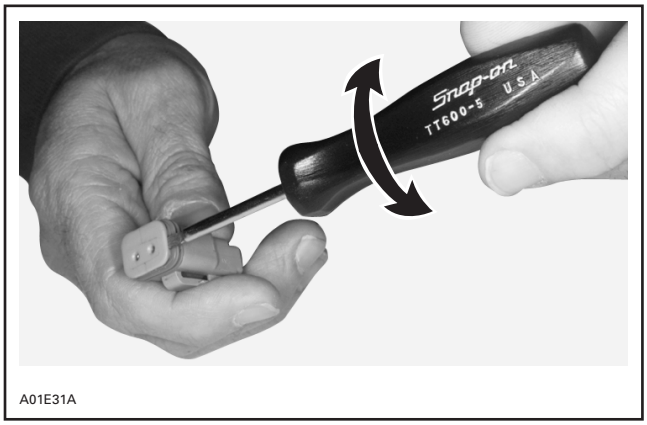


Waterproof Connector Housing

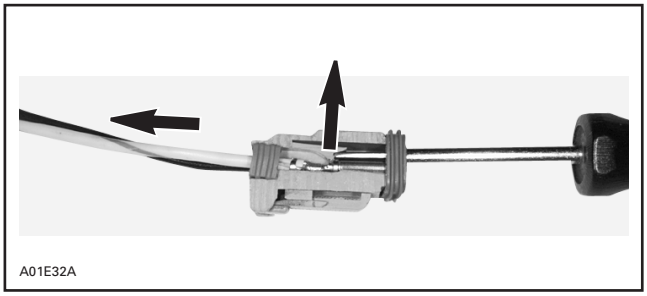
Female Connector Housing

To remove:

– Insert tool Snap-on TT 600-5 under lock and twist to lift it.



– Pry tab to free connector then pull wire out of housing.

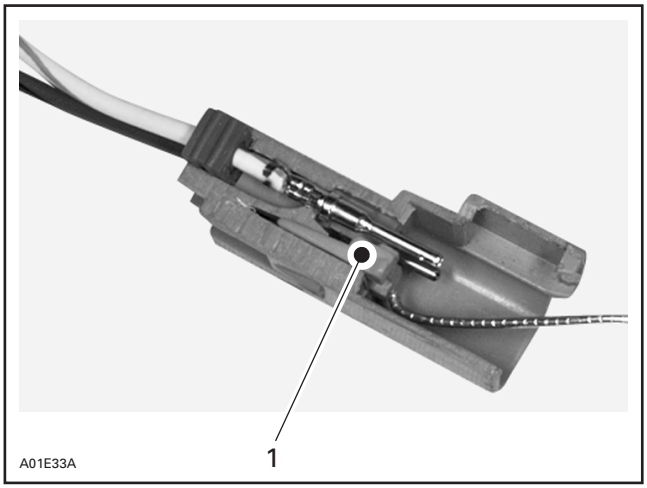


FEMALE CONNECTOR HOUSING — CUT-AWAY

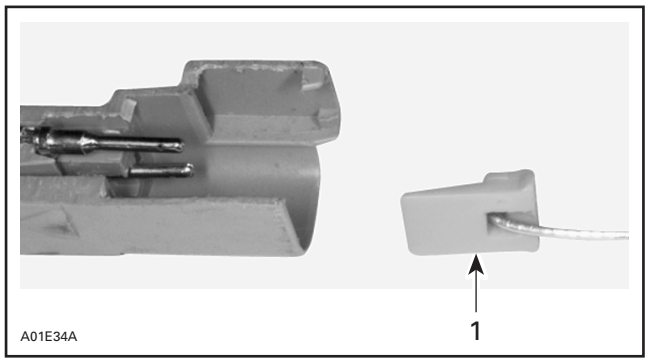
Male Connector Housing

To remove:

– Using a small hook, pull out the lock.

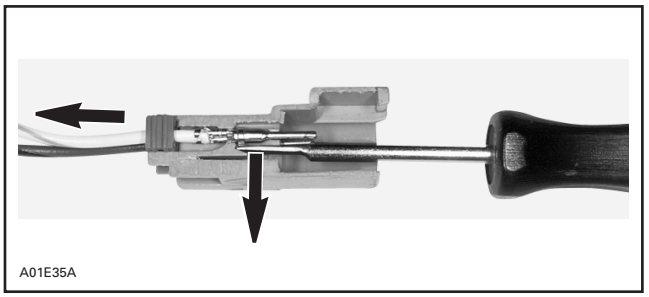


1. Lock



1. Lock

– Pry tab to free connector then pull wire out of housing.

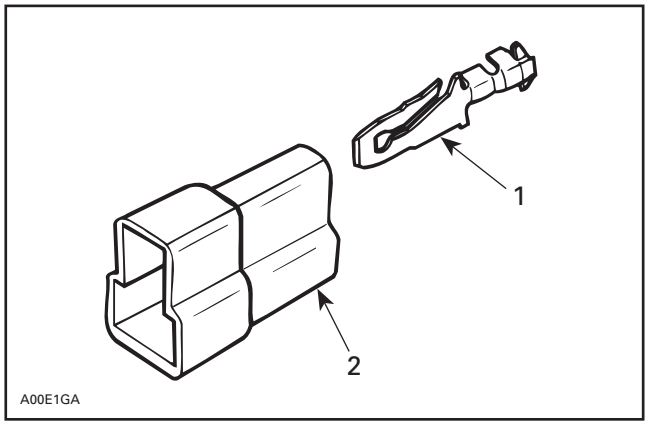


MALE CONNECTOR HOUSING — CUT-AWAY

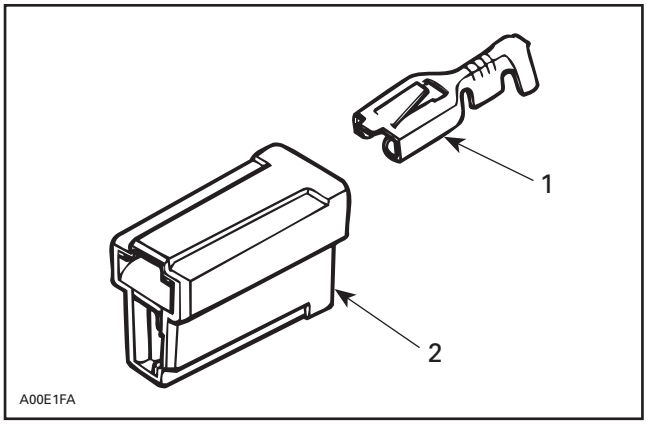
TAB AND RECEPTACLE CONNECTORS INSTALLATION

Prior to installing, make sure locking tab is sufficiently lifted to properly lock.

Insert tab and receptacle connectors in their respective housings as shown in following illustrations. Push sufficiently so that they snap. Try pulling wire to ensure they are properly locked.



1. Tab
2. Housing



TYPICAL

1. Receptacle
2. Housing

ACCESSORIES INSTALLATION

On all **electric start models:** The direct current (DC) utilizes the snowmobile frame as ground "wire" while all alternating current (AC) consumers (lights, heated grips, fuel gauge, etc.) utilize a separate ground wire.

Never interconnect AC and DC grounds as an AC voltage drop will result. When installing accessories on **any** snowmobile, connect their wires directly to the YELLOW and YELLOW/BLACK lighting coil wires.

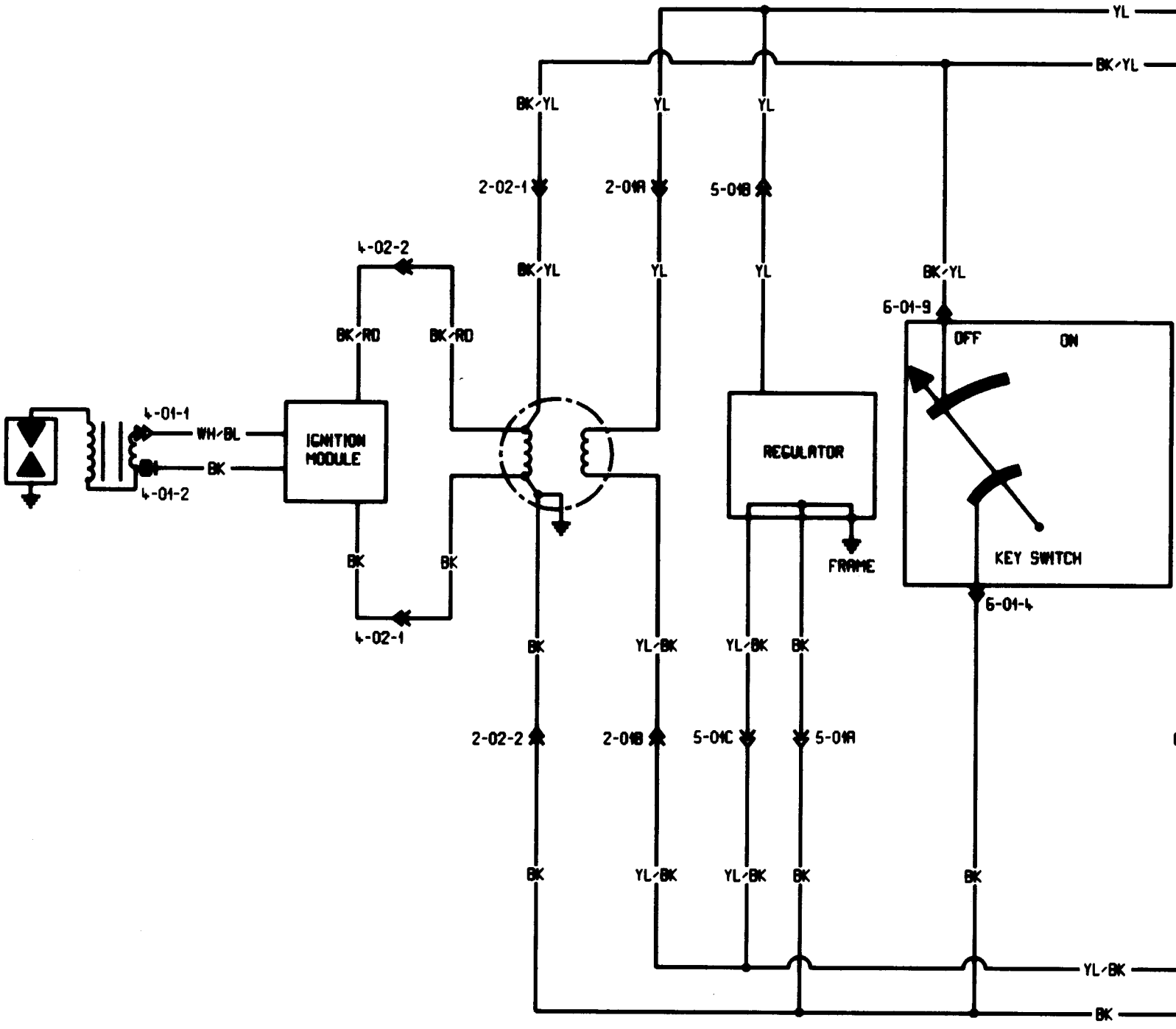
Even if **manual start models** have an AC ground to the chassis (on voltage regulator), all accessories utilize a ground wire isolated from chassis. When an electric starter kit is installed, the voltage regulator and its ground wire are replaced by a voltage rectifier/regulator unit permitting a completely isolated AC circuit.

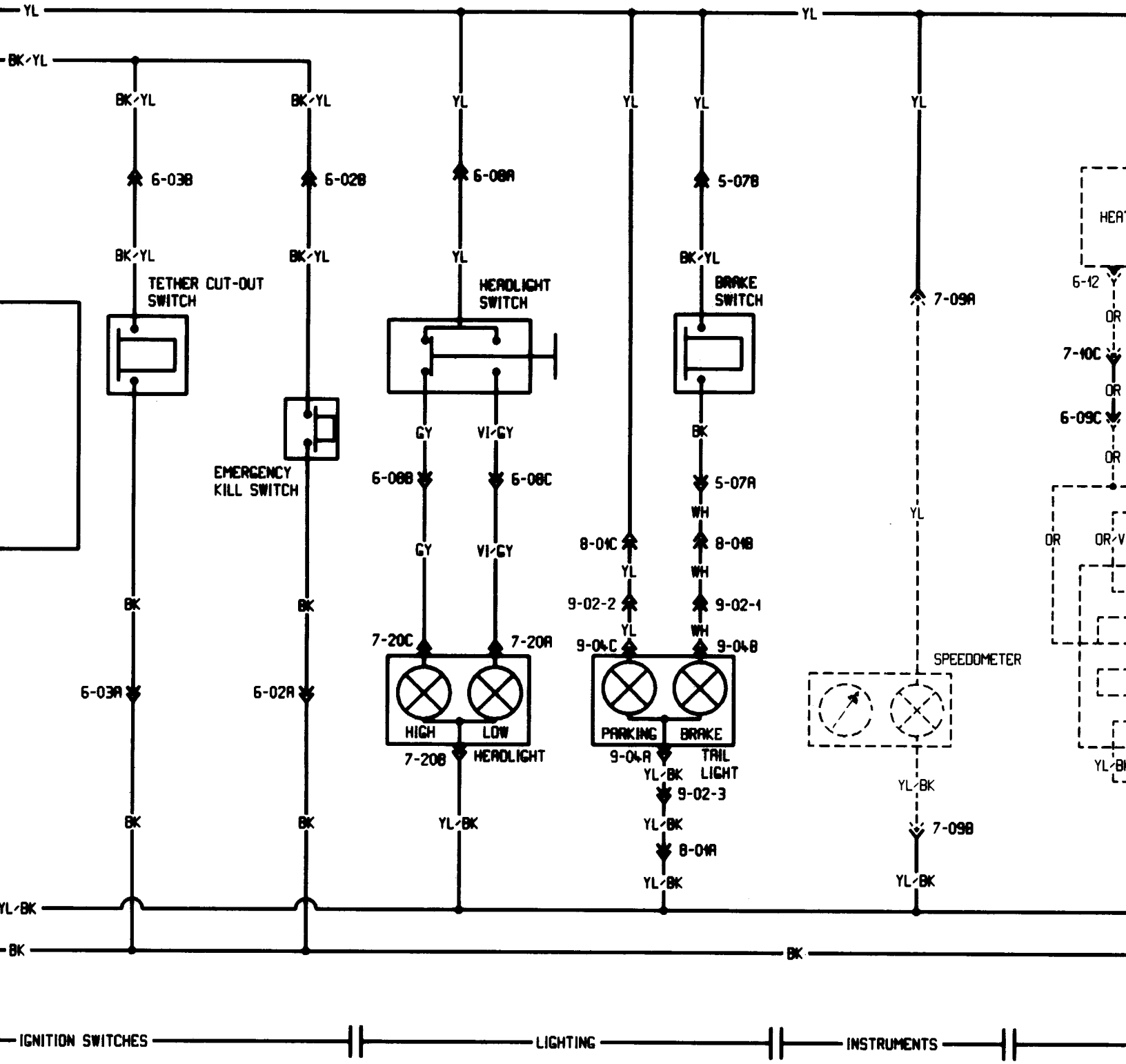
◆ WARNING

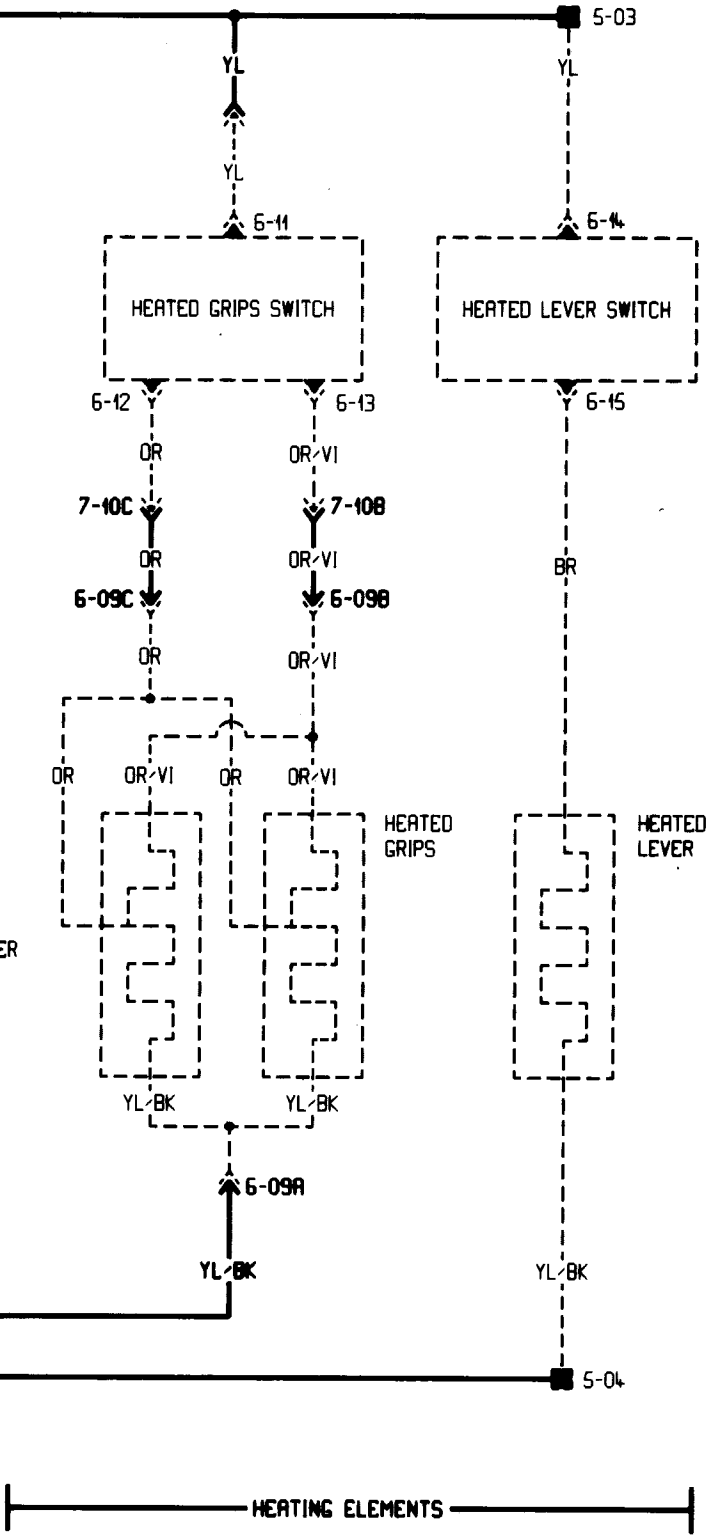
Keep wires away from any rotating, moving, heating, vibrating or sharp edge. Use proper fastening devices as required.

ANNEX 1 TUNDRA

'99 TUNDRA


YL
BK/YL
BK/YL
YL
YL
2-02-1
2-01A
5-01B
4-02-2
BK/YL
YL
YL
BK/YL
6-01-9
BK/RD
BK/RD
OFF
ON
4-01-1
WH/BL
BK
4-01-2
IGNITION MODULE
REGULATOR
FRAME
KEY SWITCH
6-01-4
BK
BK
4-02-1
BK
YL/BK
YL/BK
BK
2-02-2
2-01B
5-01C
5-01A
BK
YL/BK
YL/BK
BK
BK
YL/BK
BK
IGNITION SYSTEM
POWER SUPPLY SYSTEM
IGNITION

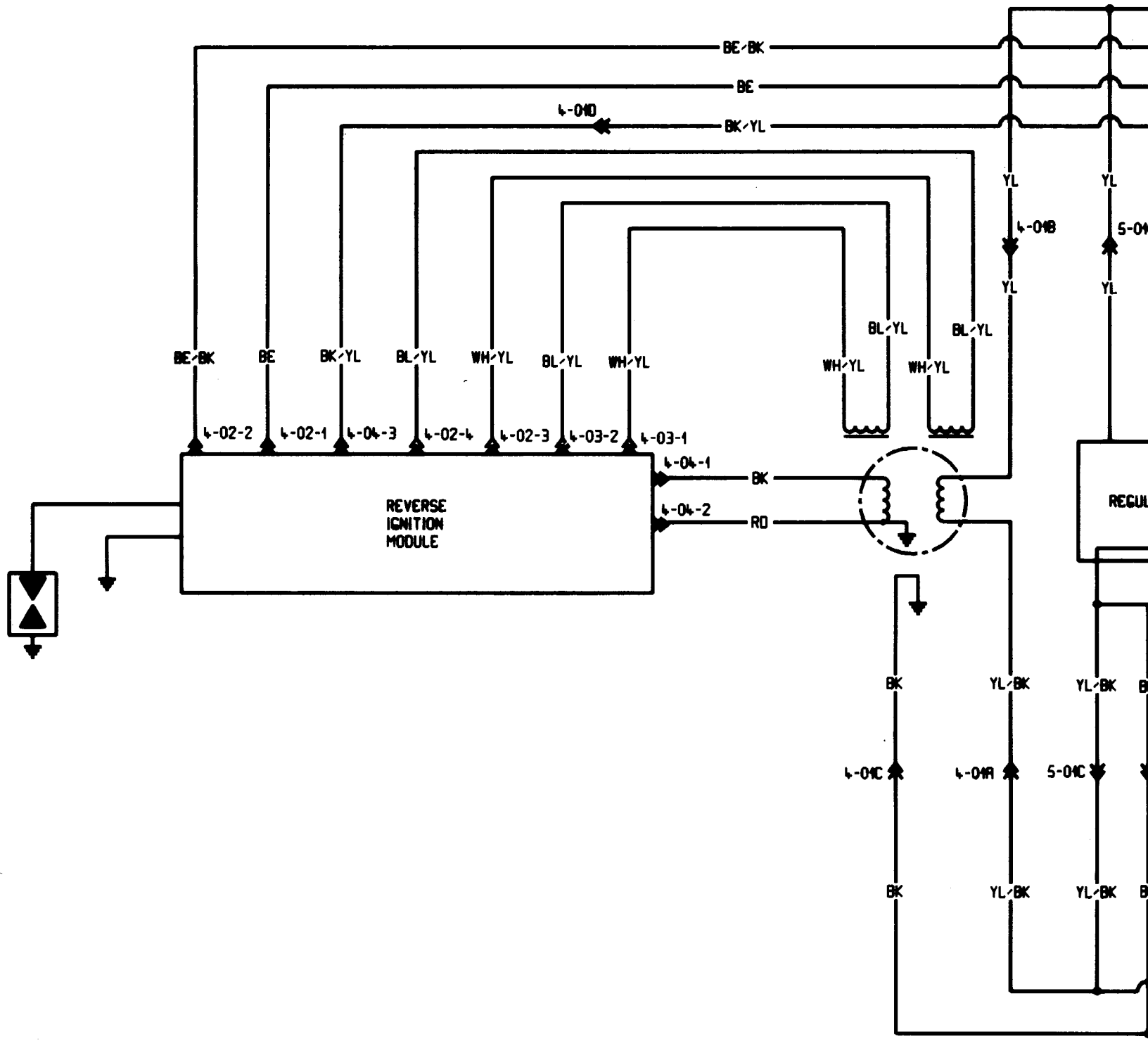

YL
BK/YL
BK/YL
6-03B
BK/YL
TETHER CUT-OUT SWITCH
BK
6-03A
BK
YL/BK
BK/YL
6-02B
BK/YL
EMERGENCY KILL SWITCH
BK
6-02A
BK
BK
YL
6-08A
YL
HEADLIGHT SWITCH
GY
VI/GY
6-08B
6-08C
GY
VI/GY
7-20C
7-20A
HIGH
LOW
7-20B
HEADLIGHT
YL/BK
YL
YL
5-07B
BK/YL
BRAKE SWITCH
BK
5-07A
WH
8-04C
8-04B
YL
WH
9-02-2
9-02-1
YL
WH
9-04C
9-04B
PARKING
BRAKE
9-04A
TAIL LIGHT
YL/BK
9-02-3
YL/BK
8-04A
YL/BK
YL
7-09A
YL
SPEEDOMETER
YL/BK
7-09B
YL/BK
6-12
OR
7-10C
OR
6-09C
OR
OR
OR/V
YL/BK
BK
IGNITION SWITCHES
LIGHTING
INSTRUMENTS

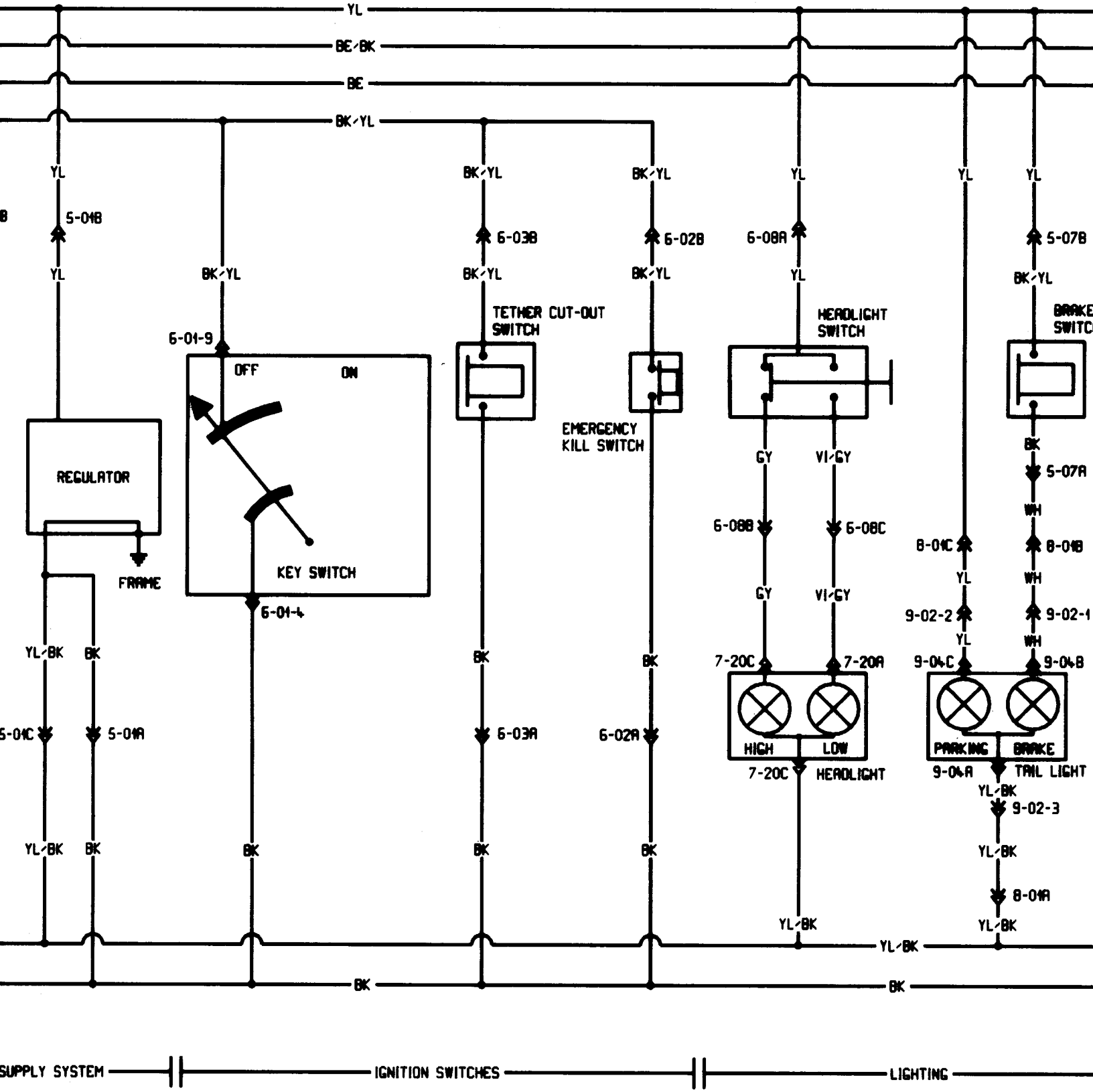


HEATING ELEMENTS

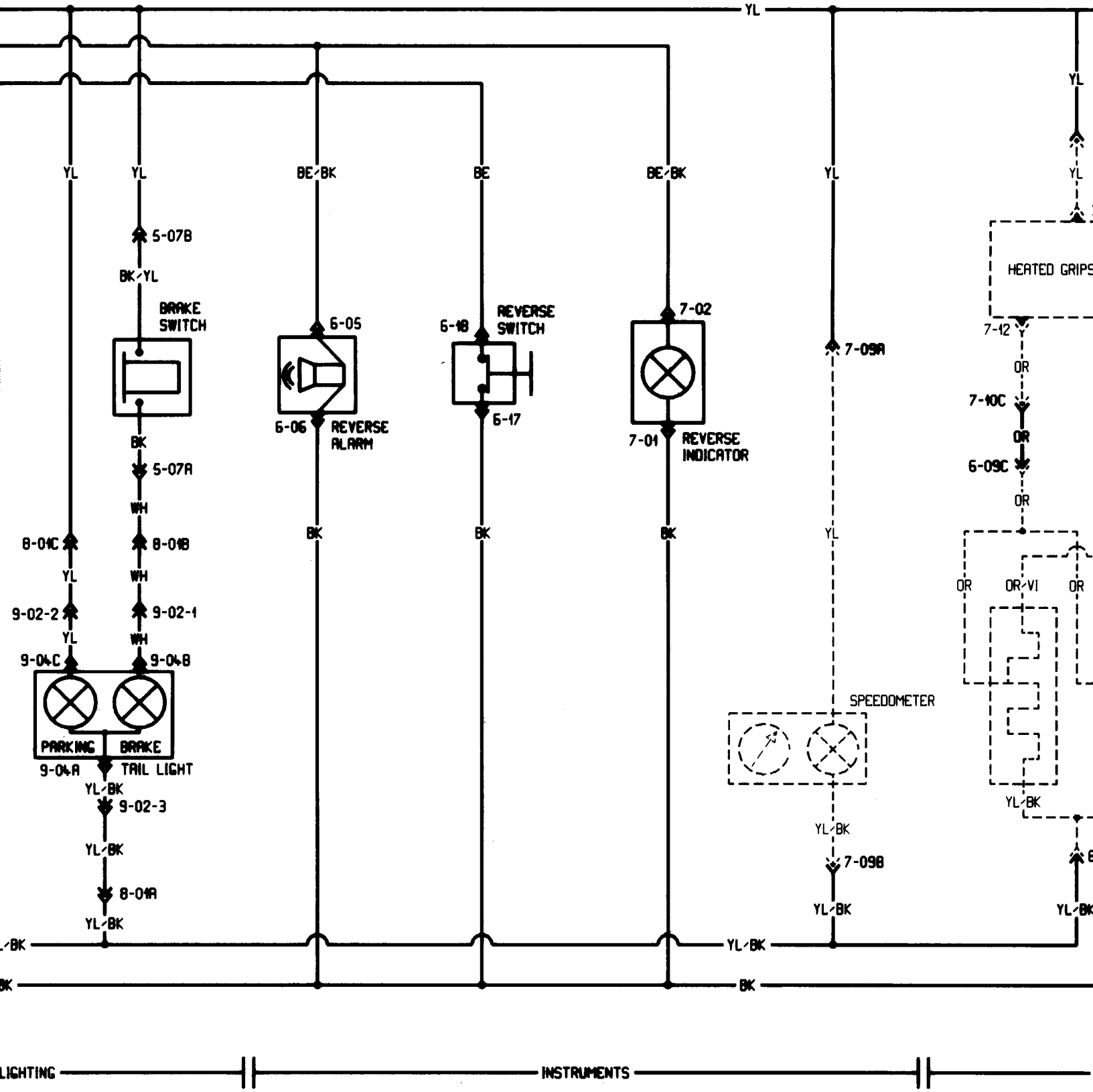
ANNEX 2 TUNDRA R

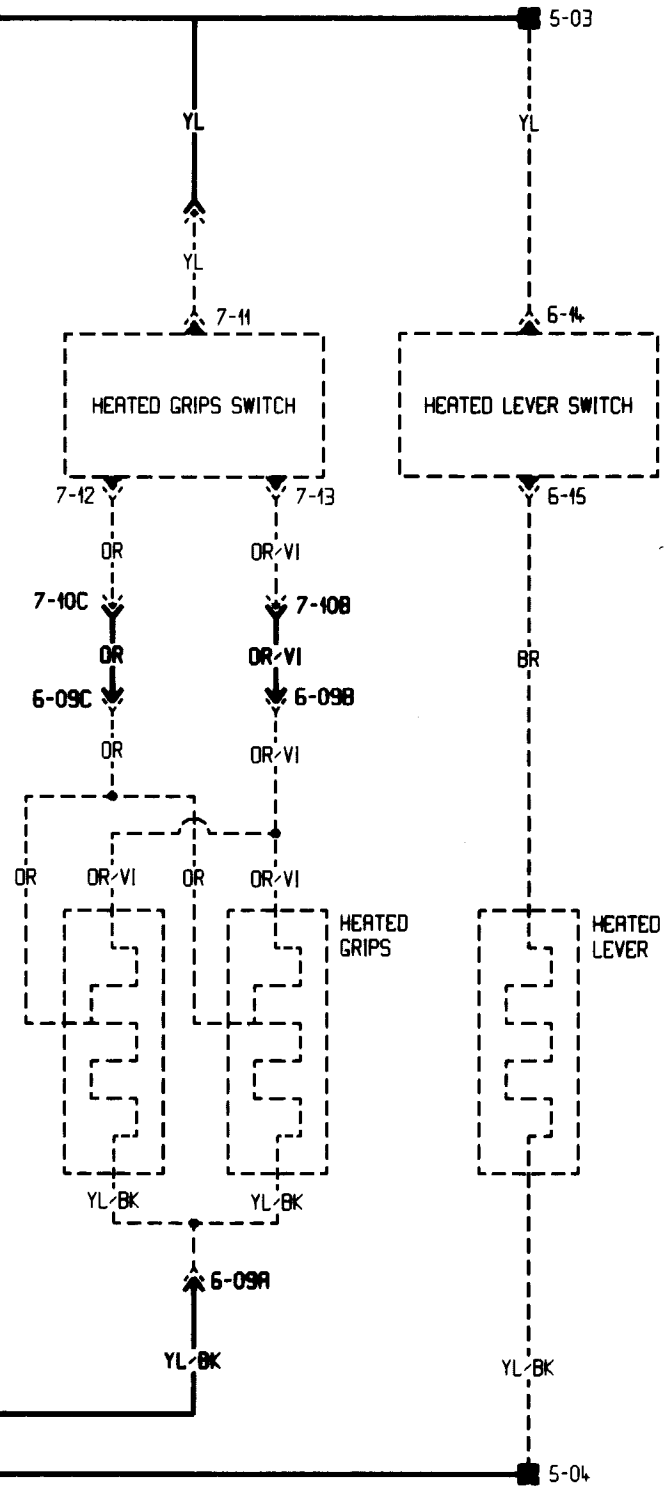
'99 TUNDRA R


BE/BK
BE
BK/YL
4-01D
YL
YL
4-01B
5-01
YL
YL
BL/YL
BL/YL
BE/BK
BE
BK/YL
BL/YL
WH/YL
BL/YL
WH/YL
WH/YL
WH/YL
4-02-2
4-02-1
4-04-3
4-02-4
4-02-3
4-03-2
4-03-1
4-04-1
BK
4-04-2
RD
REVERSE
IGNITION
MODULE
REGUL
BK
YL/BK
YL/BK
4-01C
4-01A
5-01C
BK
YL/BK
YL/BK



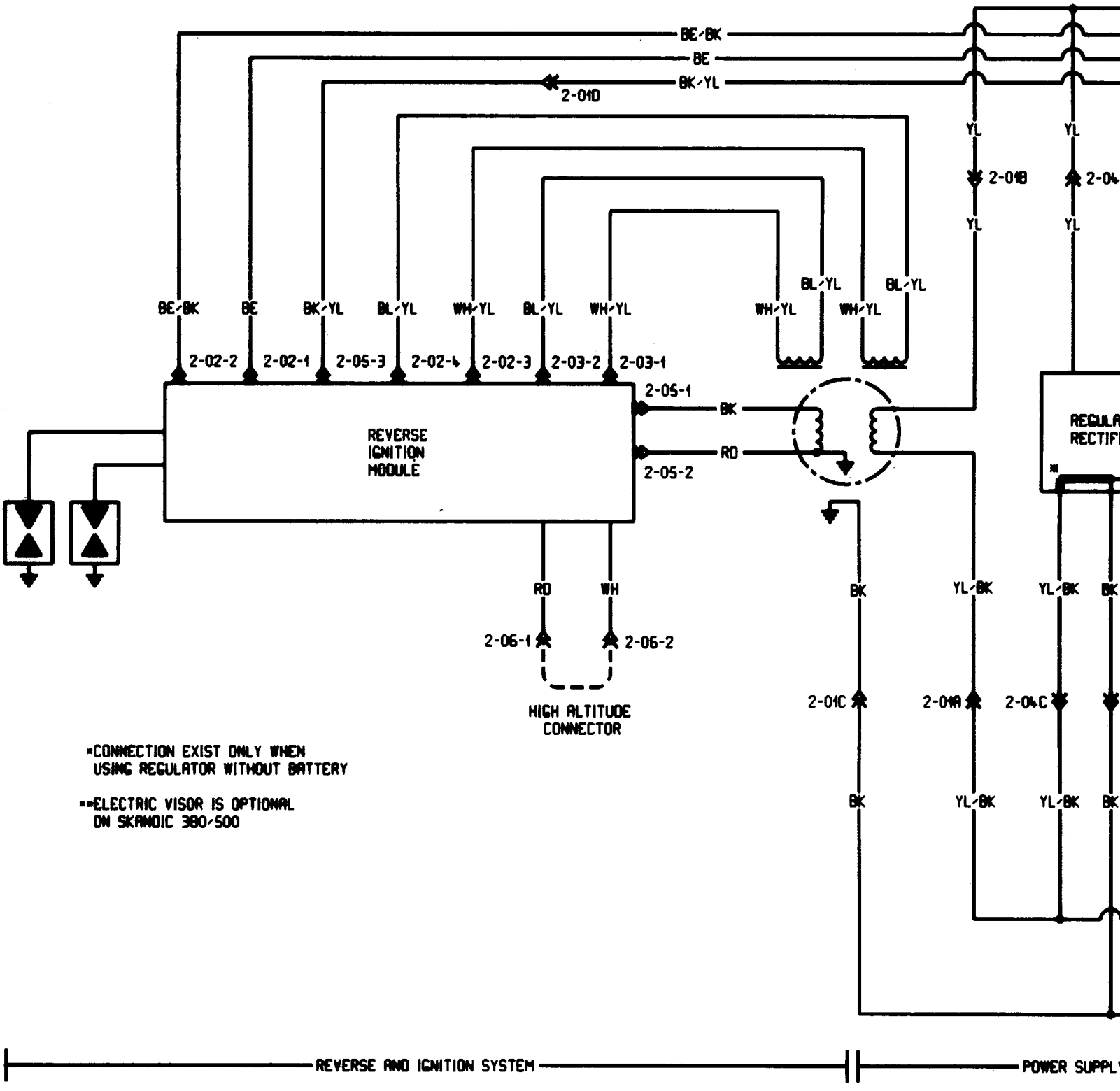
SUPPLY SYSTEM — IGNITION SWITCHES — LIGHTING


YL
YL
YL
BE/BK
BE
BE/BK
YL
YL
5-07B
BK/YL
BRAKE SWITCH
6-05
6-18
REVERSE SWITCH
7-02
HEATED GRIPS
7-12
7-09A
OR
7-10C
OR
6-09C
OR
6-06
REVERSE ALARM
6-17
7-01
REVERSE INDICATOR
BK
5-07A
WH
8-01C
8-01B
YL
WH
9-02-2
9-02-1
YL
WH
9-04C
9-04B
PARKING
BRAKE
9-04A
TAIL LIGHT
YL/BK
9-02-3
YL/BK
8-01A
YL/BK
SPEEDOMETER
YL/BK
7-09B
YL/BK
OR
OR/VI
OR
YL/BK
YL/BK
YL/BK
BK
BK
LIGHTING
INSTRUMENTS


5-03
YL
YL
YL
7-11
6-14
HEATED GRIPS SWITCH
HEATED LEVER SWITCH
7-12
7-13
6-15
OR
OR/VI
7-10C
7-10B
OR
OR/VI
BR
6-09C
6-09B
OR
OR/VI
OR
OR/VI
OR
OR/VI
HEATED GRIPS
HEATED LEVER
YL/BK
YL/BK
6-09A
YL/BK
YL/BK
5-04

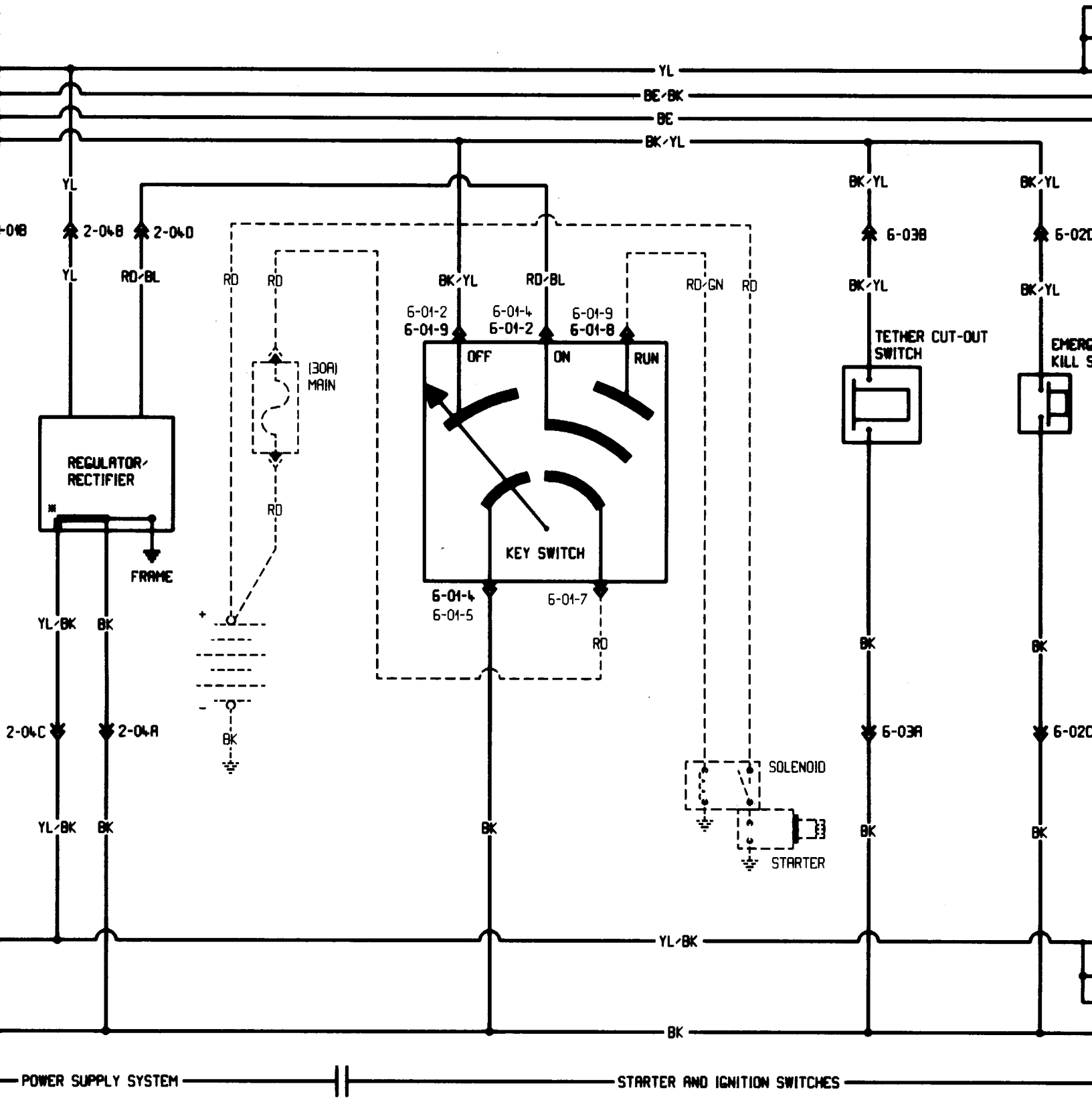
ANNEX 3 SKANDIC 380/500

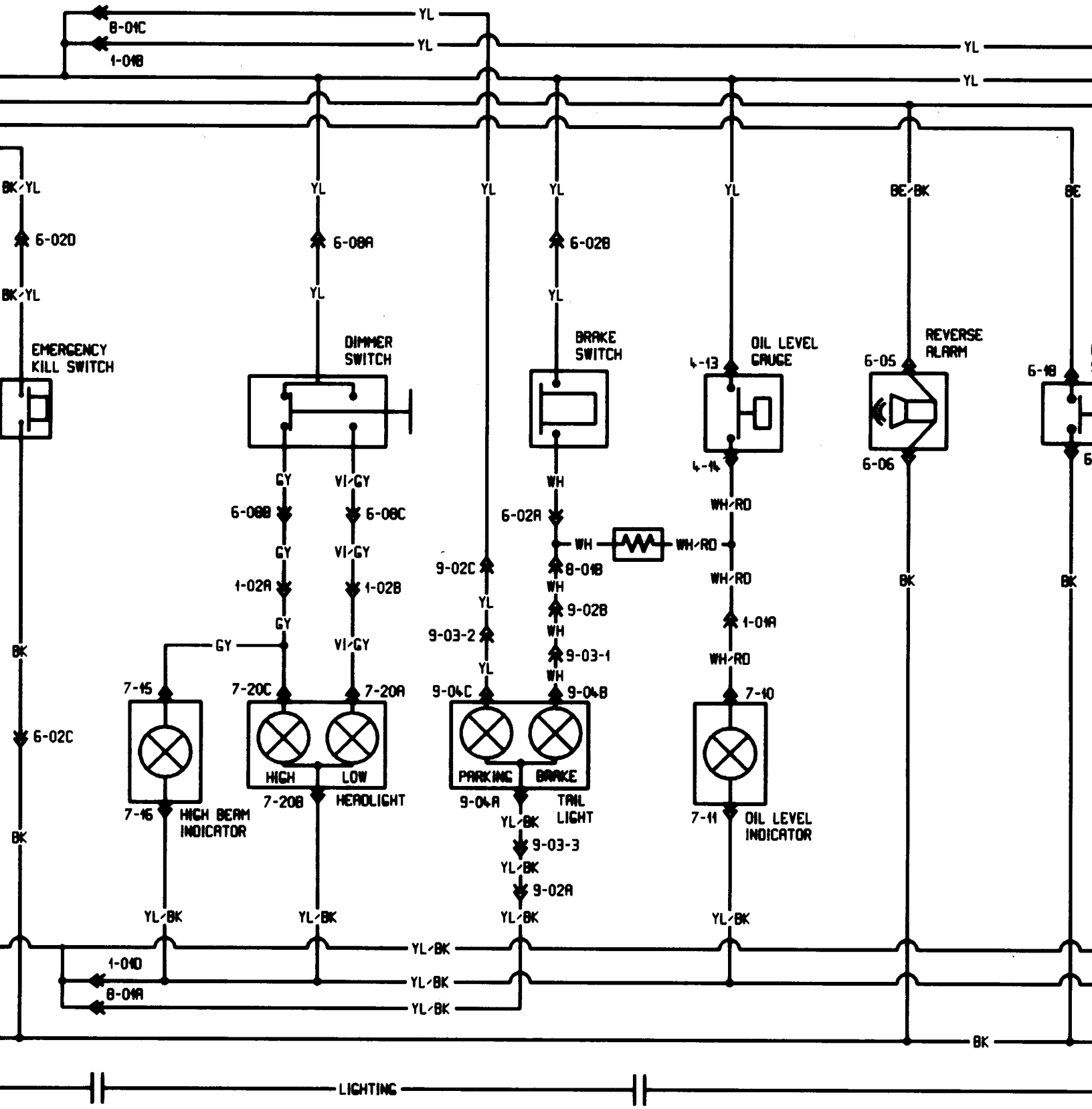
'99 SKANDIC 380/500

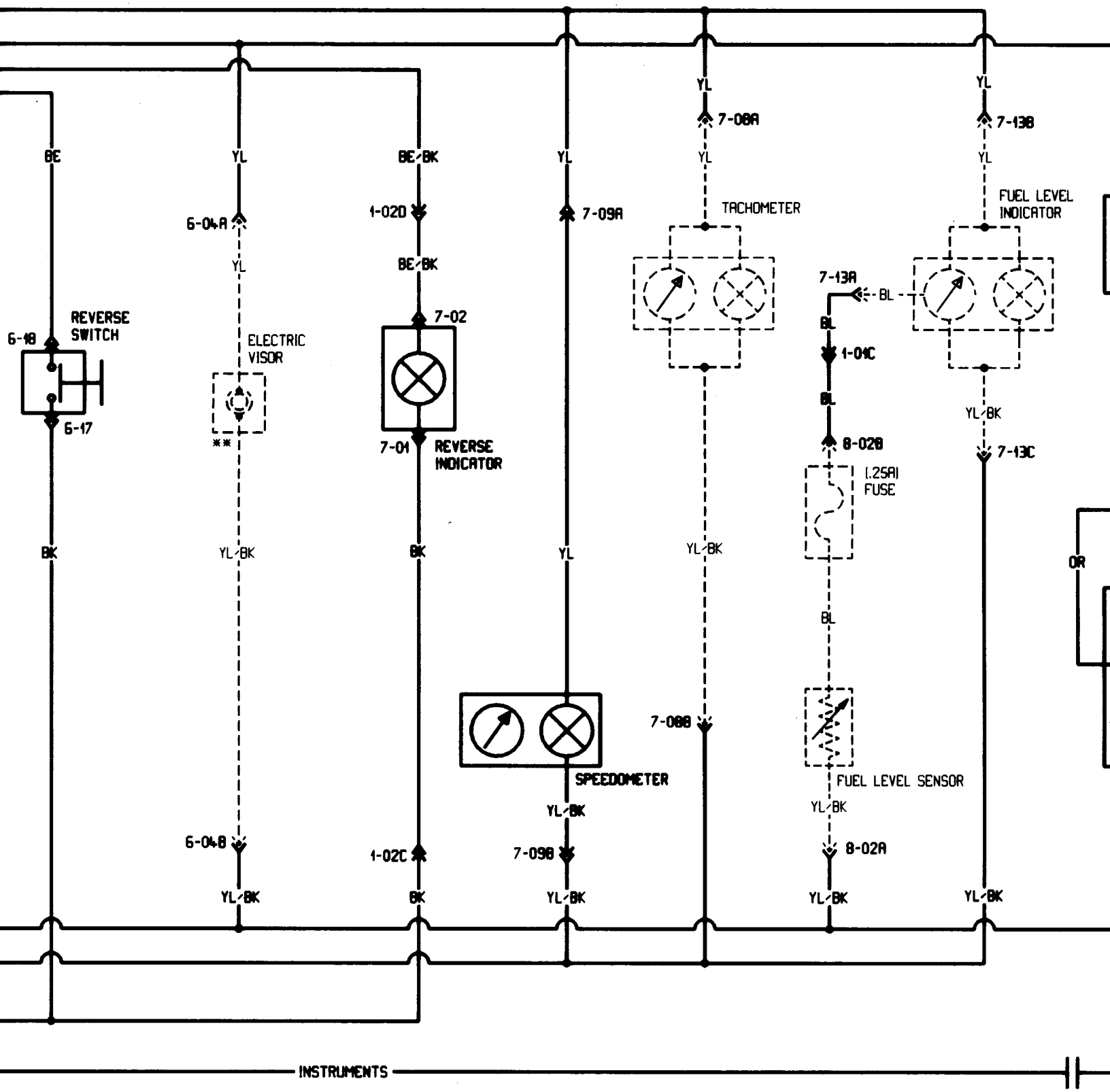


*CONNECTION EXIST ONLY WHEN USING REGULATOR WITHOUT BATTERY

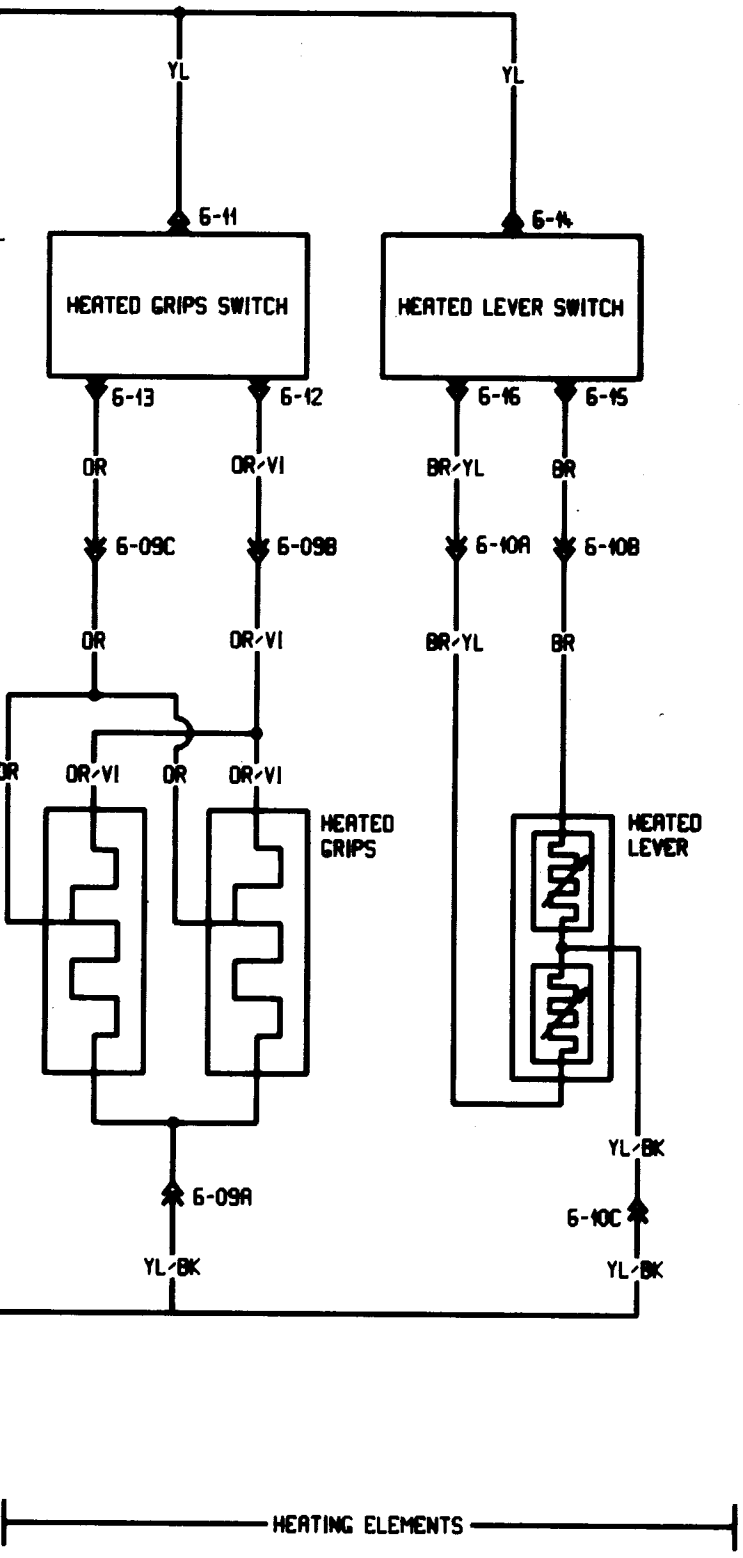
**ELECTRIC VISOR IS OPTIONAL ON SKANDIC 380/500


YL
BE/BK
BE
BK/YL
YL
2-04B
2-04D
YL
RD/BL
RD
RD
(30A)
MAIN
RD
REGULATOR/
RECTIFIER
FRAME
YL/BK
BK
2-04C
2-04A
YL/BK
BK
BK
BK/YL
RD/BL
6-01-2
6-01-9
6-01-4
6-01-2
6-01-9
6-01-8
OFF
ON
RUN
KEY SWITCH
6-01-4
6-01-5
6-01-7
RD
RD/GN
RD
BK
SOLENOID
STARTER
BK/YL
BK/YL
6-03B
BK/YL
BK/YL
TETHER CUT-OUT
SWITCH
BK
6-03A
BK
BK
BK/YL
BK/YL
6-02
BK
6-02
BK
YL/BK
BK
POWER SUPPLY SYSTEM
STARTER AND IGNITION SWITCHES


8-01C
1-01B
YL
BK/YL
6-02D
EMERGENCY KILL SWITCH
6-08A
DIMMER SWITCH
GY
VI/GY
6-08B
6-08C
1-02A
1-02B
7-15
7-20C
7-20A
HIGH
LOW
7-20B
HEADLIGHT
7-15
HIGH BEAM INDICATOR
6-02C
BK
6-02B
BRAKE SWITCH
WH
9-02C
9-03-2
8-01B
9-02B
9-03-1
9-04C
9-04B
PARKING
BRAKE
9-04A
TAIL LIGHT
YL/BK
9-03-3
9-02A
4-13
OIL LEVEL GAUGE
4-14
WH/RD
1-01A
7-10
7-11
OIL LEVEL INDICATOR
BE/BK
6-05
REVERSE ALARM
6-06
BE
6-18
1-01D
8-01A
LIGHTING



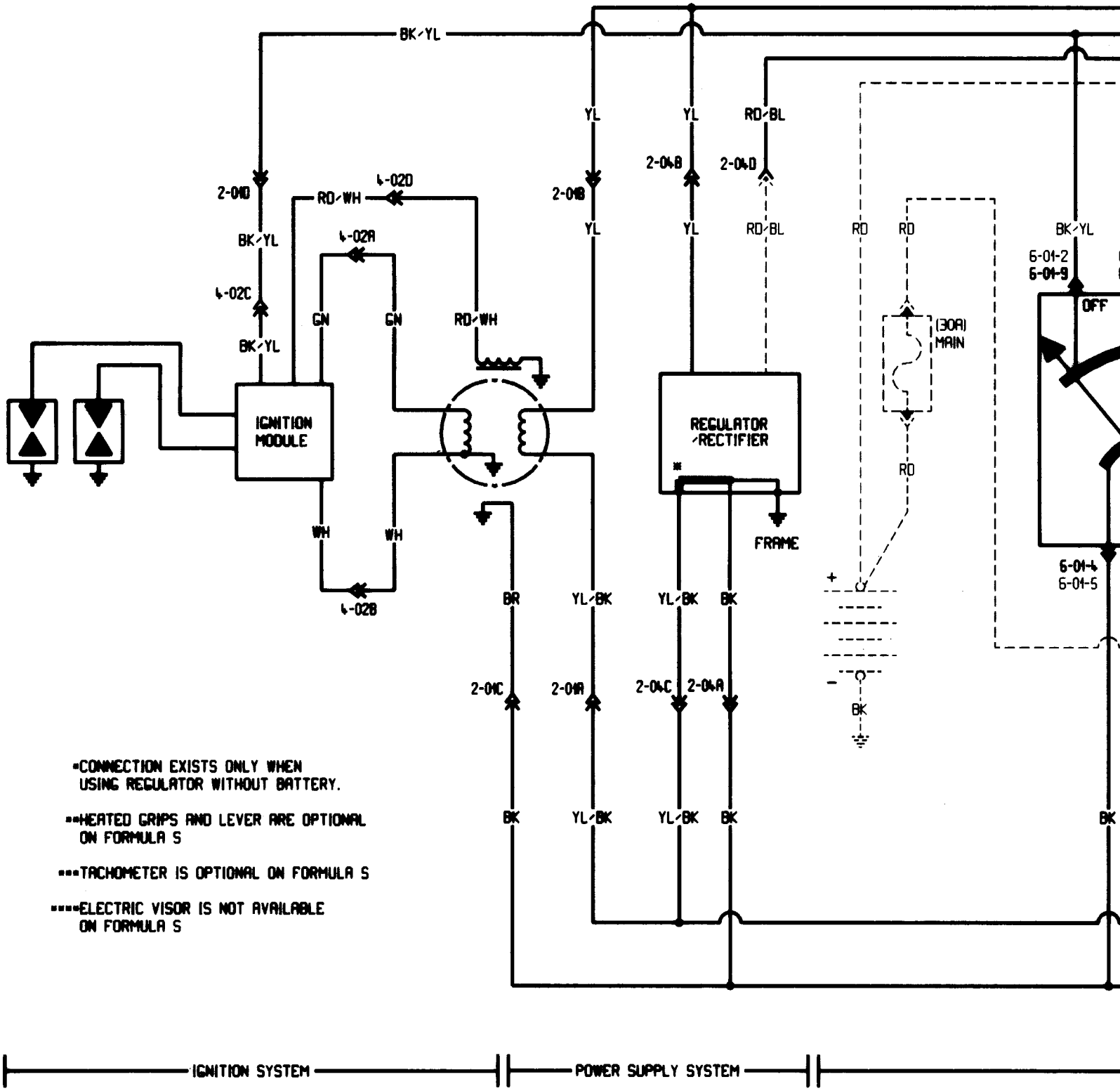
INSTRUMENTS



HEATING ELEMENTS

ANNEX 4 FORMULA S/SL

'99 FORMULA SL/S

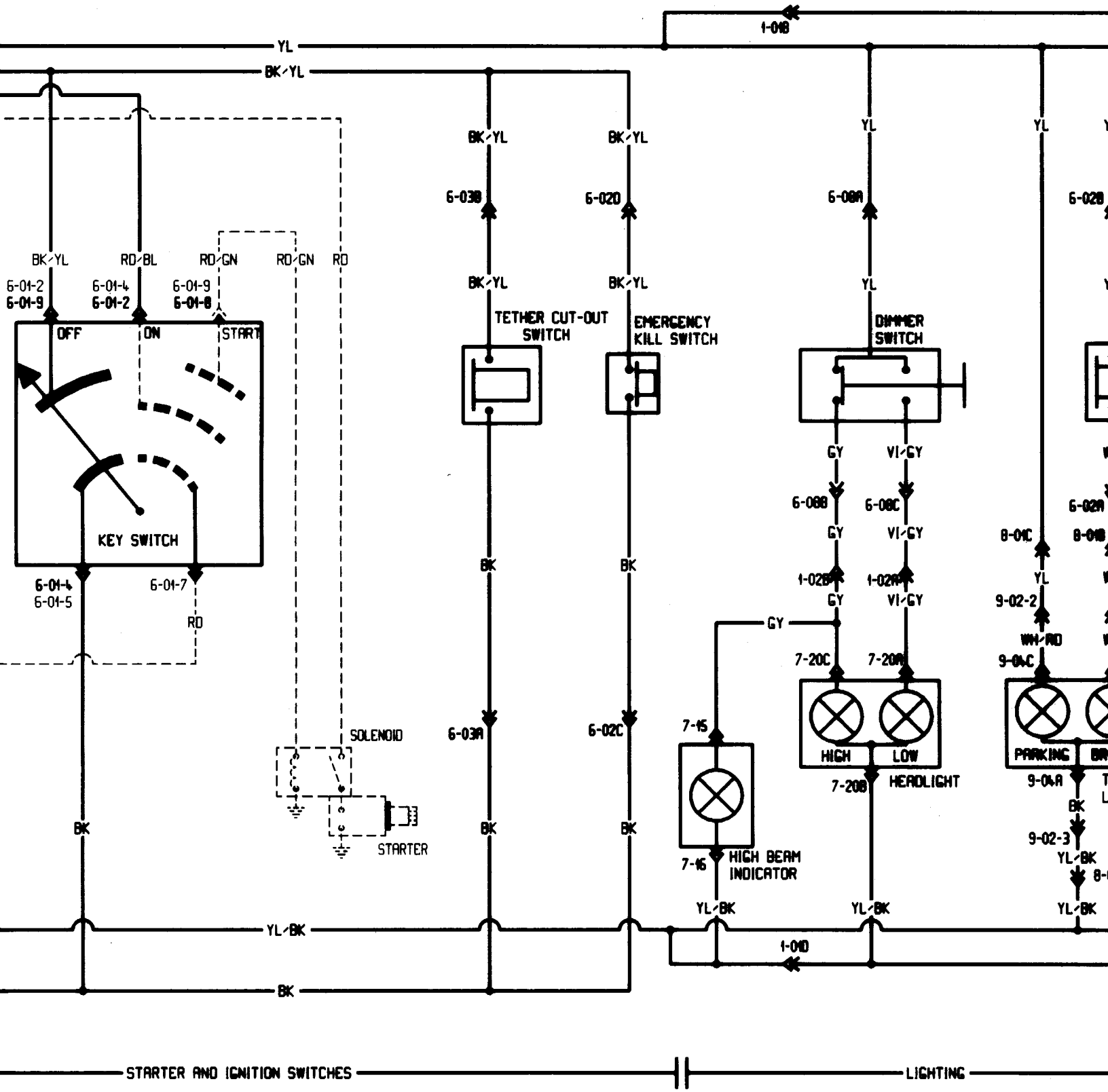


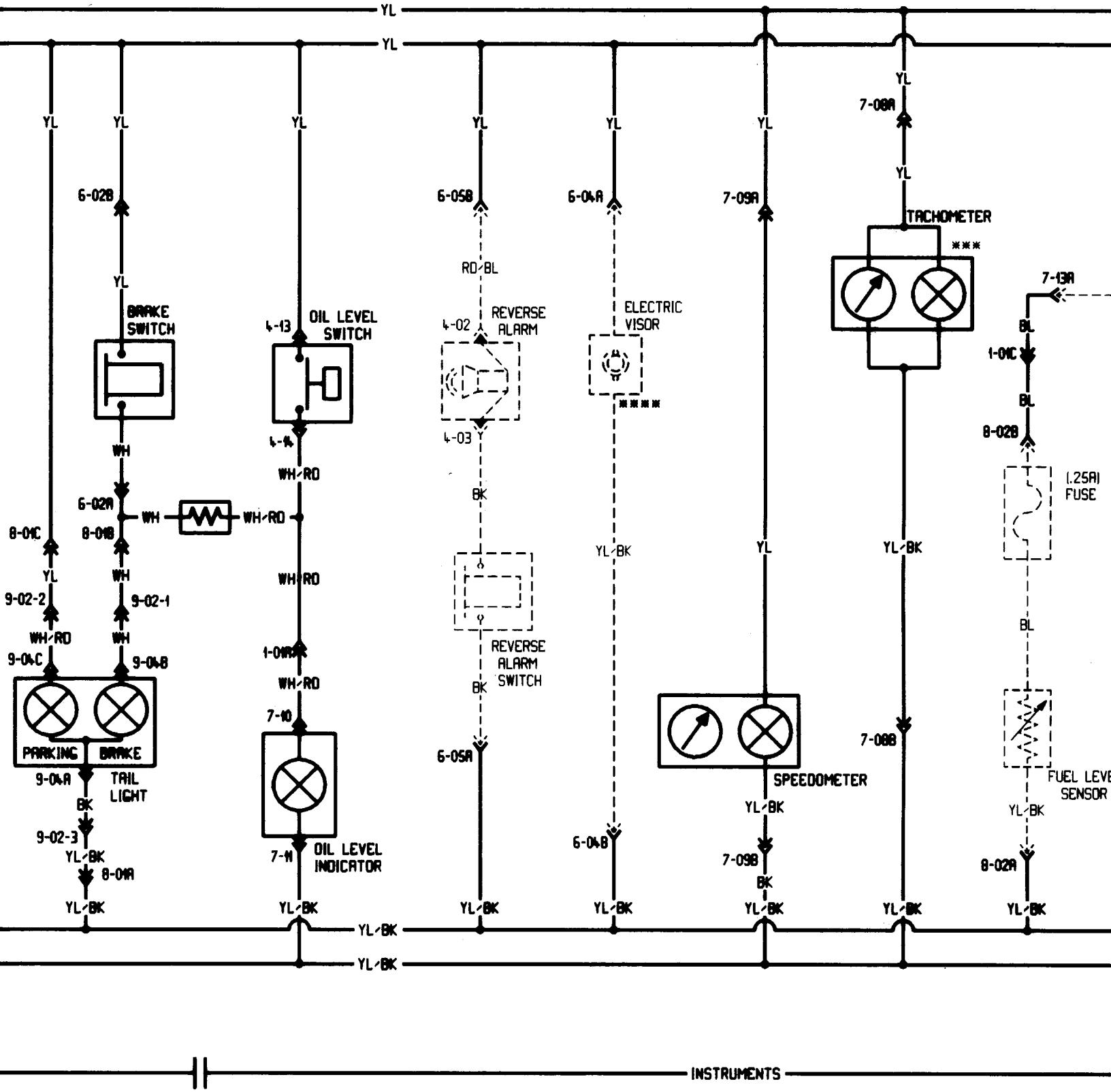
*CONNECTION EXISTS ONLY WHEN USING REGULATOR WITHOUT BATTERY.

**HEATED GRIPS AND LEVER ARE OPTIONAL ON FORMULA S

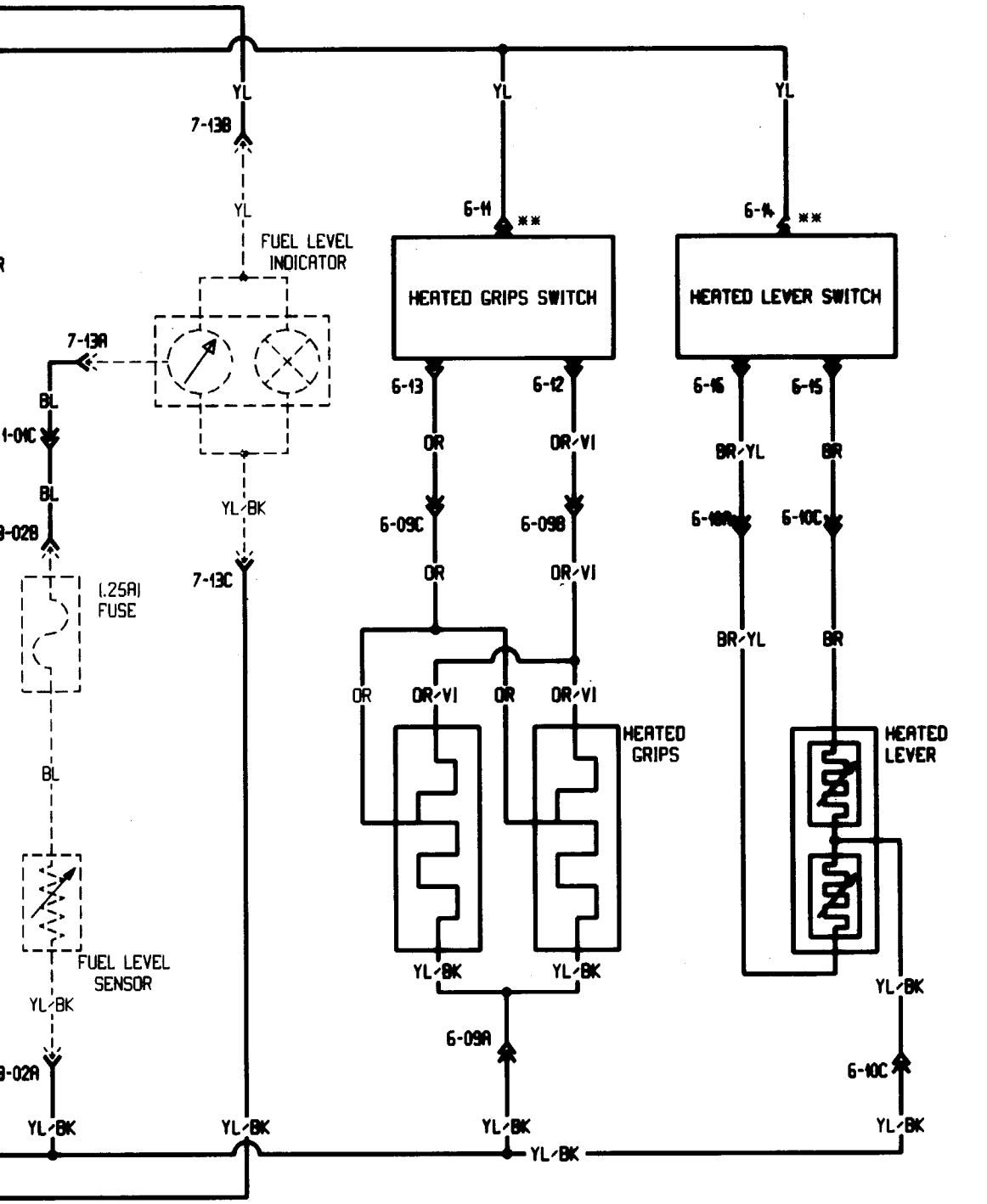
***TACHOMETER IS OPTIONAL ON FORMULA S

****ELECTRIC VISOR IS NOT AVAILABLE ON FORMULA S


1-01B
YL
BK/YL
BK/YL
BK/YL
YL
YL
6-03B
6-02D
6-09A
BK/YL
BK/YL
YL
BK/YL
RD/BL
RD/GN
RD/GN
RD
6-01-2
6-01-9
6-01-4
6-01-2
6-01-9
6-01-8
TETHER CUT-OUT SWITCH
EMERGENCY KILL SWITCH
DIMMER SWITCH
OFF
ON
START
KEY SWITCH
GY
VI/GY
6-06B
6-06C
GY
VI/GY
1-02B
1-02A
GY
VI/GY
6-01-4
6-01-5
6-01-7
RD
BK
BK
GY
7-20C
7-20A
9-02-2
WH/RD
9-04C
7-15
HIGH
LOW
PARKING
SOLENOID
6-03A
6-02C
7-20B
HEADLIGHT
9-04A
BK
9-02-3
YL/BK
BK
BK
BK
7-15
HIGH BEAM INDICATOR
YL/BK
YL/BK
YL/BK
YL/BK
1-01D
BK
STARTER
STARTER AND IGNITION SWITCHES
LIGHTING



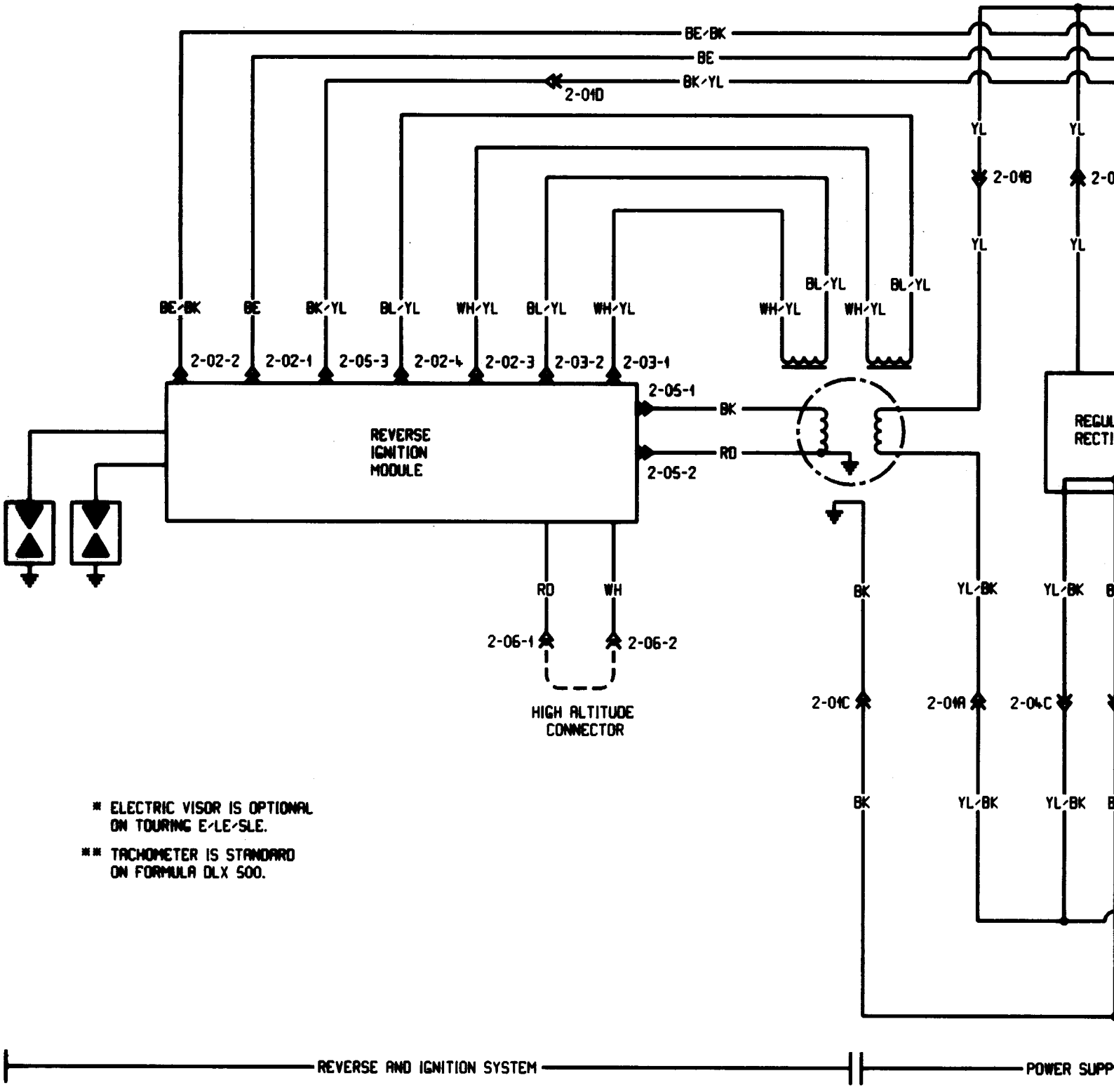
INSTRUMENTS


YL
7-13B
YL
FUEL LEVEL
INDICATOR
7-13A
BL
BL
YL/BK
7-13C
(.25A)
FUSE
BL
FUEL LEVEL
SENSOR
YL/BK
YL/BK
YL/BK
YL/BK
YL
YL
6-11
**
6-14
**
HEATED GRIPS SWITCH
HEATED LEVER SWITCH
6-13
6-12
6-16
6-15
OR
OR/VI
BR/YL
BR
6-09C
6-09B
6-10B
6-10C
OR
OR/VI
BR/YL
BR
OR
OR/VI
OR
OR/VI
HEATED
GRIPS
HEATED
LEVER
YL/BK
YL/BK
YL/BK
6-09A
6-10C
YL/BK
YL/BK
YL/BK
YL/BK
HEATING ELEMENTS

ANNEX 5

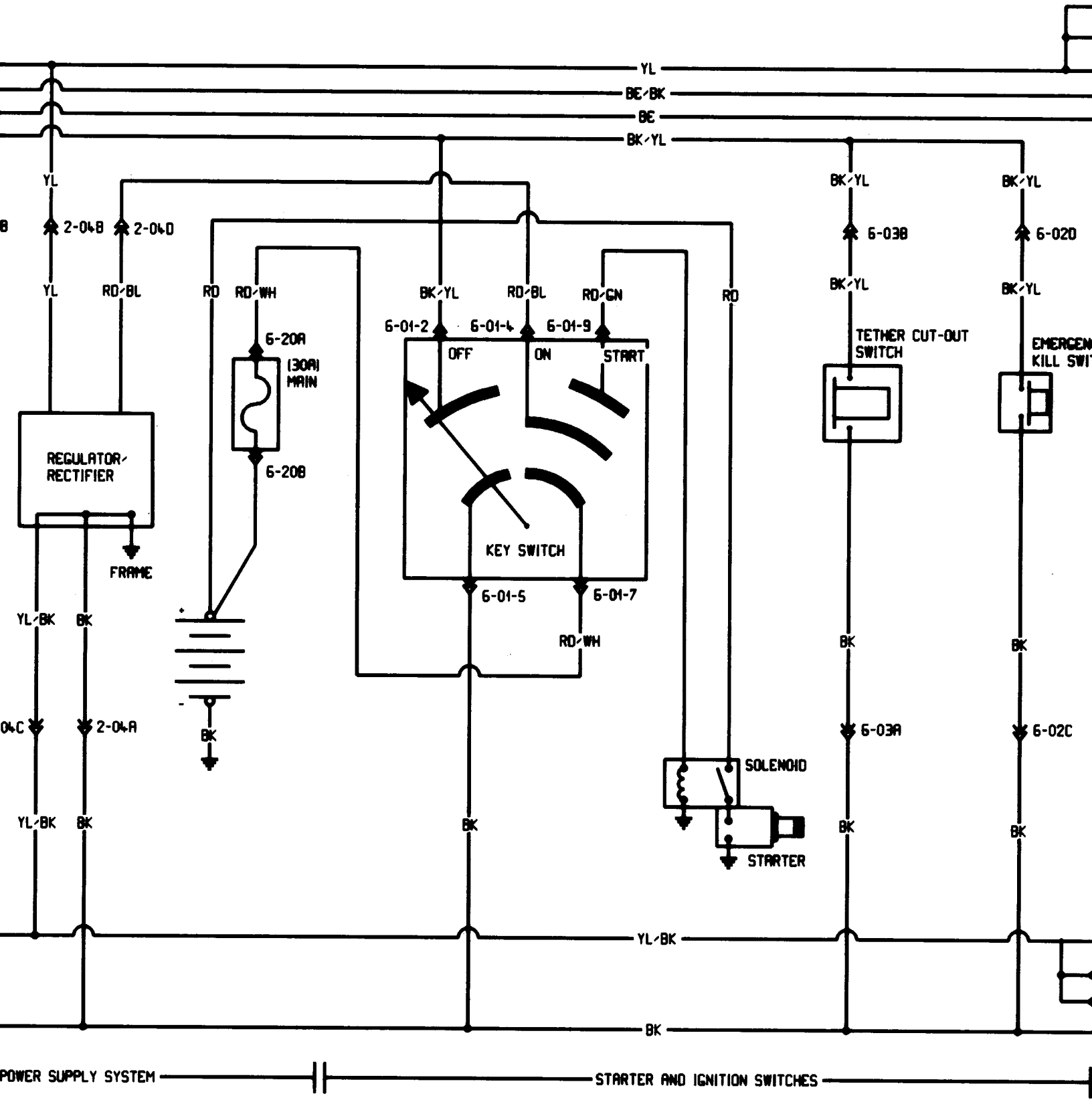
TOURING E/LE/SLE
FORMULA DELUXE 380/500

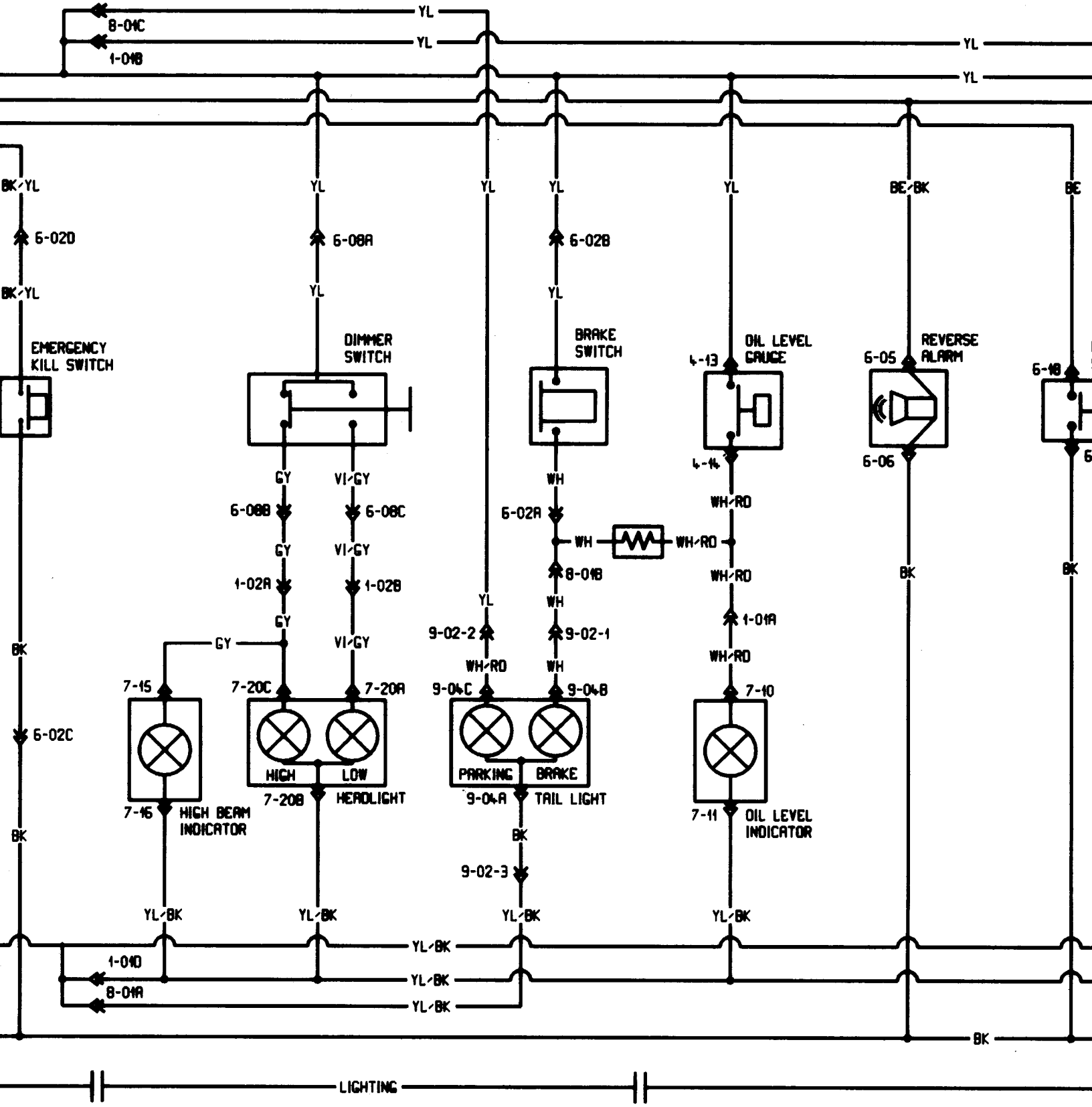
'99 TOURING E/LE/SLE
'99 FORMULA DLX 380/500

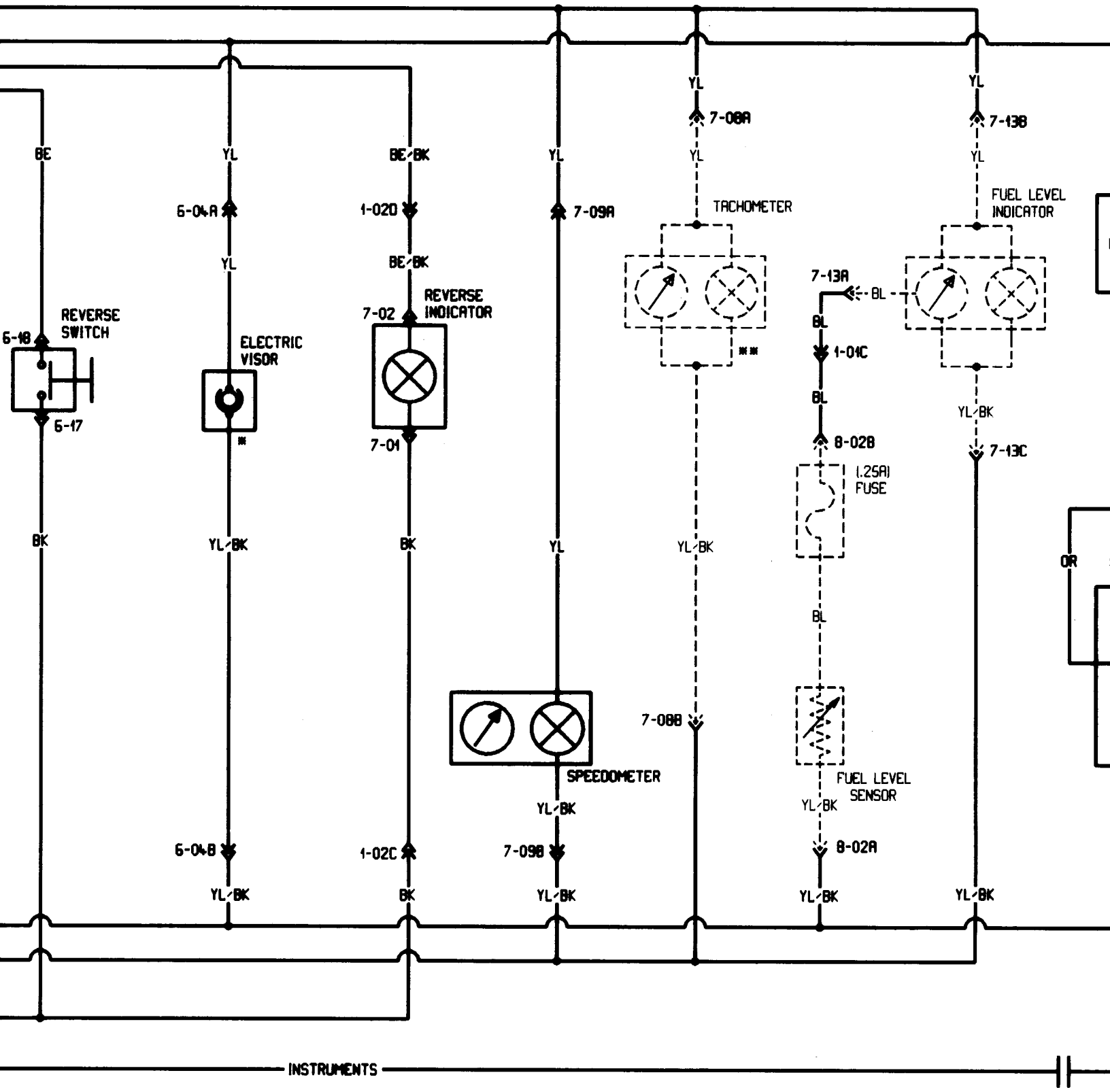


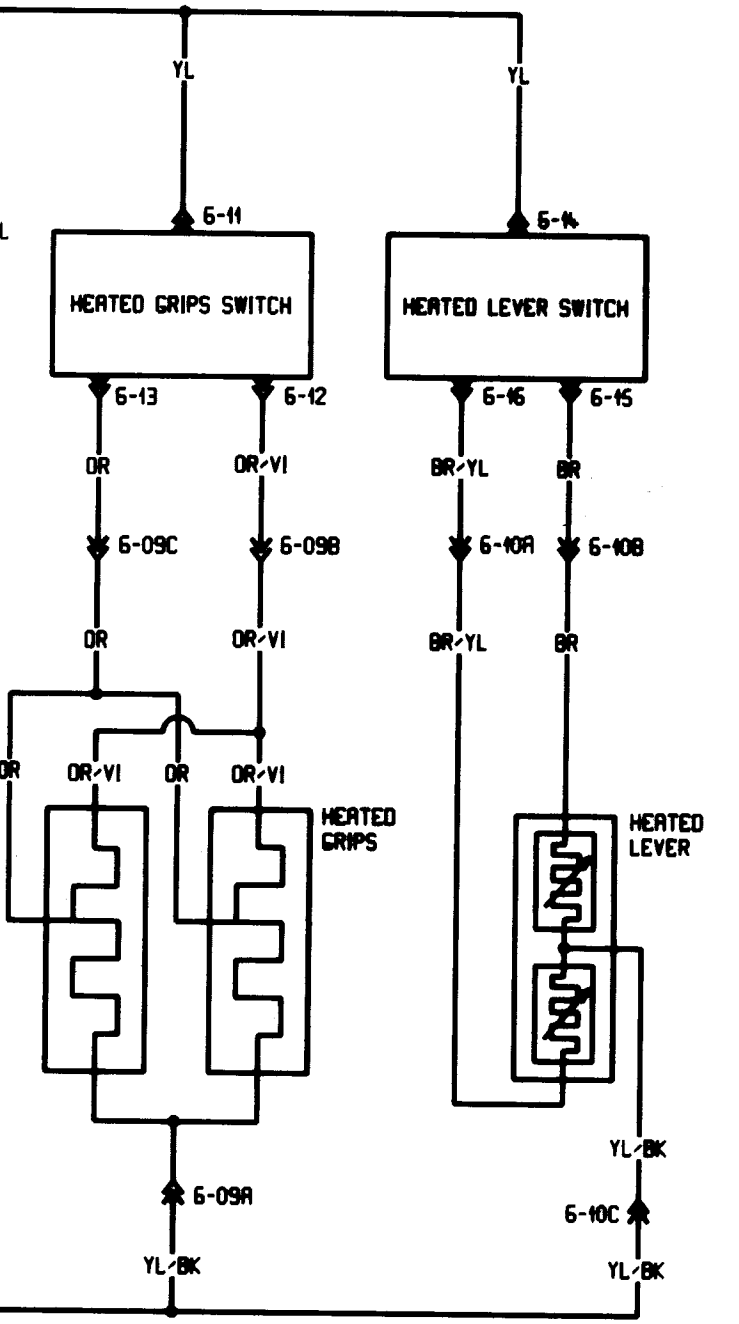
* ELECTRIC VISOR IS OPTIONAL ON TOURING E/LE/SLE.

** TACHOMETER IS STANDARD ON FORMULA DLX 500.


YL
BE/BK
BE
BK/YL
YL
2-04B
2-04D
YL
RD/BL
RD
RD/WH
6-20A
(30A)
MAIN
6-20B
REGULATOR/
RECTIFIER
FRAME
YL/BK
BK
2-04C
2-04A
YL/BK
BK
BK
BK/YL
RD/BL
RD/GN
RD
6-01-2
6-01-4
6-01-9
OFF
ON
START
KEY SWITCH
6-01-5
6-01-7
RD/WH
BK
SOLENOID
STARTER
BK/YL
6-03B
BK/YL
TETHER CUT-OUT
SWITCH
BK
6-03A
BK
BK/YL
6-02D
BK/YL
EMERGEN
KILL SWI
BK
6-02C
BK
YL/BK
BK
POWER SUPPLY SYSTEM
STARTER AND IGNITION SWITCHES


8-01C
1-01B
YL
BK/YL
6-02D
EMERGENCY KILL SWITCH
6-08A
DIMMER SWITCH
GY
VI/GY
6-08B
6-08C
1-02A
1-02B
7-15
7-20C
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YL/BK
YL/BK
YL/BK
INSTRUMENTS



HEATING ELEMENTS



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VERSION FRANÇAISE ÉGALEMENT DISPONIBLE

ski-doo®



SHOP MANUAL 1999

Volume 2

GRAND TOURING 500/583
SUMMIT 500/x 670
MX Z 440/500/670 H.O.
FORMULA Z 500/583/670
FORMULA DELUXE 500 LC/583/670
SKANDIC WT/SWT/WT LC

484 200 003

1999
Shop Manual

VOLUME 2

MX Z 440/500/670 HO/670 HO T.H.

FORMULA Z 500/DELUXE 500 LC/Z 583/
DELUXE 583/Z 670/DELUXE 670

SUMMIT 500/X 670

GRAND TOURING 500/583

SKANDIC WT/SWT/WT LC

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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair some 1999 Ski-Doo snowmobiles. See model list on next page.

This edition was primarily published to be used by snowmobile mechanics who are already familiar with all service procedures relating to Bombardier made snowmobiles.

Please note that the instructions will apply only if proper hand tools and special service tools are used.

This *Shop Manual* uses technical terms which may be slightly different from the ones used in the *Parts Catalog*.

It is understood that this manual may be translated into another language. In the event of any discrepancy, the English version shall prevail.

The content depicts parts and/or procedures applicable to the particular product at its time of manufacture. It does not include dealer modifications, whether authorized or not by Bombardier, after manufacturing the product.

In addition, the sole purpose of the illustrations throughout the manual, is to assist identification of the general configuration of the parts. They are not to be interpreted as technical drawings or exact replicas of the parts.

The use of Bombardier parts is most strongly recommended when considering replacement of any component. Dealer and/or distributor assistance should be sought in case of doubt.

The engines and the corresponding components identified in this document should not be utilized on product(s) other than those mentioned in this document.

Torque wrench tightening specifications must be strictly adhered to. Locking devices (ex.: locking tab, elastic stop nut, etc.) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be renewed.

This manual emphasizes particular information denoted by the wording and symbols:

◆ WARNING

Identifies an instruction which, if not followed, could cause serious personal injury including possibility of death.

▼ CAUTION

Denotes an instruction which, if not followed, could severely damage vehicle components.

NOTE: Indicates supplementary information needed to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use. Always use common shop safety practice.

This information relates to the preparation and use of Bombardier snowmobiles and has been utilized safely and effectively by Bombardier Inc. However, Bombardier Inc. disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic. It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

WHAT'S NEW

SERVICE TOOLS AND SERVICE PRODUCTS 01

- Complete list of SKI-DOO service tools.

443 AND 503 ENGINES TYPES 04-02

- Lithium grease on crankshaft seal lip is replaced by Molykote 111.

494, 583 AND 670 ENGINES TYPES 04-03

- Lithium grease on crankshaft seal lip is replaced by Molykote 111.

OIL INJECTION SYSTEM 04-06

- Procedure for leak test.

AXIAL FAN COOLING SYSTEM 04-07

- Procedures for checking belt deflection and to replace it.

SC-10 SUSPENSION (ALL VERSIONS) 07-02

- Wear limit of slider shoe is now indicated by a line.

ARM SUSPENSION 07-03

- Wear limit of slider shoe is now indicated by a line.

INTRODUCTION

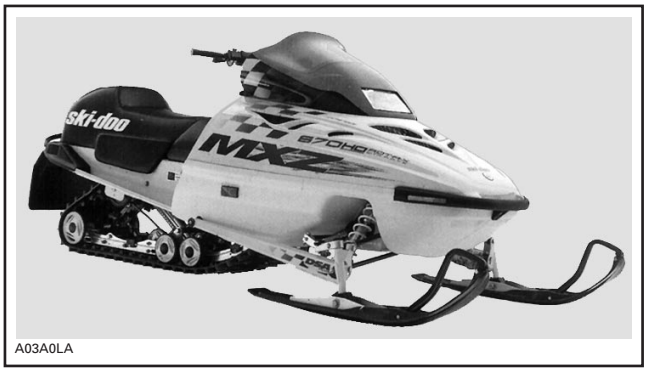
This *Shop Manual Volume 2* covers the following Bombardier made 1999 snowmobiles:

MODELS	MODEL NUMBER
MX Z 440 (Canada)	1409
MX Z 440 (Canada)	1448
MX Z 440 (U.S.)	1410
MX Z 440 (U.S.)	1449
MX Z 440 (Europe)	1411
MX Z 500 (Canada)	1412
MX Z 500 (Canada)	1450
MX Z 500 (U.S.)	1413
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MX Z 670 HO (Canada)	1415
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MX Z 670 HO (U.S.)	1416
MX Z 670 HO (U.S.)	1453
MX Z 670 HO T.H. (U.S.)	1466
MX Z 670 HO (Europe)	1417
FORMULA* Z 500 (Canada)	1388
FORMULA* Z 500 (U.S.)	1389
FORMULA* Z 500 (Europe)	1458
FORMULA* DELUXE 500 LC (Canada)	1377
FORMULA* DELUXE 500 LC (U.S.)	1378
FORMULA* DELUXE 500 LC (Europe)	1379
FORMULA* DELUXE 583 (Canada)	1380
FORMULA* DELUXE 583 (U.S.)	1381
FORMULA* Z 583 (Canada)	1391
FORMULA* Z 583 (U.S.)	1392
FORMULA* Z 670 (Canada)	1393
FORMULA* Z 670 (U.S.)	1394
FORMULA* Z 670 (Europe)	1395
FORMULA DELUXE 670 (Canada)	1382
FORMULA DELUXE 670 (U.S.)	1383
SUMMIT 500 (Canada)	1403
SUMMIT 500 (U.S.)	1404
SUMMIT 500 (Europe)	1405
SUMMIT X 670 (Canada)	1406
SUMMIT X 670 (U.S.)	1407
SUMMIT X 670 (Europe)	1408
GRAND TOURING 500 (Canada)	1367
GRAND TOURING 500 (U.S.)	1368
GRAND TOURING 500 (Europe)	1369
GRAND TOURING 583 (Canada)	1370
GRAND TOURING 583 (U.S.)	1371
GRAND TOURING 583 (Europe)	1372
SKANDIC* WT (Canada)	1429
SKANDIC* WT (U.S.)	1430
SKANDIC* SWT (Canada)	1431
SKANDIC* SWT (U.S.)	1432
SKANDIC* WT LC (Canada)	1427
SKANDIC* WT LC (U.S.)	1428

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MX Z 440/500/670 HO/670 HO T.H.
Formula Z 500/DELUXE 500 LC/Z 583
Formula DELUXE 583/Z 670/DELUXE 670
Summit 500/X 670
Grand Touring 500/583

These are S-Series models.



TYPICAL — S-SERIES

Skandic WT
Skandic SWT
Skandic WT LC

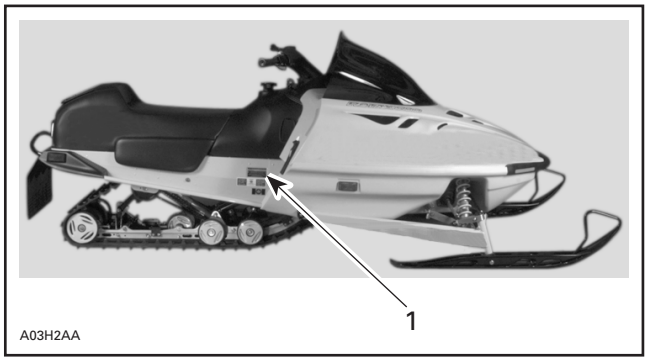
These are Skandic WT Series models.



TYPICAL — SKANDIC WT SERIES

VEHICLE SERIAL NUMBER

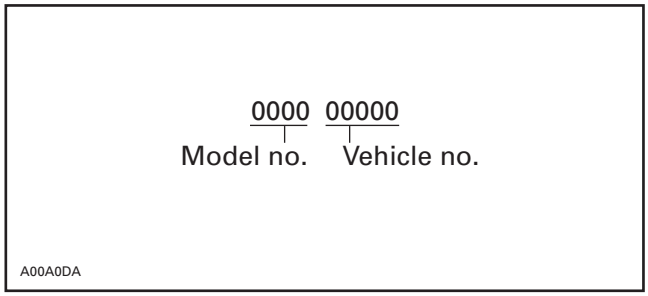
Vehicle Serial Number Location



TYPICAL

1. Vehicle serial number

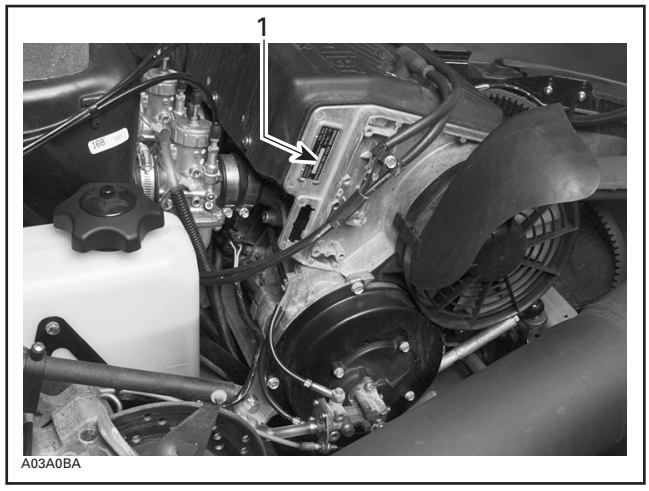
Serial Number Meaning



ENGINE SERIAL NUMBER

Engine Serial Number Location

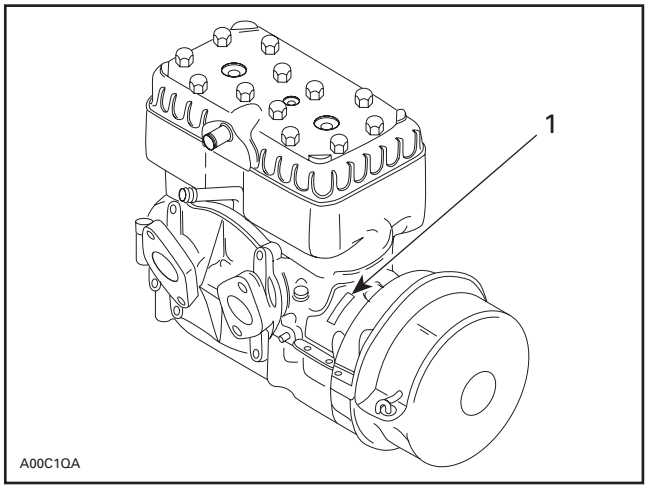
Fan-Cooled Engines



TYPICAL — FAN-COOLED ENGINES

1. Engine serial number

Liquid-Cooled Engines



TYPICAL — LIQUID-COOLED ENGINES

1. Engine serial number

ARRANGEMENT OF THE MANUAL

The manual is divided into 11 major sections:

01 SERVICE TOOLS AND SERVICE PRODUCTS

02 LUBRICATION AND MAINTENANCE

03 TROUBLESHOOTING

04 ENGINE

05 TRANSMISSION

06 ELECTRICAL

07 REAR SUSPENSION

08 STEERING/FRONT SUSPENSION

09 BODY/FRAME

10 TECHNICAL DATA

11 WIRING DIAGRAMS

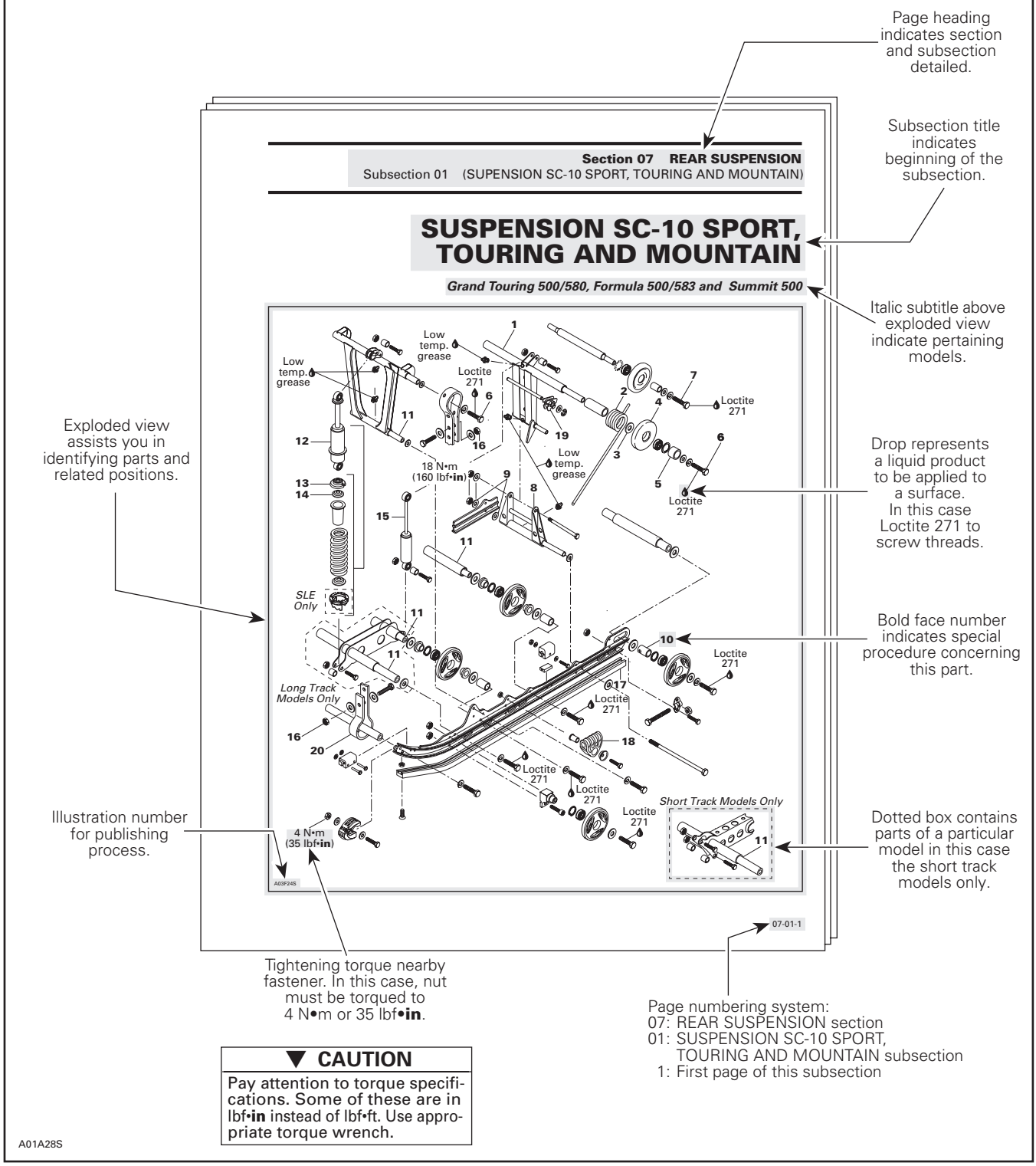
Each section is divided in various subsections, and again, each subsection has one or more division.

LIST OF ABBREVIATIONS USED IN THIS MANUAL

A	ampere
amp	ampere
A•h	ampere-hour
AC	alternate current
ACM	acceleration and control modulator
ARM	advance ride management
BDC	bottom dead center
BTDC	before top dead denter
°C	degree Celsius
CDI	capacitor discharge ignition
CTR	center
cm	centimeter
cm^2	square centimeter
cm^3	cubic centimeter
DC	direct current
DPM	digital performance management
DSA	direct shock action
°F	degree Fahrenheit
FC	fan cooled
fl. oz	fluid ounce
ft	foot
GRD	ground
H.A.C.	high altitude compensator
hal.	halogen
HI	high
imp. oz	imperial ounce
in	inch
in^2	square inch
in^3	cubic inch
k	kilo (thousand)
kg	kilogram
km/h	kilometer per hour
kPa	Kilopascal
L	liter
lb	pound
lbf	pound (force)
lbf/in^2	pound per square inch
LH	left hand
LO	low
LT	long track
m	meter
MAG	magneto
Max.	maximum
Min.	minimum
mL	milliliter
mm	millimeter
MPEM	multi-purpose electronic module
MPH	mile per hour
N	newton
N.A.	not applicable
no.	number
00.0	continuity
0.L	overload (open circuit)
O.D.	outside diameter
OPT	optional
oz	ounce
P/N	part number
PSI	pound per square inch
PTO	power take off
R	rectangular
RH	right hand
RAVE	rotax adjustable variable exhaust
RPM	revolution per minute
RMS	root mean square
RRIM	reinforced reaction injection molding
Sp. Gr.	specific gravity
ST	semi-trapez
TDC	top dead center
TRA	total range adjustable
U.S. oz	ounce (United States)
V	volt
Vac	volt (alternative current)

This *Shop Manual* uses technical terms wich may be slightly different from the ones in the parts catalog.

TYPICAL PAGE



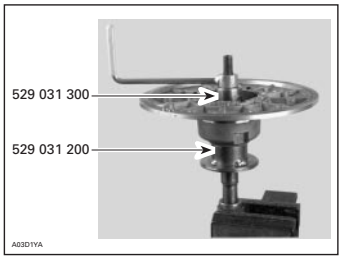
▼ CAUTION

Pay attention to torque specifications. Some of these are in lbf•**in** instead of lbf•ft. Use appropriate torque wrench.

A01A28S

TYPICAL PAGE

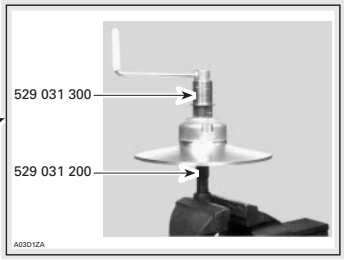
Turn puller handle and sliding half at once to extract the bushing.



IMPORTANT: Large bushing retaining screws and washers must be removed before small bushing installation.

Coat bushing outside diameter with Loctite 609 (P/N 413 703 100).

Install bushing as following photo.



ASSEMBLY

Came Slider Shoe

When replacing slider shoes **no. 4**, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

Cam

Coat cam **no. 18** interior with anti-seize lubricant.

INSTALLATION

Countershaft

▼ CAUTION

Always apply anti-seize lubricant (P/N 413 701 000) on the countershaft before final pulley installation.

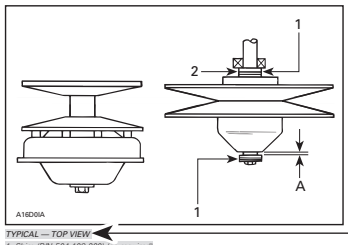
F-Series and S-Series Only

Should installation procedure be required, refer to BRAKE 05-05 then look for **Brake Disc and Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

All Models

Check end play of driven pulley on countershaft by pushing pulley towards outer housing so that the inner shims (P/N 504 108 200) contact it. Measure end play at the mounting screw end between shim(s) and puley. See illustration.



TYPICAL — TOP VIEW
1. Shim (P/N 504 108 200) (as required)
2. Contact
A. 0 to 1 mm (0 to 3/64 in)

Torque retaining screw **no. 13** to 25 N•m (18 lbf•ft).

ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT 05-04 to adjust pulley distance. Adjust drive belt height between pulley halves to obtain specified belt deflection.

05-03-5

A01A27S

Title indicates main procedure to be carried-out.

Italic bold face type setting indicates a particular procedure concerning a model.

Italic bold face setting in this case indicates that particular procedure for F and S-Series is finished, so from this point, all models are concerned.

"TYPICAL" caption indicates a general view which does not represent full detail. "TOP VIEW" caption helps you in understanding illustration.

Call-outs for above illustration.

Illustration always follows text to which it pertains.

Subtitle indicates a particular procedure for the named part.

Reference to look up a certain section and subsection. In this case it concerns pulleys adjustment.

Bold face number following part name refers to exploded view at beginning of subsection.

GENERAL INFORMATION

The information and component/system descriptions contained in this manual are correct at time of publication. Bombardier Inc. however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

Due to late changes, it may have some diferences between the manufactured product and the description and/or specifications in this document.

Bombardier Inc. reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligation.

USEFUL PUBLICATIONS

Refer to *Parts Catalogs* to order the right parts.

PARTS CATALOG	
MODELS	P/N
MX Z 500 MX Z 670 HO	484 400 004
MX Z 670 HO T.H.	484 400 042
MX Z 440	484 400 000
FORMULA DELUXE 500 LC FORMULA DELUXE 583 FORMULA DELUXE 670	484 400 001
FORMULA Z 500 FORMULA Z 583 FORMULA Z 670	484 400 002
SUMMIT 500 SUMMIT 670	484 400 006
GRAND TOURING 500 GRAND TOURING 583	484 400 003
SKANDIC WT SKANDIC SWT SKANDIC WT LC	484 400 002

Use *Specification Booklet* to find rapidly the right specs.

1995-1999 SPECIFICATION BOOKLET (P/N 484 300 002).

ILLUSTRATIONS AND PROCEDURES

Illustrations and photos show the typical construction of the different assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts shown. However, they represent parts which have the same or a similar function.

▼ CAUTION

Most components of those vehicles are built with parts dimensioned in the metric system. Most fasteners are metric and must not be replaced by customary fasteners or vice versa. Mismatched or incorrect fasteners could cause damage to the vehicle or possible personal injury.

As many of the procedures in this manual are interrelated, we suggest, that before undertaking any task, you read and thoroughly understand the entire section or subsection in which the procedure is contained.

A number of procedures throughout the book require the use of special tools. Before commencing any procedure, be sure that you have on hand all the tools required, or approved equivalents.

The use of RIGHT and LEFT indications in the text, always refers to driving position (when sitting on vehicle).



TYPICAL

1. Left
2. Right

TIGHTENING TORQUES

Tighten fasteners to torque mentioned in exploded views and text. When they are not specified refer to following table. All torques apply to 8.8 grade fasteners. Bold face size (e.g. **M4)** indicates nominal value (mean value).

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•**in**
2	**M4**	18
3	M4	27
4	**M5**	35
8	M6	71
9	M6	80
10	**M6**	89
11	M6	97
12	M6	106

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•ft
21	M8	15
22	M8	16
23	**M8**	17
24	M8	18
25	M8	18
43	M10	32
44	M10	32
45	M10	33
46	M10	34
47	M10	35
48	**M10**	35
49	M10	36
50	M10	37
51	M10	38
52	M10	38
53	M10	39
76	M12	56
77	M12	57
78	M12	58
79	M12	58
80	**M12**	59
81	M12	60
82	M12	60
83	M12	61
84	M12	62
121	M14	89
122	M14	90

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•ft
123	M14	91
124	M14	91
125	M14	92
126	M14	93
127	M14	94
128	M14	94
129	M14	95
130	M14	96
131	M14	97
132	M14	97
133	M14	98
134	M14	99
135	**M14**	100
136	M14	100
137	M14	101
138	M14	102
139	M14	103
140	M14	103
141	M14	104
142	M14	105
143	M14	105
144	M14	106
145	M14	107
146	M14	108
147	M14	108
148	M14	109
149	M14	110
150	M14	111

TIGHTENING TORQUES FOR 8.8 GRADE BOLTS AND NUTS

We would be pleased if you could communicate to Bombardier any suggestions you may have concerning our publications.

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After Sales Service
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Valcourt, Quebec, Canada J0E 2L0

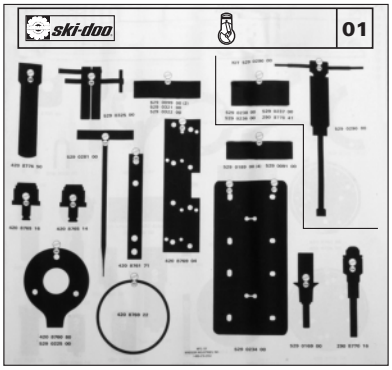
SERVICE TOOLS

This is a list of tools to properly service Ski-Doo snowmobiles. The list includes both the mandatory tools and the optional tools that are ordered separately. The list of Service Products, both mandatory and optional, are not part of any kit and must all be ordered separately. If you need to replace or add to your tool inventory these items can be ordered through the regular parts channel.

Following mention points out new tool: 

WORKSHOP — MANDATORY SERVICE TOOLS

Tool board
(P/N 529 034 000)

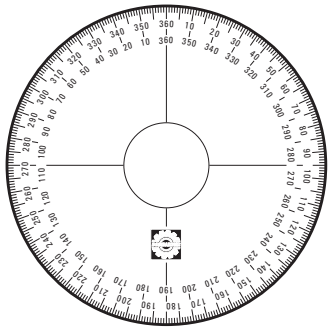


A00A3X4

APPLICATION
All models.

ENGINE — MANDATORY SERVICE TOOLS

Degree wheel
(P/N 295 000 007)

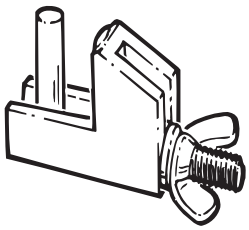


A00B334

APPLICATION
All rotary valve engines.

NOTE: Only the P/N has been changed. This degree wheel is identical to the P/N 414 352 900.

Hose pincher (2)
(P/N 295 000 076)

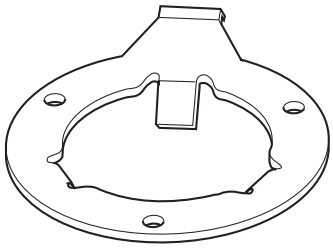


A01B2I4

APPLICATION
All vehicles.

NOTE: Only the P/N has been changed. This hose pincher is identical to the P/N 529 009 900.

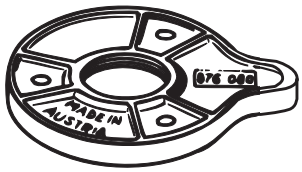
Fan holder
(P/N 420 876 357)



A00C0Q4

APPLICATION
377, 443 and 503 engines.

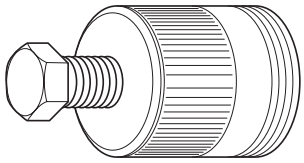
Magneto puller ring
(P/N 420 876 080)



A00C1R4

APPLICATION
All engines except 247.

Magneto puller
(P/N 529 033 547)

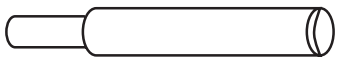


A00C1A4

APPLICATION
All engines except 247.

NOTE: The previous extractor (P/N 529 022 500) can be upgraded by replacing the screw with the new one (P/N 529 035 549).

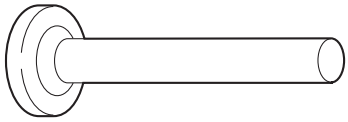
Aligning pin (4)
(P/N 529 018 900)



A00A1D4

APPLICATION
467, 494 and 582 engines.

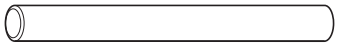
Pusher
(washer behind the impeller)
(P/N 529 020 700)



A00C3H4

APPLICATION
Rotary valve engines.

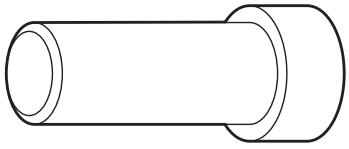
Rotary valve shaft pusher
(P/N 420 876 612)



A00C0F4

APPLICATION
Rotary valve engines with a 10 mm impeller shaft.

Rotary valve seal pusher
(valve side)
(P/N 420 876 607)



A00C0Y4

APPLICATION
Rotary valve engines.

ENGINE (continued) — MANDATORY SERVICE TOOLS

Rotary valve shaft seal pusher (inner, water pump side)
(P/N 420 876 512)

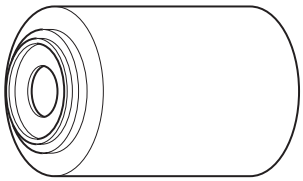


A00C374

APPLICATION

Rotary valve engines, 1991 and newer with a 10 mm impeller shaft.

Rotary valve shaft seal pusher (outer, water pump side)
(P/N 420 877 050)

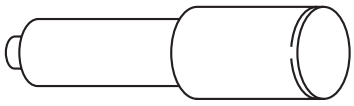


A00C0X4

APPLICATION

Rotary valve engines.

Bearing pusher (rotary valve)
(P/N 420 876 500)

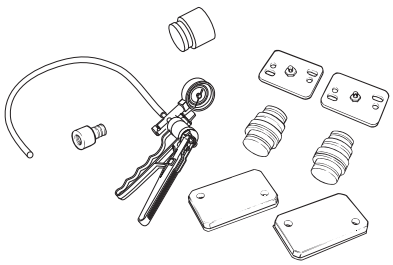


A00B2J4

APPLICATION

Rotary valve engines.

Engine leak tester kit
(P/N 861 749 100)



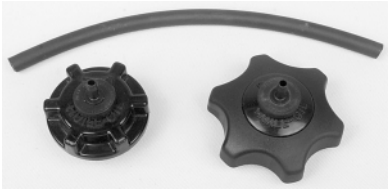
A01B2D5

APPLICATION

All engines.

Fuel and oil system leak tester kit
(P/N 529 033 100)

NEW

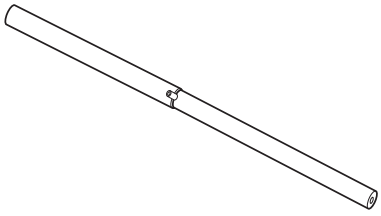


A01B5E4

APPLICATION

All models.

Choke plunger tool
(P/N 529 032 100)

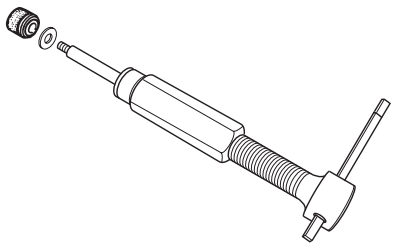


A01C5D4

APPLICATION

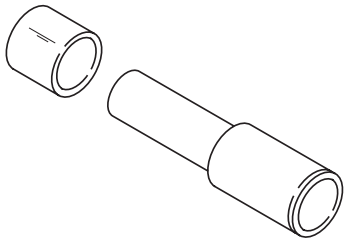
All models equipped with chokes.

1) Piston pin puller
(P/N 529 035 503)



A02B094

2) Sleeve kit 18 mm
(P/N 529 035 541)
3) Sleeve kit 20 mm
(P/N 529 035 542)



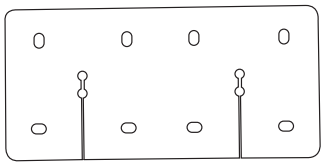
A01B5A4

APPLICATION

1) All engines.
2) 277, 443, 503 and 809 engine.
3) 670 engine.

NOTE: The previous piston pin puller (P/N 529 029 000) can be upgraded by adding protector (P/N 529 035 513) and replacing the locating sleeve and expansion sleeve with appropriate sleeve kit.

Rubber pad
(P/N 529 023 400)



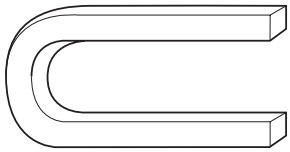
A01B4C4

APPLICATION

All cageless bearing engines.

ENGINE (continued) — MANDATORY SERVICE TOOLS

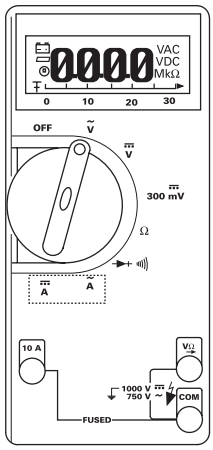
Rotary valve circlip tool
A) (P/N 529 029 100)
B) (P/N 529 020 800)



A00C3I4

APPLICATION
A) 1994 and on rotary valve engines.
B) Up to 1993 rotary valve engines.

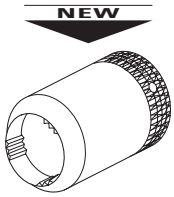
Multimeter
(P/N 529 022 000)



F01B1O4

APPLICATION
All models.

Choke/DESS nut tool
(P/N 529 034 600)



A01B554

APPLICATION
All models equipped with a choke and/or a DESS.

NOTE: This tool replaces choke nut tool (P/N 529 032 200).

Programmer
(P/N 529 035 585)



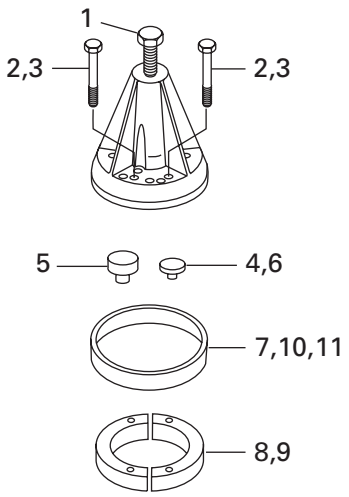
A01B5B4

APPLICATION
All models equipped with a DESS.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

1-2) Crankshaft bearing puller with screw (P/N 420 877 635)



A01B546

APPLICATION
All engines.

1) Screw (M16 x 1.5 x 150)	(P/N 420 940 755)
2) Screw M8 x 40 (4)	(P/N 420 840 681)
3) Screw M8 x 70 (4)	(P/N 420 841 201)
4) Crankshaft protector 247 engine.	(P/N 420 976 890)
5) Crankshaft protector PTO All engines except 247.	(P/N 420 876 552)
6) Crankshaft protector MAG All engines except 247.	(P/N 420 876 557)
7) Puller ring Use with half rings (P/N 420 977 475 or 420 276 025).	(P/N 420 977 490)
8) Half ring (2) For 72 mm O.D. bearings.	(P/N 420 977 475)
9) Half ring For 62 mm O.D. bearings.	(P/N 420 276 025)
10) Puller ring For half rings (P/N 420 977 479).	(P/N 420 977 494)
11) Half ring For 80 mm O.D. bearings.	(P/N 420 977 479)

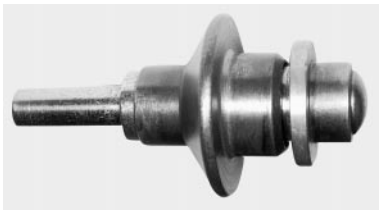
ENGINE (continued) — RECOMMENDED SERVICE TOOLS

Piston circlip installer

A) (P/N 529 035 561) 18 mm

B) (P/N 529 035 562) 20 mm

NEW



A00B4Y4

APPLICATION

A) All engines except 670.

NOTE: This tool replaces circlip installer (P/N 529 016 900).

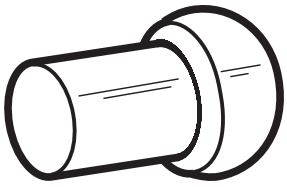
B) 670 engine.

NOTE: This tool replaces circlip installers (P/N 529 035 562 and 290 877 016).

Piston pin/connecting rod bearing centering tool

(P/N 529 009 100)

NOTE: New diameter is 9.65 mm (0.380'').



A01B1R4

APPLICATION

All engines except cageless and 670 engines.

Ring compressor

A) (P/N 420 876 090) (62 mm)

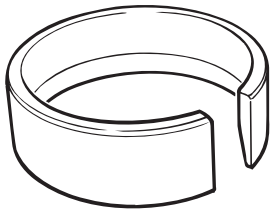
B) (P/N 420 876 974) (69.5 mm)

C) (P/N 420 876 970) (72 mm)

D) (P/N 420 876 972) (76 mm)

E) (P/N 420 876 975) (67.5 mm)

F) (P/N 529 030 800) (78 mm)



A01B1T4

APPLICATION

A) 377 engine.

B) 467 and 494 engines.

C) 503, 253 and 536 engines.

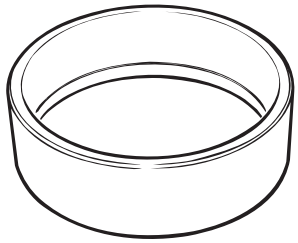
D) 582, 583 and 643 engines.

E) 443 and 447 engines.

F) 670 engine.

Magneto coil centering ring

(P/N 420 876 922)



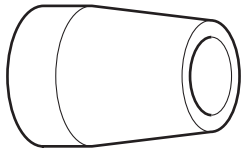
A01B1V4

APPLICATION

All engines with Nippondenso CDI (160 W).

Seal protector sleeve

(P/N 420 276 900)
(MAG)



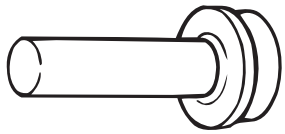
A00C0D4

APPLICATION

247 engine.

Polyamid ring pusher

(P/N 420 276 930)



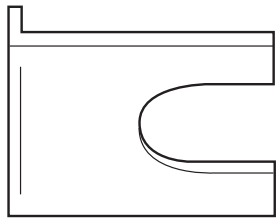
A00C0Z4

APPLICATION

247 engine.

Crankshaft feeler gauge

(P/N 420 876 620)



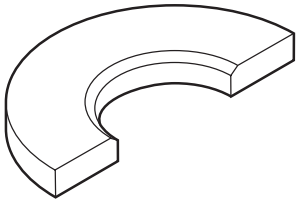
A00C114

APPLICATION

377, 443, 447 and 503 engines.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

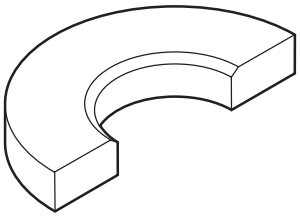
Crankshaft distance gauge (5.7 mm)
(P/N 420 876 822)



A00C294

APPLICATION
377, 443 and 447 engines.

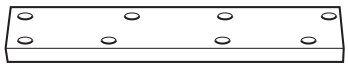
Crankshaft distance gauge (12.7 mm)
(P/N 420 876 824)



A00C3A4

APPLICATION
503 engine.

Cylinder aligning tool
A) (P/N 420 876 904) (on exhaust side)
B) (P/N 420 876 171) (on intake side)



A00B084

APPLICATION
A) 2-cylinder liquid cooled engines.
B) 2-cylinder fan cooled engines.

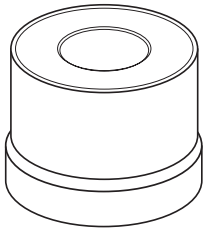
Driver tool
(P/N 529 035 521)



A00B4O4

APPLICATION
Mini Z.

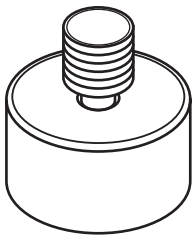
Attachment
(P/N 529 035 522)



A00B4P4

APPLICATION
Mini Z.

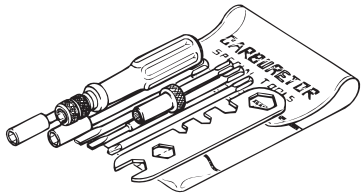
Pilot 22 mm
(P/N 529 035 523)



A00B4Q4

APPLICATION
Mini Z.

Carburetor tool kit
(P/N 404 112 000)



A00B2F4

APPLICATION
All models.

Adaptor
(P/N 529 033 800)
(TYPICAL)

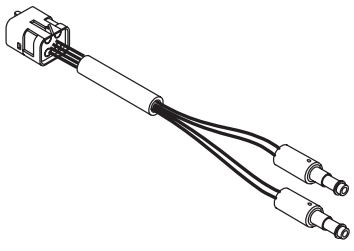


A00B4H4

APPLICATION
1997 and 1998 Grand Touring SE
1998 Summit x 670.

Adaptor
(P/N 512 058 922)

NEW

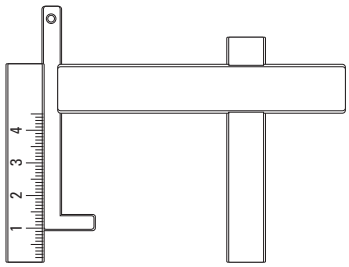


A00B4Z4

APPLICATION
1999 Grand Touring SE,
1999 Summit x 670 and MX Z 670.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

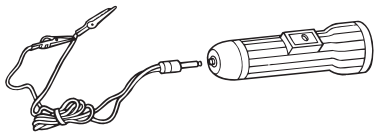
Float level gauge
(P/N 529 035 520)



A00B4N4

APPLICATION
All models.

Circuit tester
(continuity light)
(P/N 414 012 200)



A00C214

APPLICATION
All vehicles.

Stroboscopic timing light
(P/N 529 031 900)



A00B4F4

APPLICATION
All engines.

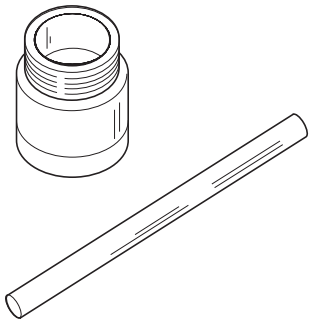
Bypass wires
(P/N 529 033 300)



A00I094

APPLICATION
360 W magneto (Grand Touring 700/SE).

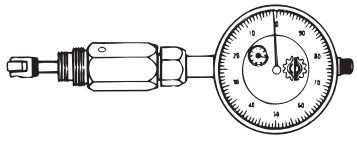
RAVE movement
indicator
(P/N 861 725 800)



A18B014

APPLICATION
All RAVE equipped engines.

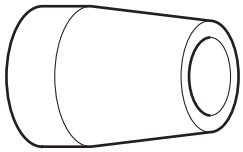
Dial indicator
(TDC gauge)
(P/N 414 104 700)



A00B4E4

APPLICATION
All engines.

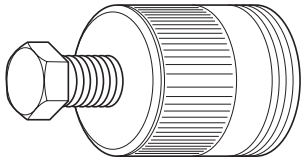
Seal protector sleeve
A) (P/N 420 876 980)
B) (P/N 420 876 490)



A00C0D4

APPLICATION
A) Rotary valve engines with 10 mm shaft.
B) Rotary valve engines with 12 mm shaft.

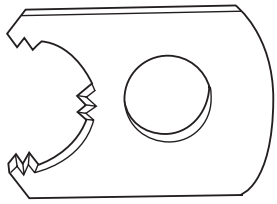
Magneto puller
(P/N 420 976 235)



A00C1A4

APPLICATION
247 engine.

Injection pump gear holder
(P/N 420 876 695)

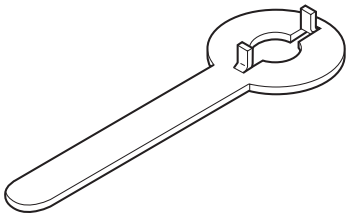


A00B314

APPLICATION
253, 377, 447 and 503 engines.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

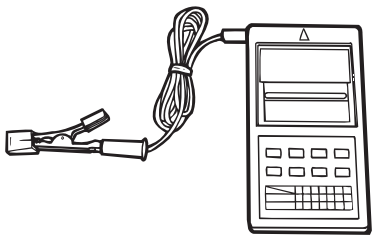
Injection pump gear holder
(P/N 420 277 905)



A00C164

APPLICATION
All liquid cooled engines.

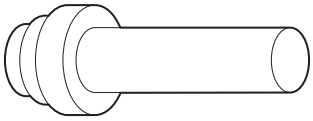
Digital/induction type tachometer
(P/N 529 014 500)



F01B1G4

APPLICATION
All engines.

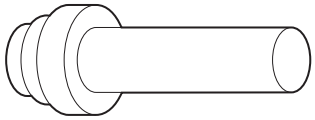
MAG seal pusher
(P/N 420 277 875)



A00C0V4

APPLICATION
277 engine.

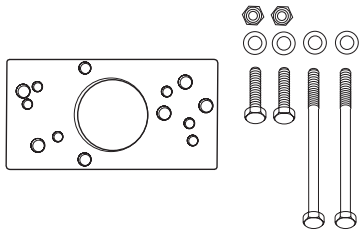
PTO seal pusher
(P/N 420 876 660)



A00C0V4

APPLICATION
277 engine.

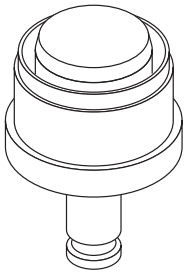
Base puller plate kit
(P/N 529 024 900)



A05C0M4

APPLICATION
277 engine.

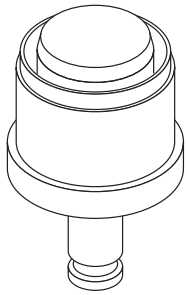
Insertion jig
(magneto side seal)
(P/N 420 876 516)



A00C3T4

APPLICATION
779 engine.

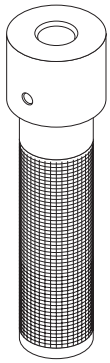
Insertion jig
(magneto seal)
(P/N 420 876 514)



A00C3U4

APPLICATION
454, 494, 599, 670, 699 and 809 engines.

Handle for insertion jig
(P/N 420 877 650)

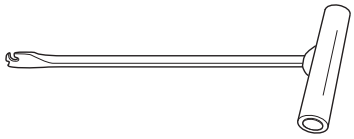


A00C3V4

APPLICATION
454, 494, 599, 670, 699, 779 and 809 engines.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

Exhaust spring installer/remover
(P/N 529 035 559)



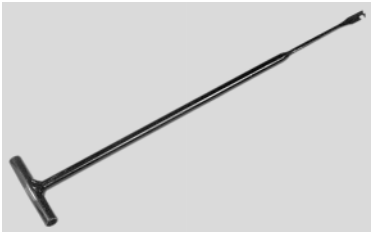
A00C3S4

APPLICATION

All models except CK3 series.

NOTE: This tool replaces exhaust spring installer/remover (P/N 529 028 100).

Exhaust spring installer/remover
(P/N 529 035 400)

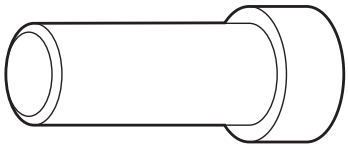


A01B584

APPLICATION

CK3 series.

Rotary valve seal and shaft pusher
(P/N 420 876 605)



A00C0Y4

APPLICATION

Rotary valve engines 1990 models and older.

Seal pusher (rotary valve)
(P/N 420 876 510)

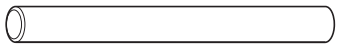


A00C374

APPLICATION

All rotary valve shaft seals with a 12 mm I.D.

Rotary valve shaft pusher
(P/N 420 876 610)

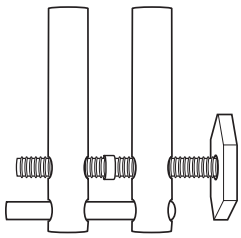


A00C0F4

APPLICATION

All rotary valve engines with 12 mm shaft.

Large hose pincher
(P/N 529 032 500)
(TYPICAL)



F01B234

APPLICATION

All vehicles.

TRANSMISSION — MANDATORY SERVICE TOOLS

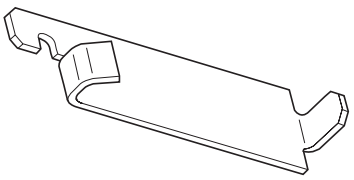
Transmission alignment bar
A) (P/N 529 026 900)
B) (P/N 529 030 000)
C) (P/N 529 035 586)
D) (P/N 529 026 700)
E) (P/N 529 035 530)
F) (P/N 529 035 545)
G) (P/N 529 031 000)
H) (P/N 529 035 527)
I) (P/N 529 035 572)



A01B4D4

APPLICATION
A) Tundra II LT/R.
B) S-Series with Bombardier Lite.
C) S-Series with Bombardier Lite and RER.
D) F-Series and S-Series with TRA.
E) S-Series with TRA and RER.
F) Skandic WT.
G) Skandic WT LC/SWT.
H) CK3 series except Mach Z series.
I) Mach Z series.

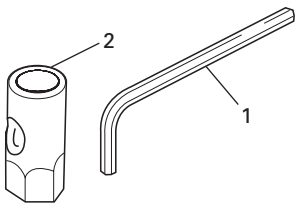
Spring scale hook (long)
A) (P/N 529 006 500)
B) (P/N 529 030 900)
C) (P/N 529 035 557)
(TYPICAL)



A00B4A4

APPLICATION
A) Tundra II LT.
B) F-Series and S-Series (1995 and newer).
C) CK3 without RER.

Drive belt tension adjuster tool
(P/N 529 008 700)

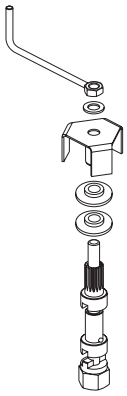


A15B044

APPLICATION
All vehicles except Élan, Tundra II and Skandic WT.

Parts included:
1) Hex. wrench (P/N 420 876 730)
2) Socket wrench (P/N 529 015 000)

Pulley spring compressor
(P/N 529 035 524)

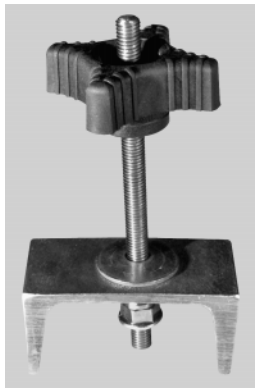


A02D1P4

APPLICATION
All models.

NOTE: This tool has Acme threads and replaces spring compressor (P/N 529 018 600).

Driven pulley spring compressor
(P/N 529 035 300)



A05B034

APPLICATION
Tundra R.

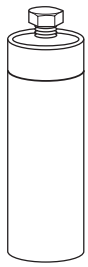
Tension tester
(P/N 414 348 200)



A00C074

APPLICATION
All models.

Countershaft bearing installer
(P/N 529 030 200)

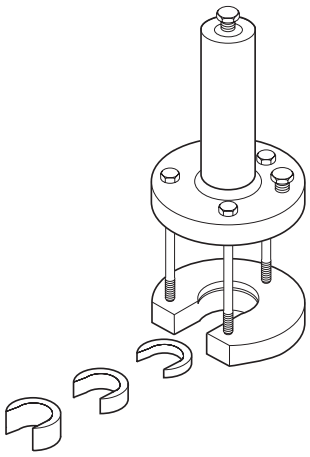


A00A194

APPLICATION
S-Series and F-Series.

TRANSMISSION (continued) — MANDATORY SERVICE TOOLS

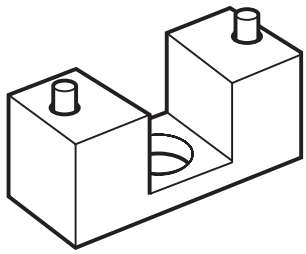
Countershaft bearing remover
(P/N 529 030 100)



A00A274

APPLICATION
S-Series and F-Series.

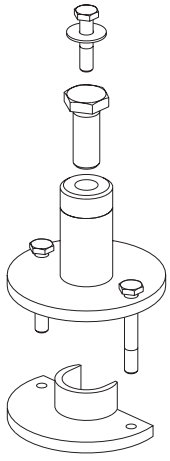
Spring cover tool
(P/N 529 027 300)



A01B4M4

APPLICATION
Bombardier Lite drive pulley.

Countershaft bearing remover/installer
(P/N 529 035 554)



A01B5C4

APPLICATION
CK3 Series.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

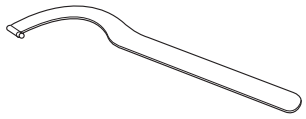
Clutch holder
(P/N 529 006 400)



A01B154

APPLICATION
All TRA drive pulleys.

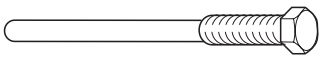
Clutch holder
(P/N 529 027 600)



A02B034

APPLICATION
Bombardier Lite drive pulley.

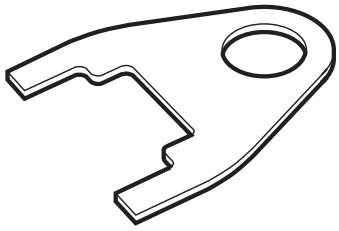
Drive pulley puller
(P/N 529 031 400)



A18B044

APPLICATION
Bombardier Lite drive pulley, except Élan.

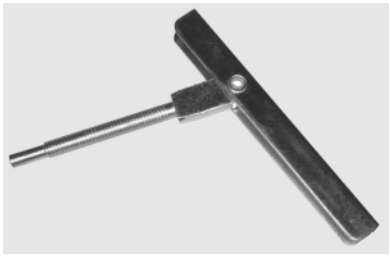
Forks (3)
(P/N 529 005 500)



A16B014

APPLICATION
All vehicles equipped with a TRA drive pulley.

Driven pulley opening tool
(P/N 529 035 500)



A02D1O4

APPLICATION
All vehicles except Élan, Tundra series, Skandic WT series, and all vehicles with RER.

Driven pulley opening tool
(P/N 529 035 501)



A03D2P4

APPLICATION
S and CK3 series with RER.

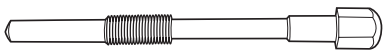
Driven pulley opening tool
(P/N 529 034 200)



A05B044

APPLICATION
Tundra R.

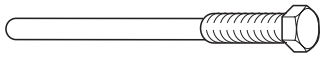
TRA drive pulley puller
(P/N 529 022 400)



A06B014

APPLICATION
TRA drive pulley for the 454, 494, 599, 670, 699, 779 and 809 engines.

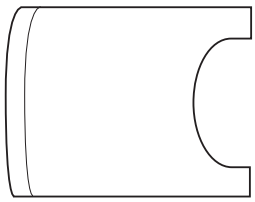
TRA drive pulley puller
(P/N 529 007 900) (25 mm)



A18B044

APPLICATION
TRA drive pulley for 443 and 503 engines.

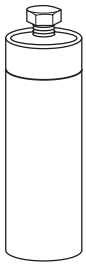
Alignment tool
(P/N 420 476 010)



A00C1D4

APPLICATION
Skandic WT and Alpine II gearbox.

Countershaft bearing installer
(P/N 529 018 800)

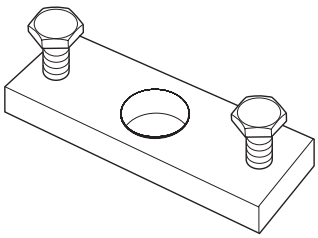


A00A194

APPLICATION
PRS chassis.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

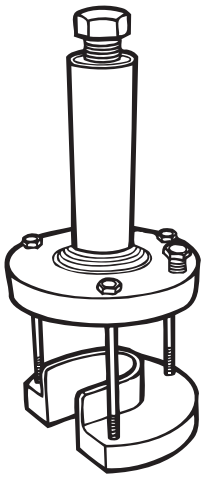
Cam pusher
(P/N 529 012 900)



A18B064

APPLICATION
Tundra II LT.

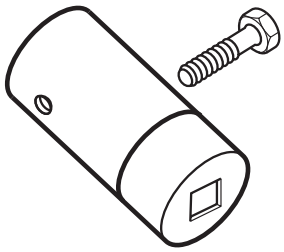
Countershaft bearing remover
(P/N 529 018 700)



A00A164

APPLICATION
PRS chassis.

Drive pulley puller
(P/N 529 023 100)



A00C3J4

APPLICATION
Élan.

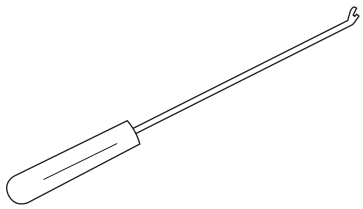
Transmission ball mounting pin
(P/N 420 476 020)



A00C1C4

APPLICATION
Alpine II 3-speed gearbox.

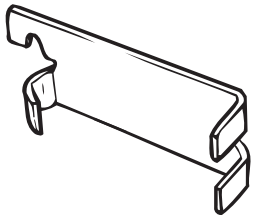
Transmission adjuster
(P/N 529 028 500)



A00D0X4

APPLICATION
F-Series equipped with "twist shifter" reverse transmission.

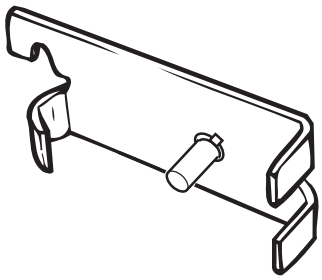
Spring scale hook (long)
(P/N 529 015 200)



A01B514

APPLICATION
1994 models and older except Alpine II.

Spring scale hook (short)
(P/N 529 006 500)



A01B174

APPLICATION
Alpine II 1994 and older.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

Alignment bar
A) (P/N 529 025 600)
B) (P/N 529 028 200)
C) (P/N 529 028 300)
D) (P/N 529 026 800)
E) (P/N 529 031 000)



A01B4D4

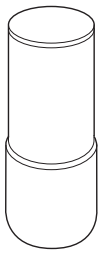
F) (P/N 529 008 300)



A03B034

APPLICATION
A) PRS chassis.
B) Alpine II.
C) Élan.
D) Safari L.
E) Skandic WT 1996.
F) Scout.

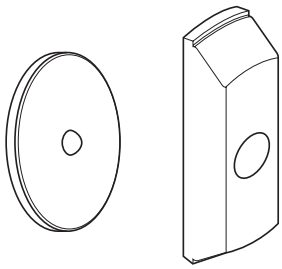
Burnishing bar
(P/N 529 026 402)



A00B464

APPLICATION
Tundra II LT, Safari L and Skandic.

Large bushing extractor
(P/N 529 031 100)

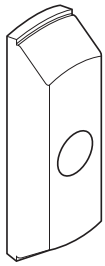


A00B4I4

APPLICATION
All models except Tundra/R, Skandic WT/SWT/WT LC and S-Series with RER.

NOTE: Use this tool only with former puller (P/N 529 018 600) that has regular threads.

Large bushing extractor
(P/N 529 035 576)

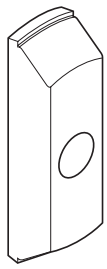


A02D1Q4

APPLICATION
All models except Tundra/R, Skandic WT/SWT/WT LC and S-Series with RER.

NOTE: Use this tool only with new puller (P/N 529 035 524) that has Acme threads.

Large bushing extractor
(P/N 529 035 575)

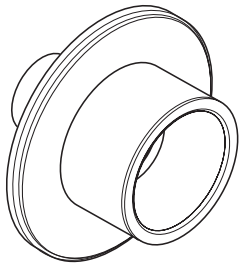


A02D1Q4

APPLICATION
S-Series with RER.

NOTE: Use this tool only with new puller (P/N 529 035 524) that has Acme threads.

Large bushing installer and small bushing extractor
(P/N 529 031 200)



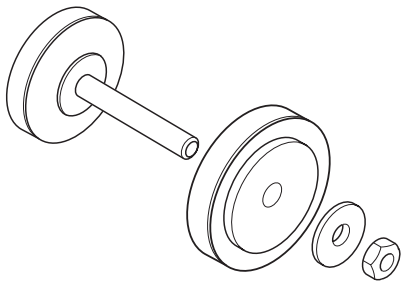
A00B4J4

APPLICATION
All models except Tundra/R, Skandic WT/SWT/WT LC and S-Series with RER.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

Chaincase seal pusher
(P/N 529 035 584)

NEW



A00B504

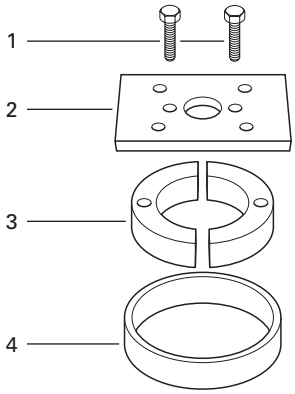
APPLICATION

S, F, CK3 and ZX Series.

NOTE: This tool replaces chaincase upper seal pusher (P/N 529 032 300).

3-speed transmission bearing extractor

1) Screw M8 x 25 (2) (P/N 222 082 565)
2) Plate
3) Half ring (2) (P/N 420 876 330)
4) Ring (P/N 420 977 480)

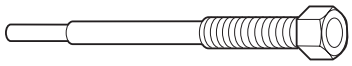


A00C1B4

APPLICATION

Alpine II 3-speed transmission.

Drive pulley puller
(P/N 529 002 100)
(standard threads)

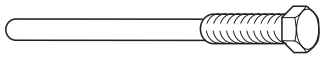


A00C084

APPLICATION

Square shaft, standard (SAE) threads.

TRA drive pulley puller (27 mm)
(P/N 529 010 100)

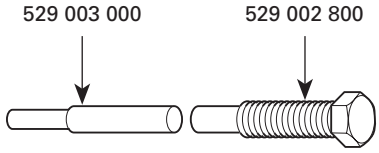


A18B044

APPLICATION

TRA drive pulley (27 mm) shaft except 454, 670 and 779 engines.

Drive pulley puller
(P/N 860 414 200)
(square shaft metric)
Consists of:

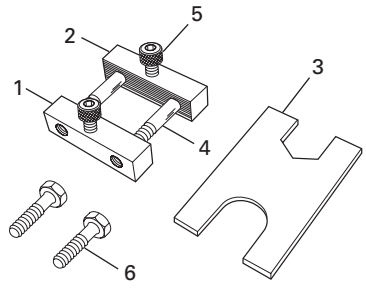


A00C095

APPLICATION

Square shaft, metric threads drive pulley.

Drive axle sprocket adjuster
(P/N 861 725 700)



A01B2O4

APPLICATION

All vehicles except Élan.

Parts included in the kit:

1) Block with threads (P/N 529 010 700)
2) Block without threads (P/N 529 010 800)
3) Plate (P/N 529 010 600)
4) Bolt M10 (2) (P/N 222 007 565)
5) Allen screw M8 (2) (P/N 222 983 065)
6) Screw M8 (2) (P/N 222 082 565)

NOTE: When the tool is to be used between tunnel and sprocket use screw M8.

Transmission adjuster
(P/N 529 030 300)



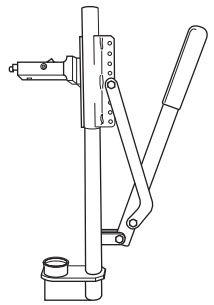
A03D1T4

APPLICATION

Vehicles equipped with "push-pull shifter" reverse transmission.

SUSPENSION — MANDATORY SERVICE TOOLS

Shock spring removal kit
(P/N 529 035 504)
Replacement clevis pin:
(P/N 414 528 400)



A01B4O4

APPLICATION

All suspensions with coil spring.

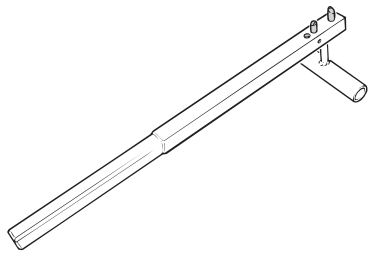
NOTE: The previous shock spring removal kit (P/N 529 027 100) can be upgraded by replacing the stopper with a wider stopper (P/N 529 035 551).

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

A) Track cleat remover
(P/N 529 008 200)

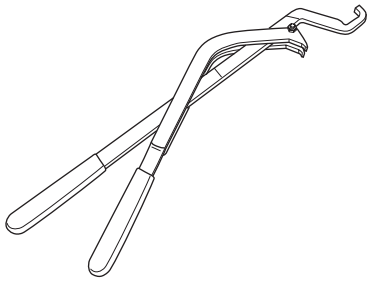
Pins
(P/N 529 008 204)

NOTE: Pins can be rotated 180° depending on whether the tool is used by a left-hander or right-hander.



A01B1J4

B) Track cleat remover
(P/N 529 028 700)



A01F224

APPLICATION

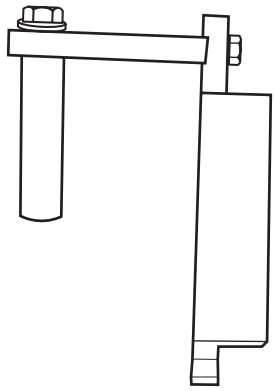
A) 1993 and older.

B) 1994 and newer except Élan and Tundra II.

Camber angle tool
(P/N 529 021 600)

NOTE: Angle finder with a magnetic base must be used.

Suggestion: K-D tool no. 2968

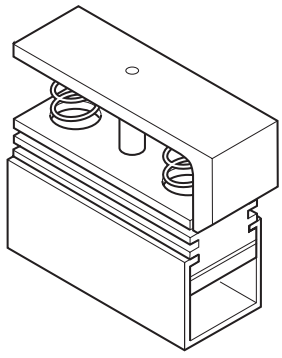


A06B024

APPLICATION

All DSA front suspensions.

Track tension gauge
(P/N 529 021 500)



A00B3X4

APPLICATION

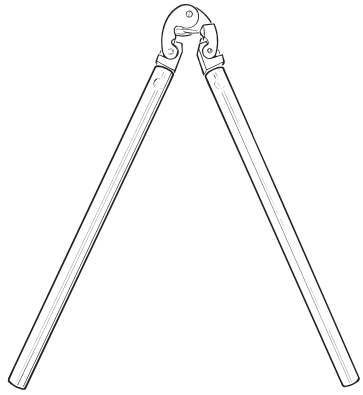
All models except Élan.

Track cleat installer

A) (P/N 529 008 500)
Narrow

B) (P/N 529 028 800)
Narrow

C) (P/N 529 007 700)
Wide



A01B1M4

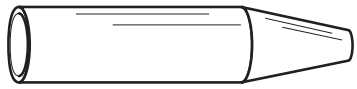
APPLICATION

A) 1993 and older.

B) 1994 and newer.

C) 1992 and older with wide cleat opening.

Dome guide
(P/N 529 026 500



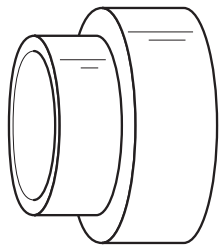
A06F1B4

APPLICATION

T/A shocks.

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

Piston guide
(P/N 529 026 600)

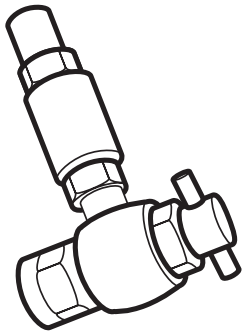


A06F1C4

APPLICATION
T/A shocks.

Gas shock valve tool
(P/N 529 035 570)

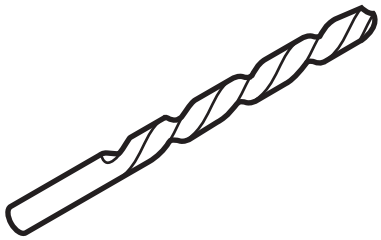
NEW



A02F134

APPLICATION
T/A shocks.

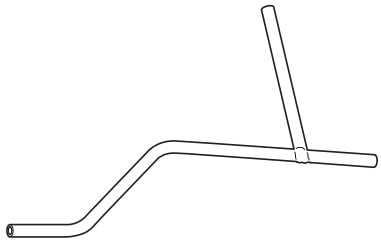
Drill bit
(P/N 529 031 800)



A01B564

APPLICATION
All 3/16 inch rivets.

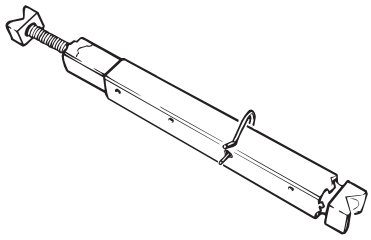
Spring installer (bar)
(P/N 529 005 000)



A00C1I4

APPLICATION
Tundra II LT, Scout and all SC-10 suspensions.

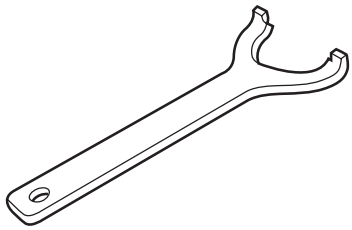
Drive axle holder
(P/N 529 007 200)



A01B1E4

APPLICATION
All models.

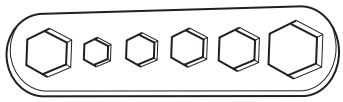
Kayaba shock adjustment tool
(P/N 529 019 000)



A00A1K4

APPLICATION
C-7 suspension.

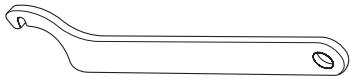
Hexagonal wrench
(P/N 529 014 700)



A19B024

APPLICATION
All SC 10 suspensions, Safari and Skandic prior to 1995.

Suspension adjustment wrench
(P/N 529 017 100)



A15B094

APPLICATION
1992 and old Formula C-7.

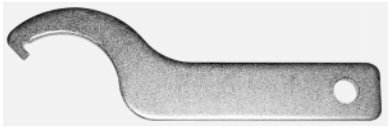
Suspension adjustment wrench
(P/N 529 032 900)



A02F114

APPLICATION
Arm suspension.

Suspension adjustment wrench
(P/N 529 034 100)

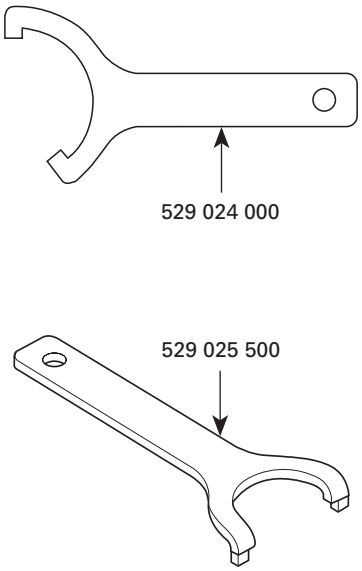


A02F124

APPLICATION
CK3 series.

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

Adjustment wrench
(P/N 861 743 900)
Consists of:



APPLICATION
T/A shock.

VEHICLES — RECOMMENDED SERVICE TOOLS

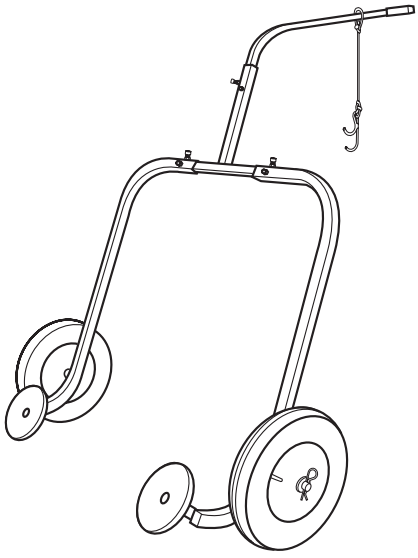
Protective mat
(P/N 529 030 600)



A01B45W

APPLICATION
All vehicles.

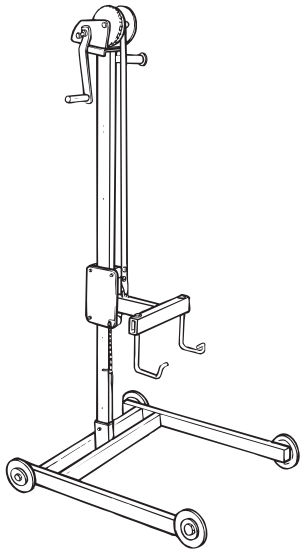
Dolly
(P/N 529 029 900)



A00B4CJ

APPLICATION
All models.

Snowmobile jack
(P/N 529 020 000)



A01A1JJ

APPLICATION
All models.

VEHICLES (continued) — RECOMMENDED SERVICE TOOLS

Template for hood drilling
(P/N 529 034 400)

NEW



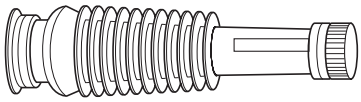
A02H154

APPLICATION

S-Series.

NOTE: To drill new hood prior to install meters.

Flexible spout for oil container
(P/N 414 837 300)



F04B044

APPLICATION

All models.

SERVICE PRODUCTS

MANDATORY SERVICE PRODUCTS

Loctite® is a trademarks of Loctite Corporation.

Dow Corning® is a trademarks of Dow Corning Corporation.

Retaining compound

(P/N 413 703 100)

Loctite® RC/609:

Retaining compound (10 mL) (green)



A00B2S4

APPLICATION

Used for retaining bushings, bearings in slightly worn housing or on shaft.

Paste gasket

(P/N 413 702 700)

Loctite® 515:

Gasket eliminator (50 mL)



A00B2T4

APPLICATION

Crankcase halves, transmission and gearbox mating surfaces.

Medium-strength threadlocker

(P/N 293 800 015)

Loctite® 242:

Threadlocker (10 mL) (blue, medium strength)



A00B324

APPLICATION

Flywheel nut, crankcase studs, etc.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 703 000.

High strength threadlocker

(P/N 293 800 005)

Loctite® 271:

Threadlocker (10 mL) (red, high strength)



A00B2U4

APPLICATION

Fasteners and studs up to 1 in diameter.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 707 400.

Gasket/paint remover

(P/N 413 708 500)

Loctite® 79040 Chisel 510 g (18 oz)



A00B3L4

APPLICATION

Clean mating surfaces of cylinders and crankcase. Remove carbon in combustion chambers.

MANDATORY SERVICE PRODUCTS (continued)

Loctite® primer
(P/N 293 800 041)
Loctite® 764-56
Primer N
170 g (6 oz)



A00B3N4

APPLICATION

To prepare mating surfaces before applying paste gasket, retaining compound or threadlockers.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 708 100.

Silicone compound
(P/N 420 897 061)
Dow Corning® MS4



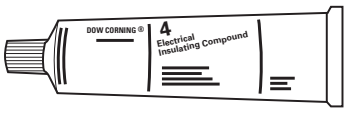
A00B3R4

APPLICATION

Lubricate pawl and pawl lock of rewind starter.

RECOMMENDED SERVICE PRODUCTS

Silicone dielectric grease
(3 oz)
(P/N 293 550 004)



A00B1X4

APPLICATION

On all electric connections. High tension coil and spark plug connections. Connector housings, etc.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 701 700.

Grease LMZ no. 1
(400 g)
(P/N 413 707 500)



A00B1Y4

APPLICATION

Mainly used between regulators or rectifiers and upper column to transfer the heat build-up and to assure a good ground.

Chaincase oil
(16 x 250 mL)
(P/N 413 801 900)



A00B2R4

APPLICATION

Chaincase lubricant on all fan-cooled models except Skandic WT series.

Synthetic chaincase oil
(12 x 355 mL)
(P/N 413 803 300)



A01B4Q4

APPLICATION

Chaincase lubricant on all liquid-cooled models and Skandic WT series.

Blizzard oil
(12 x 500 mL)
(P/N 413 803 100)



A00B2Q4

APPLICATION

All pre-mix models.

Injection oil
(P/N 413 802 900)
(12 x 1 liter)
(P/N 413 803 000)
(3 x 4 liter)
(P/N 413 803 200)
(205 liters)



F01B2H4

APPLICATION

All engines.

RECOMMENDED SERVICE PRODUCTS (continued)

BOMBARDIER-ROTAX Formula XP-S synthetic injection oil
(P/N 413 711 000)
(3 x 4 liter)
(P/N 413 710 700)
(205 liters)



F01B354

APPLICATION
All engines.

BOMBARDIER-ROTAX Formula XP-S synthetic injection oil
(P/N 413 710 500)
(12 x 1 liter)



F01B2G4

APPLICATION
All models.

Pipe sealant
(P/N 413 702 300)
Loctite 592 (50 mL)



A00B2W4

APPLICATION
Engine plugs and senders.

High temperature threadlocker
(P/N 420 899 788)
Loctite 648 (green)
(5 g)



A00B3D4

APPLICATION
For RAVE valve rod distance nut.

Anti-seize lubricant
(P/N 413 701 000)
Loctite anti-seize lubricant 454 g (16 oz)



F01B174

APPLICATION
Unpainted surfaces of driven pulley countershaft.

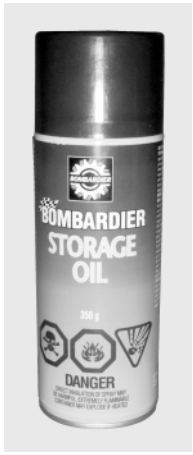
Synthetic grease
(400 g)
(P/N 413 711 500)



A01B574

APPLICATION
For idler bearings, ski legs, leaf spring cushion pads, seal interior lips, rear hub bearings, bogie wheels, countershaft bearings, etc.

Storage oil
(350 g spray can)
(12 x 350 g)
(P/N 496 014 100)



A02B054

APPLICATION
All models.

RECOMMENDED SERVICE PRODUCTS (continued)

Degreaser
(P/N 413 708 400)
Permatex® 48 TA
433 g (15 oz)



A00B3K4

APPLICATION
Engine, chaincase and any greasy surfaces.

Plastic & vinyl cleaner
(P/N 413 711 200)
6 x 1 L



A00B4V4

APPLICATION
Hood, bottom pan and seat.

Parts cleaner
(P/N 413 711 809)
320 g



A00B4X4

APPLICATION
Engine crankcase joining surfaces, pulleys and any greasy surfaces.

NOTE: This product replaces Loctite Safety solvent (P/N 413 708 200).

Gel instant adhesive
(P/N 413 708 300)
Loctite 454-40
20 g (.70 oz)



A00B3O4

APPLICATION
Isolating foam and rubber strip.

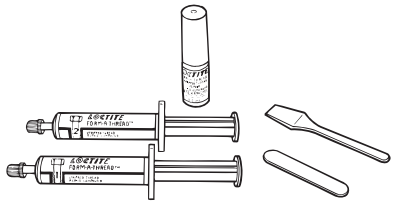
Tough adhesive
(P/N 413 408 300)
Loctite Black Max 38004
3 mL (.10 oz)



A00B3P4

APPLICATION
Shifter boot or grip.

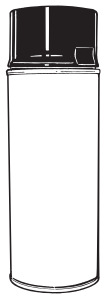
Stripped threads repair kit
(P/N 413 708 600)
Loctite 81668
Form-A-thread 81668



A00A1J4

APPLICATION
Repair damaged threads of grade 5 (SAE) or 8.8 (metric) maximum. Do not use in applications where temperatures will exceed 149°C (300°F) or on critical assemblies.

Paint for frame touch-up
(P/N 413 401 000)
Black semi-gloss
(spray can)

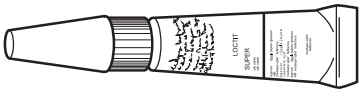


A00B3H4

APPLICATION
All models with a black frame.

RECOMMENDED SERVICE PRODUCTS (continued)

General purpose instant adhesive
Loctite 495 (3 g)
(P/N 413 703 200)



A00B2V4

APPLICATION
Rubber to metal bonding and most hard plastic.

High temperature RTV sealant
Ultra Copper
(P/N 413 710 300)
Loctite 17914 (80 mL)



A02B044

APPLICATION
All models.

Bombardier cleaner
(P/N 293 110 001) (400 g)
(P/N 293 110 002) (4 L)



F01B2J4

APPLICATION
All models.

Clear silicone
(P/N 293 800 033)



F01B1S4

APPLICATION
All models to seal bottom pan.

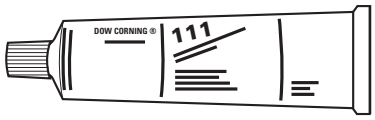
Fuel stabilizer
(12 x 8 oz)
(P/N 413 408 600)



A00B3V4

APPLICATION
All models.

Molykote 111
(P/N 413 707 000)



A00B3W4

APPLICATION
Engine crankshaft seals.

Shock oil
(32 oz)
(P/N 413 709 400)



A06F0P4

APPLICATION
T/A shocks.

Bombardier Lube
(12 x 14 oz)
(P/N 293 600 016)



A00B4W4

APPLICATION
Steering ball joints on all models.

RECOMMENDED SERVICE PRODUCTS (continued)

Super Lube (grease)
(P/N 293 550 014)



A00B474

APPLICATION
Exhaust tail pipe grommet.

LUBRICATION AND MAINTENANCE CHART

SYSTEM	PART/TASK	10-HOUR OR 500 km (300 mi) INSPECTION (to be performed by dealer)	WEEKLY OR EVERY 240 km (150 mi)	MONTHLY OR EVERY 800 km (500 mi)	ONCE A YEAR OR EVERY 3200 km (2000 mi)	STORAGE (to be performed by dealer)	PRE-SEASON PREPARATION (to be performed by dealer)	REFER TO
	Rewind Starter Lubrication and Rope Condition						✔	Subsection 04-10
	Engine Head Nuts	✔			✔			Appropriate section: See Top End
	Engine Mount Nuts	✔			✔			Appropriate section: See ENGINE REMOVAL
	Exhaust System	✔		✔				Appropriate section: See ENGINE REMOVAL
	Engine Lubrication					✔		This section no. 1
	Cooling System Condition	✔			✔			Subsections 04-07 and 04-08
	Coolant Replacement (except fan cooled)						✔	Subsection 04-08
	Condition of Seals						✔	Subsections 04-02 and 04-03
	Injection Oil Filter Condition			✔				Subsection 04-06
	Injection Oil Filter Replacement						✔	Subsection 04-06
	Oil Injection Pump Adjustment	✔			✔			Subsection 04-06
	Fuel Stabilizer					✔		This section no. 2
	Fuel Filter Replacement						✔	This section no. 3
	Fuel Lines and Connections	✔					✔	Subsection 04-12
	Carburetor Adjustment	✔			✔			Subsection 04-11
	Throttle Cable Inspection	✔			✔		✔	Subsection 04-12
	Air Filter Cleaning			✔				This section no. 4
	Drive Belt Condition	✔	✔					This section no. 5
	Condition of Drive and Driven Pulleys	✔		✔		✔		Subsections 05-03 and 05-04
	Cleaning of Drive and Driven Pulleys						✔	Subsections 05-03 and 05-04
	Retorquing of Drive Pulley Screw	✔						Subsection 05-03
	Driven Pulley Preload	✔			✔			Subsection 05-04
	Brake Condition	✔	✔					Subsection 05-06
	Brake Adjustment			✔				Subsection 05-06
	Brake Fluid Change						✔	Subsection 05-06
	Drive Chain Tension	✔		✔				Subsections 05-07 and 05-08
	Countershaft Lubrication (S-Series)	✔		✔		✔		Subsection 05-06
	Chaincase/Gearbox Oil Level	✔		✔			✔	Subsections 05-07 and 05-08
	Chaincase/Gearbox Oil Change					✔		Subsections 05-07 and 05-08
	Lubrication of Drive Axle Bearing	✔		✔		✔		Subsection 07-05

SYSTEM	PART/TASK	10-HOUR OR 500 km (300 mi) INSPECTION (to be performed by dealer)	WEEKLY OR EVERY 240 km (150 mi)	MONTHLY OR EVERY 800 km (500 mi)	ONCE A YEAR OR EVERY 3200 km (2000 mi)	STORAGE (to be performed by dealer)	PRE-SEASON PREPARATION (to be performed by dealer)	REFER TO
	Handlebar Bolts. Retorque to 26 N•m (19 lbf•ft)	✔						Subsection 08-02
	Steering and Front Suspension Mechanism	✔		✔		✔		Subsections 08-02 and 08-03
	Wear and Condition of Skis and Runners	✔	✔					Subsection 08-03
	Steering and Ski Leg Camber Adjustment	✔		✔				Subsection 08-02
	Suspension Adjustments	AS REQUIRED						Section 07: See appropriate Subsection and *Operator's Guide*
	Suspension Lubrication			✔		✔		Section 07: See appropriate Subsection
	Suspension Condition	✔			✔			Section 07: See appropriate Subsection
	Suspension Stopper Strap Condition				✔			Section 07: See appropriate Subsection
	Track Condition	✔		✔				Subsection 07-06
	Track Tension and Alignment	✔	AS REQUIRED					Subsection 07-06
	Spark Plugs*	✔		✔				Subsection 06-03
	Engine Timing	✔					✔	Subsection 06-02
	Battery Condition	✔		✔		✔		Subsection 06-04
	Headlight Beam Aiming				✔			Subsection 09-02
	Wiring Harnesses, Cables and Lines	✔		✔				Subsection 09-02
	Operation of Lighting System (HI/LO beam, brake light, etc.) Test Operation of Emergency Cut-Out Switch and Tether Cut-Out Switch	✔	✔			✔		*Operator's Guide*
	Rags in Air Intake and Exhaust System					✔	✔	This section no. 6
	Engine Compartment	✔		✔				This section no. 7
	Vehicle Cleaning and Protection	✔		✔		✔		This section no. 8

* Before installing new spark plugs at pre-season preparation, it is suggested to burn excess storage oil by starting the engine with the old spark plugs. Only perform this operation in a well-ventilated area.

NO. 1 ENGINE LUBRICATION

Engine internal parts must be lubricated to protect them from possible rust formation during the storage period.

Proceed as follows:

Start the engine and allow it to run at idle speed until the engine reaches its operating temperature.

◆ WARNING

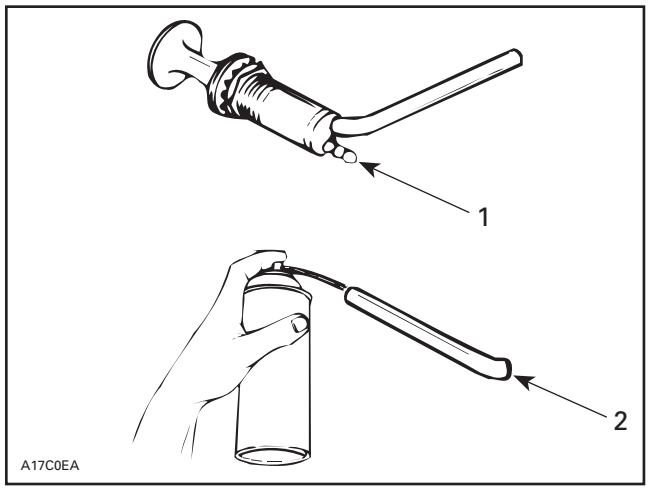
Ensure the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

Stop the engine.

Models with a Primer

To prevent fuel from draining, primer button should be pushed all the way in.

Disconnect the outlet primer hose from the primer valve (straight coupling).



1. Straight coupling
2. To intake manifold

Insert storage oil (P/N 496 014 100) nozzle into primer outlet hose.

Models with a Choke

Remove air silencers to spray storage oil into each carburetor bore.

All Models

Restart engine and run at idle speed.

Inject storage oil until the engine stalls or until a sufficient quantity of oil has entered the engine (approximately half a can).

With the engine stopped, remove the spark plug and spray storage oil (P/N 496 014 100) into each cylinder.

Crank slowly 2 or 3 revolutions to lubricate cylinders.

Reinstall the spark plugs and the outlet primer hose or air silencers.

◆ WARNING

This procedure must only be performed in a well-ventilated area. Do not run engine during storage period.

NO. 2 FUEL STABILIZER

With the new fuel additives, it is critical to use the fuel stabilizer (P/N 413 408 600) (250 mL) to prevent fuel deterioration, gum formation and fuel system components corrosion. Follow manufacturer's instructions for proper use.

Pour fuel stabilizer in fuel tank prior to starting engine for internal parts lubrication so that stabilizer flows everywhere in fuel system.

After engine starting, use primer several times so that stabilizer flows inside it.

Do not drain fuel system.

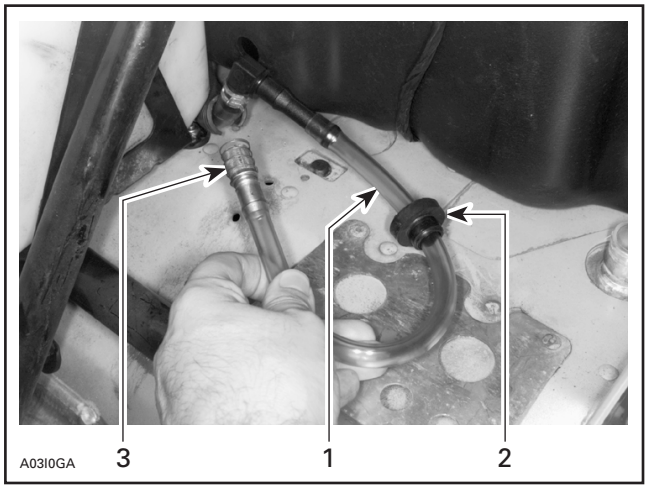
▼ CAUTION

Fuel stabilizer should be added prior to engine lubrication to ensure carburetor(s) protection against varnish deposit.

NO. 3 FUEL FILTER REPLACEMENT

Drain fuel tank.

Remove fuel line grommet from fuel tank and pull out inlet fuel line from tank.



TYPICAL

1. *Inlet fuel line*
2. *Position of grommet when installing*
3. *Fuel filter*

Replace fuel filter. To facilitate the fuel line installation, slide grommet on fuel line about 50 mm (2 in) away from elbow then install grommet on fuel tank and push elbow through grommet.

NO. 4 AIR FILTER CLEANING

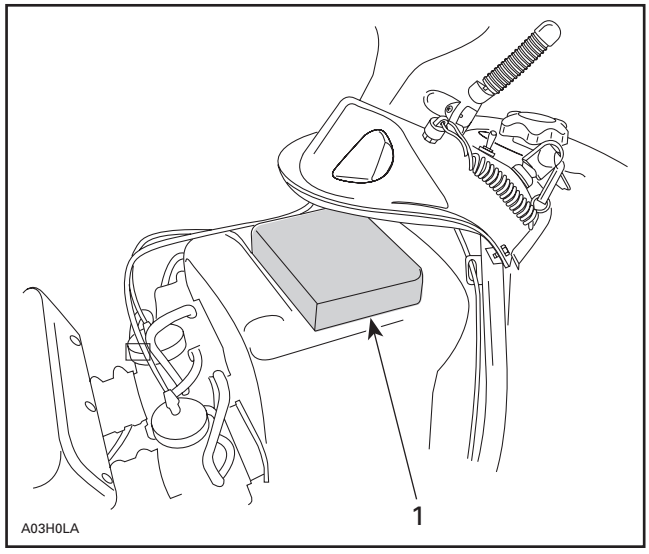
Check that the air box is clean and dry then properly reinstall the filter.

▼ CAUTION

These snowmobiles have been calibrated with the filter installed. Operating the snowmobile without it may cause engine damage.

S-Series

Lift hood and remove air filter from air intake silencer.



TYPICAL

1. *Filter*

To clean the filter, shake the snow out of it then, dry it out.

NO. 5 DRIVE BELT CONDITION

Inspect belt for cracks, fraying or abnormal wear (uneven wear, wear on one side, missing cogs, cracked fabric). If abnormal wear is noted, probable cause could be pulley misalignment, excessive RPM with frozen track, fast starts without warm-up period, burred or rusty sheave, oil on belt or distorted spare belt.

Check the drive belt width. Replace the drive belt if width is less than the minimum width recommended in DRIVE BELT 05-02.

NO. 6 RAGS IN AIR INTAKE AND EXHAUST SYSTEM

At storage preparation, block air intake hole and exhaust system hole using clean rags.

Remove those rags at pre-season preparation.

NO. 7 ENGINE COMPARTMENT

Keep clean of grass, twigs, cloth, etc. These are combustible under certain conditions.

NO. 8 VEHICLE CLEANING AND PROTECTION

Remove any dirt or rust.

To clean the entire vehicle, use only flannel clothes or Kimtowels® wipers no. 58-380 from Kimberly-Clark.

▼ CAUTION

It is necessary to use flannel cloths or Kimtowels wipers on windshield and hood to avoid damaging further surfaces to clean.

To clean the entire vehicle, including metallic parts with a **thick** coat of grease, use Endust® imported by Bristol Myers, available at hardware stores or supermarkets.

For bottom pan cleaning, use Bombardier Cleaner (P/N 293 110 001 (spray can 400 g) and 293 110 002 (4 L)).

▼ CAUTION

Do not use Bombardier Cleaner on decals or vinyl.

To clean the entire vehicle, including metallic parts with a **thin** coat of grease, use Simple Green® from Sunshine Makers Inc., available at hardware stores or at automotive parts retailer.

For vinyl and plastic parts, use Vinyl & Plastic Cleaner (P/N 413 711 200 (6 x 1 L)).

To remove scratches on windshield or hood: Start with "Slip Streamer Motorcycle Windshield Heavy Duty Scratch, Remover". Finish with "Slip Streamer Motorcycle Cleaner and Polish".

NOTE: The latest product may be use alone if only light scratches are noticeable.

▼ CAUTION

Never clean plastic parts or hood with strong detergent, degreasing agent, paint thinner, acetone, products containing chlorine, etc.

Inspect the hood and repair any damage. Touch up all metal spots where paint has been scratched off. Spray all metal parts including shock chromed rods with BOMBARDIER LUBE (P/N 293 600 016). Wax the hood and the painted portion of the frame for better protection.

NOTE: Apply wax on glossy finish only. Protect the vehicle with a cover to prevent dust accumulation during storage.

▼ CAUTION

The snowmobile has to be stored in a cool and dry place and covered with an opaque tarpaulin. This will prevent sun rays and grime from affecting plastic components and vehicle finish.

Lift rear of vehicle until track is clear of the ground. Install on a snowmobile mechanical stand.

NOTE: Do not release track tension.

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ENGINE

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**ENGINE BACKFIRES.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check spark plugs.** a. Carbon accumulation caused by defective spark plug(s). *Clean carbon accumulation and replace spark plugs.*
	2. Check cooling system. a. Loose fan belt. *Adjust or replace fan belt (refer to TECHNICAL DATA 10).* b. Low antifreeze level. *Adjust antifreeze level. Then check clamps or hoses.* c. Defective tank cap. *Replace cap.* d. Air in system. *Bleed system.*
	3. Check ignition timing. a. Timing is too advanced. *Set timing according to specifications (refer to TECHNICAL DATA 10).*

SYMPTOM	ENGINE SUDDENLY TURNS OFF.
CONDITION	NORMAL USE.
Test/Inspection	**1. Perform engine leak test. Refer to ENGINE LEAK VERIFICATION FLOW CHART. Check possible piston seizure.** a. Damaged gasket and/or seal. *Replace defective parts.*
	2. "Four-corner" seizure of piston(s). a. Accelerating too fast when engine is cold. Piston expands faster than cylinder. *Replace piston(s). Ask driver to refer to warm-up procedure in* Operator's Guide.
	3. Piston(s) seizure on exhaust side (color on piston dome is correct). a. Kinked fuel tank vent tube. *Relocate fuel tank vent tube.* b. Leaks at fuel line connections or damaged fuel lines. *Replace defective lines.* c. Fuel does not flow through carburetor(s) (plastic particles in needle area and/or varnish formation in carburetor(s)). *Clean carburetor(s).* d. Spark plug heat range is too warm. *Install spark plugs with appropriate heat range (refer to TECHNICAL DATA 10).* e. Improper ignition timing. *Adjust according to specifications (refer to TECHNICAL DATA 10).* f. Restriction in exhaust system. *Replace.* g. Compression ratio is too high. *Install genuine parts.* h. Carburetor calibration is too lean. *Adjust according to specifications (refer to TECHNICAL DATA 10).* i. Improper rotary valve timing or improper valve. *Adjust according to specifications (refer to TECHNICAL DATA 10) and/or install Bombardier's recommended rotary valve.* j. Poor oil quality. *Use BOMBARDIER-ROTAX oil.* k. Leaks at air intake silencer. *Replace air intake silencer grommets.*

	4. Melted and/or perforated piston dome; melted section at ring end gap. a. When piston reaches TDC, mixture is ignited by heated areas in combustion chamber. This situation is due to an incomplete combustion of a poor oil quality. *Clean residue accumulation in combustion chamber and replace piston(s). Use BOMBARDIER-ROTAX injection oil.* b. Spark plug heat range is too high. *Install recommended spark plugs (refer to TECHNICAL DATA 10).* c. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).* d. Inadequate fuel quality. *Use appropriate fuel.* e. Carburetion is too lean. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Seized piston all around the circumference (dry surface). a. Lack of oil, damaged oil line or defective injection pump. *Replace defective part(s).*
	6. Grooves on intake side of piston only. a. Oil film eliminated by water (snow infiltration in engine). *Replace piston(s) and check if intake system leaks.*
	7. Piston color is dark due to seizure on intake and exhaust sides. a. Broken or loose fan belt. *Replace fan belt or adjust its tension (refer to TECHNICAL DATA 10).* b. Cooling system leaks and lowers coolant level. *Tighten clamps or replace defective parts. Add antifreeze in cooling system until appropriate level is reached.* c. Accumulation of foreign particles in needle and/or main jet area. *Clean carburetor(s).*
	8. Cracked or broken piston(s). a. Cracked or broken piston(s) due to excessive piston/cylinder clearance or engine overreving. *Replace piston(s). Check piston/cylinder clearance (refer to TECHNICAL DATA 10). Adjust drive pulley according to specifications (refer to TECHNICAL DATA 10) and/or clean pulley sheaves if they are contaminated with greasy particles.*

SYMPTOM	**PISTON RING AND CYLINDER SURFACES ARE GROOVED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check oil quality.** a. Poor oil quality. *Use BOMBARDIER-ROTAX injection oil.*
	2. Check injection pump and its hoses. a. Inadequate injection pump adjustment and/or defective hoses. *Adjust pump according to specifications (refer to ENGINE 04) and/or replace hoses.*

SYMPTOM	ENGINE DOES NOT OFFER MAXIMUM POWER AND/OR DOES NOT REACH MAXIMUM OPERATING RPM.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check spark plug condition.** a. Fouled spark plugs. *Replace.*
	2. Check if there is water in fuel. a. There is water in fuel. *Drain fuel system, then fill it with appropriate fuel.*
	3. Check items listed in ENGINE RUNS OUT OF FUEL (refer to fuel and oil system subsection 03).
	4. Check carburetor adjustments and cleanliness. a. Inadequate carburetor adjustments or dirt accumulation. *Adjust according to specifications (refer to TECHNICAL DATA 10) or clean.*
	5. Check drive belt. a. Worn belt. *Replace belt if width is 3 mm (1/8 in) less than nominal dimension (refer to TECHNICAL DATA 10).*
	6. Check track adjustment. a. Too much tension and/or improper alignment. *Align track and adjust its tension to specifications (refer to TECHNICAL DATA 10).*
	7. Check drive pulley. a. Improper calibration screw adjustments (TRA pulley) and/or worn bushing(s). *Adjust according to specifications (refer to TECHNICAL DATA 10) and/or replace bushing(s).*
	8. Check driven pulley. a. Worn bushing and/or spring tension. *Replace spring and/or adjust its tension according to specifications (refer to TECHNICAL DATA 10).*
	9. Check exhaust system. a. Restriction. *Replace.*
	10. Check ignition timing. a. Decrease in power due to retarded ignition. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	11. Check engine compression. a. Worn piston(s) and ring(s). *Replace (refer to TECHNICAL DATA 10 for specifications).*
	12. Check engine cooling system. a. Engine overheats. Improper fan belt tension. *Adjust fan belt (refer to TECHNICAL DATA 10).* b. Antifreeze level is low, cap fails to pressurize system or air circulates through lines. *Adjust level, replace cap or bleed cooling system.*

SYMPTOM	ENGINE DETONATION AT MAXIMUM RPM.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check which type of fuel is used.** a. Octane number is too low and/or alcohol level is too high. *Use recommended fuel type.*
	2. Check spark plug type. a. Improper spark plug heat range. *Install recommended spark plugs (refer to TECHNICAL DATA 10).*
	3. Check exhaust system. a. Too much restriction. *Replace.*
	4. Check ignition timing. a. Timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check carburetion. a. Fouled and/or improper carburetor components. *Clean or replace according to specifications (refer to TECHNICAL DATA 10).*
	6. Check compression ratio and combustion chamber volume. a. Compression ratio is too high. *Install genuine parts.*

SYMPTOM	ENGINE TURNS OVER BUT FAILS TO START.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check switches.** a. Ignition switch, emergency cut-out switch or tether switch is in the OFF position. *Place all switches in the RUN or ON position.*
	2. Check fuel level. a. Mixture not rich enough to start cold engine. *Check fuel tank level and use primer.*
	3. Check spark plug. a. Defective spark plug (no spark). *Replace spark plugs.*
	4. Check amount of fuel on spark plug. a. Flooded engine (spark plug wet when removed). *Do not overprime or overchoke. Remove wet spark plugs, turn ignition switch to OFF and crank engine several times. Install clean dry spark plugs. Start engine following usual starting procedure.*
	5. Check fuel lines. a. No fuel to the engine (spark plugs dry when removed). *Check fuel tank level; turn fuel valve on if applicable; check fuel filter, replace if clogged; check condition of fuel and impulse lines and their connections.*
	6. Check engine compression. a. Insufficient engine compression. *Replace defective part(s) (ex.: piston(s), ring(s), etc.).*

SYMPTOM	IRREGULAR ENGINE IDLE.
CONDITION	NORMAL USE AFTER ENGINE WARM UP.
Test/Inspection	**1. Check primer.** a. Fuel leaks at primer nipple which is mounted to carburetor. *Replace.*
	2. Check choke. a. Choke plunger may be partially opened. *Readjust.*
	3. Check carburetor adapter. a. Air enters through a crack. *Replace.*
	4. Check air screw position. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check ignition system trigger coil air gap. a. Air gap is too large. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	6. Check dimension of pilot jet. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	7. Perform engine leak test. a. Leaking gaskets allow air to enter in engine. *Replace defective parts.*

SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check temperature gauge sensor.** a. False reading. *Replace.*
	2. Check fan belt. a. Belt slides because it is too loose. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	3. Verify antifreeze level and check if there is air infiltration in the system or if there are leaks in gasket areas. a. Low antifreeze level or air in system. *Add antifreeze until recommended level is reached, bleed system and/or tighten clamps at fitting.*
	4. Check if antifreeze flows through system properly. a. Foreign particles and/or broken coolant pump impeller. *Clean cooling system and/or replace coolant pump impeller.*
	5. Check thermostat. a. Thermostat reacts slowly or not at all. *Replace.*

	6. Check antifreeze concentration. a. Antifreeze concentration is too high. *Adjust concentration according to Bombardier's recommendations.*
	7. Check tank cap. a. Cap does not hold pressure. *Replace.*
	8. Check carburetion. a. Improperly adjusted or inadequate carburetor components. *Adjust according to specifications (refer to TECHNICAL DATA 10) or replace inadequate component(s).*
	9. Check cylinder head gaskets. a. Worn gaskets. *Replace.*
	10. Check ignition timing. a. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	11. Check if there are leaks at air intake silencer and/or engine crankcase. a. Leak(s). *Repair or replace.*
	12. Check condition and heat range of spark plugs. a. Melted spark plug tip or inadequate heat range. *Replace.*

SYMPTOM	**ENGINE EQUIPPED WITH RAVE VALVE DOES NOT REACH ITS FULL OPERATING RPM (500 TO 1000 RPM SLOWER).**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check RAVE valve pistons.** a. Valve piston(s) is (are) too far out. *Screw valve piston(s) to bottom.*
	2. Check RAVE valve stems. a. Bent RAVE valve stem(s). *Replace.*
	3. Check RAVE valves. a. Jammed valve(s). *Clean.*
	4. Check tension of RAVE springs. a. Inadequate spring tension. *Replace.*
	5. Check RAVE pressure holes. a. Clogged holes. *Clean.*
	6. Check clamps or sleeves. a. Damaged clamp(s) or sleeve(s). *Replace.*

SYMPTOM	ENGINE EQUIPPED WITH RAVE. ENGINE HESITATES AT MID-SPEED AND REACHES MAXIMUM PERFORMANCE ONLY AFTER A WHILE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check RAVE valve spring(s).** a. Spring tension is too weak or spring(s) is (are) broken. *Replace.*
	2. Check RAVE valve cover red adjustment screws. a. Adjustment screw(s) is (are) too loose. *Adjust according to specifications.*
	3. Check RAVE valve movement (RAVE movement indicator P/N 861 725 800). a. Valve(s) is (are) stuck in open position. *Clean.*

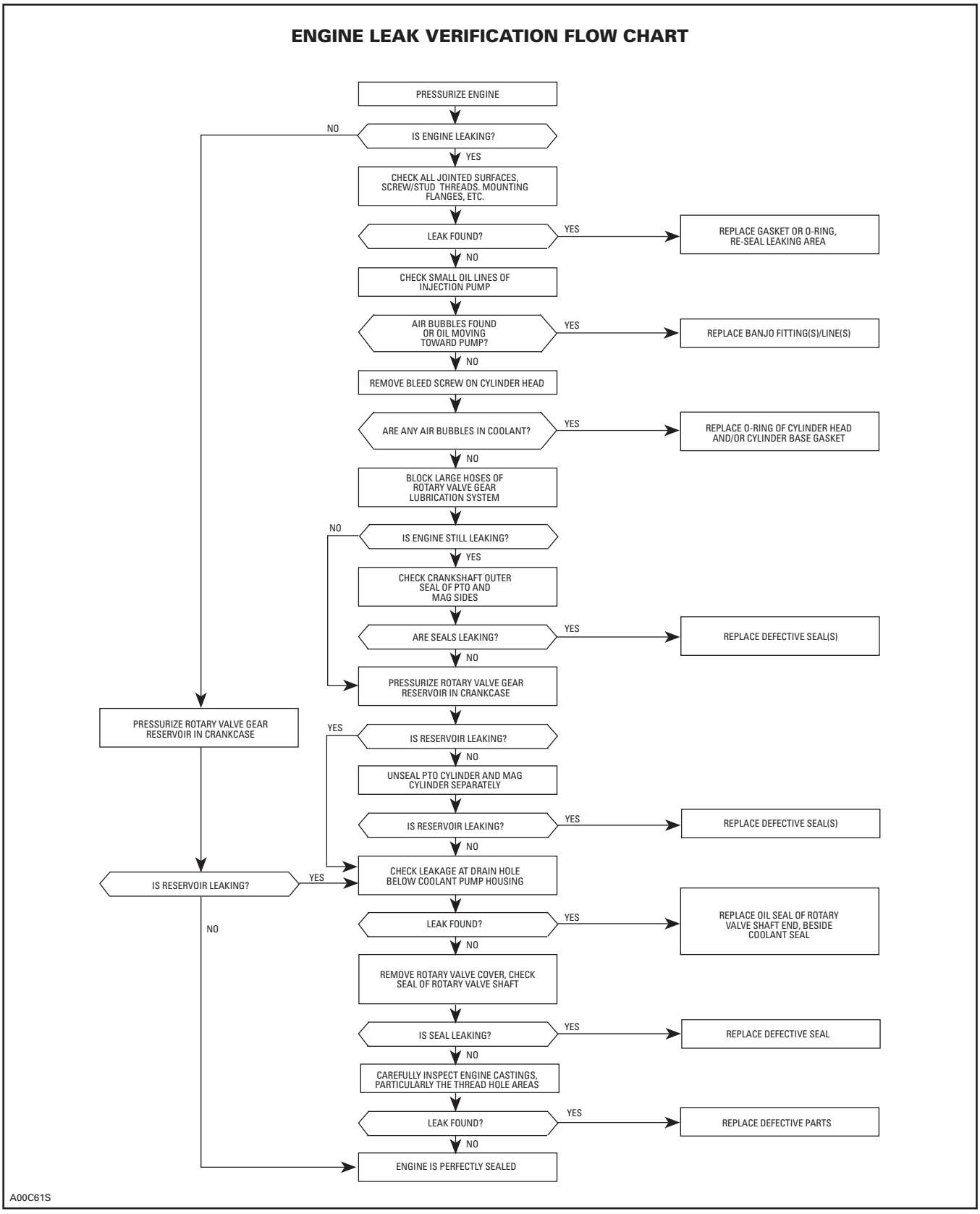
SYMPTOM	REWIND STARTER ROPE DOES NOT REWIND.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check rewind spring.** a. Broken spring. *Replace spring.*

SYMPTOM	REWIND STARTER PAWL DOES NOT ENGAGE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check stopper spring.** a. Broken stopper spring. *Replace.*
	2. Check pawl and pawl lock. a. Pawl and pawl lock have stuck together because of heat. *Replace.*
	3. Check pawl and rope sheave. a. Pawl and rope sheave have stuck together because of heat. *Replace.*

SYMPTOM	**ENGINE PINGING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel lines.** a. Bent fuel lines (preventing fuel from flowing through). *Relocate or replace fuel lines.*
	2. Check if carburetor(s) is (are) clean. a. Dirt prevents fuel from flowing through. *Clean.*
	3. Check ignition timing. a. Timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	4. Check compression ratio. a. Compression ratio is too high. *Replace inadequate part(s) to obtain manufacturer's recommended compression ratio or use a higher grade fuel.*

SYMPTOM	**ENGINE GENERATES A LOT OF VIBRATIONS.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check engine supports.** a. Loose and/or broken supports or interference between support(s) and chassis. *Retighten to specification (refer to TECHNICAL DATA 10) or replace.*
	2. Check drive pulley (refer to: vibrations coming from drive pulley).
	3. Check carburetor synchronization. a. Throttle slide heights are adjusted differently and/or throttle slide openings are unsynchronized. *Adjust throttle slide heights and throttle cable.*

ENGINE LEAK VERIFICATION FLOW CHART



FUEL AND OIL SYSTEMS

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**HIGH FUEL CONSUMPTION OR RICH MIXTURE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel tank.** a. Perforated fuel tank. *Replace fuel tank.*
	2. Check fuel pump reservoir and carburetor fittings. a. Leaking fittings. *Replace defective part.*
	3. Check primer. a. Fuel flows through primer while engine runs. *Replace primer.*
	4. Check float height in carburetor(s). a. Fuel level is too high in float bowl(s). *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check needle valve. a. Foreign particles prevent needle valve(s) from closing and/or worn seating area. *Clean or replace needle valve(s), then clean seating area.*
	6. Check H.A.C. system. a. Connection to atmosphere is plugged. *Clean.* b. Leakage in H.A.C. to carburetor tube. *Replace.* c. Leak in H.A.C. sealed chamber. *Replace.* d. H.A.C. frozen. *Replace.*

SYMPTOM	**FUEL LEAKS IN ENGINE BASE WHEN ENGINE IS STOPPED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check items 3, 4 and 5 of HIGH FUEL CONSUMPTION.**
	2. Check fuel pump diaphragm. a. Cracked diaphragm. *Replace.*

SYMPTOM	ENGINE LACKS POWER OR STALLS AT HIGH RPM.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel tank vent hose.** a. Kinked or clogged hose. *Relocate or replace.*
	2. Check fuel filter. a. Clogged filter. *Replace.*
	3. Check fuel lines. a. Kinked or clogged lines. *Relocate or replace.*
	4. Check fuel pump flow. a. Dried diaphragm. *Replace.*
	5. Check if carburetor(s) is (are) clean. a. Varnish. *Clean.*

SYMPTOM	HIGH INJECTION OIL CONSUMPTION.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check oil injection pump adjustment.** a. Oil injection pump adjusted too rich. *Adjust.*
	2. Check injection pump identification. a. Wrong pump installed. *Replace with the appropriate pump. Refer to OIL INJECTION SYSTEM 04-06.*
	3. Check injection oil lines and their fitting. a. Leaking lines and/or cover. *Replace defective part(s).*
	4. Check injection pump cover gasket. a. Worn gasket. *Replace.*
	5. Pressurize crankcase rotary valve gear reservoir. a. Leaking gasket(s). *Replace gasket(s).*

SYMPTOM	ENGINE RUNS OUT OF FUEL (OR LEAN MIXTURE).
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel filter ball located in fuel tank. Ball must move freely.** a. Corrosion due to oxidation at installation. *Replace fuel filter.*
	2. Check if lines are perforated or kinked and make sure they do not leak at fittings. a. Lines are too big for their fittings or are improperly routed. *Replace or properly relocate lines.*
	3. Check fuel pump outlet flow. a. Dirt clogging fuel pump lines or torn membrane. *Clean or replace fuel pump.*
	4. Check carburetor needle valve(s). a. Dirt (varnish, foreign particle) clogging fuel line inlets. *Clean.*
	5. Check main jet. a. Dirt (varnish, foreign particle) accumulation at main jet. *Clean.*
	6. Check float height in carburetor bowl(s). a. Running out of fuel at high speed because float height is too low. *Adjust float lever height according to specifications.*
	7. Check H.A.C. system. a. Plugged hole in air jet inlet. *Clean.* b. H.A.C. frozen. *Replace.*

TRANSMISSION AND BRAKE SYSTEMS

The following charts are provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

TRANSMISSION

SYMPTOM	THE SNOWMOBILE ACCELERATES SLOWLY, ESPECIALLY WHEN IT IS STOPPED.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive belt condition.** a. Belt is too narrow (drive belt engagement is higher in drive pulley). *Replace belt if width is 3 mm (1/8 in) less than a new one (refer to TECHNICAL DATA 10).*
	2. Check distance between pulleys and/or drive belt deflection. a. Distance is too small between pulleys or deflection is too high (drive belt engagement is higher in drive pulley). *Adjust distance between pulleys and/or drive belt deflection according to specifications (refer to TECHNICAL DATA 10).*
	3. Check driven pulley sliding half play. a. Jammed sliding half. *Replace.*
	4. Check spring tension of driven pulley sliding half. a. Sliding half rotation is accelerated when spring tension is too weak. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Refer to VIBRATIONS ORIGINATING FROM DRIVEN PULLEY and check items listed.
	6. Check drive pulley spring tension. a. Spring tension is too weak. *Replace.*

SYMPTOM	ENGINE MAXIMUM RPM IS TOO HIGH AND TOP SPEED IS NOT REACHED.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check items 1, 2 and 3 of THE SNOWMOBILE ACCELERATES SLOWLY, ESPECIALLY WHEN IT IS STOPPED.**
	2. Check driven pulley spring tension. a. Spring tension is too stiff. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	3. Check position of the calibration screws. (TRA drive pulley) a. Selected numbers are too high. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	4. Refer to VIBRATIONS ORIGINATING FROM DRIVEN PULLEY and check items listed.

SYMPTOM	LOOSENESS IS FELT IN DRIVE SYSTEM WHEN ACCELERATING/DECELERATING.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive chain tension.** a. Drive chain is too loose. *Adjust.*
	2. Check play of driven pulley Woodruff key (aluminum frame models) a. Worn Woodruff key or keyway. *Replace.*

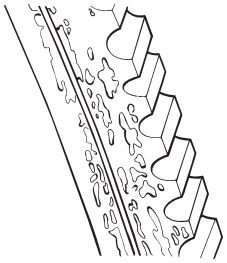
SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVE PULLEY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive belt.** a. Belt width is uneven at many places. *Replace (refer to TECHNICAL DATA 10 for the part number).*
	2. Check tightening torque of drive pulley screw. a. Moving governor cup. *Retighten screw.*
	3. Spring cover screws. a. Spring cover moves and restrains sliding half movement. *Retighten screws.*
	4. Check spring cover (TRA TYPE) and/or outer half bushings. a. Excessive gap between bushings and inner half shaft, thus restraining sliding half movements. *Replace bushing(s).*
	5. Check sliding half slider shoes. a. Worn slider shoes. *Replace.*

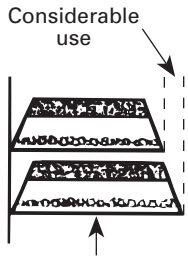
SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVEN PULLEY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check sliding half play.** a. Sliding half runout. *Replace sliding half bushing.*
	2. Check sliding half and fixed half straightness. a. Sliding half/fixed half runout. *Replace.*
	3. Check cam slider shoes. a. One or two slider shoes out of three are broken. *Replace.*

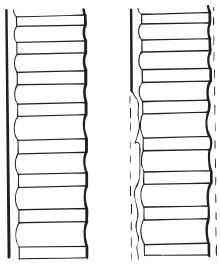
SYMPTOM	PULLEYS DO NOT DOWN SHIFT PROPERLY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check driven pulley spring tension.** a. Spring tension is too weak. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Refer to VIBRATIONS COMING FROM DRIVEN PULLEY and check items listed.
	3. Check drive pulley bushings (cleanliness, wear, etc.). a. Bushings stick to fixed half pulley shaft. *Clean or replace.*
	4. Check driven pulley spring tension. a. Spring tension is too weak. *Replace.*

SYMPTOM	IT IS DIFFICULT TO ENGAGE TRANSMISSION IN FORWARD OR REVERSE GEAR.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check position of gear shift lever adjustment screw.** a. Improper adjustment. *Adjust according to specifications (refer to TRANSMISSION 05).*

SYMPTOM	UNEVEN BELT WEAR ON ONE SIDE ONLY.
CONDITION	NORMAL USE.
Test/Inspection  A00D09Y	**1. Check tightening torque of engine mount bolts.** a. Loose engine mount. *Tighten engine mount nuts/bolts equally.*
	2. Check pulley alignment. a. Pulley misalignment. *Align pulleys.*
	3. Check drive belt contact area on pulleys. a. Rough or scratched pulley surfaces. *Repair or replace pulley half.*
	4. Check driven pulley sliding half play. a. Driven pulley bushing worn. *Replace bushing.*

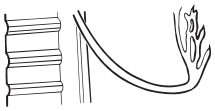
SYMPTOM	BELT GLAZED EXCESSIVELY OR HAVING BAKED APPEARANCE.
CONDITION	NORMAL USE.
Test/Inspection  A00D0AY	**1. Check if drive pulley bushings are worn.** a. Insufficient pressure on belt sides. *Replace bushing.* **2. Check condition of drive pulley fixed half shaft.** a. Rusted drive or driven pulley shafts. *Clean shaft with fine steel wool.* **3. Check if pulley halves are clean.** a. Oil on pulley surfaces. *Clean pulley halves.* **4. Check pulley calibration.** a. Improper pulley calibration. *Calibrate according to specifications.*

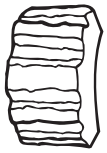
SYMPTOM	BELT WORN EXCESSIVELY IN TOP WIDTH.
CONDITION	NORMAL USE.
Test/Inspection  A00D0BY	**1. Check drive pulley.** a. Excessive slippage due to irregular outward actuation movement of drive pulley. *Carry out drive pulley inspection.* **2. Check drive belt identification number.** a. Improper belt angle. (wrong type of belt). *Replace belt with an appropriate drive belt.* **3. Check drive belt width.** a. Considerable use. *Replace belt if 3 mm (1/8 in) less than recommended width (see TECHNICAL DATA 10).*

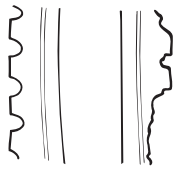
SYMPTOM	**BELT WORN NARROW IN ONE SECTION.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if parking brake is released.** a. Parking brake is engaged. *Release parking brake.*
	2. Check track tension/alignment. a. Frozen or too tight track. *Liberate track from ice or check track tension and alignment.*
 A00D0CY	**3. Check drive pulley.** a. Drive pulley not functioning properly. *Repair or replace drive pulley.*
	4. Check idle speed. a. Engine idle speed too high. *Adjust according to specifications.*
	5. Check drive belt length. a. Incorrect belt length. *Replace belt with an appropriate drive belt (refer to TECHNICAL DATA 10).*
	6. Check distance between pulleys. a. Incorrect pulley distance. *Readjust according to specifications.*
	7. Check belt deflection. a. Deflection is too small. *Adjust according to specifications.*

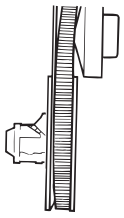
SYMPTOM	**BELT SIDES WORN CONCAVE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check pulley half surfaces.** a. Rough or scratched pulley half surfaces. *Repair or replace.*
 A00D0DY	**2. Check drive belt identification number.** a. Unspecified type of belt. *Replace belt with an appropriate drive belt (refer to TECHNICAL DATA 10).*

SYMPTOM	**BELT DISINTEGRATION.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive belt identification number.** a. Excessive belt speed. *Using unspecified type of belt. Replace belt with proper type of belt (refer to TECHNICAL DATA 10).*
 A00DOEY	**2. Check if pulley halves are clean.** a. Oil on pulley surfaces. *Clean pulley surfaces with fine emery cloth and wipe clean using a cleaning solvent and a cloth.*

SYMPTOM	**BELT EDGE CORD BREAKAGE.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0FY	**1. Check pulley alignment.** a. Pulley misalignment. *Align pulley according to specifications (refer to TECHNICAL DATA 10).*

SYMPTOM	**FLEX CRACKS BETWEEN COGS.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0GY	**1. Check drive belt condition.** a. Considerable use, belt wearing out. *Replace.*

SYMPTOM	**SHEARED COGS, COMPRESSION SECTION FRACTURED OR TORN.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0HY	**1. Check drive belt rotational direction.** a. Improper belt installation. *Replace.* **2. Check if drive belt rubs against components.** a. Belt rubbing on stationary object. *Relocate components.* **3. Check drive pulley.** a. Violent engagement of drive pulley. *Check drive pulley engagement speed, drive pulley bushings and components.*

SYMPTOM	**BELT FLIP-OVER AT HIGH SPEED.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0IY	**1. Check pulley alignment.** a. Pulley misalignment. *Align pulley according to specifications (refer to TECHNICAL DATA 10).* **2. Check drive belt identification number.** a. Using unspecified type of belt. *Replace belt with an appropriate drive belt.*

BRAKE SYSTEM

MECHANICAL BRAKE

SYMPTOM	BRAKE DOES NOT ADJUST AUTOMATICALLY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ratchet wheel spring.** a. Broken ratchet wheel tag. *Replace.*
	2. Check mobile pad stud. a. Stud rotates in pad. *Replace.*

SYMPTOM	BRAKE HANDLE DOES NOT RETURN COMPLETELY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check brake return spring.** a. Broken return spring. *Replace.*
	2. Check if brake cable moves freely in its housing. a. Brake cable movement is limited due to oxidation or dirt accumulation. *Replace.*
	3. Check distance between brake lever and caliper. a. Distance is too wide. *Adjust according to specifications (refer to TRANSMISSION 05).*

HYDRAULIC BRAKE

SYMPTOM	SPONGY BRAKE CONDITION.
CONDITION	NORMAL USE.
Test/Inspection	*Replace brake fluid and bleed system. If problem still occurs, replace master cylinder.*

SYMPTOM	BRAKE FLUID LEAKING.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check for loosen hose connectors.** *Replace copper washers and retighten.*
	2. Check for damaged hose, master cylinder and caliper. *Replace part(s) and check for proper mounting.*

MECHANICAL AND HYDRAULIC BRAKES

SYMPTOM	**BRAKE SYSTEM IS NOISY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check brake pad thickness.** a. Pads are worn up to wear warner. *Replace.*

ELECTRICAL SYSTEM

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**STARTER DOES NOT TURN.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuse.** a. Burnt fuse. *Check wiring condition and replace fuse.*
	2. Check continuity of starter switch contact points. a. Poor contact of starter switch contact points. *Repair or replace switch.*
	3. Check continuity between starter switch and solenoid. a. Open circuit between starter switch and solenoid switch. *Repair.*

SYMPTOM	STARTER TURNS; BUT DOES NOT CRANK THE ENGINE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check battery capacity.** a. Shorted battery cell(s). *Replace.*
	2. Check battery charge. a. Weak battery. *Recharge.*
	3. Check wire connection. a. Inadequate connection (too much resistance). *Clean and reconnect.*
	4. Check solenoid switch contact disc. a. Burnt or poor contact of solenoid switch contact disc. *Replace solenoid switch.*
	5. Check continuity of solenoid switch pull-in winding. a. Open circuit of solenoid switch pull-in winding. *Replace solenoid switch.*
	6. Check continuity of solenoid switch hold-in winding. a. Open circuit of solenoid switch hold-in winding. *Replace solenoid switch.*
	7. Check brushes. a. Poor contact of brushes. *Replace brushes.*
	8. Check commutator. a. Burnt commutator. *Turn commutator on a lathe. Respect outer diameter wear limit. Refer to ELECTRIC STARTER 06-05.*
	9. Check height of commutator mica. a. Commutator mica too high. *Undercut mica.*
	10. Check field coil resistance. a. Shorted field coil. *Repair or replace yoke.*
	11. Check armature resistance. a. Shorted armature. *Repair or replace armature.*
	12. Check tension of brush springs. a. Weak brush spring tension. *Replace springs.*
	13. Check yoke assembly magnets. a. Weak magnets. *Replace yoke assembly.*
	14. Check if bushings are worn. a. Worn bushings. *Replace bushings.*

SYMPTOM	**STARTER TURNS, BUT OVERRUNNING CLUTCH PINION DOES NOT MESH WITH RING GEAR.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check clutch pinion gear.** a. Worn clutch pinion gear. *Replace clutch.*
	2. Check clutch. a. Defective clutch. *Replace clutch.*
	3. Check movement of clutch on splines. a. Poor movement of clutch on splines. *Clean and correct.*
	4. Check clutch bushing. a. Worn clutch bushing. *Replace clutch.*
	5. Check starter bushings. a. Worn starter bushing(s). *Replace bushing(s).*
	6. Check ring gear. a. Worn ring gear. *Replace ring gear.*

SYMPTOM	**ELECTRIC STARTER KEEPS TURNING WHEN ENGINE IS STARTED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check clutch.** a. Jammed clutch pinion gear. *Replace or clean.*
	2. Check movement of clutch on splines. a. Clutch is stuck on splines. *Clean.*
	3. Check ignition switch. a. Ignition switch does not return to its ON position or is short-circuited. *Adjust retaining screw or replace switch.*
	4. Check solenoid. a. Shorted solenoid switch winding(s). *Replace solenoid switch.*
	5. Check solenoid switch contacts. a. Melted solenoid switch contacts. *Replace solenoid switch.*
	6. Check starter switch. a. Starter switch returns poorly. *Replace ignition switch.*

SYMPTOM	NOISE OCCURENCE WHEN STARTING ENGINE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if ring gear is well-mounted to drive pulley inner half.** a. Loose and/or broken bolts. *Retighten bolts using thread locker or replace ring gear and drive pulley inner half.*

SYMPTOM	ELECTRIC STARTER SOMETIMES DOES NOT WORK WHEN TURNING IGNITION SWITCH.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check battery cables and starter wires.** a. Corroded and/or loose connection(s). *Clean and/or retighten.*
	2. Check fuse. a. Oxidized fuse. *Clean.*
	3. Check wiring harness connections. a. Oxidized connections. *Clean or replace defective terminals.*
	4. Check ignition switch. a. Defective contacts in ignition switch. *Replace.*
	5. Check solenoid of electric starter. a. Shorted solenoid wiring harness or eroded contact washer. *Replace.*

SYMPTOM	HEADLAMP NOT LIGHTING.
CONDITION	WHITE BULB.
Test/Inspection	**1. Check bulb.** a. Gas leak. *Replace bulb.*
CONDITION	BROKEN ELEMENT.
Test/Inspection	**1. Check for loose headlamp housing and bulb socket.** a. Vibration problem. *Tighten headlamp mounting screws. Lock bulb in socket. Replace bulb.*
CONDITION	MELTED FILAMENT (ENDS OF ELEMENT HOLDER) AND BLACK BULB.
Test/Inspection	**1. Check voltage at headlamp at different speeds. It must not be above 15 Vac.** NOTE: If quartz halogen bulb is involved, ensure that proper voltage regulator is installed. a. Excessive voltage in lighting circuit. *Replace voltage regulator and ensure proper grounding. Retest.*

SYMPTOM	**HEADLAMP DIMING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check voltage at headlamp at different speeds. It must not be below 11 Vac.** a. Insufficient voltage in lighting circuit. *Replace voltage regulator and retest.*
	2. Visually inspect wiring harness for damaged and/or melted wires and/or bad wire terminal crimping and/or connections. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. *Repair/replace damaged wires and/or terminals. Reroute harness where necessary.*
	3. On manual start models: Verify regulator ground. a. Rusted or loose retaining screws. *Clean, apply lithium grease (LMZ1) and firmly tighten screws.*
	4. Verify if there is an interconnection between AC and DC current. a. Faulty installation of optional equipment. *Find optional equipment connected directly to DC ground (BK wire or chassis) or to any DC hot wire (RD, RD/BL). Disconnect and reconnect to AC current (YL and YL/BK wires).*
	5. Verify if optional electric accessories are overloading the magneto/generator. a. Excessive electrical load to magneto/generator. *Reduce the electrical load by removing excess accessories. Reconnect as recommended by manufacturer.*
	6. Hot Grips brand: Verify if they were connected in parallel by mistake. a. Excessive electrical load to magneto/generator. *Reconnect as recommended by manufacturer.*
	7. Bombardier heating grips: Verify if the return wires of the elements were grounded to the chassis by mistake. a. Faulty installation of optional equipment. *Reconnect as recommended by manufacturer.*
	8. Verify if heating grips installation overloads the magneto/generator capacity. a. Excessive electrical load to magneto/generator. *Reduce the electrical load by removing accessories.*

SYMPTOM	**FALSE FUEL AND/OR TEMPERATURE GAUGE READINGS.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Verify if gauge was connected on DC current by mistake (in case of optional installation).** a. Faulty installation of optional equipment. *Find optional wires connected directly to DC ground (BK wire to chassis) or to any DC hot wire (RD, RD/BL). Disconnect and reconnect to AC current (YL and YL/BK wires).*
	2. Verify sender unit for free movement and/or correct arm position. a. Defective or damaged part. *Correct or replace sender unit.*
	3. Verify sender unit/gauge wiring harness condition. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. *Replace or repair damaged wires. Reroute where necessary.*

SYMPTOM	**ENGINES DOES NOT START — NO SPARK AT SPARK PLUG.**
CONDITION	AT ENGINE CRANKING.
Test/Inspection	**1. Verify spark plug condition.** a. Defective, improperly set, worn-out, fouled. *Identify source of problem and correct. Replace spark plugs.*
	2. Verify spark plug cap resistance with an ohmmeter. a. Defective part. *Replace cap.*
	3. Verify if problem originated from electrical system wiring harness and/or accessories and/or ignition cut-out switches by unplugging the 4-wire connectors between the magneto/generator and the vehicle wiring harness. Check condition of connectors. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. Defective switch(es). Corroded connector terminals. *Replace or repair damaged wires. Reroute where necessary. Replace defective switch(es). Clean terminals and apply silicone dielectric grease.*
	4. Verify trigger coil resistance with an ohmmeter and connector condition. a. Defective coil. Corroded connector terminals. *Replace defective coil. Clean terminals and apply silicone dielectric grease.*
	5. Verify condition of ignition coil. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace ignition coil.*
	6. Verify condition of ignition generator coils. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace coils.*
	7. Verify CDI (Capacitor Discharge Ignition) module. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace CDI module, retest and verify ignition timing.*

SYMPTOM	**ENGINE STALLS.**
CONDITION	AT LOW SPEED.
Test/Inspection	**1. Verify items 4, 5 and 6 above.**

SYMPTOM	**IRREGULAR ENGINE SPEED.**
CONDITION	AT HIGH SPEED.
Test/Inspection	**1. Verify items 4, 5 and 6 above.**
CONDITION	AT LOW SPEED.
Test/Inspection	**1. Verify items 4 and 5 above and trigger coil/flywheel protrusion air gap.** a. Air gap too large. *Readjust air gap.*

SYMPTOM	**ENGINE IS MISFIRING — ERRATIC SPARK AT SPARK PLUG.**
CONDITION	RIDING ON WET SNOW.
Test/Inspection	**1. Verify if spark plug wires and/or spark plug cap seals are sealing out moisture.** a. Defective wires and/or seals. *Replace defective part.*
	2. Verify if ignition system wiring harness connectors are in good condition and/or are sealing out moisture. a. Loose connectors, corroded terminals or defective parts. *Clean terminals and apply silicone dielectric grease. Replace defective parts.*
CONDITION	NORMAL USE.
Test/Inspection	**1. Verify misfiring by observing flash of stroboscopic timing light; unplug connectors between magneto/generator and vehicle wiring harness to isolate problem. Check condition of connectors.** a. Defective spark plug(s) and/or cable(s)/cap(s). Defective electrical system wiring harness and/or accessories and/ignition cut-out switches. Condition of connector terminals. *Replace defective parts and/or repair damaged wires. Replace defective switch(es). Clean terminals and apply silicone dielectric grease.*
CONDITION	RIDING IN DEEP AND THICK SNOW.
Test/Inspection	**1. Perform all verifications outlined under ENGINE DOES NOT START — NO SPARK AT SPARK PLUG.**
	2. Verify spark plugs. Proceed with spark plug analysis in order to identify source of problem. a. Defective and/or worn spark plug(s) and/or cable(s) and/or cap(s). *Replace defective part(s). Proceed with ignition system testing procedures. Perform engine analysis.*

SYMPTOM	**FOULED (BLACK) SPARK PLUG TIP.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check carburetor(s).** a. Carburetion is too rich. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Check injection oil consumption. a. Injection pump flow is too high. *Adjust according to specifications or replace.*
	3. Check oil quality. a. Poor oil quality that creates deposits. *Use BOMBARDIER-ROTAX injection oil.*
	4. Check engine compression. a. Leaking piston ring(s). *Replace.*

SYMPTOM	**SPARK PLUG TIP(S) IS (ARE) LIGHT GREY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Refer to ENGINE SLOWS DOWN OR STOPS AT HIGH RPM and check items listed.**
	2. Check spark plug heat range. a. Spark plug heat range is too high. *Replace by Bombardier's recommended spark plug (refer to TECHNICAL DATA 10).*
	3. Check if air intake silencer leaks. a. Air surplus coming from opening(s) located between halves. *Seal.*
	4. Check carburetor adapter collars. a. Loose collar(s). *Tighten.*
	5. Check carburetor adapter(s). a. Cracked or deformed adapter(s). *Replace.*

SYMPTOM	**BRAKE LIGHT REMAINS ON.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if bulb is properly installed.** a. Bulb is not installed correctly (contact elements are reversed). *Install bulb correctly.*
	2. Check brake switch. a. Switch contact remains closed. *Adjust brake cable or brake switch.*

SYMPTOM	**REAR LIGHT BULB FLASHES.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check bulb tightness in housing.** a. Looseness at bulb contact elements. *Install bulb correctly.*
	2. Check if rear light is properly connected. a. Connector housing is partially connected. *Install connector housing properly.*
	3. Check continuity of wires. a. Corroded terminals and/or broken wires. *Replace terminal(s) or crimp defective wires.*

SYMPTOM	**TACHOMETER DOES NOT WORK.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check continuity of wires.** a. Corroded terminals and/or broken wires. *Replace terminal(s) or crimp defective wires.*

SYMPTOM	**HIGH BEAM PILOT LAMP LIGHTS UP WHEN LOW BEAM IS SELECTED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check proper connections.** a. YELLOW wire connected to pilot lamp. Mixed-up connections with heating element pilot lamps. *Reconnect a YELLOW/BLACK wire to pilot lamp. YELLOW wires are connected to heating element pilot lamps.*

SUSPENSION AND TRACK

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**REAR SUSPENSION BOTTOMS OUT.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check rear spring preload or rear arm spring preload.** a. Spring tension is too low. *Increase rear arm spring preload.*

SYMPTOM	**SLIDER SHOES WEAR OUT PREMATURELY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Pressure is too great on slider shoes. *Adjust according to specifications (refer to TECHNICAL DATA 10). Replace defective parts.*

SYMPTOM	**TRACK CLEATS BECOME BLUE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Pressure is too great on cleats. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Check slider shoes and/or suspension retaining screws. a. Worn slider shoes or lost retaining screws. *Replace defective parts and/or tighten loose screws.*

SYMPTOM	**NOISE OR VIBRATIONS ORIGINATING FROM THE TRACK.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check slide suspension retaining bolts.** a. Missing bolt(s) allowing movement of certain components which in turn interfere with track rotation. *Replace missing bolt(s).*
	2. Check condition of idler wheel(s). a. Idler wheel rubber is damaged. *Replace.*
	3. Check guide cleats. a. Top portion of guide cleat(s) is bent. *Replace.*
	4. Check sprockets. a. One or various teeth of drive shaft sprockets are broken. *Replace sprocket(s).*
	5. Check track rods and/or internal traction teeth. a. One or various track rods and/or teeth are broken. *Replace track.*

SYMPTOM	DERAILING TRACK.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Track is too loose. *Adjust.*
	2. Check if track and slider shoes are properly aligned. a. Improper alignment. *Adjust.*

SYMPTOM	REAR SUSPENSION IS LOW OR TOO STIFF.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Track is too tight. *Adjust.*
	2. Check if axles are properly lubricated. a. Improper lubrication and/or contaminated grease (sticky oil sludge). *Clean and/or lubricate.*
	3. Check rear spring preload. a. Insufficient preload. *Increase preload using adjustment cams.*

SYMPTOM	WHEN HANDLEBAR IS TURNED, SNOWMOBILE UNDERSTEERS.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ski runner condition.** a. Worn ski runners. *Replace.*
	2. Check tension of front spring adjustment cams. a. Insufficient ski pressure on the ground. *Increase spring preload.*
	3. Check if front arm stopper strap is too long. a. Insufficient ski pressure on the ground. *Shorten stopper strap.*
	4. Check front arm spring tension. a. Insufficient ski pressure on the ground. *Loosen spring tension.*

SYMPTOM	**HANDLEBAR IS DIFFICULT TO TURN.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check position of front spring adjustment cams.** a. More pressure on the ground when cam increases spring preload. *Reduce front spring preload.*
	2. Check position of stopper strap. a. More weight when stopper strap is short. *Lengthen front arm stopper strap.*
	3. Check position of front arm shock adjustment cam(s). a. When spring tension is weak, more weight is transferred to the skis. *Increase spring preload.*
	4. Check condition of ball joints. a. Corrosion restrains movement. *Lubricate or replace.*
	5. Check swing arm camber (liquid cooled models). a. Too much ski leg inclination. *Adjust camber to 0° ± .5°.*

SYMPTOM	**THE SNOWMOBILE IS UNSTABLE (IT MOVES FROM LEFT TO RIGHT AND VICE VERSA).**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ski runner condition.** a. Worn or bent ski runners. *Replace ski runners.*
	2. Check ski alignment. a. Improper ski alignment. *Align skis in order to obtain proper toe-out (opening) (to adjust, refer to STEERING SYSTEM 08).*
	3. Check if bushings are too loose in steering system. a. Bushings are too loose. *Replace.*

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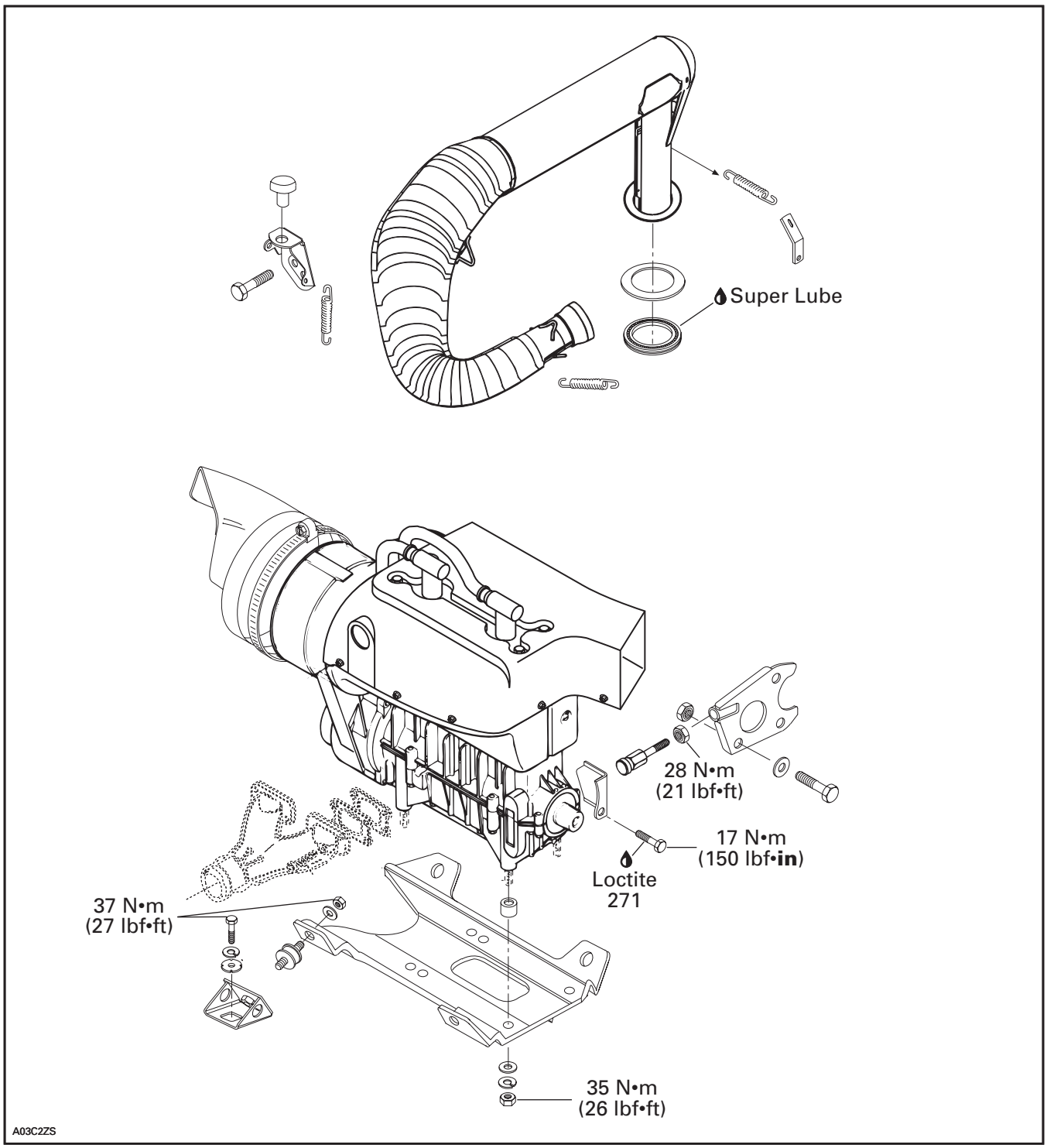
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443 AND 503 ENGINE TYPES

ENGINE REMOVAL AND INSTALLATION

443 Engine Type



PARTS

ENGINE REMOVAL AND INSTALLATION

Disconnect or remove the following:

◆ WARNING

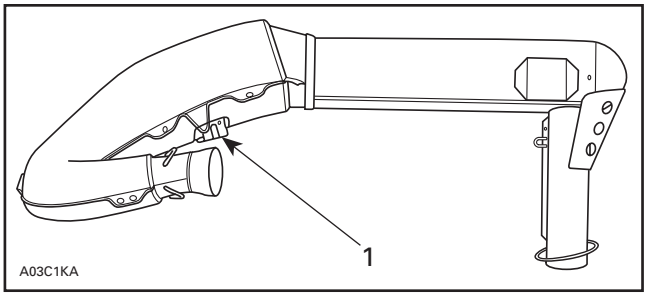
Before disconnecting any electrical wire in starter system always first disconnect the BLACK negative battery cable (on electric starting models).

- negative cable from battery (on electric starting models)
- belt guard
- drive belt
- drive pulley using appropriate puller, refer to 05-03 DRIVE PULLEY
- air silencer and carburetors
- impulse line from engine crankcase
- 4-connector housing
- exhaust pipe and exhaust cooling hose on so equipped models
- oil pump inlet tube and plug it
- oil pump cable
- rewind cable: tie a knot near rewind housing and remove starting grip

TUNED PIPE IDENTIFICATION

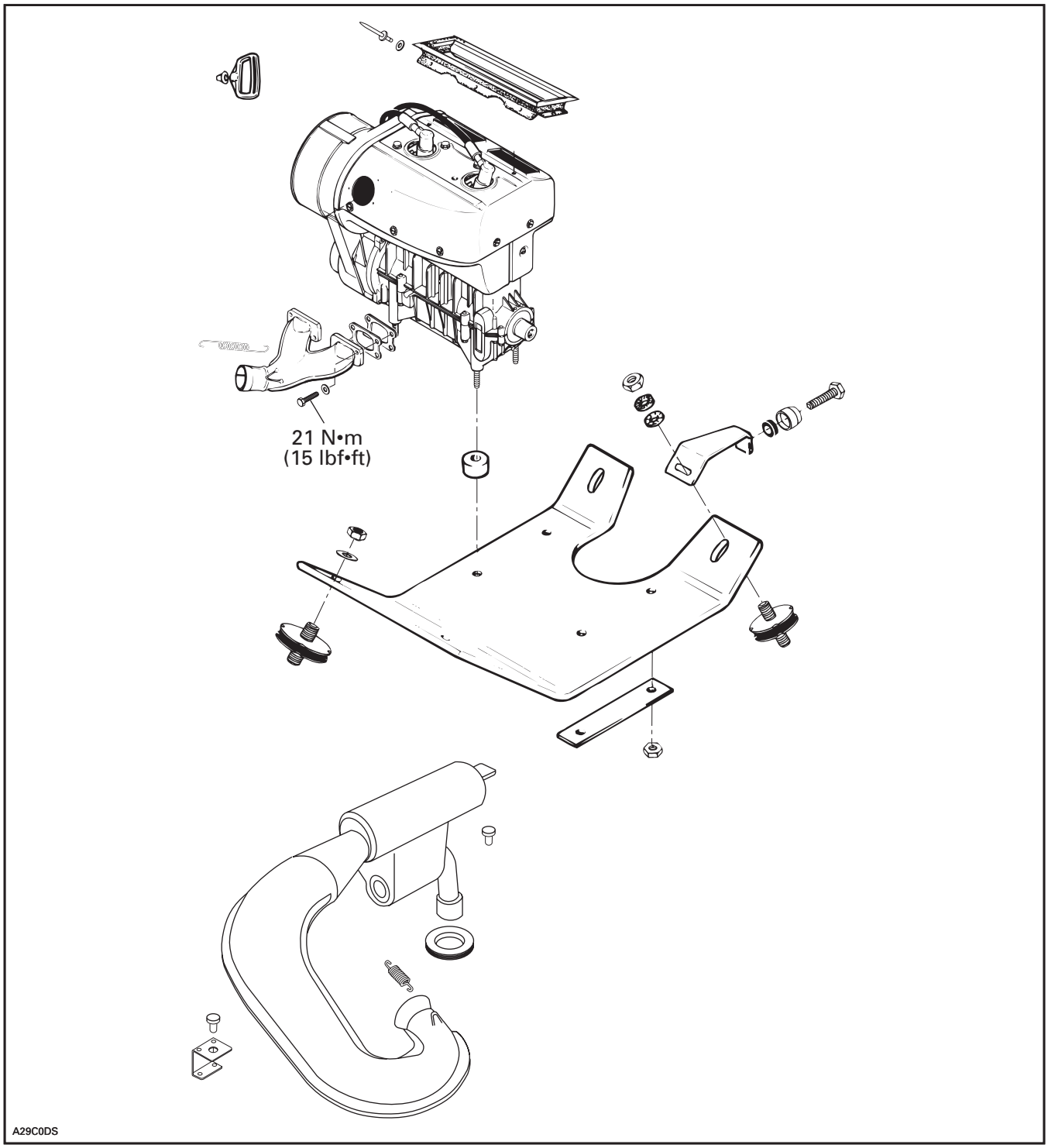
This part is identified on welded support.

Second number sequence of P/N is stamped on part.



1. Identification: 0464 for 514 046 400

Skandic WT/SWT 503 Engine Type



ENGINE REMOVAL AND INSTALLATION

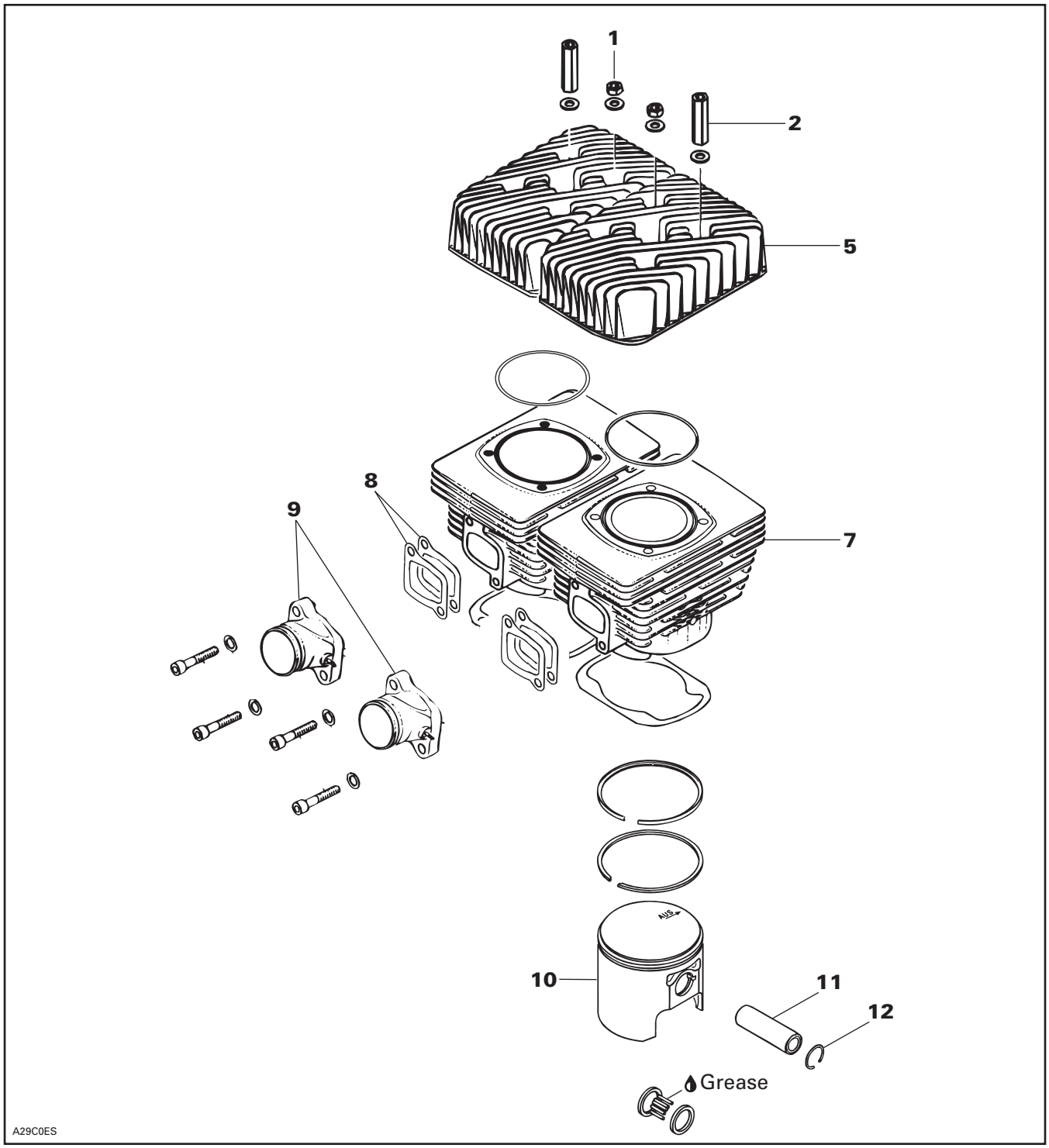
Disconnect or remove the following:

◆ WARNING

Before disconnecting any electrical wire in starter system always first disconnect the BLACK negative battery cable (on electric starting models).

- negative cable from battery
- positive cable and wire from starter then from engine
- belt guard
- drive belt
- drive pulley using appropriate puller, refer to 05-03 DRIVE PULLEY
- air silencer and carburetor
- impulse line from engine crankcase
- electrical connector housings
- exhaust pipe
- oil pump inlet tube and plug it
- oil pump cable
- rewind cable: tie a knot near rewind housing and remove starting grip

TOP END



NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

Discard all gaskets. Use Gasket Remover (P/N 413 708 500) to clean mating surfaces.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

NOTE: The letters AUS and arrow on the piston dome must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

DISASSEMBLY

Remove top fan cowl, intake sockets and lower fan cowl.

Remove cylinder heads.

On these engines, piston pin needle bearing is mounted without a cage.

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase to prevent circlips no. 12 from falling into crankcase. Then with a pointed tool inserted in piston notch, remove both circlips from piston no. 10.

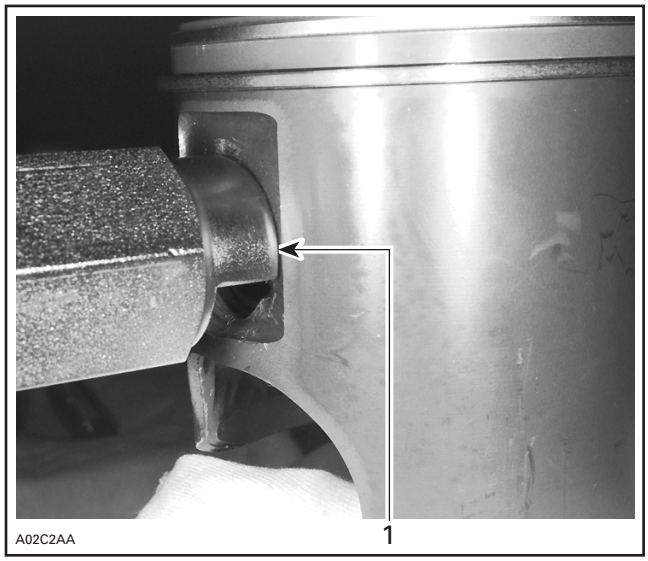


TYPICAL

Use piston pin puller (P/N 529 035 503) along with 18 mm sleeve kit (P/N 529 035 541) and locating sleeve (P/N 529 023 800).

NOTE: The locating sleeve is the same that contains new cageless bearing.

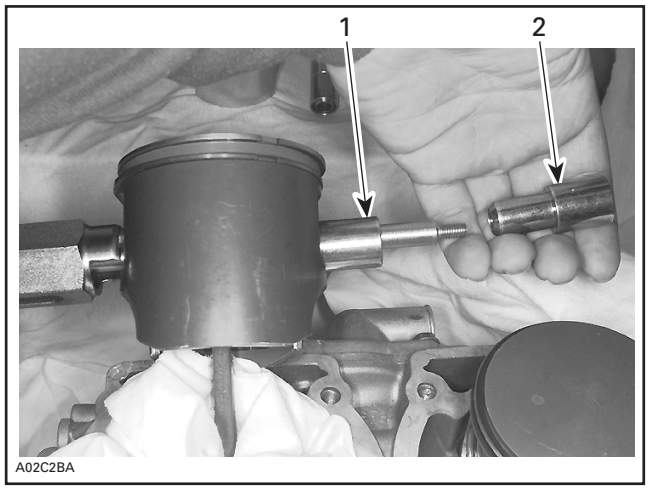
Insert piston pin puller (P/N 529 035 503) making sure it sits squarely against piston.



TYPICAL

1. Properly seated all around

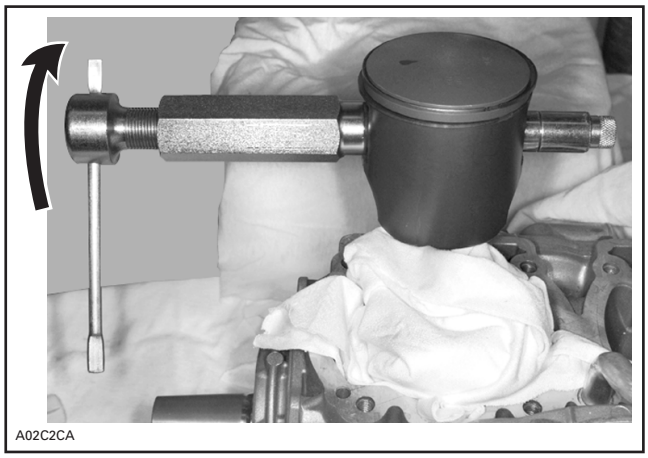
Install sleeve then shouldered sleeve over puller rod.



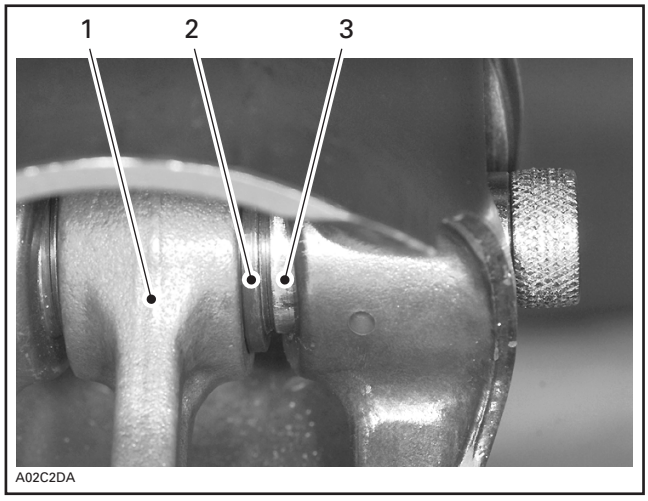
TYPICAL — INSTALLATION OF SLEEVE KIT

1. Sleeve
2. Shouldered sleeve

Pull out piston pin **no. 11** by unscrewing puller until shouldered sleeve end is flush with thrust washer of piston pin bearing.



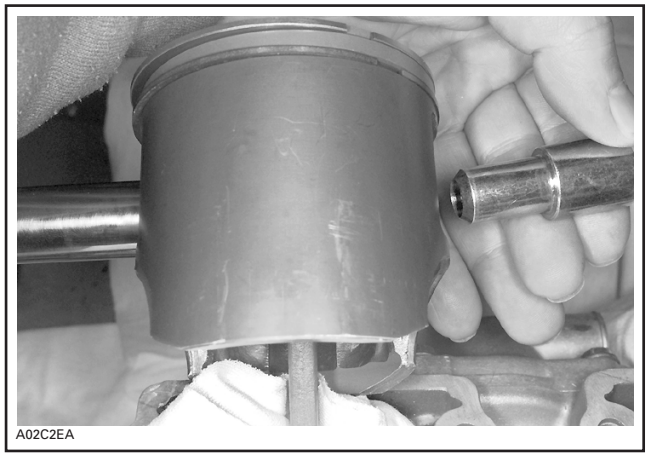
TYPICAL — PISTON PIN EXTRACTION



TYPICAL

1. *Sleeve inside bearing*
2. *Thrust washer*
3. *Shouldered sleeve end*

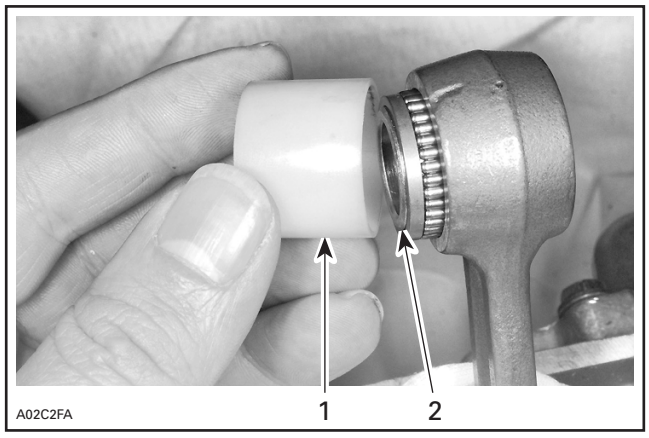
Remove puller. Pull out shouldered sleeve carefully.



TYPICAL

Remove piston from connecting rod.

Install locating sleeve. Then push needle bearings along with thrust washers and sleeve.



TYPICAL

1. *Locating sleeve*
2. *Sleeve*

Use a locking tie to fasten all needles and thrust washers along with sleeves.

NOTE: The PTO cylinder or fan housing have to be removed to give access to MAG piston pin with the puller.

NOTE: 0.25 and 0.5 mm oversize piston and rings are available if necessary.

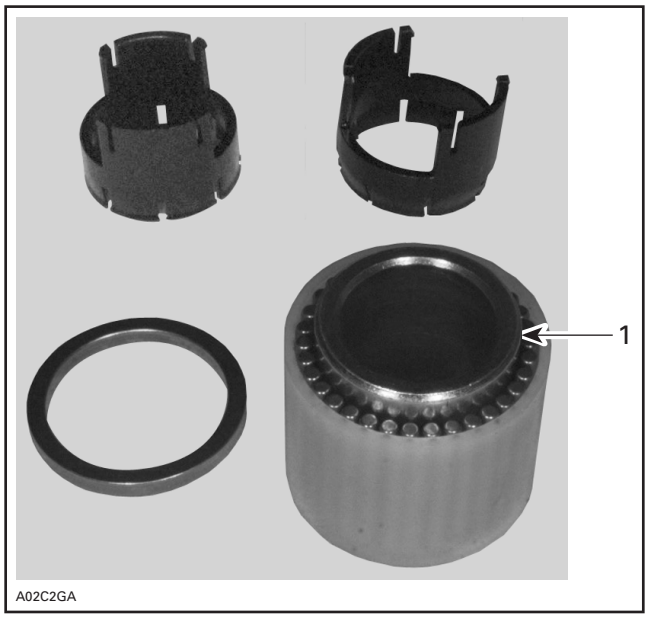
INSPECTION

Refer to ENGINE DIMENSIONS MEASUREMENT 04-04.

ASSEMBLY

When reinstalling original needle bearings, make sure that 31 needles are inserted between sleeve and locating sleeve.

When installing a new cageless bearing, replace half plastic cages by sleeve.



TYPICAL
1. Sleeve

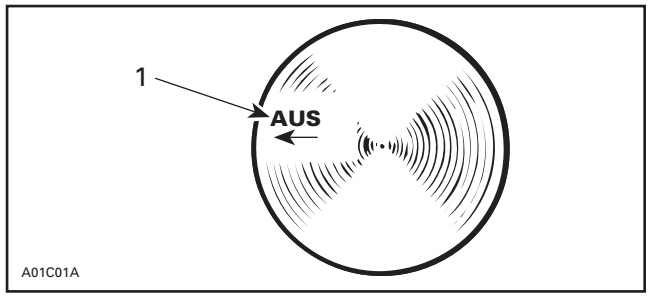
Grease thrust washers and install them on each end of needles.

Insert cageless bearing into connecting rod.



TYPICAL — CAGELESS BEARING AND SLEEVE INSTALLED

Mount piston over connecting rod with the letters **"AUS"** (over an arrow on the piston dome) facing in the direction of exhaust port.



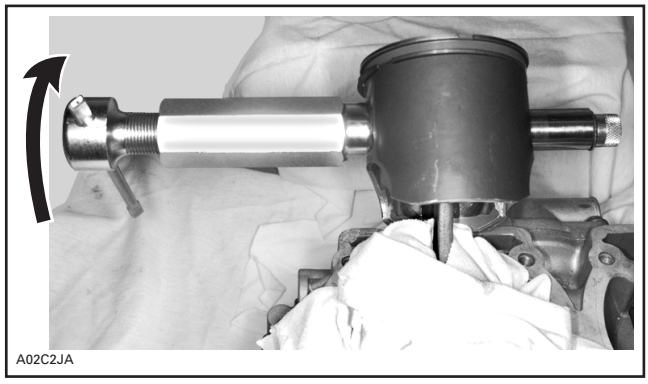
1. Exhaust

Install shouldered sleeve.



TYPICAL — SHOULDERED SLEEVE INSTALLATION

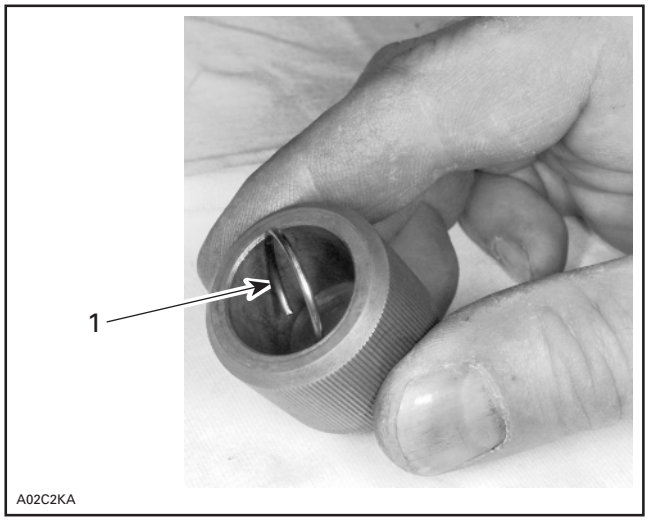
Install piston pin puller and turn handle until piston pin is correctly positioned in piston.



TYPICAL

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 035 561).

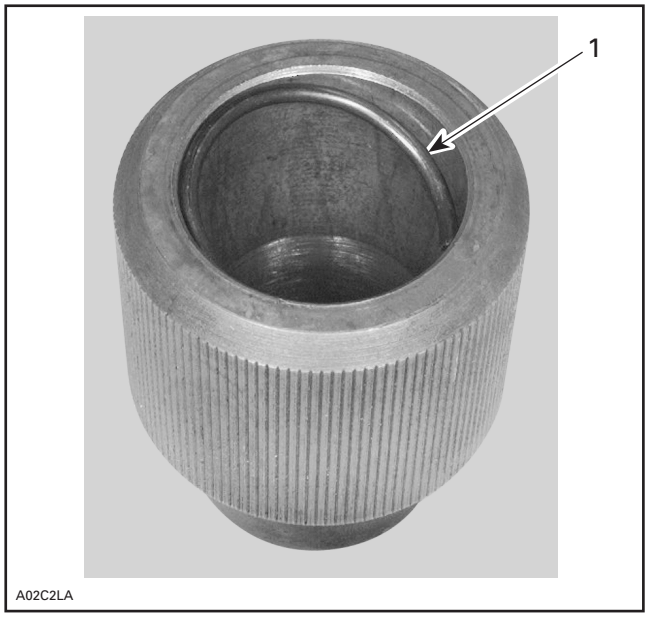
Insert circlip in tool at an angle.



TYPICAL

1. Circlip

Square it up using a finger.



TYPICAL

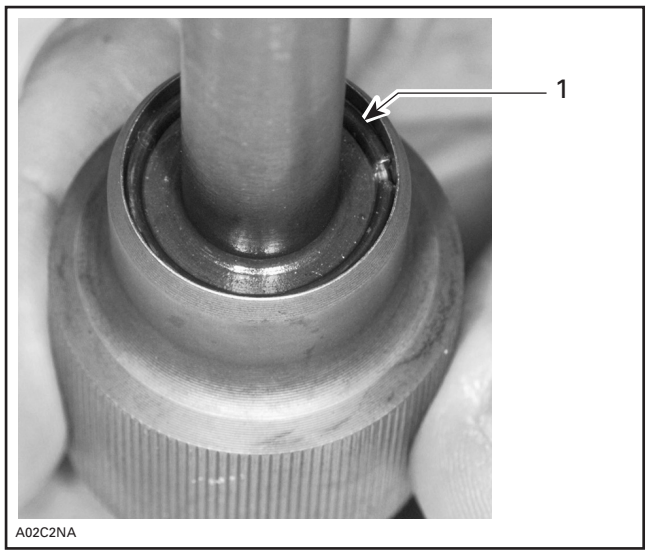
1. Circlip

Continue to square it up using round end of circlip installer.



TYPICAL

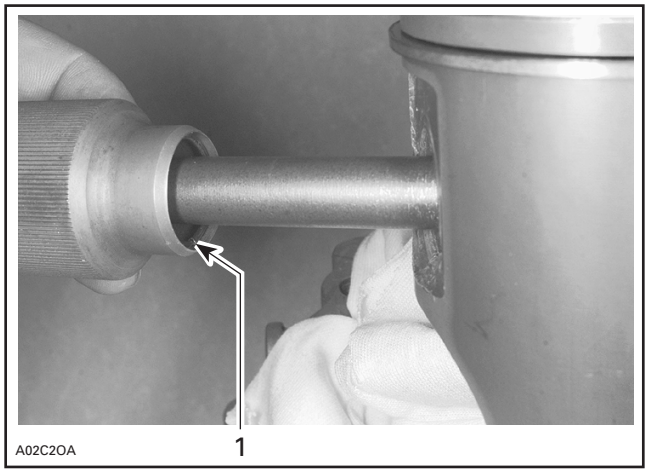
Using square end of tool, push circlip in until it rests in groove.



TYPICAL

1. Circlip in groove

Mount tool in piston making sure that circlip break is facing down.

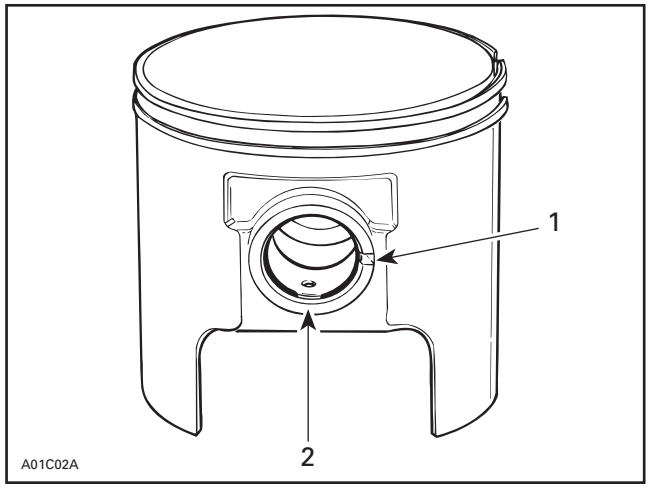


TYPICAL
1. Circlip break facing down

Hold tool firmly against piston then strike on round end of tool. Circlip will move from tool groove to piston groove.



TYPICAL



1. Piston notch
2. Circlip break at 6 o'clock

▼ CAUTION

Circlips must not move freely in the groove after installation. If so, replace them.

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.

Before inserting piston in cylinder **no. 7**, lubricate the cylinder with new injection oil or equivalent.

Install proper ring compressor on piston assembly.

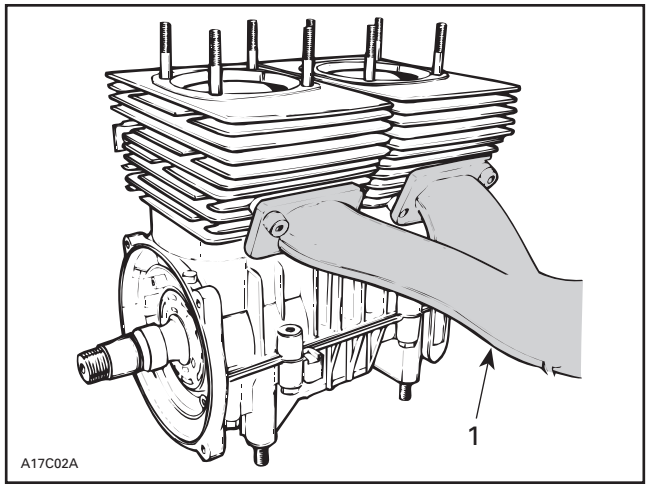
ENGINE TYPE	RING COMPRESSOR P/N
443	420 876 090
503	420 876 970

NOTE: The ring compressor will not fit on oversize pistons.

Check flatness of intake sockets **no. 9**. Refer to ENGINE DIMENSION MEASUREMENT 04-04 and look for **Checking Surface Flatness**.

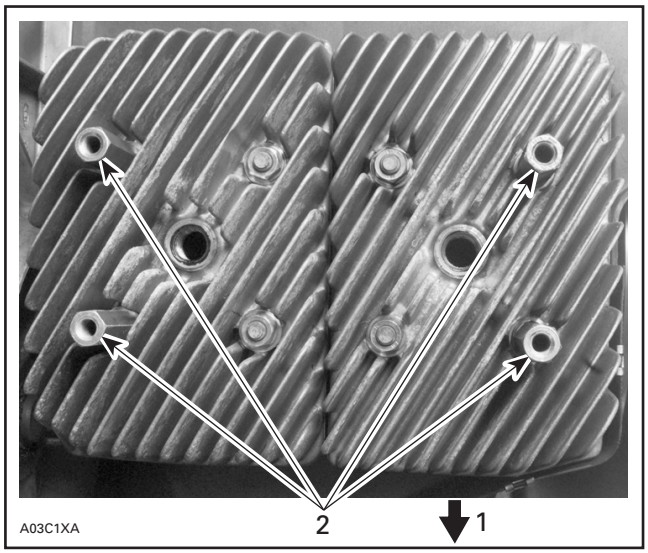
At cylinder **no. 7** and/or cylinder head **no. 5** installation, use aligning tool or exhaust manifold itself to ensure sealing of intake manifold and exhaust before tightening cylinder head nuts.

ENGINE TYPE	ALIGNING TOOL P/N
443 and 503	420 876 171



1. Or use exhaust manifold to align cylinders

Position distance nuts **no. 2** as illustrated.



1. Exhaust side
2. Distance nuts

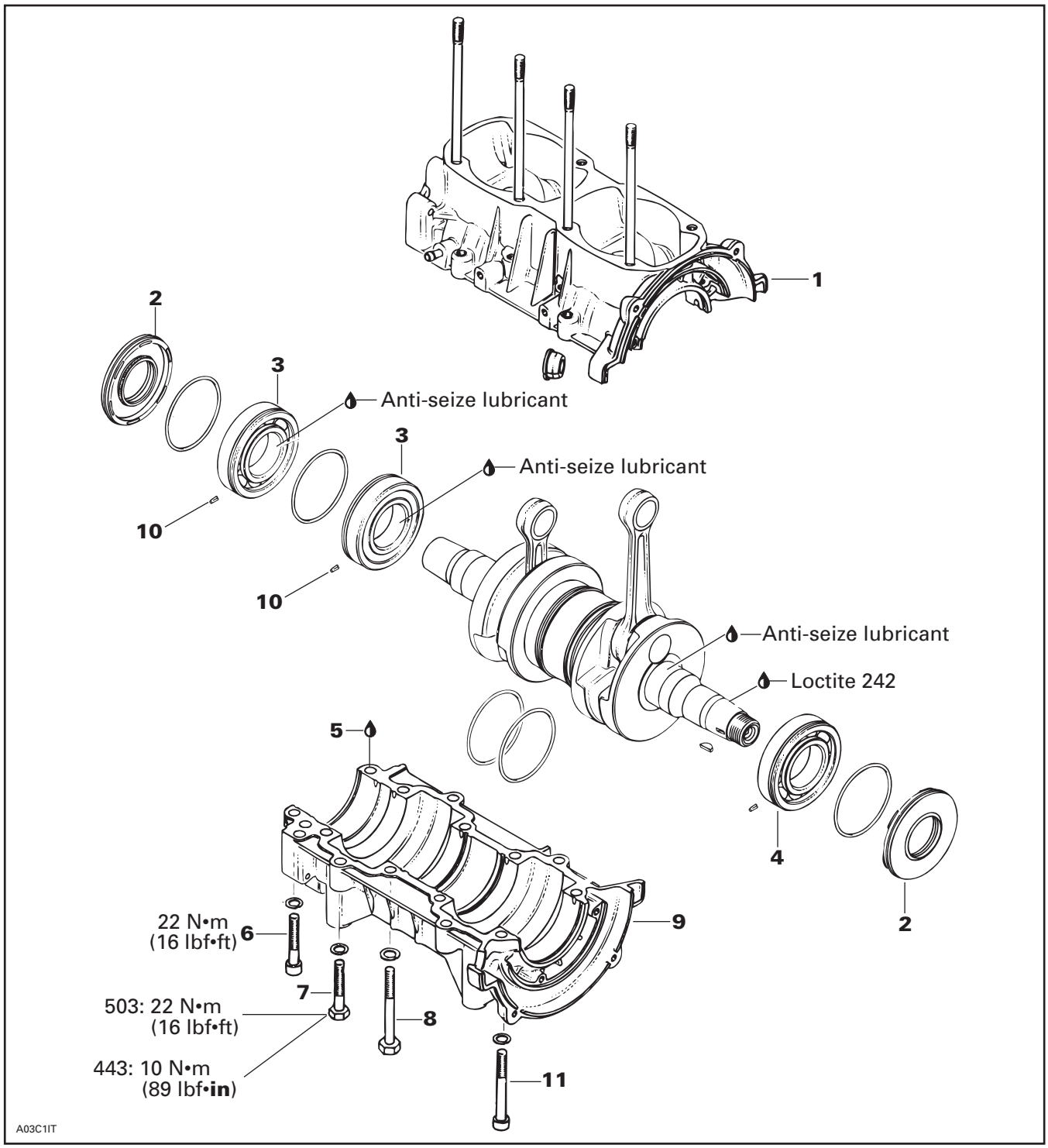
Cross torque cylinder head nuts **nos. 1** and **2** to 22 N•m (16 lbf•ft); torque each cylinder head individually.

Install armature plate, fan housing and then air deflector.

Install a gasket on each side of the air deflector.

Torque intake socket bolts to 22 N•m (16 lbf•ft).

BOTTOM END


1
2
3
Anti-seize lubricant
3
Anti-seize lubricant
10
10
Anti-seize lubricant
Loctite 242
5
4
2
22 N•m
(16 lbf•ft)
6
9
7
503: 22 N•m
(16 lbf•ft)
8
443: 10 N•m
(89 lbf•in)
11
A03C1IT

NOTE: Engine must be removed from chassis to perform the following procedures.

Remove engine from chassis.

Remove fan guard, rewind starter, starting pulley, trigger coil wire from 4-connector housing, magneto flywheel then fan housing.

Remove stator plate.

CLEANING

Discard all seals, gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner. Use gasket remover (P/N 413 708 500) accordingly.

Remove all trace of Loctite 242 from crankshaft taper.

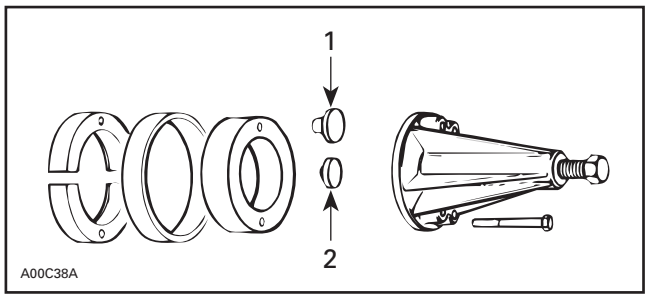
Remove old sealant from crankcase mating surfaces with Bombardier gasket remover (P/N 413 708 500).

▼ CAUTION

Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

DISASSEMBLY

To remove bearings **nos. 3** and **4** from crankshaft, use a protective cap and a special puller, as illustrated.



1. PTO side
2. MAG side

INSPECTION

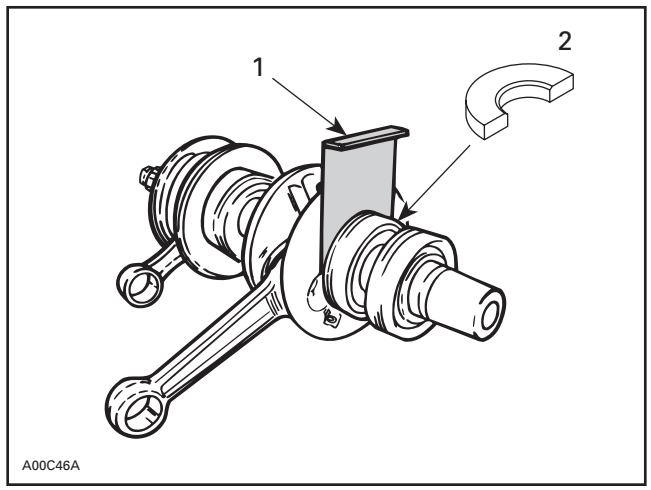
Refer to ENGINE DIMENSIONS MEASUREMENT 04-04.

ASSEMBLY

Smear anti-seize lubricant (P/N 413 701 000) on part of crankshaft where bearing fits.

To check proper clearance between bearing **no. 3** and counterweight, use feeler gauge (P/N 420 876 620).

Mount second bearing with distance gauge (P/N 420 876 822) for 443 engine and (P/N 420 876 824) for 503 engine for proper positioning.



1. Feeler gauge
2. Distance gauge

Prior to installation, place bearings into an oil container filled with BOMBARDIER-ROTAX injection oil heated to 75°C (167°F).

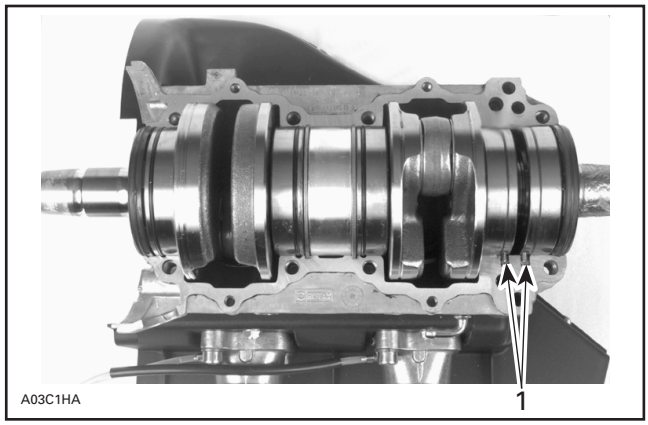
▼ CAUTION

Do not exceed 75°C (167°F).

This will expand bearings and ease installation. Install bearings with groove as per exploded view.

Bearings are pressed on crankshaft until they rest against radius. These radius maintain the gap needed for bearings lubrication.

When installing crankshaft, position drive pins **no. 10** as illustrated.



1. Drive pins

At seal **no. 2** assembly, apply a light coat of Molykote 111 (P/N 413 707 000) on seal lip.

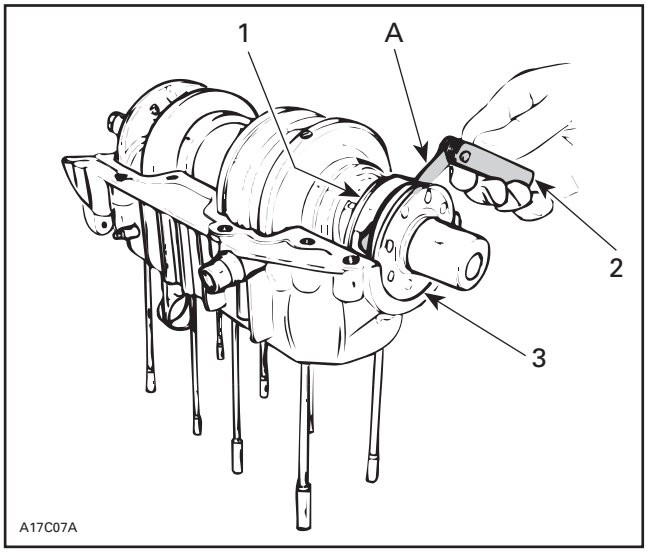
PTO side seal must be filled up with Molykote 111.

▼ CAUTION

Do not overfill seal with Molykote 111. The lubrication hole in crankcase must not be obstructed by Molykote 111.

For bearing lubrication purpose, a gap of 1.0 mm (.040 in) must be maintained between seals and bearings.

When installing plain oil seals (seal without locating ring or without spacing legs), ensure to maintain 1.0 mm (.040 in) gap.



1. Bearing
2. Feeler gauge
3. Plain oil seal
A. 1 mm (.040 in)

Crankcase halves **nos. 1** and **9** are factory matched and therefore, are not interchangeable as single halves.

Prior to joining of crankcase halves, spray some new injection oil (or equivalent) in bearings and on all moving parts of the crankshaft.

Spray Primer N (P/N 413 708 100) on one of mating surfaces. Let it dry for 10 to 20 minutes.

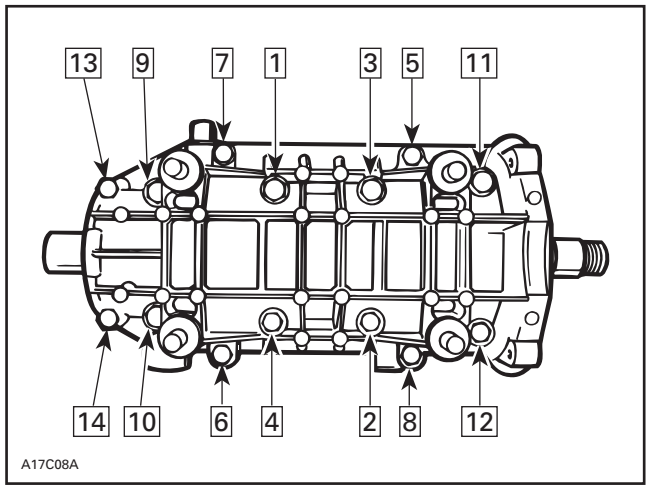
Apply paste gasket (P/N 413 702 700) **no. 5** on the other mating surface.

NOTE: Primer N allows Loctite 515 to fully cure on aluminum surfaces. It increases filling capacity and reduces curing time.

Position the crankcase halves together and tighten bolts by hand then install and tighten armature plate on magneto side to correctly align the crankcase halves.

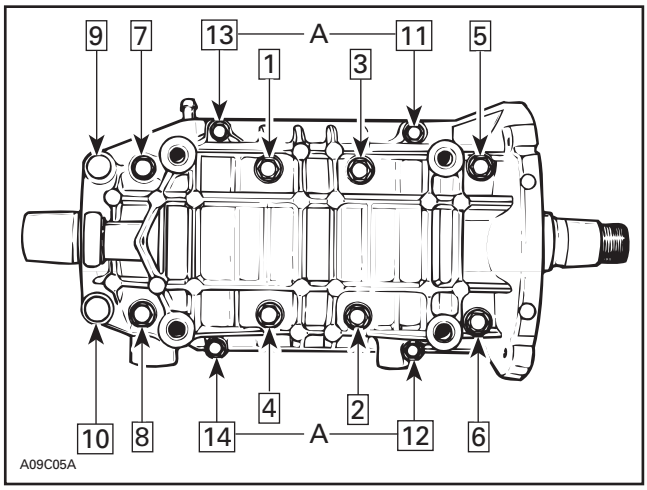
503 Engine

Torque screws **nos. 6, 7, 8** and **11** to 22 N•m (16 lbf•ft) following illustrated sequence.



443 Engine

Torque screws to proper torque in the following sequence.



*A. 10 N•m (89 lbf•**in**). All the other screws are torqued to 21 N•m (15 lbf•ft)*

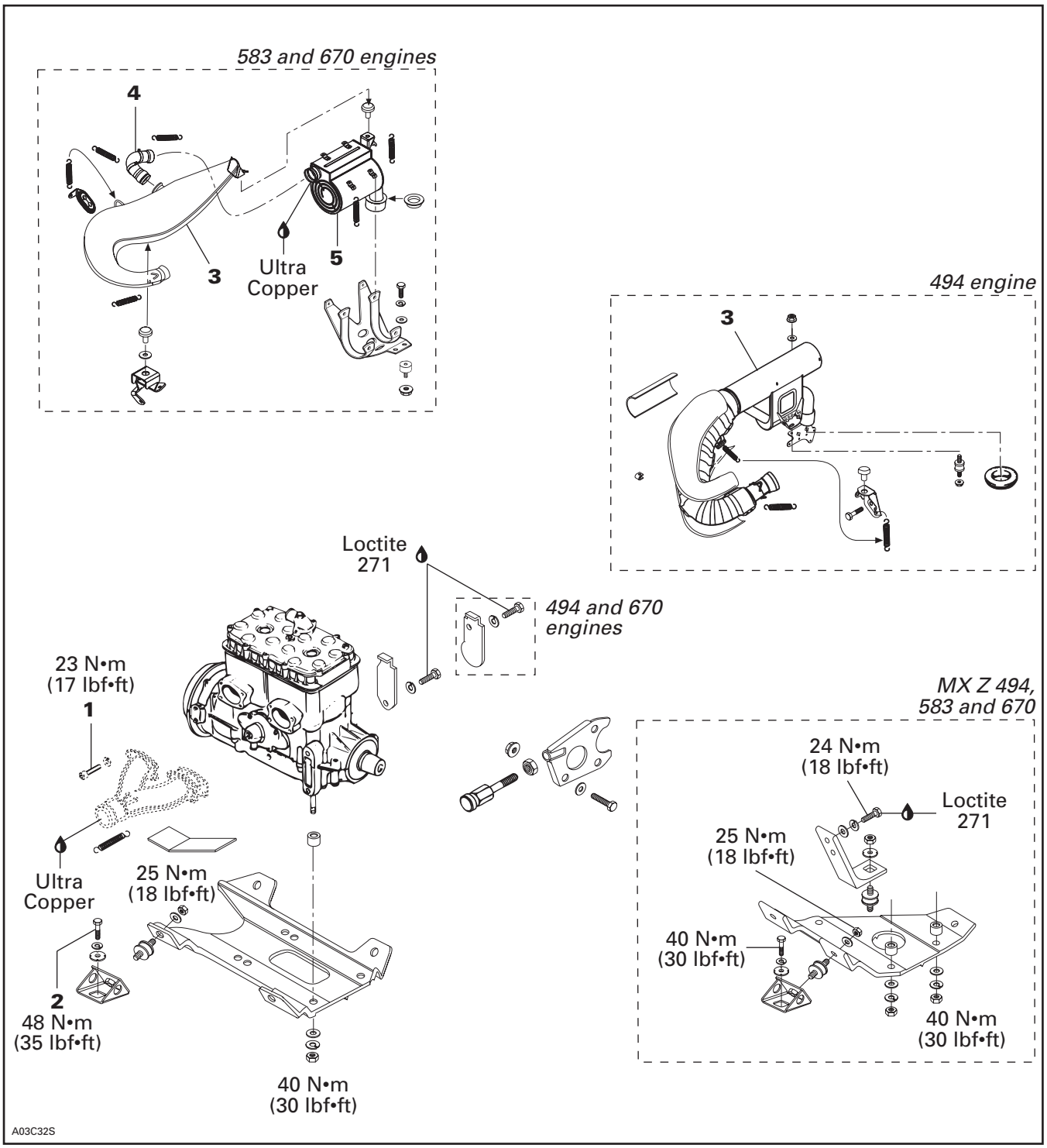
All Engines

To install magneto, refer to CDI MAGNETO 04-05.

494, 583 AND 670 ENGINE TYPES

ENGINE SUPPORT AND MUFFLER

All Models



REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle.

– air intake silencer
– belt guard and drive belt
– drive pulley
– carburetors and throttle cable at oil injection pump
– impulse line, oil supply line and rotary valve shaft lubrication hoses then plug all these hoses
– ignition coils and ignition module
– electrical connector housings
– drain the cooling system and disconnect hoses from the engine. Refer to COOLING SYSTEM 04-08
– 4 screws retaining support to frame

ENGINE SUPPORT AND MUFFLER DISASSEMBLY AND ASSEMBLY

1,2, Manifold Screw and Engine Support Screw

Torque the engine support screws to 48 N•m (35 lbf•ft).

Torque the manifold screws to 23 N•m (17 lbf•ft).

INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention to the following:

– Check tightness of engine rubber mount nuts. Torque to 25 N•m (18 lbf•ft).
– After throttle cable installation, check carburetor maximum throttle opening and oil injection pump adjustment.
– Check pulley alignment and drive belt tension.

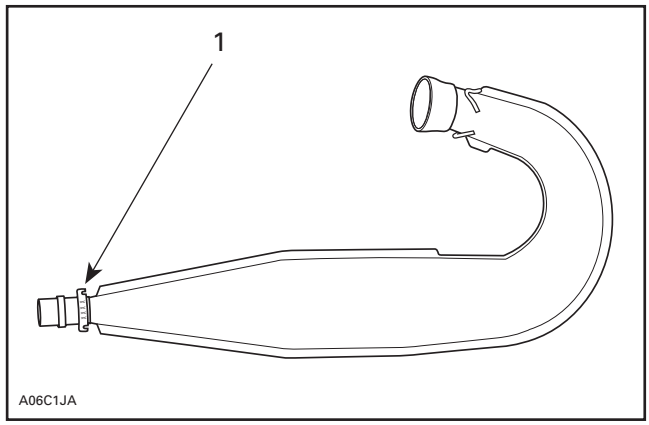
▼ CAUTION

When jetting is different each carburetor is identified by a color dot. Magneto side carburetor has a red dot and PTO side one has a blue dot. Install accordingly.

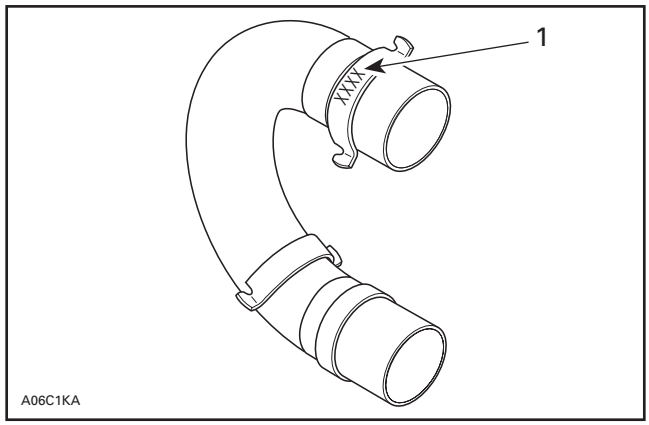
3,4,5, Tuned Pipe, Tail Pipe and Muffler

These parts are identified on welded hook.

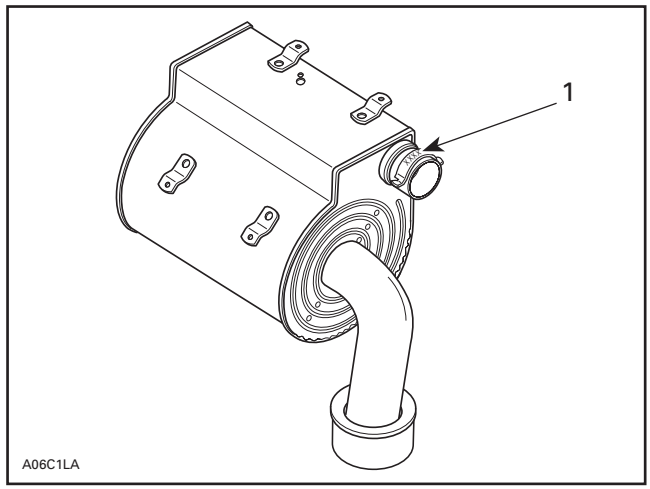
Second number sequence of P/N is stamped on part.



1. Example: 0392 for 514 039 200



1. Number sequence

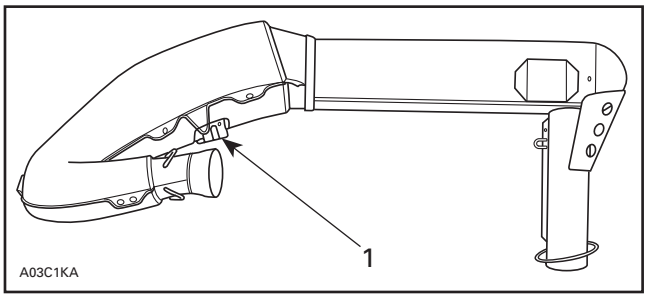


1. Number sequence

3, Tuned Muffler

This part is identified on welded support.

Second number sequence of P/N is stamped on part.

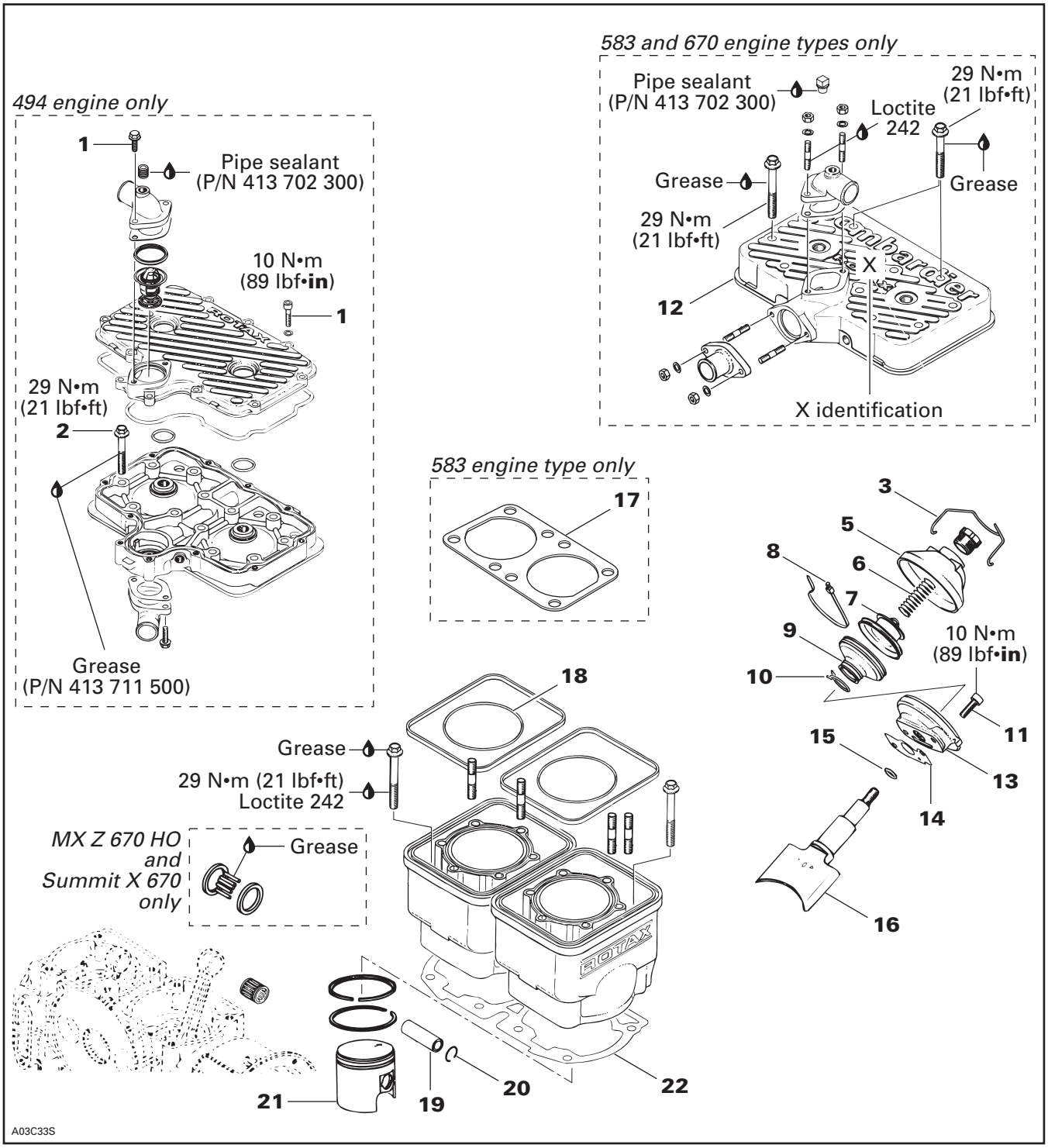


TYPICAL

1. Identification

– Should a light exhaust leak be experienced at any ball joints, Ultra Copper (P/N 413 710 300) can be used.

TOP END



PARTS

NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

Discard all gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

NOTE: The letters AUS (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring groove with a groove cleaner tool, or with a piece of broken ring.

DISASSEMBLY

All Models Except MX Z 670 and Summit X 670

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase then with a pointed tool inserted in piston notch, remove circlip no. 20 from piston no. 21.


A02C29A

TYPICAL

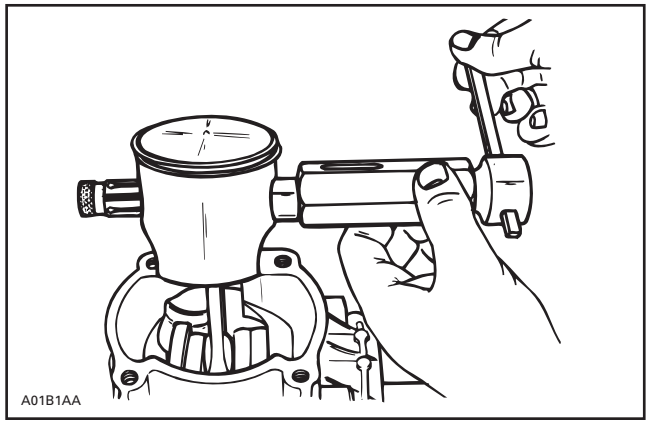
To remove piston pin no. 19, use piston pin puller (P/N 529 035 503) as follows:

Fully screw puller handle.

Insert puller end into piston pin.

Screw (LH threads) extracting nut.

Hold puller firmly and rotate puller handle counterclockwise to pull piston pin.


A01B1AA

TYPICAL

NOTE: 0.25 mm oversize piston and rings are available if necessary.

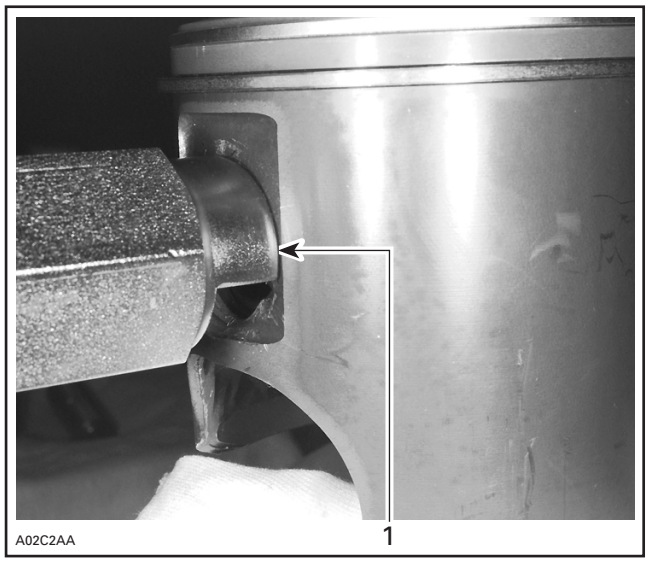
MX Z 670 and Summit X 670 Only

Remove both circlips as decribe above.

Use piston pin puller (P/N 529 035 503) along with 20 mm sleeve kit (P/N 529 035 542) and locating sleeve.

NOTE: The locating sleeve is the same that contains new cageless bearing.

Insert piston pin puller (P/N 529 035 503) making sure it sits squarely against piston.

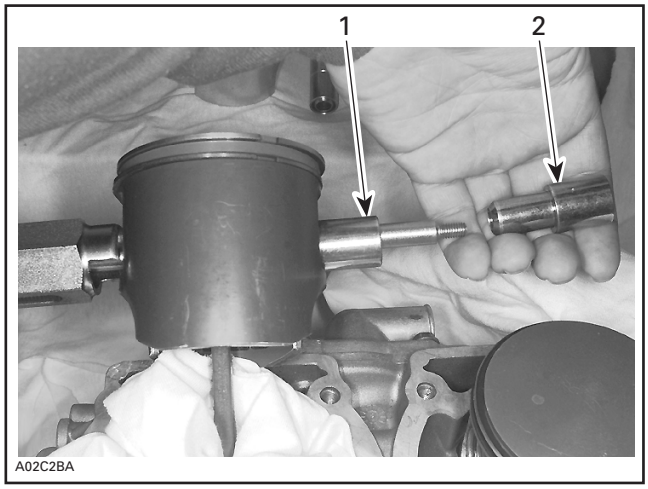


A02C2AA

TYPICAL

1. Properly seated all around

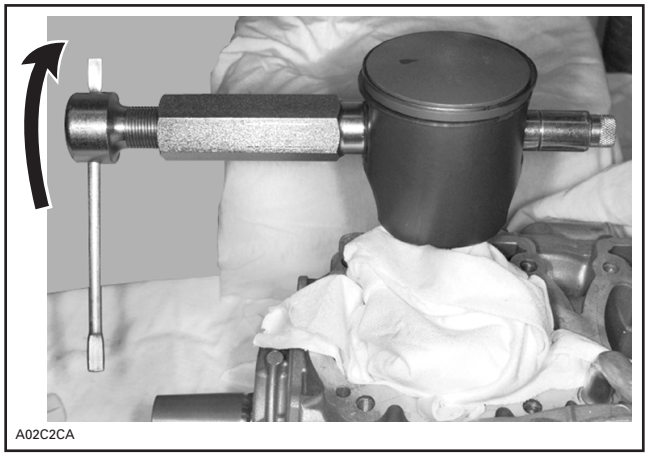
Install sleeve then shouldered sleeve over puller rod.



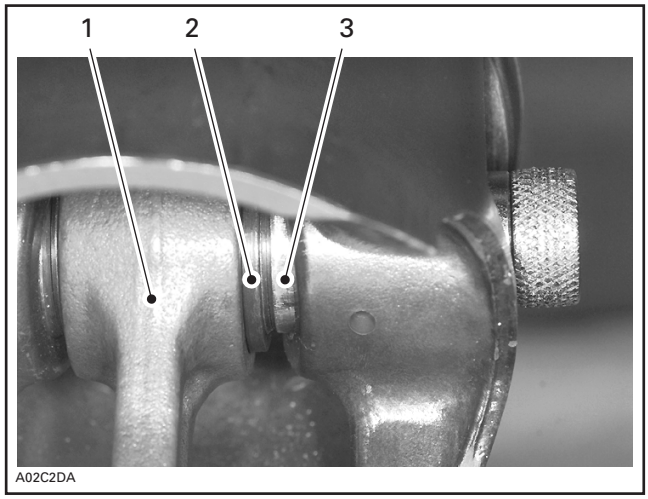
TYPICAL — INSTALLATION OF SLEEVE KIT

1. *Sleeve*
2. *Shouldered sleeve*

Pull out piston pin **no. 19** by unscrewing puller until shouldered sleeve end is flush with thrust washer of piston pin bearing.



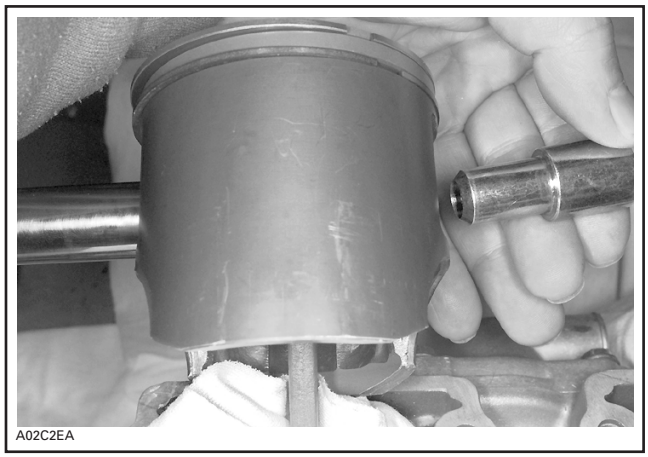
TYPICAL — PISTON PIN EXTRACTION



TYPICAL

1. *Sleeve inside bearing*
2. *Thrust washer*
3. *Shouldered sleeve end*

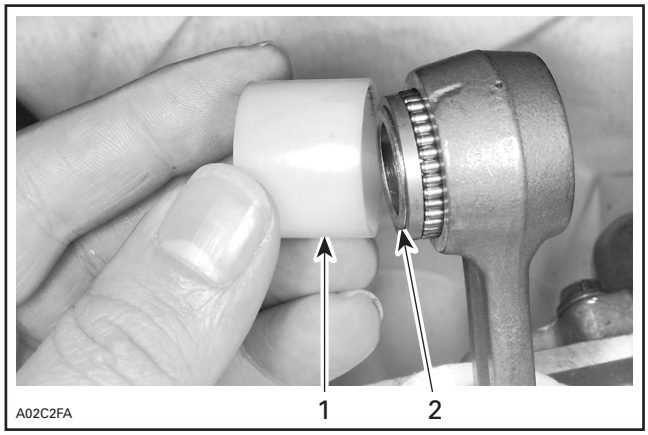
Remove puller. Pull out shouldered sleeve carefully.



TYPICAL

Remove piston from connecting rod.

Install locating sleeve. Then push needle bearings along with thrust washers and sleeve.



TYPICAL

1. *Locating sleeve*
2. *Sleeve*

RAVE System

NOTE: RAVE stands for Rotax Adjustable Variable Exhaust.

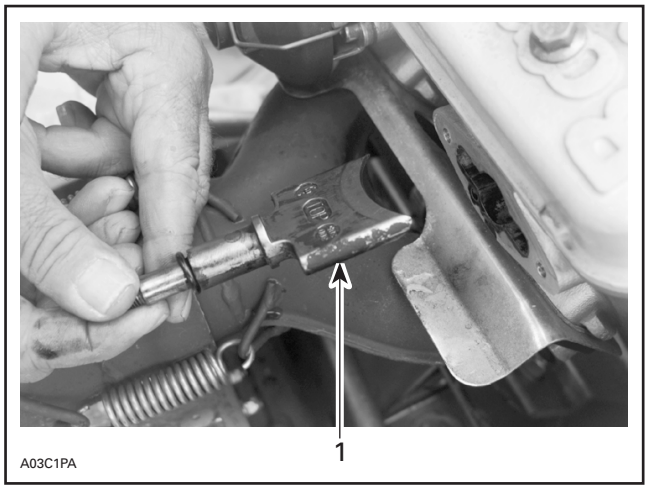
Remove spring clip **no. 3**, cover **no. 5** and spring **no. 6**.

Cut clamp **no. 8** (remove spring on 494) and unscrew valve piston **no. 7**.

Spread clamp **no. 10** and remove bellows **no. 9**.

Remove cylindrical screws **no. 11** then valve rod housing **no. 13**.

Pull out exhaust valve **no. 16**.



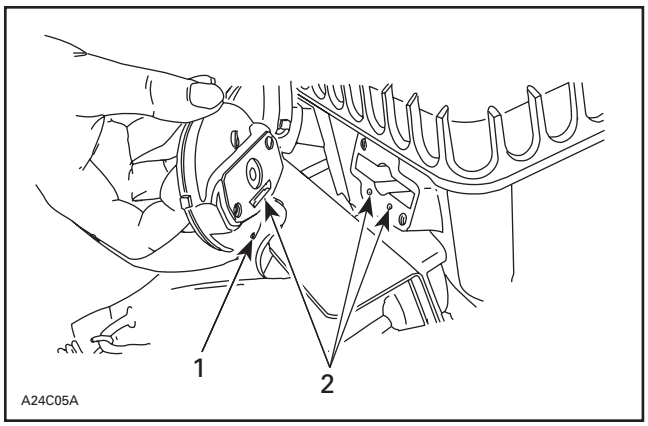
1. *Exhaust valve*

INSPECTION

Refer to ENGINE DIMENSIONS MEASUREMENT 04-04.

RAVE System

Check valve rod housing and cylinder for clogged passages.



TYPICAL

1. *Draining hole*
2. *Passages*

NOTE: Oil dripping from draining hole indicates a loosened clamp or damaged bellows.

Check for cracked, dried or perforated bellows **no. 9**.

6, Spring

ENGINE TYPE	SPRING P/N	WIRE DIA.	FREE LENGTH	PRELOAD IN N (LBF) AT COMPRESSED LENGTH
		mm (in)	mm (in)	OF 14.7 mm (.579 in)
494	420 239 944	0.9 (.035)	48.5 (1.909)	0.0169 (.00379)
583 and 670 on Formula Z 670/DLX 670	420 239 948	1.0 (.039)	38.0 (1.496)	0.0163 (.00365)
670 on MX Z 670 HO and Summit X 670	420 239 941	0.8 (.031)	52.5 (2.067)	0.0110 (.00246)

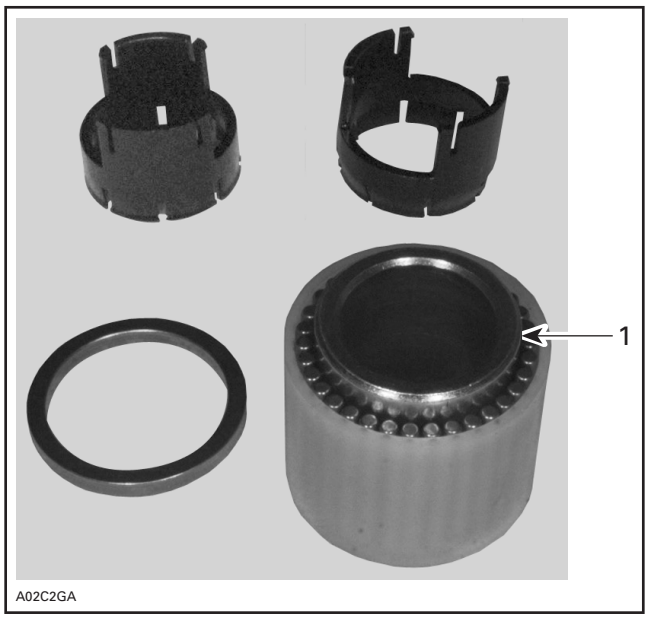
Make sure both springs installed on the engine have same characteristics.

ASSEMBLY

MX Z 670 and Summit X 670 Only

When installing a new cageless bearing, replace half plastic cages by sleeve.

NOTE: 670 engine cageless bearing has 28 needles.



TYPICAL
1. Sleeve

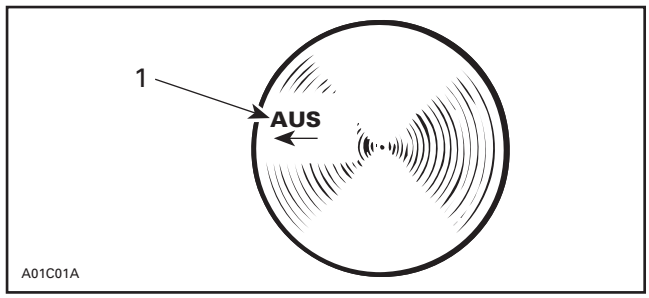
Grease thrust washers and install them on each end of needles.

Insert cageless bearing into connecting rod.



TYPICAL — CAGELESS BEARING AND SLEEVE INSTALLED

At assembly, place the pistons over the connecting rods with the letters "AUS" (over an arrow on the piston dome) facing in direction of the exhaust port.



1. Exhaust

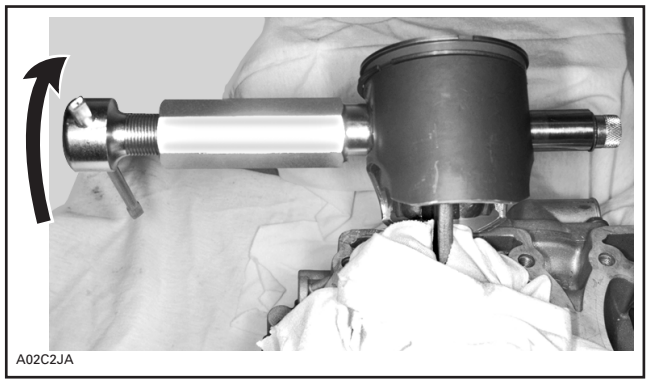
Install shouldered sleeve.



TYPICAL — SHOULDERED SLEEVE INSTALLATION

All Models

Install piston pin puller and turn handle until piston pin is correctly positioned in piston.



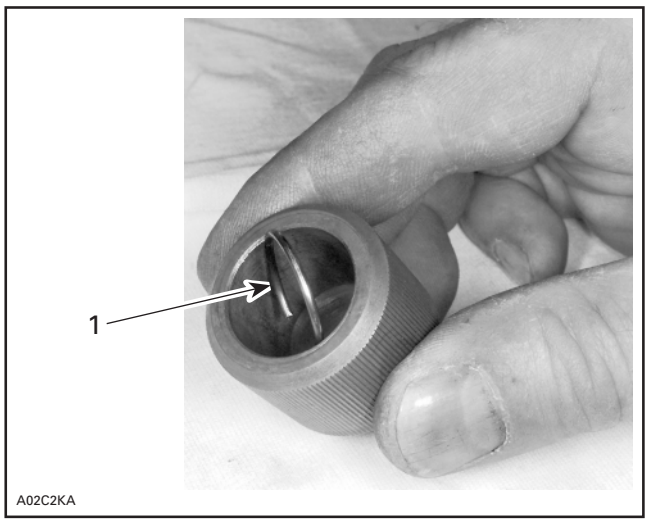
TYPICAL

▼ CAUTION

Always install new circlips.

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 035 561) for all engines except 670 and (P/N 290 877 016) for 670 engine.

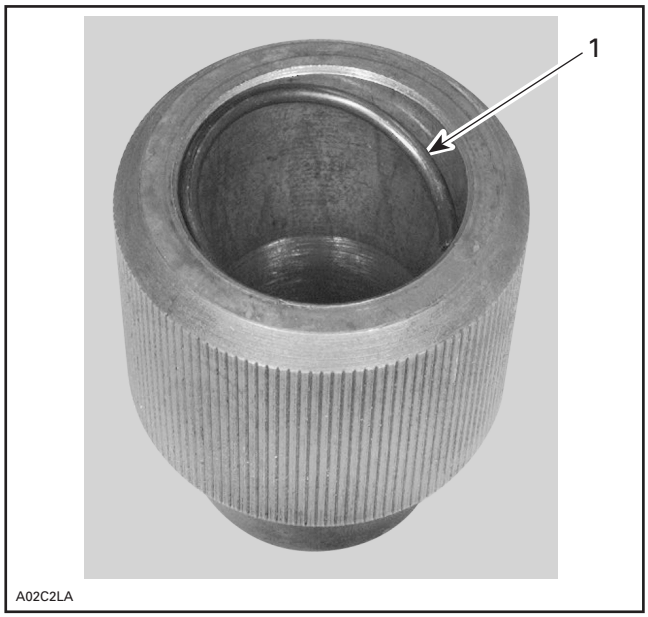
Insert circlip in tool at an angle.



TYPICAL

1. Circlip

Square it up using a finger.



TYPICAL

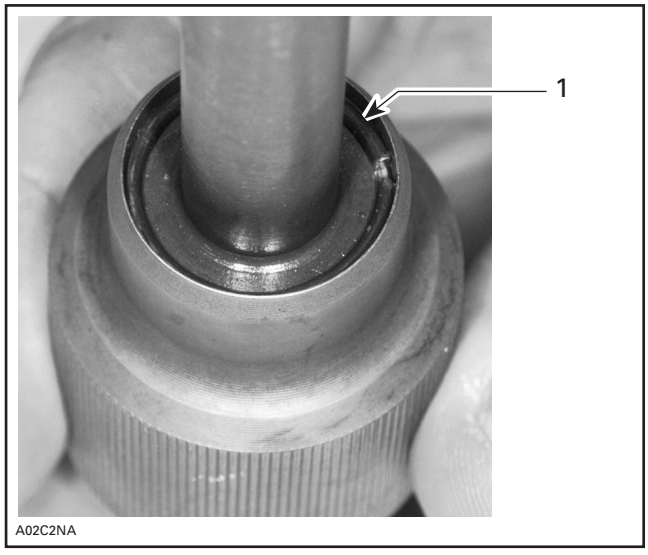
1. Circlip

Continue to square it up using round end of circlip installer.



TYPICAL

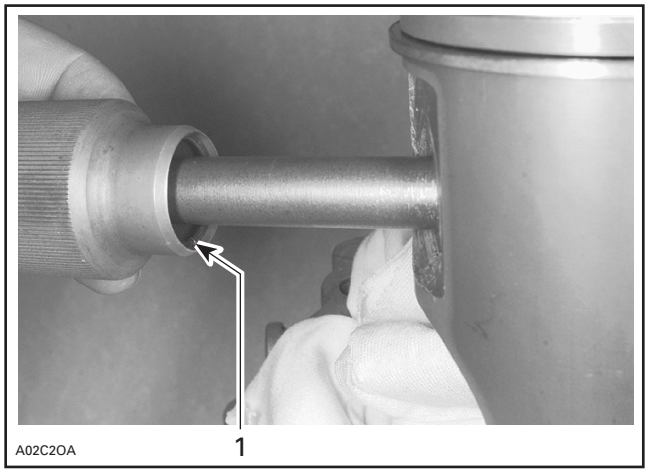
Using square end of tool, push circlip in until it rests in groove.



TYPICAL

1. Circlip in groove

Mount tool in piston making sure that circlip break is facing down.

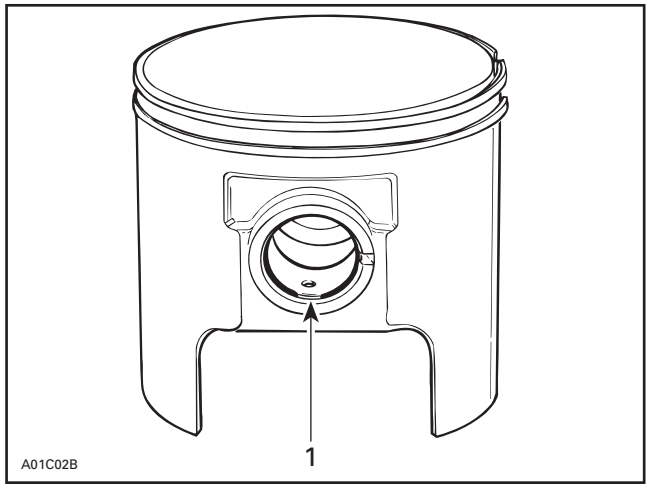


TYPICAL
1. Circlip break facing down

Hold tool firmly against piston then strike on round end of tool. Circlip will move from tool groove to piston groove.



TYPICAL



TYPICAL
1. Circlip break

▼ CAUTION

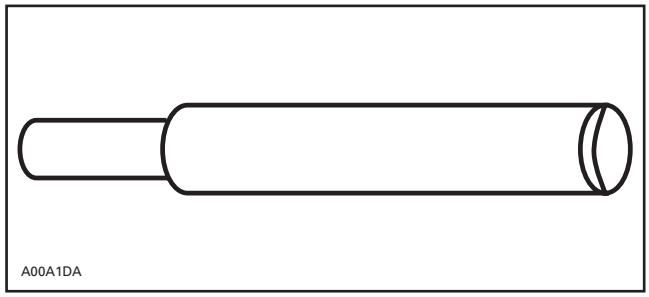
Circlips must not move freely after installation; if so, replace them.

22, Cylinder

494 Engine Only

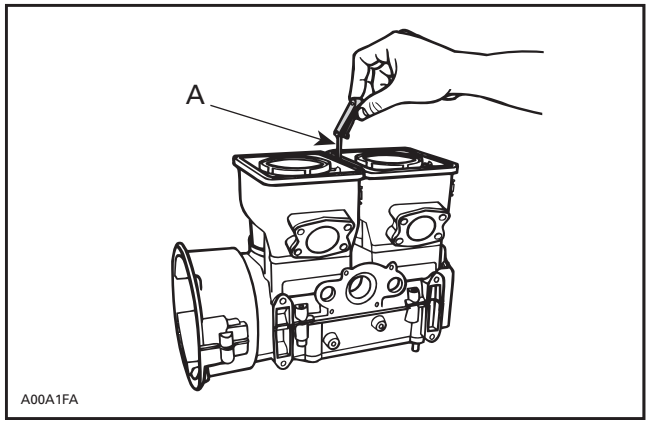
To avoid pinching or cutting of O-ring no. 18 between cylinder and cylinder head, it is necessary to use a special tool and to proceed as follows:

Use aligning pin (P/N 529 018 900).



NOTE: Neither exhaust manifold nor cylinder aligning tools (flat bars) must be installed on exhaust flanges to perform this procedure.

1. Place a 0.43 mm (.017 in) feeler gauge between cylinders and slide it back and forth to have the good spacing along cylinders.

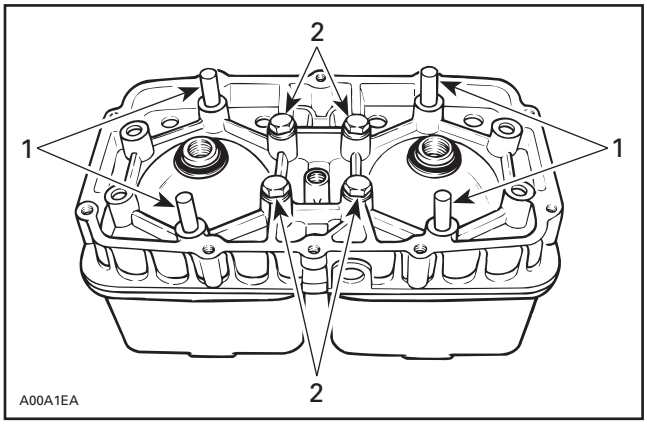


A. 0.43 mm (.017 in) feeler gauge

2. Apply Loctite 242 to screw threads. Properly torque cylinders screws.
3. Lay down cylinder head and insert aligning pins in holes as shown.

NOTE: If pins can not be inserted in cylinder head holes, enlarge them with a 8.75 mm (11/32 in) drill bit.

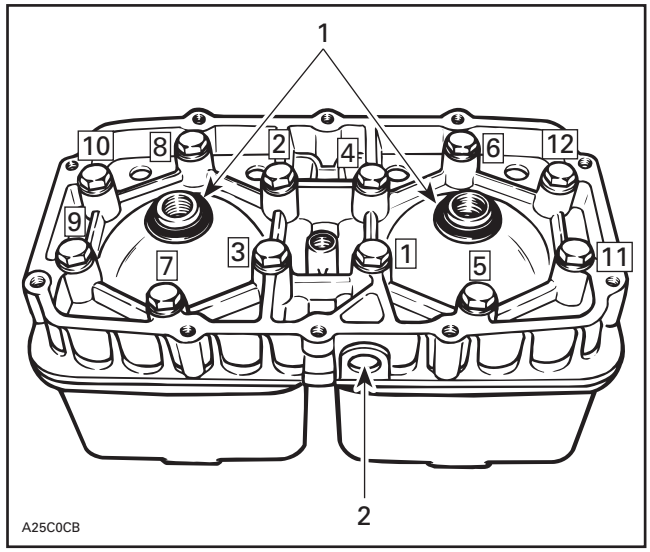
4. Install 4 screws in center holes. Torque to 10 N•m (89 lbf•**in**).



1. Pins
2. Screws

5. Remove pins and install remaining screws.
6. Tighten all screws in the above-recommended sequence and torque as specified.

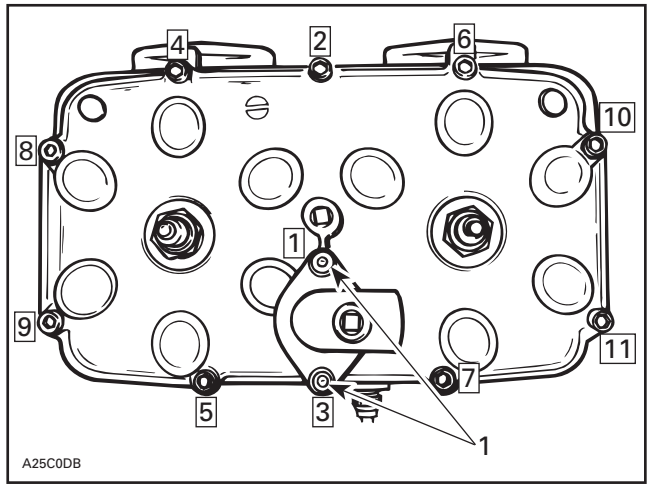
Position O-rings over cylinders then install cylinder head with its temperature sensor hole on rotary valve side. Install and torque screws to 29 N•m (21 lbf•ft) as per following illustrated sequence. Make sure to install O-rings around spark plug holes.



TYPICAL
1. O-rings
2. Temperature sensor hole

1, Screw

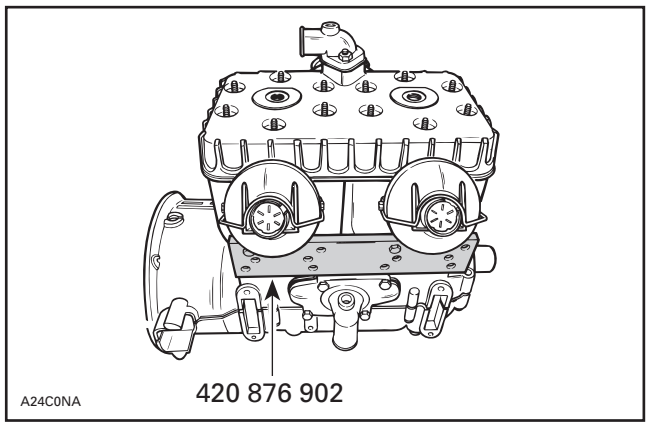
Torque cylinder head cover screws to 10 N•m (90 lbf•**in**) as per following illustrated sequence.



TYPICAL
1. Longer screws

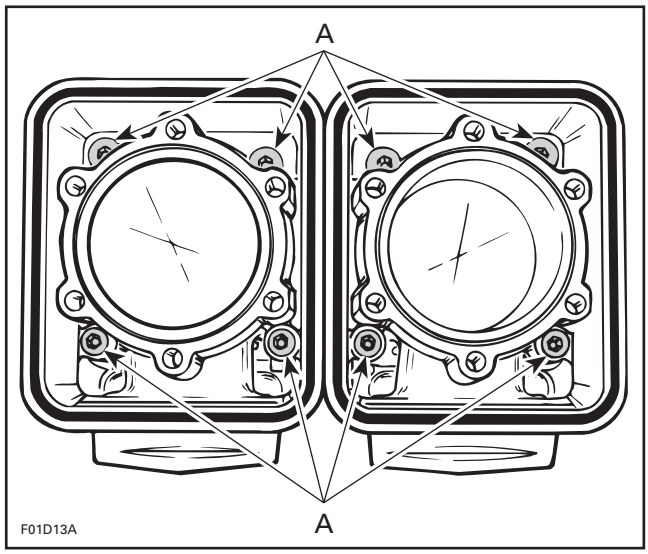
583 and 670 Engines Only

When reassembling the cylinders to the crankcase, it is important to have them properly aligned so that the cylinder head holes will match up with the studs. Cylinder head itself can be used to align the cylinders. Prior to torquing crankcase/cylinder nuts, install exhaust manifold to properly align exhaust flanges or use exhaust flange aligning tool (P/N 420 876 902).



Apply Loctite 242 (P/N 413 703 000) on cylinder screw threads.

Install and torque screws in a criss-cross sequence for each cylinder to 29 N•m (21 lbf•ft). For 670 engine longer screws go on exhaust side.

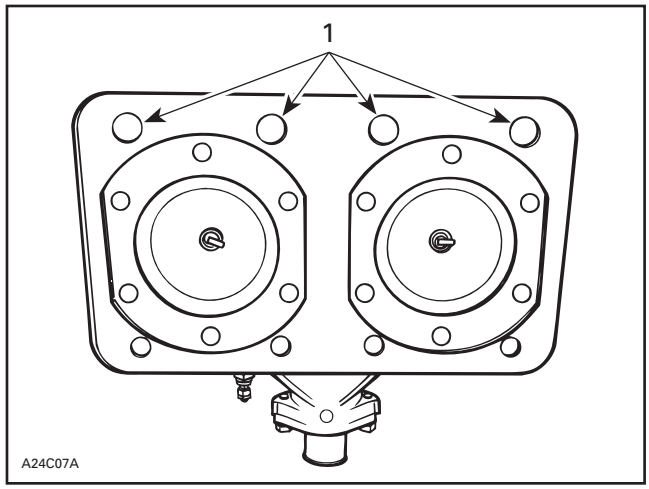


TYPICAL
A. Torque screws to 29 N•m (21 lbf•ft)

17, Gasket

583 Engine Only

Install gasket with its larger holes on exhaust side.



EXHAUST SIDE
1. Larger holes

12, Cylinder Head

MX Z 670 Only

The cylinder head is identified by an X. See exploded view for location.

Summit X 670 Only

The cylinder head has a very high compression ratio.

▼ CAUTION

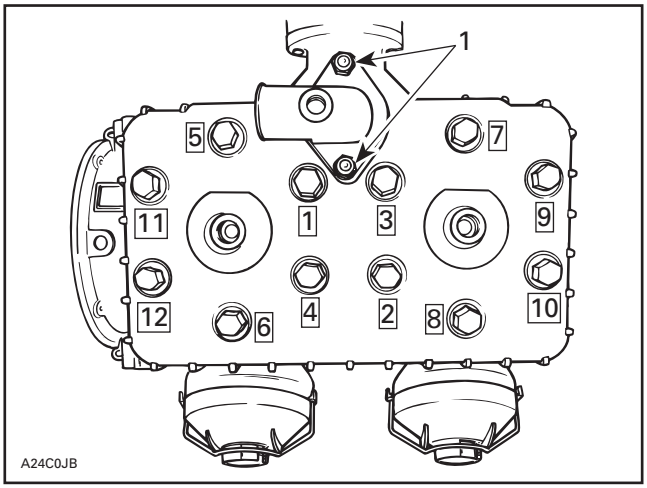
Install proper cylinder head.

All Models

2, Cylinder Head Screw

ENGINE TYPE	CYLINDER HEAD SCREWS TIGHTENING TORQUE
494, 583 and 670	29 N•m (21 lbf•ft) Apply grease under screw head

Torque cylinder head screws following illustrated sequence. On 583 and 670 engines longer screws go on intake side.

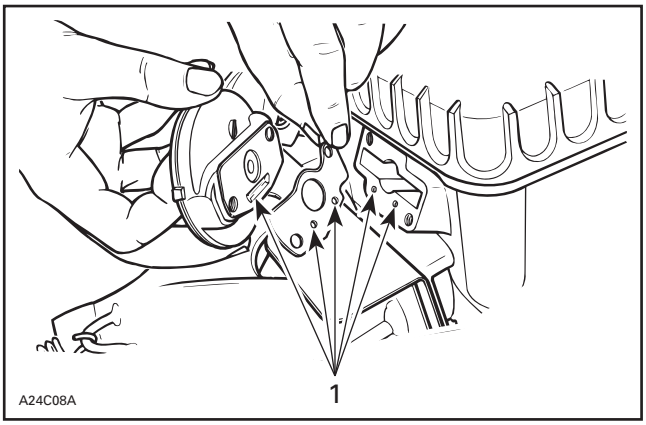


*1. Torque these screws to 10 N•m (90 lbf•**in**).*

RAVE SYSTEM

Install exhaust valve in cylinder with its mention TOP upward (see illustration at removal).

Install gasket and valve rod housing with their passages toward bottom.



1. Passages

Torque socket screws to 10 N•m (90 lbf•**in**). Check free sliding action of valve.

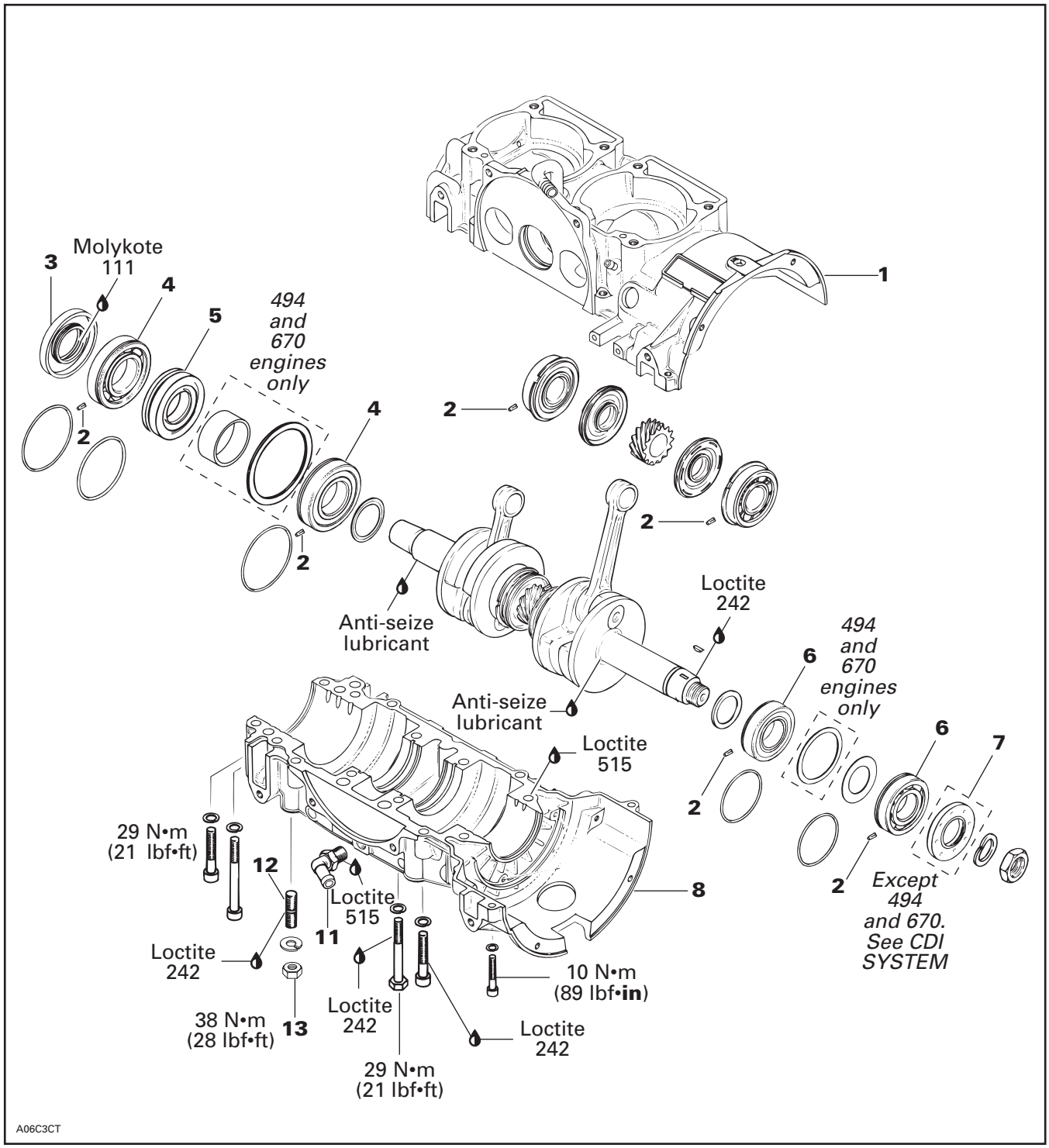
Install bellows over valve rod housing groove and secure with a clamp.

Screw by hand valve piston on valve rod until it bottoms.

Secure bellows to valve piston with a clamp (spring on 494 engine).

Install spring, cover and spring clip. Turn adjustment screw by hand until it bottoms.

BOTTOM END



TYPICAL

NOTE: Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all oil seals, gaskets, O-rings and sealing rings.

Clean all metal components in a non-ferrous metal cleaner. Use gasket remover (P/N 413 708 500) accordingly.

Remove all trace of Loctite from crankshaft taper.

Remove old paste gasket from crankcase mating surfaces with Bombardier gasket remover (P/N 413 708 500).

▼ CAUTION

Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

DISASSEMBLY

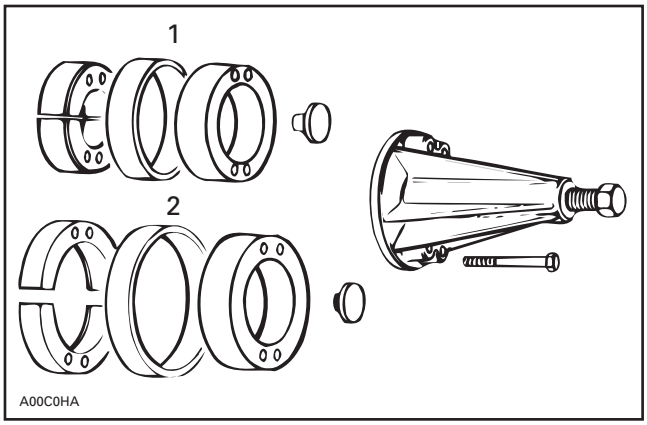
General

To remove drive pulley, refer to DRIVE PULLEY 05-03.

To remove magneto, refer to CDI MAGNETO 04-05.

2,4,6,9, Crankshaft Bearing

To remove bearings from crankshaft, use a protective cap and special puller, as illustrated.



1. PTO side
2. MAG side

INSPECTION

Refer to ENGINE DIMENSIONS MEASUREMENT 04-04.

ASSEMBLY

2,4,5,6,9, Crankshaft Bearing and Labyrinth Sleeve

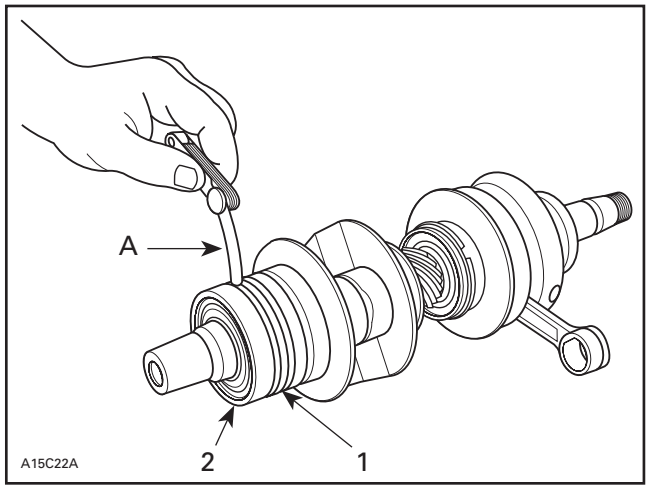
Smear anti-seize lubricant (P/N 413 701 000) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container filled with BOMBARDIER-ROTAX injection oil previously heated to 75°C (167°F).

▼ CAUTION

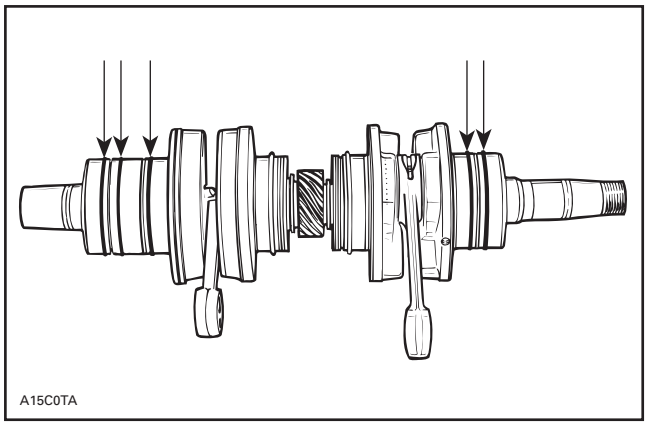
Do not exceed 75°C (167°F).

This will expand bearing and ease installation. Install bearings and labyrinth sleeve with groove as per the following illustration. Keep a 0.3 mm (.012 in) gap between outer bearing and labyrinth sleeve.



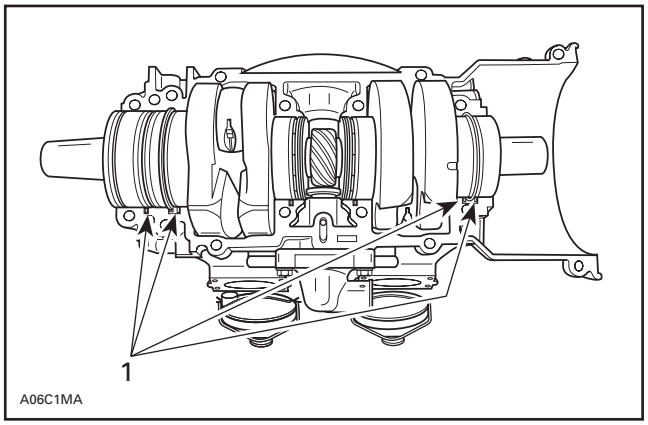
1. Labyrinth sleeve
2. Outer bearing
A. 0.3 mm (.012 in)

Install O-rings as illustrated.



583 ENGINE

Install bearing drive pins **no. 2** as illustrated.



494 AND 670 ENGINES — EXHAUST SIDE
1. Drive pins

▼ CAUTION

Make sure drive pins of bearings are on exhaust side of crankcase for proper seating in recesses.

3,7, Seal

At seal assembly, apply a light coat of Molykote 111 (P/N 413 707 000) on seal lip.

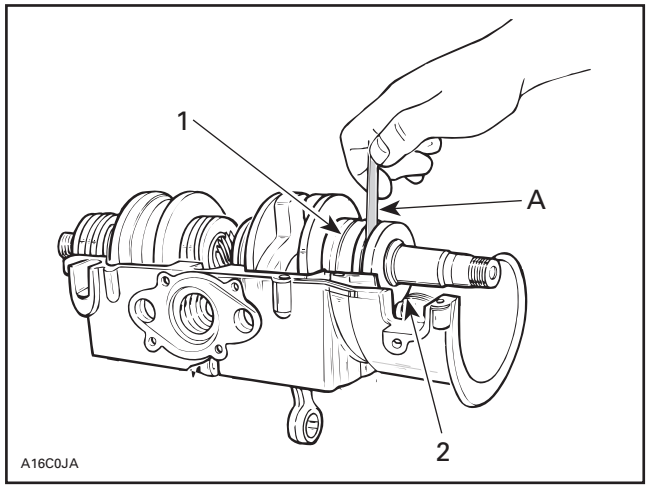
PTO side seal **no. 3** must be filled up with Molykote 111.

▼ CAUTION

Do not overfill seal with Molykote 111. The lubrication hole in crankcase must not be obstructed by Molykote 111.

For bearing lubrication purpose, a gap of 1.0 mm (.040 in) must be maintained between seals and bearings.

When installing plain oil seals (seal without locating ring or without spacing legs), ensure to maintain a 1.0 mm (.040 in) gap. For seals with spacing legs, install them against the bearing.



1. Bearing
2. Oil seal
A. 1 mm (.040 in)

1,8, Upper Crankcase and Lower Crankcase

Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves.

Prior to joining of crankcase halves, spray some new injection oil (or equivalent) in bearings and on all moving parts of the crankshaft.

Spray Primer N (P/N 413 708 100) on one of mating surfaces. Let it dry for 10 to 20 minutes.

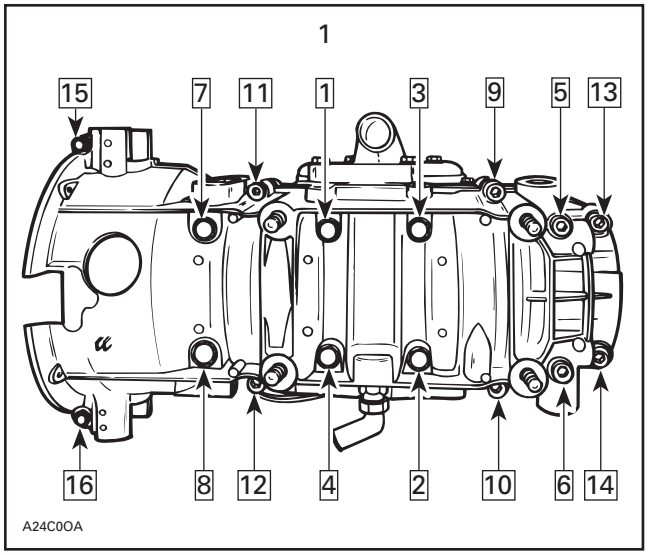
Apply paste gasket (P/N 413 702 700) **no. 5** on the other mating surface.

NOTE: Primer N allows Loctite 515 to fully cure on aluminum surfaces. It increases filling capacity and reduces curing time.

▼ CAUTION

Before joining crankcase halves be sure that crankshaft rotary valve gear is well-engaged with rotary valve shaft gear.

Position the crankcase halves together and tighten screws by hand then install and tighten armature plate on magneto side to correctly align crankcase halves. Apply Loctite 242 on screw threads and under head. Torque screws as specified following illustrated sequence.



1. Follow sequence shown 1 to 14: Torque to 29 N•m (21 lbf•ft)
*15 and 16: Torque to 10 N•m (90 lbf•**in**)*

NOTE: Torque the 2 smaller screws (15 and 16) on magneto side to 10 N•m (90 lbf•**in**).

Apply pipe sealant (P/N 413 702 300) on threads prior to assembly angular tube no. 11.

At assembly on crankcase, apply Loctite 242 (P/N 413 703 000) on stud threads no. 12.

Torque the crankcase/engine bracket nut no. 13 to 38 N•m (28 lbf•ft).

To install magneto, refer to CDI MAGNETO 04-05.

LEAK TEST AND ENGINE DIMENSION MEASUREMENT

LEAK TEST

The following gives verification procedures for liquid cooled engines though it also applies to fan cooled engines. For FC engines, do not consider information pertaining to coolant system and crankcase rotary valve gear reservoir/components.

On twin-cylinder engines, each cylinder cannot be verified individually due to leakage from one cylinder to the other through rotary valve (except on engines with separate intake manifolds). Besides, on FC engines, leak will occur through labyrinth sleeve in center of crankshaft.

PREPARATION

1. Remove tuned pipe/muffler and exhaust manifold.
2. Install plugs over exhaust flanges. Tighten with previously removed screws.
3. On engines with RAVE system, remove RAVE valves and install plugs over flanges. Tighten with previously removed screws.
4. Remove carburetor(s).
5. Insert plug(s) in intake rubber boot(s). Tighten with clamps already there.
6. Using a hose pincher(s) (P/N 529 009 900), block impulse hose(s).

NOTE: Do not block large hoses of rotary valve gear lubrication system.

7. Install air pump on any valve of exhaust plug.

NOTE: If necessary, lubricate air pump piston with mild soap.

▼ CAUTION

Using hydrocarbon lubricant (such as engine oil) will damage rubber seal of pump piston.

8. Rotate crankshaft so that piston goes to BDC (Bottom Dead Center) on side where the pump is installed. This will open exhaust port.
9. Activate pump and pressurize engine to 34 kPa (5 PSI). Do not exceed this pressure.
10. Engine must stand this pressure during 3 minutes. If pressure drops before 3 minutes, check tester kit by spraying a soapy solution on pump piston, all plugs and fittings.
    - If tester kit is leaking, bubbles will indicate where leak comes from.
    - If tester kit is not leaking, check engine as per following procedure.

PROCEDURE

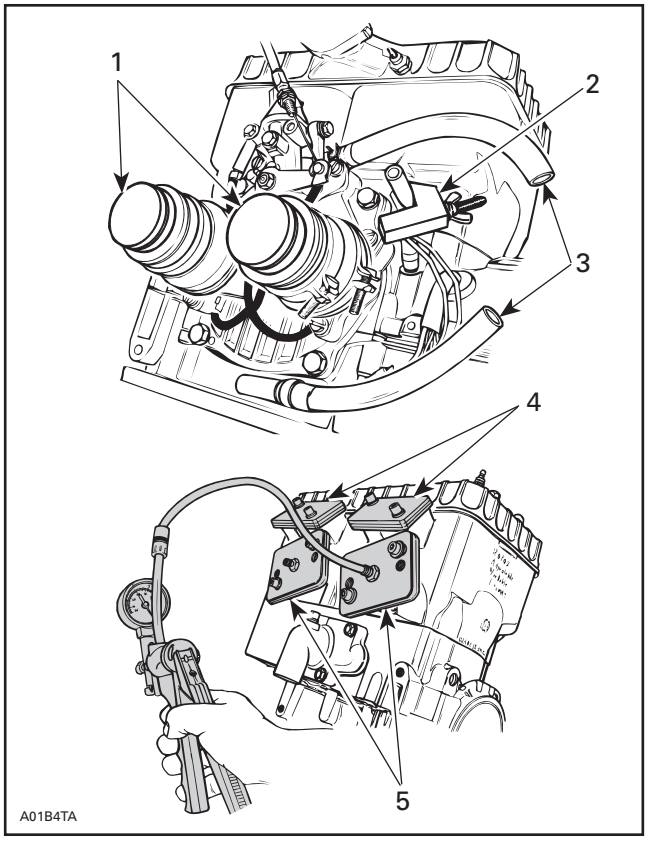
NOTE: A flow chart has been prepared as a visual reference. See last page of this chapter.

Using flow chart and following text, pressurize area to be tested and spray soapy solution at the indicated location.

TEST PRESSURE: 34 kPa (5 PSI) for 3 minutes

- If there is a leak at the tested location, it is recommended to continue testing next items before overhauling engine. There is a possibility of more than one leak.
- If there is no leak at the tested location, continue pumping to maintain pressure and continue with next items until leak is found.

Engine



TYPICAL

1. *Blocked intake flanges*
2. *Blocked impulse fitting*
3. *Open ends (if applicable)*
4. *Blocked RAVE valve flanges (if applicable)*
5. *Blocked exhaust flanges*

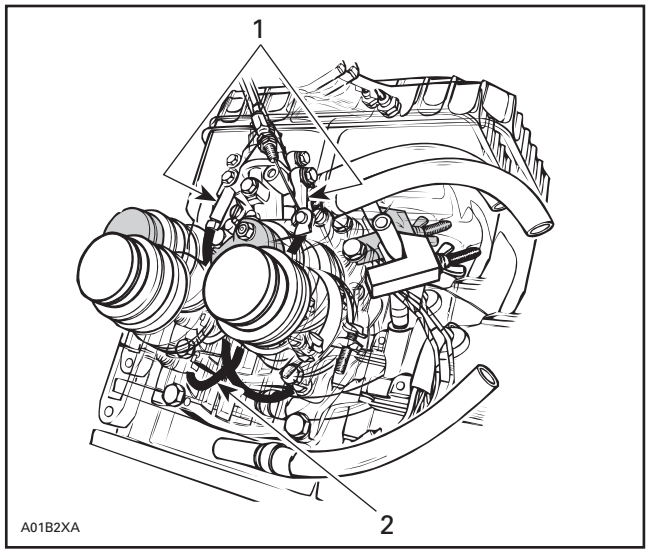
When exhaust manifold is installed, use rubber plug. (In this case it is not necessary to move piston to BDC).



1. *Rubber plug*

Check the following:

1. All jointed surfaces and screw/stud threads of engine:
   - spark plug base, insulator
   - cylinder head
   - cylinder base
   - crankcase halves (joint)
   - rotary valve cover
   - oil injection pump mounting flange (O-ring, seal)
   - coolant pump housing
   - bleed screws/plugs
2. Small injection oil lines coming from pump.



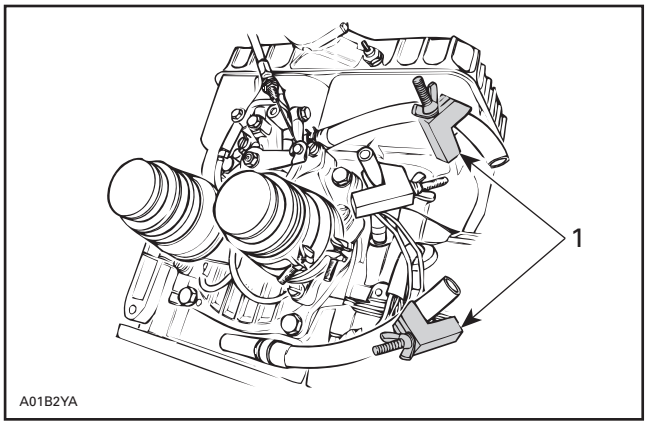
1. *Banjo fittings*
2. *Small injection oil lines*

Check for air bubbles or oil column going toward pump. It indicates defective check valve in banjo fitting (or lines).

3. Remove cooling system cap.

Check for air bubbles in antifreeze. It indicates defective cylinder head O-ring or cylinder base gasket.

4. Block both hoses of rotary valve gear lubrication system with hose pinchers.



1. Block both hoses

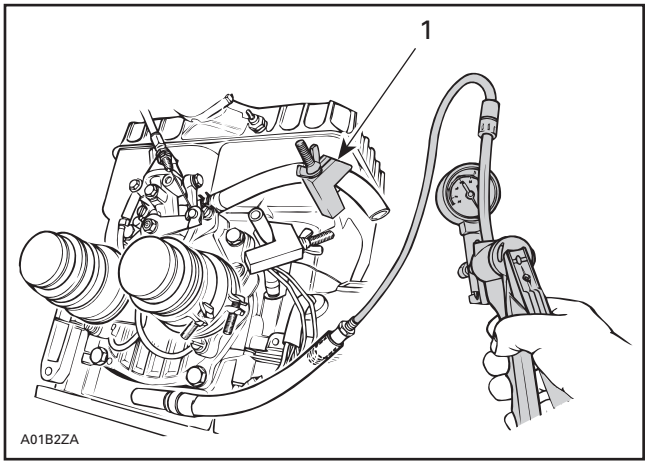
If leakage stops, ignore remaining items and check crankcase rotary valve gear reservoir as per Crankcase Rotary Valve Gear Reservoir of this section.

5. Remove drive pulley then check crankshaft outer seal.
6. Remove rewind starter and magneto system then check crankshaft outer seal.
7. Check crankcase rotary valve gear reservoir.

Crankcase Rotary Valve Gear Reservoir

Block one hose of rotary valve gear lubrication system with a hose pincher and install an adapter in remaining hose.

Install air pump on adapter and pressurize as before.

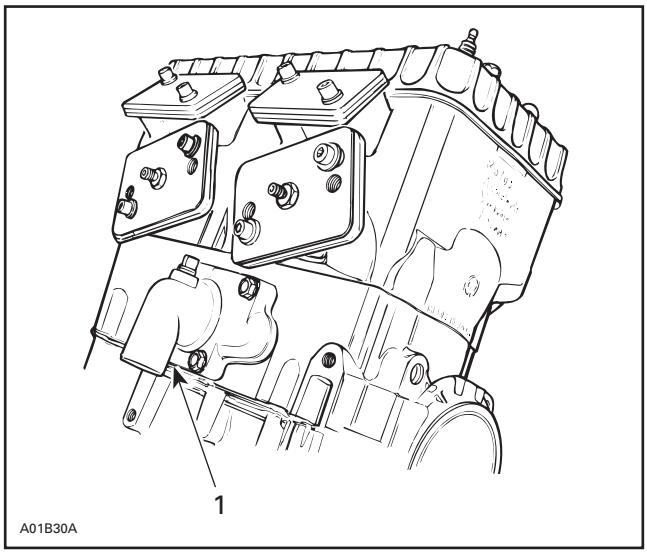


1. Blocked hose

1. Remove a spark plug or any plug of leak tester kit on PTO side.

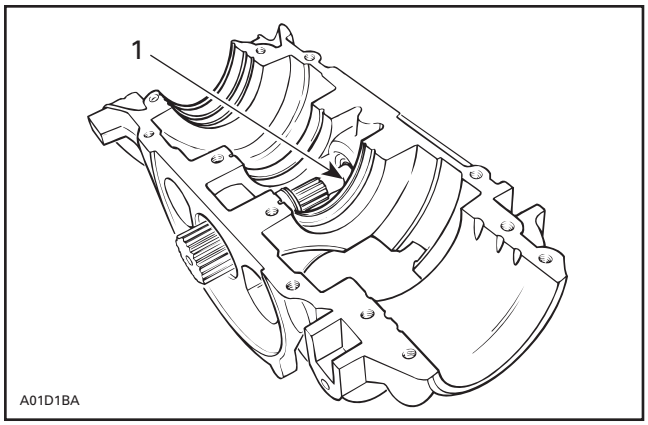
   If pressure drops, it indicates defective crankshaft inner seal on PTO side.
2. Remove a spark plug or any plug of leak tester kit on MAG side.

   If pressure drops, it indicates defective crankshaft inner seal on MAG side.
3. Check drain hole below coolant pump housing with soapy water.



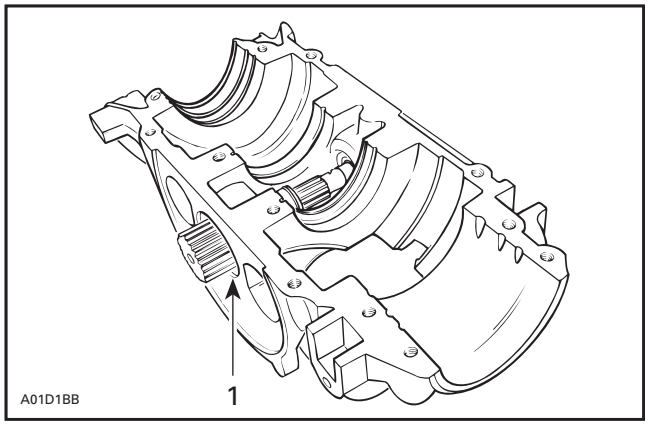
1. Drain hole

If there is a leak, it indicates defective seal of rotary valve shaft (oil seal beside coolant seal).



1. Oil seal

4. Remove rotary valve cover and check for leak of rotary valve seal with soapy water.



1. Seal

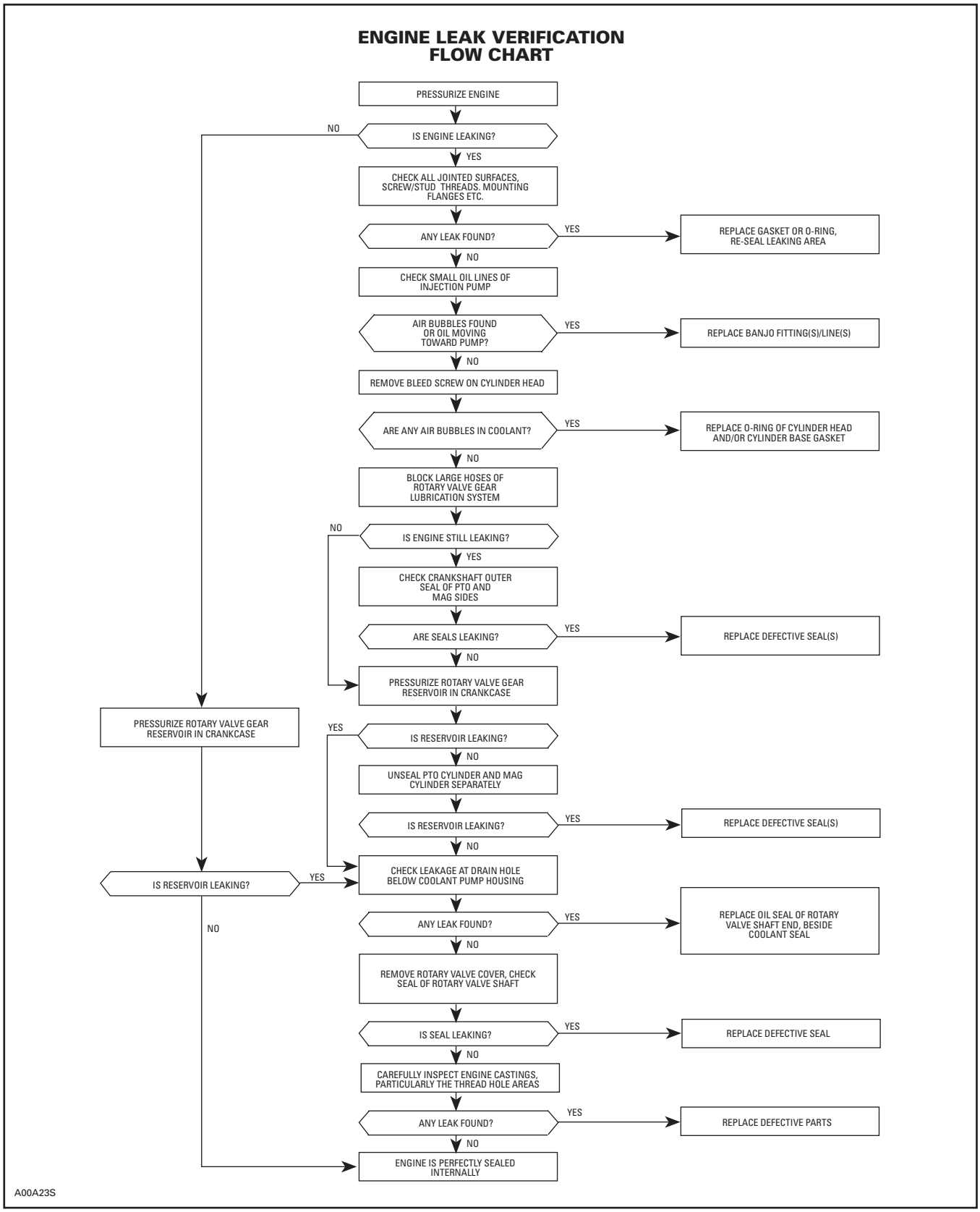
5. If leak still persists, it indicates a defective casting somewhere in engine.

   Disassemble engine and carefully check for defects in castings. Pay attention to tapped holes which may go through engine sealed area and thus lead to leakage.

FINALIZING REASSEMBLY

After reassembling engine, always recheck for leakage.

ENGINE LEAK VERIFICATION FLOW CHART



ENGINE DIMENSION MEASUREMENT

This section covers all engine types.

CYLINDER HEAD WARPAGE

ENGINE TYPE	MAXIMUM
All	0.05 mm (.002 in)

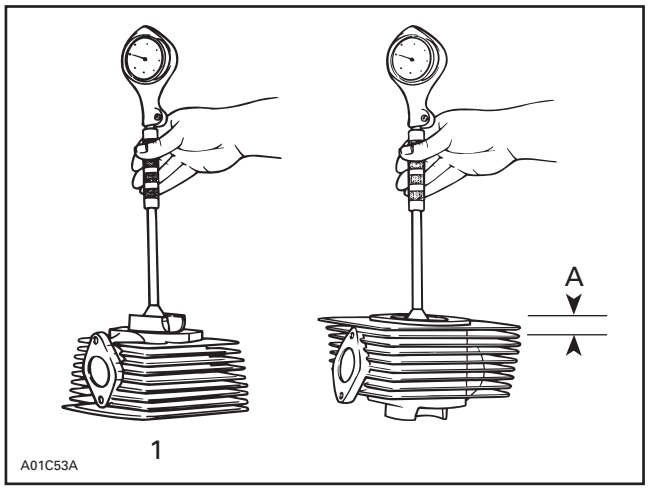
CYLINDER TAPER

ENGINE TYPE	MAXIMUM
All	0.10 mm (.004 in)

Compare cylinder diameter 16 mm (5/8 in) from top of cylinder to just below its intake port area.

On rotary valve engines, measure just below auxiliary transfer port, facing exhaust port. If the difference exceeds the specified dimension the cylinder should be rebored and honed or should be replaced.

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



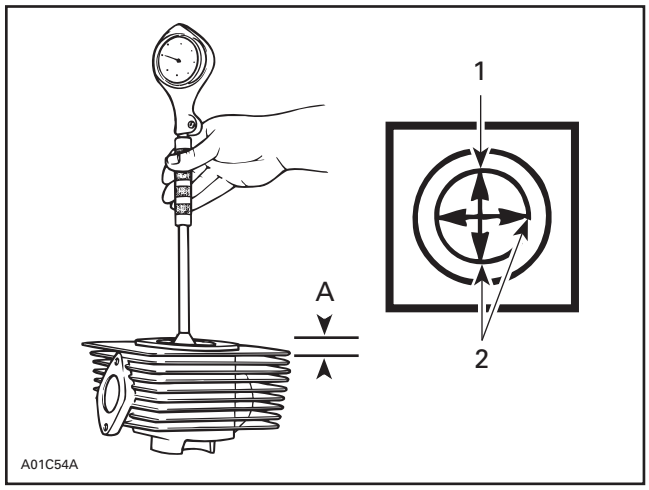
1. Below the intake port
A. 16 mm (5/8 in) from top

CYLINDER OUT OF ROUND

ENGINE TYPE	MAXIMUM
All	0.05 mm (.002 in)

Measuring 16 mm (5/8 in) from top of cylinder with a cylinder gauge, check if the cylinder out of round is more than the specified dimension. If larger, cylinder should be rebored and honed or should be replaced.

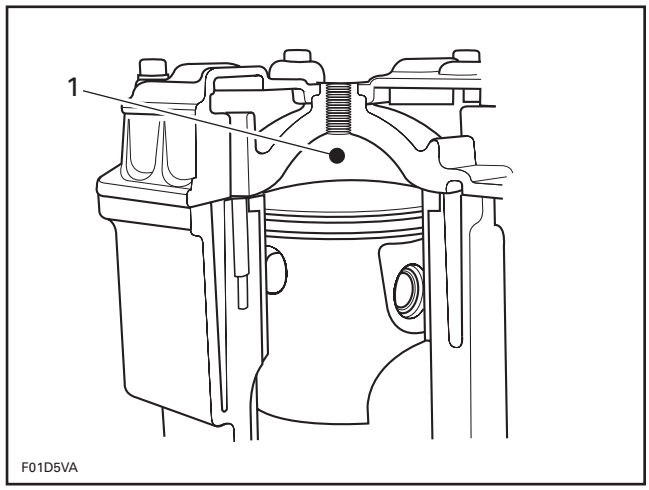
NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



1. Piston pin position
2. Measures to be compared
A. 16 mm (5/8 in)

COMBUSTION CHAMBER VOLUME MEASUREMENT

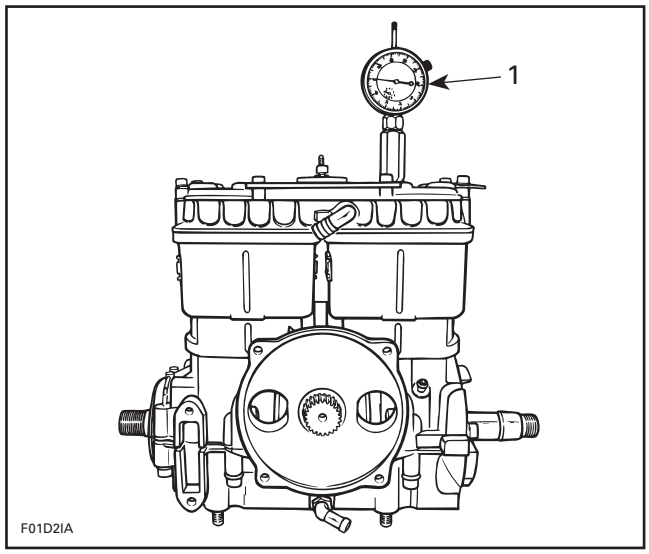
The combustion chamber volume is the region in the cylinder head above the piston at Top Dead Center. It is measured with the cylinder head installed on the engine.



1. Combustion chamber

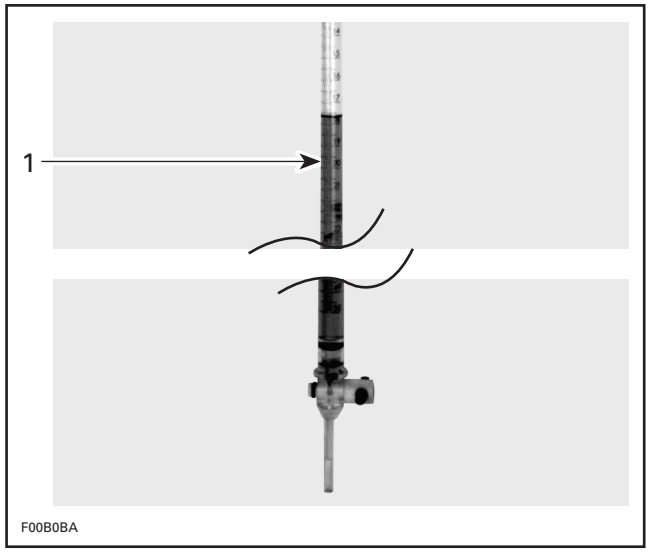
NOTE: When checking the combustion chamber volume, engine must be cold, piston must be free of carbon deposit and cylinder head must be leveled.

1. Remove both spark plugs and bring one piston to Top Dead Center a using a TDC gauge.



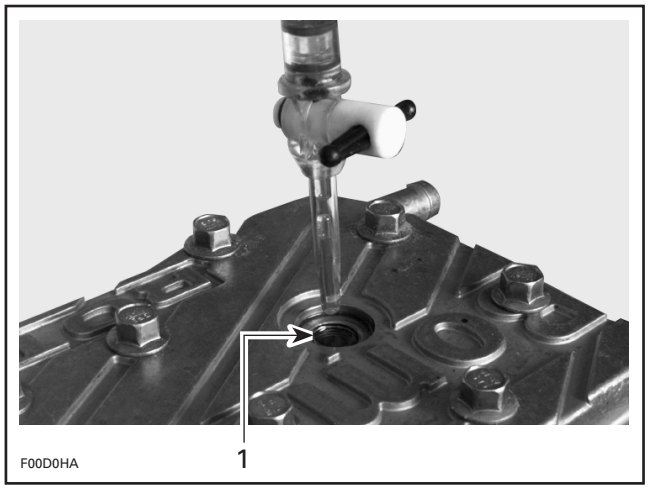
1. Bring piston to TDC

2. Obtain a graduated burette (capacity 0-50 cc) and fill with an equal part (50/50) of gasoline and injection oil.



1. Graduated burette (0-50 cc)

3. Open burette valve to fill its tip. Add liquid in burette until level reaches 0 cc.
4. Inject the burette content through the spark plug hole until liquid touches the top spark plug hole.



TYPICAL

1. Top of spark plug hole

NOTE: The liquid level in cylinder must not drop for a few seconds after filling. If so, there is a leak between piston and cylinder. The recorded volume would be false.

5. Let burette stand upward for about 10 minutes, until liquid level is stabilized.
6. Read the burette scale to obtain the quantity of liquid injected in the combustion chamber.

NOTE: When the combustion chamber is filled to top of spark plug hole, it includes an amount of 2.25 cc corresponding to the spark plug tip.

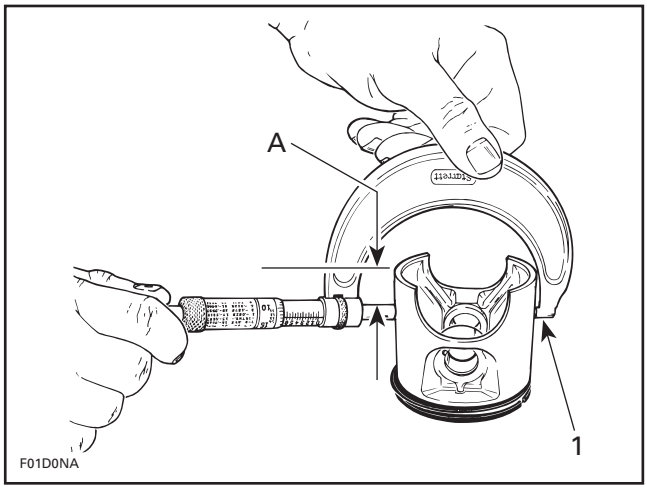
7. Repeat the procedure for the other cylinder.

ENGINE TYPE	COMBUSTION CHAMBER VOLUME (cc) (up to top thread of spark plug hole)
443	24.1 ± 1.0
494	25.0 ± 1.0
503	27.6 ± 1.0
583	28.7 ± 1.2
670	32.7 ± 0.7
670 on Summit X 670	30.15 ± 0.60

If the measured volume is out of specifications install genuine parts.

USED PISTON MEASUREMENT

Using a micrometer, measure piston at A perpendicularly (90°) to piston pin.



1. Measuring perpendicularly (90°) to piston pin axis
A. See table below

ENGINE TYPE	DIMENSION A mm (in)
443	20.8 (.82)
503	18 (.71)
494	30 (1.18)
583	27 (1.06)
670	29 (1.14)

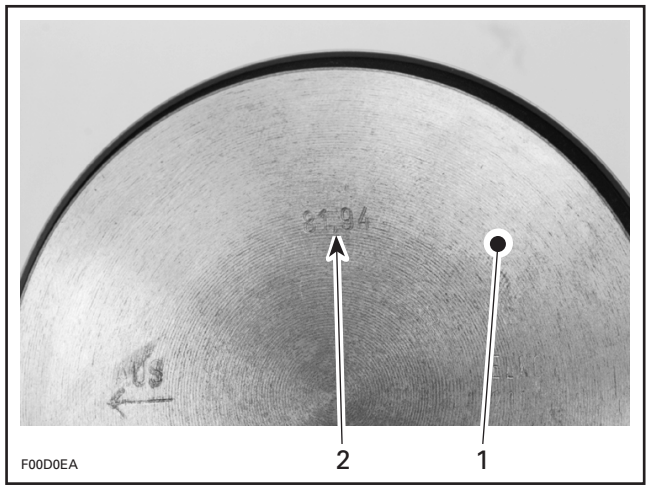
The measured dimension should be the same as the one scribed on piston dome. If not, install a new piston.

CYLINDER/PISTON CLEARANCE

Used and New Pistons

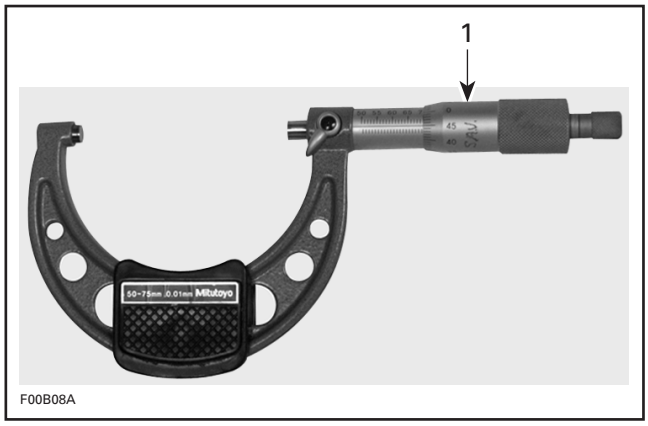
NOTE: Make sure used piston is not worn. See USED PISTON MEASUREMENT above.

Take the measurement on the piston dome.



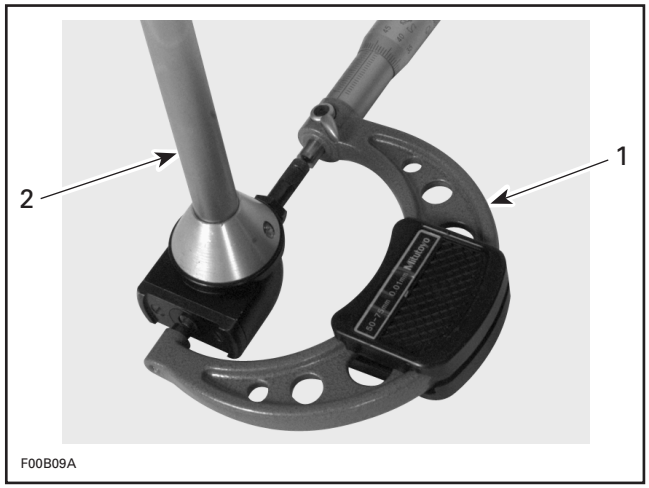
1. Piston dome
2. Piston measurement

Adjust and lock a micrometer to the specified value on the piston dome.

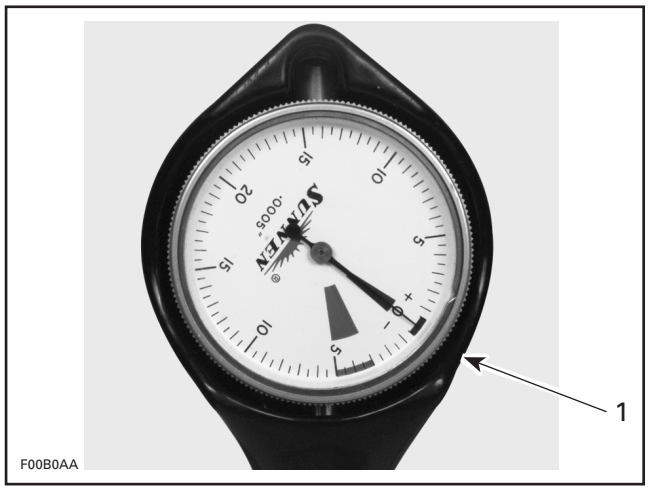


1. Micrometer set to the piston dimension

With the micrometer set to the piston dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0.

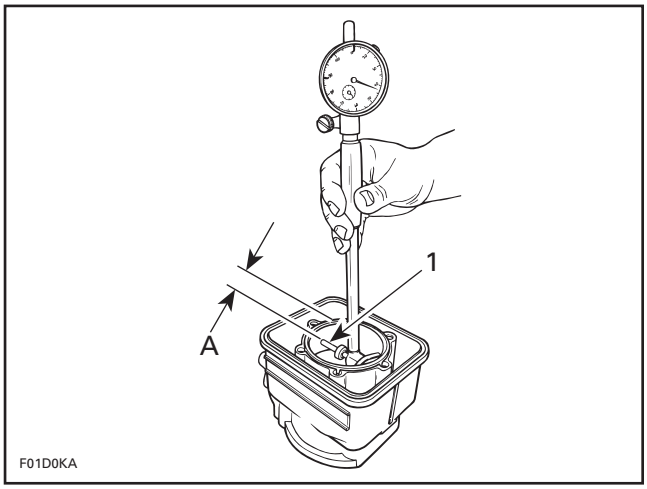


1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



1. Indicator set to 0

Position the dial bore gauge at 16 mm (5/8 in) below cylinder top edge.



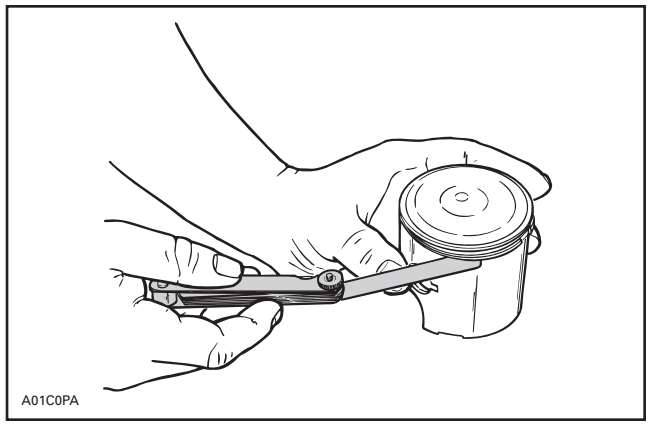
1. Measuring perpendicularly (90°) to piston pin axis
A. 16 mm (5/8 in)

Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance. If clearance exceeds specified tolerance, replace cylinder or rebore. Refer to TECHNICAL DATA 10.

NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.

RING/PISTON GROOVE CLEARANCE

Using a feeler gauge check clearance between rectangular ring and groove. Replace piston if clearance exceeds specified tolerance. Refer to TECHNICAL DATA 10-02.

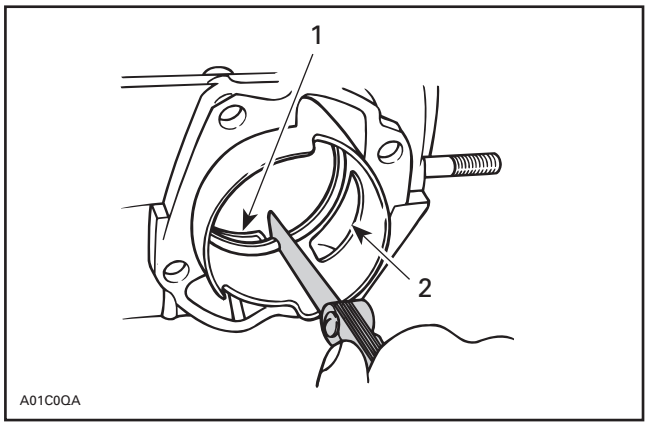


RING END GAP

Position ring half-way between transfer ports and intake port. On rotary valve engines, position ring just below transfer ports.

NOTE: In order to correctly position the ring in the cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. Replace ring if gap exceeds specified tolerance. Refer to TECHNICAL DATA 10-02.



1. Transfer port
2. Intake port

CRANKSHAFT DEFLECTION

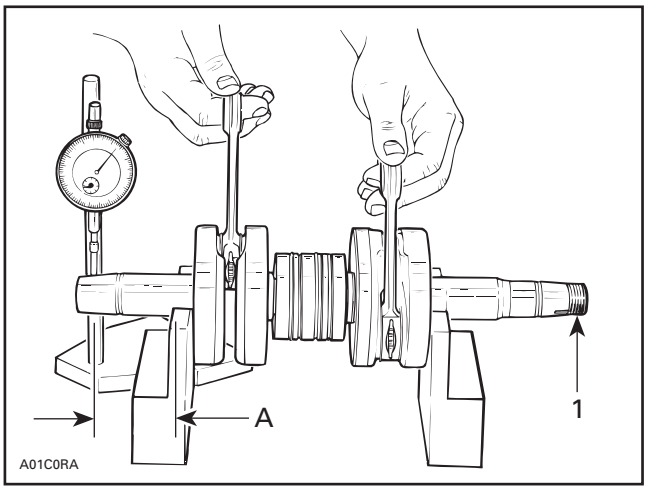
Crankshaft deflection is measured with a dial indicator.

Measuring (in engine)

First, check deflection with crankshaft in engine. If deflection exceeds the specified tolerance, recheck deflection using V-shaped blocks to determine the defective part(s). See below.

Measuring (on bench)

Once engine is disassembled, check crankshaft deflection on V-shaped blocks. If deflection exceeds the specified tolerance, it can be worn bearings or a bent crankshaft. Remove crankshaft bearings and check deflection again on V-shaped blocks to determine the defective part(s). See measurement A in following illustration.



TYPICAL

1. Measure at mid point between the key and the first thread
A. See table below

Crankshaft Deflection on PTO Side

ENGINE TYPE	DISTANCE A mm (in)	MAXIMUM ON PTO SIDE mm (in)
443	75.5 (2.972)	0.06 (.002)
494 and 583	86 (3.386)	
503	82.5 (3.248)	
670	100 (3.937)	

Crankshaft Deflection on MAG Side

ENGINE TYPE	MAXIMUM ON MAG SIDE mm (in)
All	0.03 (.001)

Crankshaft Deflection in Center of Crankshaft

ENGINE TYPE	MAXIMUM IN CENTER OF CRANKSHAFT
All	0.08 mm (.0031 in)

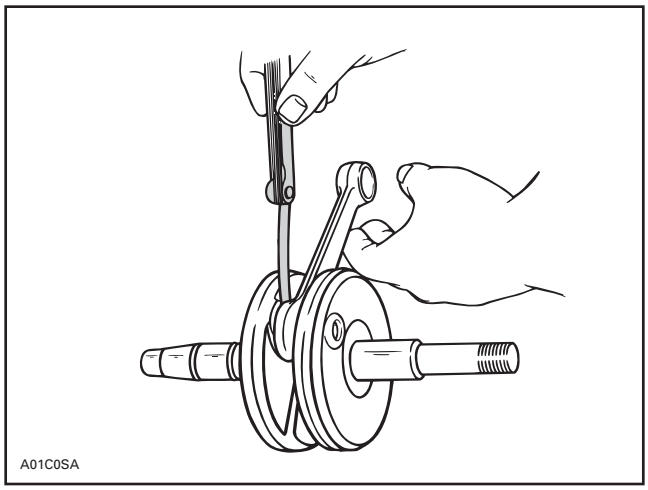
NOTE: Crankshaft deflection cannot be correctly measured between centers of a lathe.

If the deflection exceeds the specified tolerance, crankshaft should be repaired or replaced.

CONNECTING ROD BIG END AXIAL PLAY

ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
443 and 503	0.20 - 0.53 mm (.008 - .021 in)	1.00 mm (.039 in)
494, 583 and 670	0.40 - 0.75 mm (.016 - .029 in)	1.20 mm (.047 in)

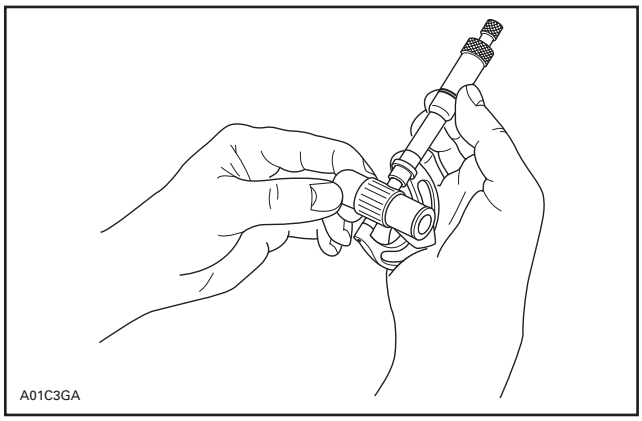
Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight. If the distance exceeds specified tolerance, repair or replace the crankshaft.

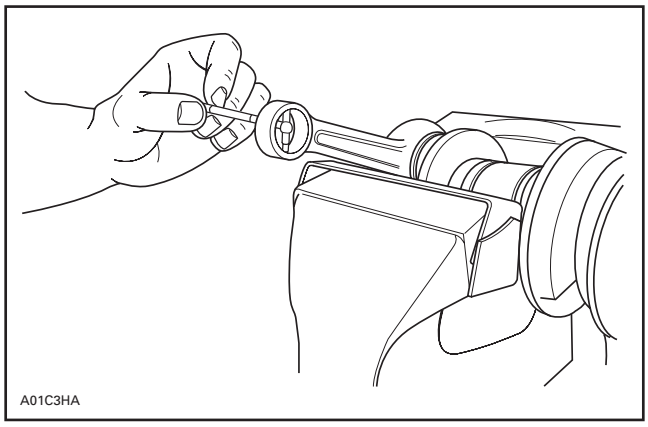


TYPICAL

CONNECTING ROD/PISTON PIN CLEARANCE

Measure piston pin with its needle bearing. Compare to inside diameter of connecting rod.





When worn out these needle bearings are noisy.

ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
All	0.03 - 0.012 mm (.0001 - .0005 in)	0.015 mm (.0006 in)

CONNECTING ROD/CRANKPIN CLEARANCE

ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
443 and 503	0.020 - 0.033 mm (.0008 - .0013 in)	0.05 mm (.0020 in)
494, 583 and 670	0.038 - 0.050 mm (.0015 - .0020 in)	0.06 mm (.0024 in)

CRANKSHAFT END-PLAY

All Engine Types

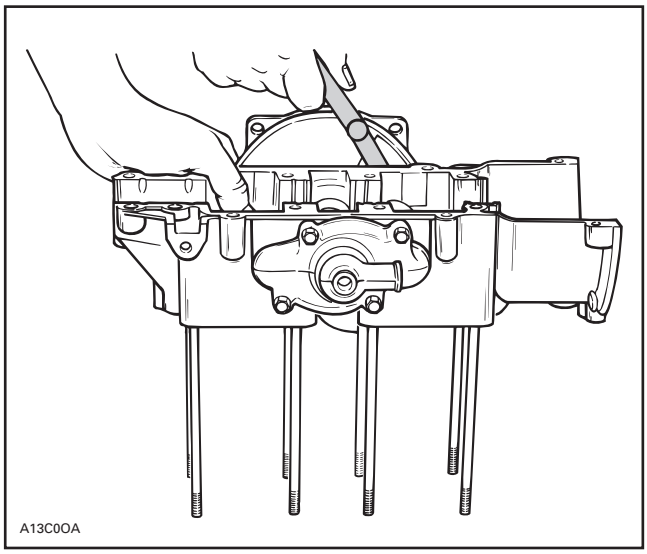
End-play is not adjustable but it should be between 0.10 - 0.30 mm (.004 - .012 in).

CRANKCASE/ROTARY VALVE GAP

ENGINE TYPE	MINIMUM	MAXIMUM
Liquid cooled engines	0.27 mm (0.011 in)	0.40 mm (0.016 in)

First Method

To measure this gap use a feeler gauge inserted between rotary valve and upper crankcase with the rotary valve cover in place **without its O-ring**. Check the most surface as possible. Follow the same procedure with the lower crankcase.



TYPICAL

The gap can be measured with the engine installed on vehicle. Use 45° bent blade feeler gauge (Snap-on FB300A) inserted through intake socket of valve cover.

If gap is under tolerances, rotary valve cover can be refaced to increase clearance.

If gap is over tolerances, cover replacement may be necessary. Check if surfaces on crankcase halves are damaged, replacement wear plate is available.

Second Method

Remove rotary valve cover and its O-ring.

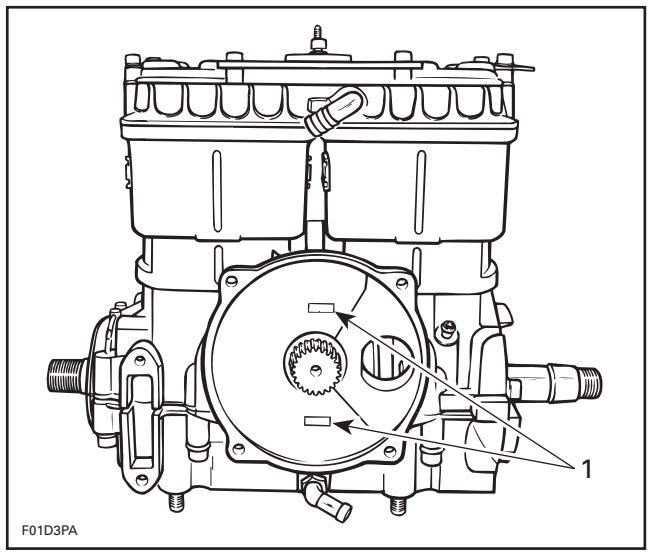
Use the following type of solder:

– rosin core
– diameter: 0.5 mm (.020 in)
– electronic application (available at electronic stores)

Install 2 short pieces (13 mm (1/2 in) long) of solder directly on rotary valve, one above and one below rotary valve gear. Apply grease to hold solder in position.

Reinstall cover in place WITHOUT its O-ring and torque screws to 20 N•m (15 lbf•ft).

Remove cover then clean and measure compressed solder thickness, it must be within the specified tolerance.



TYPICAL
1. Solder

CHECKING SURFACE FLATNESS

Intake manifold, intake manifold cover, rotary valve cover can be checked for perfectly mating surfaces.

Lay part on a surface plate (marble, mirror or thick glass plate).

Holding down one end of part, try pushing down the other end.

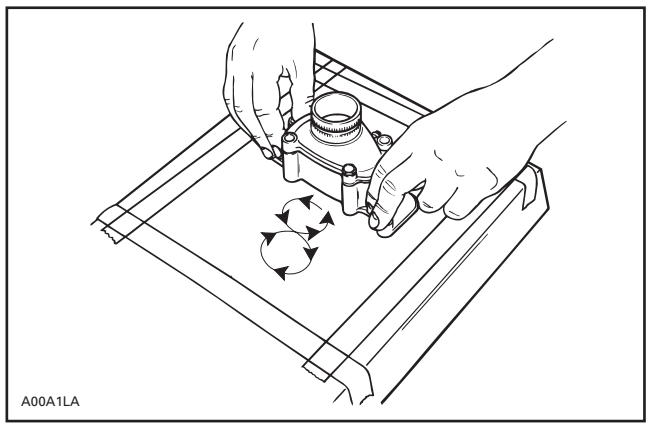
If any play is felt, part must be rectified.

RECTIFYING SURFACES

Stick a fine sand paper sheet on the surface plate then lightly oil the sand paper.

Rub manifold mating surface on sand paper using 8-figure movements.

Sand until mating surface is perfectly straight.



CHECKING CRANKSHAFT ALIGNMENT

Install a degree wheel (P/N 414 352 900) on crankshaft end.

Remove both spark plugs.

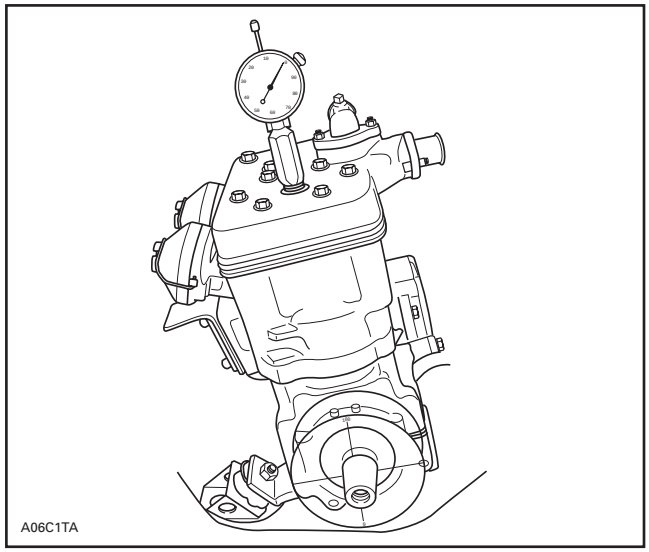
Install a TDC gauge (P/N 414 104 700) in spark plug hole on MAG side.

Bring MAG piston at top dead center.

Rotate degree wheel (not crankshaft) so that 360° mark aligns with center of crankcase. Scribe a mark on crankcase.

Remove TDC gauge and install it on PTO side.

Bring PTO piston to top dead center.



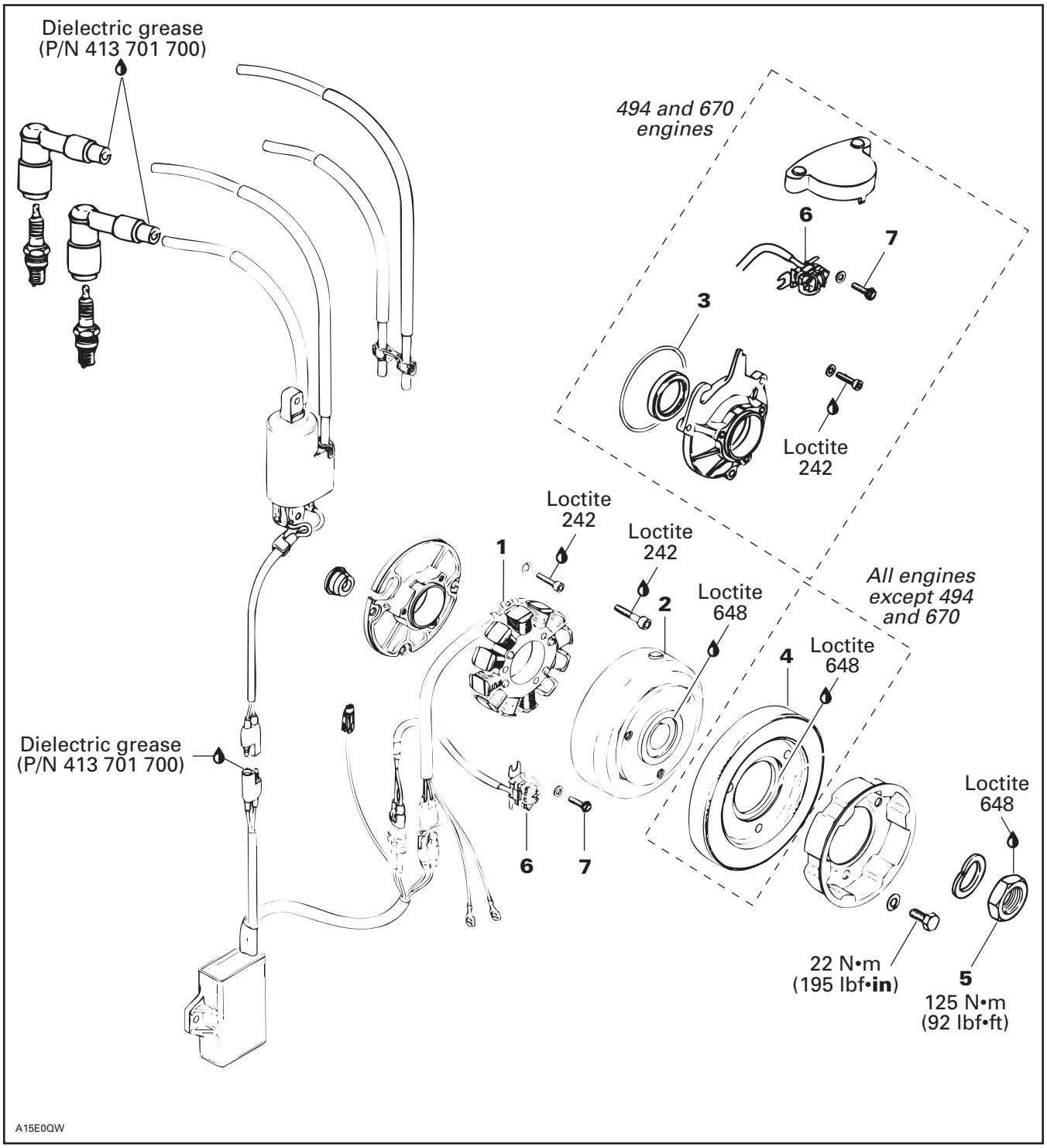
Interval between cylinders must be exactly 180°.

Any other reading indicates a misaligned (twisted) crankshaft.

CDI SYSTEM

NIPPONDENSO TRIGGER COIL IGNITION SYSTEM

494, 583 and 670 Engines



PARTS

NOTE: The following procedures can be done without removing the engine from chassis. To facilitate magneto removal, hold drive pulley with tool (P/N 529 027 600).

CDI means Capacitor Discharge Ignition system.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ CAUTION

Clean stator and magneto using only a clean cloth.

DISASSEMBLY

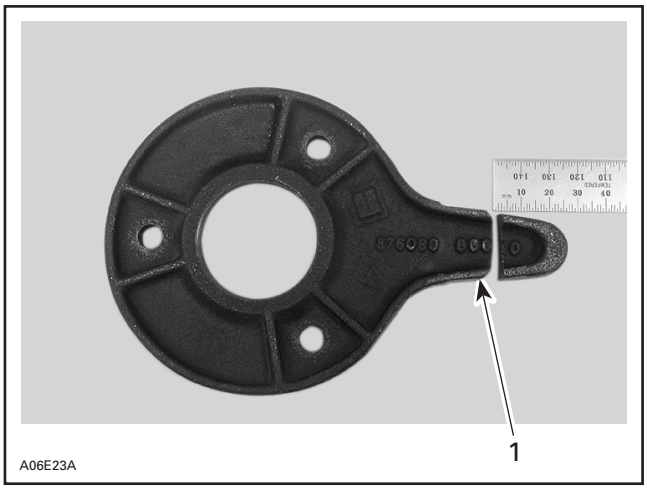
2,5, Magneto and Magneto Flywheel Nut

To gain access to magneto assembly, remove the following parts as needed on different engines:

– muffler
– rewind starter
– starting pulley

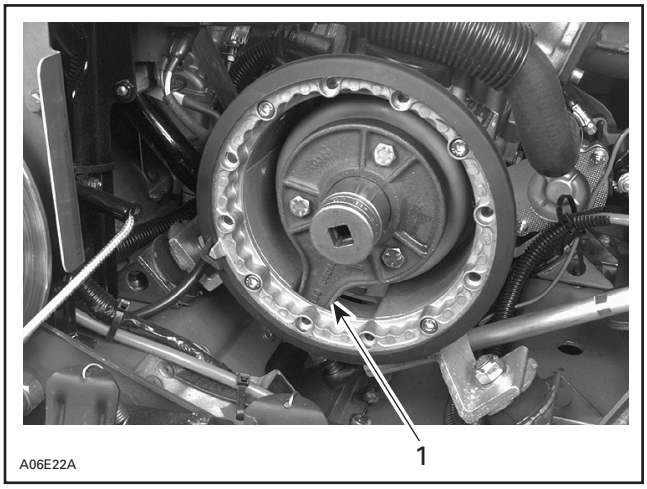
To remove magneto flywheel retaining nut:

Use magneto puller ring (P/N 420 876 080) modified as shown.



1. Cut by 25 mm (1 in)

Install puller with its tab in magneto housing opening.



TYPICAL
1. Tab in magneto housing opening

– Remove magneto flywheel nut, using a 30 mm socket machined to 40 mm (1.580 in) outside diameter by 16 mm (5/8 in) long.

NOTE: To correctly remove a threadlocked fastener it is first necessary to tap on the fastener to break threadlocker bond. This will eliminate the possibility of thread breakage.

To remove magneto flywheel, install the puller (P/N 529 022 500).

– Tighten puller bolt and at the same time, tap on bolt head using a hammer to release magneto flywheel from its taper.

4, Hydro Damper Ass'y

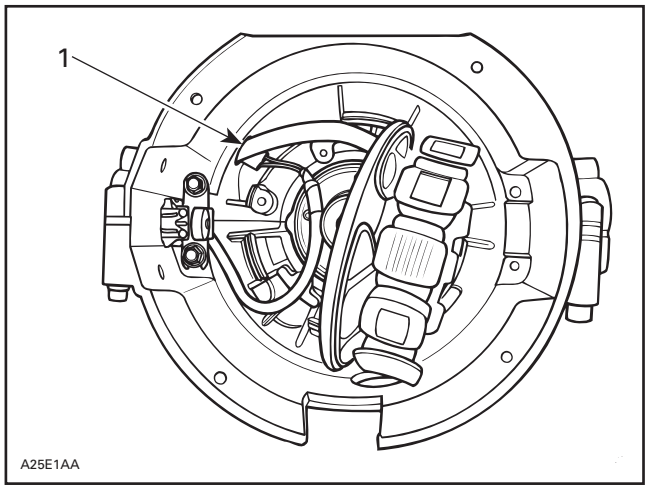
Check for oil leaks and for noisy ring inside. Replace it in both cases.

6,7, Trigger Coil and Screw

Magneto and stator plate must be removed before trigger coil removal.

To replace trigger coil:

– Disconnect trigger coil connector housing.
– Remove grommet from crankcase where trigger coil wire exits magneto housing.
– Remove retaining screws.
– Remove trigger coil and carefully pull wires.
– Thread magneto harness through crankcase hole before trigger coil harness.



1. Magneto harness through crankcase hole

– Install new trigger coil and other parts removed.

PRELIMINARY ADJUSTMENT

NOTE: The final trigger coil adjustment will be done when checking ignition timing.

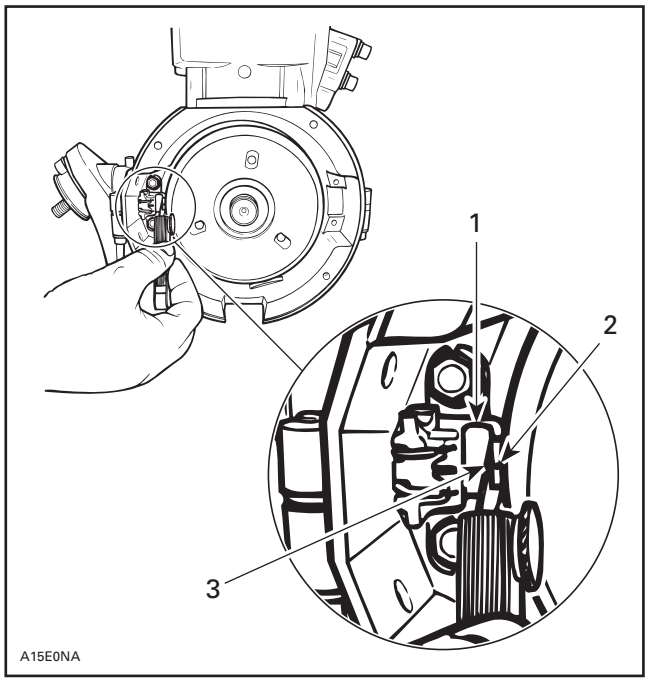
Whenever the trigger coil or the magneto flywheel is removed or replaced, the air gap between the trigger coil and the flywheel protrusion must be checked and adjusted. The purpose of this adjustment is to obtain the minimum clearance between these parts — without touching at any RPM — so that the trigger coil produces its proper electrical output. Ignition timing must also be checked. Refer to IGNITION TIMING 06-02 then look for **Checking Ignition Timing**.

▼ CAUTION

Each time trigger coil air gap is adjusted, ignition timing must be checked.

Proceed as follows:

1. Rotate flywheel so that the protrusion aligns with trigger coil.
2. Using a feeler gauge of 0.75 mm (.030 in) thick (allowable range is 0.55 mm (.022 in) to 1.45 mm (.057 in)), check air gap between center pole of trigger coil and flywheel protrusion.
3. If necessary, adjust by loosening retaining screws and moving trigger coil toward or away of protrusion.
4. Retighten screws and recheck air gap.



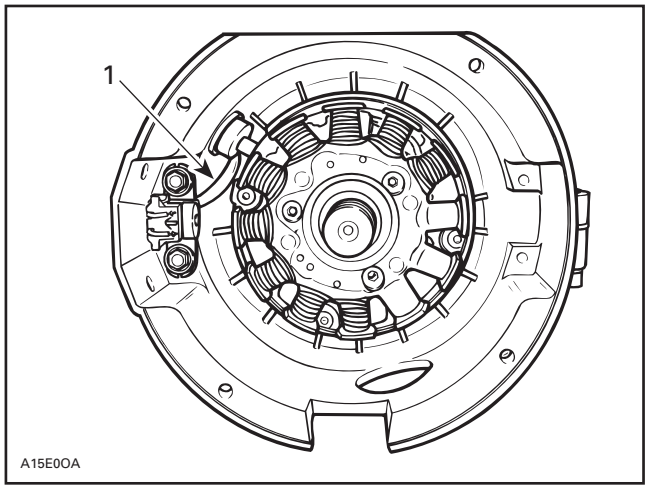
PRELIMINARY TRIGGER COIL AIR GAP ADJUSTMENT

1. Trigger coil
2. Flywheel protrusion
3. Measure at center pole of trigger coil 0.75 mm (.030 in)

1, Stator

To replace stator:

– Disconnect the 3-wire connector (BLACK, RED and BLACK/RED wires).
– Disconnect both YELLOW wires.
– Remove grommet from crankcase where magneto harness exits magneto housing.
– Remove stator plate retaining screws.
– Remove stator plate with stator and carefully pull wires.
– Install new parts and other parts removed taking care not to squeeze trigger coil harness.



1. Trigger coil harness

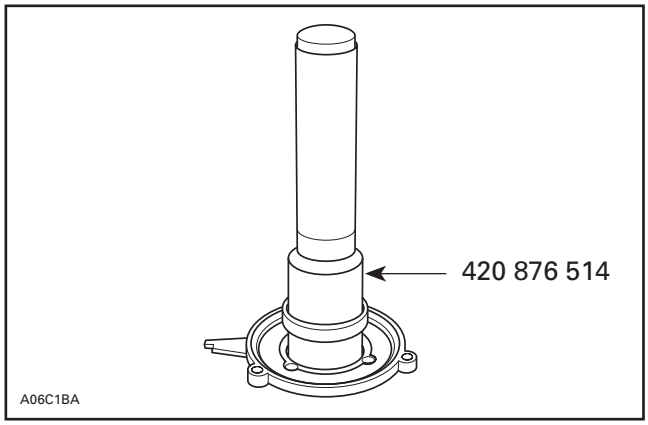
ASSEMBLY

3, Oil Seal

Use pusher (P/N 420 876 514) to install oil seal into stator.

▼ CAUTION

Make sure oil seal is fully pushed against stator shoulder.



2,5, Magneto Flywheel and Nut

Clean crankshaft extension (taper) and apply Loctite 242 (blue) on taper, then position Woodruff key, flywheel and lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue) then tighten nut to 125 N•m (92 lbf•ft).

At reassembly coat all electric connections with silicone dielectric grease (P/N 413 701 700) to prevent corrosion or moisture penetration.

▼ CAUTION

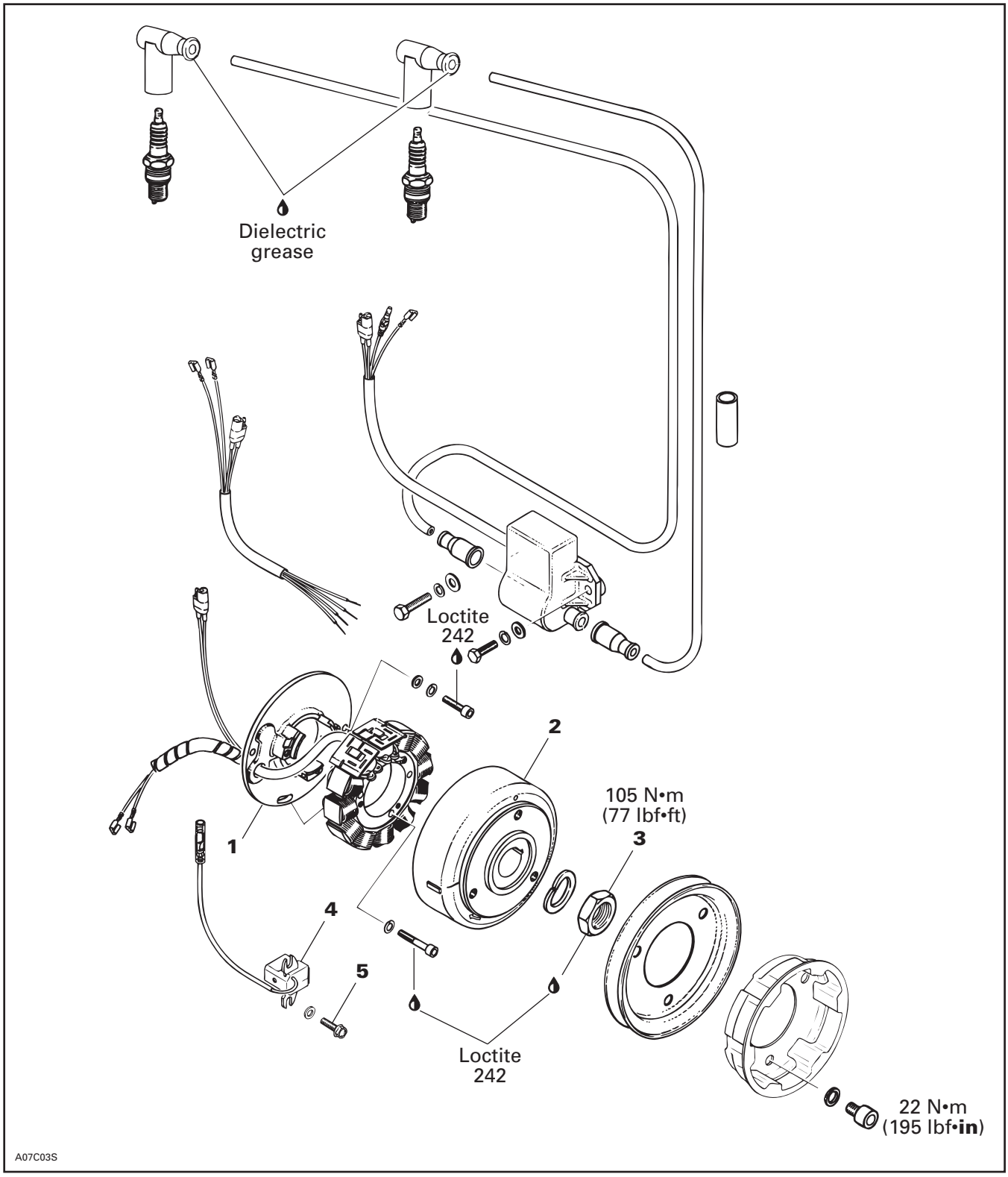
Do not use silicone "sealant", this product will corrode contacts.

Ignition Timing

Check as described in IGNITION TIMING 06-02.

DUCATI IGNITION SYSTEM

443 and 503 Engines



NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ CAUTION

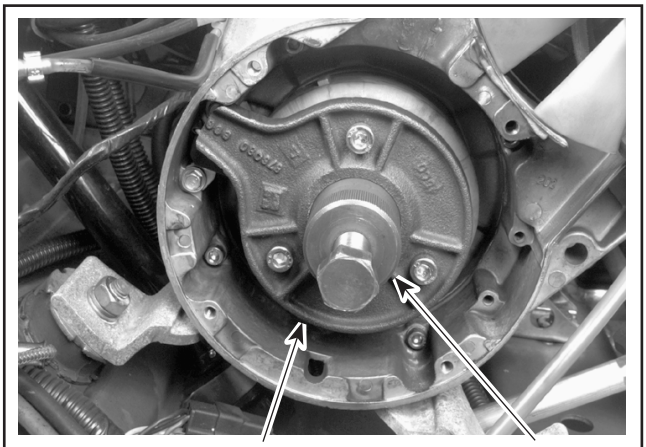
Clean armature and magneto using only a clean cloth.

DISASSEMBLY

To gain access to magneto assembly, remove the following parts as needed on different engines:

– tuned pipe and muffler
– oil injection pump mounting plate from rewind starter
– rewind starter
– starting and V-belt pulleys

NOTE: Before disassembling armature plate, indexing marks should be scribed to facilitate reassembly.



To remove magneto flywheel retaining nut **no. 3**, install puller ring (P/N 420 876 080) and M8 x 20 screws.

– Remove magneto flywheel nut, using a 30 mm socket machined to 40 mm (1.580 in) outside diameter by 16 mm (5/8 in) long.

NOTE: To correctly remove a threadlocked fastener it is first necessary to tap on the fastener to break threadlocker bond. This will eliminate the possibility of thread breakage.

To remove magneto flywheel **no. 2**, install the magneto puller (P/N 529 022 500).

– Tighten puller bolt and at the same time, tap on bolt head using a hammer to release magneto flywheel from its taper.

REPAIR

To replace generator coil **no. 1**:

– Heat the armature plate to 93°C (200°F) around the screw holes to break the threadlocker bond.

To replace trigger coil **no. 4**:

– Disconnect trigger coil wire (RED).
– Remove grommet from crankcase where trigger coil wire exits magneto housing.
– Remove retaining screws **no. 9**.
– Remove trigger coil and carefully pull wire.
– Install new trigger coil and other parts removed.

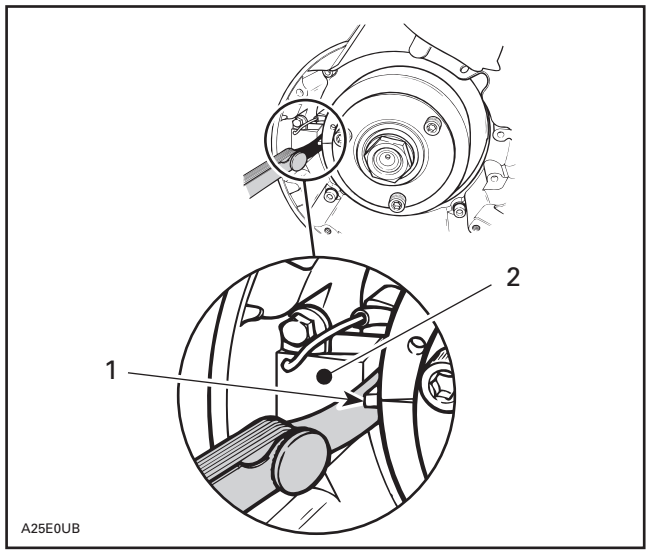
Preliminary Adjustment

NOTE: The final trigger coil adjustment will be done when checking ignition timing.

Whenever the trigger coil or the magneto flywheel is removed or replaced, the air gap between the trigger coil and the flywheel protrusion must be checked and adjusted. The purpose of this adjustment is to obtain the minimum clearance between these parts — without touching at any RPM — so that the trigger coil produces its proper electrical output. Ignition timing must also be checked. Refer to IGNITION TIMING 06-02 then look for **Checking Ignition Timing.**

Proceed as follows:

1. Rotate flywheel so that one protrusion aligns with trigger coil.
2. Using a feeler gauge of 0.45 mm (.018 in) to 0.55 mm (.022 in) thick, check air gap between center pole of trigger coil and flywheel protrusion.
3. If necessary, adjust by loosening retaining screws and moving trigger coil toward or away of protrusion.
4. Retighten screws and recheck air gap.



ADJUSTING TRIGGER COIL AIR GAP

1. *Flywheel protrusion*
2. *Trigger coil*

To replace armature:

– Disconnect the 2-wire connector (GREEN and WHITE wires).
– Disconnect YELLOW/BLACK and YELLOW wires.
– Remove grommet from crankcase where magneto harness exits magneto housing.
– Remove armature plate retaining screws.
– Remove armature plate with armature and carefully pull wires.
– Install new parts and other parts removed.

ASSEMBLY

Clean crankshaft extension (taper).

Apply Loctite 242 (blue) on taper.

Position Woodruff key, flywheel and lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue) before tightening nut to 105 N•m (77 lbf•ft).

At reassembly coat all electric connections with silicone dielectric grease (P/N 413 701 700) to prevent corrosion or moisture penetration.

▼ CAUTION

Do not use silicone "sealant", this product will corrode contacts.

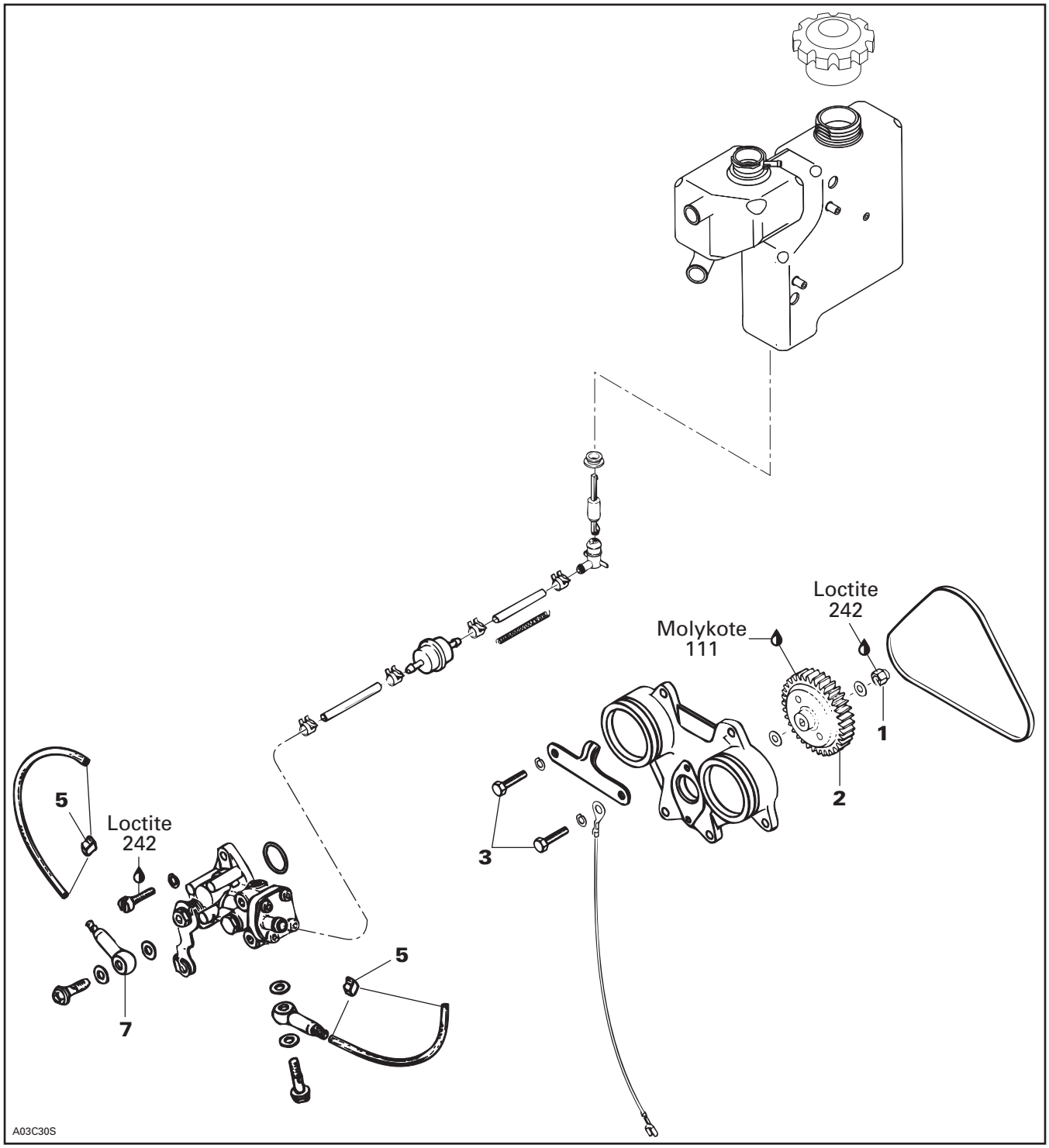
Ignition Timing

Check as described in IGNITION TIMING 06-02.

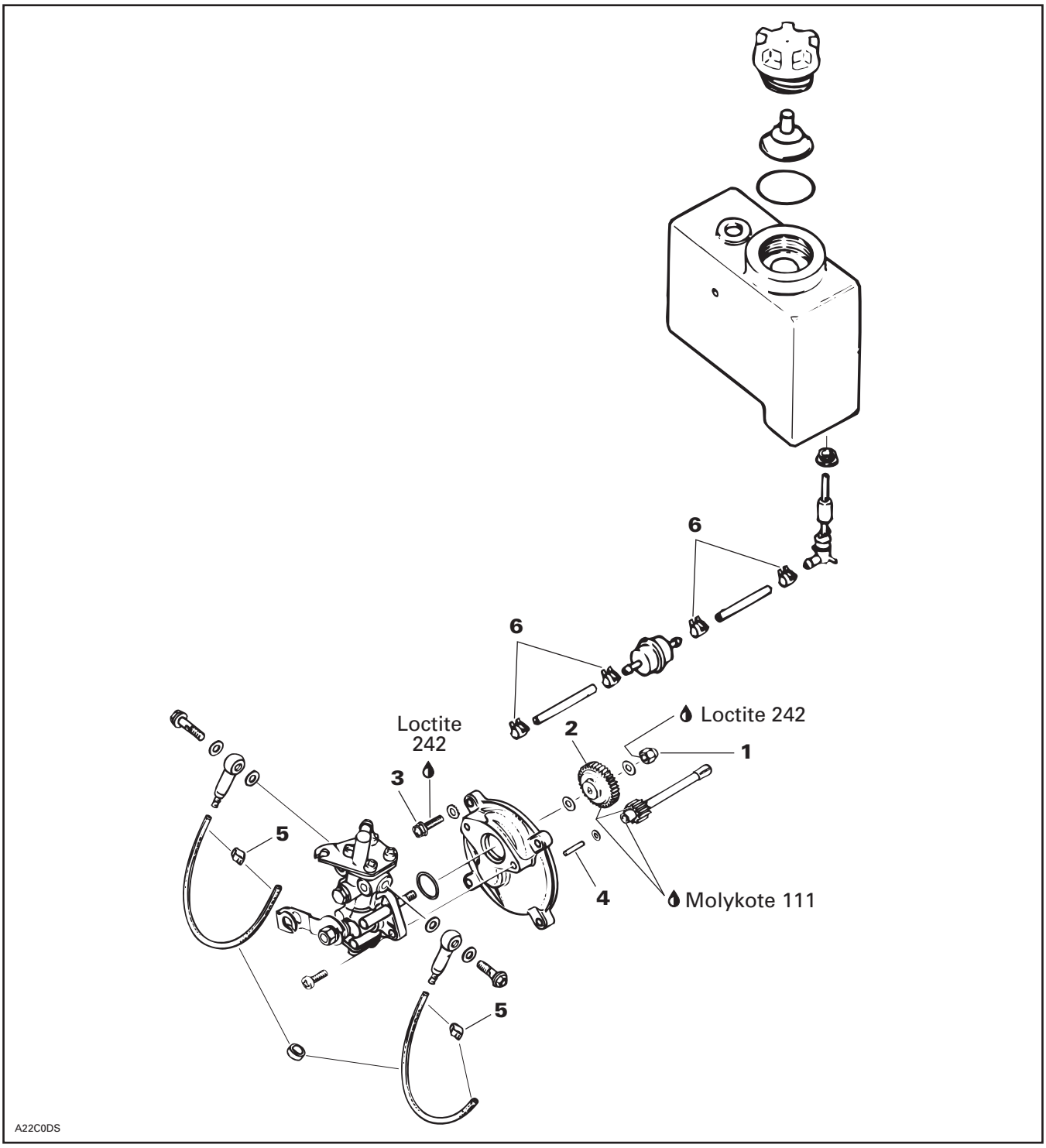
OIL INJECTION SYSTEM

OIL INJECTION PUMP

494, 583 and 670 Engines



443 and 503 Engines



TYPICAL

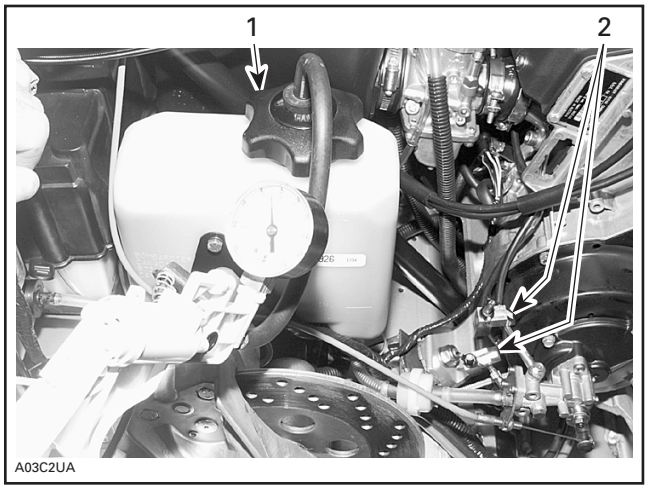
OIL SYSTEM LEAK TEST

All Models

The following test will indicate any leak from oil reservoir to the banjo fitting(s).

Install on oil reservoir special cap of leak testing kit (P/N 529 033 100).

Install hose pinchers (P/N 295 000 076) on outlet hoses.



TYPICAL

1. *Special cap on reservoir*
2. *Hose pinchers on outlet hoses*

Connect pump of leak testing kit to special cap.

Pressurize oil system to 34 kPa (5 PSI). That pressure must not drop during 3 minutes.

If pressure drops, locate leak(s) and repair/replace leaking component(s). To ease locating leak(s) spray soapy water on components, bubbles will indicate leak location(s).

OIL PUMP IDENTIFICATION

Different engines use different pumps. See identification on lever no. 7.

▼ CAUTION

Always mount proper pump on engine.

ENGINE TYPE	OIL PUMP IDENTIFICATION
443	E6*
494 Skandic WT LC	N4
494 Formula/GT/ MX Z/Summit	N8*
503 Skandic WT/SWT	E4
583	N9*
670 on Formula Z 670/DLX 670	N9*
670 on MX Z 670 HO and Summit X 670	12

* E6, N8 and N9 oil pumps do not supply any oil at idle. They are called zero oil delivery at idle.

NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

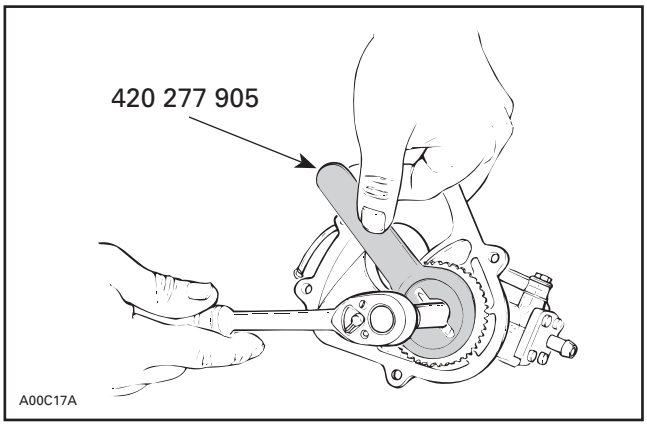
DISASSEMBLY

NOTE: Some oil pump components are not available as single parts.

1,2, Gear Retaining Nut and Oil Pump Gear

To remove gear retaining nut, first extract the needle roller with pliers then lock gear in place using one of the following gear holder.

ENGINE TYPE	TOOL P/N
443/494/503/583/670	420 277 905



TYPICAL

ASSEMBLY

2, Oil Pump Gear

At gear assembly, apply a light coat of Molykote 111 (P/N 413 707 000) on gear teeth.

4, Needle Roller (fan cooled engine only)

The needle roller must be engaged as deep as possible in the pump mounting flange.

5,6, Spring Clip and Clamp

Always check for spring clips and clamps tightness.

3, Screw

Torque to 9 N•m (80 lbf•**in**).

Make sure cable barrel is well-seated in oil pump lever.

Secure barrel with plastic washer and circlip.

Verify cable and oil pump lever operation.

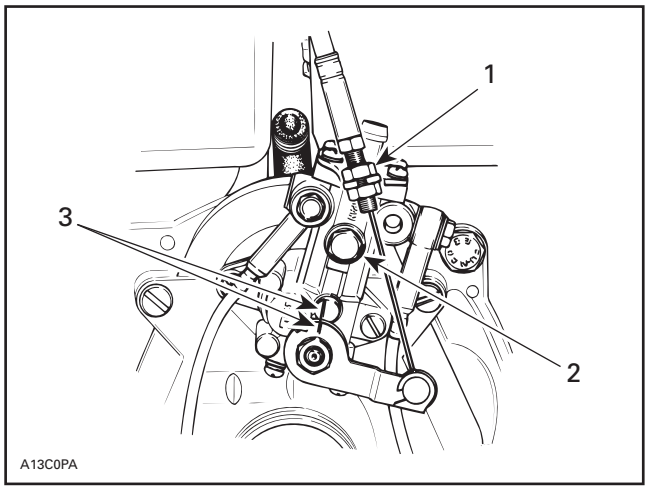
ADJUSTMENT

Prior to adjusting the pump, make sure all carburetor adjustments are completed.

Synchronizing Pump with Carburetor

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place. The marks on the pump casting and on the lever must align. Pump lever mark may be up to 2 mm (.080 in) at right of casting mark. So pump may be partially opened at idle. Loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.



1. *Adjuster nut*
2. *Bleeder screw*
3. *Marks in line*

▼ CAUTION

Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

Bleeding Oil Lines

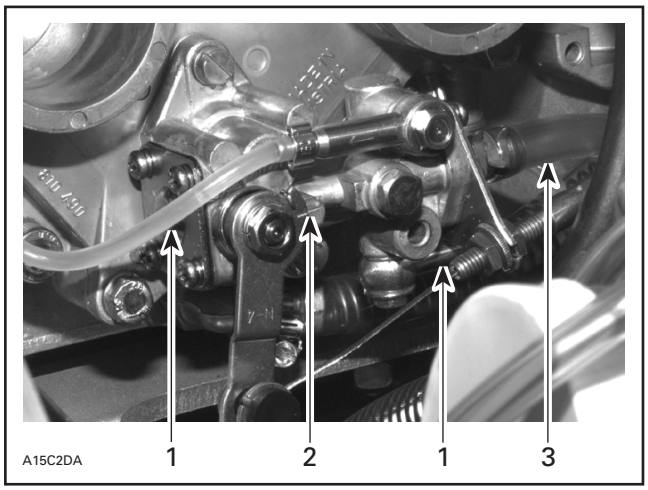
S-Series Only

Remove air silencer and move carburetors aside.

All Models

Bleed main oil line (between tank and pump) by loosening the bleeder screw until air has escaped from the line. Add injection oil as required.

Check also for proper pump lever adjustment. Marks must be aligned when throttle lever is activated just enough to take all cable play.

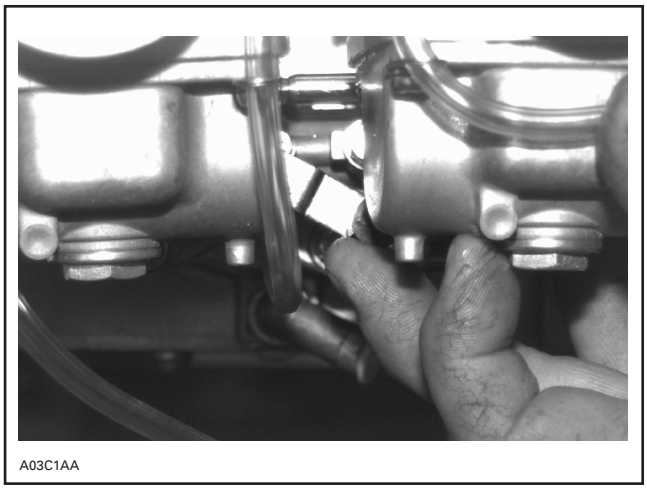


1. Small oil line
2. Marks aligned
3. Main oil line

Reinstall all parts except air silencer.

Bleed the small oil line between pump and intake manifold by running engine at idle while holding the pump lever in fully open position.

NOTE: If the air silencer has been reinstalled, make a J hook out of mechanical wire to lift the lever.



TYPICAL — ENGINE AT IDLE

S-Series Only

Reinstall air silencer.

◆ WARNING

Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

CHECKING OPERATION

Oil Pump

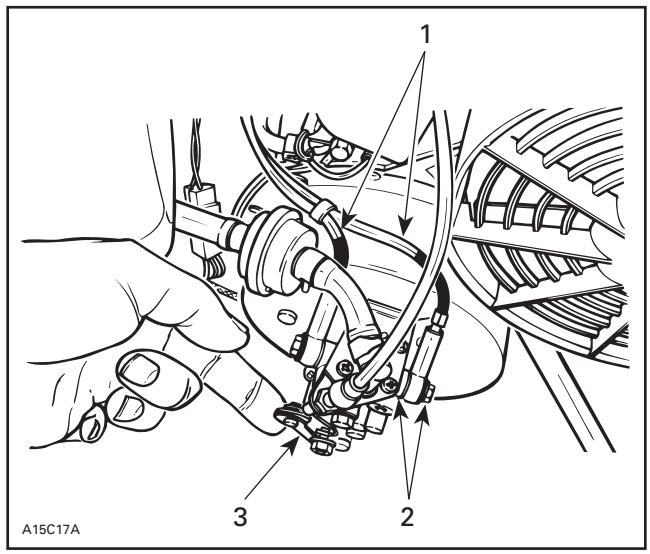
On Vehicle

NOTE: Main oil line must be full of oil. See bleeding procedure above.

Lift rear of vehicle and support with a mechanical stand. Unbolt banjo fittings from pump. Start engine and stop it as soon as it fires.

Check that oil level in small oil lines is passed banjo fittings end by about 25 mm (1 in) (this will be indicated by a clear section of small oil lines of about 25 mm (1 in)). Repeat the procedure until this condition is attained.

Reconnect banjo fittings with a washers on each side, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.



TYPICAL — ENGINE AT IDLE

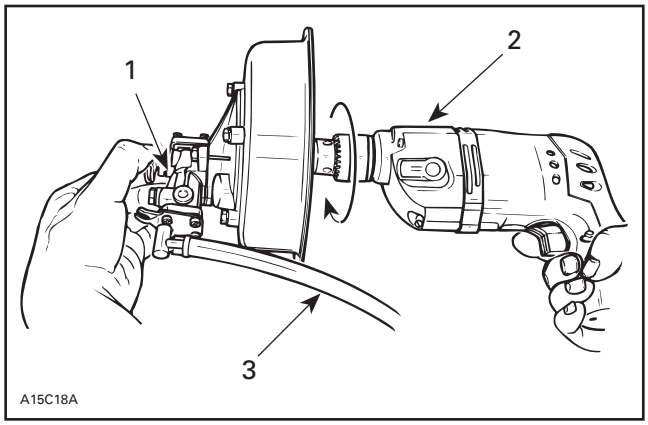
1. Oil columns advancing
2. Washer on each side
3. Fully open position

If not, remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as describes below.

NOTE: Through normal use, oil level must not drop in small tubes. If oil drops, verify check valve operation in banjo fittings.

Test Bench

Connect a hose filled with injection oil to main line fitting. Insert other hose end in an injection oil container. Using a counterclockwise rotating drill rotate pump shaft. Oil must drip from outer holes while holding lever in a fully open position. If not replace pump.



TYPICAL

1. *Fully open position*
2. *Counterclockwise rotating drill*
3. *Main line*

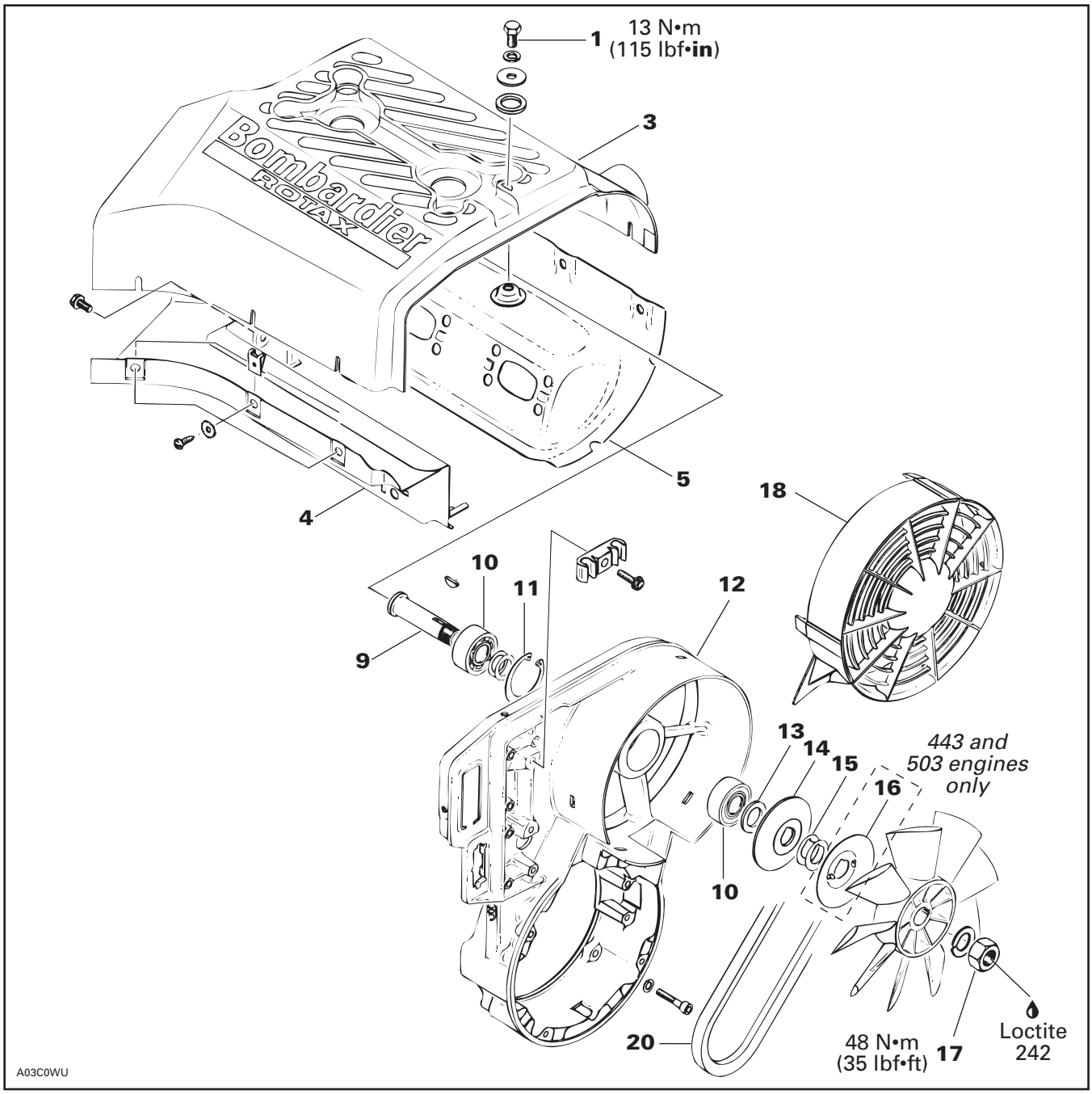
Banjo Fitting

Inside the banjo fitting, there is a ball that acts as a check valve. To verify this check valve, proceed the same as for checking pump operation on vehicle. First unbolt banjo fitting from pump. After restarting the engine, check that a clear section in small oil line is present. Reconnect banjo fitting.

Run engine at idle. Oil column must advance. If the check valve is faulty, oil column will go back and forth. Replace if so.

AXIAL FAN COOLING SYSTEM

443 and 503 Engines



NOTE: The following procedures can be done without removing engine from chassis.

REMOVAL

NOTE: To facilitate further disassembly, fan nut may be removed before removing fan housing.

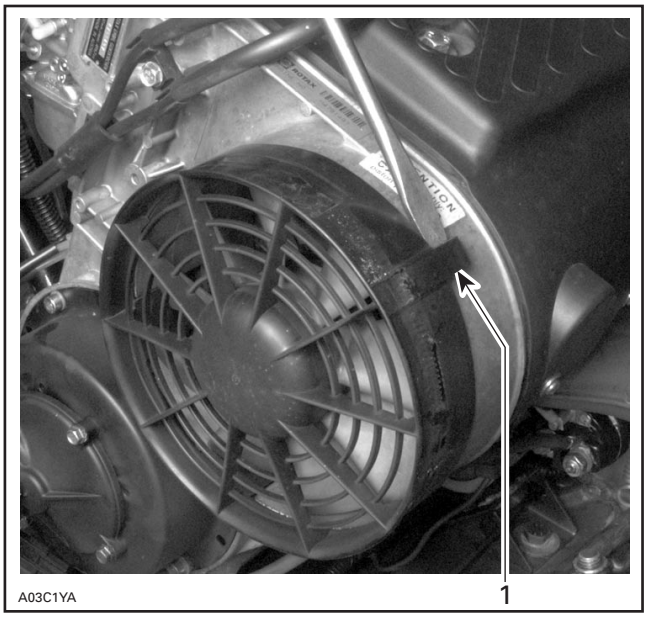
Remove rewind starter, starting pulley, trigger coil wire from 4-connector housing then fan housing ass'y.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

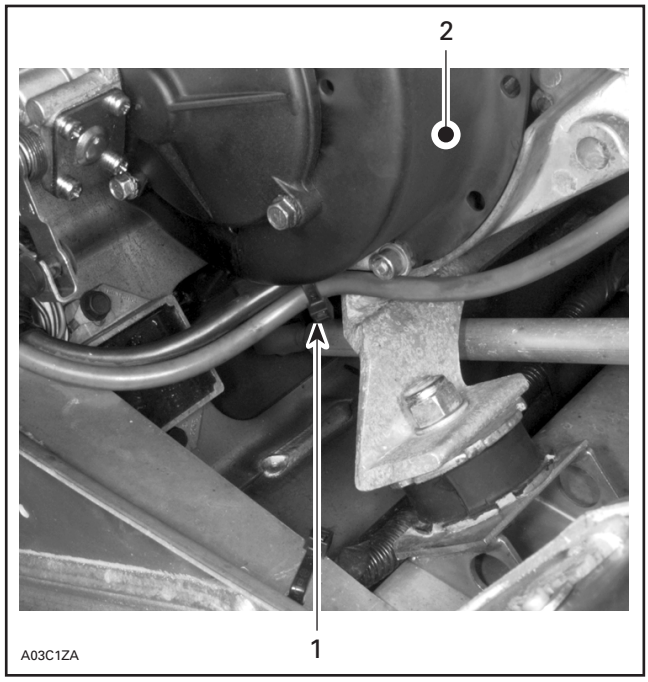
DISASSEMBLY AND ASSEMBLY

Using a flat screwdriver, lift fan protector tabs as shown in the following photo, then remove fan protector.



1. Lift tab and remove fan protector

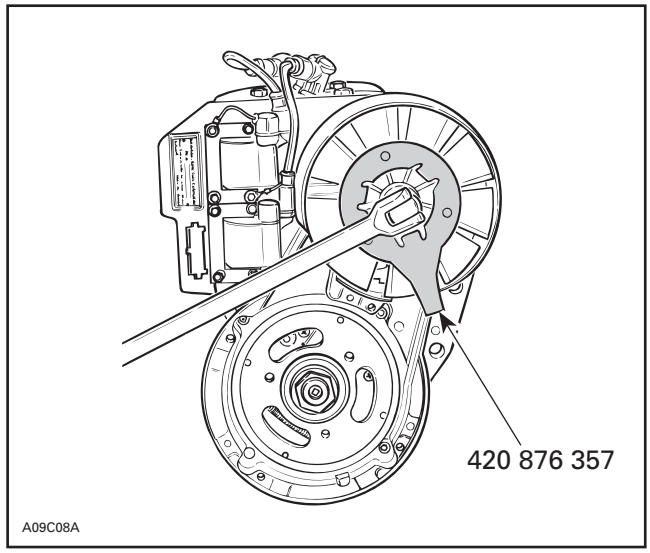
Cut locking tie located under rewind starter (electric start models only).



ELECTRIC START MODELS ONLY

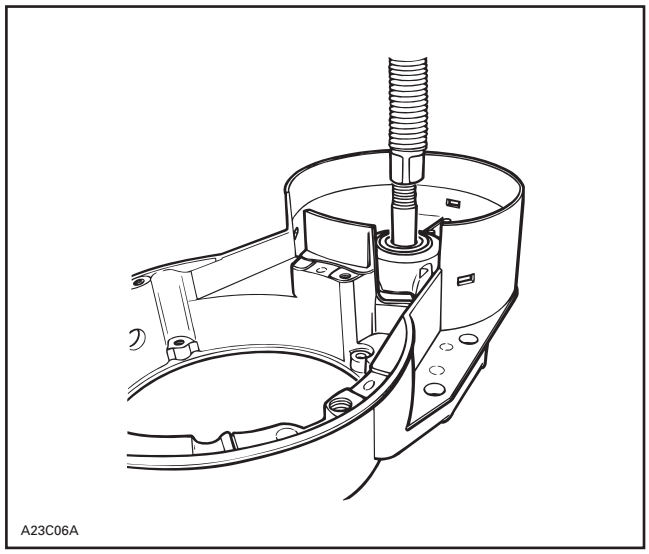
1. Cut this locking tie
2. Rewind starter

To remove or install fan pulley retaining nut no. 17, lock fan pulley with special holder wrench (P/N 420 876 357). At assembly, torque nut to 48 N•m (35 lbf•ft).

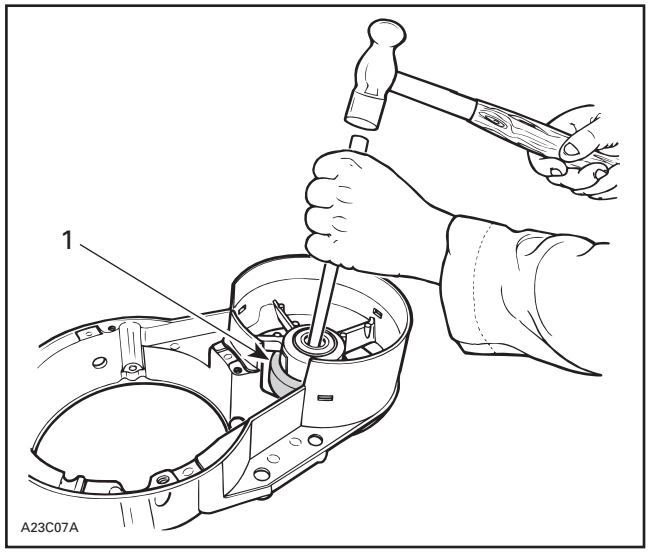


TYPICAL

Using a press, drive the fan shaft **no. 9** out.



Support fan housing **no. 12** with a ring. With a punch, working all around bearing **no. 10** inner race, drive bearing out of fan housing. Keep shims for installation.



1. Ring supporting fan housing

Remove circlip **no. 11** then remaining bearing.

To install, press one bearing in place then install circlip and shims. Press the other bearing from opposite side until it is flush with housing. Press fan shaft from engine side of fan housing. Check for free rolling action.

INSTALLATION

At assembly, apply a light coat of Loctite 242 (blue) on screw **no. 1** threads.

A gasket must be placed on both sides (inner and outer) of intake and exhaust holes of cylinder cowl **nos. 4** and **5**.

Reinstall fan protector **no. 18** properly.

◆ WARNING

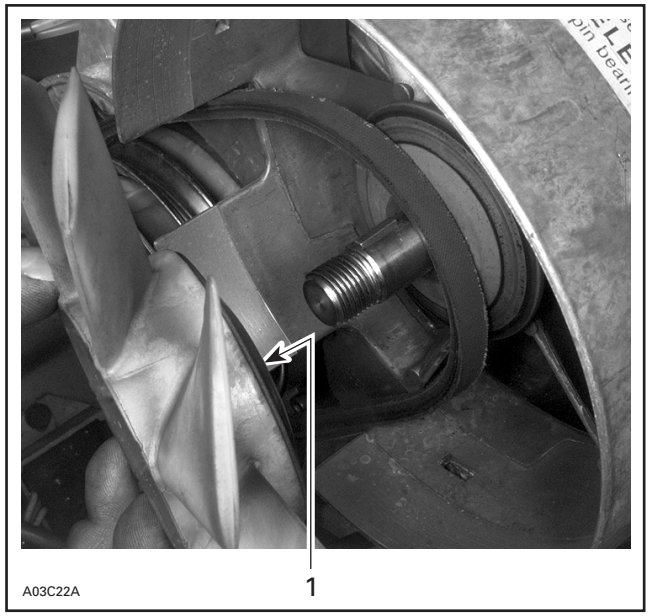
Always reinstall fan protector after servicing.

FAN BELT REPLACEMENT AND DEFLECTION ADJUSTMENT

Remove muffler, rewind starter and on so equipped models connecting flange. Following procedure described above.

Using fan holder tool (P/N 420 876 357), remove fan nut.

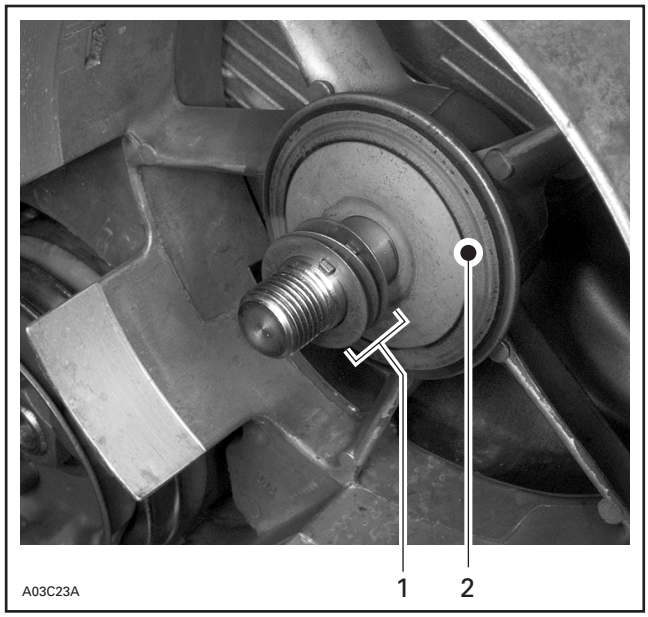
Remove fan with pulley half.



1. Remove fan with pulley half

Remove fan belt.

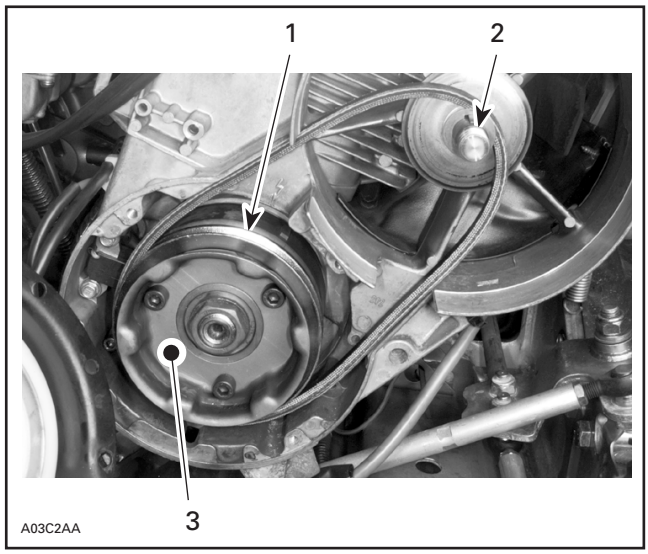
Leave shims and second half pulley in place. Refer to the following photo.



1. Keep shims
2. Leave second half pulley in place

Reassembly

Install fan belt on bottom pulley first then position onto fan shaft, as shown in the next photo.



FAN BELT PROPERLY INSTALLED ON BOTTOM PULLEY AND FAN SHAFT

1. Bottom pulley
2. Fan shaft
3. Starting pulley

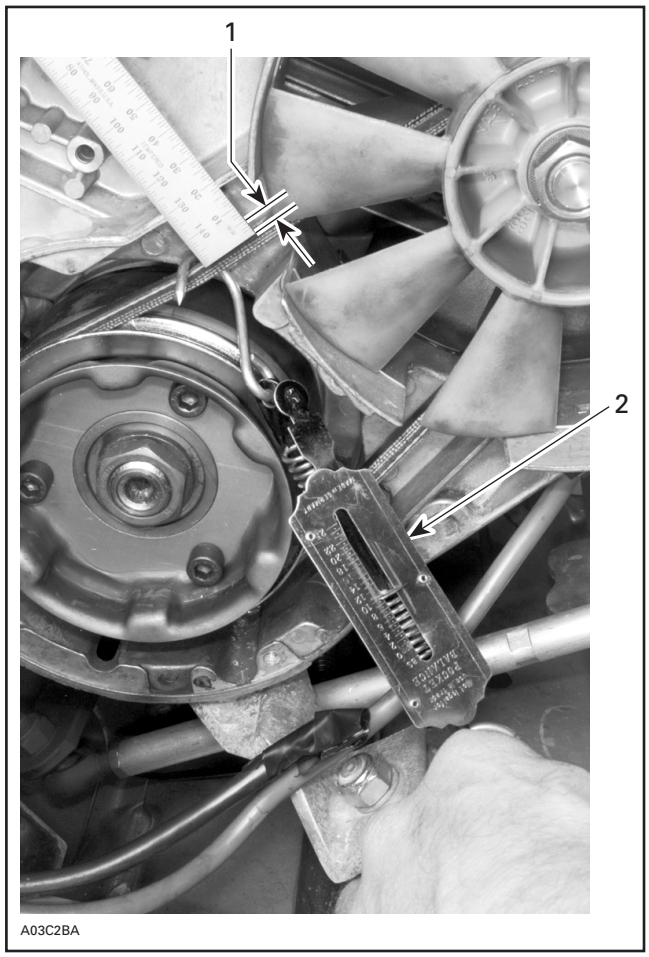
Reinstall fan assembly on fan shaft. Temporarily tighten fan nut.

▼ CAUTION

When reinstalling fan assembly, ensure that key is properly positioned into fan shaft keyway.

Fan Belt Deflection Adjustment

Check fan belt deflection using a ruler and a fish scale positioned midway between pulleys as per following photo.



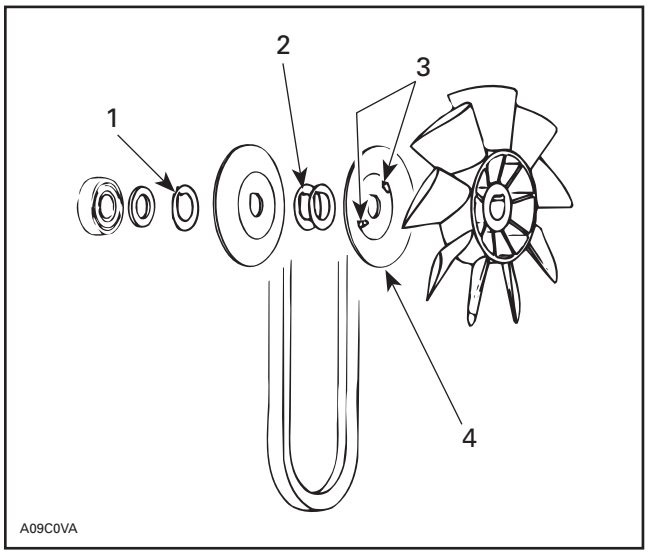
TYPICAL

1. Measure deflection here
2. Fish scale

Belt deflection must be according to the following specifications:

ENGINE TYPE	BELT DEFLECTION	FORCE APPLIED
443 and 503	9.5 mm (3/8 in)	5 kg (11 lb)

To adjust deflection tension, add or remove shim(s) **no. 15** between pulley halves **nos. 14** and **16**. Install excess shim(s) between distance sleeve **no. 13** and half pulley **no. 14** (housing side).

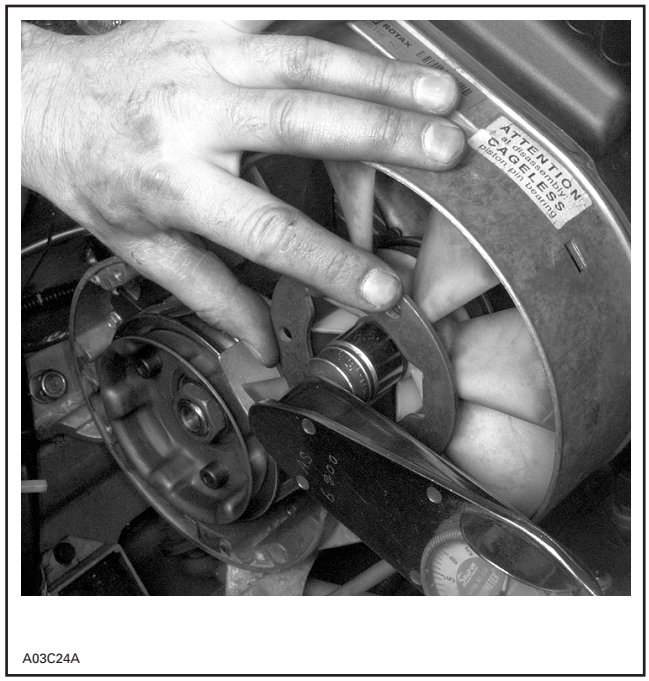


1. Unused shim(s) here
2. Adjust here
3. Positioning noses
4. Some engines only

Some engines have a separate metal pulley half instead of using back of fan as pulley half. On first mentioned engines, select pulley halves so that the one with 2 positioning noses will be on fan side. Ensure to insert these nose' into fan notches.

Once fan belt is properly adjusted, torque fan nut to 48 N•m (35 lbf•ft) using fan holder tool (P/N 420 876 357), as shown in the following photo.

NOTE: Apply Loctite 242 (blue) on fan nut threads.



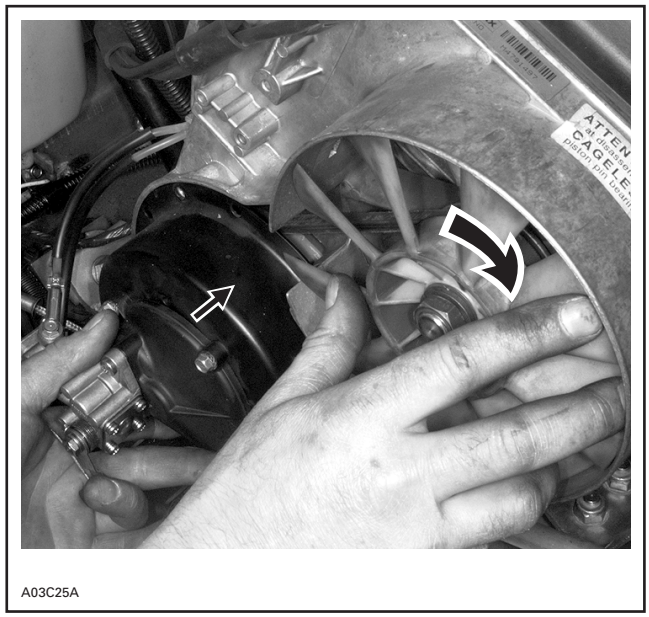
TORQUE FAN NUT USING FAN HOLDER TOOL

Finalizing Reassembly

Reinstall rewind starter.

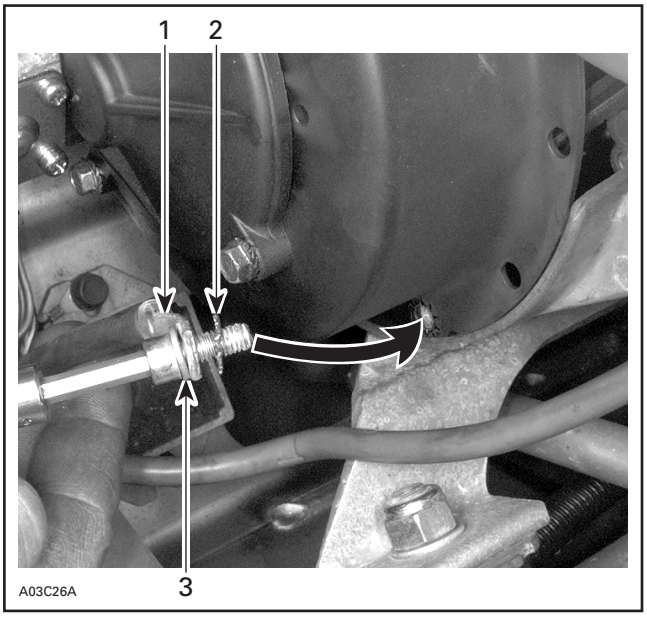
▼ CAUTION

When installing rewind starter, ensure that oil pump shaft is properly positioned. Do not force shaft insertion. Turn fan until oil pump shaft slides in place, as shown in the following photo.



TURN FAN TO SLIDE OIL PUMP SHAFT IN PLACE

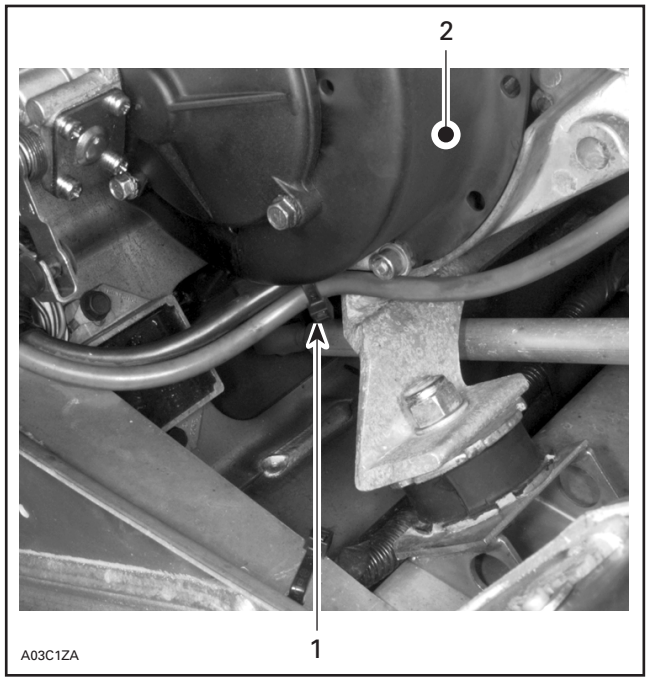
Secure rewind starter with original screws and ensure that ground cable (electric start models only) is properly installed, as shown in the following photo.



ELECTRIC START MODELS ONLY

1. *Ground cable*
2. *Tooth washer*
3. *Washer*

On electric start models, secure cables with a locking tie.



ELECTRIC START MODELS ONLY

1. *Secure cables with a locking tie*
2. *Rewind starter*

Reinstall fan protector no. 18 properly.

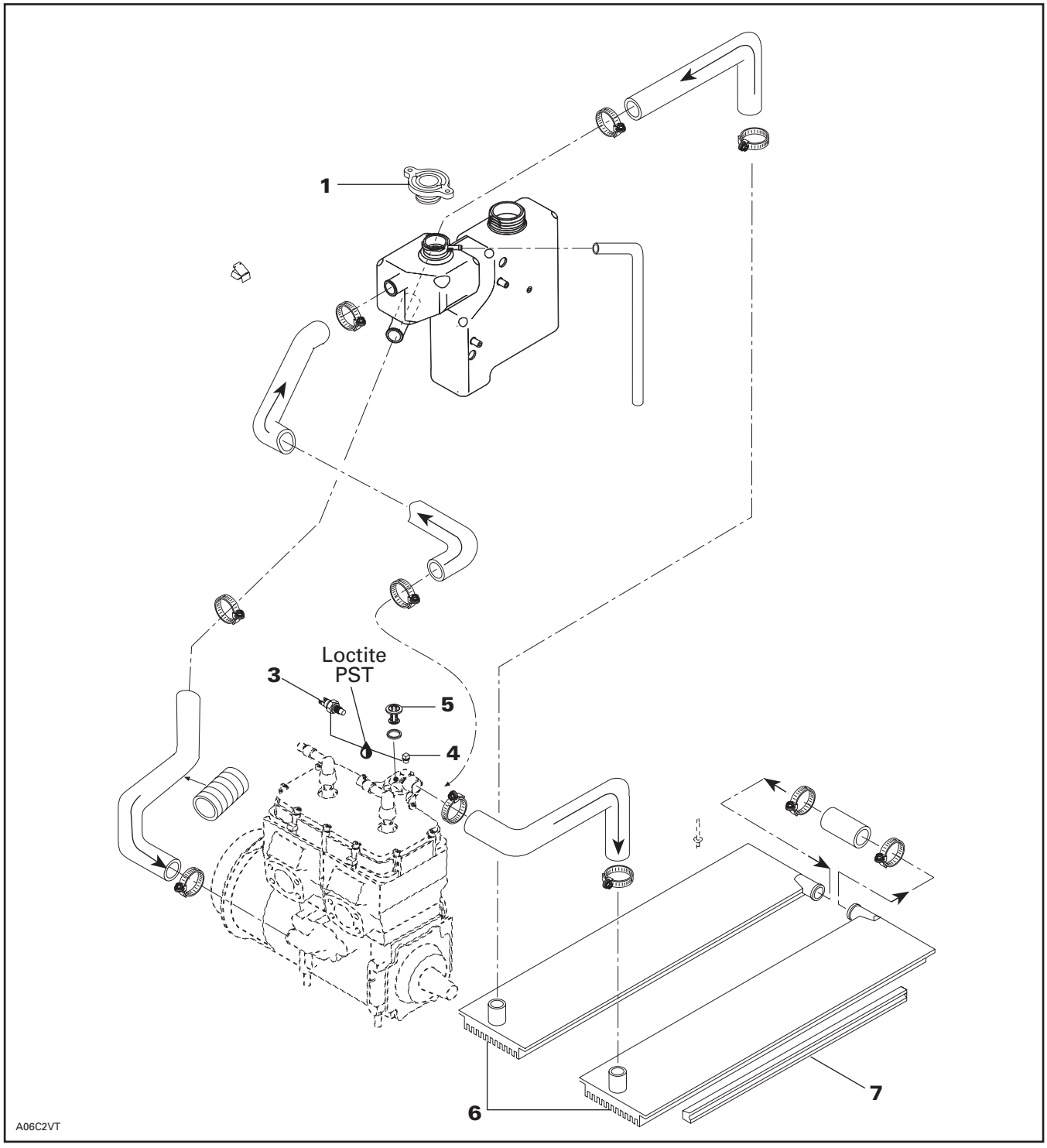
◆ WARNING

Always reinstall fan protector after servicing.

Reinstall muffler.

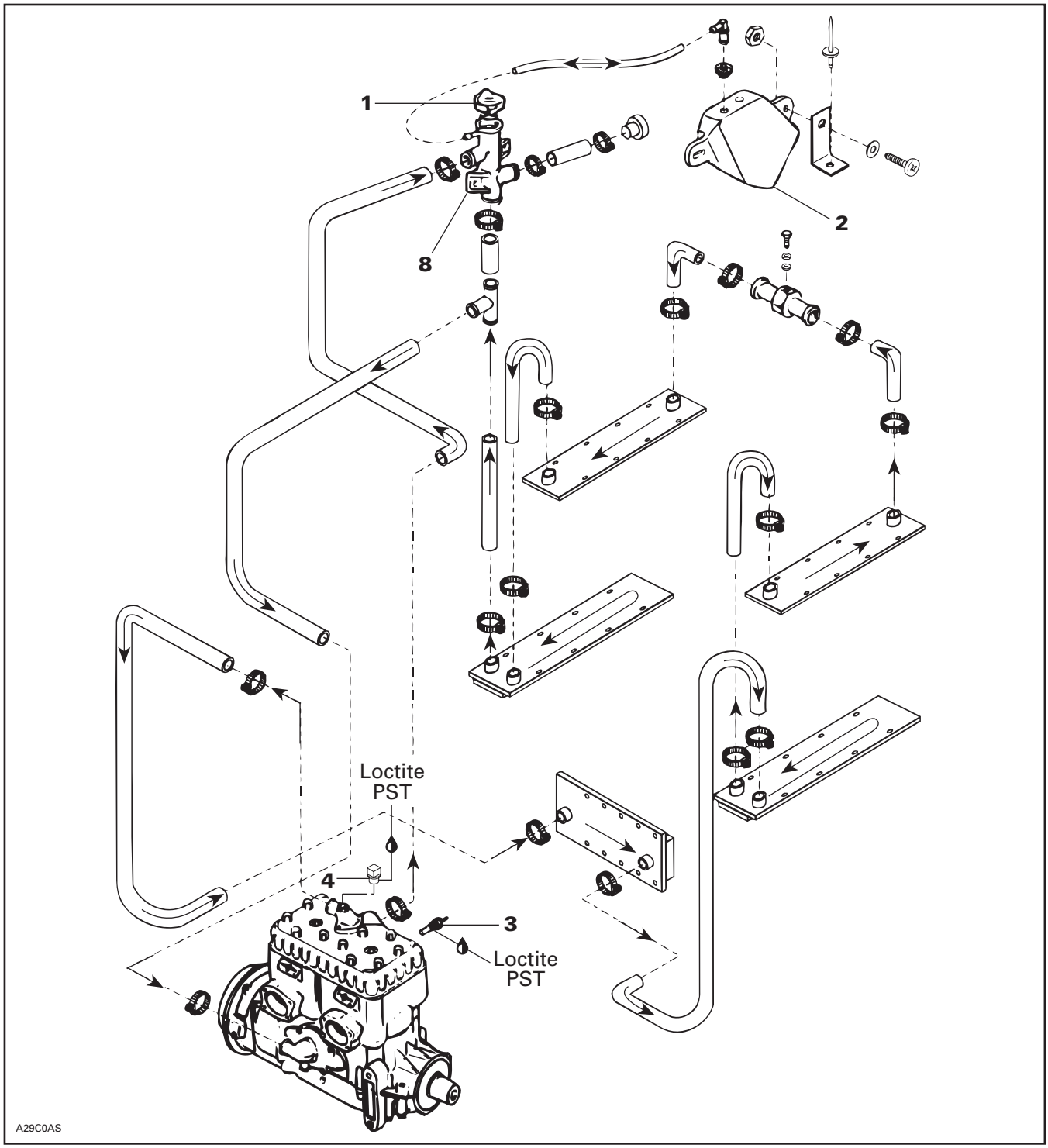
LIQUID COOLING SYSTEM

All S-Series Engines



PARTS

Skandic WT LC

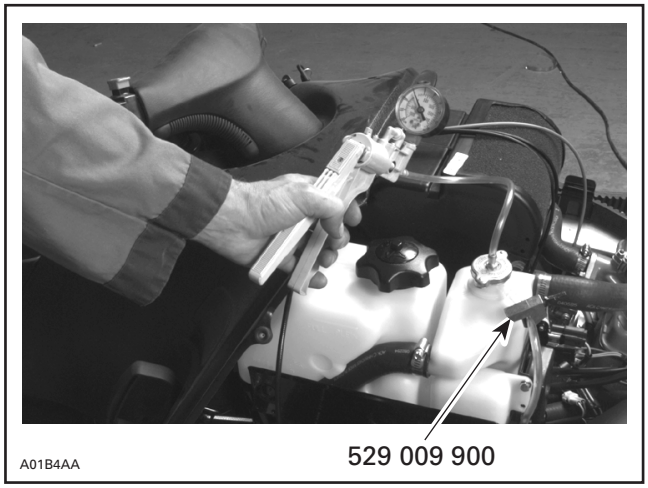


TYPICAL

LIQUID COOLING SYSTEM LEAK TEST

Install special plug (radiator cap) (P/N 529 021 400) and hose pincher (P/N 529 009 900) on overflow hose. Pressurize all system through coolant reservoir to 15 PSI.

Check all hoses and cylinder/base for coolant leaks. Spray a soap/water solution and look for air bubbles.



TYPICAL

INSPECTION

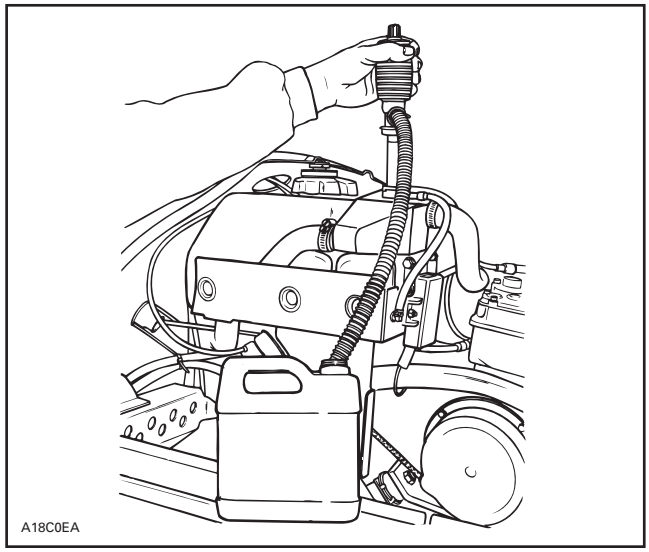
Check general condition of hoses and clamp tightness.

DRAINING THE SYSTEM

◆ WARNING

Never drain or refill the cooling system when engine is hot.

To drain the cooling system, siphon the coolant mixture from the coolant tank. Use a primer pump with a plastic hose inserted as deep as possible into the lower hose.



TYPICAL

When the coolant level is low enough, lift the rear of vehicle to drain the radiators.

DISASSEMBLY AND ASSEMBLY

3,4, Sender and Plug

Apply thread sealant on sender and plug to avoid leaks.

1, Pressure Cap

Check if the cap pressurizes the system. If not, install a new 90 kPa (13 PSI) cap, (do not exceed this pressure).

6,7, Radiator and Radiator Protector

Insert radiator protector into radiator C-rail and crimp C-rail at both ends. Refer to FRAME 09-02 for radiator removal.

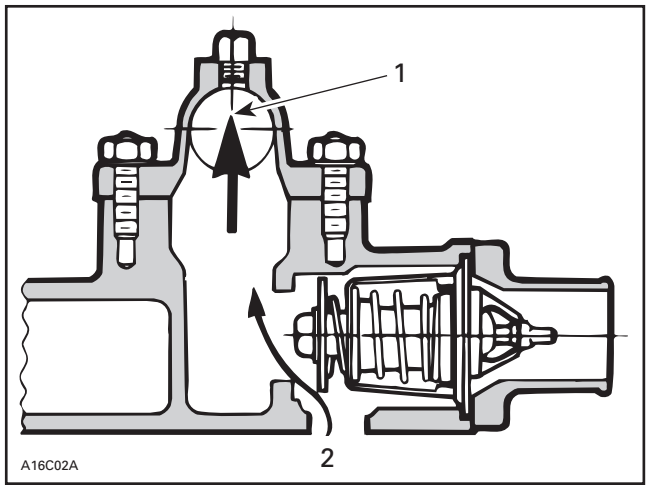
5, Thermostat

To check thermostat, put in water and heat water. Thermostat should open when water temperature reaches the following degree.

ENGINE	TEMPERATURE
494, 583 and 670	42°C (108°F)

On 494, 583 and 670 engines, the thermostat is a double action type.

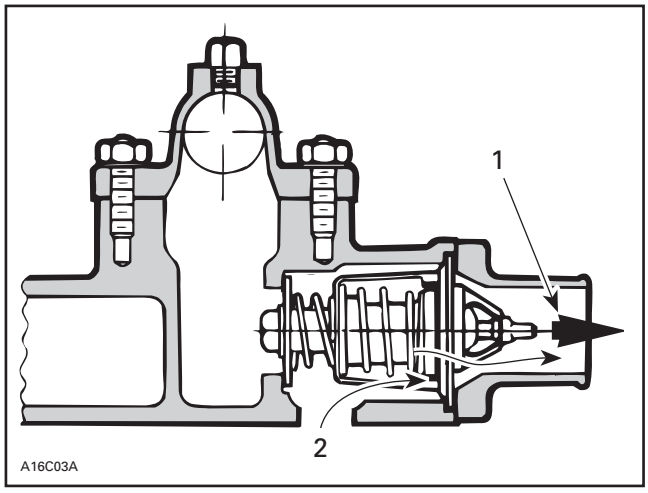
a. Its function is to give faster warm up of the engine by controlling a circuit; water pump — engine — coolant tank. This is done by bypassing the radiator circuit.



TYPICAL — CLOSED THERMOSTAT, COLD ENGINE

1. To reservoir
2. From cylinders

b. When the liquid is warmed enough, the thermostat opens the circuit, water pump — engine — radiators — coolant tank to keep the liquid at the desired temperature. (See the diagram of the exploded view).



TYPICAL — OPEN THERMOSTAT, WARM ENGINE

1. To radiators
2. From cylinders

These 2 functions have the advantage of preventing a massive entry of cold water into the engine.

2, Overflow Coolant Tank

Skandic WT LC Only

The coolant expands as the temperature (up to 90-100°C (195-212°F)) and pressure rise in the system. When the limiting system working pressure (cap) is reached (90 kPa (13 PSI)), the pressure relief valve in the pressure cap is lifted from its seat and allows coolant to flow through the overflow hose into the overflow coolant tank.

When the system temperature drops, the coolant contracts in volume and the pressure in the system is reduced. The coolant in the overflow coolant tank will then flow back into the filling neck no. 8 through the vacuum relief valve in the pressure cap.

COOLING SYSTEM REFILLING PROCEDURE

Recommended Coolant

Use a blend of 60% antifreeze with 40% water. Do not reinstall pressure cap.

▼ CAUTION

To prevent rust formation or freezing condition, always replenish the system with 60% antifreeze and 40% water. Pure antifreeze without water freezes. Always use ethylene-glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

System Capacity

Refer to TECHNICAL DATA 10-03.

Refilling Procedure

S-Series

With vehicle on a flat surface, engine cold, refill coolant tank up to cold level mark. Wait a few minutes then refill to mark. Install pressure cap. Run engine until thermostat opens then stop engine. Refill up to mark.

To make sure coolant flows through radiators, touch them by hand. They must feel warm.

Reinstall pressure cap.

When engine has completely coolesd down, recheck coolant level in coolant tank and top up if necessary.

Check coolant concentration (freezing point) with proper tester.

Skandic WT LC

Open cap and fill filler neck no. 8 completely.

Tilt seat and unscrew bleeding screw on top of connecting hose. Coolant must flow. Refill through filler neck no. 8 as necessary.

Reinstall bleeding screw.

Proceed the same for bleeding screw on thermostat housing.

Start engine and let it warm until thermostat opens.

To make sure coolant flows through radiators, touch them by hand. They must feel warm.

Turn engine off. Let it cool down for 15 to 20 minutes.

Open cap and refill filler neck completely.

Start engine and let it idle. Do not race engine.

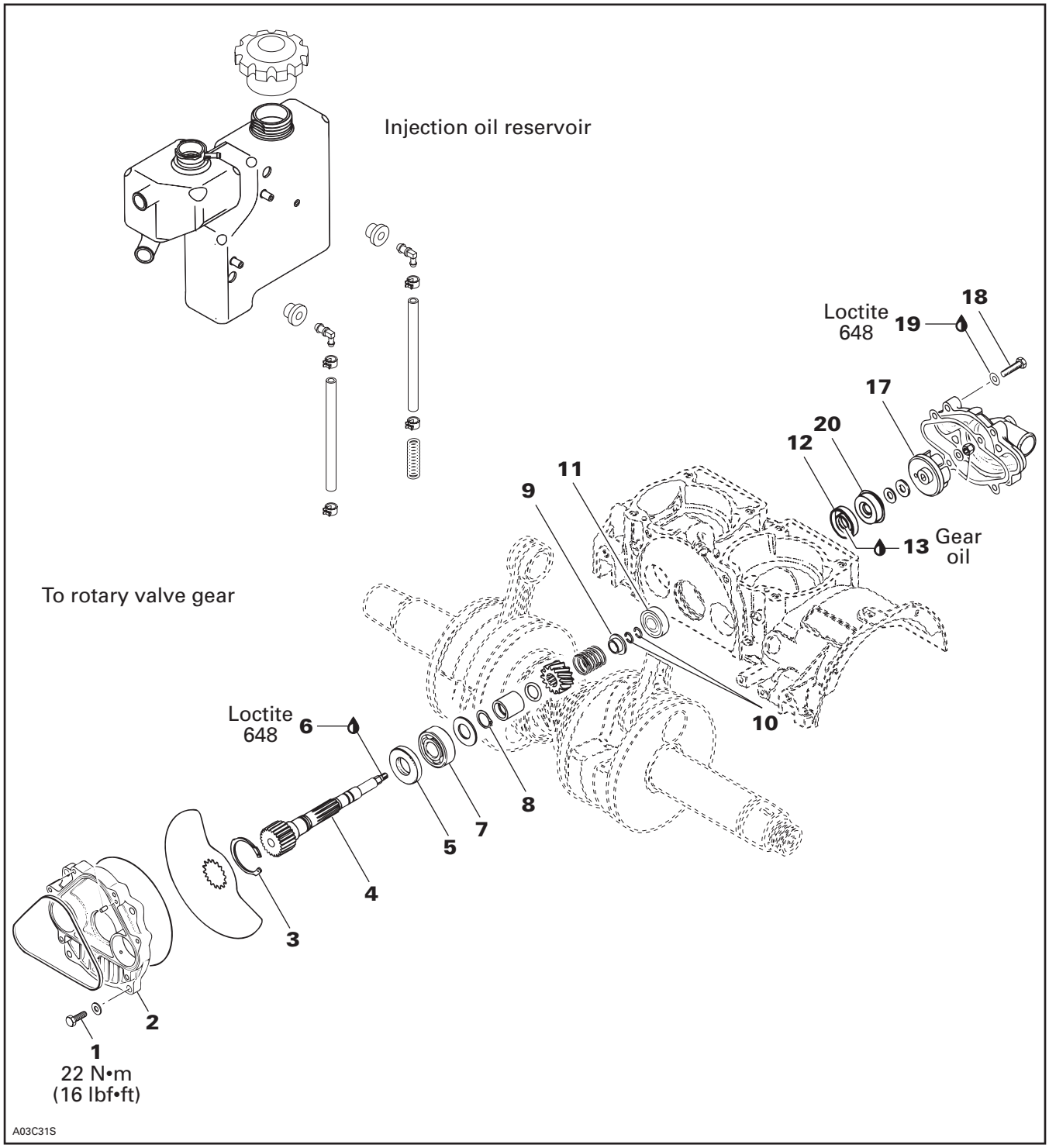
If coolant level gets down, add more coolant in filler neck.

Turn off engine and close cap.

IMPORTANT: After first drive let engine completely cool down. Check that coolant level is at top of filler neck. Add coolant as necessary. This is to ensure that coolant circulation from and back to overflow coolant tank works properly. Overflow coolant tank should be half full when engine is cold.

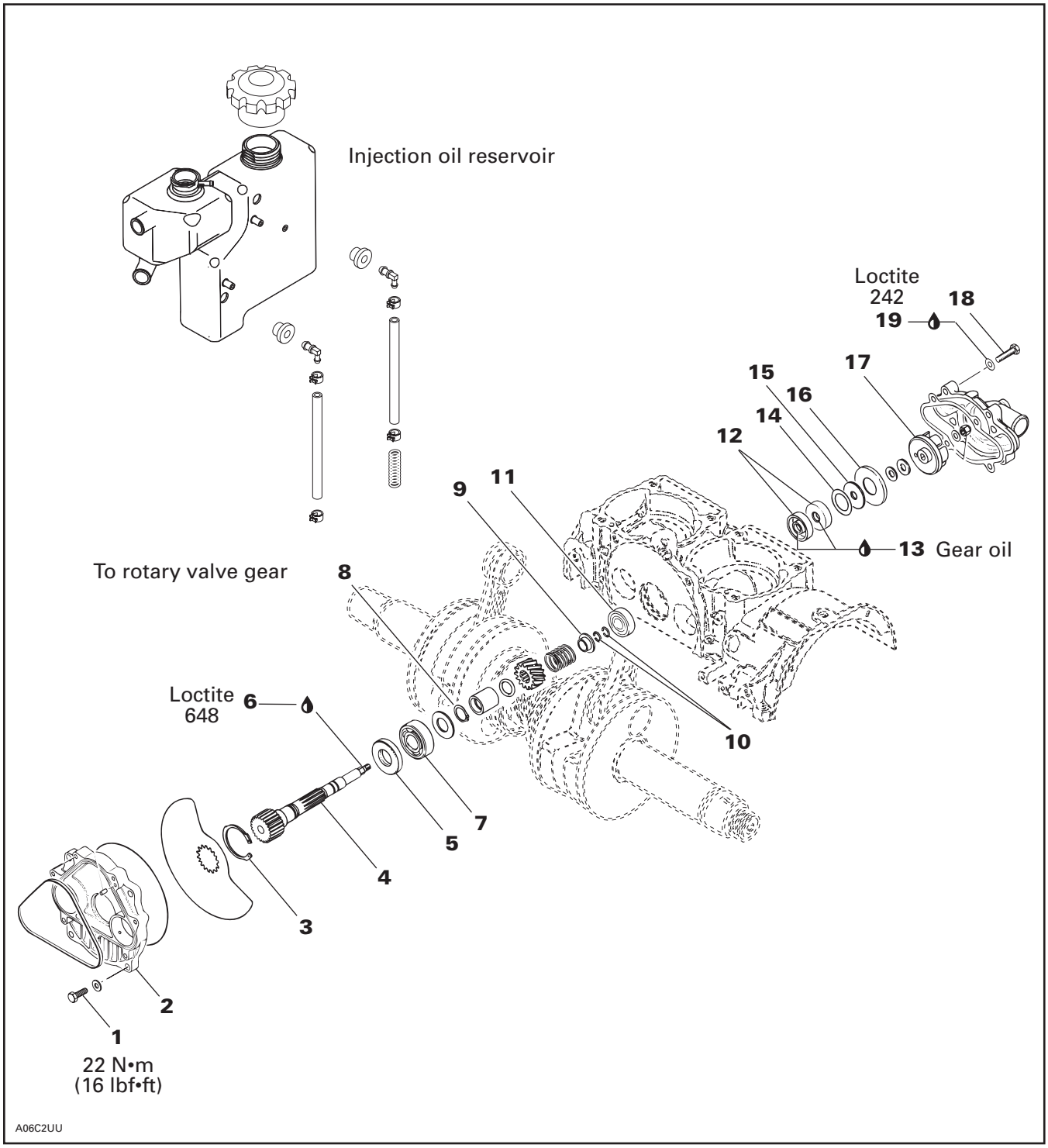
ROTARY VALVE, COOLANT PUMP AND RESERVOIR

494 and 670 Engines



TYPICAL

583 Engine



TYPICAL

PARTS

NOTE: Some verifications can be performed with engine in vehicle. Refer to ENGINE DIMENSION MEASUREMENT 04-04.

GENERAL

Engine must be removed from vehicle to work on rotary valve shaft/components. Refer to **Removal and Installation** of appropriate engine for procedures.

Bottom end must be opened to remove rotary valve shaft.

CLEANING

Discard all seals and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

1,2, Screw and Rotary Valve Cover

NOTE: Before removing rotary valve, check valve timing as described in **Rotary Valve Timing** at the end of this subsection.

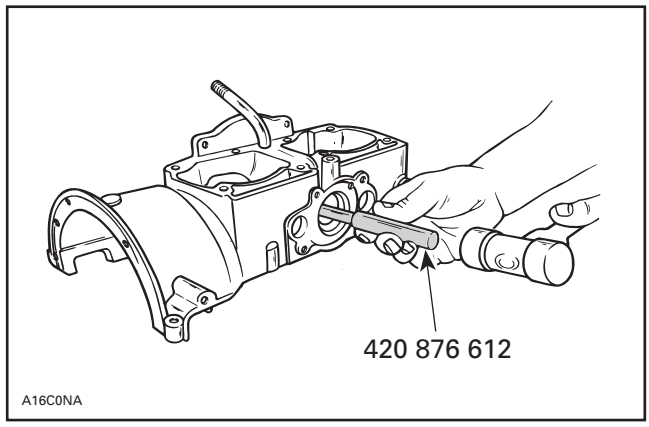
Unscrew 4 retaining screws and withdraw rotary valve cover and valve.

3,17, Circlip and Pump Impeller

▼ CAUTION

Bottom end must be opened to remove rotary valve shaft.

To remove rotary valve shaft assembly from crankcase, first remove coolant pump impeller and circlip on valve side. Using the suitable pusher (P/N 420 876 612) and a fiber hammer, push shaft assembly.

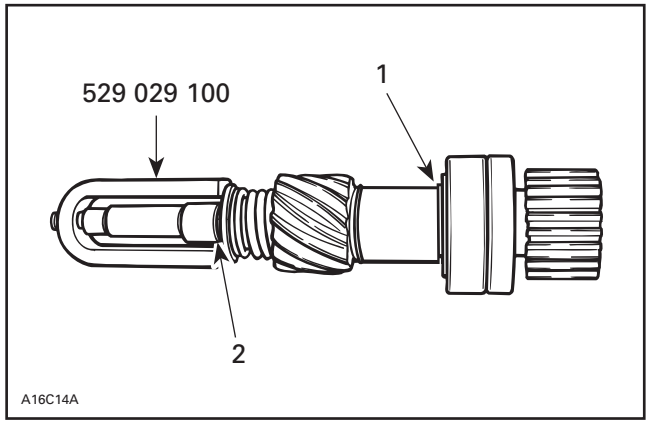


▼ CAUTION

To prevent damage to the end of the rotary valve shaft, use pusher (P/N 420 876 612).

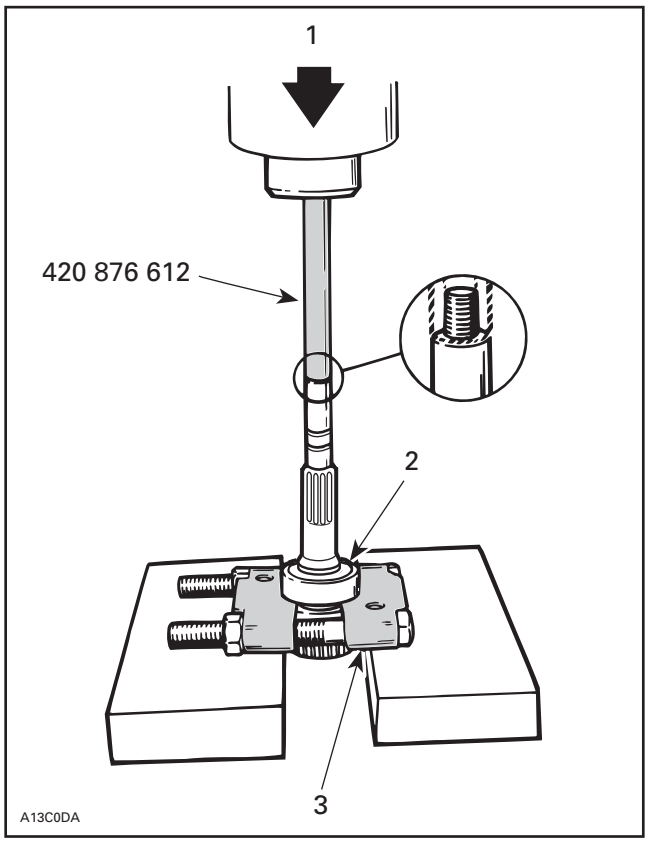
8,9,10, Circlip and Spring Retaining Cup

If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup with rotary valve circlip tool (P/N 529 029 100) in order to remove circlip. Remove gear and distance sleeve then external circlip.



1. External circlip
2. Circlip

To remove bearing, use a bearing puller (ex.: Snap-on no. CJ 950) and pusher (P/N 420 876 612) as illustrated.



1. Press
2. Bearing
3. Bearing puller. Ex.: Snap-on no. CJ 950

▼ CAUTION

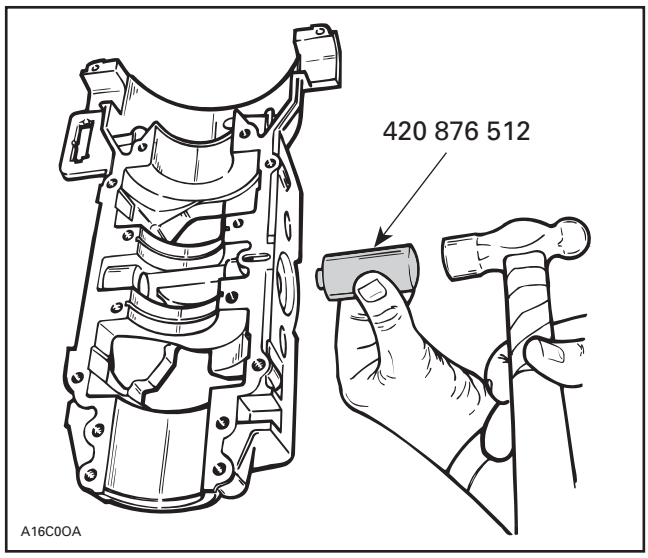
Ensure that the rotary valve shaft is perfectly perpendicular with the press tip or damage will occur.

14,15,16, Shim, Rubber Washer and Support Plate

Pry support plate out of crankcase and remove rubber washer and shim.

11,12,14,15, Bearing 6201 and Seal

To remove bearing 6201 (the smallest one), seals and rubber washer, use seal pusher (P/N 420 876 512).



INSPECTION

Inspect rotary valve cover for warpage. Small deformation can be corrected by surfacing with fine sand paper on a surface plate. Surface part against oiled sand paper.

Inspect bearings. Check for scoring, pitting, chipping or other evidence of wear. Make sure plastic cage (on bigger bearing) is not melted. Rotate them and make sure they turn smoothly.

Check for presence of brass fillings in gear housing.

Visually check gear wear pattern. It should be even on tooth length all around. Otherwise it could indicate a bent shaft; check deflection. Replace gear if damaged.

Refer to ENGINE DIMENSION MEASUREMENT 04-04.

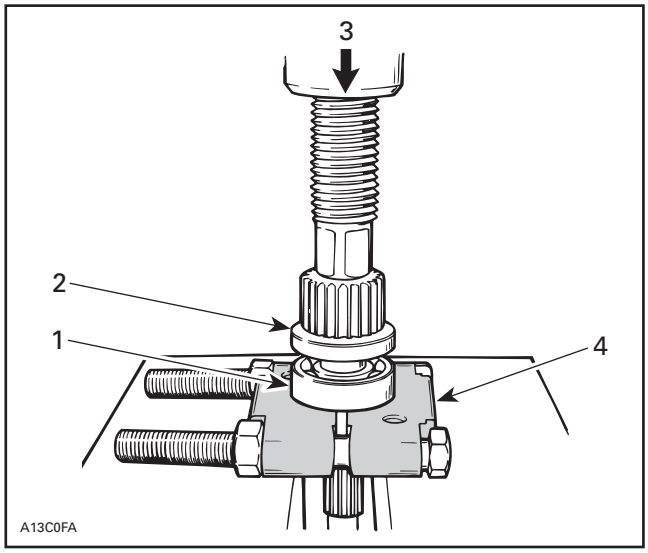
ASSEMBLY

Assembly is essentially the reverse of disassembly procedures. However, pay particular attention to the following.

4,5,7, Rotary Valve Shaft, Seal and Bearing 6203

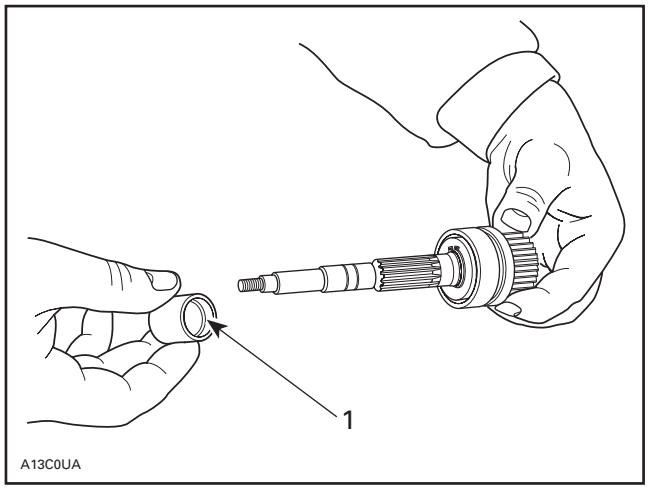
At assembly apply lithium grease on seal lips. Position the seal with shielded portion against splines of shaft.

Install bearing as illustrated.



1. Bearing
2. Shielded portion of seal here
3. Press
4. Bearing puller. Ex.: Snap-on no. CJ 950

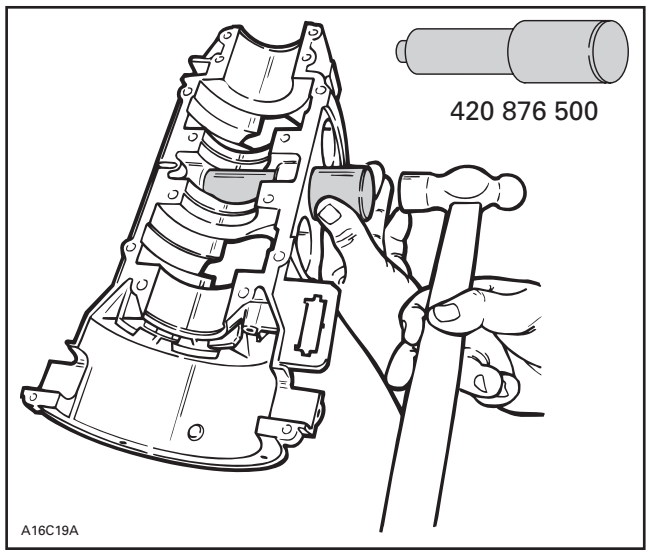
Install distance sleeve with its counterbore first.



1. Counterbore first

11, Bearing 6201

To install bearing 6201, use bearing pusher (P/N 420 876 500).



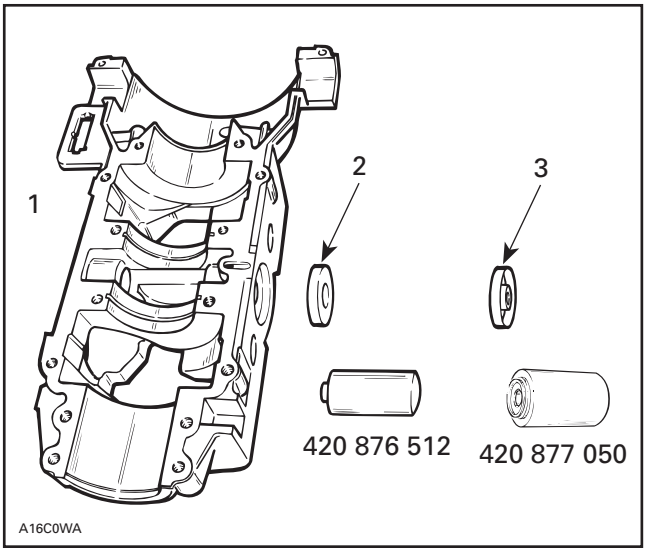
NOTE: Bearing shielded side must be facing rotary valve.

Refer to **Rotary Valve Timing** at the end of this subsection to properly install gear on rotary valve shaft.

12,13,14,15, Seals, Shim and Rubber Washer

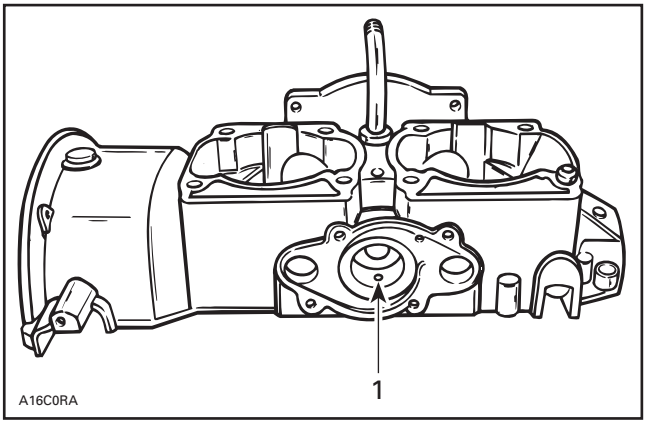
To install seals on coolant pump side proceed as follows:

– Apply synthetic chaincase oil (P/N 413 803 300) on lip of both seals.
– Position **oil seal** shielded portion towards pump impeller. Drive in place with a seal pusher (P/N 420 876 512).
– Position **coolant seal** shielded portion towards rotary valve. Drive in place with the rotary valve shaft seal pusher (P/N 420 877 050).



1. Rotary valve side
2. Oil seal
3. Coolant seal

Make sure not to obstruct draining hole. Position seals so that hole is between them.



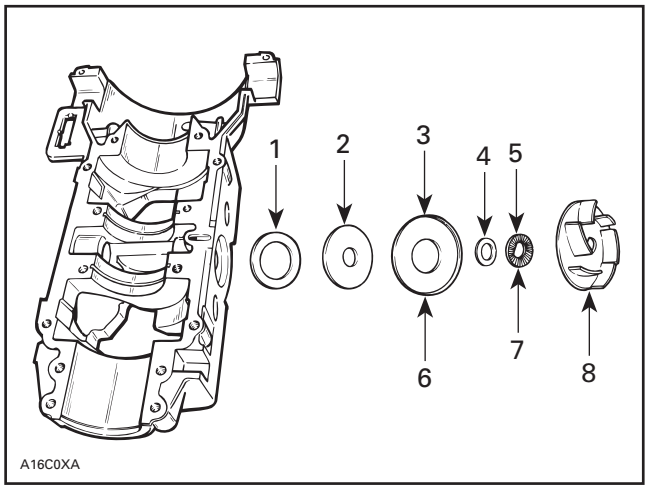
1. Draining hole

▼ CAUTION

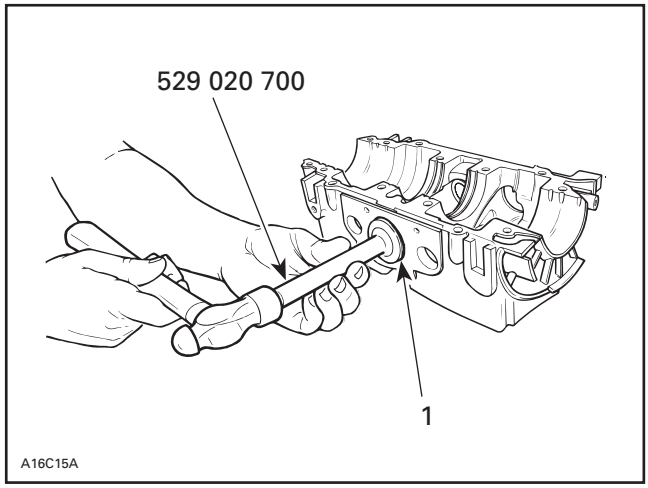
Failure to position the seals as specified may cause the seal spring to be corroded by coolant. Severe damage may occur if these notices are disregarded.

NOTE: The draining hole is used to detect seal malfunction. If you notice oil or coolant at the exit of the draining hole, this means that oil seal or coolant seal leaks.

– Install large shim and pack space with Molykote 111 (P/N 413 707 000).
– Install rubber washer then support plate with its flange towards pump impeller. Use impeller support plate pusher (P/N 529 020 700) for proper installation.
– Install small thrust washer then friction washer positioning its grooves against pump impeller.

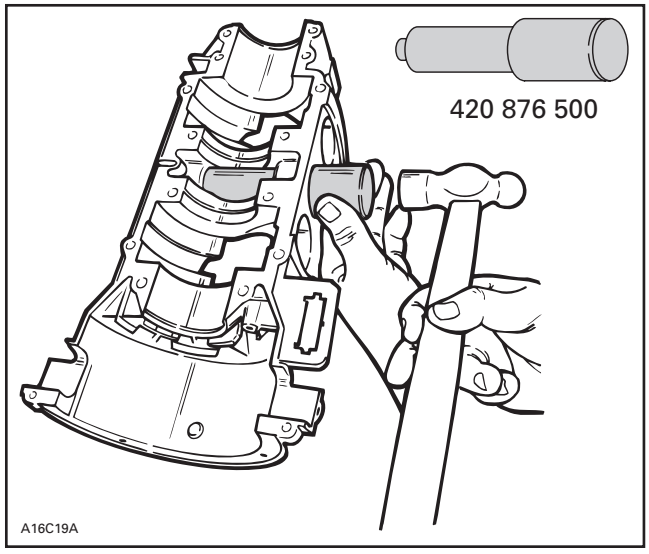


1. Large shim
2. Rubber washer
3. Support plate
4. Small thrust washer
5. Friction washer
6. Flange this side
7. Grooves this side
8. Pump impeller



1. Support plate

NOTE: After seals installation, check if the coolant pump end bearing is correctly positioned with bearing pusher (P/N 420 876 500).



20, Coolant Seal

At time of printing there is no tool available to install that new type of seal.

Do not apply any grease or oil on that coolant seal.

4,6, Rotary Valve Shaft and Loctite 648

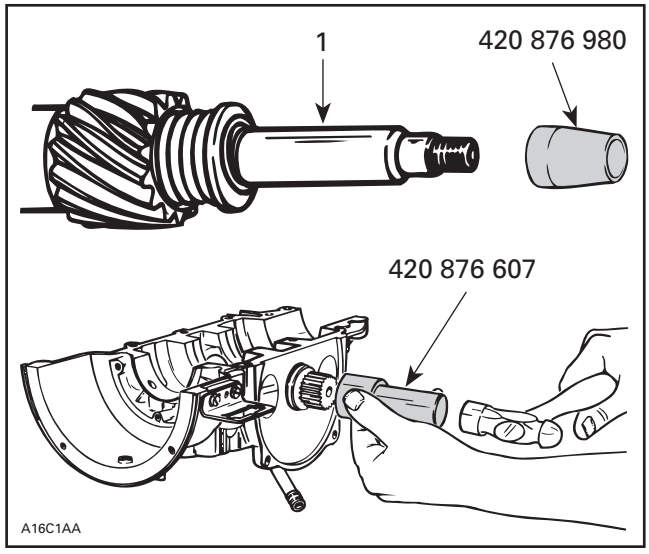
▼ CAUTION

Crankcase halves must be separated and crankshaft must not be present to install rotary valve shaft ass'y in crankcase.

To install rotary valve shaft proceed as follows with the suitable tools:

– rotary valve seal pusher (P/N 420 876 607)

– seal protector sleeve (P/N 420 876 980)



1. Rotary valve shaft

Apply Loctite 648 (P/N 420 899 788) on shaft threads.

18,19, Pump Housing Bolt and Loctite 242 (Blue)

Apply Loctite 242 (blue) on bolt threads.

Rotary Valve

The rotary valve controls the opening and closing of the inlet ports. Therefore its efficiency will depend on the precision of its installation.

IDENTIFICATION OF THE ROTARY VALVE

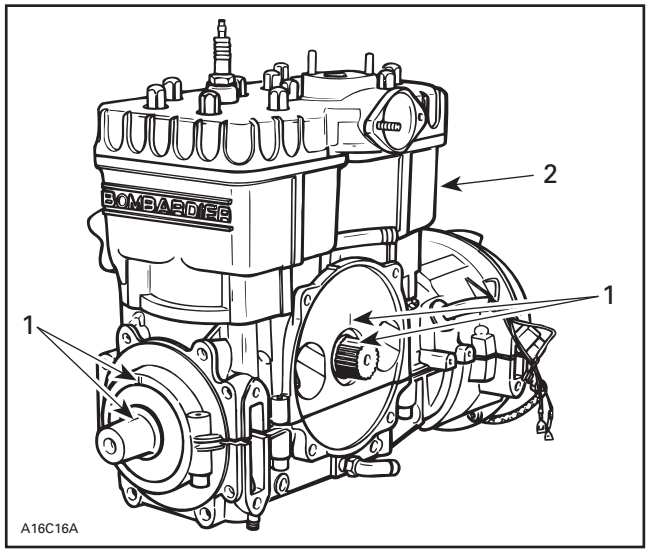
There is no identification code on the valve. To find out the duration, place an angle finder on the valve and measure the valve cut-out angle.

ENGINE TYPE	ROTARY VALVE P/N 420 924 XXX	VALVE DURATION (CUT-OUT ANGLE) °
494 MX Z	502	159
494 All models except MX Z	509	147
583 GT and Formula Z 583/DLX 583	502	159
670	500	164

ROTARY VALVE TIMING

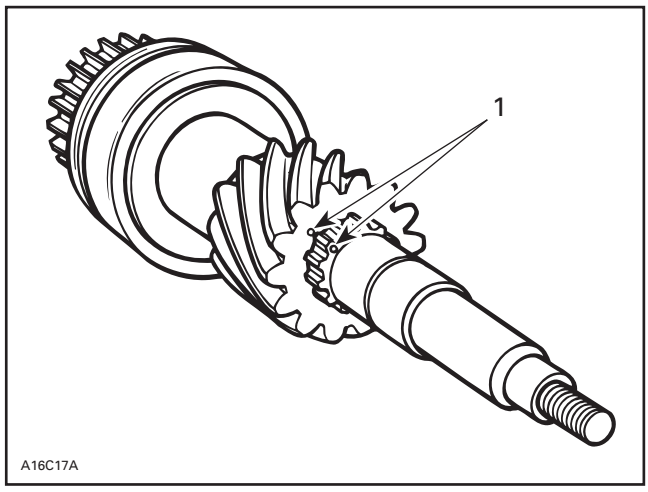
At disassembly, before removing rotary valve, note original rotary valve timing: it may be out of specifications by 1 to 4 degrees of retard or advance. To do so, bring MAG piston to TDC and scribe a mark on crankshaft end at top (12 o'clock) and also on upper crankcase half.

Mark position of rotary valve shaft gear in relation to upper crankcase.



1. Mark here
2. MAG piston at TDC

After removing rotary valve shaft but before disassembling, mark brass gear in relation to shaft.



1. Mark here

These marks will be useful to time rotary valve exactly to the specifications.

NOTE: Tolerance of rotary valve timing is ± 5 degrees.

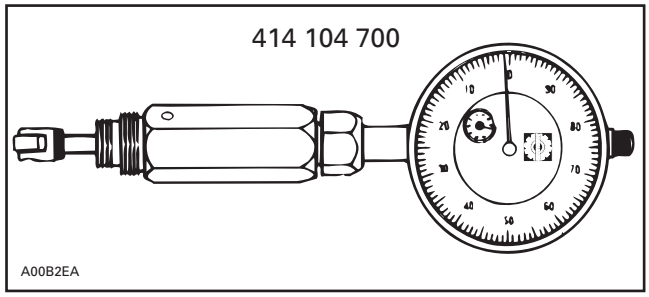
When the same crankcase is reassembled, the first timing method is to be followed. However, since replacement crankcases do not have timing marks (ridge), the second method is required. Take note that the second method is more accurate and may be used any time.

Installation

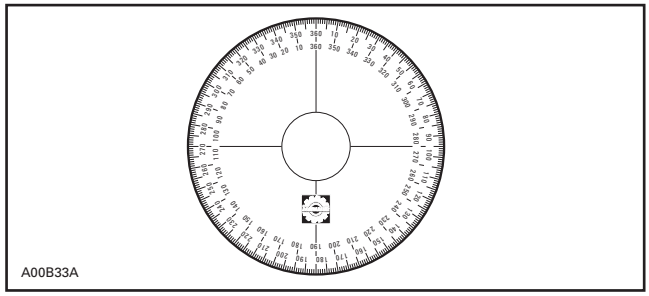
To correctly install rotary valve, proceed as follows:

– Turning crankshaft, bring **MAG side** piston to Top Dead Center.

Use a dial indicator (P/N 414 104 700).



A degree wheel (P/N 414 352 900) is required to measure rotary valve opening and closing angles in relation with **MAG side** piston. Degree wheel will be installed on rotary valve shaft for measurements.



Rotary valve must be set as specified in TECHNICAL DATA 10.

For the following instructions, use these specifications as an example:

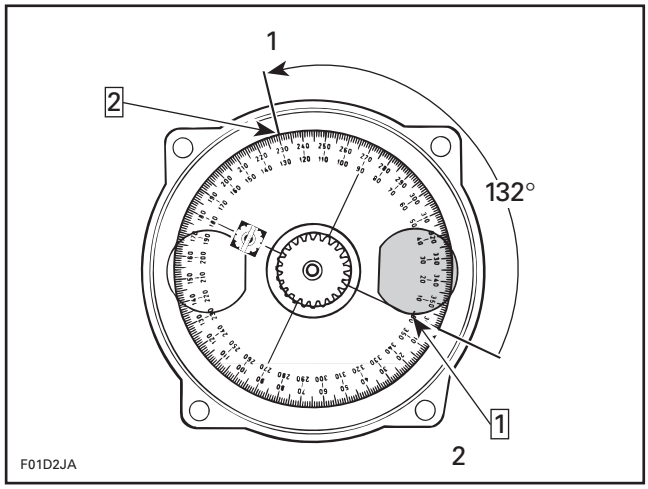
OPENING: 132° BTDC

CLOSING: 52° BTDC

Proceed as follows:

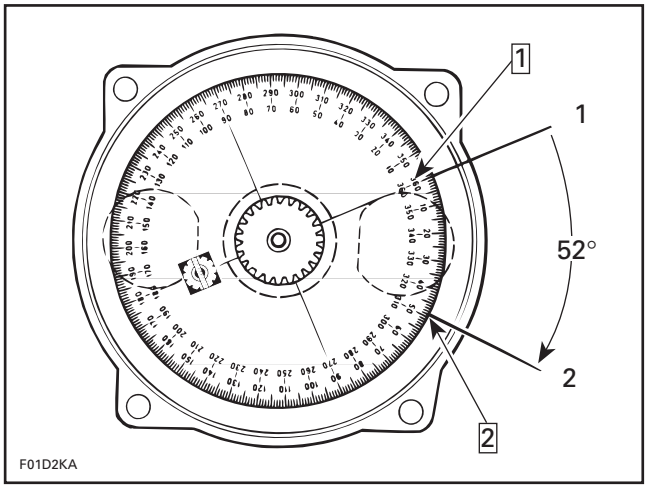
– Turning crankshaft, bring **MAG side** piston to Top Dead Center as done before with a crankcase having a ridge.

– For opening mark, first align 360° line of degree wheel with BOTTOM of **MAG side** inlet port. Then, find 132° line on degree wheel and mark crankcase at this point.



Step 1: Align 360° line of degree wheel here
Step 2: Find 132° on degree wheel and mark here
1. *Opening mark*
2. *Bottom of **MAG** inlet port*

– For **closing** mark, first align 360° line of degree wheel with TOP of **MAG side** inlet port. Then, find 52° line on degree wheel and mark crankcase at this point.



Step 1: Align 360° line of degree wheel here
Step 2: Find 52° on degree wheel and mark here
1. *Top of **MAG** inlet port*
2. *Closing mark*

– Position rotary valve on shaft splines to have edges as close as possible to marks.

NOTE: Rotary valve is asymmetrical. Therefore, try turning it inside out then reinstall on splines to determine best installation position.

Apply injection oil on rotary valve before closing rotary valve cover.

To Time Rotary Valve Exactly to Specifications

NOTE: If desynchronization (out of spec.) is unknown, install rotary valve to determine it before proceeding with the following.

First Method

Turn crankshaft to bring **MAG** piston to TDC. Scribed marks of crankshaft and upper crankcase must align. These marks were scribed to determine desynchronization.

Install brass gear on rotary valve shaft with its marked spline 4 positions (splines) away for one degree of desynchronization. Turn in the opposite direction of desynchronization. For instance, a rotary valve is retarded by 2.5°, turn brass gear by 10 splines counterclockwise.

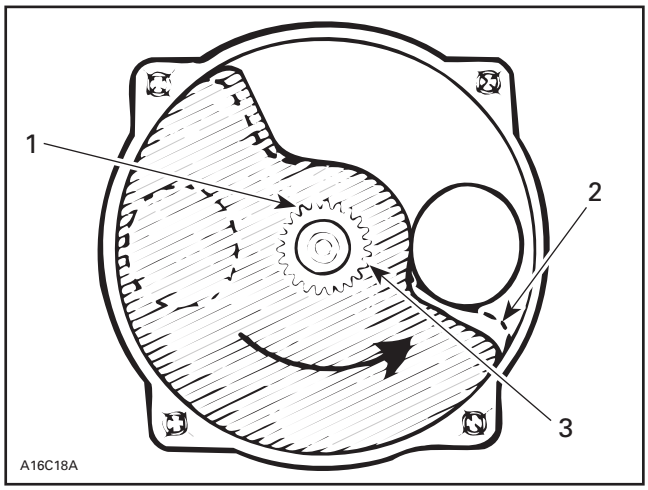
Second Method

Turn crankshaft to bring **MAG** piston to TDC. Scribed marks of crankshaft and upper crankcase must align. These marks were scribed while determinating desynchronization.

For each degree of desynchronization, rotary valve shaft should be turned in the opposite direction by about 5 splines on the rotary valve gear.

Note position of rotary valve gear mark when brass gear disengages worm gear of crankshaft at removal of rotary valve shaft. From this position, turn shaft accordingly then reinstall.

For instance, take a valve advanced by 2°.



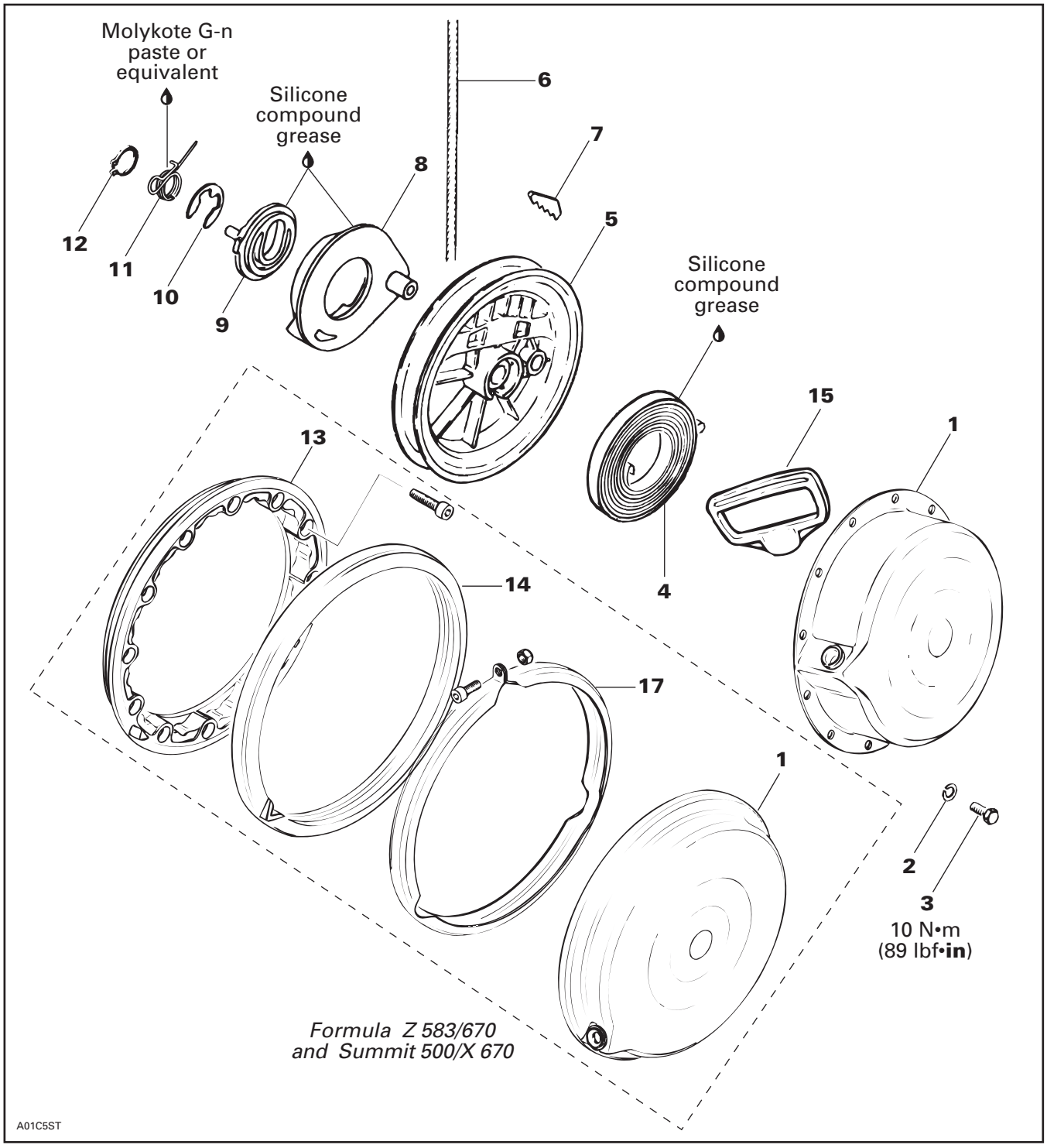
1. *Position of mark when brass gear disengages worm gear*
2. *Advanced by 2°*
3. *Position of mark before installation (about 10 splines from original position)*

1,2, Screw and Rotary Valve Cover

Install O-ring and cover then torque screws to 22 N•m (16 lbf•ft) in a criss-cross sequence.

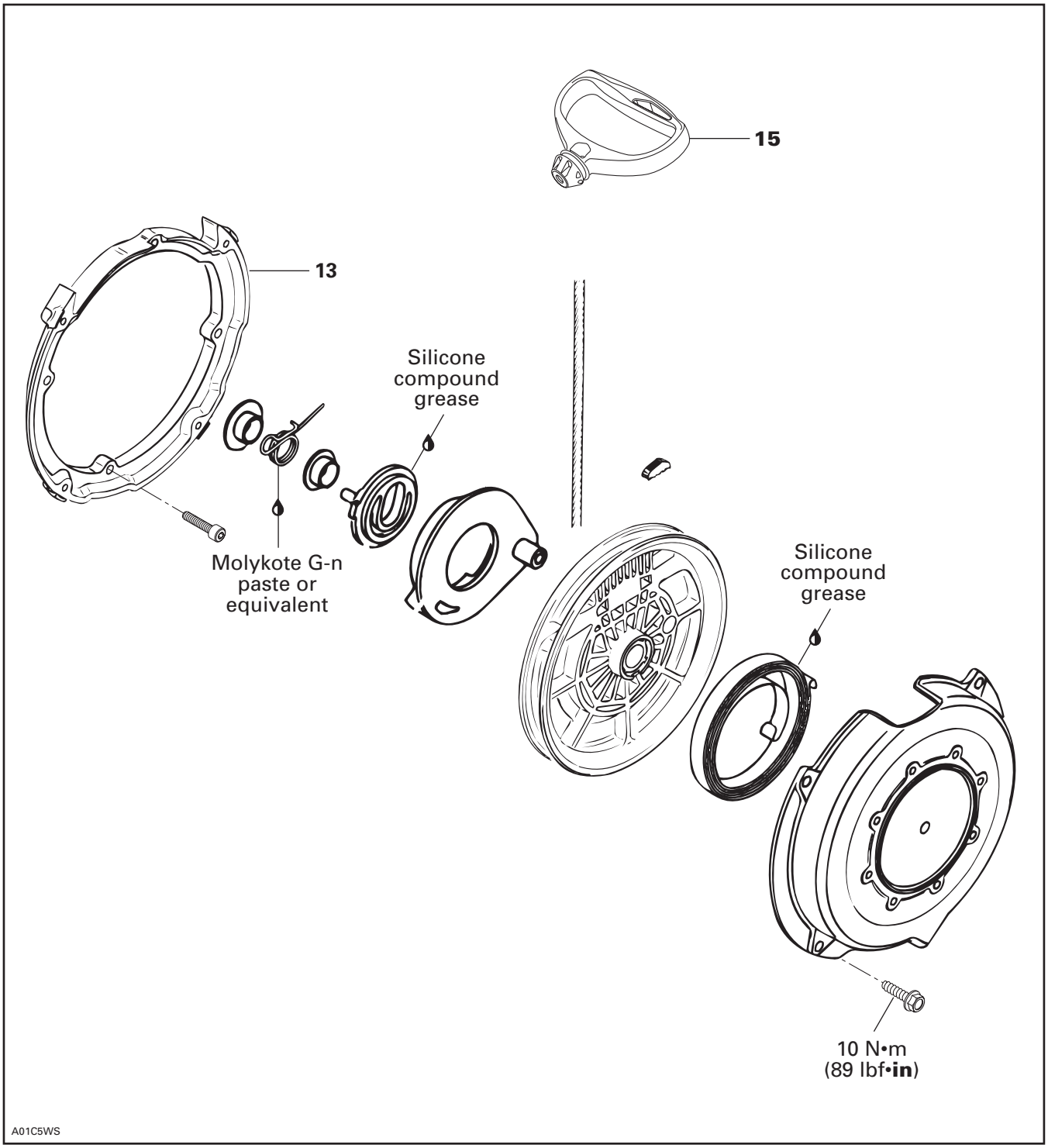
REWIND STARTER

All Liquid Cooled Models



TYPICAL

All Fan Cooled Engines



REMOVAL

Using a small screwdriver, extract rope knot from starter grip **no. 15**. Cut rope close to knot. Tie a knot near starter.

Remove screws **no. 3** and washers **no. 2** securing rewind starter **no. 1** to engine then remove rewind starter.

On fan cooled models with oil injection pump remove pump from rewind starter cover.

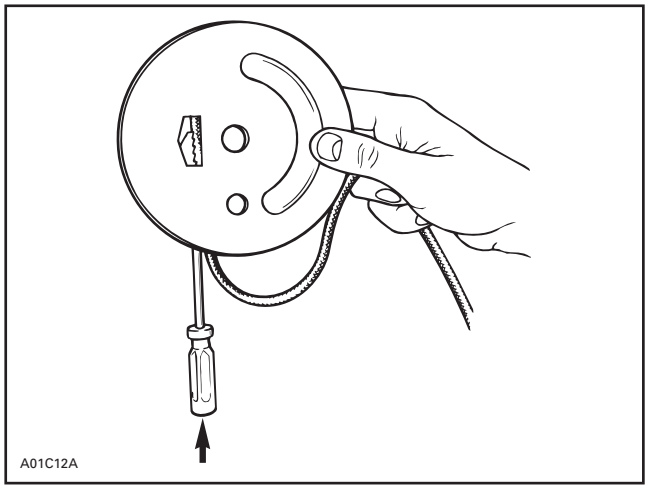
DISASSEMBLY

To remove rope from rewind starter mechanism:

– First remove locking ring **no. 12**, locking spring **no. 11**, circlip **no. 10**, pawl lock **no. 9** and pawl **no. 8**.

– Remove sheave **no. 5** from starter housing **no. 1**.

– Disengage key **no. 7** and pull out rope **no. 6**.



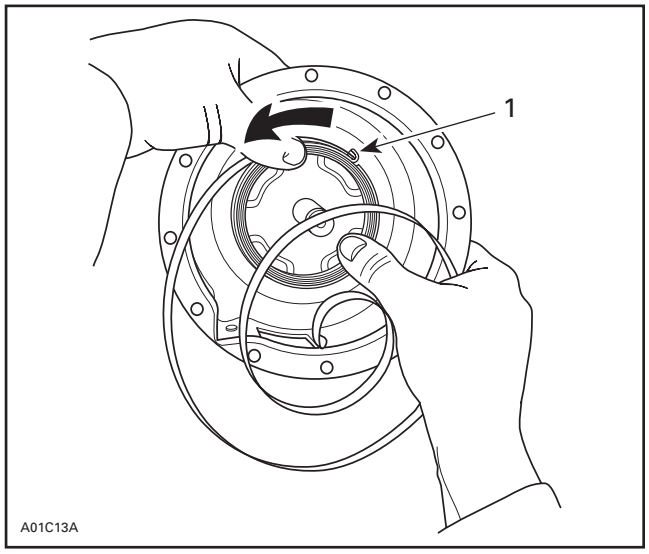
GENTLY TAP ON KEY

ASSEMBLY

At assembly, position spring **no. 4** outer end into spring guide notch then wind the spring counterclockwise into guide.

◆ WARNING

Since the spring is tightly wound inside the guide it may fly out when rewind is handled. Always handle with care.



1. Outer end into guide notch

NOTE: Due to dust accumulation, rewind starter must be periodically cleaned, inspected and relubricated.

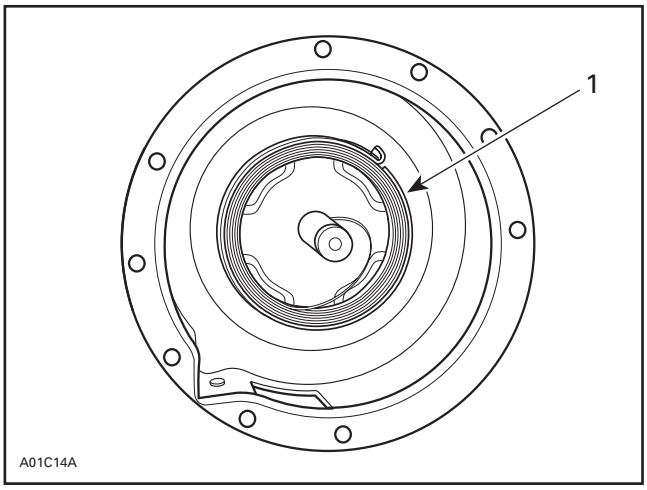
▼ CAUTION

It is of the utmost importance that the rewind starter spring(s) be lubricated periodically using specific lubricants. Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Lubricate spring assembly with silicone compound grease (P/N 420 897 061) and position into starter housing as illustrated.

▼ CAUTION

This lubricant must NOT be used on rewind starter locking spring as it does not stay on under vibration.

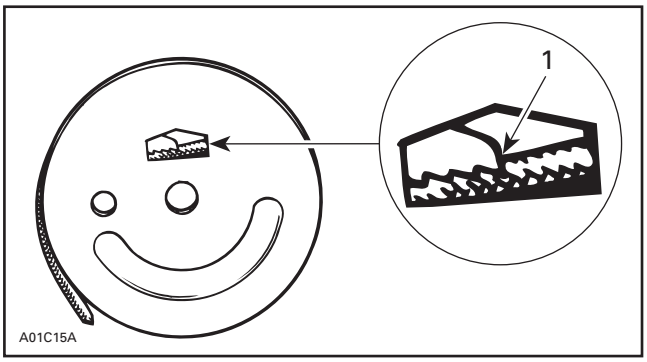


1. Grease inside spring guide

▼ CAUTION

The use of standard multi-purpose grease could result in rewind starter malfunction.

To install a new rope **no. 6**, insert rope into sheave **no. 5** orifice and lock it with the key **no. 7** as illustrated.



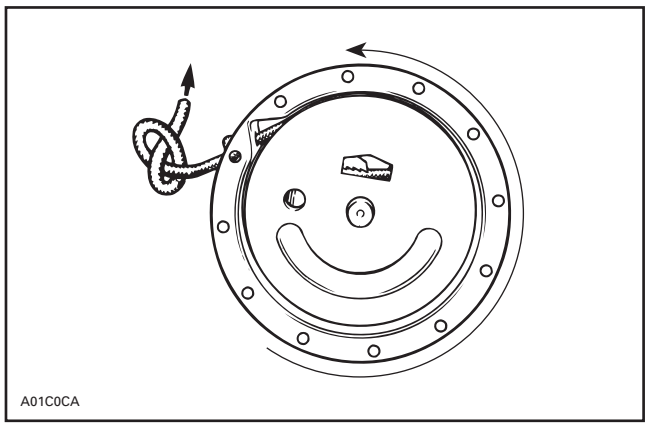
1. Push to lock

To adjust rope tension:

Wind rope on sheave and place rope sheave into starter housing making sure that the sheave hub notch engages in the rewind spring hook.

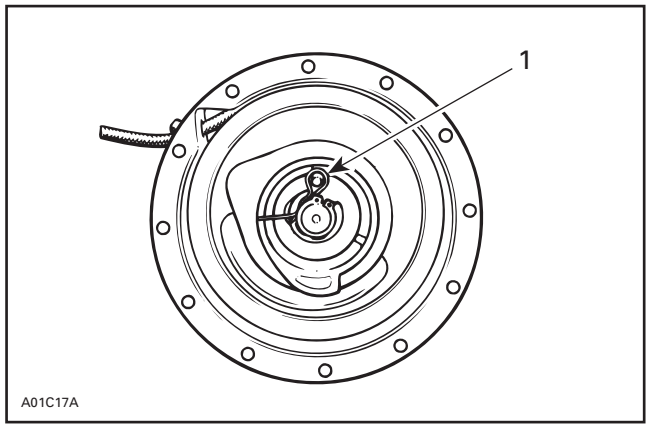
Rotate the sheave counterclockwise until rope end is accessible through starter housing orifice.

Pull the rope out of the starter housing and temporarily make a knot to hold it. One turn preload will give 7 turns of tension when fully extended.



Position pawl **no. 8**, pawl lock **no. 9** and circlip **no. 10**.

Install locking spring **no. 11** and lubricate with MOLYKOTE G-n paste from Dow Corning® or equivalent.



1. Spring coated with MOLYKOTE G-n paste

Install locking ring.

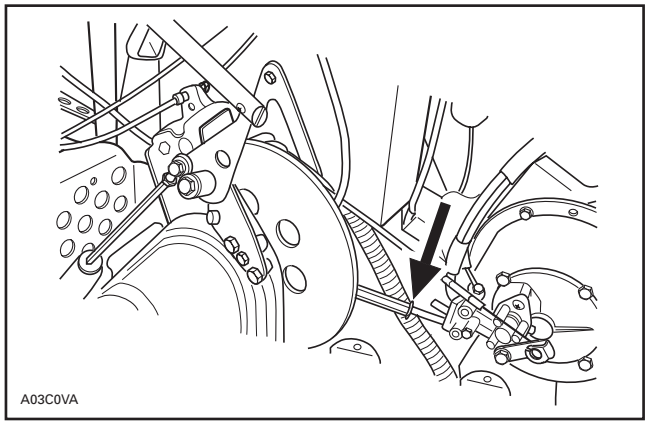
▼ CAUTION

This lubricant must NOT be used on rewind springs as it does not stay on when dry.

INSTALLATION

On fan cooled models with oil injection pump, reinstall oil pump on rewind starter assembly.

Thread starter rope **no. 6** through rope guide when applicable.



All Models Except Formula Z 583/670 and Summit 500/X 670

Reinstall rewind starter assembly on engine.

Formula Z 583/670 and Summit 500/X 670 Only

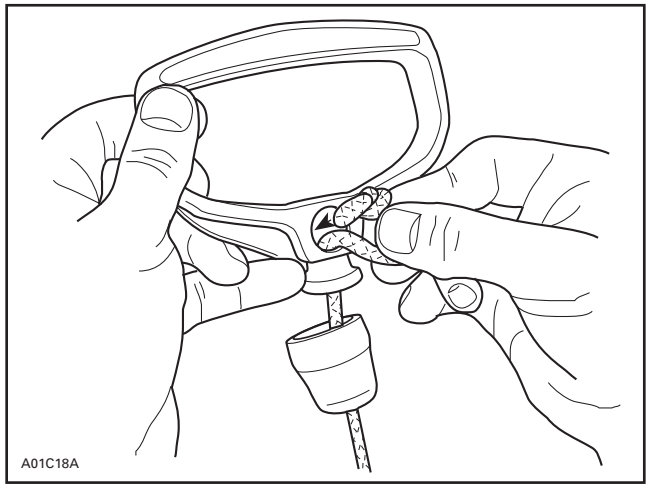
Install rewind starter on damper ring matching notches and embosses.



1. Notch

All Models

Prior to installing starter grip **no. 15** on new rope, it is first necessary to fuse the rope end with a lit match. Pass rope through starter grip and tie a knot in the rope end. Fuse the knot with a lit match then insert rope end down and pull the starter grip over the knot.

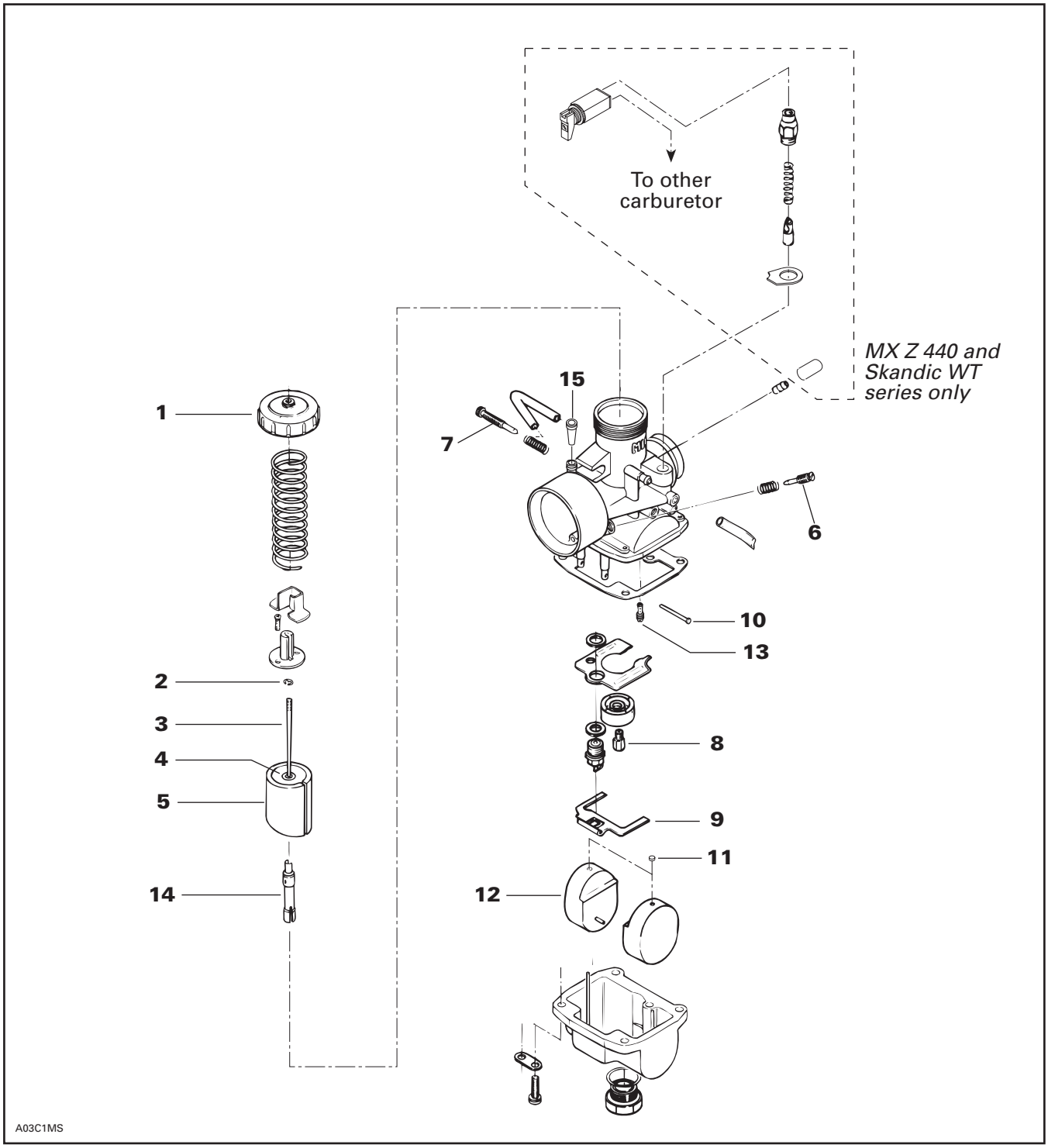


TYPICAL

CARBURETOR AND FUEL PUMP

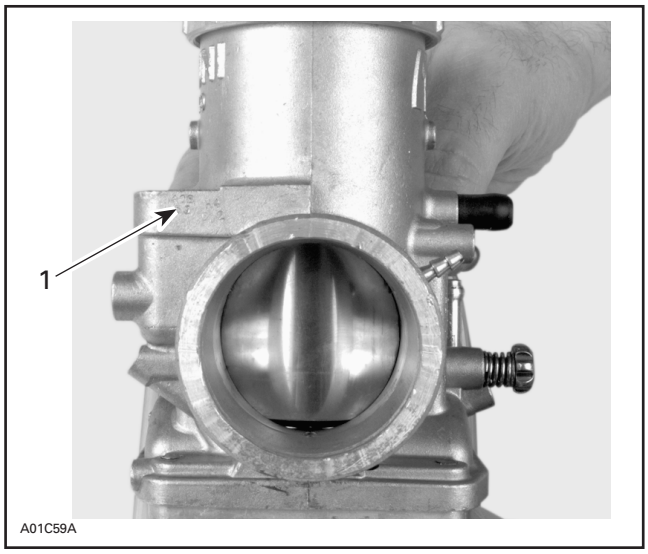
CARBURETOR

All Models



IDENTIFICATION

All carburetors are identified on their body.

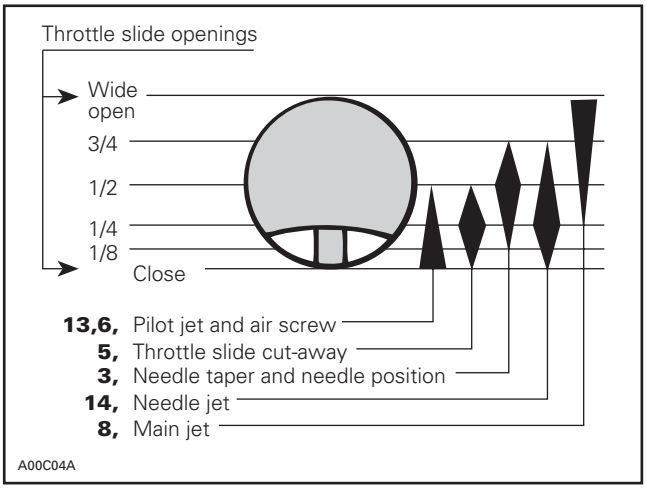


1. Identification: 34-482

CARBURETOR CIRCUIT OPERATION VERSUS THROTTLE OPENING

The following illustration shows the part of the carburetor which begins and stops to function at different throttle slide openings.

Note that the wider part of symbol corresponds to the opening mostly affected. For instance, throttle slide cut-away begins to function at closed position but it is most effective at 1/4 opening and decreases up to 1/2 opening.



VIEW FROM AIR INTAKE OPENING

NOTE: For proper calibration refer to TECHNICAL DATA 10 and to SPARK PLUG 06-03.

NOTE: For high altitude regions, the *High Altitude and Sea Level Technical Data Booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude and temperature.

REMOVAL

Remove air silencer(s). Refer to BATTERY 06-04.

Disconnect fuel inlet line.

Disconnect primer line from carburetor on some models.

Disconnect choke cable on some models.

Unscrew carburetor cover **no. 1** then pull out throttle slide **no. 5** from carburetor.

◆ WARNING

Exercise care when handling throttle slide. Scratches incurred may cause throttle slide to stick open in operation.

Disconnect throttle cable from throttle slide.

Untighten rubber flange clamps then remove carburetor from engine.

CLEANING AND INSPECTION

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

▼ CAUTION

Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O-rings, etc. Therefore, it is recommended to remove those parts prior to cleaning.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions.

◆ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

15, Filter

Check for clogged filter. Clean or replace as required.

Check inlet needle tip condition. If worn, the inlet needle and seat must be replaced as a matched set.

NOTE: Install needle valve for snowmobile carburetor only. It is designed to operate with a fuel pump system.

Check throttle slide for wear. Replace as necessary.

Check that idle speed screw is straight. Replace as necessary.

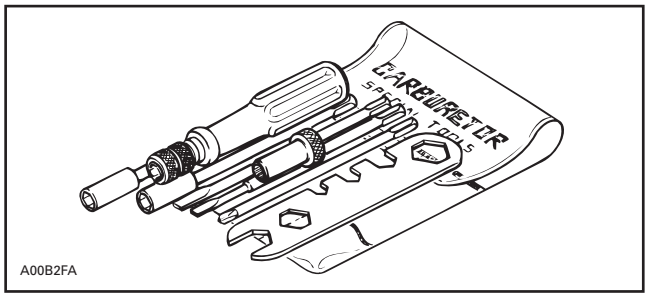
Check for fuel soaked into float **no. 12**; replace as necessary.

Check float for cracks or other damages affecting free movement; replace as necessary.

Inspect throttle cable and housing for any damages. Replace as necessary.

DISASSEMBLY AND ASSEMBLY

NOTE: To ease the carburetor disassembly and assembly procedures it is recommended to use carburetor tool kit (P/N 404 112 000).



2,3, E-Clip and Needle

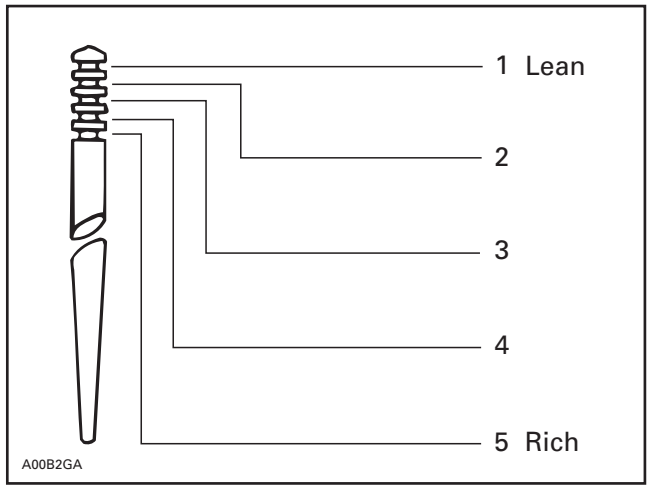
Remove screws from needle retaining plate to withdraw the needle.

The position of the needle in the throttle slide is adjustable by means of an E-clip inserted into 1 of 5 grooves located on the upper part of the needle. Position 1 (at top) is the leanest, 5 (at bottom) the richest.

NOTE: The last digit of the needle identification number gives the recommended position of the E-clip **from the top** of the needle.

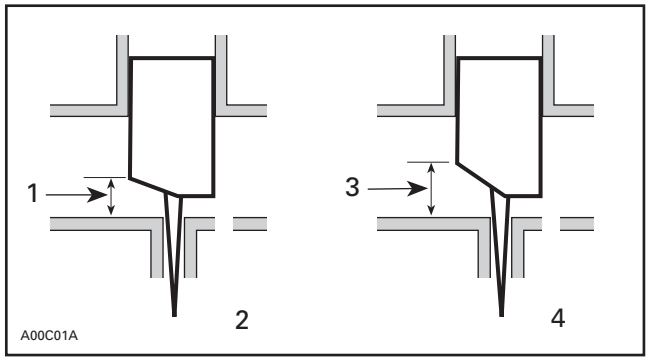
Example: 6DH4-3

Needle identification — Recommended position of the E-clip **from top**



CLIP POSITIONS

The size of the throttle slide cut-away affects the fuel mixture between 1/8 to 1/2 throttle opening.



1. *Low cut-away low*
2. *Rich mixture*
3. *High cut-away high*
4. *Lean mixture*

8, Main Jet

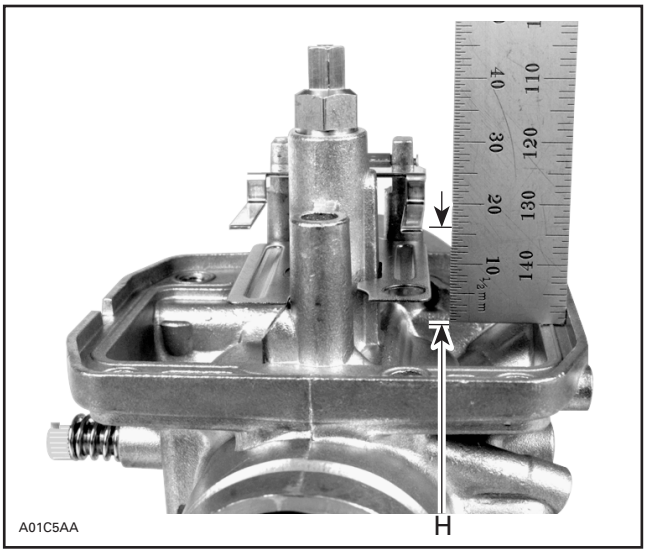
The main jet installed in the carburetor has been selected for a temperature of - 20°C (0°F) at sea level. Different jetting can be installed to suit temperature and/or altitude changes. Always check spark plug tip and/or piston dome color to find out correct jetting.

CARBURETOR FLOAT LEVEL ADJUSTMENT

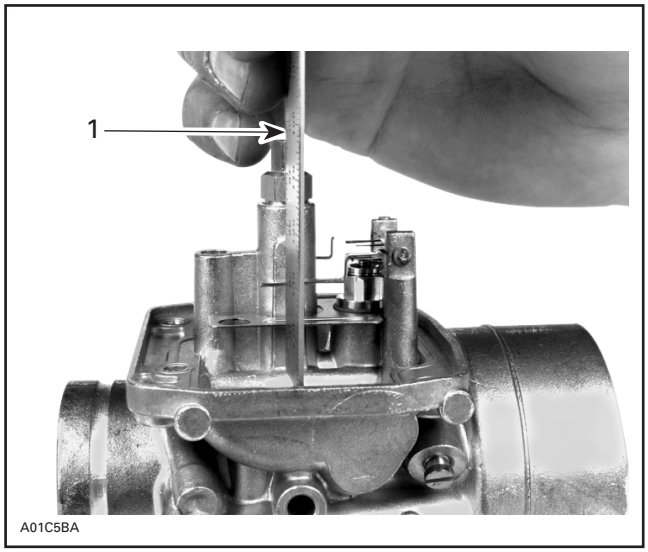
9,10, Float Arm and Float Arm Pin

Correct fuel level in float chamber is vital toward maximum engine efficiency. To check for correct float level proceed as follows:

– Make sure that float arm is symmetrical — not distorted.
– Remove float bowl and gasket from carburetor.
– With carburetor chamber upside-down on a level surface, measure height H between bowl seat and **top** edge of float arm. Keep ruler perfectly vertical and in line with main jet hole.



TYPICAL
H: Float height

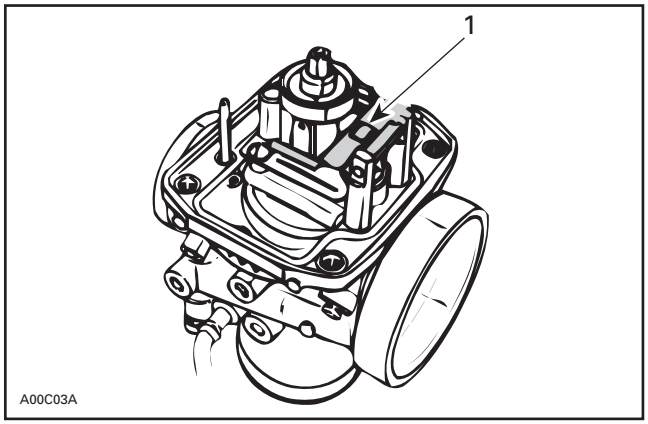


1. Ruler vertical and in line with main jet

CARBURETOR MODEL	FLOAT HEIGHT H	
	± 1 mm	(± .040 in)
MX Z 440	23.9	(.941)
MX Z 494	18.1	(.713)
MX Z 670 HO	22.9	(.902)
Formula Z 500/ DLX 500 LC	18.1	(.713)
Formula Z 583/ DLX 583	18.1	(.713)
Formula Z 670 DLX 670	18.1	(.713)
Summit 500	18.1	(.713)
Summit X 670	22.9	(.902)
Grand Touring 500	18.1	(.713)
Grand Touring 583	18.1	(.713)
Skandic WT	36.5	(1.437)
Skandic SWT	23.9	(.941)
Skandic WT LC	36.5	(1.437)

To Adjust Height H

– Bend the contact tab of float arm until the specified height is reached.

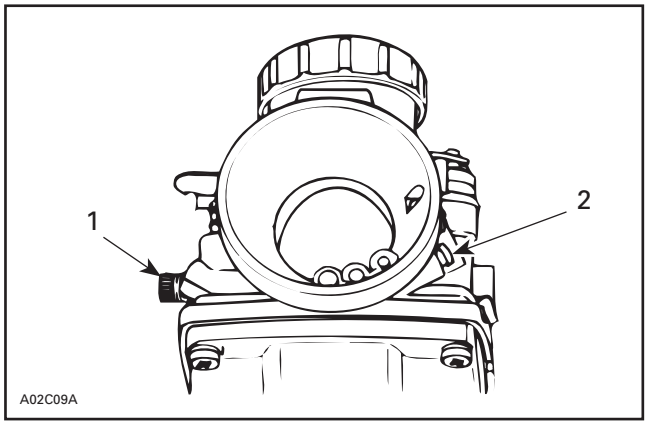


1. Contact tab

CARBURETOR ADJUSTMENTS

Adjustments should be performed following this sequence:

– air screw adjustment
– throttle slide height (preliminary idle speed adjustment)
– throttle cable adjustment
– carburetor synchronization (dual carburetor models)
– final idle speed adjustment (engine running)
– oil pump and carburetor synchronization



1. Idle speed screw
2. Air screw

6, Air Screw

Completely close the **air screw** (until a slight seating resistance is felt) then back off as specified.

Turning screw in clockwise enrichners mixture and conversely, turning it out counterclockwise leans mixture.

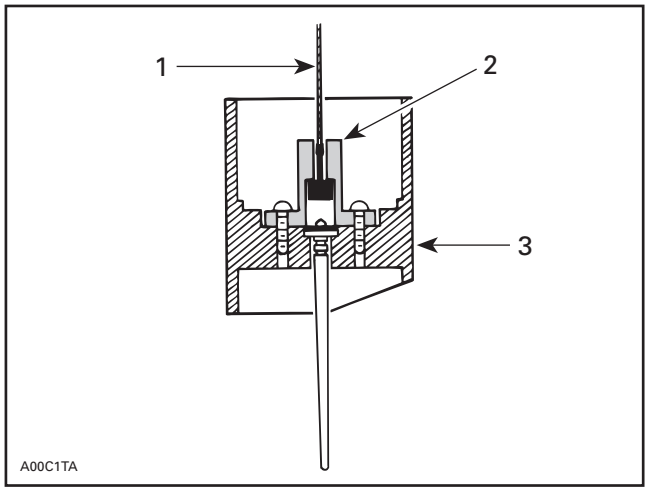
Refer to TECHNICAL DATA 10 for the specifications.

7, Idle Speed Screw

Throttle Slide Opening (preliminary idle speed adjustment)

Hook throttle cable into the needle retainer plate.

NOTE: Do not obstruct hole in throttle slide when installing needle retaining plate. This is important to allow air escaping through and thus allowing a quick response.



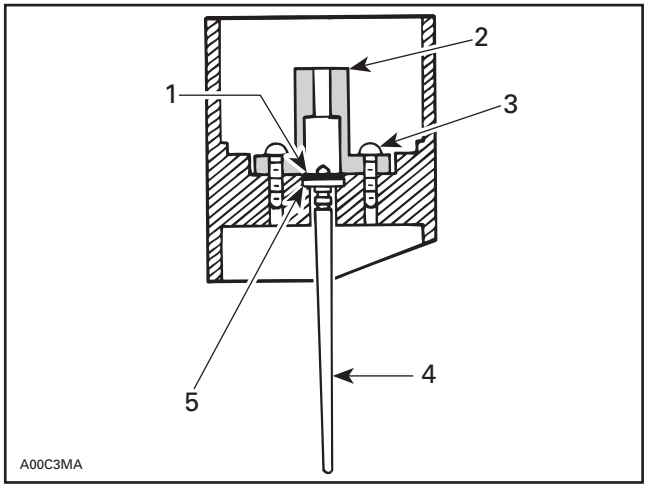
CENTER POST TYPE

1. Throttle cable
2. Needle retaining plate
3. Throttle slide

Make sure the nylon packing **no. 4** is installed on all applicable throttle slides.

▼ CAUTION

Serious engine damage can occur if this notice is disregarded.



CENTER POST TYPE

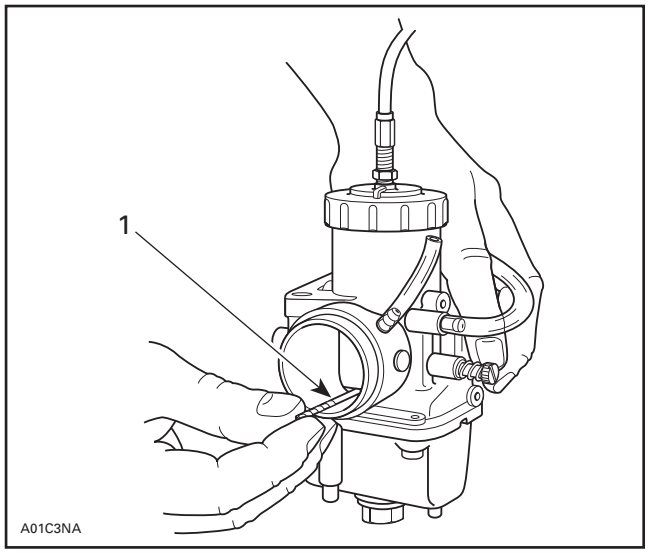
1. E-clip
2. Needle retaining plate
3. Screw
4. Needle
5. Nylon packing

Adjust throttle slide height (see following table) by turning idle speed screw **no. 7**. Throttle slide height is measured on **outlet** side of carburetor (engine side).

NOTE: Make sure that throttle cable does not hold throttle slide. Loosen cable adjuster accordingly. Throttle cable adjustment will be done during adjustment of throttle-slide-to-cover free play.

Final idle speed adjustment (engine running at idle speed) should be within 1/2 turn of idle speed screw from preliminary adjustment.

MODELS	THROTTLE SLIDE HEIGHT mm (in)
MX Z 440	1.5 (.059)
MX Z 500	1.8 (.071)
MX Z 670 HO	1.9 (.075)
Formula Z 500/DLX 500	1.8 (.071)
Formula Z 583/DLX 583	2.0 (.078)
Formula Z 670/DLX 670	2.1 (.083)
Summit 500	2.2 (.087)
Summit X 670	2.4 (.094)
Grand Touring 500	1.8 (.071)
Grand Touring 583	2.0 (.078)
Skandic WT	1.5 (.059)
Skandic SWT	1.3 (.051)
Skandic WT LC	1.5 (.059)



TYPICAL

1. Drill bit used as gauge for throttle slide height

INSTALLATION

▼ CAUTION

Never allow throttle slide(s) to snap shut.

Prior to install carburetor, adjust air screw and preliminary idle speed as described above.

To install carburetor on engine, inverse removal procedure.

However, pay attention to the following:

On applicable models, make sure to align tab of carburetor and air intake silencer (if applicable) with notch of adaptor(s). On applicable models, install adaptor with UP mark facing up.

▼ CAUTION

The rubber flange must be checked for cracks and/or damage. At assembly, the flange must be perfectly matched with the air intake manifold or severe engine damage will occur.

Install clamps in a way that their tightening bolts are staggered — not aligned.

Throttle Cable Adjustment

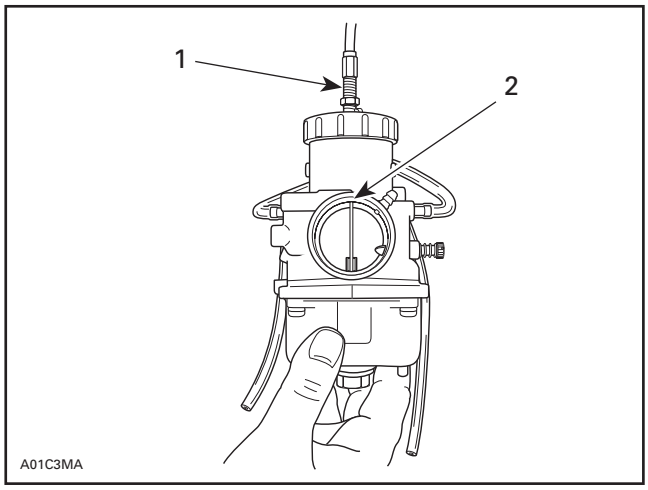
◆ WARNING

Ensure the engine is turned OFF, prior to performing the throttle cable adjustment.

For maximum performance, correct cable adjustment is critical.

At full opening throttle slide must be flush or 1.0 mm (.040 in) lower than the top of carburetor **outlet** bore (engine side).

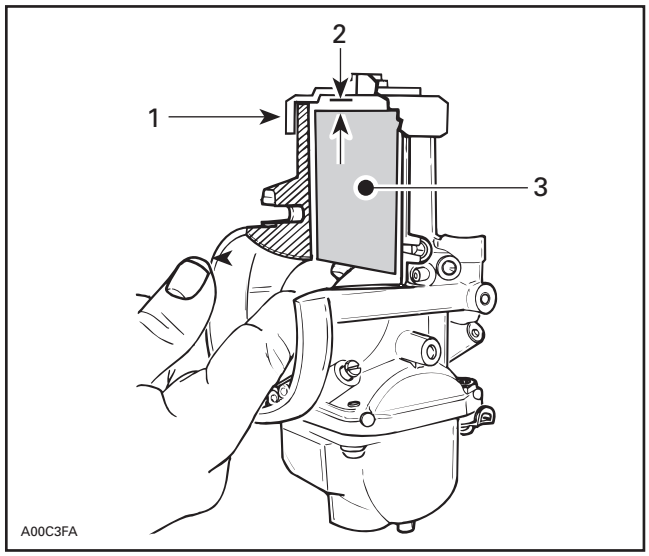
First loosen adjuster nut then turn throttle cable adjuster accordingly.



FULL OPENING (THROTTLE LEVER AGAINST HANDLE GRIP)

1. *Throttle cable adjuster*
2. *Throttle slide flush or 1.0 mm (.040 in) lower than carburetor oulet bore (engine side)*

Check that with the throttle lever fully depressed, there is a free play between the carburetor cover and top of throttle slide.



FULL OPENING (THROTTLE LEVER AGAINST HANDLE GRIP)

1. *Cover*
2. *Free play*
3. *Throttle slide*

◆ WARNING

This gap is very important. If the throttle slide rests against the carburetor cover at full throttle opening, this will create too much strain and may damage the throttle cable or other components in throttle mechanism.

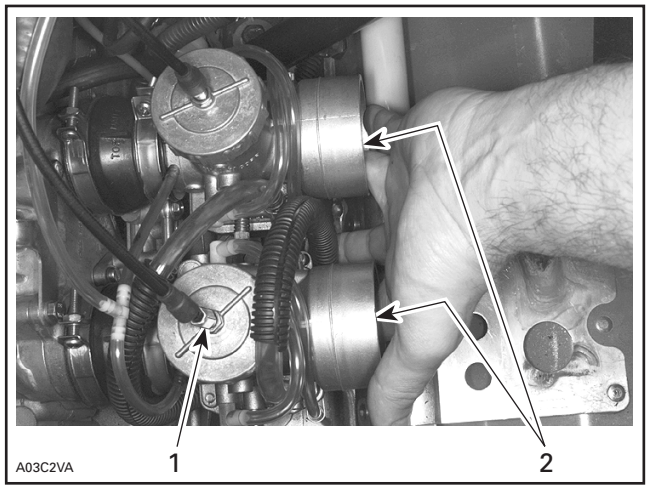
Carburetor Synchronization

Dual Carburetor Models Only

When depressing throttle lever, both carburetor slides must start to open at the same time.

Unlock cable adjustment lock nut on one carburetor.

Screw or unscrew cable adjuster until both carburetor slides start to open at same time. Cable play will be identical on both carburetors. Retighten jam nut.



TYPICAL

1. *Screw or unscrew adjuster*
2. *Check that both slides start to open at the same time*

Check throttle slide position at wide open throttle. Throttle slide must be flush or 1 mm (.040 in) lower than carburetor **outlet** bore. At that same position, check that throttle slide does not contact carburetor cover. Turn cable adjuster and recheck synchronization.

▼ CAUTION

If the throttle slide rests against the carburetor cover at full throttle opening, this will create too much strain and may damage the throttle cable or other components in throttle mechanism.

▼ CAUTION

On dual carburetor models, make sure both carburetors start to operate simultaneously. Beside do not interchange carburetors, the jetting may be different on each side. A red dot is printed on one carburetor and on the engine. Match the carburetor and the engine dots when applicable.

▼ CAUTION

On oil injection models, the oil injection pump adjustment must be checked each time carburetor is adjusted. Refer to OIL INJECTION SYSTEM 04-06.

IDLE SPEED FINAL ADJUSTMENT

7, Idle Speed Screw

▼ CAUTION

Before starting engine for the final idle adjustment, make sure that oil pump is adjusted. The oil injection pump adjustment must be checked each time carburetor is adjusted. Refer to OIL INJECTION SYSTEM 04-06.

Start engine and allow it to warm then adjust idle speed to specifications by turning **idle speed** screw clockwise to increase engine speed or counterclockwise to decrease it.

NOTE: On twin-carburetor models: Turn adjustment screw the same amount to keep carburetors synchronized.

Refer to TECHNICAL DATA 10 for the specifications.

▼ CAUTION

Do not attempt to set the idle speed by using the air screw. Severe engine damage can occur.

CHOKE

S-Series

Choke Plunger Adjustment

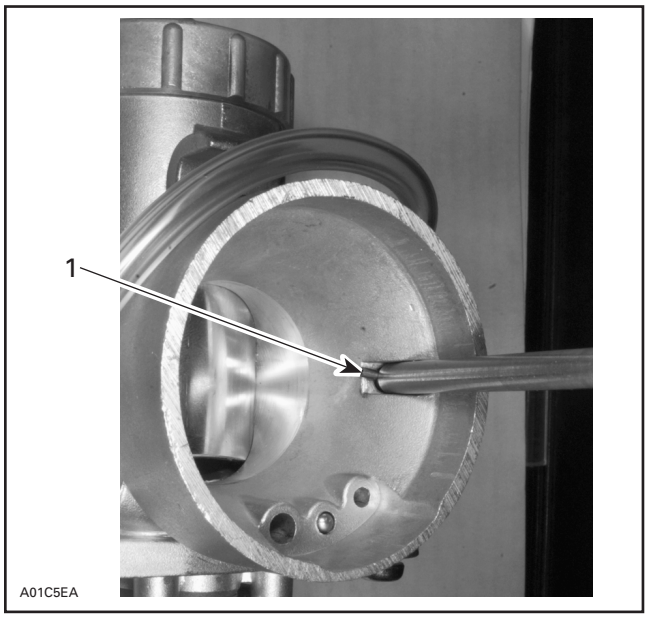
Set choke lever to fully open position.



CHOKE LEVER — FULLY OPEN POSITION

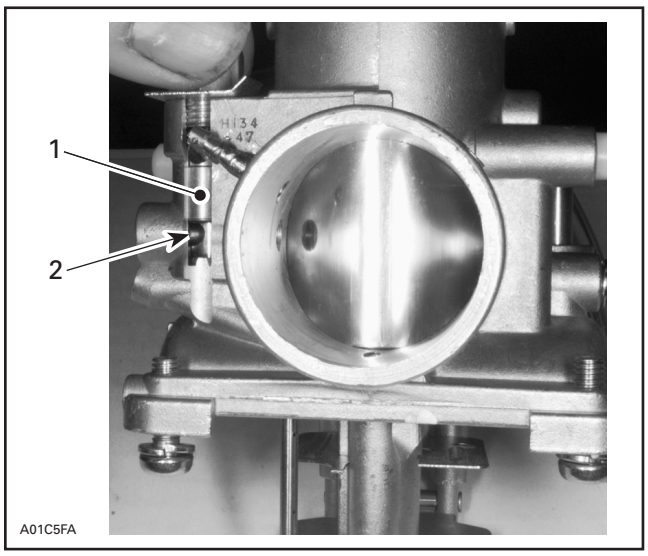
Use small diameter of tool for VM 34 carburetors.

Insert choke plunger tool into choke air inlet of each carburetor. Tool stopper may not lean against recess wall. Though it must be within 1 mm (.040 in) of recess wall.



AIR SILENCER SIDE SHOWN

1. *Tool stopper within 1 mm (.040 in) of recess wall*



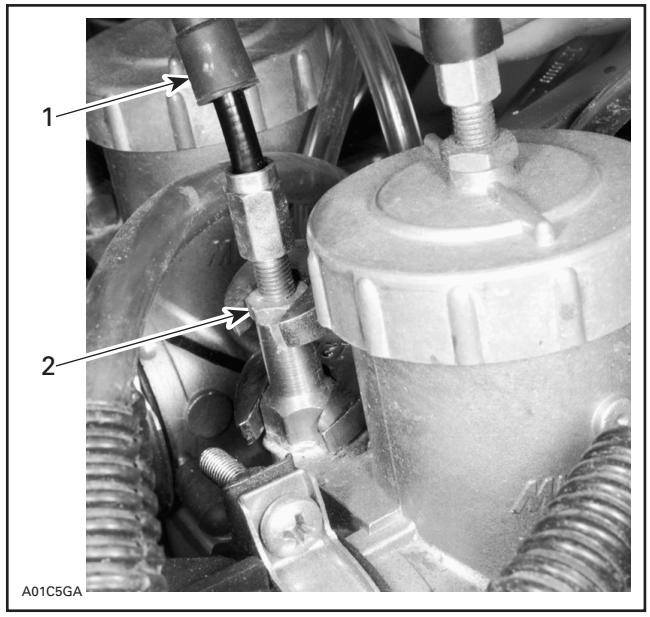
CUT-AWAY (ENGINE SIDE SHOWN)

1. *Choke plunger*
2. *Tool properly seated under choke plunger*

If tool tip does not seat under choke plunger **no. 15**, adjust as follows:

Make sure choke lever is at fully open position.

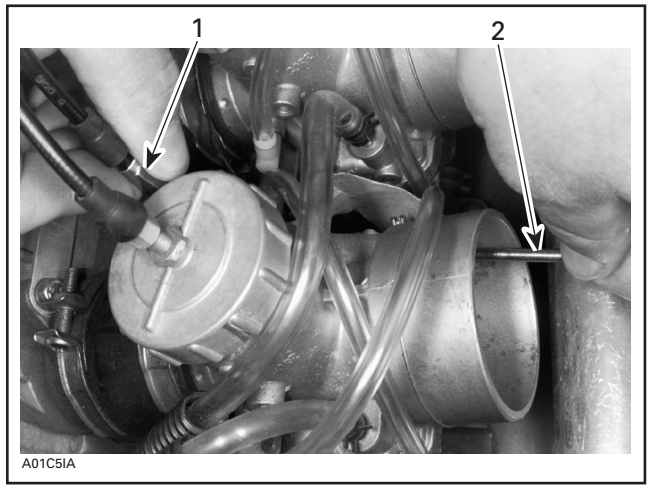
Lift up protector cap and loosen choke cable lock nut, as shown in the next photo.



1. *Lift up protector cap*
2. *Loosen lock nut*

Turn choke cable adjustment nut by hand until tool properly seats under choke plunger.

NOTE: A light pressure should be needed to position tool under plunger.



1. *Choke cable adjustment nut*
2. *Choke plunger tool*

Tighten choke cable lock nut and reinstall protector cap.

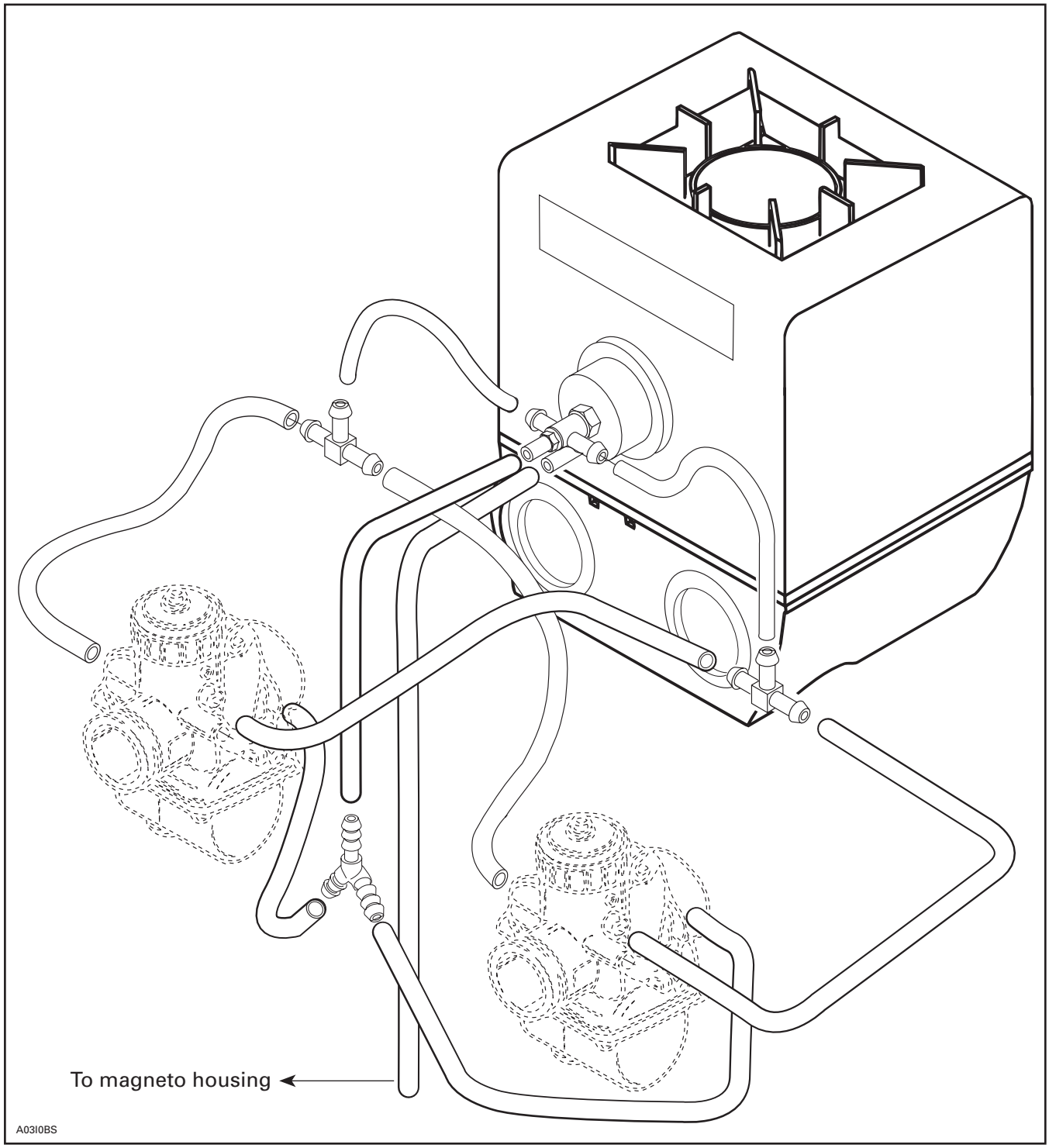
Set choke lever to close and open positions and ensure that tool properly seats under plunger **only** when lever is set to fully open position.

Set choke lever to close position and, by pulling and pushing choke lever, make sure there is no tension on cable (free play).



CHOKE LEVER — CLOSED POSITION

H.A.C. SYSTEM



H.A.C. SYSTEM

Summit 500 Only

H.A.C. (High Altitude Compensator) is a maintenance free device.

No adjustment and verification can be done to H.A.C.

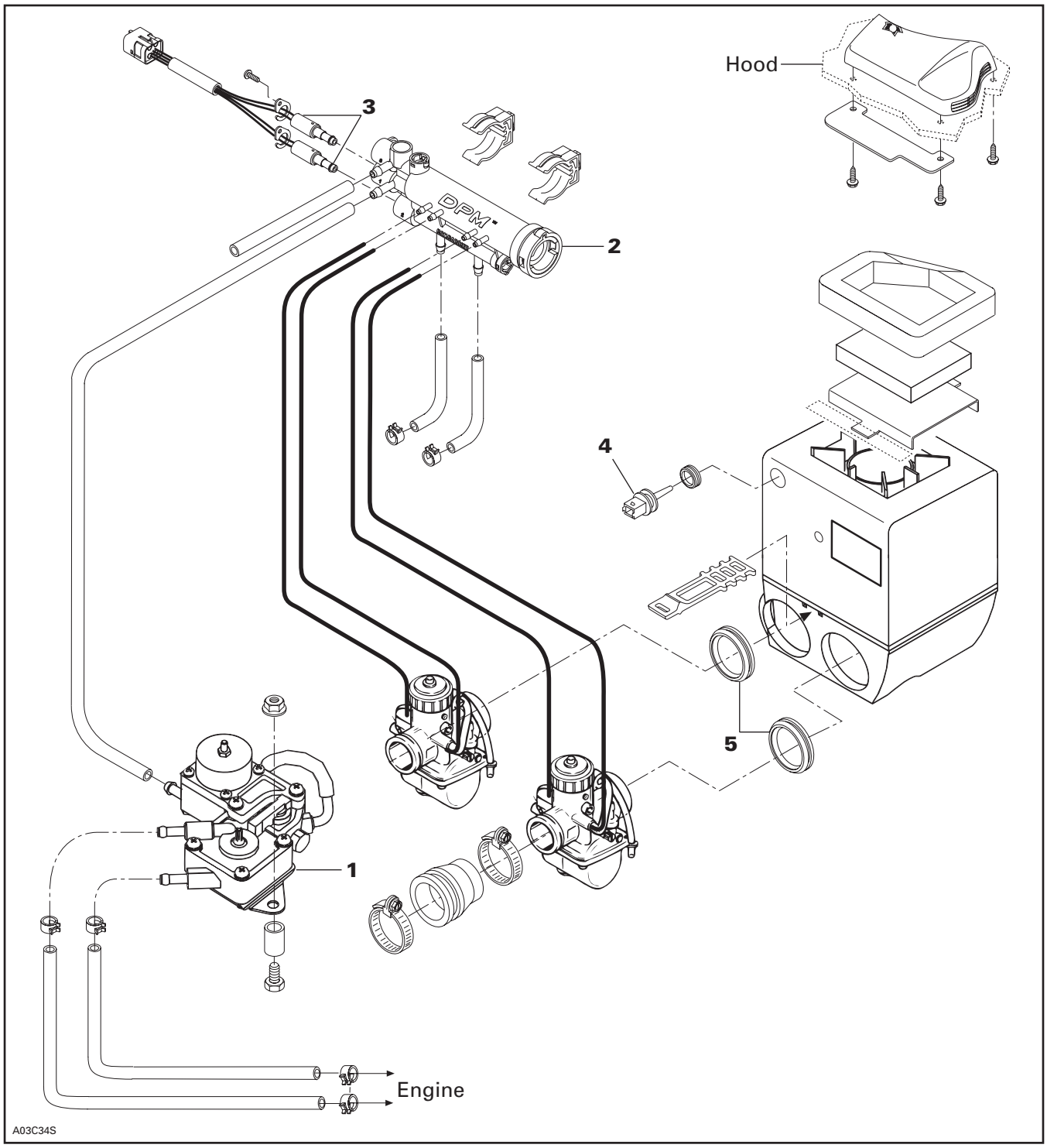
If H.A.C. is suspected to be faulty, replace it and check for improvement.

Hoses connected to H.A.C. must not be altered in length or size. Check for kinked or loose hoses. Tighten or replace as necessary. See below illustration for routing.

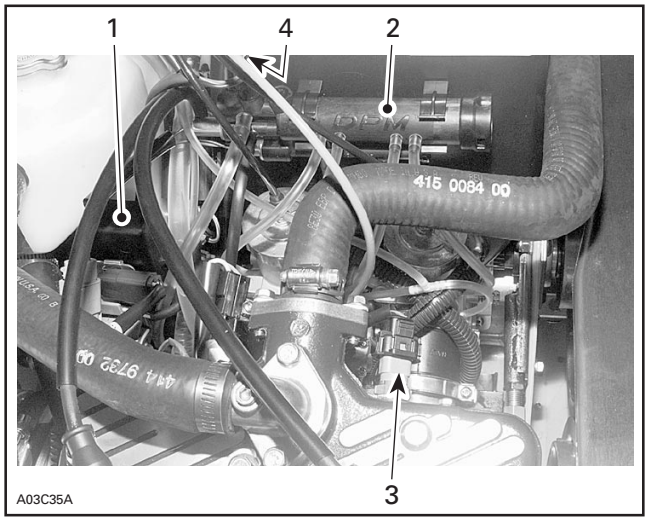
Nut holding T-fitting must be torqued to 6 N•m (53 lbf•**in**).

DIGITAL PERFORMANCE MANAGEMENT (DPM) SYSTEM

Summit X 670 and MX Z 670 HO



COMPONENT LOCATION



1. MPEM
2. Manifold
3. Engine coolant temperature DPM sensor
4. Air temperature DPM sensor

PURPOSE

Calibrate the air/fuel mixture in order to optimize the engine output while reducing fuel consumption.

METHOD

The system makes the pressure vary within the carburetor bowl.

OVERALL SYSTEM OPERATION

Introduction

The Digital Performance Management (DPM) system increases pressure within all 2 carburetor bowls thus the air/fuel mixture is enriched. This is what we call the enrichment mode.

As soon as the spark plug gives off its first spark, the DPM system calculates the enrichment time and rate based on the engine coolant temperature.

Once enrichment mode is completed carburetor bowls return to atmospheric pressure (DPM in standby mode), and the air/fuel mixture is identical to that of carburetors without the DPM system.

Over 3000 RPM, compensation mode is activated but will compensate only if the air temperature exceeds - 20°C (- 4°F) and the air pressure is lower than 1000 mbar.

Float bowls are now under vacuum (lower than atmospheric pressure) and the air/fuel mixture is leaner.

BLACK and WHITE/GRAY wires (2-05 housing) are used for programming by the manufacturer. Nothing must be plugged to this housing.

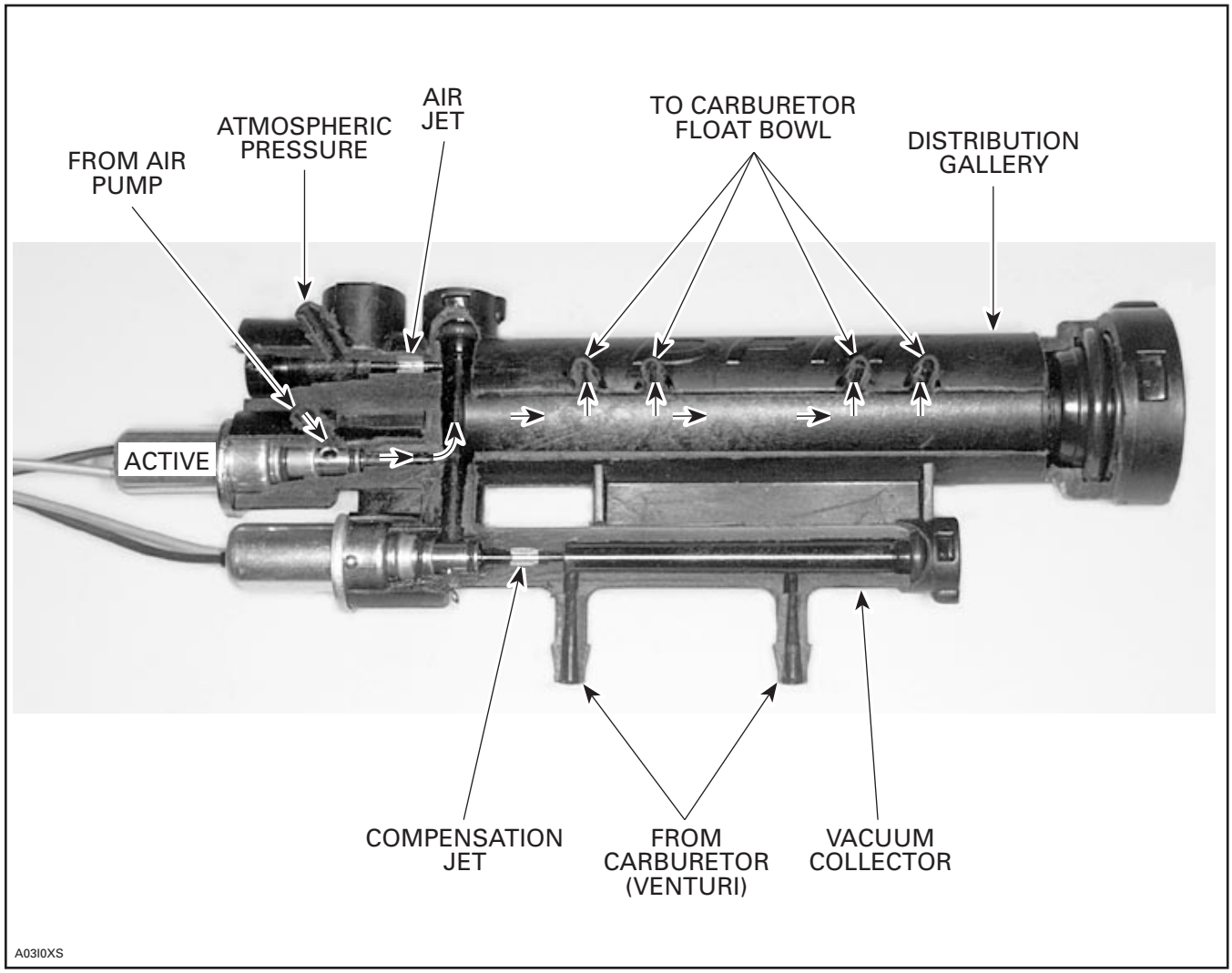
NOTE: During enrichment mode only both modes (enrichment or compensation) **can** operate at the same time.

Enrichment Mode (starting)

Turning the ignition key to the ON position will not energize DPM system. The DPM system is energized only once the engine turns over 250 RPM.

The DPM system then comes on by reading the engine coolant temperature through the sensor located on the cylinder head. The DPM system calculates the enrichment solenoid opening time (duty cycle) and the enrichment rate according to the temperature. The air/fuel mixture is then enriched in order to facilitate starting.

The system pressurizes both carburetor bowls in order to enrich the air/fuel mixture. This is accomplished with the help of an air pump.



ENRICHMENT MODE — DPM MANIFOLD ASSEMBLY

This enrichment mode of the air/fuel mixture takes place at start-up and during engine warm-up, and it depends on engine coolant temperature.

The higher the engine coolant temperature upon start-up, the leaner the mixture.

This enrichment mode progressively decreases (with time) by reducing the solenoid duty cycle. The warmer the engine, the shorter the enrichment mode.

If the throttle opening exceeds one quarter before engine runs, the enrichment mode is interrupted by a switch during the starting process, which allows unflooding the engine.

However, the enrichment mode is restored when releasing the throttle.

Following the enrichment mode, carburetors are operating normally, i.e. without additional pressure within bowls.

NOTE: Calibration is normally the same on engines with a DPM system and those without.

Compensation Mode

Two conditions must be met for the compensation mode to operate:

1. Engine must rev over 3000 RPM.
2. Air temperature must exceed - 20°C (- 4°F) and/or atmospheric pressure must be lower than 1000 mbar.

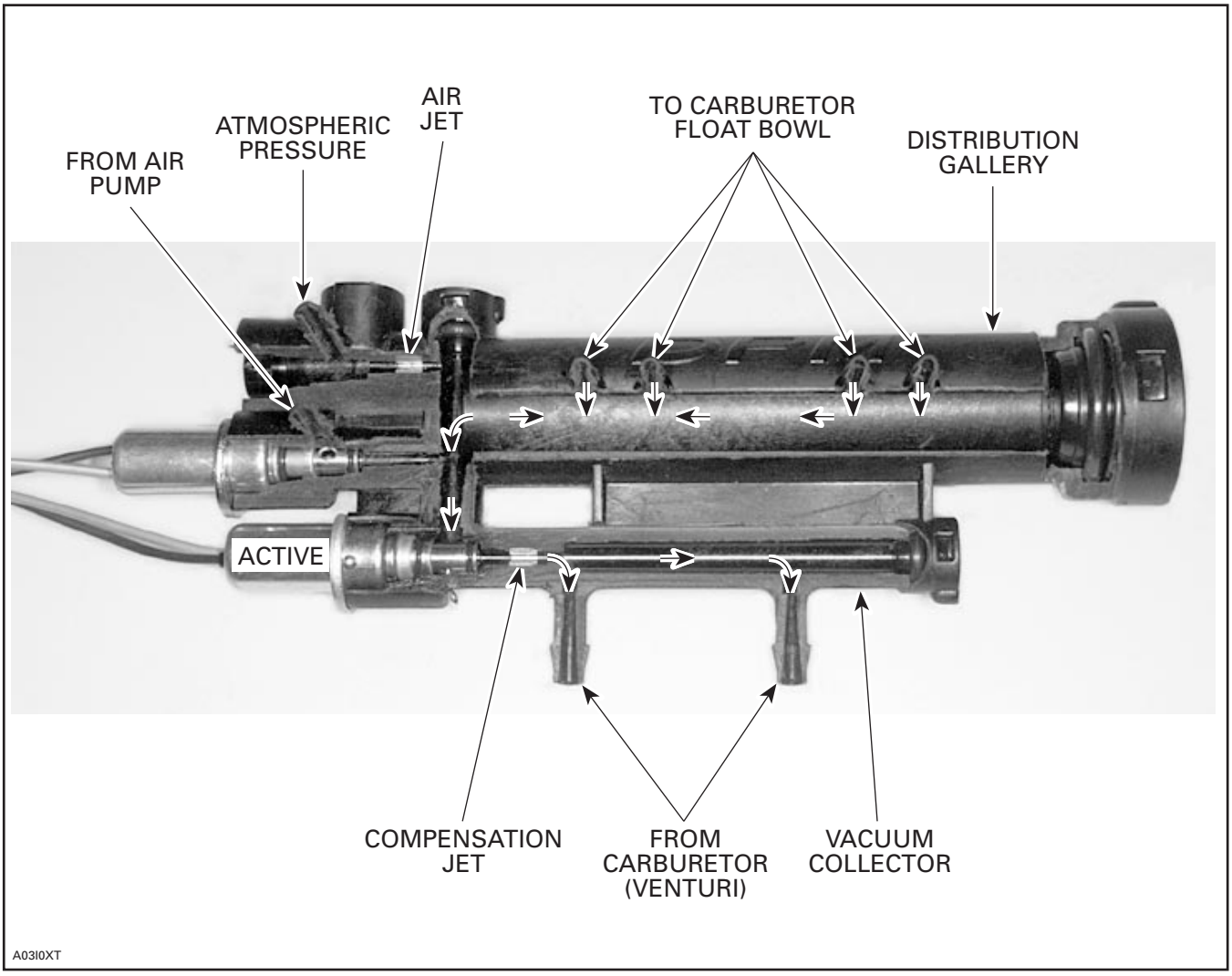
The compensation system brings both carburetor bowls under vacuum (lower than atmospheric pressure) in order to make the air/fuel mixture leaner. The required vacuum is produced within the needle jet air inlet.

The compensation ratio will depend on the air temperature and the atmospheric pressure.

The higher the air temperature, the leaner the air/fuel mixture.

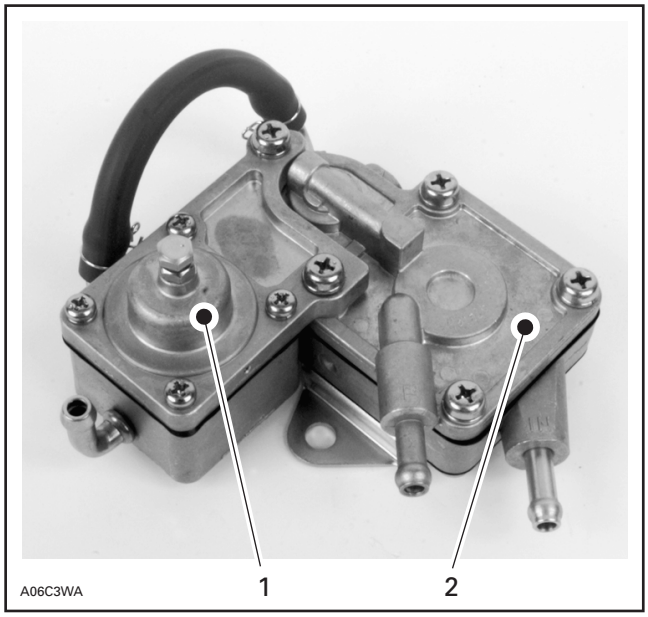
The lower the atmospheric pressure, the leaner the air/fuel mixture.

NOTE: The atmospheric pressure decreases as the altitude increases.



COMENSATION MODE — DPM MANIFOLD ASSEMBLY

AIR PUMP OPERATION



TYPICAL

1. *Regulator*
2. *Pump*

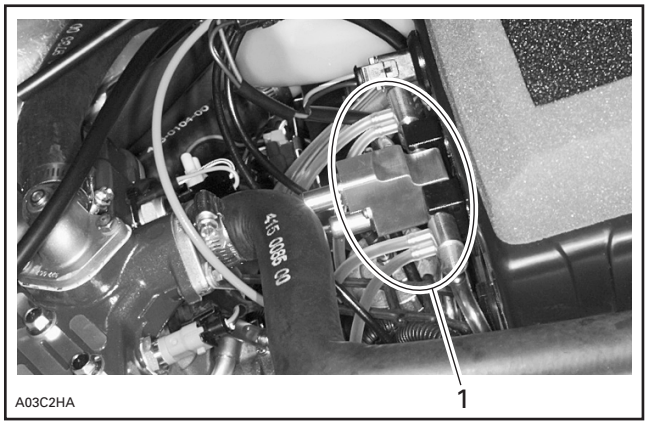
Air pump supplies the distribution gallery through a unique hose.

Pump diaphragm is activated by the alternating pressure/vacuum within the engine crankcase. Two hoses connect the crankcase (cylinders nos. 1 and 2) to the pump.

A regulator within the pump stabilizes the pump pressure.

Since the pump pressure is insufficient upon starting, the regulator is fed directly by the crankcase pressure.

DPM MANIFOLD OPERATION

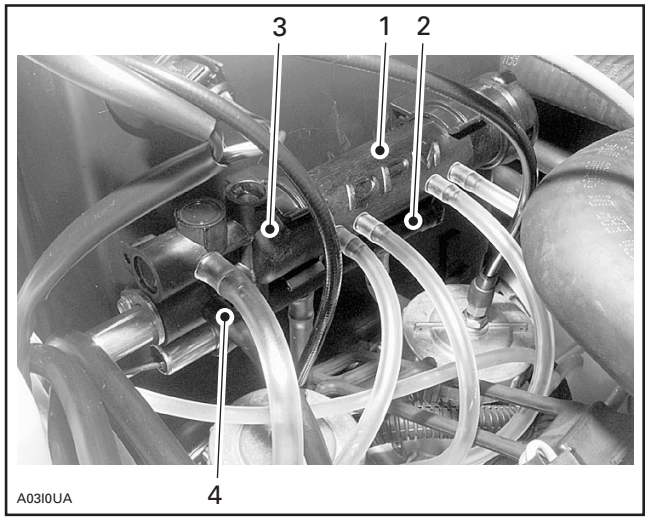


1. *Manifold*

The DPM manifold consists of 2 tubes. Depending on the mode, the upper tube (distribution gallery) distributes pump pressure or vacuum to each bowl through 2 hoses. The passage is then opened by the enrichment or the compensation solenoid, depending on the mode.

The lower tube (vacuum collector) receives the vacuum created by each carburetor within the needle jet air inlet.

An air jet (manifold air jet) also allows the atmospheric pressure to enter.



MANIFOLD ASS'Y

1. *Upper tube: distribution gallery*
2. *Lower tube: vacuum collector*
3. *Manifold air jet — atmospheric pressure*
4. *From air pump*

Enrichment Solenoid

Solenoid Operating Principle

A solenoid is a winding coiled in order to produce a magnetic field. A metal rod crosses the coil and cuts the magnetic field. Each time the coil is activated, the magnetic field attracts the rod. If the supply current is interrupted, a spring pushes the rod.

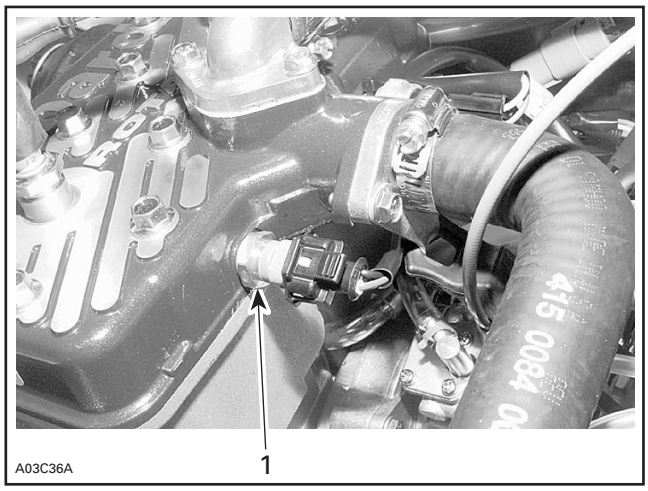
Solenoid Function within the DPM System

The DPM system turns the solenoid **no. 3** ON and OFF 10 times per second, which means that it operates at 10 cycles/second or 10 Hertz (Hz). The solenoid therefore opens and closes 10 times per second, thus allowing the pump pressure to reach the distribution gallery (upper tube).

For the pressure to vary within the bowls, the solenoid is activated in part by the DPM during each cycle. This is what is called the duty cycle. In other words, the solenoid will not open throughout the whole cycle. The duty cycle depends on the engine coolant temperature.

The colder the engine, the longer the duty cycle. Therefore, the solenoid will stay open longer, thus giving way to pressure.

MPEM reads engine temperature at once (when starting) through a sensor.



1. Engine temperature DPM sensor

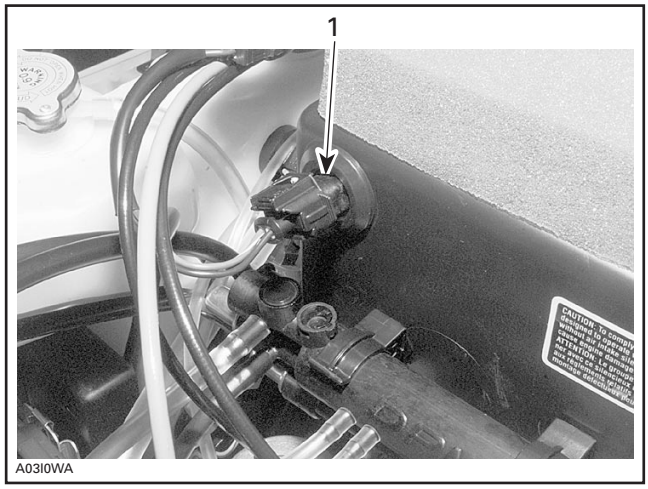
Compensation Solenoid

NOTE: Same principle as enrichment solenoid. Read **Solenoid Operating Principle** at the beginning of the chapter.

The duty cycle of the compension solenoid depends on the air temperature and the atmospheric pressure.

The warmer the air, the longer the duty cycle. Therefore, the solenoid will stay open longer, thus giving way to vacuum. The same applies when the altitude increases.

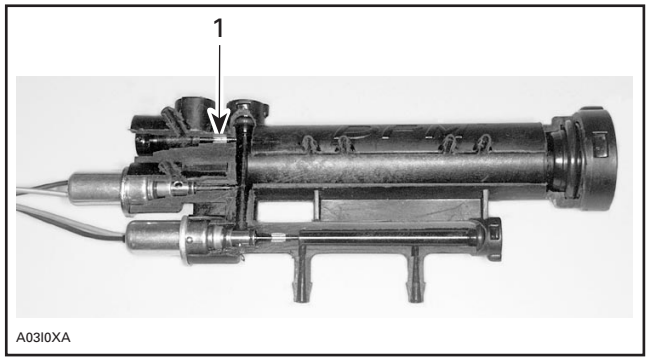
MPEM reads air temperature through a sensor.



1. Air temperature sensor

Manifold Air Jet

This jet allows the atmospheric pressure to reach carburetor bowls when the DPM SYSTEM is on standby (returned to atmospheric pressure).



1. Atmospheric pressure air jet

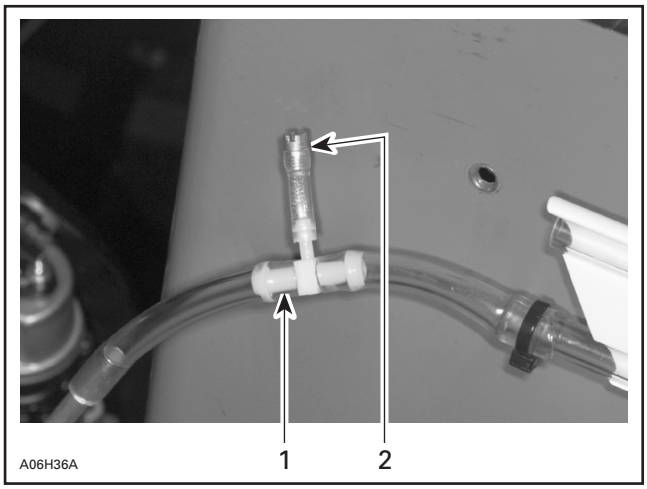
TESTING PROCEDURE

Pump

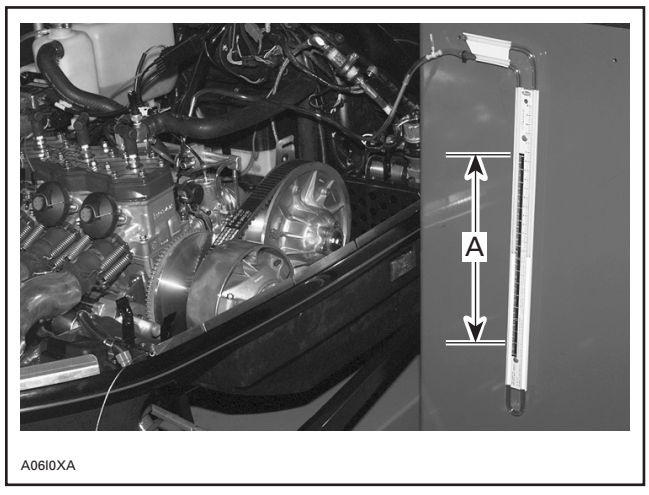
Pressure Test

The pump must create a minimum pressure of 400 ± 50 mm of water.

Connect a jet (P/N 270 500 157) to a hose then connect that little tube to the small nipple of a T-fitting (P/N 414 222 500). Install that T-fitting between a U-tube and air pump outlet.



1. T-fitting (P/N 414 222 500)
2. Jet (P/N 270 500 157)



TYPICAL
A. 400 ± 50 mm of water

Start engine and note water height.

DPM System

Solenoids are supplied by the MPEM. If MPEM does not work, there will be no current on compensation solenoid RD/BL and BK connectors; and on enrichment solenoid RD/GR and BK connectors.

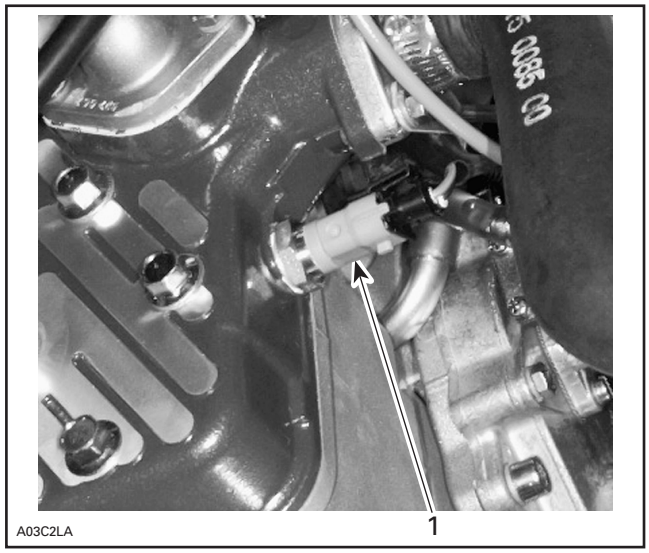
Unplug upper solenoid wire (enrichment). Connect a good solenoid to MPEM output connector.

▼ CAUTION

Do not disconnect both DPM connectors. The compensation solenoid must remain plugged.

Disconnect engine temperature sensor connector. The DPM system now operates as though the engine temperature was - 20°C (- 4°F) to allow maximum mixture enrichment.

For the compensation solenoid, the air temperature sensor **no. 4** must be at room temperature. Operate the engine at 3500 RPM. The solenoid must vibrate.



1. Engine temperature sensor

Start the engine and observe the solenoid. A vibrating solenoid indicates that the MPEM is in good working order. If not, replace the MPEM and repeat test.

Solenoid

Static Test

Unplug electrical connector of the solenoid and connect it to a 12 V battery. The solenoid must sound when it opens. Repeat test several times.

Dynamic Test

When checking the enrichment solenoid, disconnect engine temperature sensor connector. The DPM system now operates as though the engine temperature was - 20°C (- 4°F) to allow maximum mixture enrichment.

Remove the solenoid, hold it in hand and start the engine.

For the enrichment solenoid, check if it vibrates as soon as the engine is started.

For the compensation solenoid, the air temperature sensor **no. 4** must be at room temperature. Operate the engine at 3500 RPM. The solenoid must vibrate.

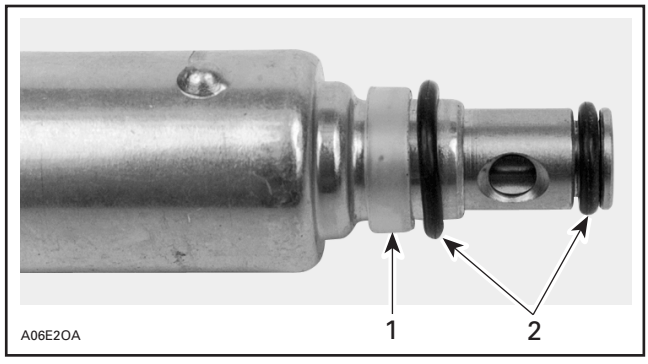
Temperature Sensor (air and engine)

At room temperature 20°C (68°F), the sensor resistance must be 2500 Ω ± 300.

PARTS REMOVAL AND INSTALLATION

Solenoid

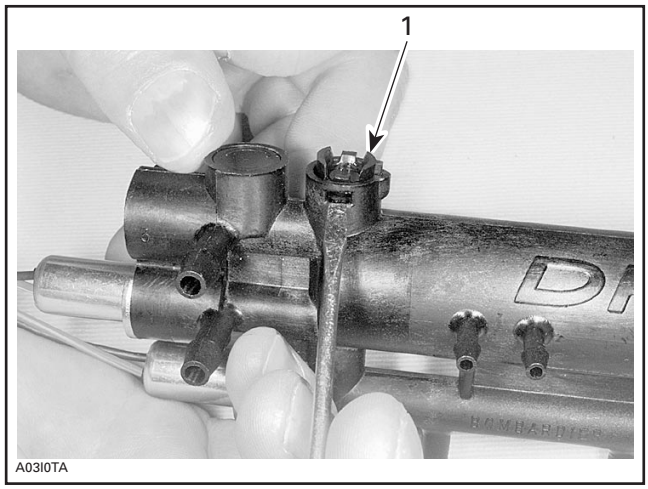
At reassembly, ensure that solenoid seals are in place.



1. Plastic seal
2. O-rings

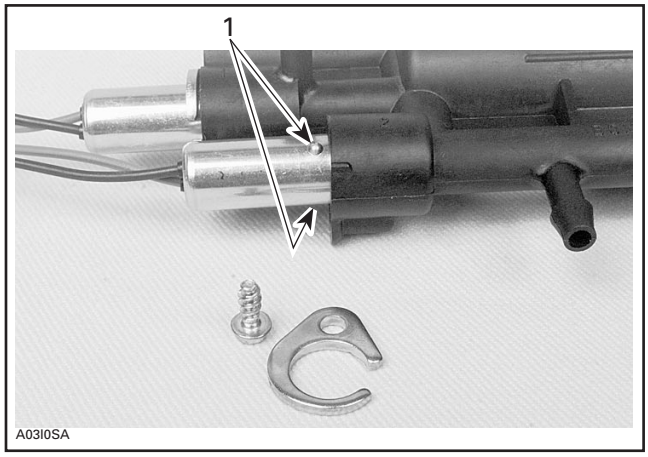
Installation of compensation solenoid must be done as follows:

Remove transfer gallery plug by pushing 2 tabs.



1. Transfer gallery plug

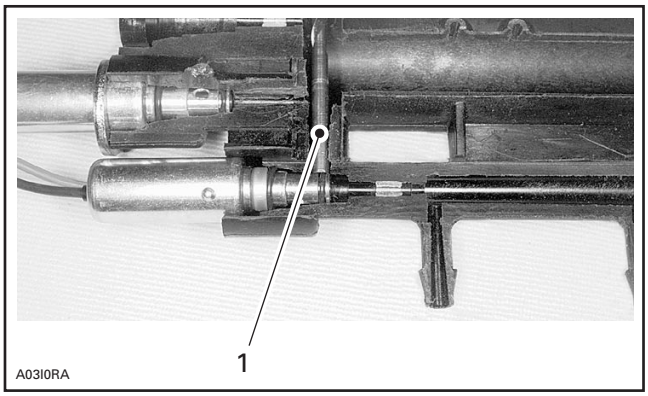
Partially insert compensation solenoid into DPM manifold.



1. Embosses not engaged

Insert a 5/32 in drill bit with its round end first into the transfer gallery.

Fully push solenoid into DPM manifold while maintaning a pressure on drill bit. This will guide the solenoid O-ring.

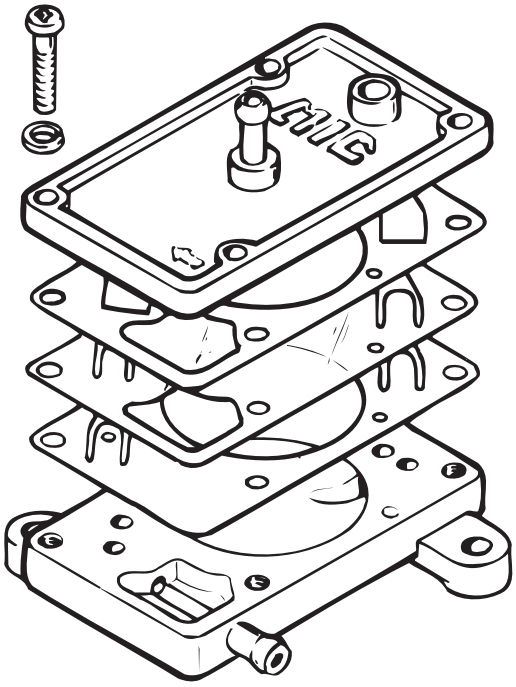


TYPICAL — CUT-AWAY

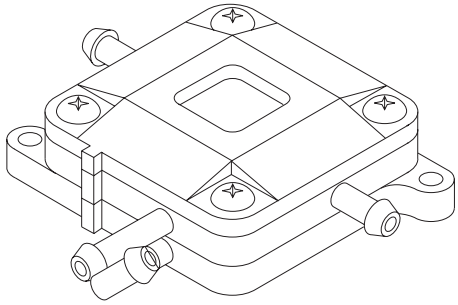
1. Drill bit round end guiding solenoid O-ring

FUEL PUMP

443 and 503 engines



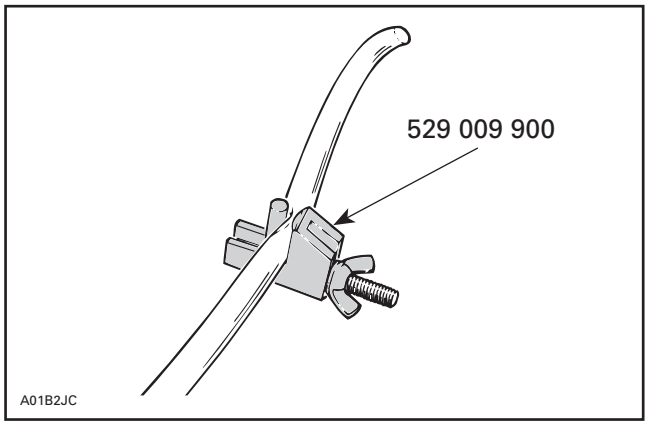
494, 583 and 670 engines



A06C45S

REMOVAL

Install a hose pincer (P/N 529 009 900) on fuel supply line close to pump inlet.



Disconnect fuel outlet line(s).

Disconnect impulse line.

Remove screws securing fuel pump.

PUMP VERIFICATION

Check fuel pump valves operation as follows:

Connect a clean plastic tubing to the inlet nipple and alternately apply pressure and vacuum with pump of leak test kit. The inlet valve should release with pressure and hold under vacuum.

Repeat the same procedure at the outlet nipple. This time the outlet valve should hold with pressure and release under vacuum.

NOTE: On model fitted with 2 outlets, plug 1 outlet with finger while checking outlet valve.

Check impulse diaphragm and gasket on high-supply fuel pump with twin outlets as follows:

Connect a clean plastic tubing to the impulse nipple and plug vent hole on top cover. Either apply pressure or vacuum. The diaphragm/gasket must not leak.

CLEANING AND INSPECTION

The entire pump should be cleaned with general purpose solvent before disassembly.

Fuel pump components should be cleaned in general purpose solvent and dried with compressed air.

◆ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as each is flammable and explosive.

Inspect diaphragm. The pumping area should be free of holes, tears or imperfections. Replace as needed.

High-supply pump with twin outlets: Thoroughly clean filter on top cover. Replace pump if too dirty.

INSTALLATION

To install, inverse removal procedure.

◆ WARNING

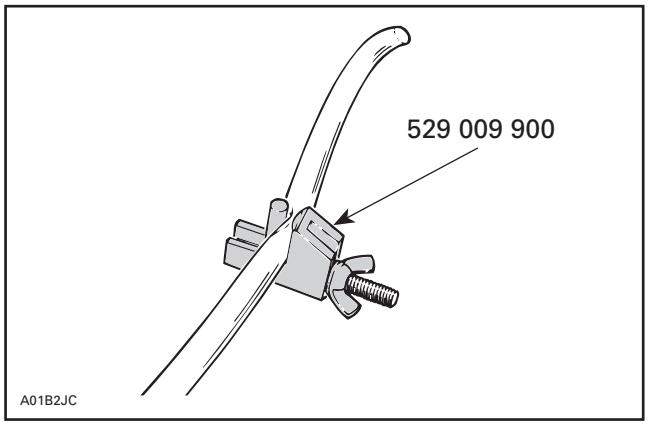
Pressure test to ensure there is no leak in fuel system.

FUEL TANK AND THROTTLE CABLE

Fuel Tank Lines

◆ WARNING

When draining a fuel tank or whenever a fuel line is disconnected, obstruct line with a hose pincher (P/N 529 009 900) or equivalent device. Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.



Impulse/Fuel Lines Spring Clips

All Models

Always reposition spring clips after any repair to prevent possible leaks.

Throttle Cable Circlip at Handlebar

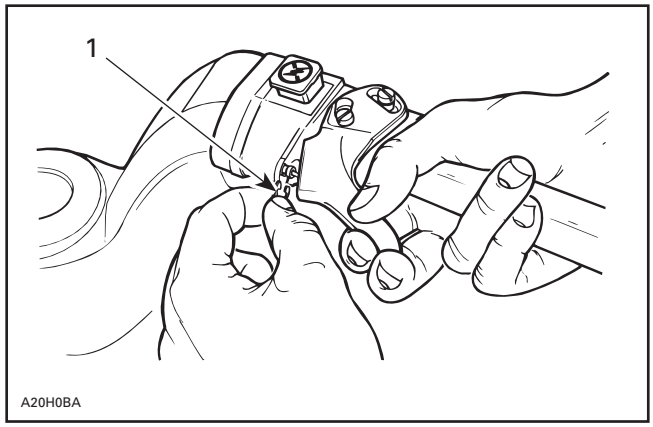
All Models

Put silicone grease (P/N 413 701 700) around cable barrel. Locate circlip as per illustration.

◆ WARNING

If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

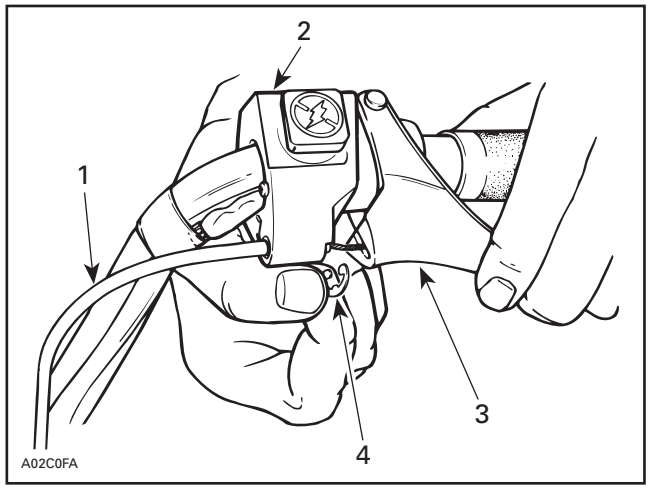
Models with Easy Action Throttle Lever



TYPICAL

1. *Circlip*

Other Models



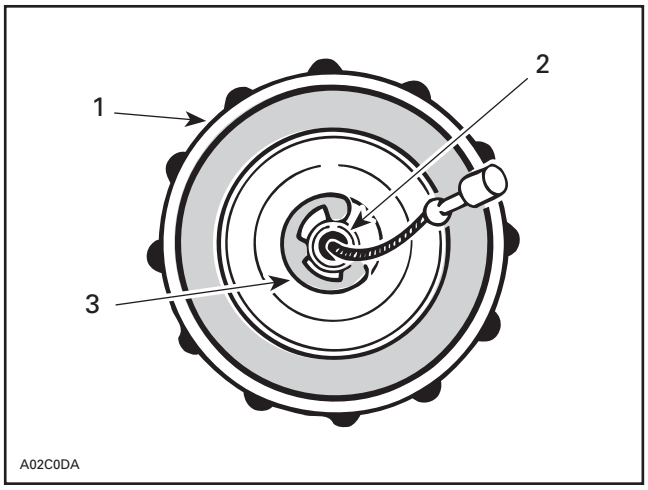
TYPICAL

1. *Throttle cable housing*
2. *Throttle handle housing*
3. *Throttle handle*
4. *Circlip*

Throttle Cable O-Ring and Retaining Ring at Carburetor

Some Models

Locate O-ring outside of carburetor cover and retaining ring inside.



1. *Carburetor cover*
2. *Throttle cable housing*
3. *Retaining ring*

Adjust throttle cable as specified in CARBURETOR AND FUEL PUMP 04-11.

Throttle Cable Routing

▼ CAUTION

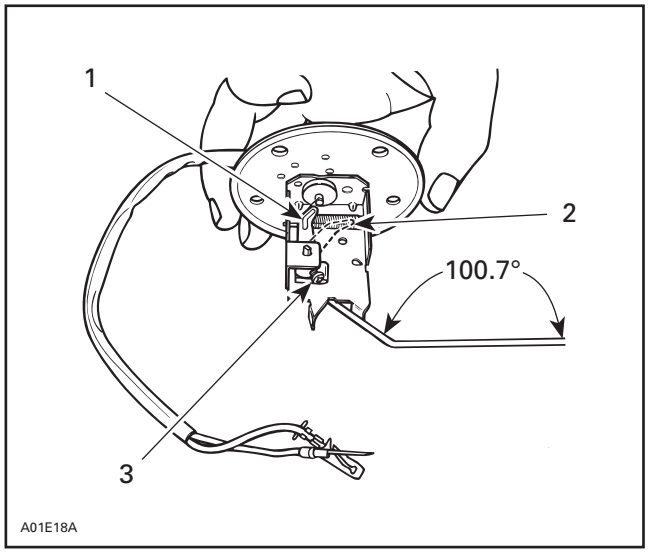
Check that throttle cable is routed away from sharp edges, hot or vibrating parts. When turning steering while engine is running, idle speed must not vary.

Fuel Level Sensor

Grand Touring 500/583 and Formula Z 583/ DLX 583/Z 670/DLX 670

INSPECTION

Visually inspect the condition of connectors and wiring throughout the circuit. Connections must be clean and tight, and wiring free of damage. Repair as necessary. Use silicone dielectric grease to prevent corrosion at the connectors. Operate the engine to see if the problem has been corrected. If not, remove fuel level sensor from fuel tank and check rod angle (100.7°), resistance at full position (3 ± 2 Ω) and resistance at empty position (110 ± 7 Ω).



1. *Full position (3 ± 2 Ω)*
2. *Empty position (110 ± 7 Ω)*
3. *Loosen to adjust*

FUSE REPLACEMENT

A 0.25 ampere fuse protects fuel level sensor circuitry. Remove seat to gain access.

Fuel Level Sensor Screws

Grand Touring 500/583 and Formula Z 583/ DLX 583/Z 670/DLX 670

Torque fuel level sensor retaining screws to 1 N•m (8 lbf•**in**) in the sequence shown and then to 2.5 N•m (22 lbf•**in**), using the same sequence.

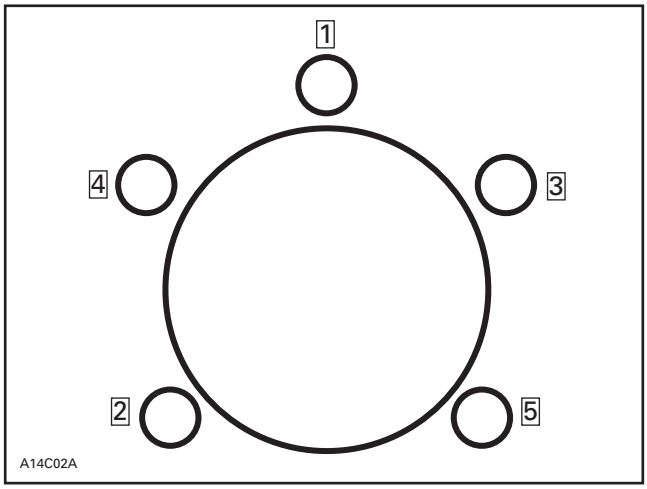


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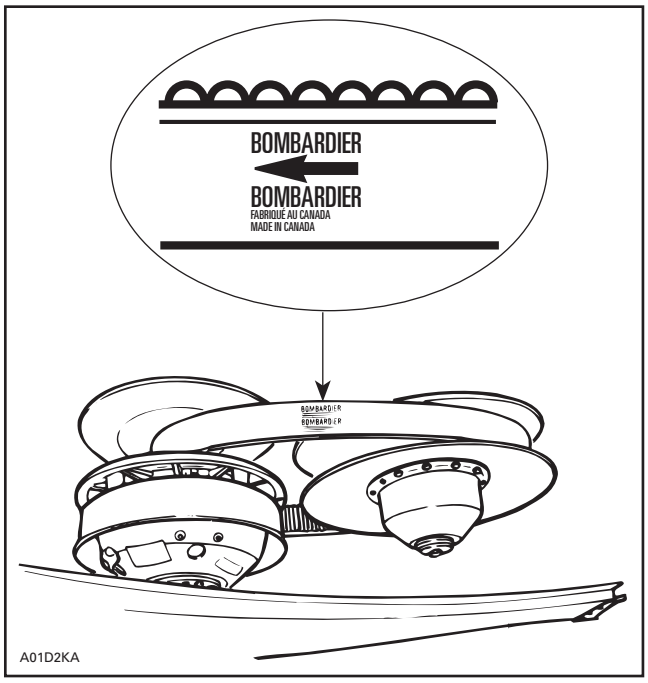
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DRIVE BELT

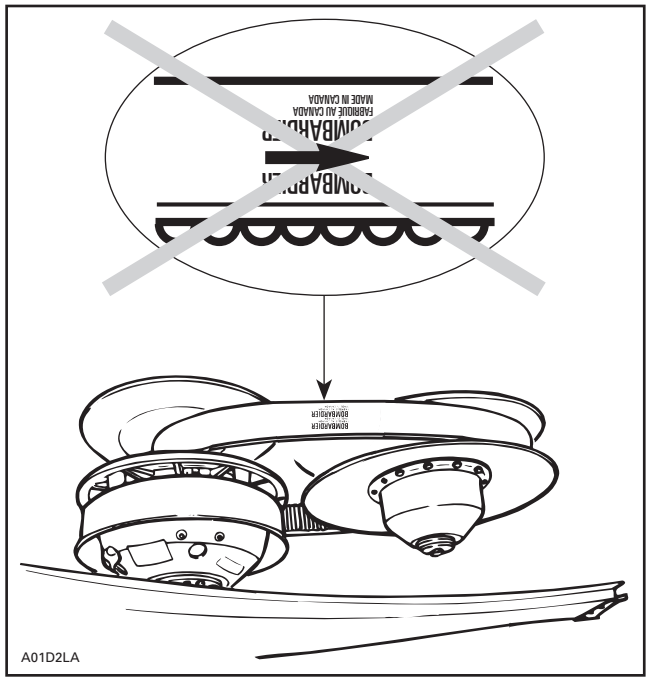
MODEL	PART NUMBER	WIDTH (NEW) ± 0.25 mm (.010 in)	MINIMUM WIDTH (WEAR LIMIT)
FORMULA Z 670	415 106 300	35.56 mm - 0.60 + 0.10 (1.378 in - .024 + .004)	33.00 mm (1.299 in)
SUMMIT X 670, FORMULA DLX 670 AND MX Z 670 HO	417 300 067	35.56 mm - 0.60 + 0.10 (1.378 in - .024 + .004)	33.00 mm (1.299 in)
SUMMIT 500, GRAND TOURING 500/583, FORMULA Z 500/DLX 500/Z 583/DLX 583 AND MX Z 500	414 860 700	35.30 mm (1.390 in)	32.30 mm (1.272 in)
SKANDIC WT/SWT/WT LC	414 633 800	34.60 mm (1.362 in)	32.00 mm (1.260 in)
MX Z 440	415 060 600	34.70 mm (1.366 in)	32.30 mm (1.272 in)

ROTATION DIRECTION

The maximum drive belt life span is obtained when the drive belt is installed as shown. This will ensure that correct direction of rotation is respected.



CORRECT



INCORRECT

NOTE: For used drive belt, mark and reinstall in the same position.

DRIVE BELT DEFLECTION MEASUREMENT

NOTE: The drive belt deflection measurement must be performed each time a new drive belt is installed.

NOTE: To obtain an accurate drive belt deflection measurement, it is suggested to allow a break-in period of 50 km (30 mi).

Before checking the belt deflection, ensure vehicle has the proper belt (Refer to the application chart).

Adjust pulley distance and alignment. Refer to 05-05 PULLEY DISTANCE AND ALIGNMENT.

To obtain maximum vehicle performance, the belt tension must be adjusted according to specifications shown in the accompanying chart.

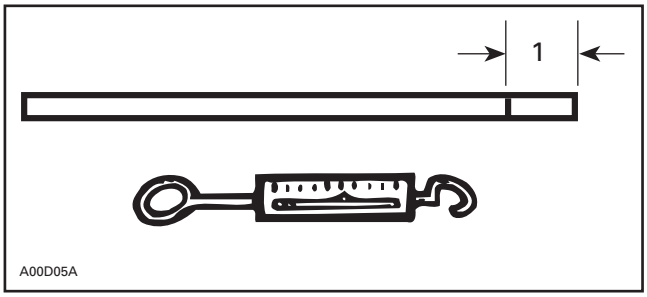
MODEL	DEFLECTION mm (in)	FORCE kg (lb)	HEIGHT† OVER DRIVEN PULLEY
All models	32 ± 5 (1-1/4 ± 13/64)	11.3 (25)	0 - 1.5 mm (0 - 1/16")

† FOR REFERENCE ONLY

To Check Tension

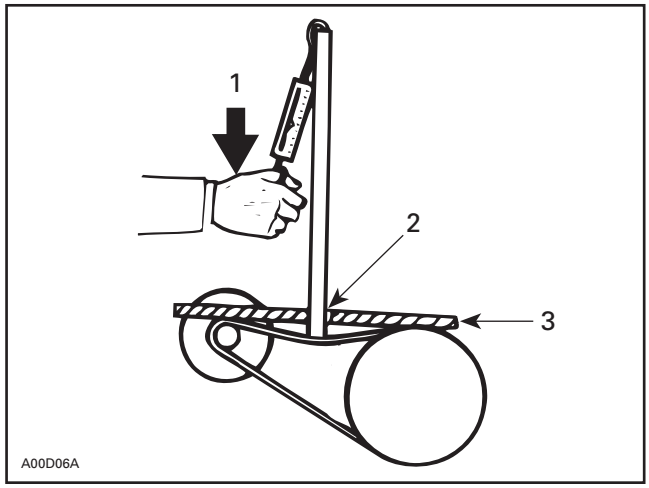
Position a reference rule on drive belt.

Wooden Stick and Spring Scale Method



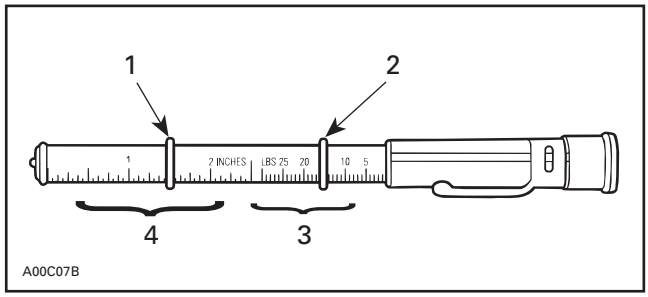
1. Mark specified deflection

Using spring scale and stick, apply specified force on drive belt halfway between pulleys as shown.



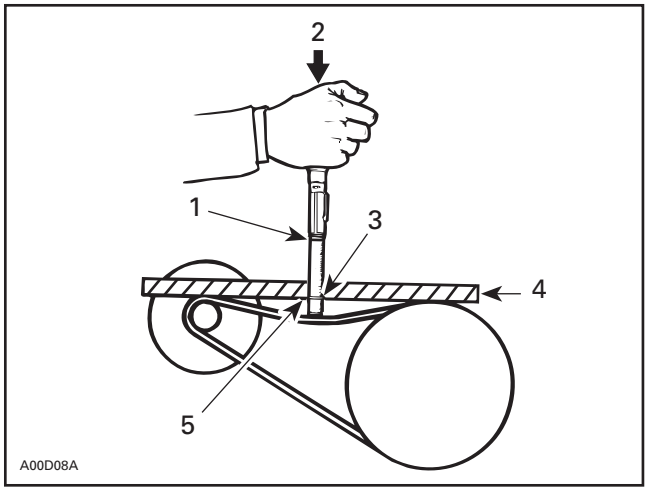
1. Force
2. Read deflection here
3. Reference rule

Or use the belt tension tester (P/N 414 348 200).



1. Lower O-ring
2. Upper O-ring
3. Force (read down)
4. Deflection (read up)

1. Slide lower O-ring of tester to specified deflection.
2. Slide upper O-ring until reaching mark 0 (zero).
3. Apply pressure until lower O-ring is flush with edge of rule and read force on the upper scale at top edge of O-ring.



1. *Upper O-ring — force*
2. *Force applied*
3. *Lower O-ring — deflection*
4. *Reference rule*
5. *Deflection*

DEFLECTION ADJUSTMENT

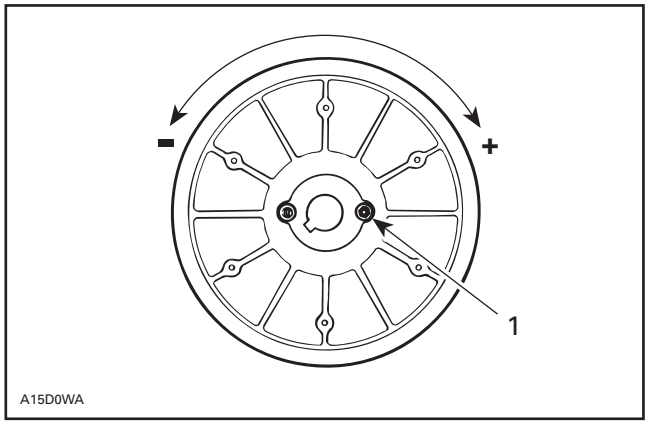
S-Series

Adjust pulley distance according to specification, refer to PULLEY DISTANCE AND ALIGNMENT 05-05, then adjust drive belt deflection using Allen screws, as shown.

To increase deflection: turn Allen screws clockwise.

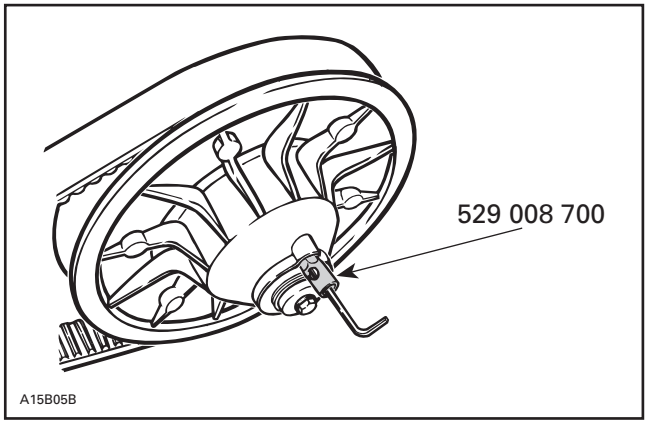
To decrease deflection: turn Allen screws counterclockwise.

NOTE: Turn Allen screws 1/4 turn at a time, then rotate driven pulley to allow drive belt to settle in pulley. Check deflection, repeat as required.



1. *Allen screw with jam nut*

Allen screws should be restrained while tightening jam nut to prevent throwing adjustment out. Use drive belt tension adjuster (P/N 529 008 700).



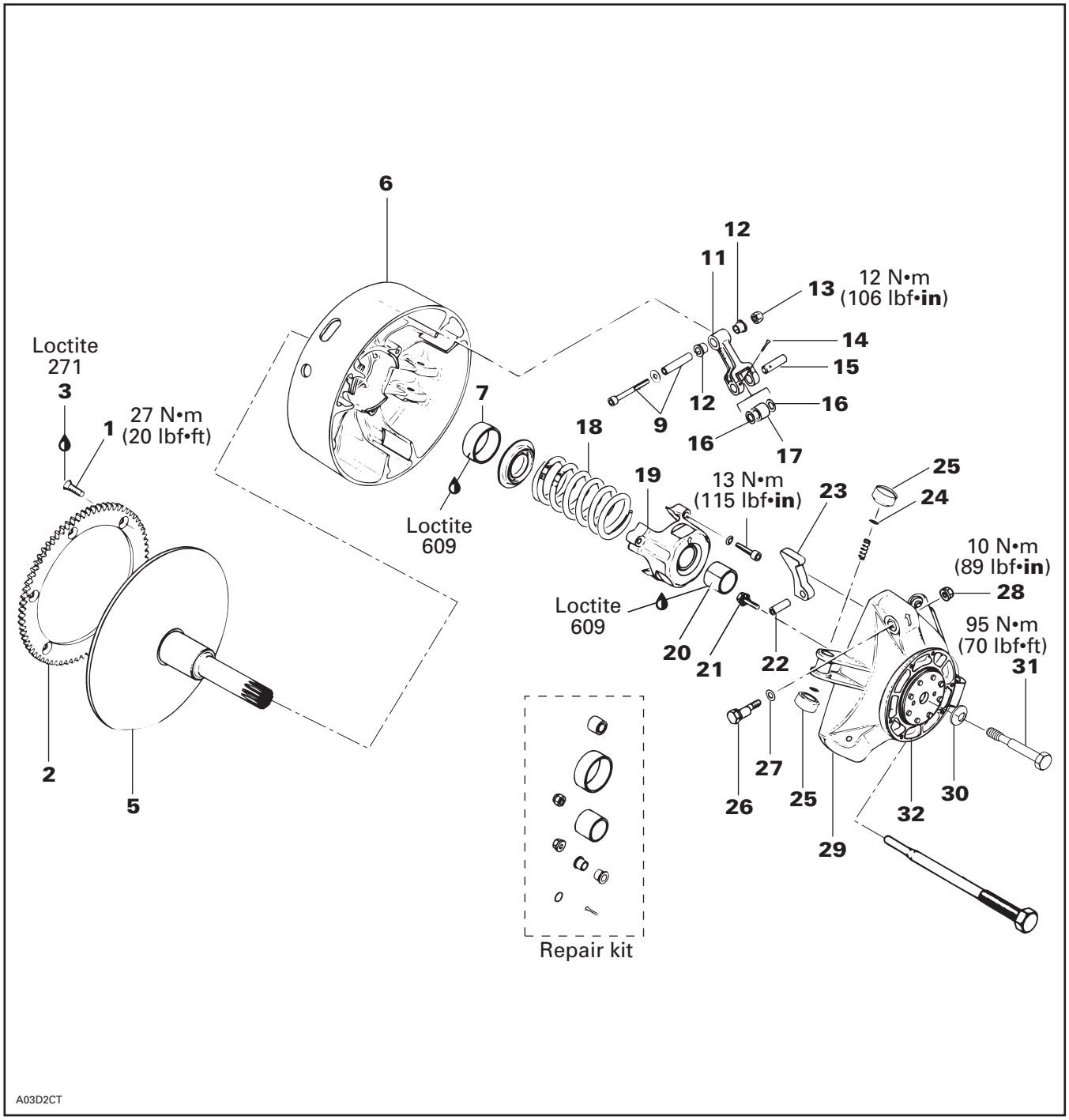
Restrain Allen screws with the wrench and tighten nut with the socket using socket handle provided in tool box.

DRIVE PULLEY

TRA

All Models

NOTE: This is a lubrication free drive pulley.



PARTS

GENERAL

Some drive pulley components (return spring, ramp) can be changed to improve vehicle performance in high altitude regions. The *High Altitude and Sea Level Technical Data Booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude.

▼ CAUTION

Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance. Verify spring specifications before installation. Do not only refer to the spring color code.

NOTE: TRA drive pulley stands for Total Range Adjustable drive pulley.

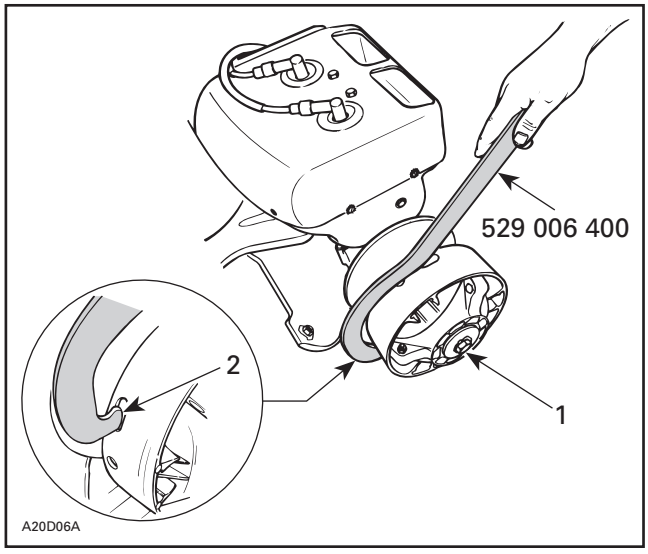
◆ WARNING

Any drive pulley repairs must be performed by an authorized Bombardier snowmobile dealer, or other such qualified person. Subcomponent installation and assembly tolerances require strict adherence to procedures detailed.

REMOVAL

30,31, Conical Spring Washer and Screw

Use holder (P/N 529 006 400).



TYPICAL

1. *Retaining screw*
2. *Insert in any slot*

◆ WARNING

Never use any type of impact wrench at drive pulley removal and installation.

Remove retaining screw.

To remove drive pulley ass'y and/or fixed half from engine, use puller (P/N 529 007 900) for 443, 503 and 583 engines. Use puller (P/N 529 022 400) for 494 and 670 engines.

▼ CAUTION

These pulleys have metric threads. Do not use imperial threads puller. Always tighten puller by hand to ensure that the drive pulley has the same type of threads (metric vs imperial) prior to fully tightening.

To Remove Drive Pulley Ass'y:

Retain drive pulley with clutch holder.

Install puller in pulley shaft then tighten.

DISASSEMBLY

1,2, Screw and Ring Gear

▼ CAUTION

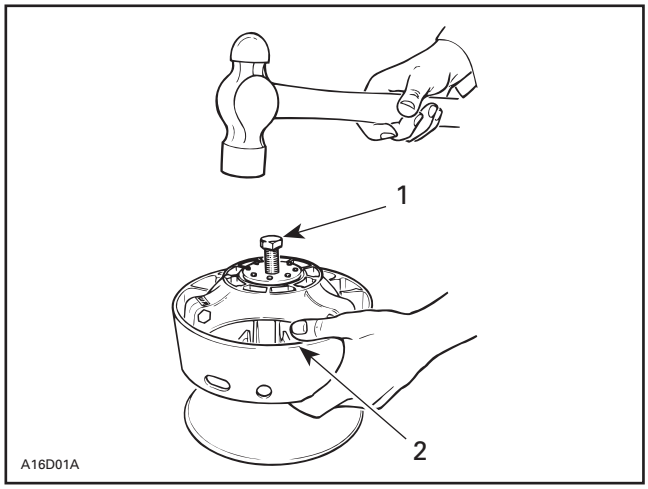
Retaining screws must be heated before disassembly.

5,6, Fixed and Sliding Half

▼ CAUTION

Do not tap on governor cup.

Screw puller into fixed half shaft about 13 mm (1/2 in). Raise drive pulley and hold it by the sliding half while knocking on puller head to disengage fixed half.



1. Puller
2. Holding sliding half

NOTE: No components marking is required before disassembling this drive pulley since it has factory mark and arrows as indexing reference.

25,29, Slider Shoe and Governor Cup

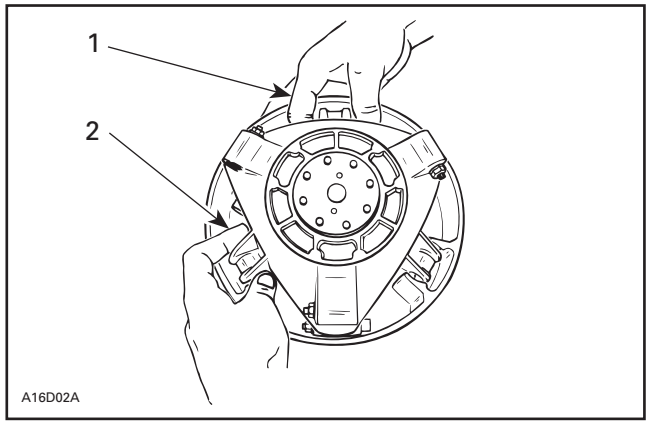
Carefully lift governor cup until slider shoes come at their highest position into guides.

Hold a slider shoe set then carefully lift its housing and remove slider shoes. Proceed the same way for other housings lifting one at a time.

32, Cushion Drive

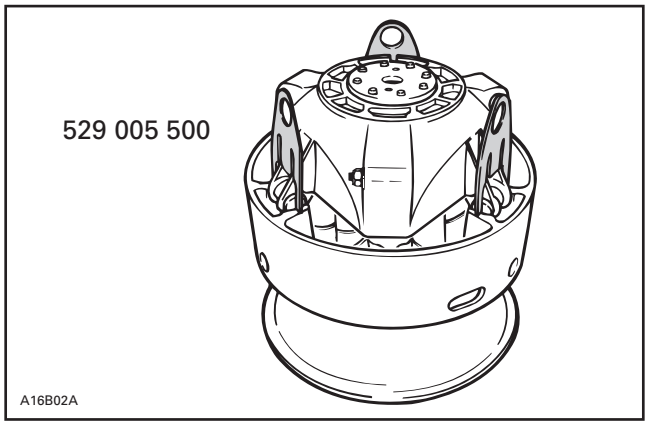
▼ CAUTION

Do not disassemble cushion drive. Governor cup and cushion drive are factory balanced as an assembly.



1. Hold slider shoes
2. Lift one housing at a time

NOTE: To ease disassembly, forks (P/N 529 005 500) should be used to hold slider shoes prior to removing governor cup.



19, Spring Cover Ass'y

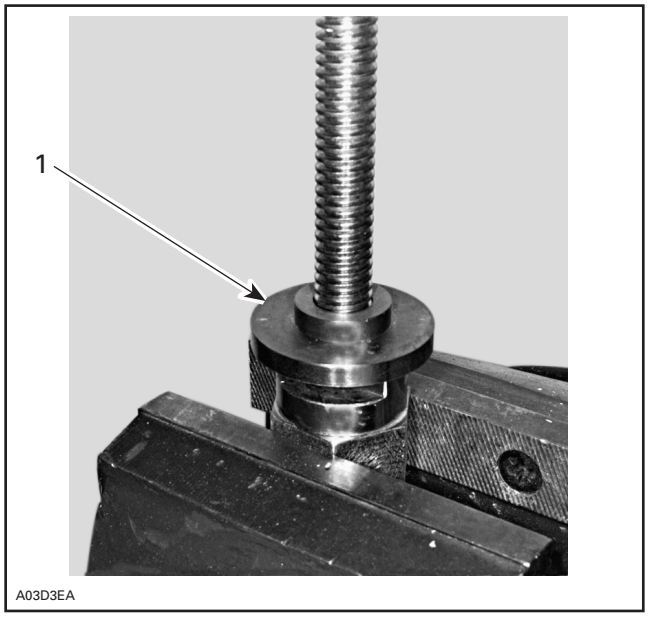
It is pushed by clutch spring pressure.

◆ WARNING

Clutch spring is very strong. Never attempt to remove spring cover without the recommended tools.

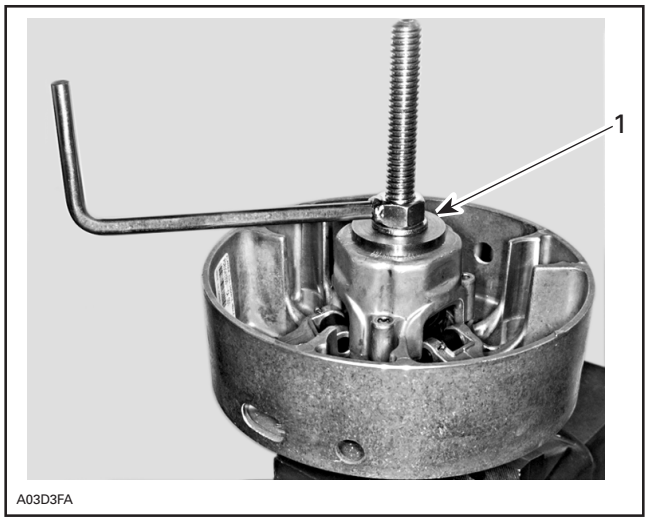
Use spring compressor (P/N 529 035 524).

Install support guide.



1. Support guide

Install sliding half then a second support guide. These support guides will prevent bushing damages.



1. Support guide

Remove 3 Allen screws retaining spring cover then unscrew compressor.

CLEANING

5,6, Fixed and Sliding Half

Clean pulley faces and shaft with fine steel wool and dry cloth.

5, Fixed Half and Crankshaft End

Parts must be at room temperature before cleaning.

Using a paper towel with cleaning solvent, clean crankshaft tapered end and the taper inside the fixed half of the drive pulley, crankshaft threads and retaining screw threads.

◆ WARNING

This procedure must be performed in a well-ventilated area.

▼ CAUTION

Avoid contact between cleaner and crankshaft seal because damage may occur.

Remove all hardened oil deposits that have baked on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper no. 600.

▼ CAUTION

Do not use any other type of abrasive.

Reclean mounting surfaces with paper towel and cleaning solvent.

Wipe off the mounting surfaces with a clean, dry paper towel.

▼ CAUTION

Mounting surfaces must be free of any oil, cleaner or towel residue.

7,20, Bushing

Only use petrol base cleaner when cleaning bushings.

▼ CAUTION

Do not use acetone to clean bushing.

INSPECTION

Drive pulley should be inspected annually.

16,17, Thrust Washer and Roller

Check roller for roundness of external diameter. Check thrust washer for thickness wear. Replace as required.

▼ CAUTION

Ensure rollers are in good condition. Replace as required.

9,12, Fitting Bolt Ass'y and Flanged Bushing

Check for wear, replace as required. When installing old style flanged bushing (made of black plastic), use a size "O" (letter) drill bit to ream inside diameter.

24,25, O-Ring and Slider Shoe

Check if O-rings are cracked, cut or crushed. Replace as required.

Check slider shoes for wear. Replace if groove is not apparent on top.

5,29, Fixed Half and Governor Cup

Inspect splines and free play between both parts. Maximum free play is 0.5 mm (.020 in) measured at calibration screw radius. Replace if required.

7,20, Sliding Half and Spring Cover Bushing

Visually inspect coating. Replace if worn.

Sliding Half Bushing Replacement

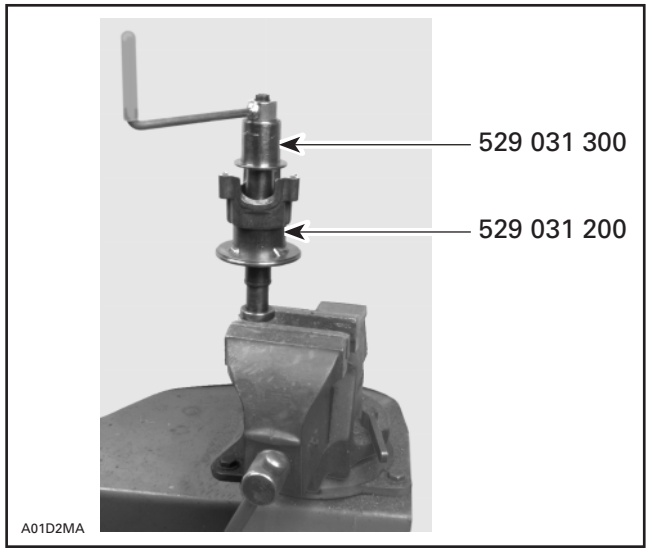
This bushing is not replacable. If worn out, replace sliding half ass'y.

Spring Cover Bushing Replacement

Under normal use there is no need to replace this bushing.

Mount compressor (P/N 529 035 524) in a vise.

Use tools (P/N 529 031 300 and 529 031 200) to remove old bushing.



▼ CAUTION

Bushing must be bonded with retaining compound.

Apply retaining compound Loctite 609 outside of bushing then press it down to counterbore from outside end.

▼ CAUTION

Insert bushing from sliding half side (inner side) of spring cover.

ASSEMBLY

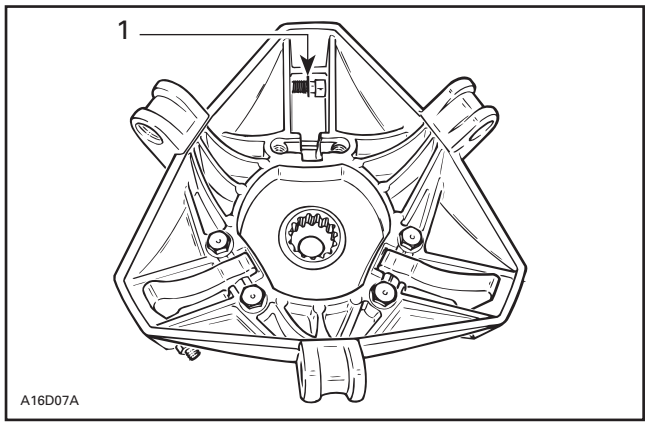
NOTE: This drive pulley is lubrication free. **Do not lubricate** any component.

1,2,3, Screw, Ring Gear and Loctite 271

Apply Loctite 271 (P/N 413 702 900) on threads and then torque to 27 N•m (20 lbf•ft).

26,27,28, Calibration Screw, Washer and Locking Nut

When installing calibration screw, make sure to install washer as shown.



1. Washer

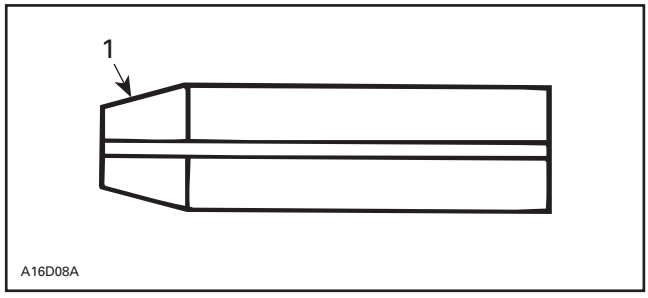
Torque locking nut to 10 N•m (89 lbf•**in**).

15, Pin

Always use the same type of pin as originally installed when servicing. Different types have different weights for calibration purpose. Refer to TECHNICAL DATA 10-03.

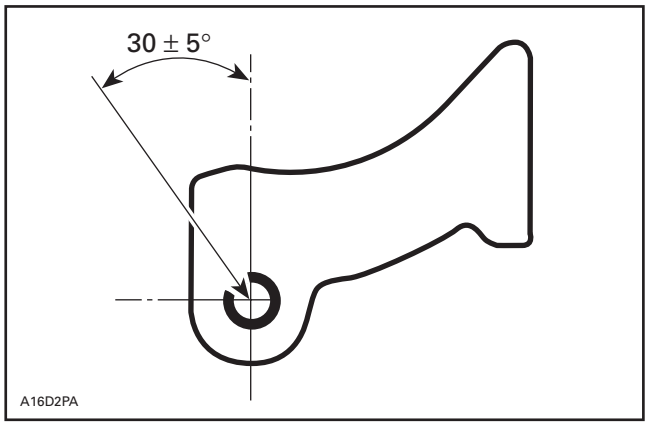
21,22,23, Ramp, Dowel Tube and Screw

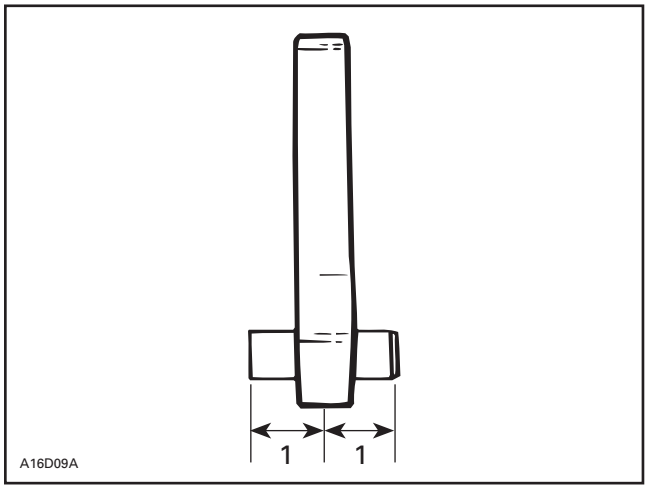
Insert dowel tube from chamfered side. Make sure ramp is centered on dowel tube.



1. Chamfered side

Position dowel tube split at the illustrated angle.





1. Equal distance

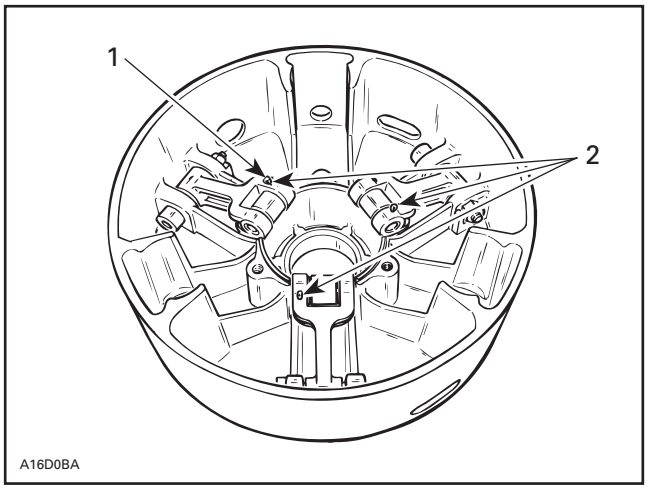
Torque screws to 10 N•m (89 lbf•**in**).

9,11,13,14, Screw, Lever Ass'y, Nut and Cotter Pin

Always install lever assemblies so that cotter pins are on the shown side. Besides install cotter pin head on top when lever is sat at bottom of sliding half. Bend cotter pin ends to sit perfectly against lever.

◆ WARNING

Whenever replacing centrifugal levers, always replace all 3 at the same time. Otherwise, clutch misbalancing will occur because of levers difference.



1. Head on top
2. All on the same side

▼ CAUTION

Lever assemblies must be installed so that cotter pins are on the same side.

Torque nuts to 12 N•m (106 lbf•**in**).

▼ CAUTION

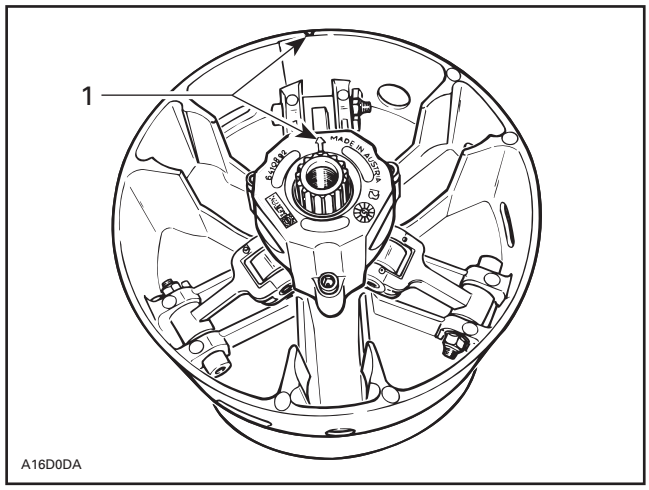
Lever ass'y and rollers must move easily after installation.

5,6,18,19, Fixed Half, Sliding Half, Spring, Spring Cover and Screw

To install spring cover, use spring compressor (P/N 529 035 524).

Assemble fixed and sliding halves. Note that fixed halves have different cone angle. Match cone angle with crankshaft.

Lift sliding half against spring cover and align spring cover arrow with sliding half mark.

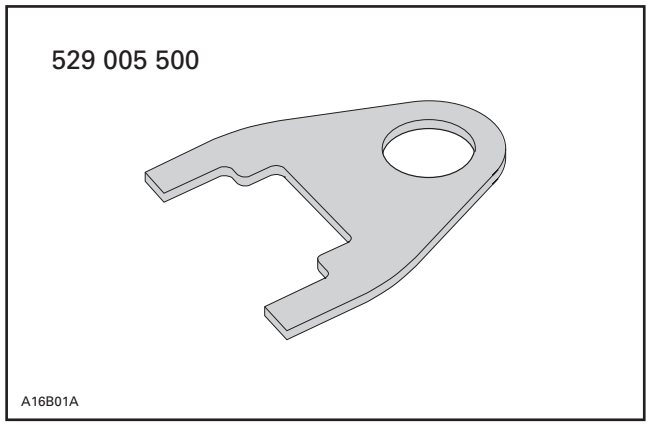


1. Align

Install and torque screws to 13 N•m (115 lbf•**in**).

6,25,29, Sliding Half, Slider Shoe and Governor Cup

To install governor cup, use following tool:

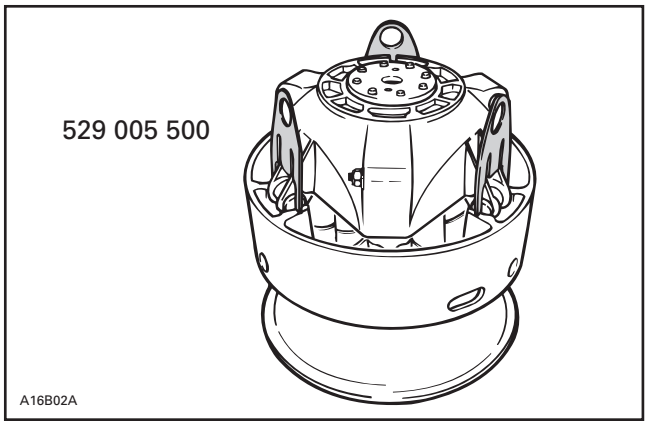


Insert spring and slider shoes into governor cup so that groove in each slider shoe is vertical to properly slide in guides.

▼ CAUTION

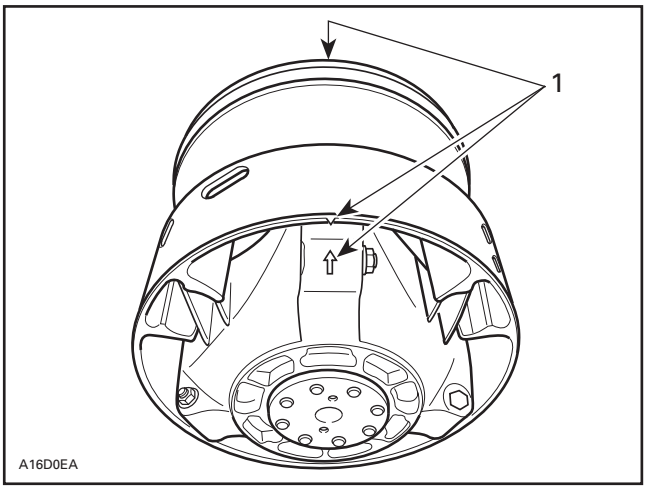
Make sure O-rings are installed on slider shoes and their grooves are positioned vertically.

Install fork (P/N 529 005 500) into slider shoe grooves to maintain them for governor cup installation. Proceed on 3 set of slider shoes.



Make sure to align governor cup arrow with sliding half and fixed half mark.

NOTE: If fixed half has no mark, align governor cup mark with segment no. 1 of inner half. Segments are identified on engine side.



1. Align

Carefully slide governor cup into sliding half. Align mark of governor cup with mark of fixed half.

Remove forks and push governor cup so that its splines engage with fixed half shaft splines.

▼ CAUTION

Make sure splines of both parts are fully engaged.

INSTALLATION

◆ WARNING

Do not apply anti-seize or any lubricant on crankshaft and drive pulley tapers.

◆ WARNING

Never use any type of impact wrench at drive pulley removal and installation.

Clean mounting surfaces as described in CLEANING above.

Drive Pulley Ass'y

The installation procedure must be strictly adhered to as follows.

Install drive pulley on crankshaft extension.

Install conical washer with its concave side towards drive pulley then install screw.

◆ WARNING

Never substitute conical washer and/or screw with jobber ones. Always use Bombardier genuine parts for this particular case.

Use holder. See removal procedure.

Torque screw to 90 to 100 N•m (66 to 74 lbf•ft).

Install drive belt and guard.

Raise and block the rear of the vehicle and support it with a mechanical stand.

◆ WARNING

Ensure that the track is free of particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure nobody is standing near the vehicle.

Accelerate the vehicle at low speed (maximum 30 km/h (20 MPH) and apply the brake, repeat 5 times.

Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

◆ WARNING

After 10 hours of operation the transmission system of the vehicle must be inspected to ensure the retaining screw is properly torqued.

DRIVE PULLEY ADJUSTMENT

The drive pulley is factory calibrated to transmit maximum engine power at a predefined RPM. Factors such as ambient temperature, altitude or surface condition may vary this critical engine RPM thus affecting snowmobile efficiency.

This adjustable drive pulley allows setting maximum engine RPM in the vehicle to maintain maximum power.

Calibration screws should be adjusted so that actual maximum engine RPM in vehicle matches with the maximum horsepower RPM given in TECHNICAL DATA 10.

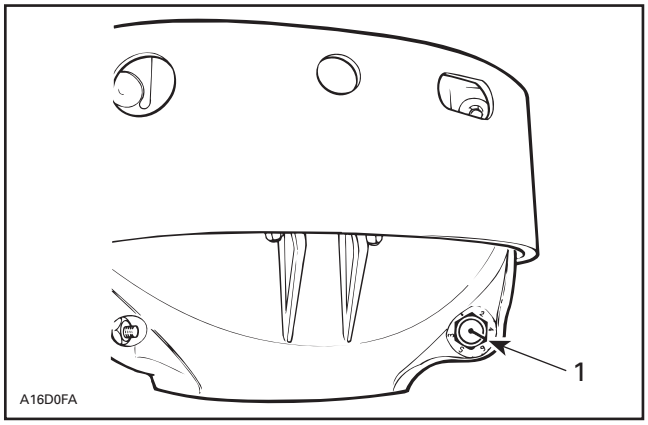
NOTE: Use precision digital tachometer for engine RPM adjustment.

NOTE: The adjustment has an effect on high RPM only.

To adjust, modify ramp end position by turning calibration screws.

26,28,29, Calibration Screw, Locking Nut and Governor Cup

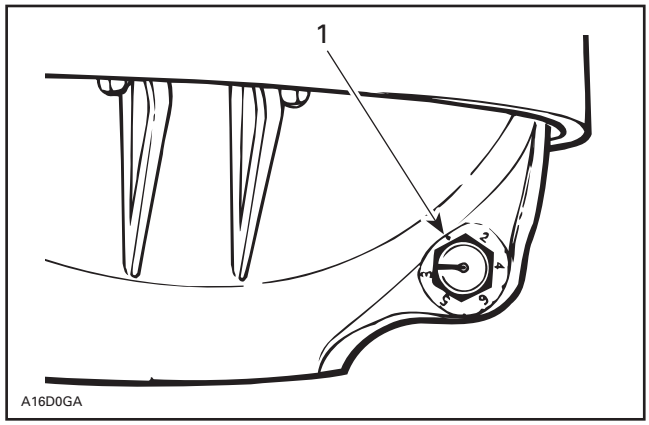
Calibration screw has a notch on top of its head.



1. Notch

Governor cup has 6 positions numbered 2 to 6. Note that in position 1 there is no stamped number (due to its location on casting).

See TECHNICAL DATA 10 for original setting.



1. Position 1 (not numbered)

Each number modifies maximum engine RPM by about 200 RPM.

Lower numbers decrease engine RPM in steps of 200 RPM and higher numbers increase it in steps of 200 RPM.

Example:

Calibration screw is set at position 3 and is changed to position 5. So maximum engine RPM is increased by about 400 RPM.

To Adjust:

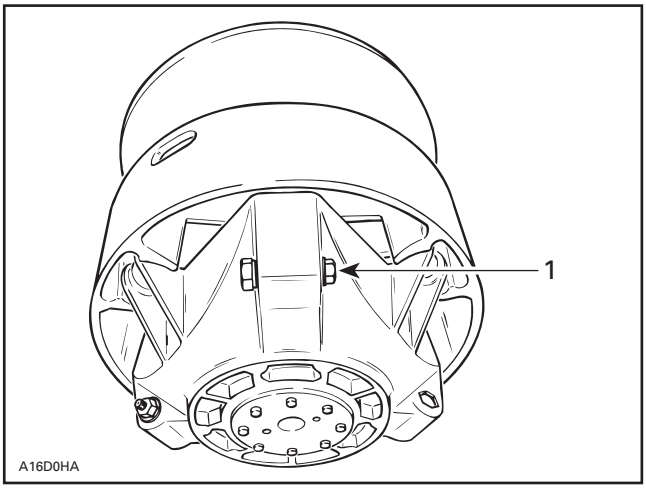
Just loosen locking nut enough to pull calibration screw **partially** out and adjust to desired position. Do not completely remove the locking nut. Torque locking nuts to 10 N•m (89 lbf•**in**).

▼ CAUTION

Do not completely remove calibration screw otherwise its inside washer will fall off.

▼ CAUTION

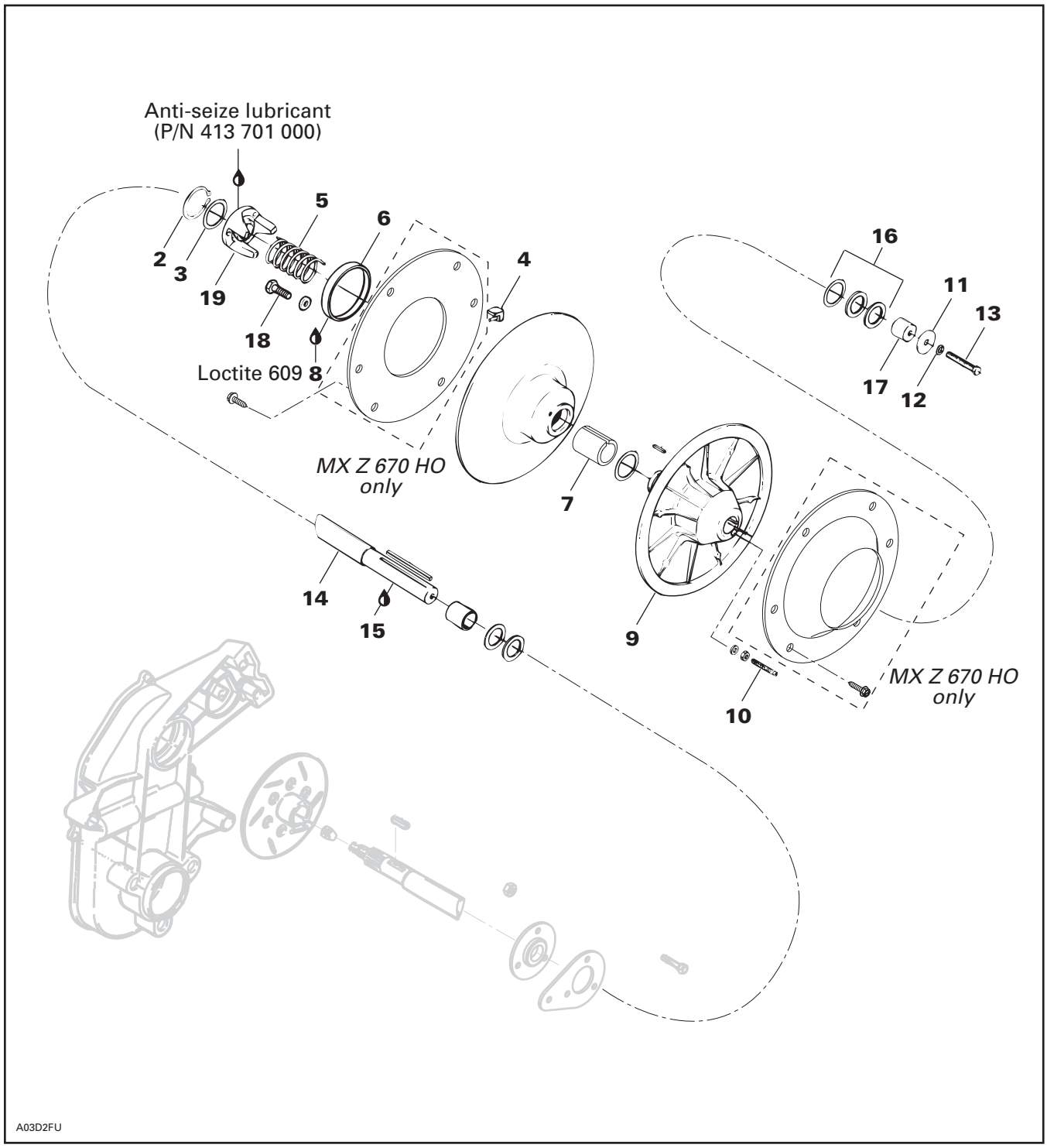
Always adjust all 3 calibration screws and make sure they are all set at the same number.



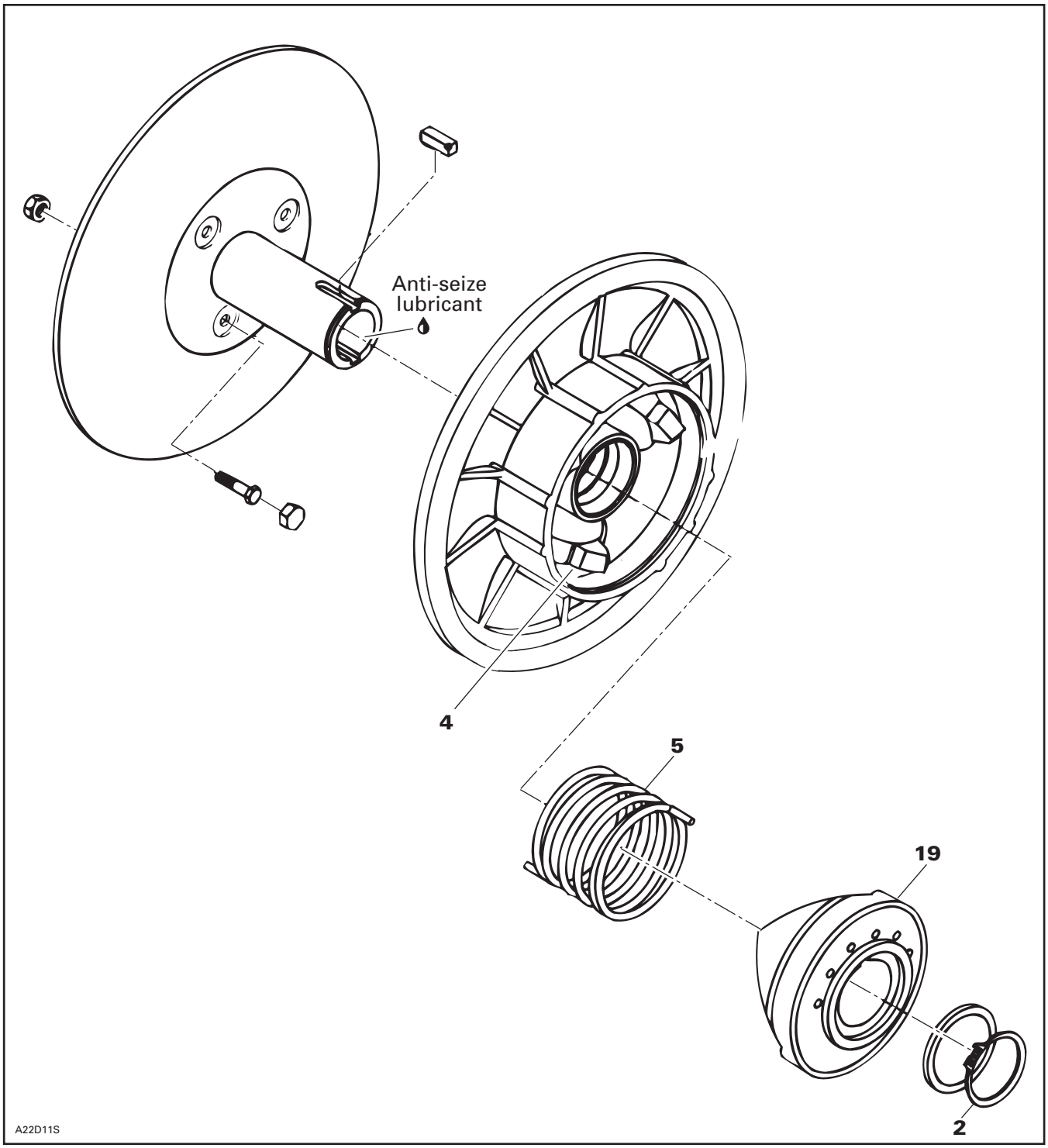
1. Loosen just enough to permit rotating of calibration screw

DRIVEN PULLEY

S-Series



Skandic WT/SWT/WT LC



REMOVAL

Remove guard and drive belt from vehicle.

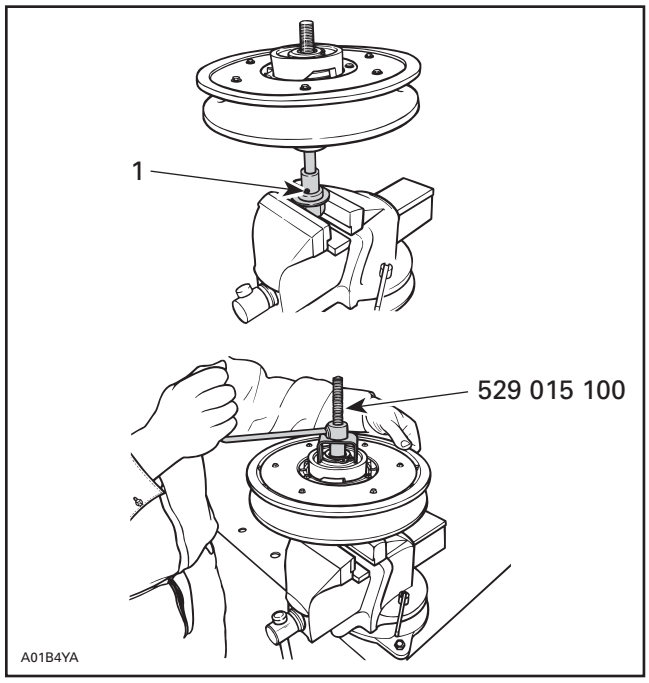
Remove the cap screw **no. 13**, lock washer **no. 12**, washer **no. 11**, extension **no. 17** and shims **no. 16** then pull the driven pulley from the countershaft.

14, Countershaft

Should countershaft **no. 14** removal be required, refer to BRAKE 05-06 then look for **Countershaft and Brake Disc Removal**.

DISASSEMBLY

Use spring compressor (P/N 529 015 100).



TYPICAL

1. Insert this pin in keyway

Remove snap ring **no. 2** and washer **no. 3** to disassemble the outer cam and the 2 pulley halves.

◆ WARNING

Driven pulley cam is spring loaded, use above-mentioned tool.

CLEANING

6,7, Large Bushing and Small Bushing

During break-in period (about 10 hours of use), teflon from bushing moves to cam or shaft surface. A teflon over teflon running condition occurs, leading to low friction. So it is normal to see gray teflon deposit on cam or shaft. Do not remove that deposit, it is not dust.

When a dust deposit has to be removed from the cam or the shaft, use dry cloth to avoid removing transferred teflon.

Pulley Half Cleaning

Use Loctite Safety Solvent (P/N 413 708 200).

INSPECTION

6,7, Bushings

Check for cracks, scratch and for free movement when assembled to fixed half.

S-Series Only

Using a dial bore gauge measure bushing diameter. Measuring point must be at least 5 mm (1/4 in) from bushing edge.



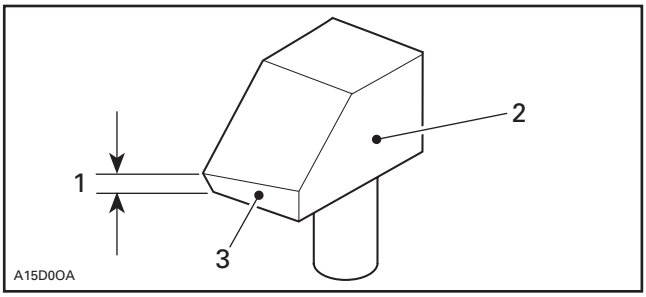
Replace bushing(s) if worn more than specified.

DRIVEN PULLEY BUSHING WEAR LIMIT mm (in)	
Small bushing	38.30 (1.508)
Large bushing	89.15 (3.510)

4, Slider Shoe

All Models

Check cam slider shoes for wear. Replace when inside edge of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



1. Measure thickness of slope base here
2. Sliding pulley side
3. Slope base

Bushing Replacement

S-Series Only

Large Bushing

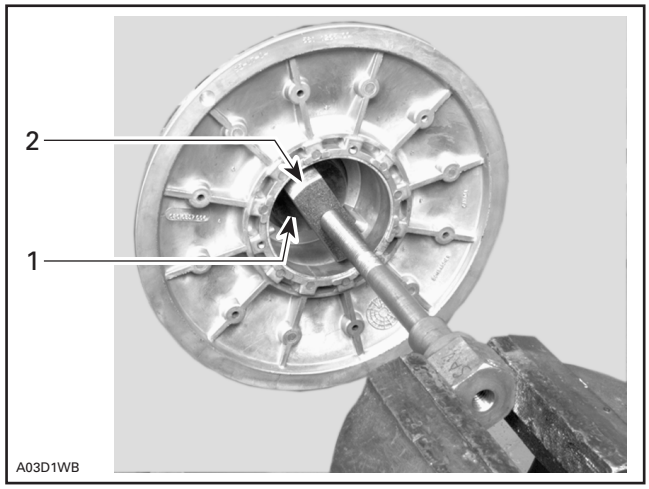
Remove Allen screws if applicable. Heat to break Loctite bond.

Remove all 3 slider shoes.



Install support plate included in tool (P/N 529 031 100) inside sliding half.

Place extractor included in tool (P/N 529 031 100) below bushing.



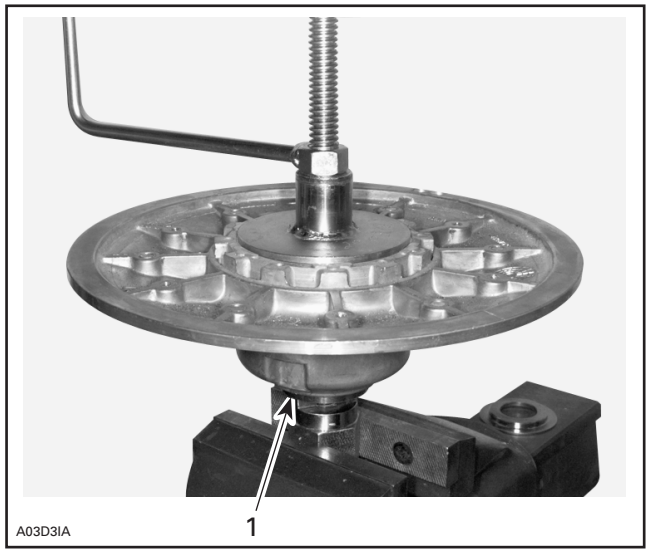
1. Support plate
2. Puller

Mount screw head of puller (P/N 529 018 600) in a vise.

Turn pulley half by hand to extract old bushing.

Before bushing installation, file sliding half bore to remove burrs from crimping areas.

Coat bushing outside diameter with Loctite 609 (P/N 413 703 100). Place new bushing on sliding half and slightly tap to engage squarely the bushing in the sliding. Use tools (P/N 529 031 200) and new puller (P/N 529 035 524) with one of its shouldered washer to install bushing.



1. Shouldered washer

Install 3 Allen screws **no. 18** and washers supplied with the new bushing.

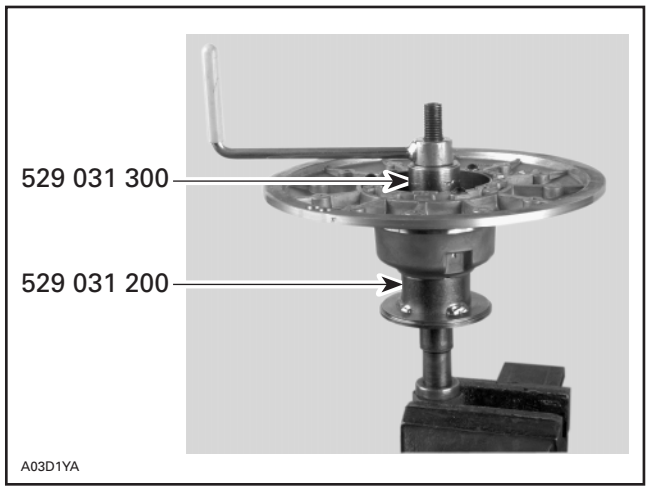
Small Bushing

NOTE: Following procedure can be done with a press using the same tools.

Install puller in a vise.

Heat bushing area.

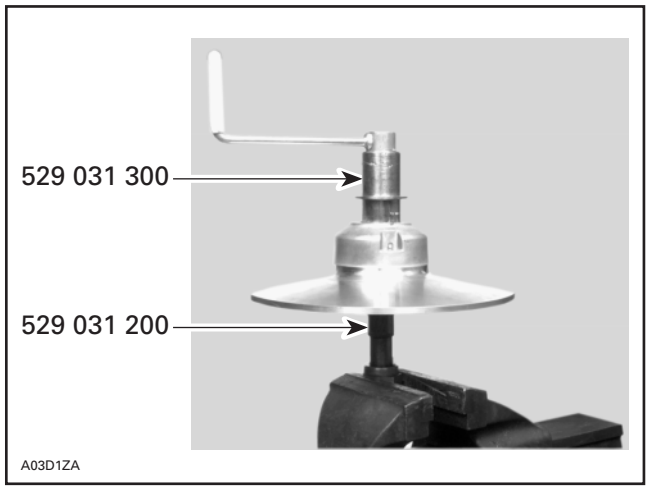
Turn puller handle and sliding half at once to extract the bushing.



IMPORTANT: Large bushing retaining screws and washers must be removed before small bushing installation.

Coat bushing outside diameter with Loctite 609 (P/N 413 703 100).

Install bushing as following photo.



ASSEMBLY

4, Cam Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

All Models

19, Cam

Coat cam interior with anti-seize lubricant.

INSTALLATION

14,15, Countershaft and Anti-seize Lubricant

▼ CAUTION

Always apply anti-seize lubricant (P/N 413 701 000) on the countershaft before final pulley installation.

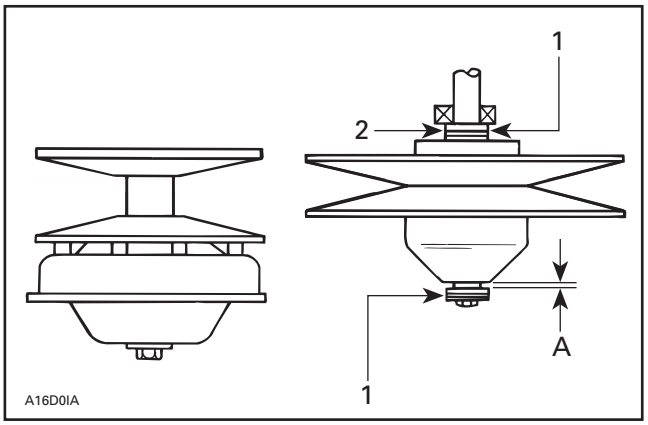
S-Series Only

Should installation procedure be required, refer to BRAKE 05-06 then look for **Brake Disc** and **Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

All Models

Check end play of driven pulley on countershaft by pushing pulley towards outer housing so that the inner shims (P/N 504 108 200) contact it. Measure end play at the mounting screw end between shim(s) and pulley. See illustration.



TYPICAL — TOP VIEW

1. *Shim (P/N 504 108 200) (as required)*
2. *Contact*

A. 0 to 1 mm (0 to 3/64 in)

13, Pulley Retaining Screw

Torque to 25 N•m (18 lbf•ft).

ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 to adjust pulley distance. Adjust drive belt height in driven pulley to obtain specified belt deflection. Turn Allen screws **no. 10** equally accordingly.

5, Spring

General

It is usual to experience spring setting during breaking period of a new spring. The factory spring preload is slightly higher (about 1 kg (2 lb)) to compensate for spring setting. Specifications in TECHNICAL DATA 10 are applicable after break-in period (about 10 hours of use).

Spring Torsional Pre-load

To check spring pre-load adjustment, use spring scale hook (P/N 529 006 500) and a spring scale.

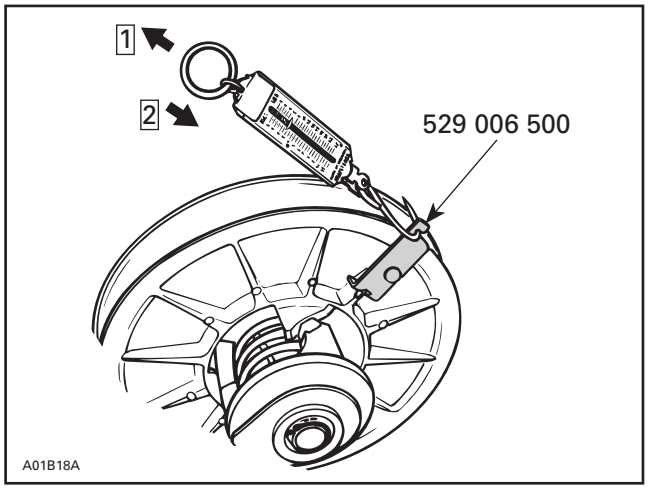
Remove drive belt.

Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicularly with pulley axle.

Take 1st measurement when sliding half begins to turn. Rotate sliding half to 10 mm (3/8 in) of rotation. Hold fish scale at this position. Slowly release tension from fish scale and take 2nd measurement when sliding half begins to return. Spring pre-load is the average measurement between these 2.

$$\frac{\text{1st measurement (when opening)} + \text{2nd measurement (when closing)}}{2} = \text{Spring pre-load}$$

Example: $\frac{\text{3.8 kg (8.4 lb) (when opening)} + \text{3.4 kg (7.5 lb) (when closing)}}{2} = \text{3.6 kg (8 lb) Actual spring pre-load}$



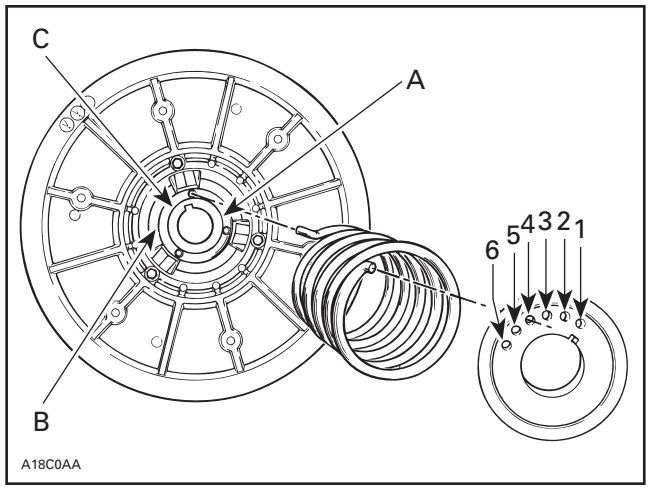
TYPICAL

Step 1: 1st measurement

Step 2: 2nd measurement

To adjust spring pre-load, relocate spring end in cam, moving it clockwise to increase the pre-load and counterclockwise to decrease it. Refer to TECHNICAL DATA 10.

NOTE: If spring pre-load cannot be adjusted, try to relocate the other end of spring in sliding pulley (holes A, B, C).



Letters and numbers shown in illustration are actual letters and numbers embossed on parts

NOTE: Always recheck torsional pre-load after adjusting.

Pulley Alignment and Drive Belt Deflection

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 and DRIVE BELT 05-02 to perform adjustments.

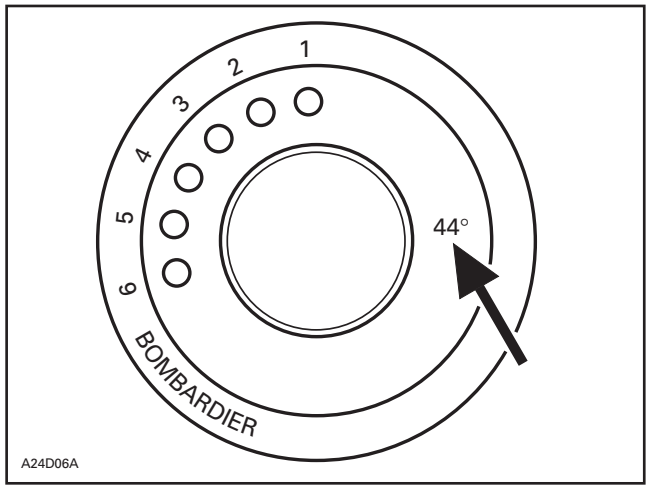
▼ CAUTION

Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

19, Cam

Make sure to install proper cam. Refer to TECHNICAL DATA 10.

Cam angle is identified on cam.



NOTE: For high altitude regions, the *High Altitude* and *Sea Level Technical Data Booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude.

PULLEY DISTANCE AND ALIGNMENT

GENERAL

The pulley distance we will refer to in this section, is the space separating the drive and driven pulley outside diameters (Z measurement).

This basic distance is provided as an assembly guide and indicates the dimensions between which satisfactory belt deflection will be obtained.

Both pulley distance adjustment and pulley alignment must be carried out to ensure the highest efficiency of the transmission system. Furthermore, optimum drive belt operation and minimal wear will be obtained only with proper pulley alignment.

▼ CAUTION

Before checking pulley adjustment, the rear suspension must be mounted on the vehicle and track tension/alignment must be done. Always check pulley adjustment after suspension is adjusted.

◆ WARNING

Failure to correctly perform pulley alignment may cause the vehicle to creep forward at idle.

All pulley alignment specifications refer to:

X = Distance between straight bar and drive pulley fixed half edge, **measured between pulleys**.

Y = Distance between straight bar and drive pulley fixed half edge, **measured at the end of straight bar**.

Z = Distance between outside diameter of pulleys.

GENERAL PROCEDURE

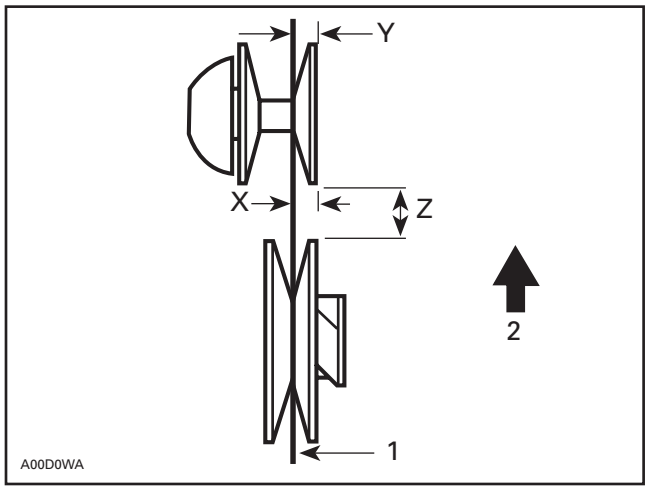
Remove guard and drive belt.

By turning and pushing the sliding half, open the driven pulley. Insert a straight bar 9.5 mm (.375 in) square, 48 cm (19 in) long or the proper alignment template into the opened driven pulley.

Measuring Procedure

Using Straight Bar:

Always measure distances X and Y from the farther straight bar side (including its thickness to the fixed half edge).



1. Straight bar
2. Front of vehicle

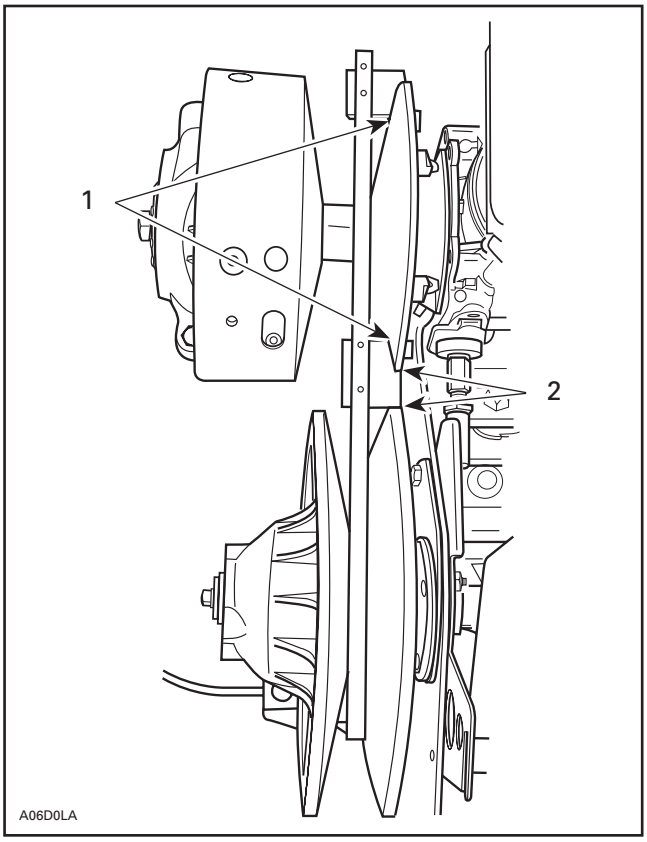
The distance Y **must** exceed distance X to compensate for the twist due to the engine torque.

Nominal Value Procedure and Quick Alignment and Distance Check

Alignment template tabs must fully contact fixed half of drive pulley.

Pulley distance is correct when tab contacts both pulley halves.

Refer to chart below for proper alignment template.



TYPICAL

1. *Contact (alignment)*
2. *Contact (distance)*

Drive Belt Deflection

NOTE: When pulley distance and alignment are adjusted to specifications, refer to DRIVE BELT 05-02 to adjust drive belt deflection.

▼ CAUTION

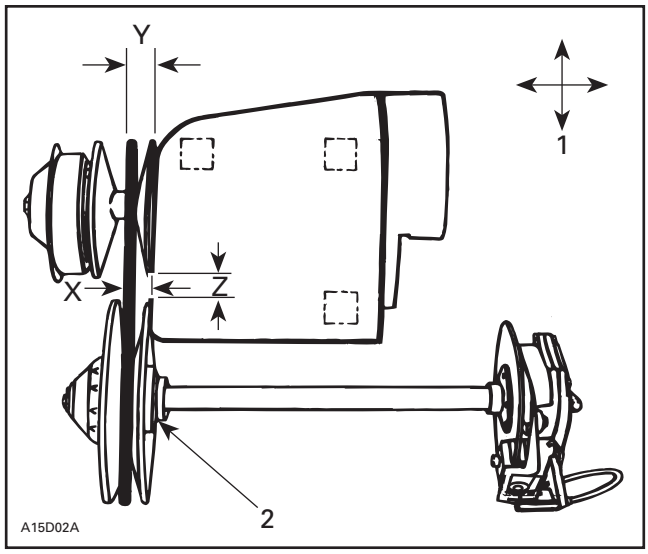
This section deals mainly with adjustment procedures. For complete assembly requirements, refer to the proper ENGINE or TRANSMISSION installation section.

PULLEY ALIGNMENT AND DISTANCE SPECIFICATIONS CHART

MODEL	PULLEY DISTANCE	OFFSET		ALIGNMENT TEMPLATE
	Z	X	Y-X	①
	+ 0, - 1 mm (+ 0, - .040 in)	± 0.50 mm (.020 in)	± 0.5 mm (.020 in)	P/N
TRA Equipped S-Series	16.5 (.650)	35.50 (1.380)	1.5 (.060)	529 026 700
Skandic WT	32.75 (1.289)	36.50 (1.437)	0.75 to 2.25 (.030 to .086)	529 035 545
Skandic SWT/WT LC	32.75 (1.289)	36.25 (1.427)	1.5 (.060)	529 031 000

① Alignment templates have been made according to pulley alignment nominal values. However, they do not take into account allowed tolerances for alignment specifications. They are used as GO/NO GO gauges for quick alignment and pulley distance check and as templates to reach alignment nominal values.

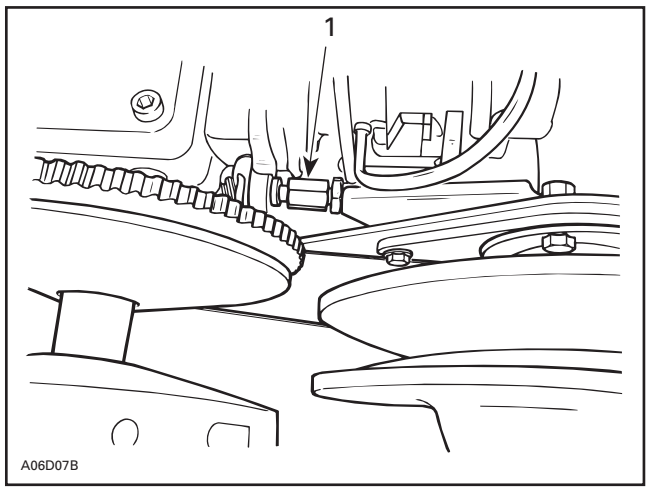
S-Series



TYPICAL

1. *Engine movement*
2. *Contact*

NOTE: Prior to performing pulley adjustment, loosen torque rod nut to allow engine movement. Engine supports have tendency to stick to frame, work engine loose prior to aligning.



1. *Loosen*

Pulley Distance Adjustment Method

Engine Movement

The engine support has slotted mounting holes. Move engine to obtain specified distance between pulleys.

Pulley Alignment Method

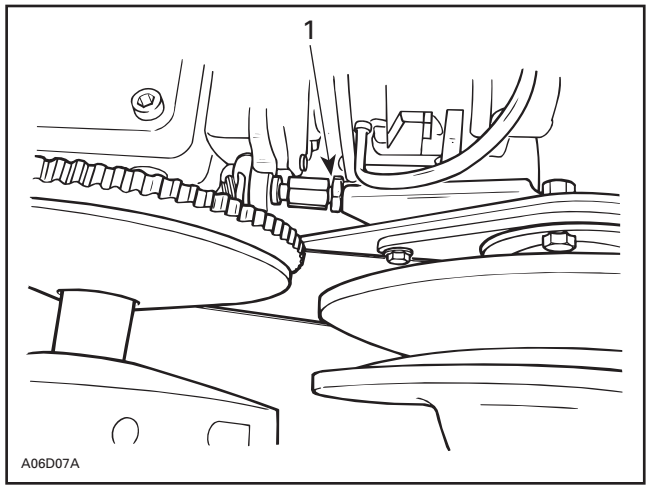
Driven Pulley Movement

When engine slotted mounting holes do not allow to set proper pulley offset X, adjust with shims (P/N 504 108 200) between pulley and countershaft bearing support (pulley pushed toward brake disc).

Engine Movement

Loosen the 4 bolts retaining engine support to the frame. Position engine to obtain the specified alignment.

NOTE: After alignment, adjust torque rod so it slightly contacts stopper plate. Do not over tighten, it will disalign pulleys.

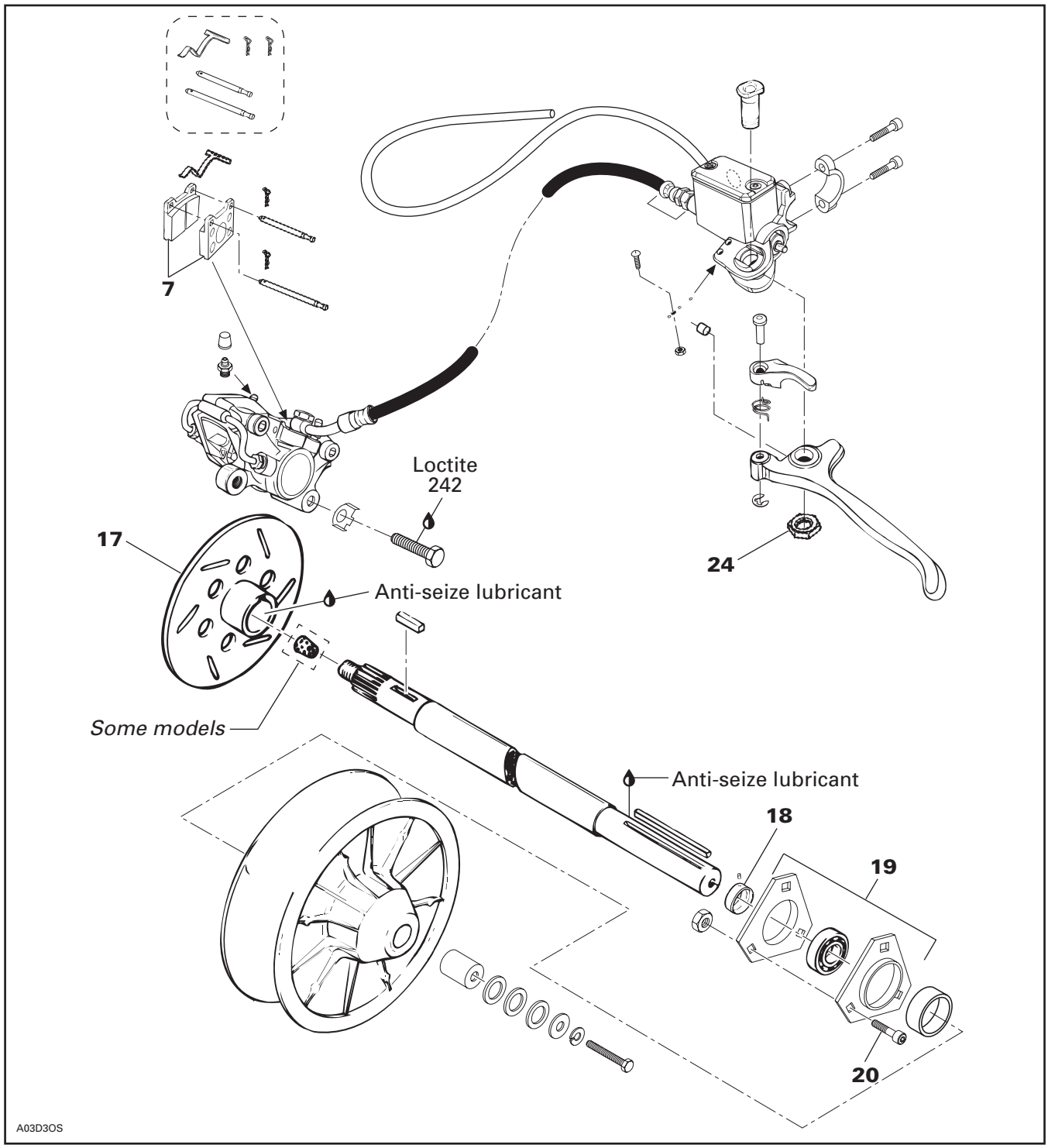


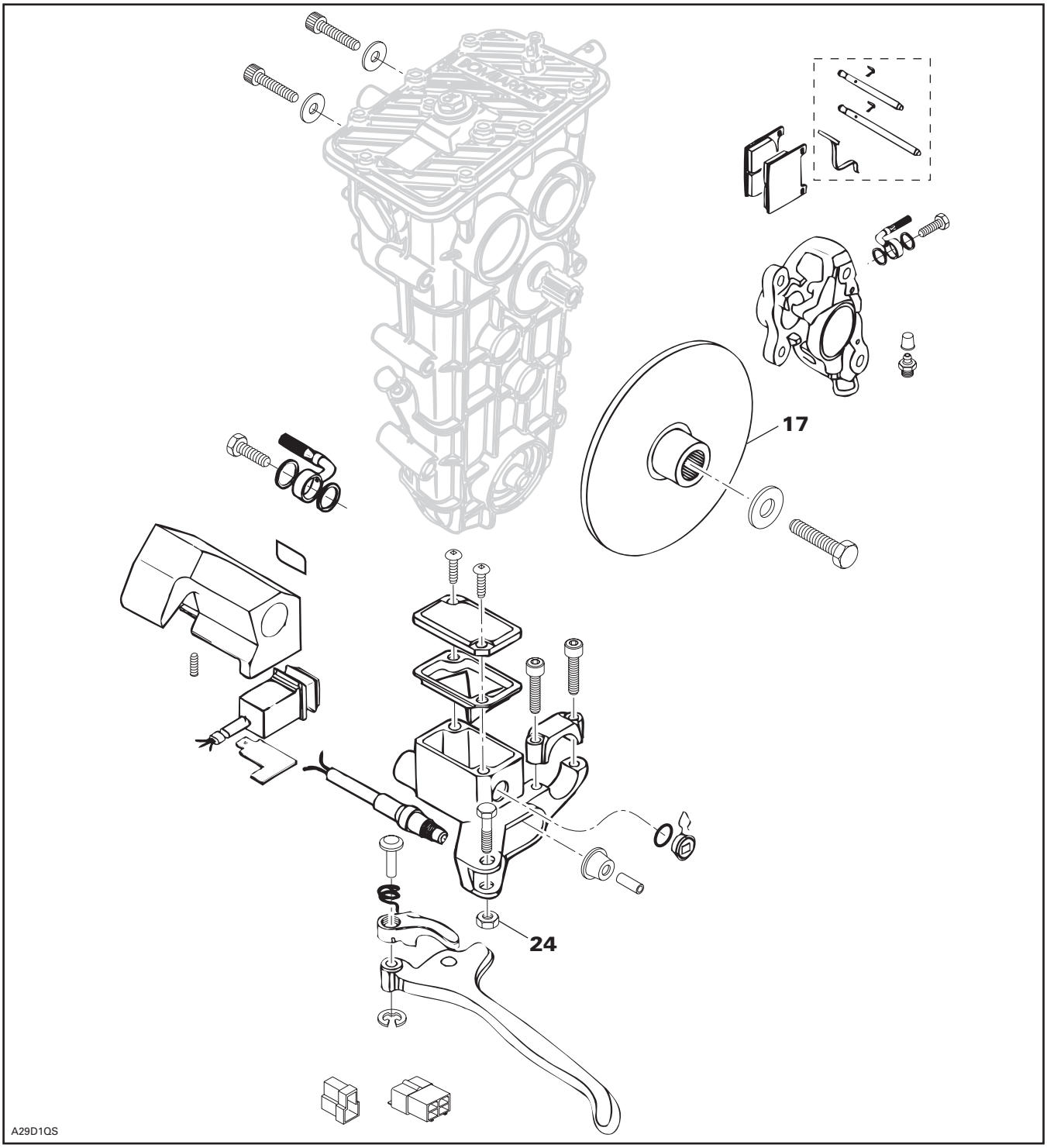
1. *Retighten*

BRAKE

HYDRAULIC DISC BRAKE

S-Series




17
24
A29D1QS

REMOVAL

BRAKE DISC REMOVAL

S-Series

Brake disc can be withdrawn without removing caliper. Proceed as follows:

– Remove belt guard, belt and driven pulley.
– Remove air silencer.
– Unbolt bearing support **no. 19** from chassis.
– Open chaincase and remove upper sprocket.
– Pull countershaft toward driven pulley side to free from chaincase and disc.
– Remove disc.

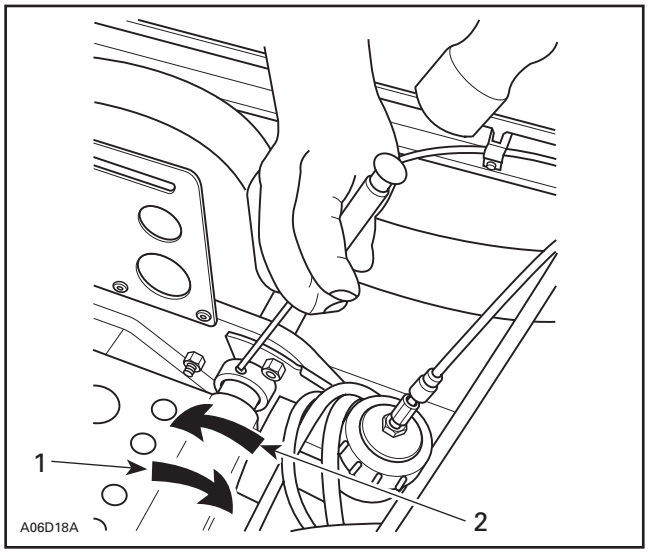
Skandic WT/SWT/WT LC

– Remove caliper by unscrewing M10 Allen screws.
– Unbolt disc.

COUNTERSHAFT REMOVAL

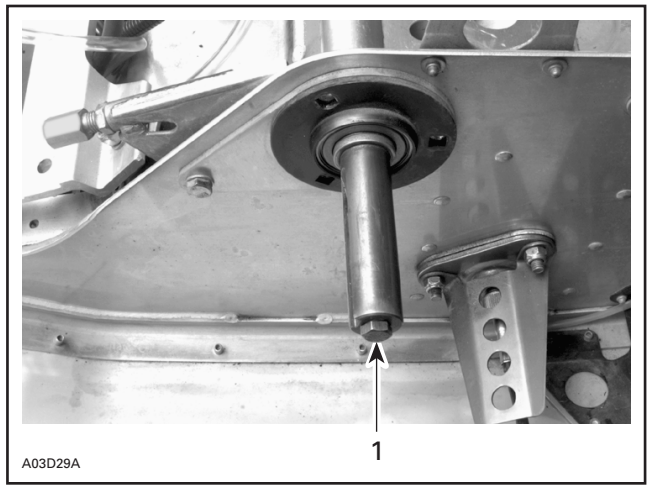
S-Series

Proceed the same as for brake disc removal but unlock bearing collar **no. 18** on driven pulley side.



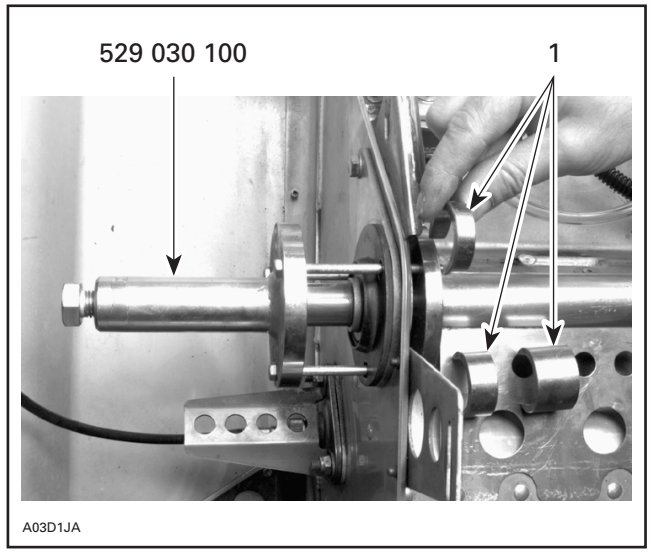
1. Lock
2. Unlock

Unbolt bearing support **no. 19** then install screw included with remover (P/N 529 030 100) on countershaft.



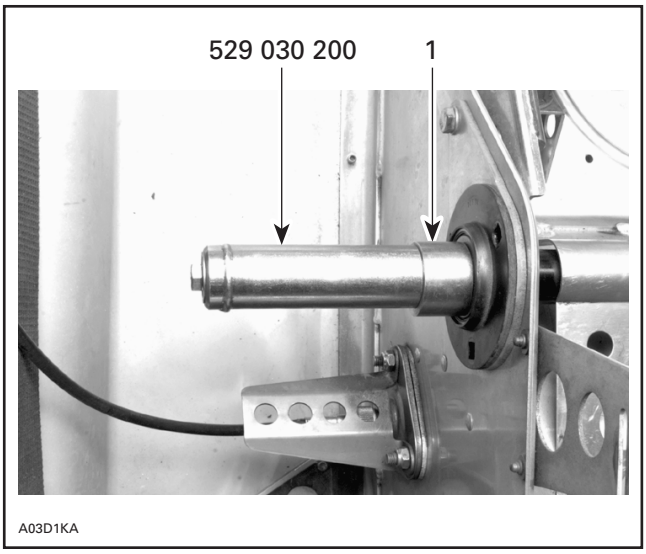
1. Screw

Pull bearing to driven pulley side out of countershaft, using remover (P/N 529 030 100). Begin with only the remover then add a spacer of different width as the bearing comes out.



1. Spacers

To install bearing on countershaft, use installer (P/N 529 030 200) and spacer(s) from remover as required.



1. Spacer

DISASSEMBLY

Only brake pads are available as spare parts. If caliper or master cylinder are damaged, replace each of them as an assembly.

CLEANING

Clean all metal components in a general purpose solvent. Thoroughly dry all components before assembling.

▼ CAUTION

Do not clean brake pads in solvent. Soiled brake pads must be replaced by new ones.

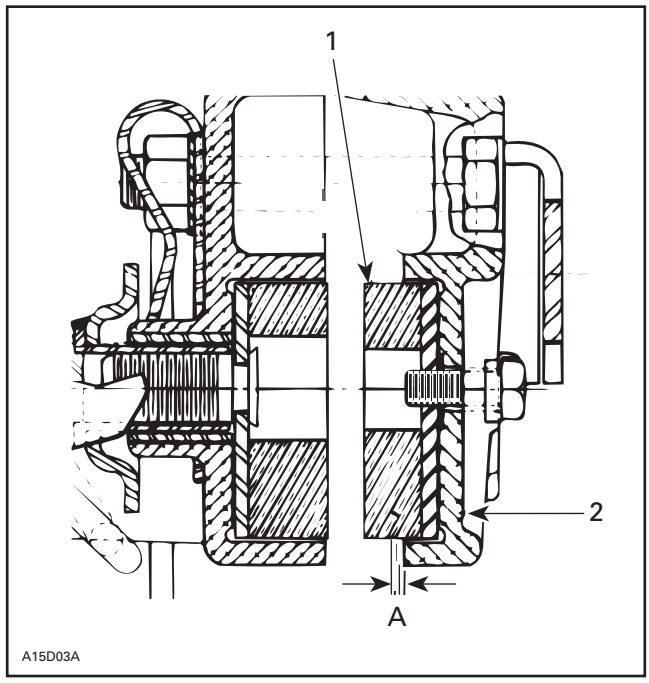
INSPECTION

7, Brake Pad

Brake pads must be replaced when lining is 1 mm (1/32 in) thick or less.

▼ CAUTION

Brake pads must always be replaced in pairs.



TYPICAL
1. Fixed pad
2. Inner caliper
A. 1 mm (1/32 in) minimum

17, Brake Disc

Check for scoring, cracking or heat discoloration, replace as required.

▼ CAUTION

Brake disc should never be machined.

ASSEMBLY

24, Brake Lever Lock Nut

◆ WARNING

Always install a new nut when servicing.

Tighten nut to 3 N•m (27 lbf•**in**). Check free movement of brake lever.

INSTALLATION

To install brake, reverse removal procedure paying attention to the following.

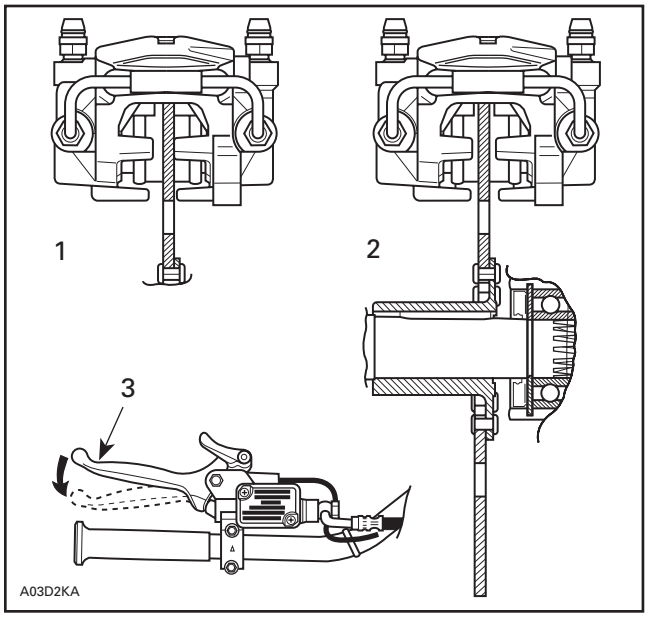
◆ WARNING

Avoid getting oil on brake pads. Do not lubricate or apply antirust or antifreeze solution in brake cable.

7, Brake Pad

After brake pads installation, brake disc must be centered in caliper. Apply brake then check for proper brake disc positioning.

Push on appropriate caliper piston in order to move pad inward allowing proper brake disc positioning.



1. Brake disc not centered
2. Brake disc centered
3. Apply brake before checking

Apply brake then recheck.

17, Brake Disc

S-Series

Apply anti-seize lubricant (P/N 413 701 000) on shaft.

The disc hub exceeds the disc more from one side than from the other. Install disc with the longer exceeding portion toward driven pulley.

Skandic WT/SWT/WT LC

The disc hub exceeds the disc more from one side than from the other. Install disc with the longer exceeding portion toward LH side.

ADJUSTMENT

Countershaft Bearing

S-Series

Insert countershaft (with brake disc) from chaincase side through countershaft support (driven pulley side), then insert into chaincase.

Install countershaft bearing **no. 19** and ensure that countershaft is properly aligned, then tighten 3 retaining screws.

NOTE: A misaligned countershaft will result in difficulty to center the bearing in its support.

Refer to DRIVE AXLE 07-05 then look **Chaincase Perpendicularity Adjustment**.

Torque castellated nut of upper sprocket to 53 N•m (39 lbf•ft).

▼ CAUTION

Upper sprocket castellated nut must be tightened **before** adjusting bearing collar.

Slide collar **no. 18** towards bearing and turn, by hand, to engage the eccentric. This should require about a quarter turn.

Turn collar in direction of countershaft rotation until collar and inner race lock together.

Insert a punch into collar hole and strike sharply in the same direction to lock firmly.

Apply Loctite 242 (P/N 413 703 000) on set screw threads, then tighten.

Close chaincase referring to CHAINCASE 05-07.

BLEEDING

Change brake fluid once a year.

Bleed brake system as follows:

Keep sufficient DOT 4 brake fluid in reservoir at all times.

▼ CAUTION

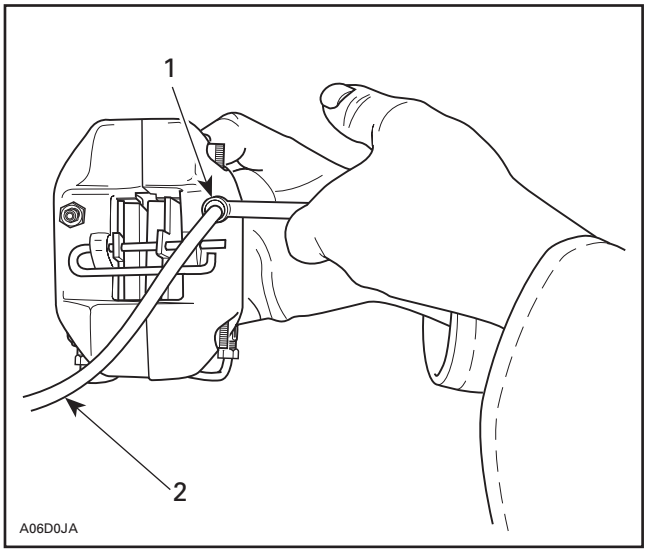
Use only DOT 4 brake fluid.

Install a hose on left side bleeder. Route this hose to a container.

Pump a few times brake lever and while holding brake lever depressed, open bleeder and check for air to escape.

Repeat with the same bleeder until no air appears in hose.

Proceed the same way with the right side bleeder.



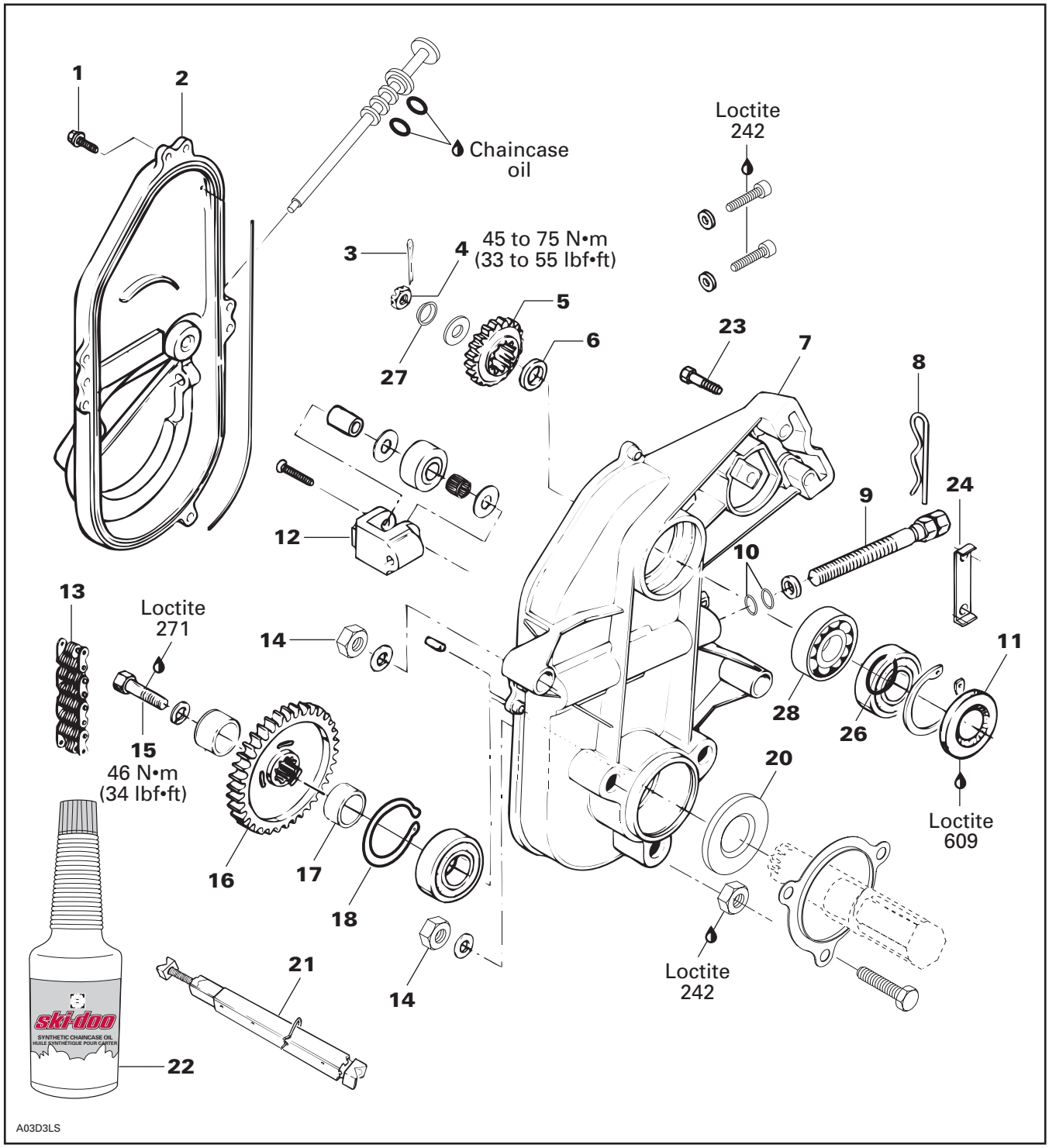
1. Open bleeder
2. Clear hose to catch used brake fluid

Brake Light

There is no adjustment on these models. Check that switch is securely installed.

CHAINCASE

S-Series without Reverse Gear



REMOVAL

To remove chaincase proceed as follows.

Remove tuned pipe and muffler.

◆ WARNING

Never remove exhaust components when engine is hot.

Remove hair pin **no. 18**. Release drive chain tension by unscrewing tensioner adjustment screw.

Drain oil by removing chaincase cover **no. 2**.

3,4,5,6,13,16,17, Cotter Pin, Nut, Sprocket, Shim and Drive Chain

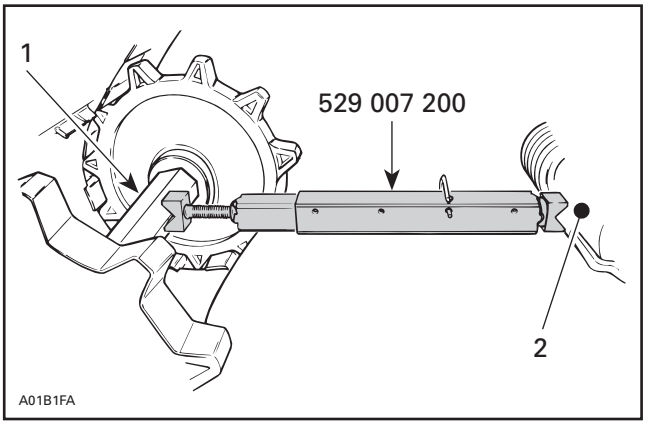
Remove cotter pin **no. 3**, nut **no. 4**, washer **no. 27** retaining upper sprocket **no. 5** and screw **no. 15** retaining lower sprocket **no. 16**. Pull sprockets and drive chain simultaneously. Remove shims **nos. 6** and **17**.

NOTE: Should countershaft removal be required, refer to BRAKE 05-06 then look for **Brake Disc**.

Remove 5 nuts **no. 14**. Three nuts are behind the lower sprocket.

Unfold locking tab **no. 24**, then remove caliper retaining screws **no. 23**.

Release track tension, use drive axle holder **no. 21** (P/N 529 007 200).



TYPICAL

1. *Drive axle*
2. *Suspension cross shaft*

Pry out drive axle oil seal **no. 20** from chaincase.

Pull chaincase from drive axle and countershaft.

Using 2 large screwdrivers inserted between chaincase **no. 7** and frame, pry complete assembly from vehicle.

INSPECTION

Visually inspect the chain for cracked, damaged or missing links. Check for worn or defective bearings, sprockets and chain tensioner components.

◆ WARNING

If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

GEAR RATIO MODIFICATION

For particular applications, the number of teeth of the sprockets can be increased or decreased on lower and upper sprockets.

Refer to TECHNICAL DATA 10-03 for gear ratios.

▼ CAUTION

Gear ratio modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

NOTE: For high altitude regions, the *High Altitude and Sea Level Technical Data Booklet* (P/N 484 300 003 and P/N 484 054 500 for binder) gives information about calibration according to altitude.

INSTALLATION

Reverse removal procedure and pay attention to the following. Replace oil seals, gaskets and O-rings.

Refer to DRIVE AXLE 07-05 for drive axle axial play adjustment.

Sealed side of bearing **no. 28** must face chaincase cover.

11, Oil Seal

Clean chaincase bore with cleaning solvent then apply Loctite 609 to oil seal mounting surface (outside).

Using an appropriate pusher, press the oil seal into chaincase hub. Oil seal must fit flush with the chaincase edge.

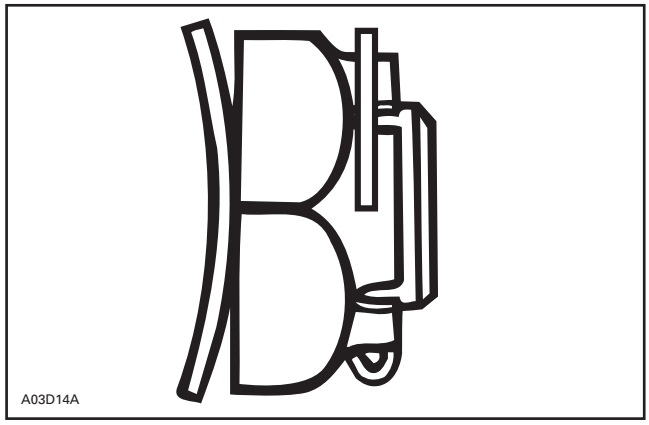
NOTE: Should installation procedure for countershaft be required, refer to BRAKE 05-06 then look for **Brake Disc and Countershaft Bearing Adjustment**.

5,16, Sprockets

Position the sprockets with the writing facing the chaincase cover.

27, Conical Spring Washer

Install washer with its concave side towards drive pulley.



4, Upper Sprocket Castellated Nut

Torque to 45 to 90 N•m (33 to 66 lbf•ft).

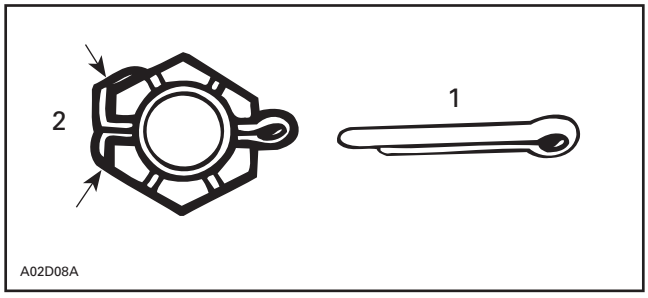
Install new cotter pin in the position shown.

▼ CAUTION

When removing a cotter pin always replace with a new one.

▼ CAUTION

Cotter pin will rub on chaincase cover if installed otherwise.



1. New
2. Fold cotter pin over castellated nut flats only

18, Circlip

▼ CAUTION

It is of the utmost importance to install the circlip otherwise damage to the chaincase components may occur.

DRIVE CHAIN ADJUSTMENT

NOTE: Brake disc key must be in good condition before checking chain free play.

10, O-Ring

Replace both O-rings **no. 10** on tensioner adjustment screw. Fully tighten tensioner adjustment screw **by hand**, then back off only far enough for hair pin to engage in locking hole.

This initial adjustment should provide 3-5 mm (1/8-13/64 in) free-play when measured at the outer circumference of the brake disc.

▼ CAUTION

Free-play must not exceed 5 mm (13/64 in), readjust if necessary.

◆ WARNING

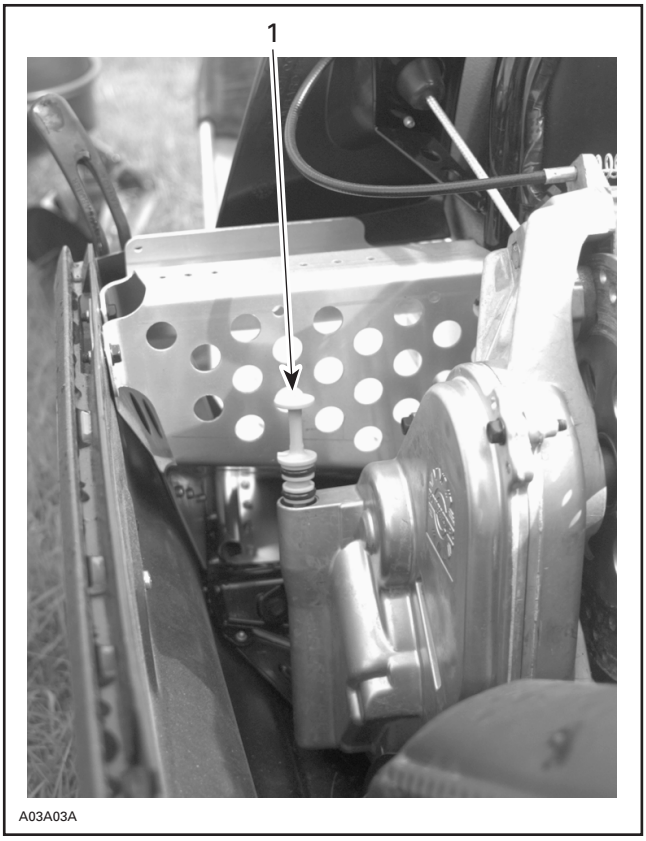
If the specified free-play is not reached with the tensioner screw fully tightened, replace chain and check the condition of sprockets.

22, Chaincase Oil

Pour 250 mL (8.5 fl. oz) of synthetic chaincase oil (P/N 413 803 300) into chaincase.

NOTE: Chaincase oil capacity is 250 mL (8.5 fl. oz).

Check oil level with the dipstick then add if required. Remove metal particles from magnet.



TYPICAL
1. Dipstick

NOTE: Chaincase must be in its proper position when checking oil level.

ADJUSTMENT

Pulley Alignment

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05.

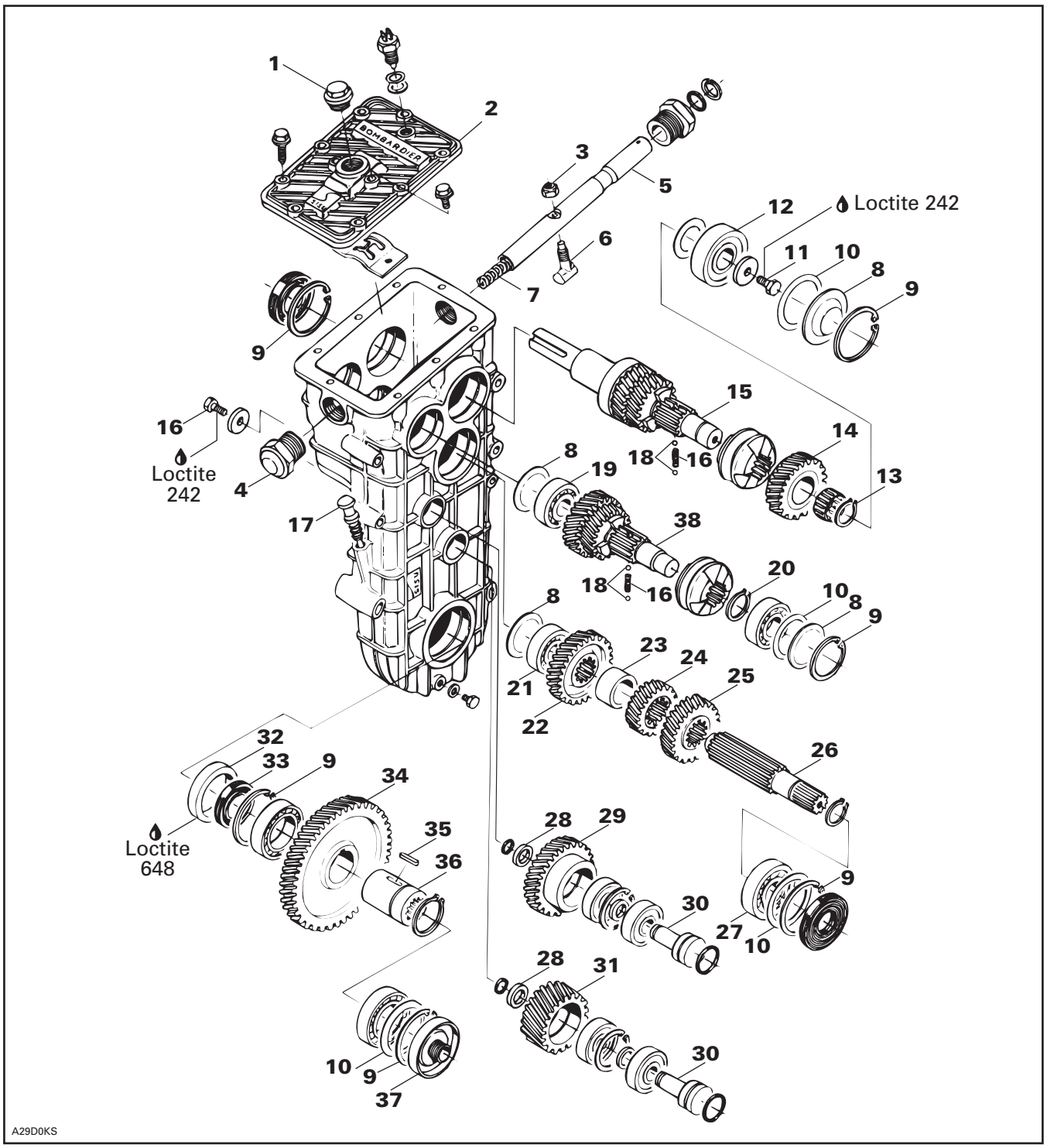
Track Tension and Alignment

Refer to TRACK 07-06.

GEARBOX

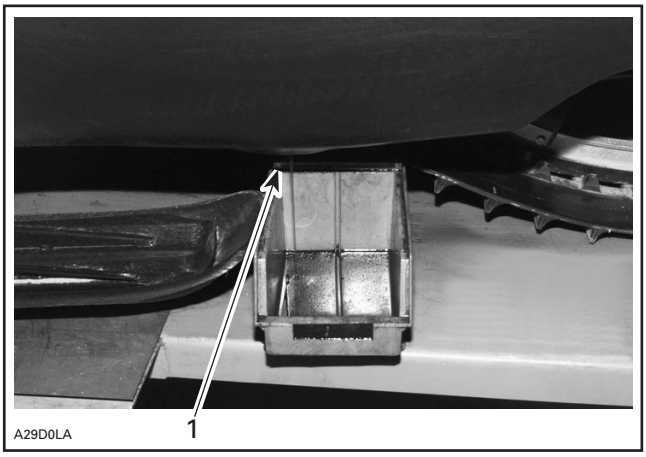
3-SPEED GEARBOX

Skandic WT/SWT/WT LC



REMOVAL

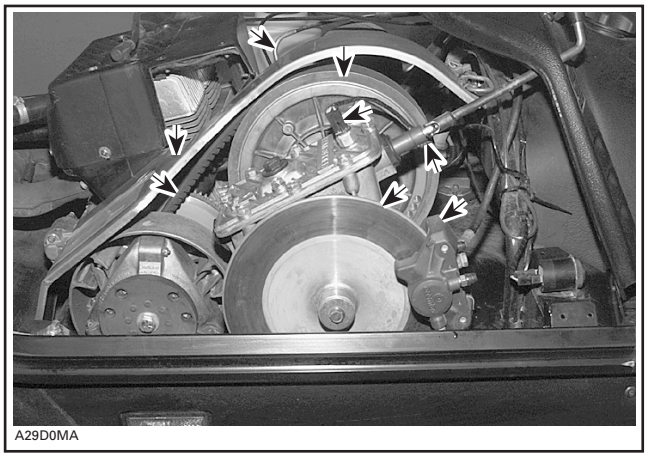
Drain gearbox oil.



1. Bottom pan drain hole nearby gearbox drain plug

Remove belt guard, drive belt. Remove air silencer, carburetor(s) then, driven pulley.

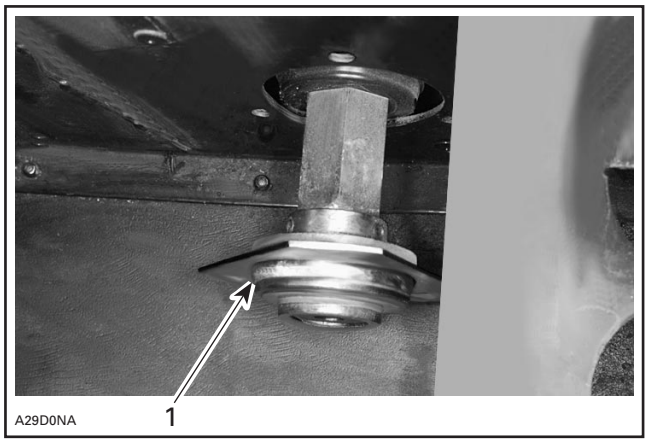
Remove brake caliper, brake disc. Unfasten shifting rod and unplug reverse switch.



Remove rear suspension.

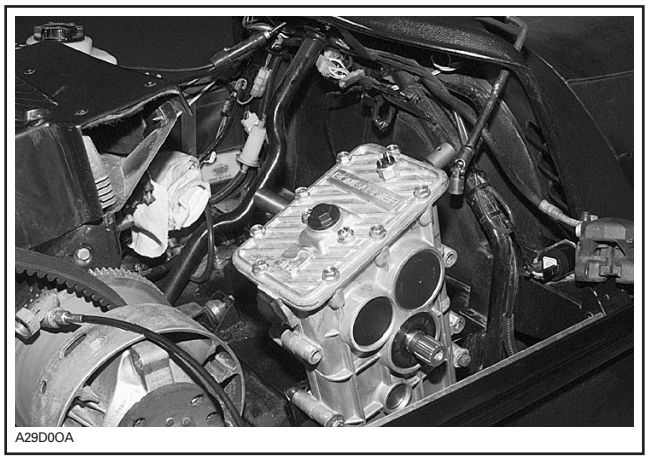
Remove angle drive and square pin from bottom of gearbox.

Remove muffler. Unbolt RH end bearing then pull drive axle toward right side.



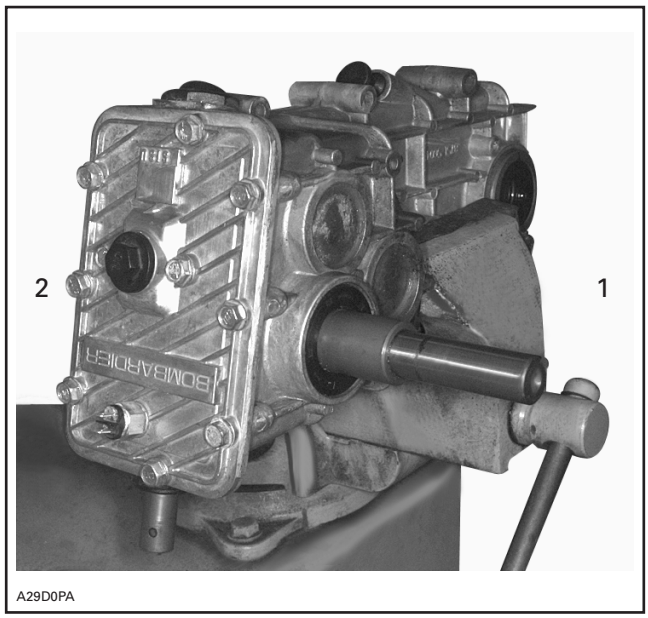
1. RH end bearing

Unbolt gearbox from chassis.



DISASSEMBLY

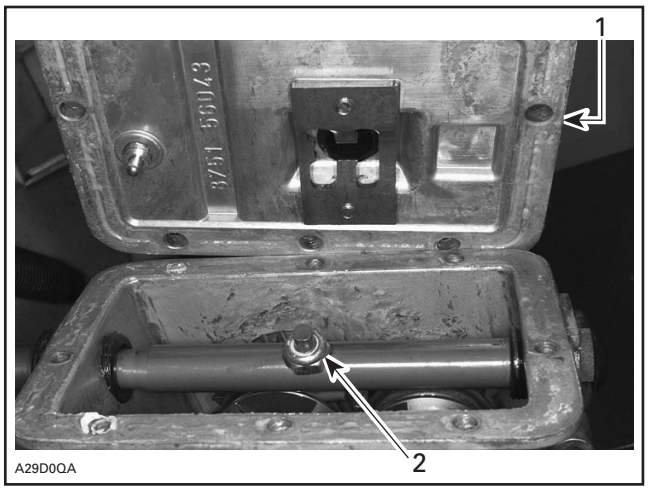
For the following procedure, right hand side refers to driven pulley side and left hand side to brake disc side.



1. RH side driven pulley side
2. LH side brake disc side

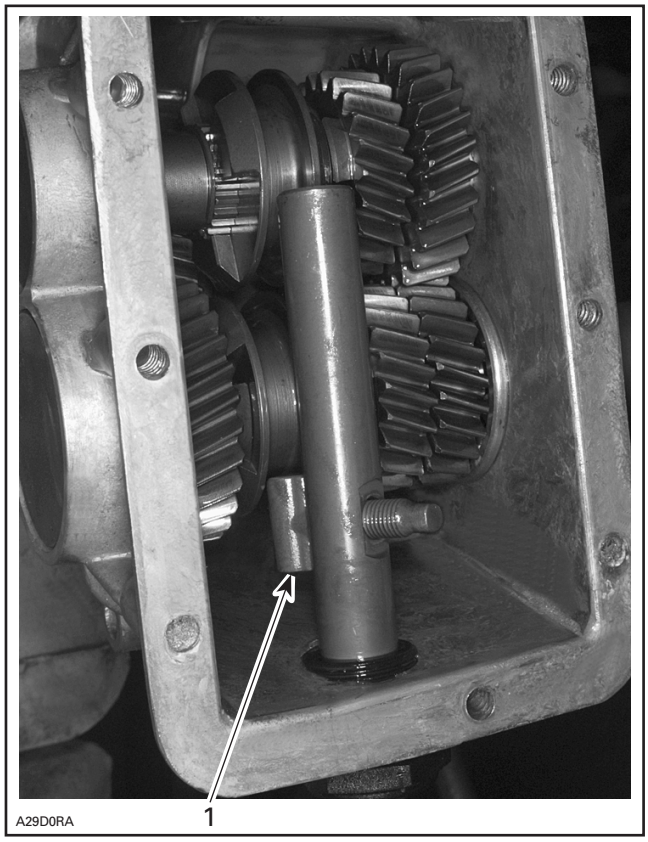
Remove dipstick **no. 17**. Unfasten cover **no. 2** from gearbox housing.

Remove nut **no. 3** retaining pin **no. 6**.



1. Cover
2. Nut

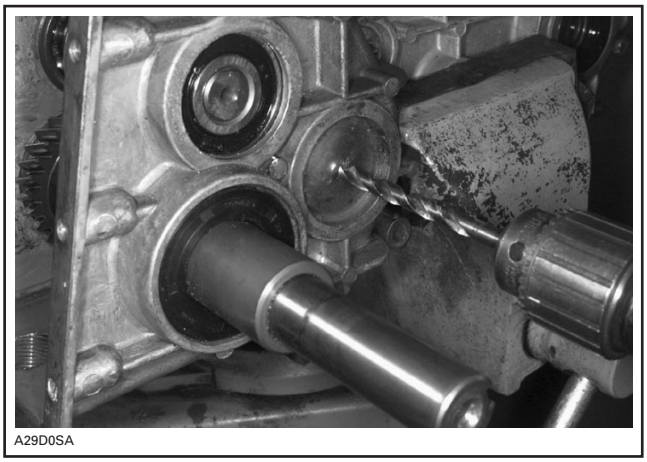
Unfasten sleeve nut **no. 4**, remove spring **no. 7** then, partially pull shaft **no. 5** and remove pin **no. 6**.



1. Pin

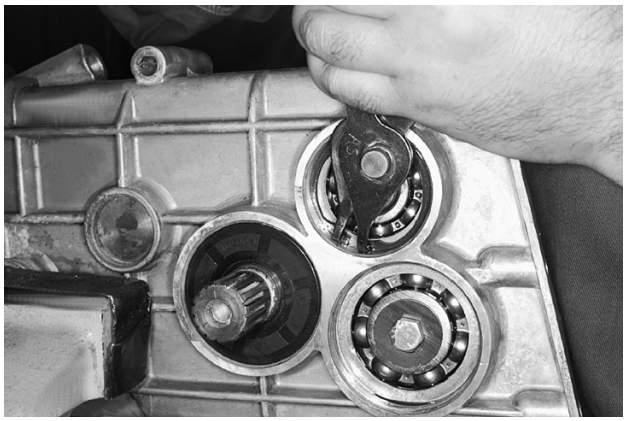
Completely remove shaft **no. 5**.

Drill a 10 mm (3/8 in) dia. hole through all plugs **no. 8**.



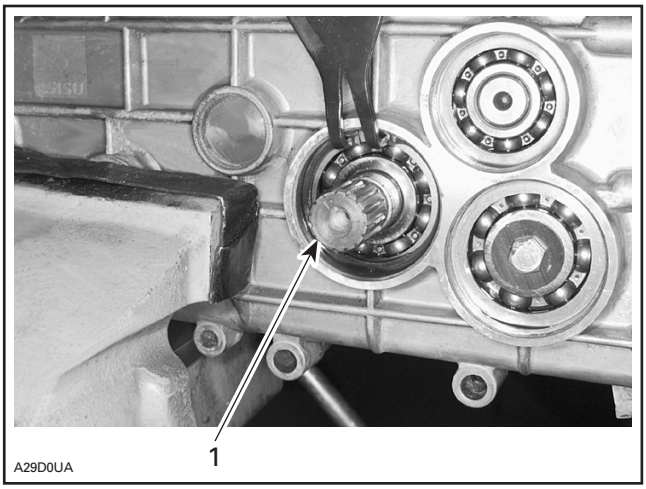
Remove all plugs **no. 8** from gearbox.

Remove all circlips **no. 9**.


A29D0TA

IMPORTANT: Note all shims quantity and location.

Remove brake shaft oil seal then, circlip.

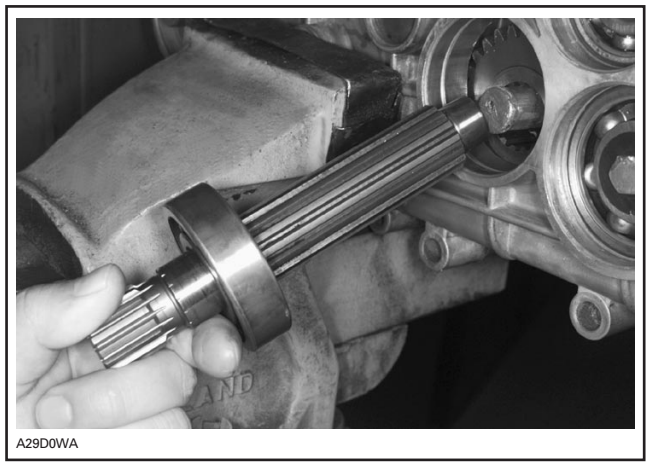


A29D0UA

1. Brake shaft

Proceeding from right side, drive brake shaft out of gearbox housing.

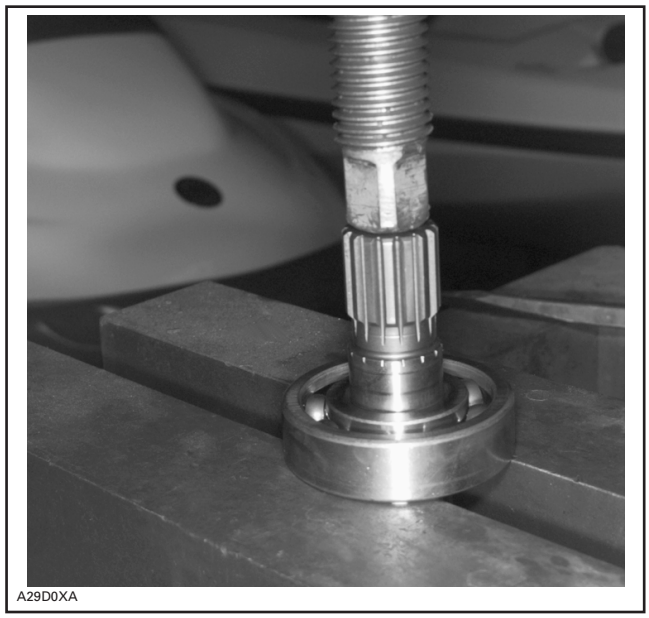

A29D0VA


A29D0WA

Remove sleeve **no. 23**.

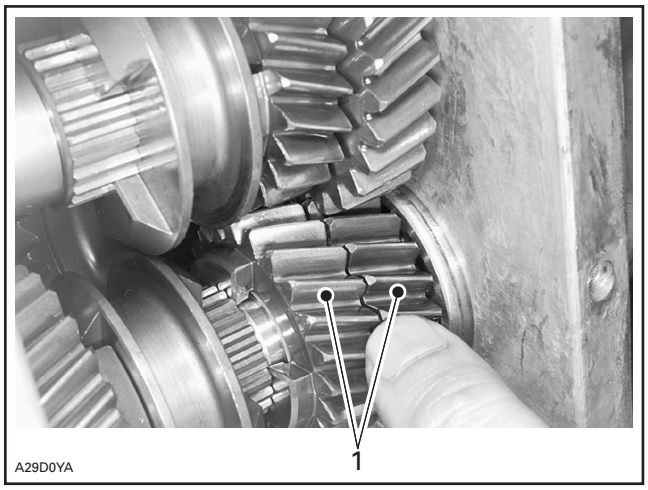
NOTE: Brake shaft gears remain in gearbox housing.

Remove bearing **no. 27** from brake shaft **no. 23** using a press.


A29D0XA

Drive reverse shaft **no. 38** out until its LH side bearing is free.

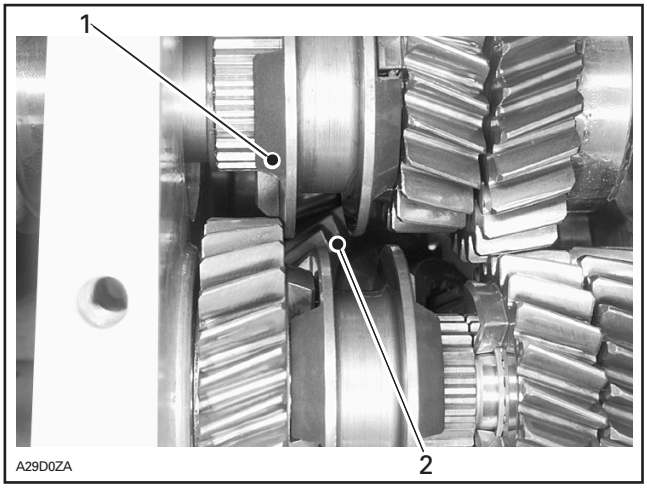
Make sure gears mesh.



1. These gears must mesh as reverse shaft is driven out

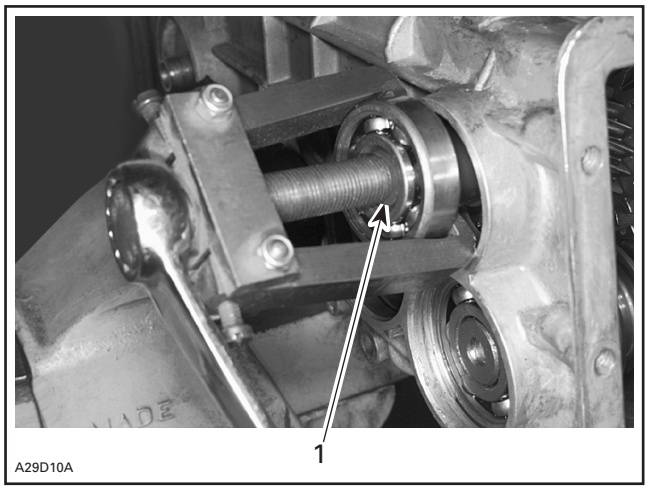
Shift in reverse gear.

Turn reverse shaft so its sliding sleeve dog will not touch the RH gear of driven pulley shaft **no. 15**. This will allow the driven pulley shaft to be pushed out enough for bearing removal.



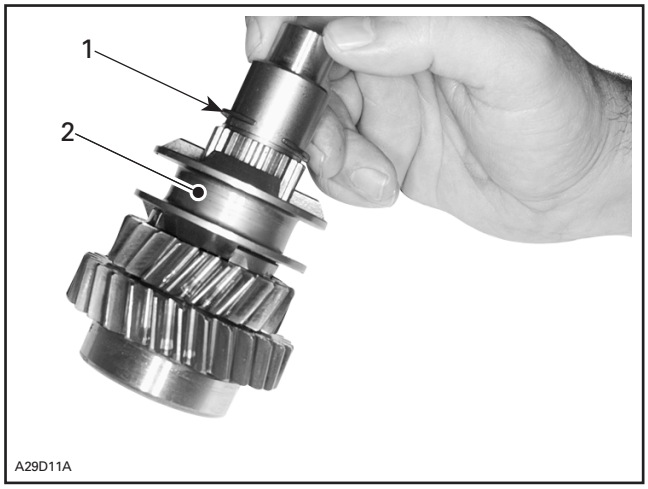
1. Sleeve dog not touching right gear
2. Brake shaft gears are still in gearbox

Use a puller to extract LH reverse shaft bearing.



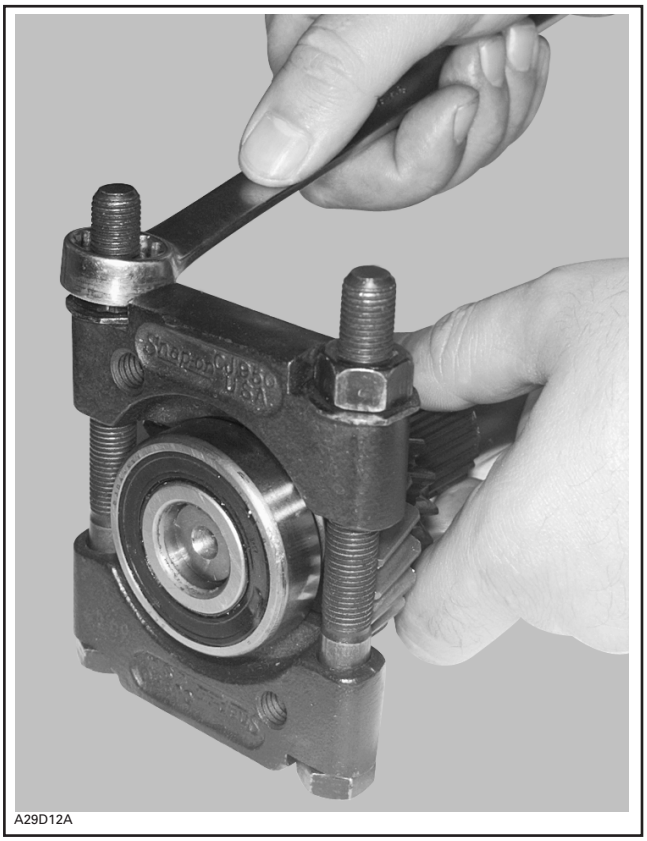
1. Extract reverse shaft LH side bearing

To remove sliding sleeve from reverse shaft, first remove circlip.



1. Circlip
2. Sliding sleeve

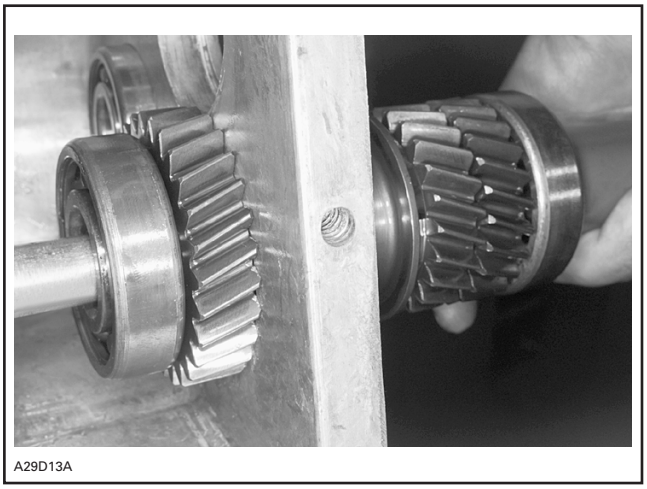
Use a puller to extract bearing **no. 19**.


A29D12A

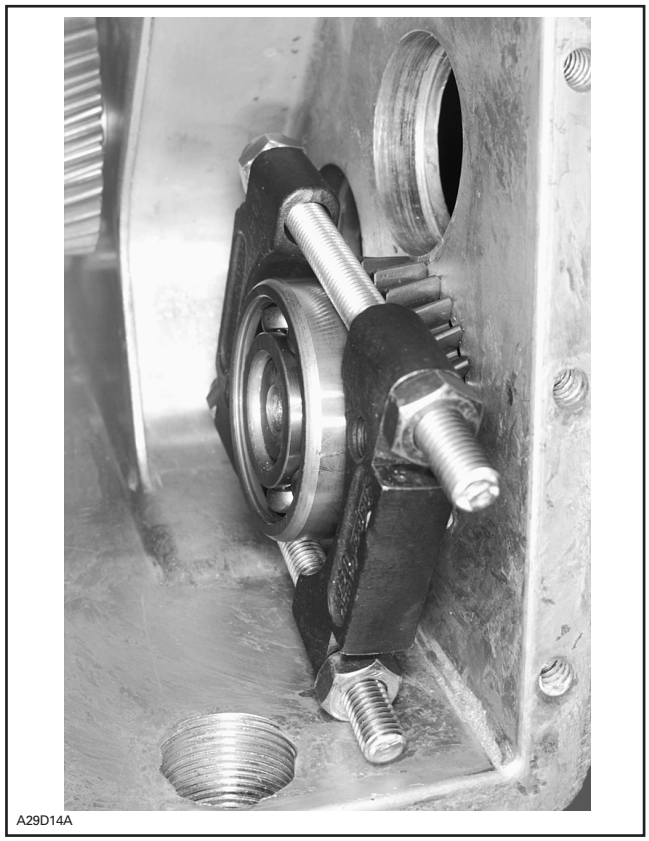
Remove brake shaft gears.

Unbolt driven pulley shaft screw **no. 11** and remove washer.

Push driven pulley shaft **no. 15** out of gearbox until its LH gear **no. 14** is against gearbox inner wall.

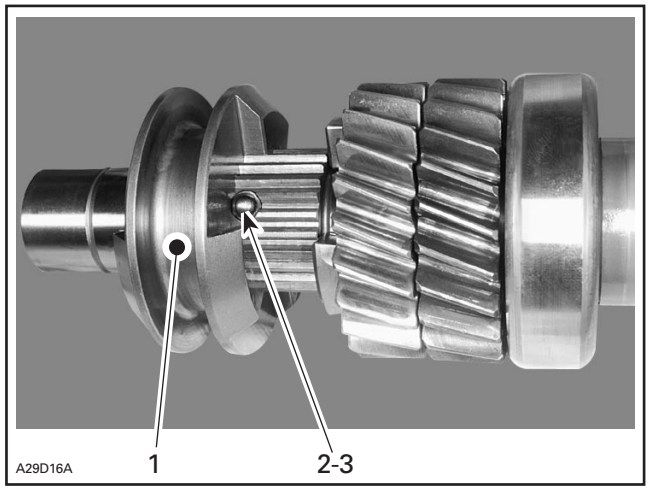

A29D13A

Use a puller to extract bearing **no. 12**.


A29D14A

Remove circlip then, gear **no. 14**. Now driven pulley shaft can be pulled out from gearbox.

Remove sliding sleeve taking care not to lose balls **no. 18** and spring **no. 16**.



A29D16A

1. *Sliding sleeve*
2. *Spring*
3. *Balls*

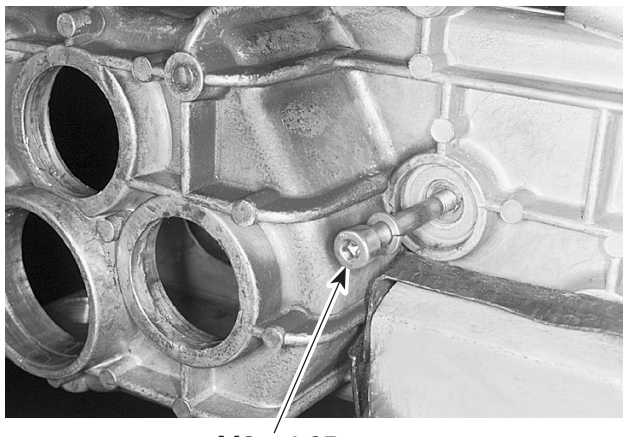


A29D17A

DRIVEN PULLEY SHAFT COMPONENTS

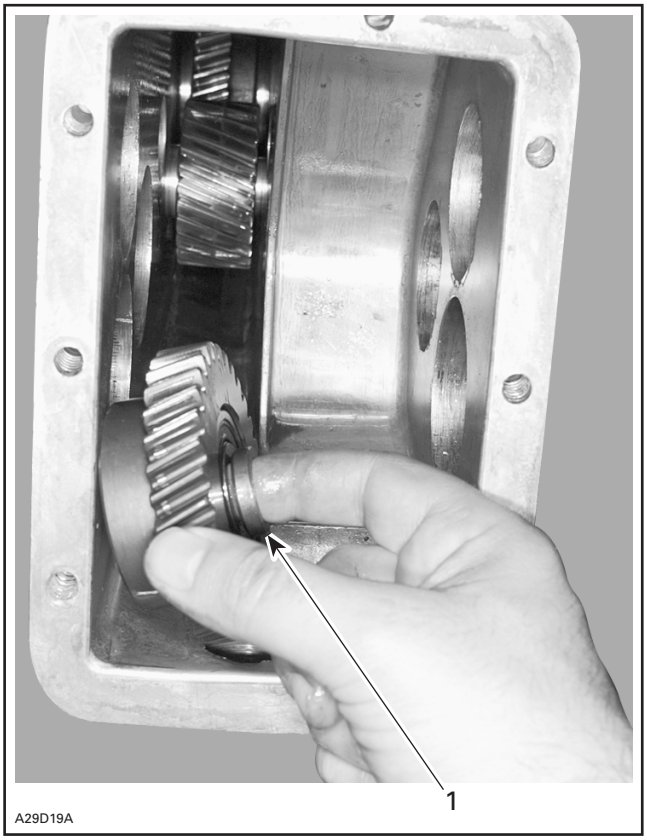
Remove screws **no. 16** from intermediate shafts **no. 30**.

Fasten a long M8 x 1.25 screw in axle end then drive it out, beginning with top one.



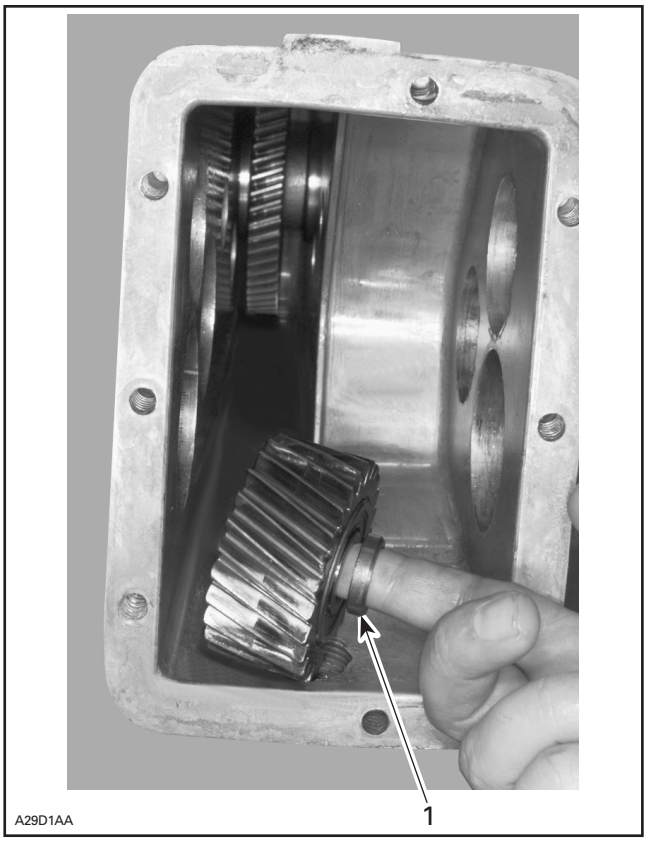
A29D18A

Remove intermediate gears and spacers.



A29D19A

1. Spacer

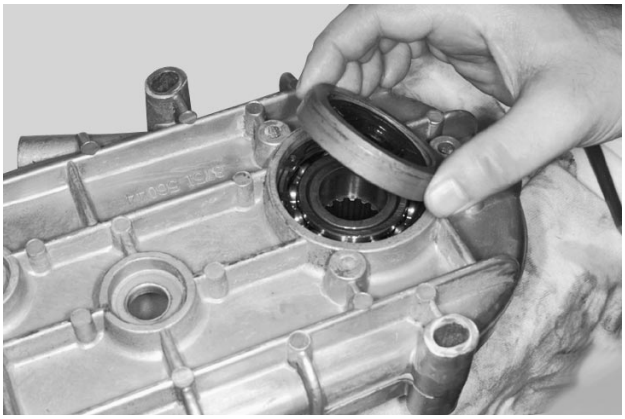


A29D1AA

1. Spacer

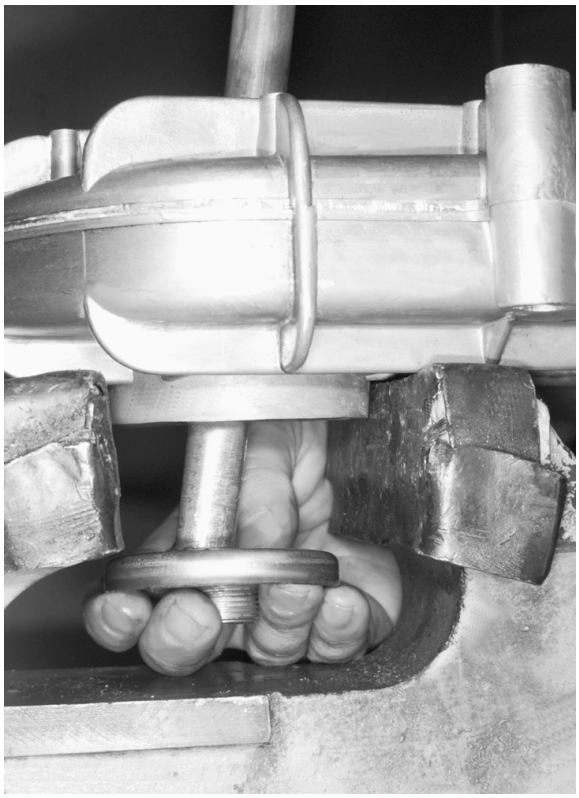
Do not disassemble bearings of intermediate gears needlessly.

Pry out bottom seal **no. 33** from gearbox housing. Remove sleeve **no. 32** then, circlip **no. 9**.



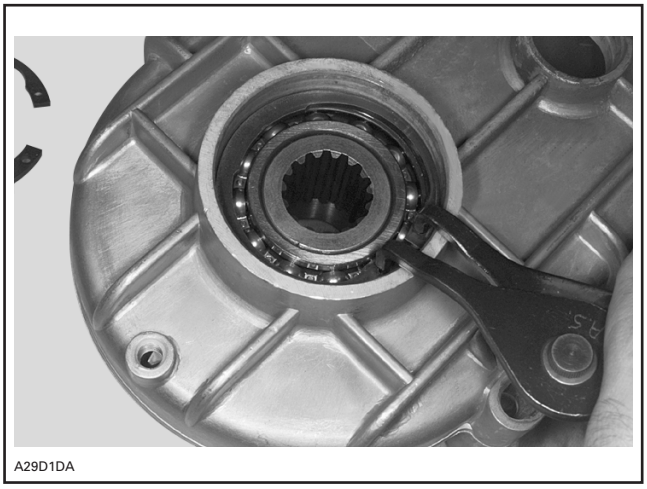
A29D1BA

Drive out plug **no. 37**.



A29D1CA

Remove circlip **no. 9** from LH side.

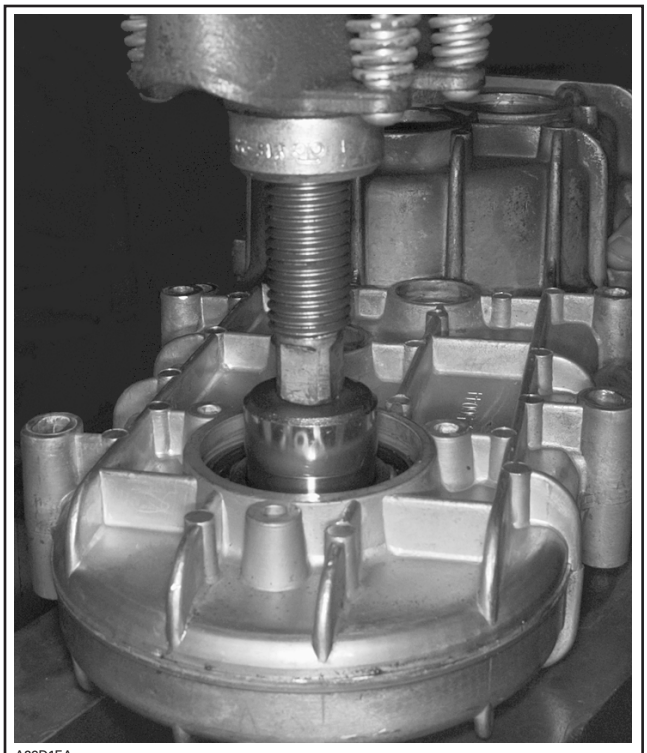


A29D1DA

Using a press, drive out lower shaft **no. 36** from RH side.

▼ CAUTION

Do not push against inner bearing race.



A29D1EA

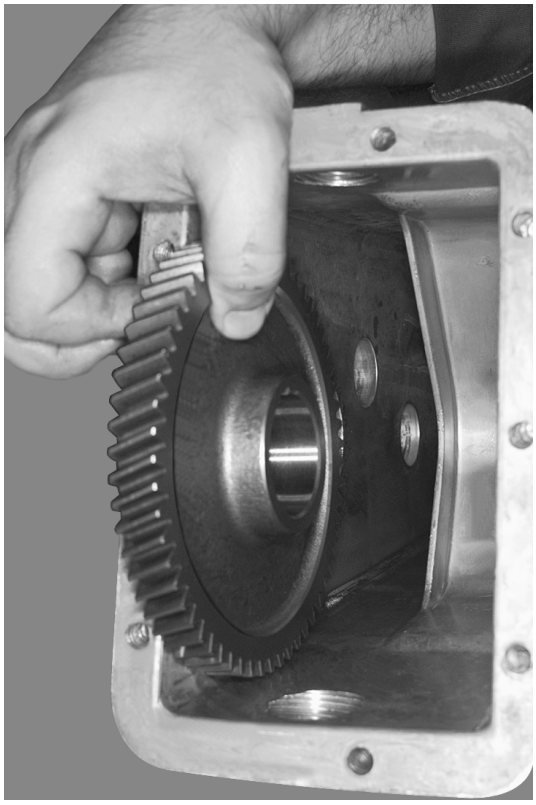
INSPECTION

Check bearing condition. There must be no discoloration, missing rollers or balls, broken cages, etc.

Check sprocket teeth.

ASSEMBLY

Install lower gear **no. 34** with its shoulder facing RH side.



A29D1FA

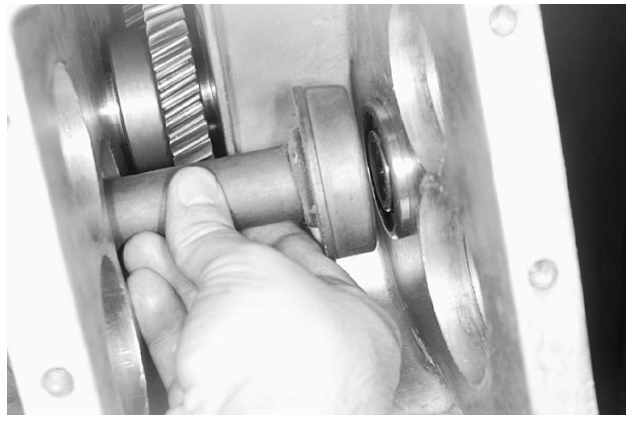
Install lower shaft **no. 36** with its hollow side (no splines) on RH side. Align key with lower gear **no. 34** keyway.



A29D1GA

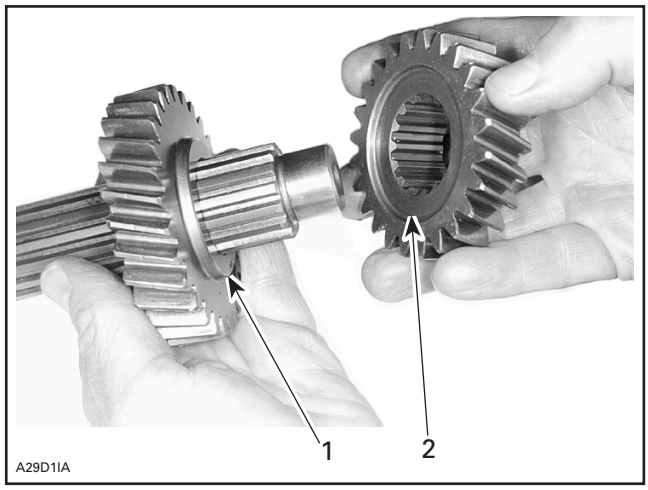
Install intermediate gears **no. 29** with their shoulder towards LH side. Position spacers **no. 28** as illustrated in removal procedure. Bevelded side of spacers goes against gearbox wall.

Install RH side bearing of brake and reverse shafts.



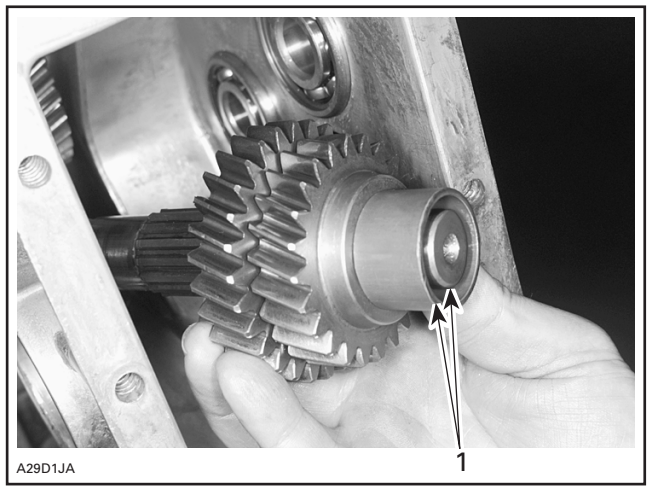
A29D1HA

Partially assemble brake shaft gears **nos. 24** and **25** with shoulder facing recess.



1. Shoulder
2. Recess

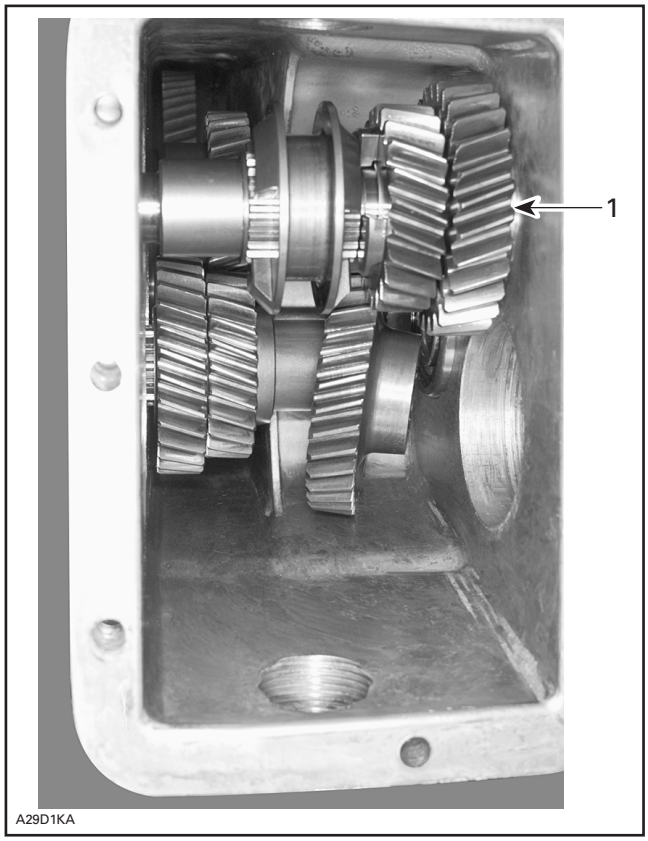
Install sleeve **no. 23** on brake shaft **no. 26** then, slide gears and sleeve until end of sleeve is flush with shaft end.



1. Flush

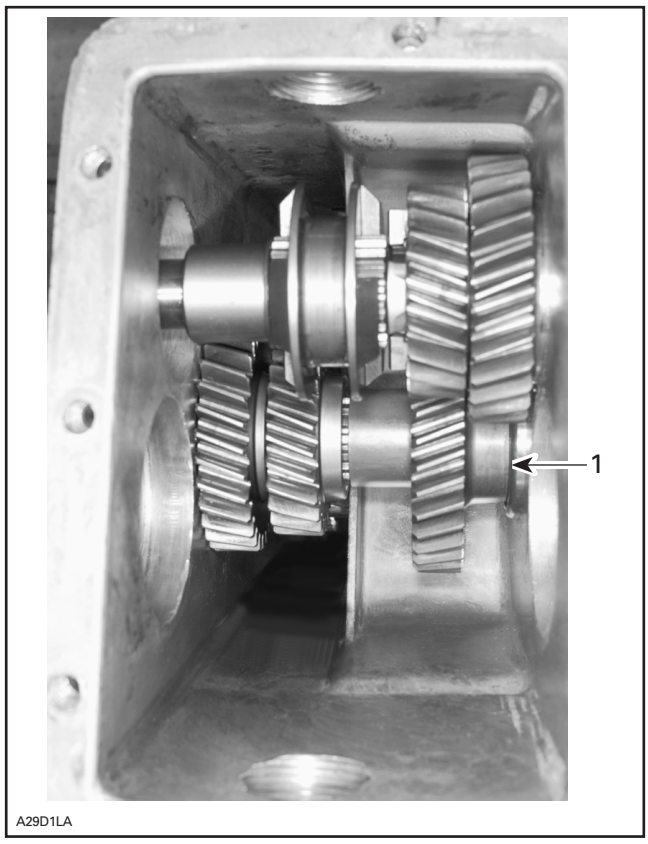
Install brake shaft **no. 26** into gearbox then, loosely install gear **no. 22** with its shoulder facing bearing **no. 21**. Do not push brake shaft into bearing **no. 21** at this time.

Install reverse shaft ass'y **no. 38** into its RH side bearing **no. 19**.



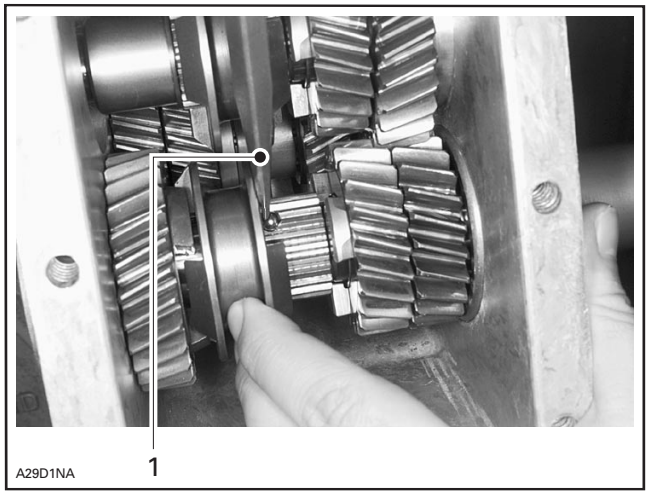
1. Reverse shaft installed in its RH bearing

Position gear **no. 22** against bearing RH side bearing **no. 19** then, finalize brake shaft **no. 26** insertion.



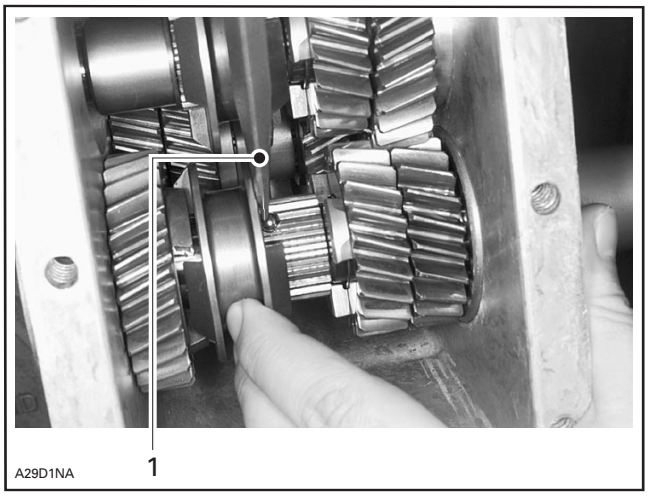
1. Finalizing brake shaft insertion

Install driven pulley shaft **no. 15** with the sliding sleeve loosely inserted. Gear **no. 14** must be at its place.



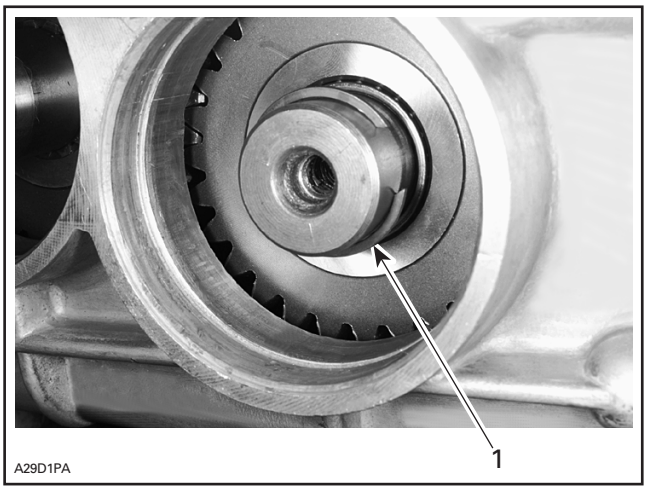
1. Sliding sleeve loosely inserted
*2. Gear **no. 14** in place*

Install balls **no. 18** and spring **no. 16** into driven pulley shaft.



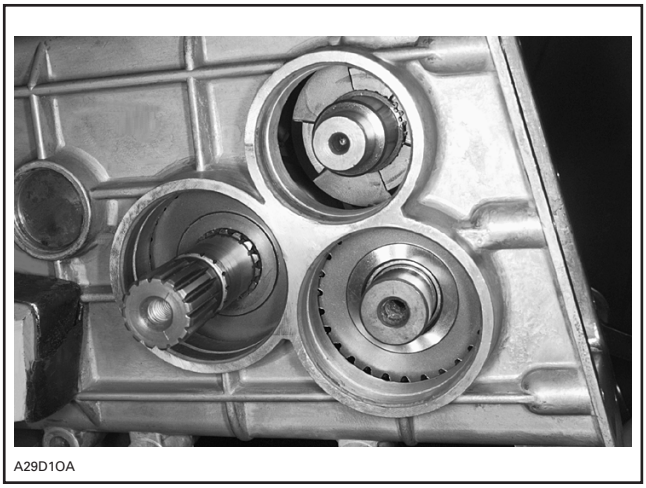
1. Push on ball with a screwdriver then move sliding sleeve to the right

Finalize driven pulley shaft insertion. Make sure that gears mesh during insertion. Install circlip **no. 20**.



1. Circlip

Install LH side bearings **nos. 12, 19** and **21**, shims **no. 8**, circlip **no. 9** then, plugs **no. 8**.


A29D1OA

READY TO INSTALL BEARINGS, SHIMS, CIRCLIPS AND PLUGS

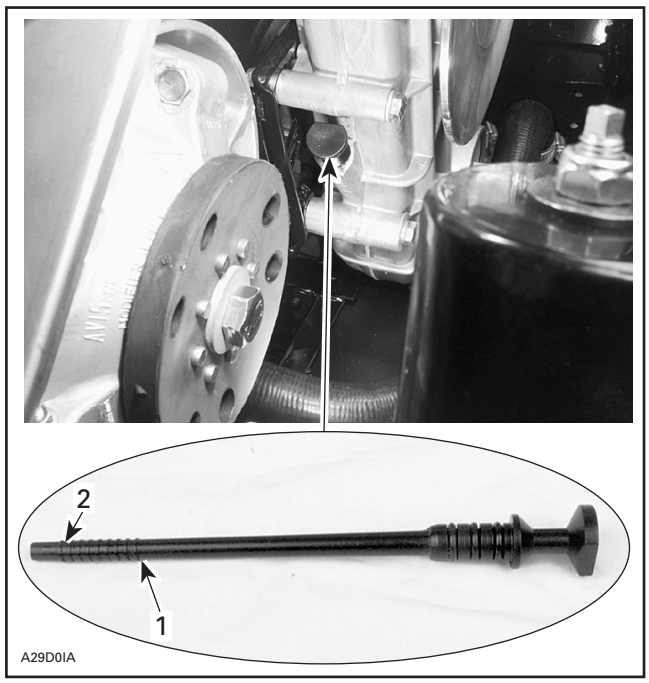
INSTALLATION

Reverse removal procedure. Check pulley alignment.

OIL LEVEL

To check, pull dipstick. Oil should reach level mark.

NOTE: After first outing, oil level will decrease as the upper oil cavity fills with oil. Recheck oil level and refill as required.

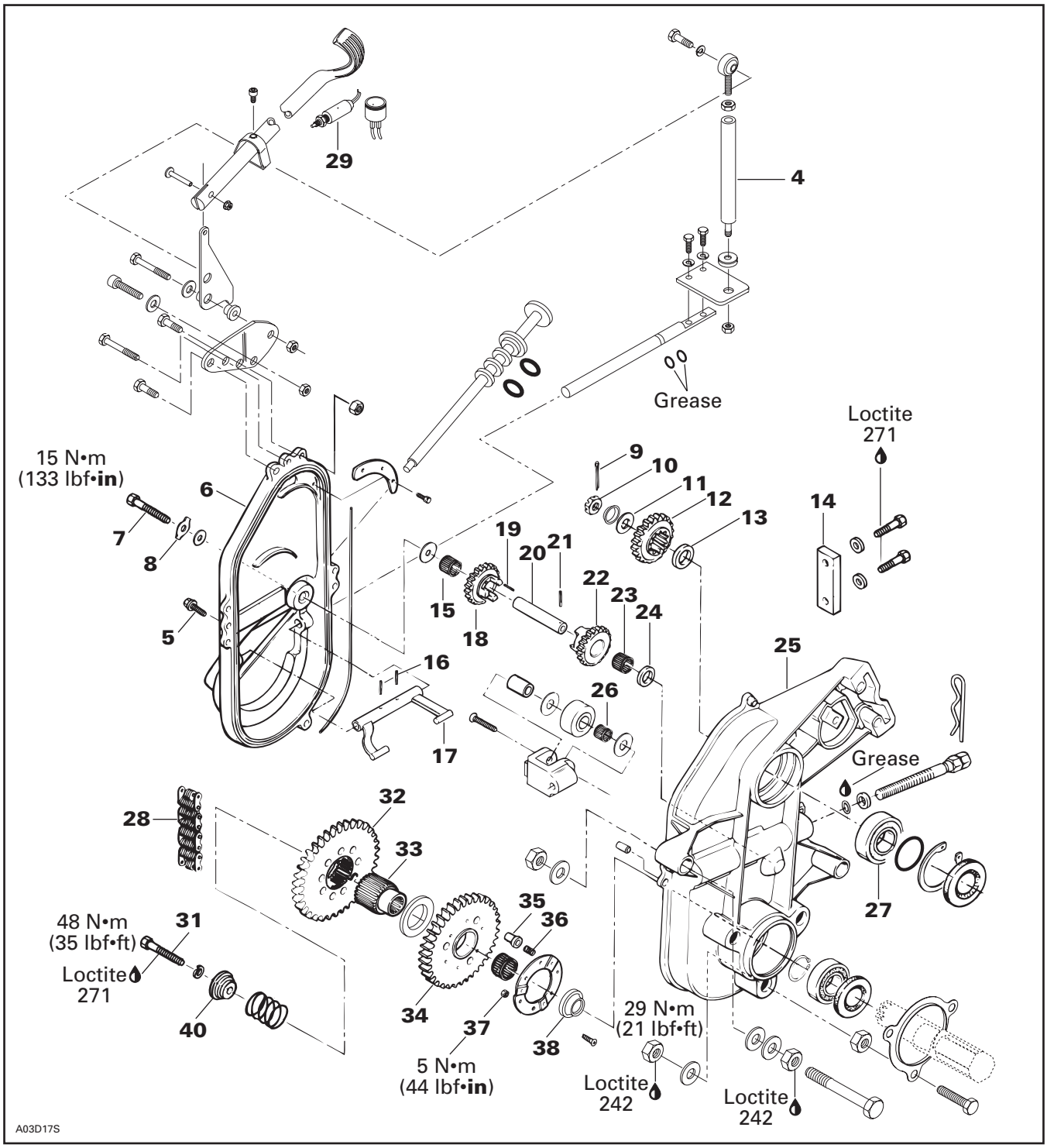


1. Full level mark
2. Lower level mark

To fill, remove filler plug from top of transmission. Refill as required using BOMBARDIER SYNTHETIC CHAINCASE OIL (P/N 413 802 800 — 12 x 250 mL).

2-SPEED GEARBOX

Grand Touring 500/583 and Formula Deluxe 500 LC/583/670

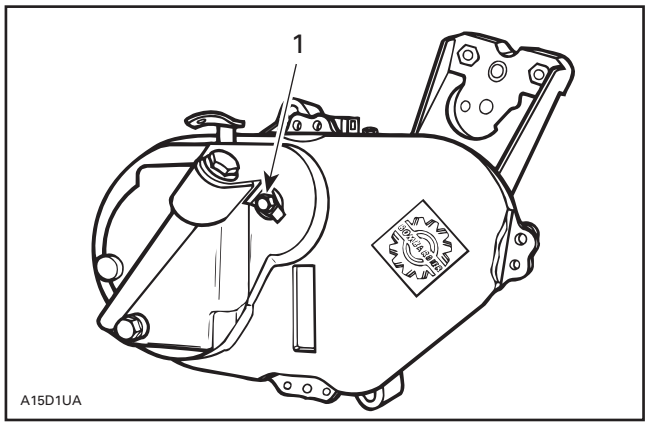


DISASSEMBLY

NOTE: It is possible to see the sliding gear in motion through oil gauge hole.

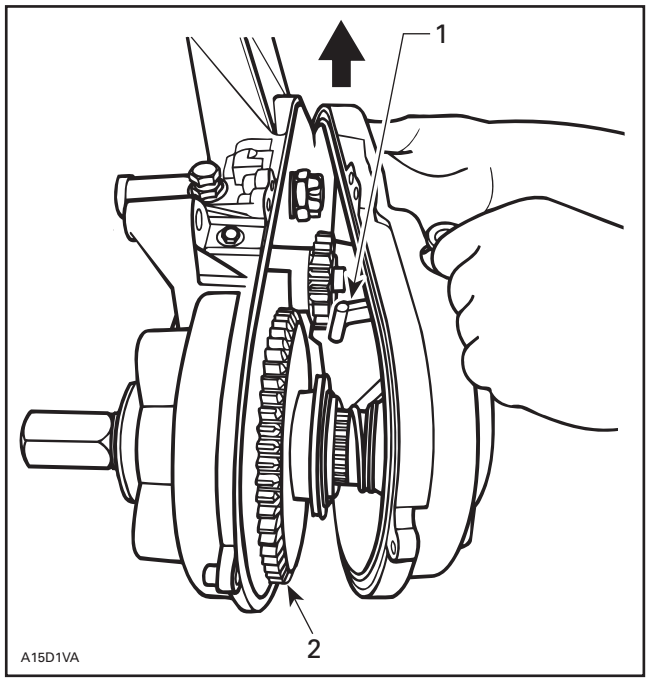
Unbolt gear shift linkage from shifter.

Unscrew cover screws **no. 5** as well as reverse axle screw **no. 7**.



1. Reverse axle screw

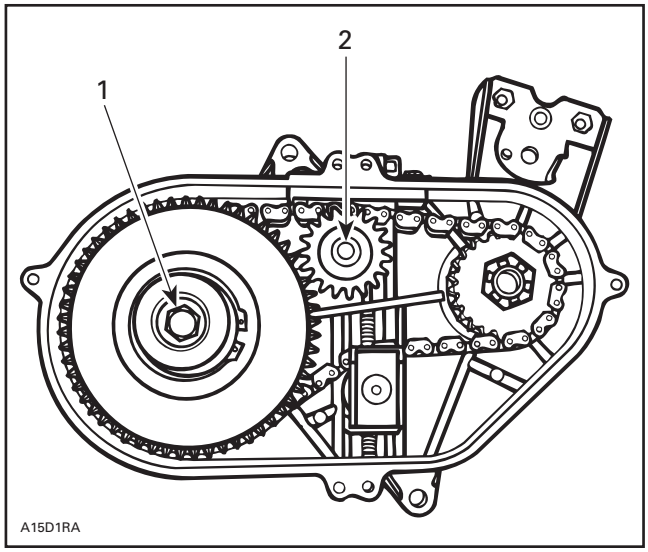
Separate cover **no. 6** from housing and move it toward the front in order to disengage fork from sliding gear.



1. Fork
2. Sliding gear

Loosen chain tension, unscrew sliding gear retaining screw **no. 31**, then remove sliding gear **no. 32**.

First remove 19-tooth reverse gear **no. 18** and then remove reverse axle **no. 20**.



1. Sliding gear screw
2. Reverse axle

Remove coupling shaft **no. 33**, 44-tooth sprocket **no. 34**, spacer **no. 38** and chain **no. 28**.

First unscrew castellated nut **no. 10**, then remove 22-tooth sprocket **no. 12**.

Force 2 spring pins **no. 16** out to disengage fork **no. 17** from its axle.

INSPECTION

14, Chain Slider

Replace slider if maximum wear is 1.0 mm (.039 in) at contact point.

Bearings

Check bearing condition. There must be no discoloration, missing rollers, broken cages, etc.

Sprockets and Gears

Check teeth.

ASSEMBLY

Reinstall drive shaft.

Reinstall gearbox housing.

NOTE: Adjustment screw can only be installed when housing is removed.

Sealed side of bearing **no. 27** must face gearbox cover.

Do not reuse removed oil seals. Replace them with new ones.

Install drive axle with track then bearing and circlip in chaincase bore. Install spacer **no. 38** with its large outer diameter against sprocket, 44-tooth sprocket **no. 34**, coupling shaft **no. 33**, cap **no. 40** and screw **no. 31**.

Place a 25 cm (10 in) rule against sprockets. Maximum allowable offset is 1 mm (.040 in).

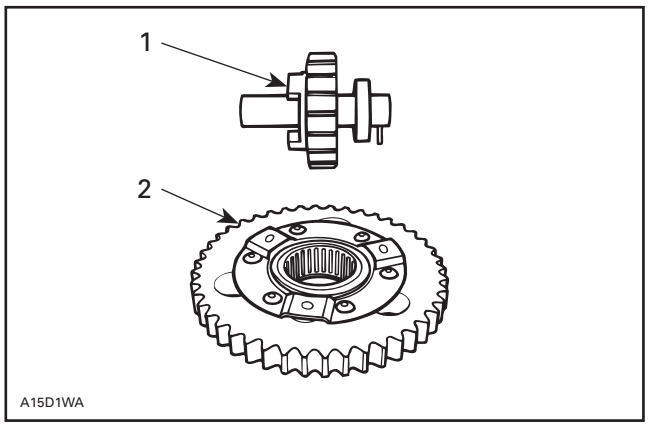
a. If upper sprocket is too far in, possible causes are:
   1. Countershaft bearing on driven pulley side may be too far in. To check, pull out bearing using countershaft bearing remover (P/N 529 030 100) then recheck sprocket alignment. Use bearing installer (P/N 529 030 200) to reposition bearing. Bearing housing (triangle) must be against frame without preload.
   2. Add shim(s) between chaincase and frame and reposition bearing on driven pulley side accordingly.

b. If upper sprocket is too far out, check:

   If there are too many shims between chaincase and frame. Remove shims accordingly and reposition bearing on driven pulley side.

Press needle bearing in 44-tooth sprocket. Assemble drive pins **no. 35** and their spring **no. 36** on 44-tooth sprocket. Tighten nut **no. 37** to 5 N•m (44 lbf•**in**) in a criss-cross sequence.

Insert spring pin **no. 21** in reverse axle up to inside diameter. Press needle bearing in 19-tooth sprocket. Install ring **no. 24** and 19-tooth sprocket on reverse axle.



1. Reverse axle ass'y
2. Sliding gear ass'y

Install shim **no. 13**, 22-tooth sprocket (drive) **no. 12** and washer **no. 11** then tighten castellated nut **no. 10** and conical spring washer. Secure with a new cotter pin.

Install chain **no. 28**, 44-tooth sprocket **no. 34** and its spacer **no. 38**. Spacer's large outer diameter must be against sprocket. Insert coupling shaft **no. 32** in 44-tooth sprocket.

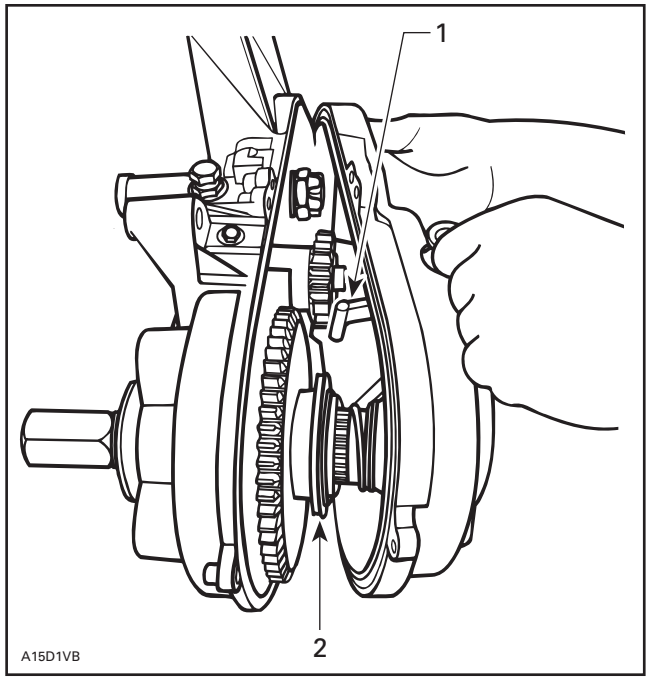
Install needle bearing **no. 15** (wider one) in reverse gear **no. 18**.

Install reverse axle **no. 20** (assembly) making sure to properly position spring pin in housing slot. Install alignment rod **no. 19**, reverse gear **no. 18** and spacer **no. 24**. Drive sprocket hole and driven gear hole must be aligned to insert alignment rod.

Mount chain tensioner (assembly) to adjustment screw already fixed to gearbox. Assemble fork **no. 17** to axle using spring pins **no. 16**. Apply grease on O-rings.

6, Cover

Join cover (assembly) to housing. Make sure fork tabs are behind sliding sprocket thrust washer.



1. Fork tabs
2. Thrust washer

▼ CAUTION

Gearbox cover must lay completely against housing.

5,7,8, Screws and Locking Tab

Tighten screws in a criss-cross sequence starting with the one above reverse axle. Install reverse axle screw and bend locking tab against screw head flat. Bolt shift linkage to shifter.

ADJUSTMENT

28, Chain

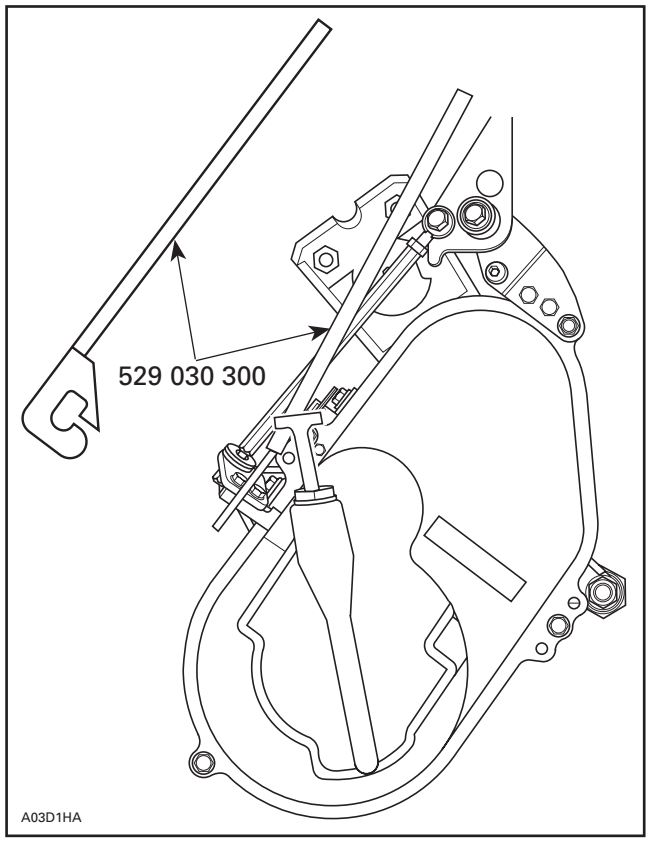
Fully tighten adjustment screw by hand, then back off only far enough for hair pin to engage in locking hole.

4, Gear Shift Linkage

1. Check proper fit of handle in console.
2. Shift into reverse gear.

NOTE: If it is impossible to shift into reverse gear, shorten tie-rod and try again. If it is still impossible, check if the fork engages in the sliding gear or disassemble the cover to inspect components.

3. Completely loosen ball joint lock nut on the gear shift linkage.
4. Use tool (P/N 529 030 300) to push and hold down tie-rod plate to make sure transmission is in reverse gear. Pull shifter handle to reverse position making sure all slack is removed. Lengthen tie-rod until it contacts the rubber washer then add an additional turn.

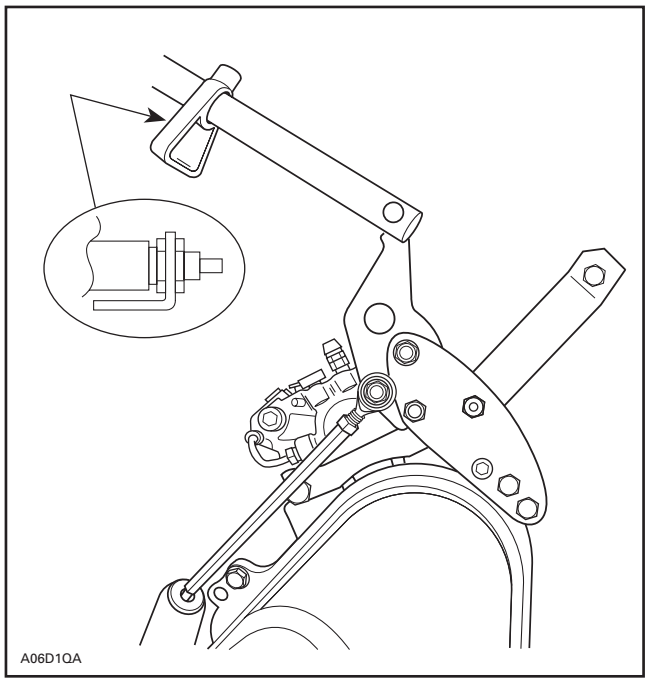


NOTE: It is normal to feel a light friction when shifting into gear.

5. Statically test transmission operation in forward and reverse positions.
6. Hold linkage and tighten ball joint jam nut.

29, Alarm Switch

Adjust backup alarm so that it sounds when transmission is in reverse gear while engine is running.



OIL CHANGE

Place a container under bottom pan (gearbox side).

Unbolt gear shift linkage from fork axle. Unbolt and remove cover by separating it from housing and by moving it toward the front in order to release fork from sliding sprocket.

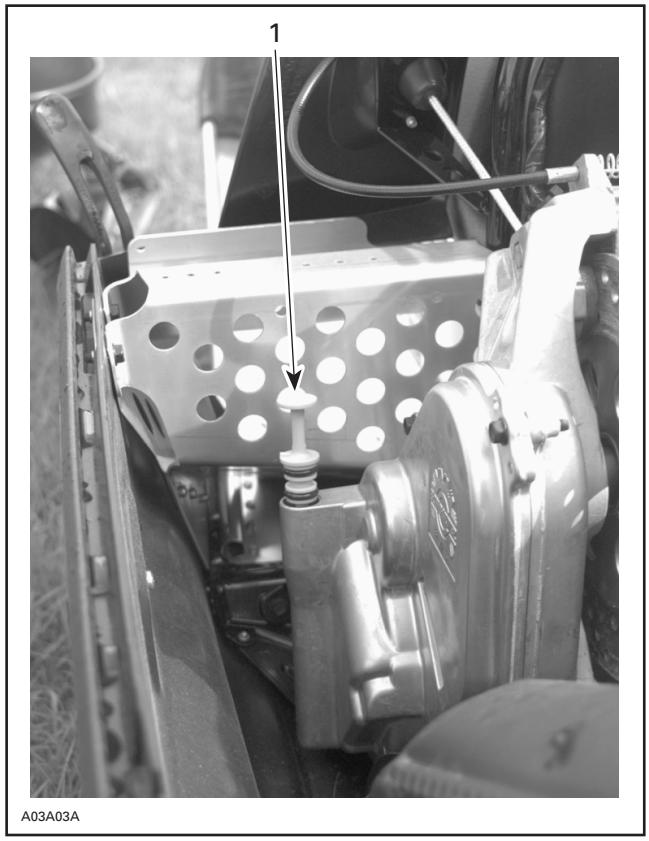
Clean cover interior.

NOTE: It is normal to find metallic particles stuck to dipstick magnet. If bigger pieces of metal are found, disassemble and check all parts.

Reinstall cover as described previously during assembly.

Fill housing with BOMBARDIER SYNTHETIC CHAINCASE OIL (P/N 413 802 800 — 12 x 250 mL). Oil capacity is 250 mL (8.5 oz).

Check oil level with dipstick. With dipstick unscrewed, oil level must be between MIN. and MAX. marks.



1. Dipstick

Shifter can be put in reverse position to ease removal of dipstick.

DRIVE CHAIN

SILENT CHAIN

There are 2 types of silent chains. One is 11-plates wide and the other is 13-plates wide (stronger). Do not interchange sprockets. Fit chain on sprockets to make that you are using the right ones according to width. Refer to TECHNICAL DATA 10.

NOTE: No work (separation, lengthening) can be done on a silent chain.

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IGNITION TIMING

DUCATI CDI SYSTEM

443 and 503 Engine Types

Proper ignition timing is determined by trigger coil position.

If for any reason, ignition timing accuracy is suspected, it can be checked as follows.

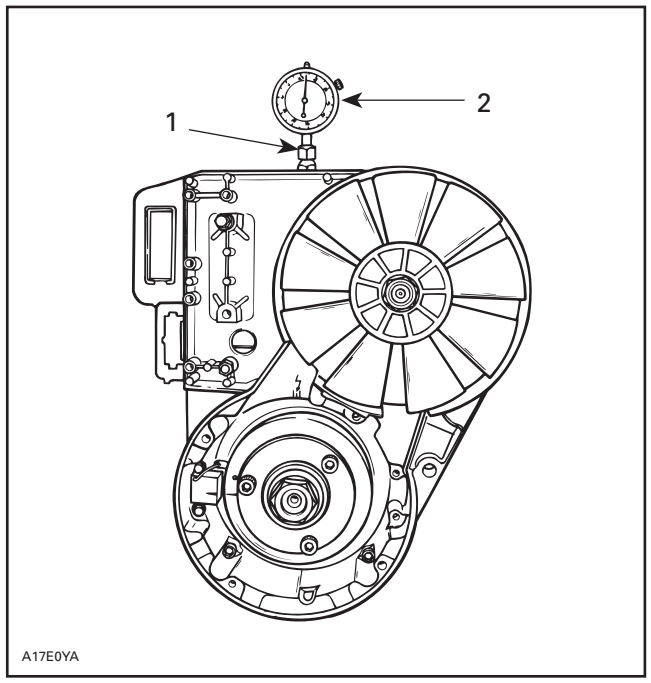
Verifying Magneto Flywheel Timing Mark Position

Prior to checking the timing, it may be necessary to verify the position of the timing mark on the magneto flywheel, for the following reasons:

1. To detect a missing or broken magneto flywheel Woodruff key which would allow a change of timing to occur, with eventual break down of the engine.
2. To correctly locate and mark a timing mark on a new service magneto flywheel.
3. To verify the correct location of the factory timing mark.
4. To detect a wrong magneto flywheel.

To verify the position of the timing mark on the magneto flywheel, proceed as follows:

1. Clean the area around the spark plugs, and remove them.
2. Remove the rewind starter from the engine.
3. Install the TDC gauge in the spark plug hole, (magneto/generator side) and adjust as follows:
   a. Position the magneto flywheel at approximately TDC.



INSTALLATION OF TDC GAUGE

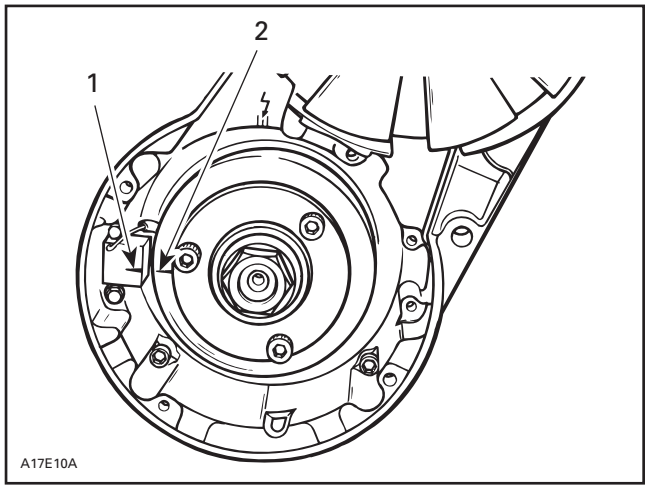
1. Adapter lock nut
2. Gauge on MAG side cylinder

   b. Assemble the gauge to the adapter and tighten the roller lock nut. Do not tighten the adapter lock nut.
   c. Screw the adapter into the spark plug hole and tighten to prevent movement in the plug hole.
   d. Position the dial face toward the magneto/generator. Move the gauge down until the needle just begins to move, then move down a further 5 or 6 mm (approximately 1/4 in). Tighten adapter lock nut by hand.

4. Locate the piston TDC position as follows:
   a. Slowly rotate the magneto flywheel back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
   b. Rotate the dial face so that 0 (zero) is in line with the needle when it stops moving.
   c. Again, slowly rotate the magneto flywheel back and forth across TDC and adjust the dial face to 0 (zero), until the needle always stops exactly at 0 (zero) before changing direction.
   d. 0 (zero) now indicates exact TDC.
5. Verify the position of the timing mark on the magneto flywheel as follows:

NOTE: When checking timing, certain procedures require that the magneto flywheel be turned in a clockwise direction, viewed facing the magneto/generator. If it is necessary to turn back (counterclockwise) for any reason, rotate the magneto flywheel at least 1/4 turn counterclockwise, and then rotate it clockwise. The last magneto flywheel movement when making a critical check must always be in a clockwise direction, to ensure that the slack in engine moving parts is taken-up.

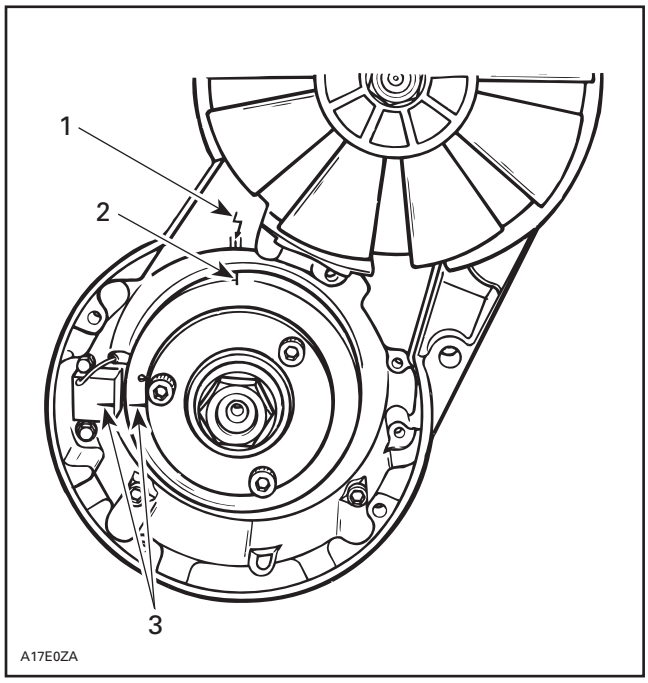
   a. Rotate the magneto flywheel 1/4 turn counterclockwise, 1/4 turn then carefully rotate it clockwise until the needle indicates the specified measurement. Refer to TECHNICAL DATA 10-02.
   b. Verify that the magneto flywheel mark perfectly aligns with the mark on the trigger coil, refer to illustration.
   c. If the marks do not align, check magneto flywheel and trigger coil part numbers and check Woodruff key condition. If all parts are the appropriate ones and if Woodruff key is in good condition, continue the procedure.



1. Trigger coil mark
2. Magneto flywheel mark

NOTE: These marks cannot be used to check dynamic (with engine running) ignition timing with a timing light: a new mark must be scribed on magneto flywheel for this purpose.

6. Scribe a new mark on magneto flywheel as follows:
   a. Remove the fan cover from the engine.
   b. Maintain magneto flywheel so that previous marks remain aligned.
   c. Scribe or punch a mark on magneto flywheel so that it aligns perfectly with the arrow on crankcase, refer to illustration. This new timing mark should be used for future timing checks (dynamic timing).
   d. Reinstall rewind starter.
   e. Check the timing with a timing light (P/N 529 031 900).



1. Crankcase arrow
2. Scribe a mark here
3. Maintain verified timing marks aligned (static timing)

Checking Ignition Timing

Use timing light (P/N 529 031 900).

To check the ignition timing, refer to illustration and proceed as follows:

NOTE: Engine should be cold when checking timing. Do not idle engine for more than 20 seconds and make checks quickly.

◆ WARNING

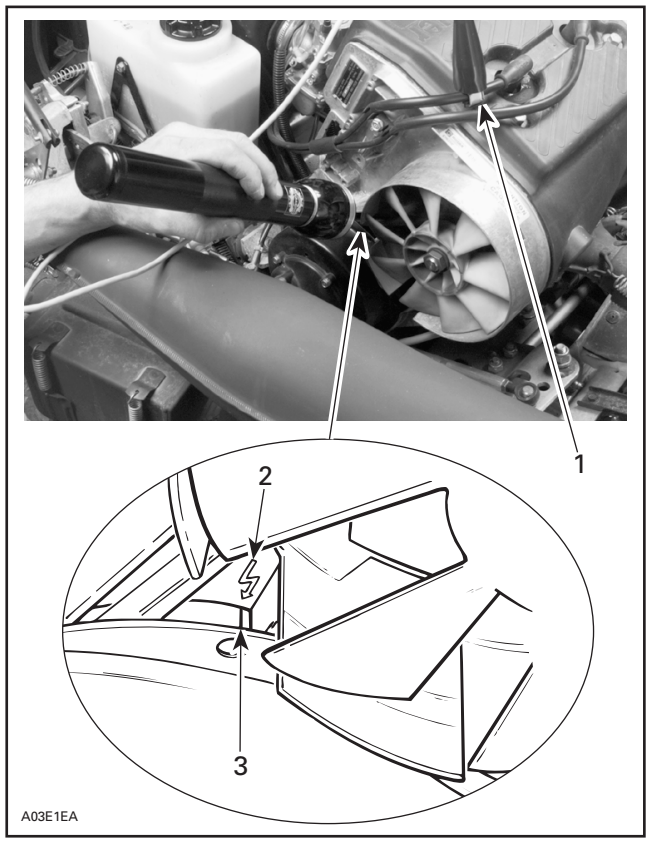
Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground. Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

1. Connect the timing light pick-up to a spark plug cable and the power connections to the battery.

NOTE: To avoid an incorrect reading due to parallax, view the magneto flywheel and the crankcase timing marks in a straight line.

2. Start the engine and raise the engine speed to at least 2000 RPM while observing the timing marks, refer to illustration. The magneto flywheel mark scribed previously and the crankcase arrow should be perfectly aligned. If the marks do not align, a faulty trigger coil (check proper grounding of coil) or a faulty CDI module could be the cause: substitute one part at a time and recheck timing marks (check connectors condition prior to substituting any part).

NOTE: Ignition timing may be verified when engine speed is anywhere within 2000 — 6000 RPM.



CHECKING IGNITION TIMING

1. Timing light pick-up on MAG side
2. Crankcase arrow
3. Magneto flywheel mark

3. Install parts which were removed.

NIPPONDENSO TRIGGER COIL SYSTEM

494, 583, and 670 Engine Types

Ignition timing is adjusted by movement of trigger coil. On 583 engine raising position of trigger coil retards ignition. Lowering position of trigger advances ignition. On 494 and 670 engines, moving trigger coil to right retards ignition and moving to left advances ignition.

▼ CAUTION

Each time ignition timing is adjusted by moving trigger coil, air gap must be adjusted.

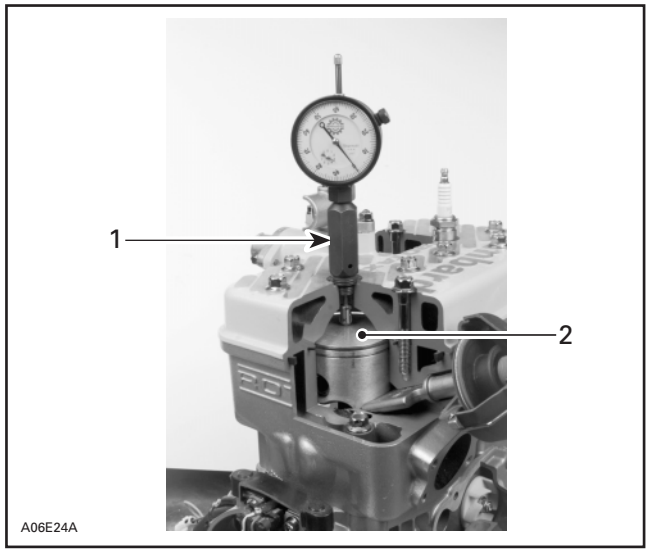
Verifying Magneto Flywheel Timing Mark Position

Prior to checking the timing, it may be necessary to verify the position of the timing mark on the magneto flywheel, for the following reasons:

1. To detect a missing or broken magneto flywheel Woodruff key which would allow a change of timing to occur, with eventual break down of the engine.
2. To correctly locate and mark a timing mark on a new service magneto flywheel.
3. To verify the correct location of the factory timing mark.
4. To detect a wrong magneto flywheel.

To verify the position of the timing mark on the magneto flywheel or to scribe a timing mark, proceed as follows:

1. Clean the area around the spark plugs, and remove them.
2. Remove the rewind starter from the engine.
3. Install the TDC gauge in the spark plug hole (magneto side) and adjust as follows:
   a. Position the magneto flywheel at approximately TDC.



TYPICAL

1. TDC gauge on MAG side
2. MAG side piston at TDC

   b. Assemble the gauge to the adapter and tighten the roller lock nut. Do not tighten the adapter lock nut.
   c. Screw the adapter into the spark plug hole and tighten to prevent movement in the plug hole.
   d. Position the dial face toward the magneto. Move the gauge down until the needle just begins to move, then move down a further 5 or 6 mm (approximately 1/4 in). Tighten adapter lock nut by hand.
4. Locate the piston TDC position as follows:
   a. Slowly rotate the magneto flywheel back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
   b. Rotate the dial face so that 0 (zero) is in line with the needle when it stops moving.
   c. Again, slowly rotate the magneto flywheel back and forth across TDC and adjust the dial face to 0 (zero), until the needle always stops exactly at 0 (zero) before changing direction.
   d. 0 (zero) now indicates exact TDC.

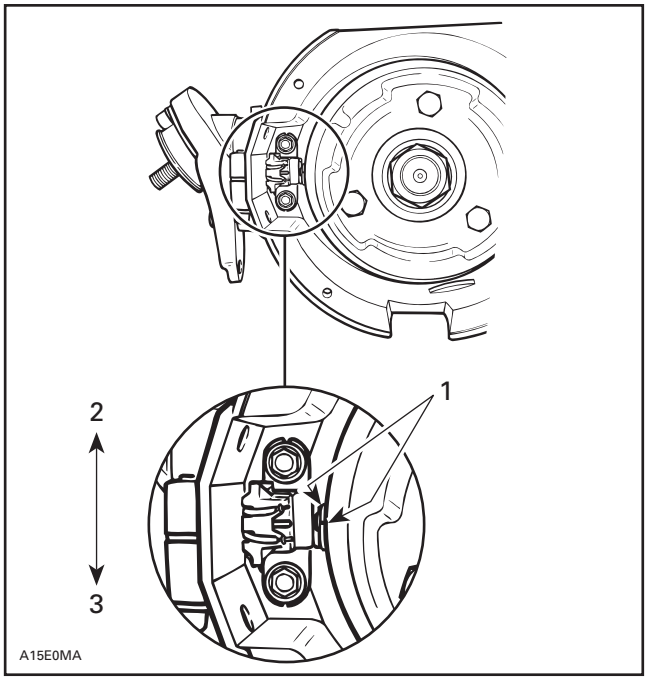
5. Verify the position of the timing mark on the magneto flywheel as follows:

NOTE: When checking timing, certain procedures require that the magneto flywheel be turned in a clockwise direction, viewed facing the magneto. If it is necessary to turn back (counterclockwise) for any reason, rotate the magneto flywheel at least 1/4 turn counterclockwise, and then rotate it clockwise. The last magneto flywheel movement when making a critical check must always be in a clockwise direction, to ensure that the slack in engine moving parts is taken-up.

a. Rotate the magneto flywheel 1/4 turn counterclockwise, 1/4 turn then carefully rotate it clockwise until the needle indicates the specified measurement, indicated in TECHNICAL DATA 10-02.

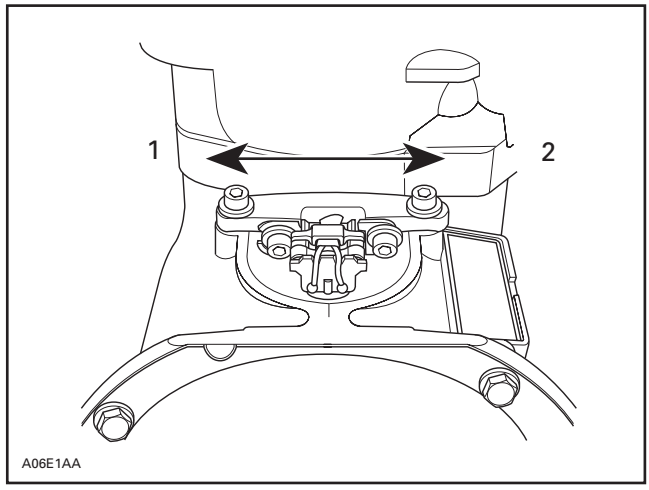
b. Make sure that the dot **located on the side of** the magneto flywheel protrusion perfectly aligns with center of trigger coil core, refer to illustration.

c. If the marks do not align, loosen trigger coil screws and move trigger coil to align dot with center of trigger coil core.



583 ENGINE

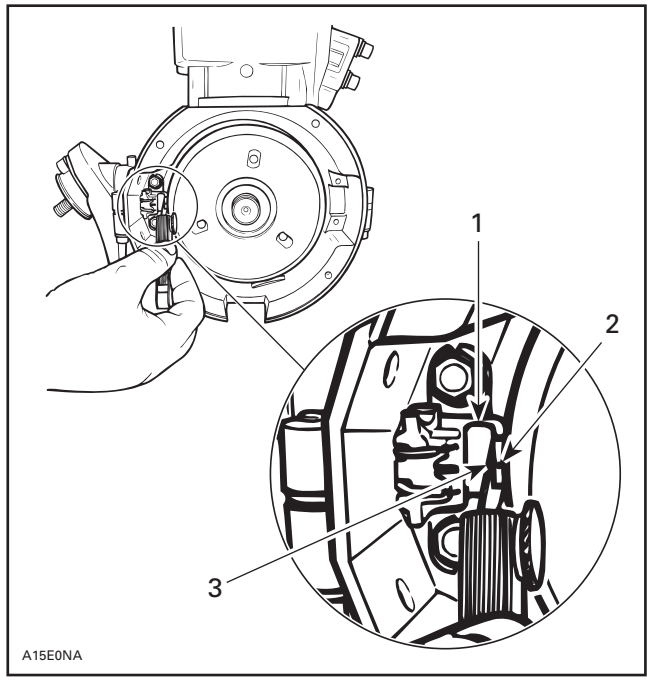
1. *Dot aligned with center of trigger coil core*
2. *Retard*
3. *Advance*



494 AND 670 ENGINES

1. *Advance*
2. *Retard*

d. Using a feeler gauge of 0.75 mm (.030 in) (allowable range is 0.55 mm (.022 in) to 1.45 mm (.057 in)), check air gap between center pole of trigger coil and flywheel protrusion.



TRIGGER COIL AIR GAP ADJUSTMENT

1. *Trigger coil*
2. *Flywheel protrusion*
3. *Measure at center pole of trigger coil 0.75 mm (.030 in)*

NOTE: These marks cannot be used to check dynamic (with engine running) ignition timing with a timing light: another mark is scribed on magneto flywheel or damper for this purpose. When flywheel protrusion dot aligns with center of trigger coil core, flywheel mark and crankcase center mark must be aligned.

Checking Ignition Timing

Use timing light (P/N 529 031 900).

To check the ignition timing, refer to illustration and proceed as follows:

All Models Except Summit X 670 and MX Z 670 HO

Engine should be cold when checking timing. Do not let engine idle for more than 20 seconds and make checks quickly.

All Models

◆ WARNING

Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground. Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

1. Connect the timing light pick-up to a spark plug cable and the power connections to the battery.

NOTE: To avoid an incorrect reading due to parallax, view the magneto flywheel and the crankcase timing marks in a straight line.

2. Start the engine and point timing light straight in line with the crankcase timing mark.

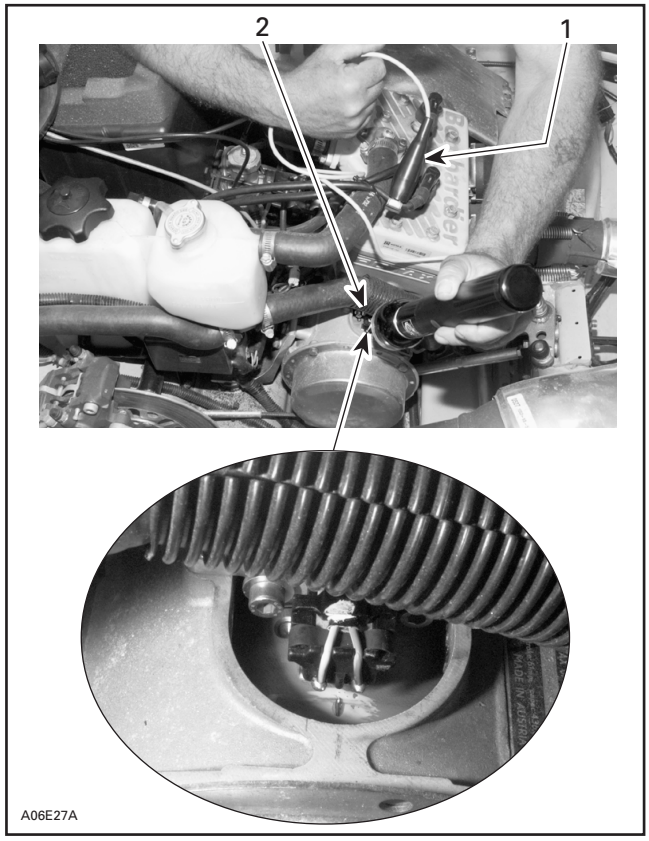
All Models Except Summit X 670 and MX Z 670 HO

Bring engine to 6 000 RPM for a brief instant.

Summit X 670 and MX Z 670 HO

Bring engine to 3 500 RPM for a brief instant.

All Models



TYPICAL

1. *Timing light pick-up on MAG side*
2. *Timing inspection hole*

The magneto/damper mark must be aligned with center mark. If not, move trigger coil as explained above and recheck ignition timing. Tolerance is ± 1°.

If the marks still do not align, a faulty trigger coil (check proper grounding of coil) or a faulty CDI module could be the cause: substitute one part at a time and recheck timing marks (check connectors condition prior to substituting any part).

SPARK PLUGS

NGK SPARK PLUG

All Models

NGK SPARK PLUG NUMBERING SYSTEM

Bombardier uses NGK brand spark plugs on all its snowmobile models.

The heat range identification system is:

Low number → hot plug

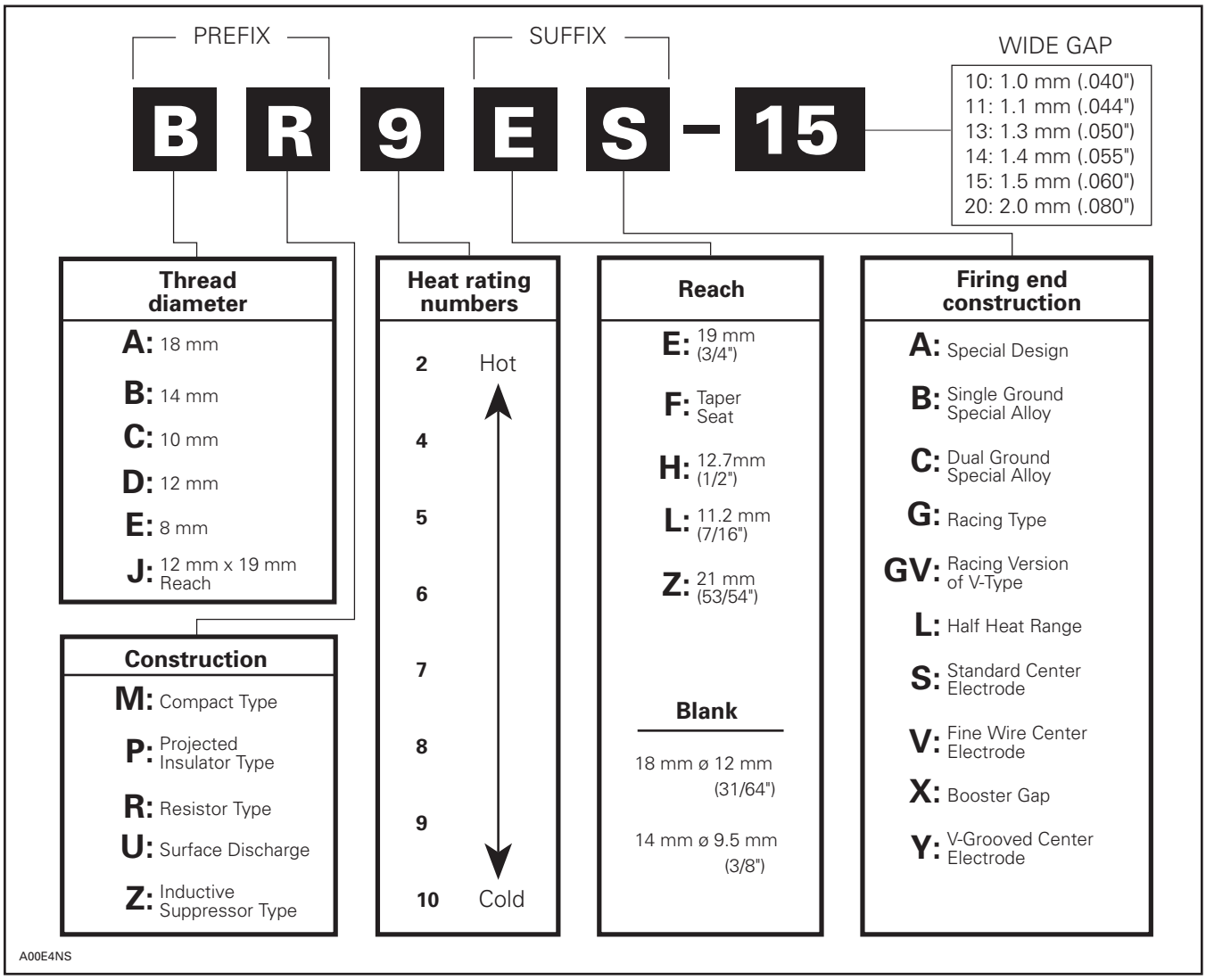
High number → cold plug

REFERENCE CHART

NGK spark plugs used on Bombardier snowmobiles are covered in this manual:

– BR9ES

DESIGN SYMBOLS USED IN NGK SPARK PLUGS



CROSSCUTS AND GAP STYLES OF SPARK PLUGS



Standard Type | Projected Insulator Type | Taper Seat Type | V-Type | Surface Discharge Type

A01E1PS

DISASSEMBLY

First unscrew the spark plug 1 turn.

Clean the spark plug and cylinder head with pressurized air, then completely unscrew.

◆ WARNING

Whenever using compressed air, always wear protective eye wear.

HEAT RANGE

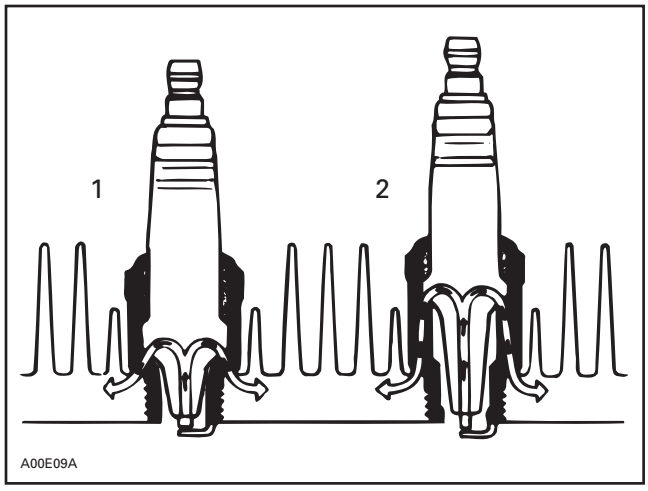
The proper operating temperature or heat range of the spark plugs is determined by the spark plug ability to dissipate the heat generated by combustion.

The longer the heat path between the electrode tip to the plug shell, the hotter the spark plug operating temperature will be — and inversely, the shorter the heat path, the colder the operating temperature will be.

A **cold** type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The **hot** type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.



1. Cold
2. Hot

▼ CAUTION

Severe engine damage might occur if a wrong heat range plug is used.

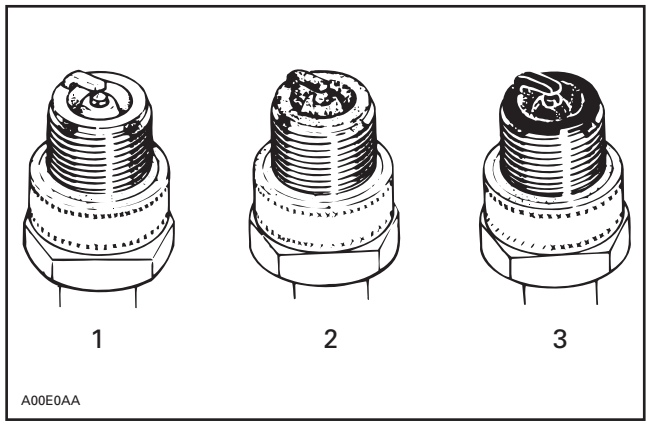
A **too hot** plug will result in overheating and pre-ignition, etc.

A **too cold** plug will result in fouling (shorting the spark plug) or may create carbon build up which can heat up red-hot and cause pre-ignition or detonation.

FOULING

Fouling of the spark plug is indicated by irregular running of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are: prolonged idling, or running on a too rich mixture due to a faulty carburetor adjustment or incorrect fuel and/or fuel mixing. The plug face of a fouled spark plug has either a dry coating of soot or an oily, glossy coating given by an excess either of oil or of oil with soot. Such coatings form a conductive connection between the center electrode and ground.

SPARK PLUG ANALYSIS



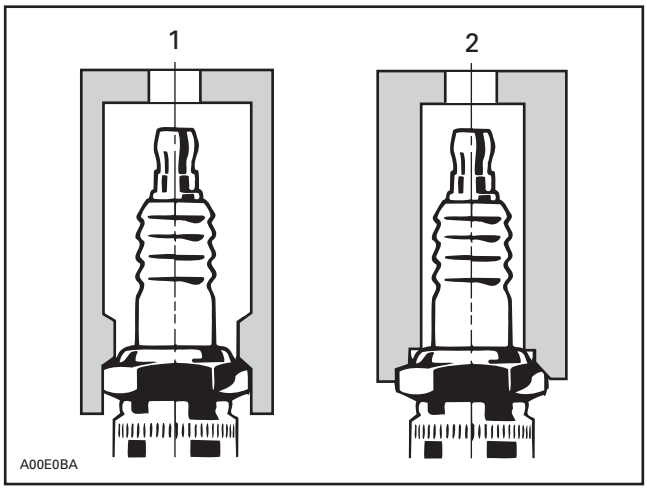
1. Overheated (light grey)
2. Normal (brownish)
3. Fouled (black)

The plug electrode and piston dome reveal the condition of the engine, operating condition, method of driving and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining the plug electrode and the piston dome.

SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

1. Using a wire feeler gauge, set electrode gap according to TECHNICAL DATA 10.
2. Apply anti-seize lubricant (P/N 413 701 000) over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



1. Proper socket
2. Improper socket

SPARK PLUG TIGHTENING TORQUE

MODELS	SPARK PLUGS	TORQUE N•m (lbf•ft)
All models	NGK	27 (20)

BATTERY

REMOVAL

All Models

◆ WARNING

Battery BLACK negative cable must always be disconnected first and connected last.

◆ WARNING

Never charge or boost battery while installed on vehicle.

S-Series

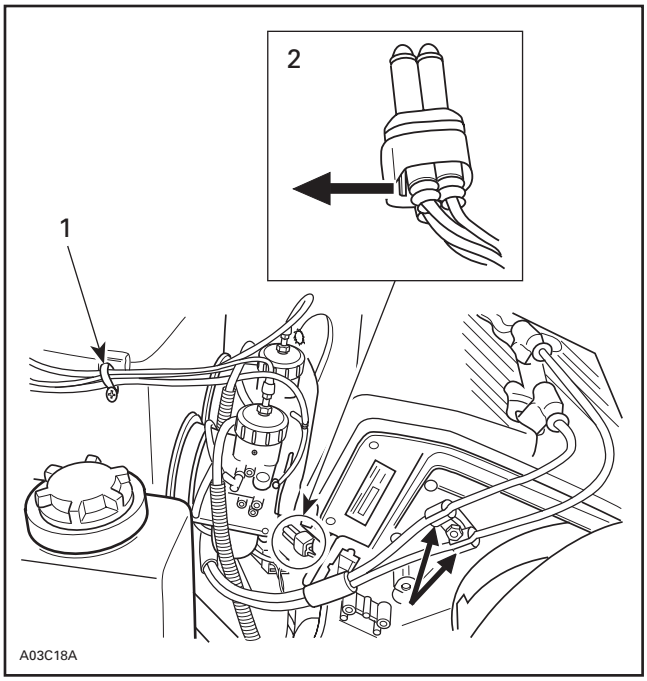
Remove belt guard.

Unfasten spark plug cables from fan housing. Unplug spark plug caps.

Remove throttle cable attachment from air silencer.

Unplug CDI box harness connector.

Loosen collar on carburetor adaptors. Remove air silencer. CDI box will come along with.

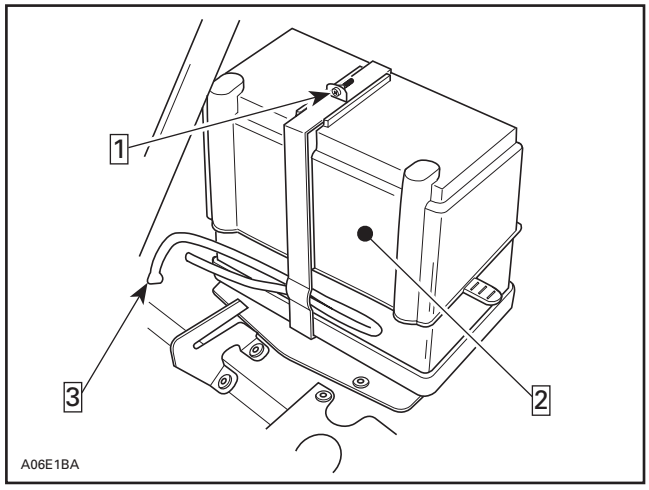


1. Attachment
2. CDI box harness connector

Unfasten retaining strips.

Open strips and lift battery protective boot.

Remove vent tube.



Step 1: Unfasten and open
Step 2: Lift protective boot
Step 3: Remove vent tube

All Models

Withdraw battery from vehicle being careful not lean it so that electrolyte flows out of vent tube.

▼ CAUTION

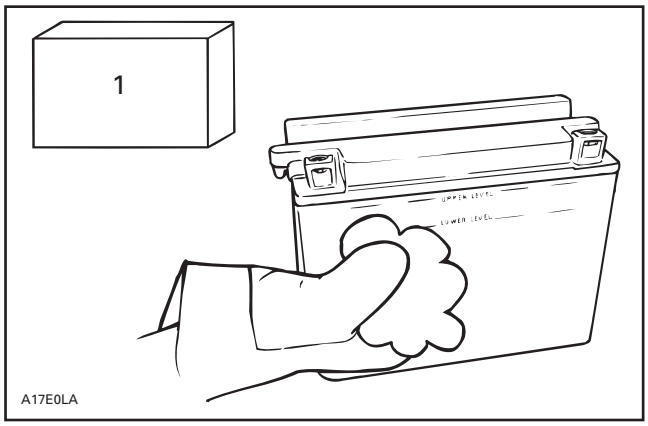
Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water to prevent damage to vehicle components.

CLEANING

Clean the battery, battery casing, vent tube, caps, cables and battery posts using a solution of baking soda and water.

▼ CAUTION

Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.



1. Baking soda

Remove corrosion from battery cable terminals and battery posts using a firm wire brush.

INSPECTION

Visually inspect battery casing for cracks or other possible damage. If casting is damaged, replace battery and thoroughly clean battery tray and close area with water and baking soda.

◆ WARNING

Should the battery casing be damaged, wear a suitable pair of non-absorbent gloves when removing the battery by hand.

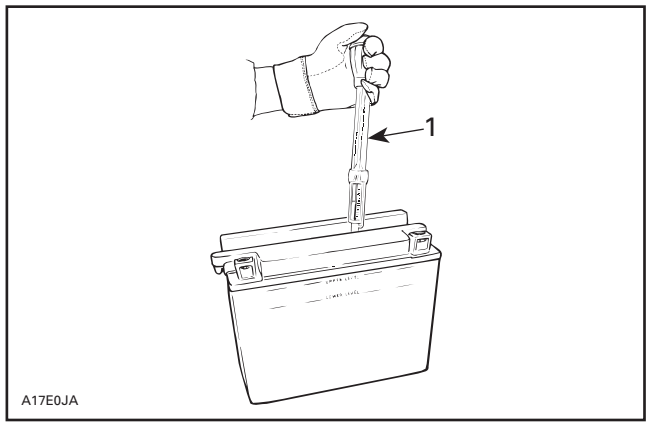
Inspect battery posts for security of mounting.

Inspect for cracked or damaged battery caps, replace defective caps.

◆ WARNING

Battery caps do not have vent holes. Make sure that vent tube is not obstructed.

HYDROMETER TEST



1. Specific gravity 1.260

A hydrometer measures the charge of a battery in terms of specific gravity of the electrolyte. Most hydrometers give a true reading at 27°C (80°F).

In order to obtain correct readings, adjust the initial reading by **adding** .004 points to the hydrometer readings for each 5.5°C (10°F) **above 27°C (80°F)** and by **subtracting** .004 point for every 5.5°C (10°F) **below 27°C (80°F)**.

This chart will be useful to find the correct reading.

ELECTROLYTE TEMPERATURE		OPERATION TO PERFORM		
°C	°F			
38 32	100 90	add	.008 .004	to the reading
27	**80**	**correct reading**		
21 16 10 4 - 1 - 7 - 12 - 18 - 23 - 29 - 34 - 40	70 60 50 40 30 20 10 0 - 10 - 20 - 30 - 40	subtract	.004 .008 .012 .016 .020 .024 .028 .032 .036 .040 .044 .048	from the reading

EXAMPLE NO. 1
Temperature below 27°C (80°F):
Hydrometer Reading: 1.250
Electrolyte temperature: - 7°C (20°F)
Subtract .024 Sp. Gr.
Corrected Sp. Gr. is 1.226

EXAMPLE NO. 2
Temperature above 27°C (80°F):
Hydrometer Reading: 1.235
Electrolyte temperature: 38°C (100°F)
Add .008 Sp. Gr.
Corrected Sp. Gr. is 1.243

▼ CAUTION

Do not install a partially charged battery on a snowmobile since the casing might crack at freezing temperature. The following chart shows the freezing point of the electrolyte in relation to the charge of the battery.

TEMPERATURE CORRECTED SPECIFIC GRAVITY	BATTERY CHARGE	FREEZING POINT OF ELECTROLYTE
1.260	Fully charged	- 59°C (- 74°F)
1.230	3/4 charged	- 40°C (- 40°F)
1.200	1/2 charged	- 27°C (- 16°F)
1.170	1/4 charged	- 18°C (0°F)
1.110	Discharged	- 7°C (+ 19F)

BATTERY STORAGE

Disconnect and remove battery from the vehicle.

Check electrolyte level in each cell, add distilled water up to upper level line.

▼ CAUTION

Do not overfill.

The battery must always be stored in fully charged condition. If required, charge until specific gravity of 1.260 is obtained.

▼ CAUTION

Battery electrolyte temperature must not exceed 50°C (122°F). The casing should not feel hot.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P/N 413 701 700) or petroleum jelly on terminals.

Clean battery casing and caps using a solution of baking soda and water. Do not allow cleaning solution to enter battery, otherwise it will destroy the electrolyte. Rinse battery with clear water and dry well using a clean cloth.

Store battery on a wooden shelf in a cool dry place. Such conditions reduce self-discharging and keep fluid evaporation to a minimum.

During the storage period, recheck electrolyte level and specific gravity readings at least every 40 days. As necessary, keep the battery at its upper level line and near full charge as possible (trickle charge).

ACTIVATION OF NEW BATTERY

◆ WARNING

Never charge or boost battery while installed on vehicle.

▼ CAUTION

Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

A new battery is factory fresh dry charged. For storage purposes, it is fitted with a temporary sealing tube.

Do not remove the sealing tube or loosen battery caps unless activation is desired.

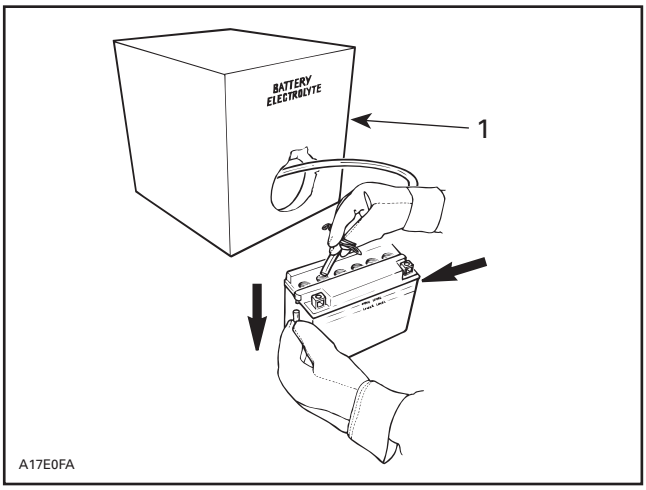
In case of accidental premature removal of caps or sealing tube, battery should be given a full charge.

Perform the following operations anytime a new battery is to be installed.

1. Remove the sealing tube from the vent elbow. Install vent tube, included in the battery kit, to battery elbow.

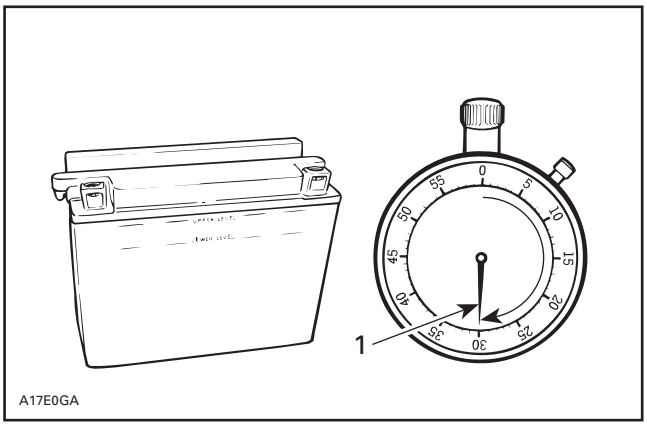
◆ WARNING

Failure to remove the sealing tube could result in an explosion.



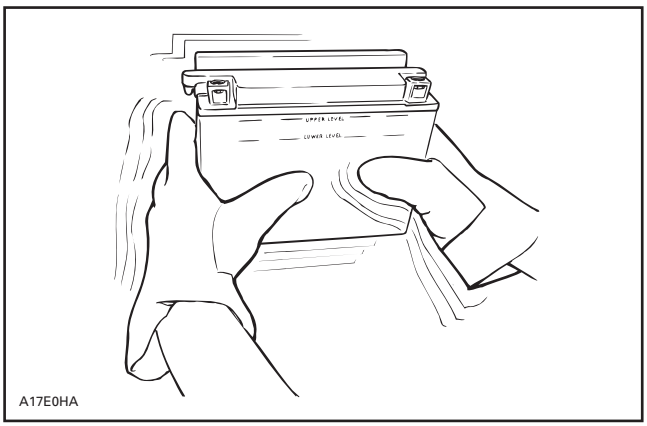
1. Battery electrolyte

2. Remove caps and fill battery to UPPER LEVEL line with electrolyte (specific gravity: 1.260 at 20°C (68°F)).
3. Allow the battery to stand for 30 minutes MINIMUM so that electrolyte soaks through battery cells.

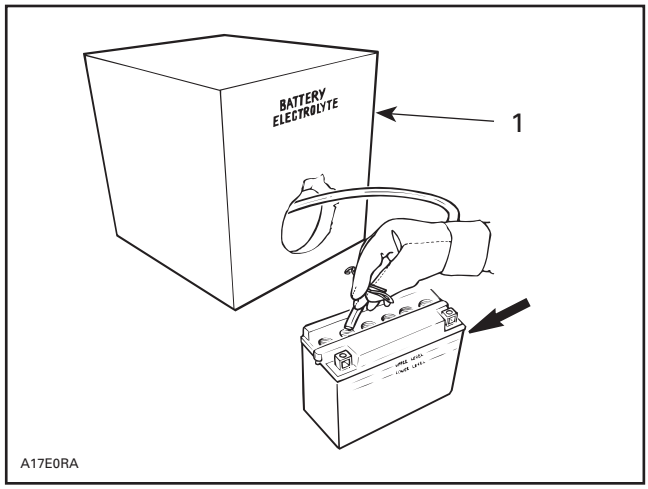


1. 30 minutes

4. Allow gas bubbles to escape by lightly shaking battery by hand.

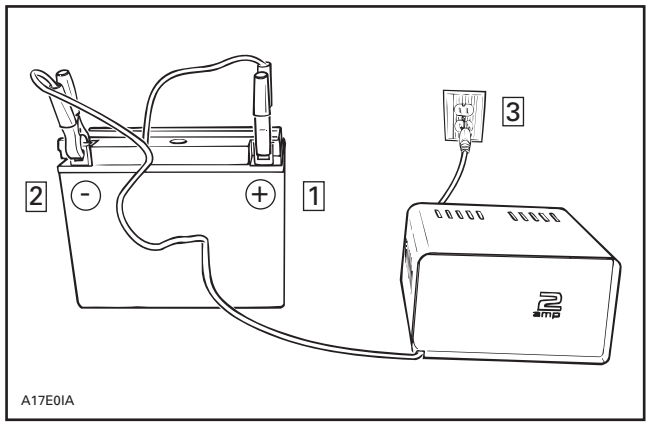


5. Readjust the electrolyte level to the UPPER LEVEL line.



1. Battery electrolyte

6. Connect a 2 A battery charger for 10 to 20 hours.



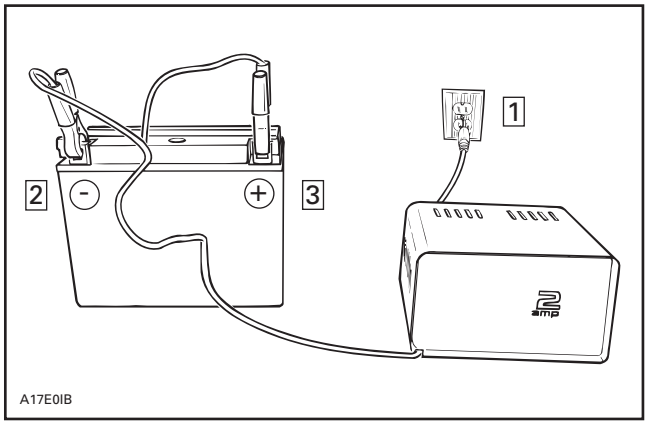
▼ CAUTION

If charging rate raises higher than 2.4 A reduce it immediately. If cell temperature rises higher than 50°C (122°F) (if the casing feels hot) discontinue charging temporarily or reduce the charging rate.

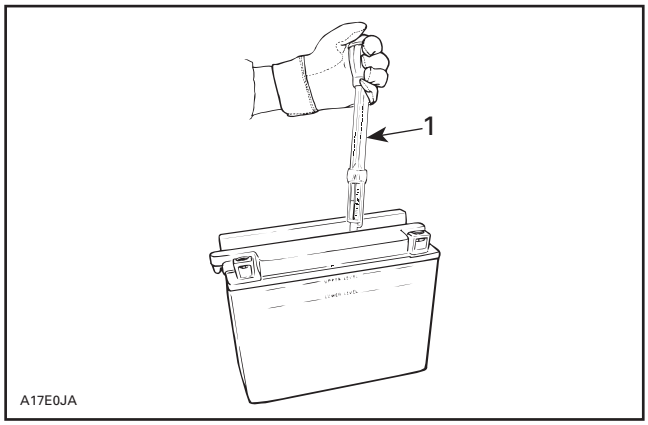
◆ WARNING

Gases given off by a battery being charged are highly explosive. Always charge in a well ventilated area. Keep battery away from cigarettes or open flames. Always turn battery charger off prior to disconnecting cables. Otherwise a spark will occur and battery might explode.

7. Disconnect battery charger.

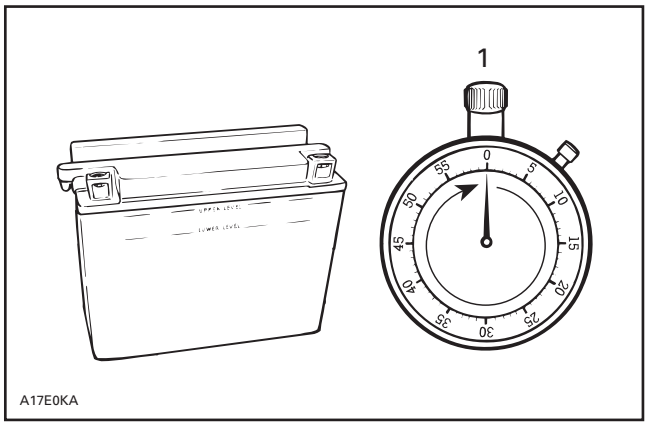


8. Test battery state of charge. Use a hydrometer.



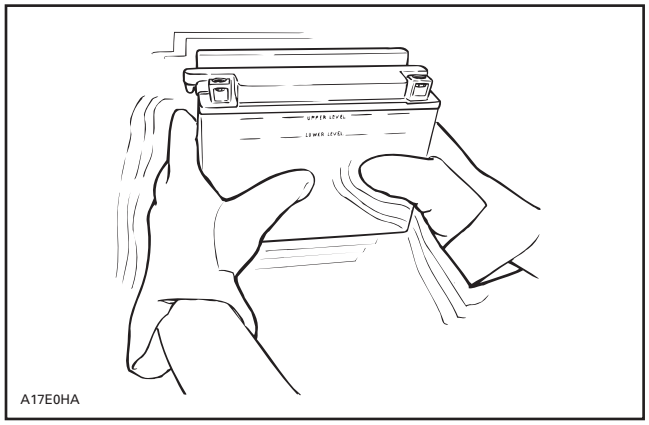
1. Specific gravity 1.260

9. Let battery settle for 1 hour.

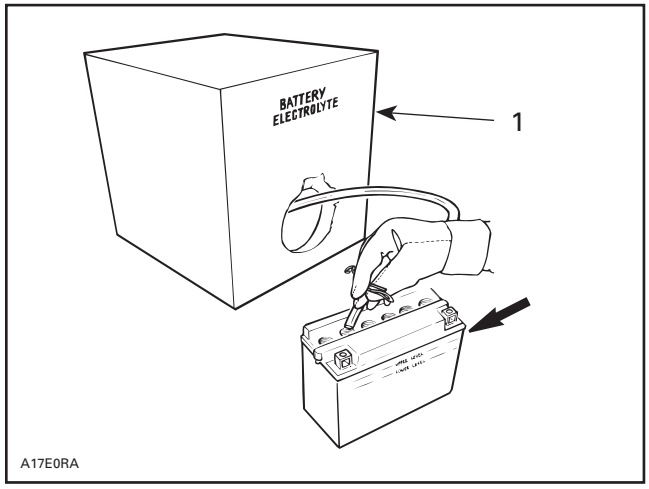


1. 60 minutes

10. Allow gas bubbles to escape by lightly shake battery.

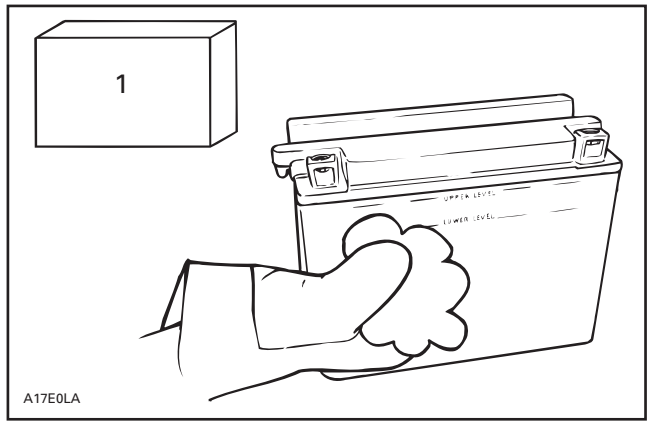


11. Readjust electrolyte level.



1. Battery electrolyte

12. Reinstall caps and clean any electrolyte spillage using a solution of baking soda and water.



1. Baking soda

▼ CAUTION

Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.

NOTE: It is recommended to verify the battery charge once a month. If necessary, fully charge battery.

SERVICING

Electrolyte Level

Since a battery has been activated (see above), add distilled water to top up electrolyte.

TIPS FOR CHARGING A USED BATTERY

▼ CAUTION

Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

For best results, battery should be charged when the electrolyte and the plates are at room temperature. A battery that is cold may not accept current for several hours after charging begun.

Do not charge frozen battery. If the battery charge is very low, the battery may freeze. If it is suspected to be frozen, keep it in a heated area for about 2 hours before charging.

◆ WARNING

Do not place battery near open flame.

Time required to charge a battery will vary depending some factors such as:

– Battery temperature: Charging time is increased as the temperature goes down. The current accepted by a cold battery will remain low. As the battery warms up, it will accept a higher rate of charge.
– State of charge: Because the electrolyte is nearly pure water in a completely discharged battery, it cannot accept current as well as electrolyte. This is the reason the battery will not accept current when the charging cycle first begins. As the battery remains on the charger, the current from the charger causes the electrolytic acid content to rise which makes the electrolyte a better conductor and then, the battery will accept a higher charging rate.
– Type of charger: Battery chargers vary in the amount of voltage and current that they can supply. Therefore, time required for the battery to begin accepting measurable current will also vary.

Charging a Very Flat or Completely Discharged Battery

Unless this procedure is properly followed, a good battery may be needlessly replaced.

– Measure the voltage at the battery posts with an accurate voltmeter. If it is below 10 volts, the battery will accept current at very low rate, in term of milliamperes, because electrolyte is nearly pure water as explained above. It could be some time before the charging rate increases. Such low current flow may not be detectable on some charger ammeters and the battery will seem not to accept any charge.
– Only for this particular case, set the charger to a high rate.

NOTE: Some chargers have a polarity protection feature which prevents charging unless the charger leads are connected to the correct battery terminals. A completely discharged battery may not have enough voltage to activate this circuitry, even though the leads are connected properly. This will make it appear that the battery will not accept a charge. Follow the charger manufacturer's instruction telling how to bypass or override this circuitry so that the charger will turn on and charge a low-voltage battery.

– Since the battery chargers vary in the amount of voltage and current they provide, the time required for the battery to accept measurable charger current might be up to approximately 10 hours or more.

– If the charging current is not up to a measurable amount at the end of about 10 hours, the battery should be replaced.
– If the charging current is measurable before the end or at the end of about 10 hours, the battery is good and charging should be completed in the normal manner as specified in **Activation of a new battery**.
– It is recommended that any battery recharged by this procedure be load tested prior to returning it to service.

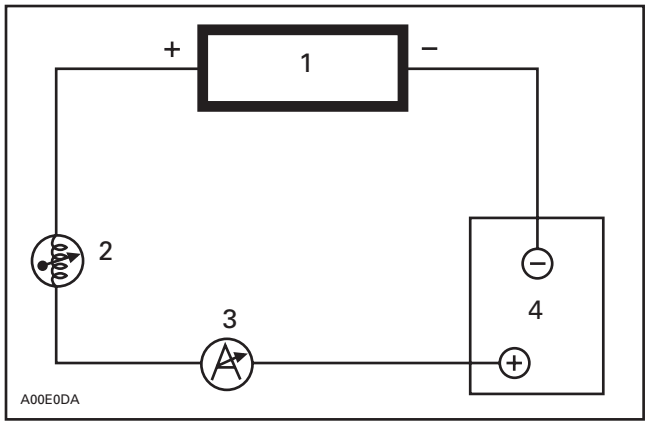
BATTERY CHARGING EQUIPMENT

The battery charger should have an adjustable charging rate. Variable adjustment is preferred, but a unit which can be adjusted in small increments is acceptable.

The battery charger must be equipped with an ammeter capable of accurately measuring current of less than one ampere.

If the present charger is not adjustable to the proper current values, a rheostat can be connected in series with the battery to provide adjustment. 12 ohm, 50 watt rheostat, such as OHMITE — 0314 or MALLORY 50K 12P, are available from electronic parts supply shops and they are suitable for use with most chargers if the peak current is to be held below 2 A.

If you need an accurate ammeter, we recommend the use of: SHURITE — 5202 (0 to 3 A) or — 5203 (0 to 5 A) available from electronic parts supply shops.



1. Charger
2. Rheostat 12 Ω 50 W
3. Ammeter
4. Battery

For a service application and a permanent installation, both ammeter and rheostat can be built into a small box adjacent to your charger.

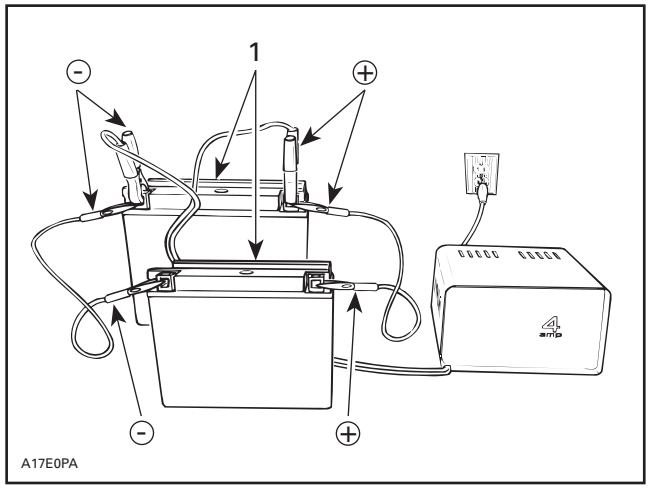
▼ CAUTION

Adequate ventilation MUST be provided to cool the rheostat.

Charging 2 or More Batteries at a Time

Connect all positives together and use a charger with a capacity (rated) equal to: number of batteries to be charged multiply by 2 A.

For example: charging 5 batteries at a time requires a 10 A rated charger (5 × 2 A = 10 A).



TYPICAL
1. Two batteries = 4 A

INSTALLATION OF BATTERY

Ensure vent tube is properly installed on battery elbow.

Connect vent tube to vehicle fitting on front frame.

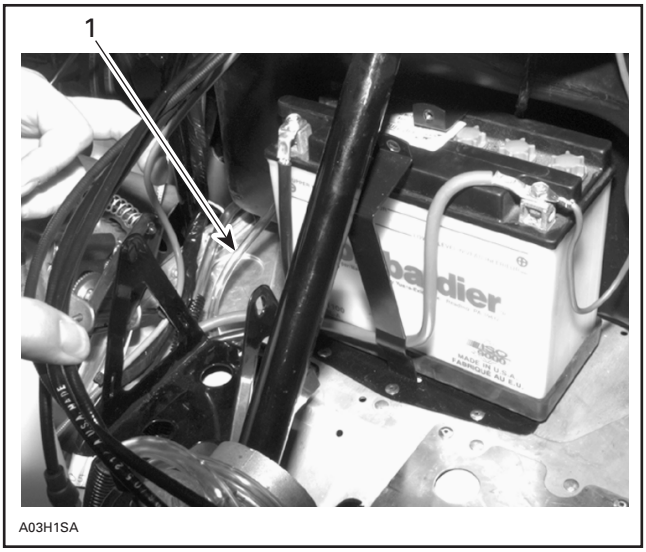
Route RED positive cable behind retaining strip and connect it to positive battery terminal. Connect RED wire (coming from ignition switch).

Connect BLACK negative cable LAST.

▼ CAUTION

Negative battery terminal should always be disconnected FIRST and reconnected LAST.

Apply silicone dielectric grease (P/N 413 701 700) on battery posts and connectors.



BATTERY CONNECTION
1. Vent tube on fitting

Ensure that vent tube is not kinked or blocked then install protective boot over battery.

Close and fasten retaining strips.

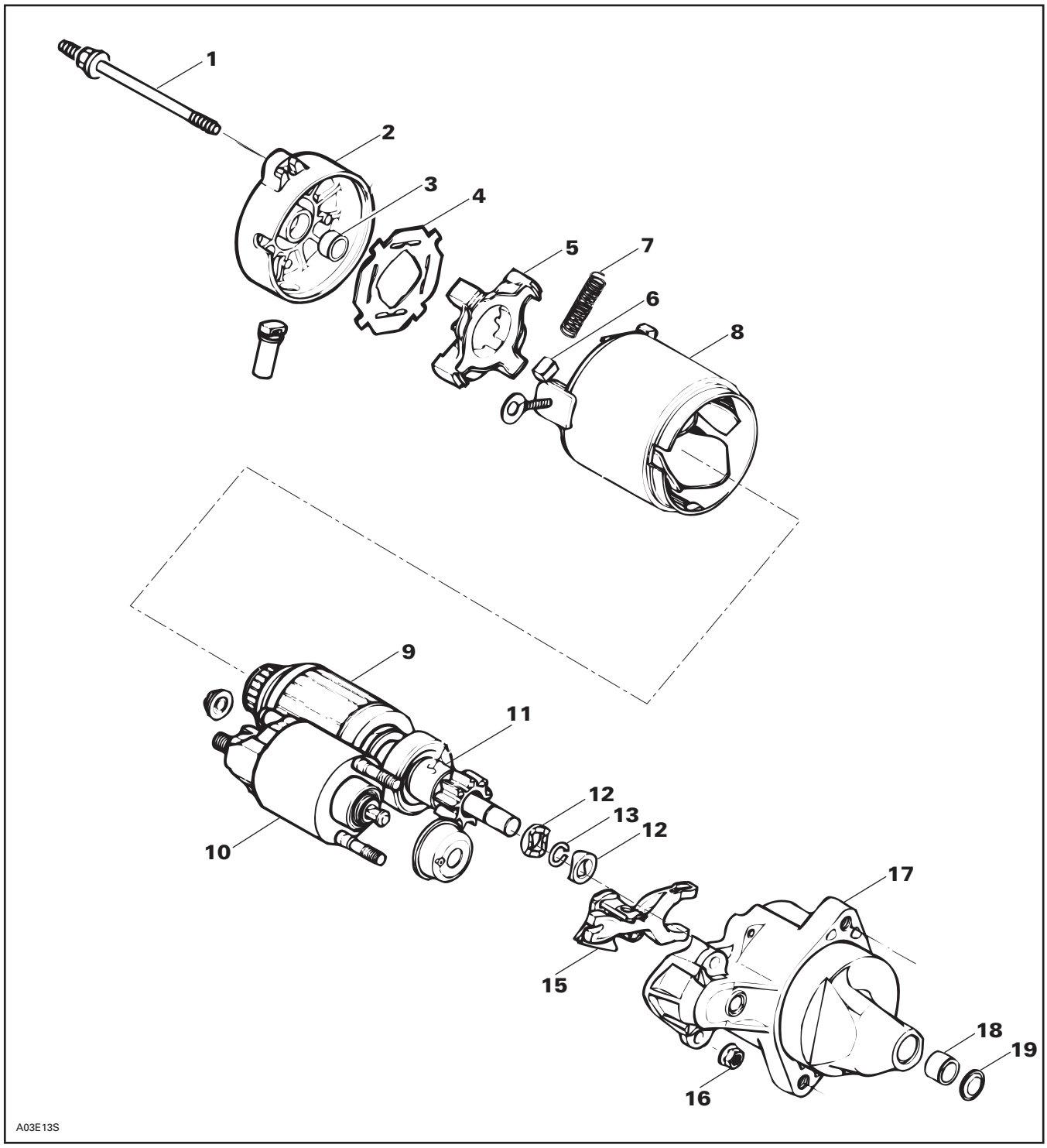
Reinstall air silencer.

Fasten spark plug cables to fan housing.

Reinstall throttle cable to air silencer. See removal illustration.

ELECTRIC STARTER

S-Series with Electric Starting and Skandic WT/SWTWT LC



REMOVAL

– Disconnect BLACK ground cable from battery.
– Disconnect RED positive cable from battery.

◆ WARNING

Always disconnect ground cable first and connect last.

– Disconnect RED cable and RED/GREEN wire from starter solenoid switch.
– Remove starter from engine.

DISASSEMBLY

Disconnect bare wire linking starter and solenoid.

Remove nuts **no. 16** then solenoid switch **no. 10** by lifting and pulling to disengage from drive lever **no. 15**.

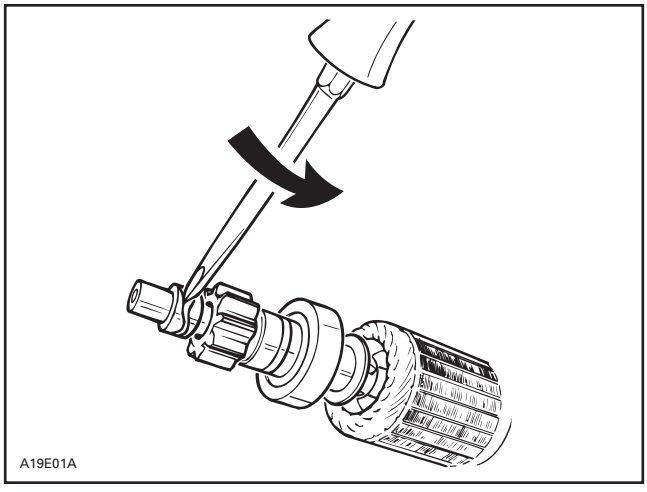
Unscrew starter screws (long) **no. 1** then pull yoke **no. 8** with end frame **no. 2** to separate from drive housing **no. 17**.

Pull armature **no. 9** with drive lever **no. 15**.

Remove insulator **no. 4** then brush springs **no. 7** being careful not to lose them since they will be projected out.

Pull brush holder **no. 5** from yoke **no. 8**.

Insert blade of a small screwdriver between stop collars.



Twist screwdriver to separate stop collars **no. 12** thus giving access to circlip **no. 13**.

Remove outer collar, circlip then inner collar.

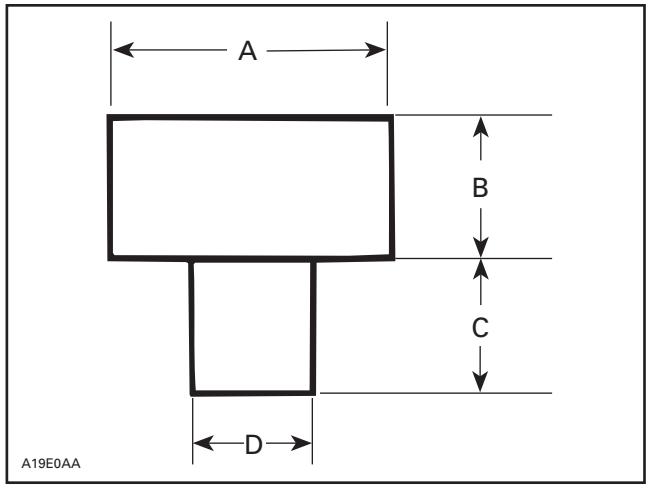
Remove overrunning clutch **no. 11**.

Check the wear on bushing **no. 18** by measuring the amount of radial play between the armature shaft and the bushing.

The radial play should not exceed 0.20 mm (.008 in). If greater, replace the bushing. To replace, press out the old one toward bushing cover and press in a new one with a bushing pusher. The correct size of the bushing pusher to use is given on next illustration.

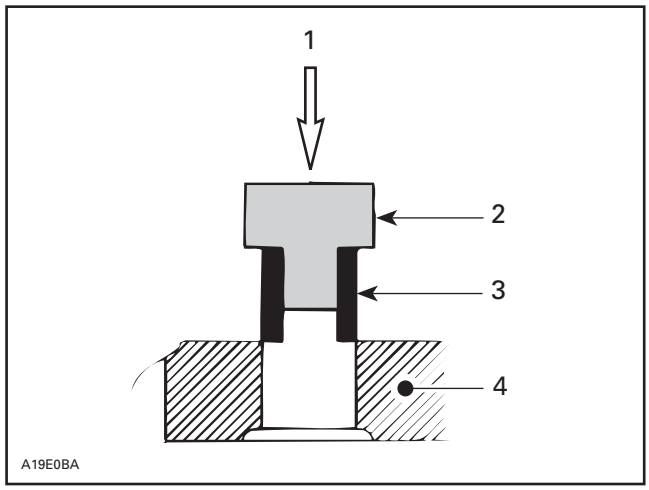
▼ CAUTION

Support drive housing adequately to prevent damage when pressing bushing.



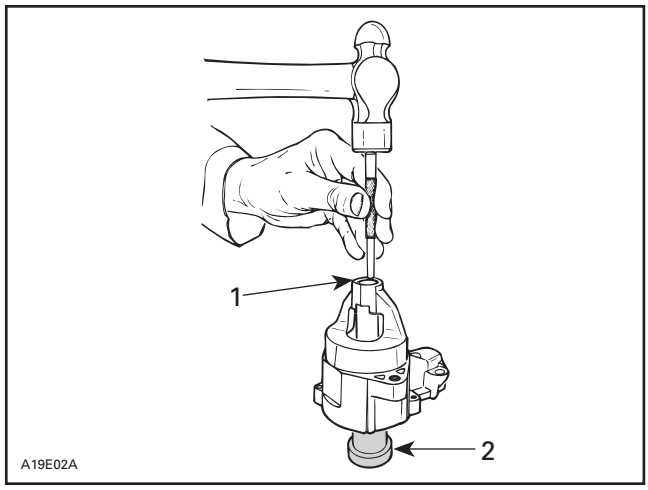
BUSHING PUSHER

A. 16 mm (5/8 in) dia.
B. 13 mm (1/2 in)
C. 11 mm (7/16 in)
D. 11.0 mm (.433 in)



1. Press-in
2. Bushing pusher
3. Bushing
4. Drive housing

Install bushing cover **no. 19** then, using a punch, stake bushing cover in place.



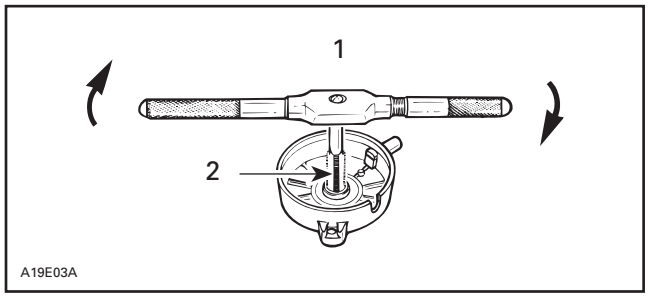
1. Stake bushing cover
2. Support

3, Bushing (end frame)

Check the wear on bushing **no. 3** by measuring the amount of radial play between the armature shaft and the bushing.

The radial play should not exceed 0.20 mm (.008 in). If greater, replace bushing as follows:

Using a 12 mm tap, cut threads into bushing so that the tap contacts the end frame. Continue to rotate tap until the bushing comes free.



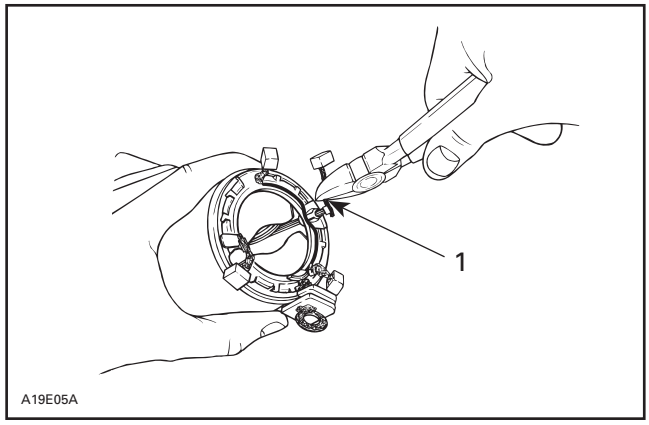
1. Turn until bushing goes out
2. 12 mm tap

To install new bushing, use the same bushing pusher as for drive housing bushing installation.

6, Brush

To replace brush **no. 6**, proceed as follows:

Cut brush wire close to connector at the welded portion.



1. Cut close to connector

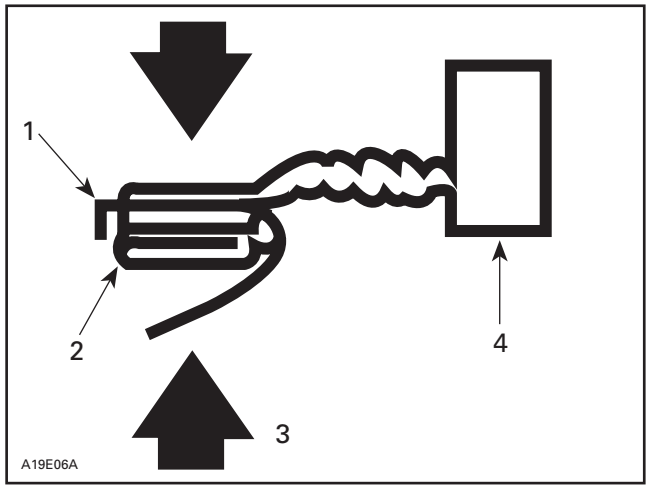
Remove burrs with a file on the remaining welded portion.

▼ CAUTION

Be careful not to damage plastic portion of yoke.

Place spare brush plate edge against yoke connector edge (welded portion).

Crimp plate over yoke connector with a pair of pliers.



1. Plate edge
2. Yoke connector
3. Crimp
4. Spare brush

Solder the crimped portion.

▼ CAUTION

Do not overheat and quickly perform soldering to prevent solder from flowing to the brush through the wire. Preferably use a heat sink.

CLEANING AND INSPECTION

Refer to the end of this subsection.

ASSEMBLY

Prior to assembling, coat sliding surfaces and moving parts on armature shaft splines, overrunning clutch, solenoid switch plunger, drive lever and bushings with G.E. Versilube G 321 (P/N 413 704 000) lubricant.

Proceed as follows for assembling.

Secure drive housing in a vise.

▼ CAUTION

Do not overtighten since housing might be damaged.

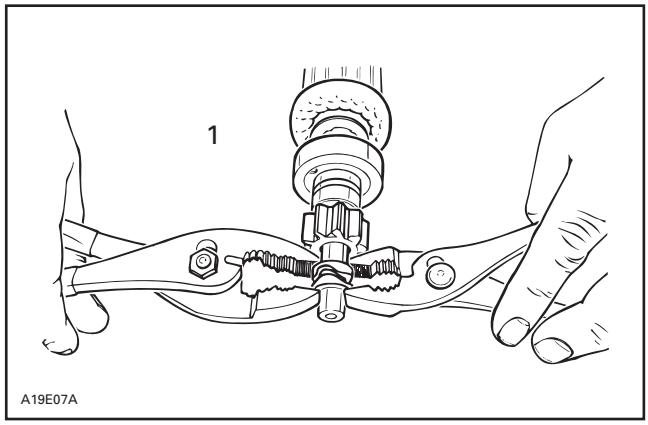
Install overrunning clutch onto armature shaft. Insert **inner** collar onto shaft. Install a new circlip.

▼ CAUTION

Always install a new circlip when servicing.

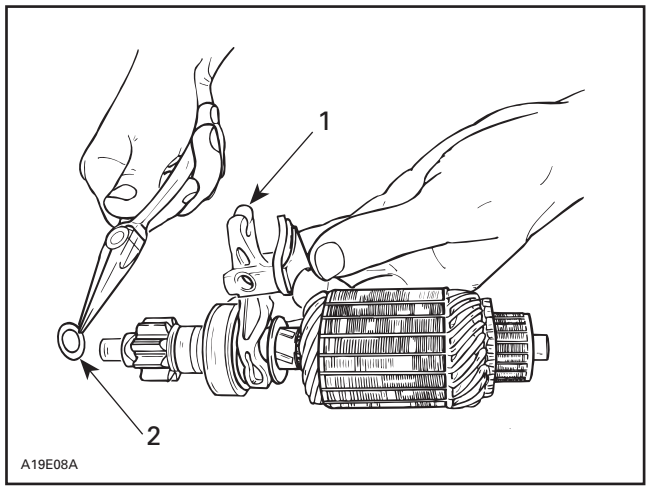
Insert **outer** collar being careful to match protrusions with notches of collars.

Using a pair of pliers on each side of stop collars, squeeze evenly until collars sit over circlip.



1. Squeeze evenly

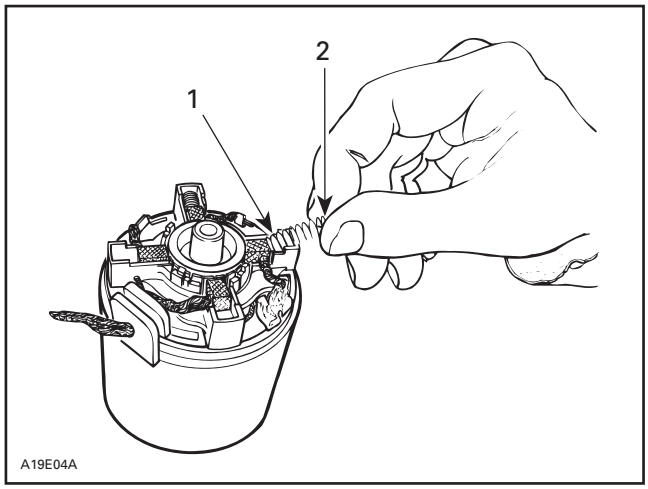
Install thrust washer against outer stop collar. Place drive lever onto overrunning clutch then insert into drive housing.



1. Install on overrunning clutch
2. Install thrust washer

Slide yoke over armature.

Install brush holder then brushes in their housings. Insert springs as follows: place one end of spring against brush, compress, then push the other end of spring onto its housing. Repeat for remaining springs.



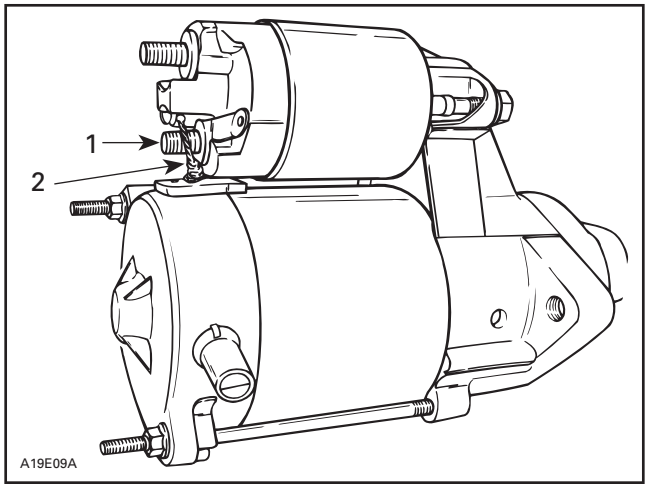
1. This end first
2. Push this end to complete

Secure insulator over brushes and springs. Properly install end frame and tighten screws.

Insert solenoid plunger inside of drive lever fork and secure to drive housing.

Connect starter bare wire to solenoid.

NOTE: Connect this wire on the **shorter** solenoid stud.



1. Shorter stud
2. Bare wire

INSTALLATION

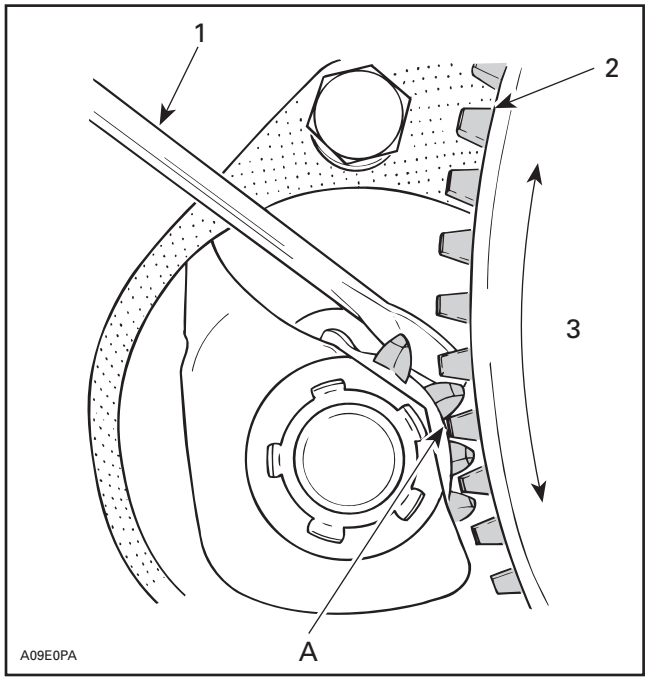
Make sure that starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.

Install starter.

NOTE: Check proper engaging depth of starter pinion teeth to ring gear teeth (see illustration). Install hardened washers (P/N 503 007 900) between engine and starter supports accordingly.

▼ CAUTION

All starter bracket fasteners must be secured with Loctite 271 (P/N 413 707 400).



1. Screwdriver pulling starter pinion
2. Ring gear
3. No excessive backlash
A. 0.5 to 1.5 mm (.020 to .060 in)

Connect the RED battery cable and the RED wire to the large terminal of the solenoid. Connect RED/GREEN wire to small terminal of solenoid.

Connect BLACK cable to battery.

◆ WARNING

Always disconnect ground cable first and connect last.

CLEANING AND INSPECTION

CLEANING

▼ CAUTION

Armature starter yoke ass'y and drive unit assembly must not be immersed in cleaning solvent.

Clean brushes and holder with a clean cloth soaked in solvent. Brushes must be dried thoroughly with a clean cloth.

Blow brush holder clean using compressed air.

◆ WARNING

Always wear safety goggles when using compressed air.

Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean, dry cloth.

Clean engine starter gear teeth and drive unit (clutch).

NOTE: Bushings must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean, dry cloth.

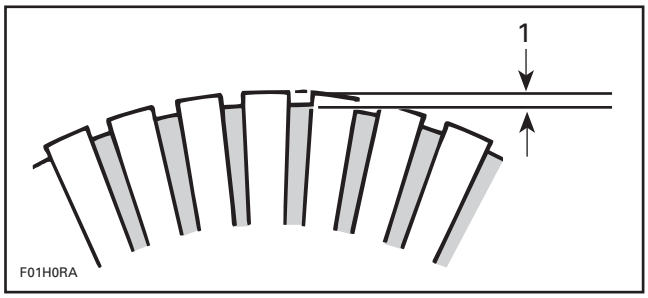
INSPECTION

Armature

NOTE: An ohmmeter may be used for the following testing procedures, except for the one concerning the shorted windings in the armature.

Check the commutator for roughness, burnt or scored surface. If necessary, turn the commutator on a lathe, enough to remove grime only.

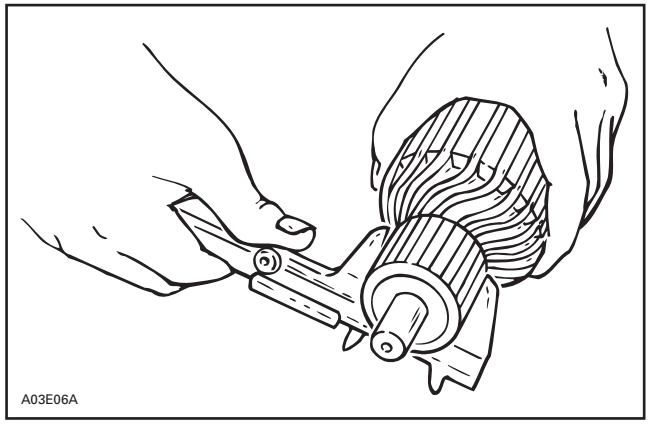
Check the commutator for mica depth. If the depth is less than 0.20 mm (.008 in), undercut the mica. Be sure that no burrs are left and no copper dust remains between the segments after the undercutting operation is completed.



1. Commutator undercut 0.20 mm (.008 in)

Check the commutator out-of-round condition with V Blocks and an indicator. If the commutator out-of-round is more than 0.40 mm (.016 in), the commutator should be turned on a lathe.

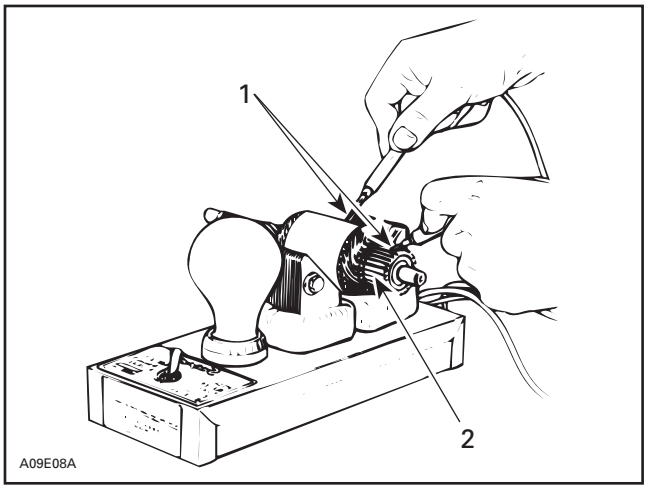
Check commutator outer diameter. If less than specified value, replace.



MODEL	WEAR LIMIT
S-Series	27 mm (1.063 in)

Test for Ground Circuit in the Armature:

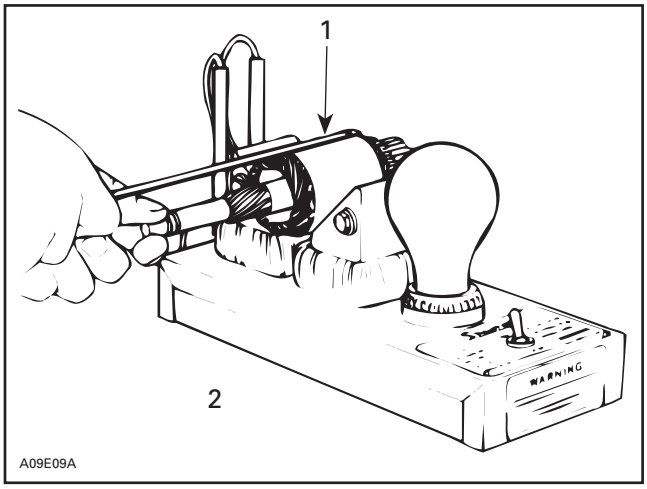
Use growler test probes. Check between armature core and the commutator bars. If growler lamp turns on, bars are grounded. If so, replace armature.



1. Test probes
2. Commutator bars

Test Armature for Shorted Winding:

When the armature is rotated in the growler with a steel strip (hacksaw blade) held above it, the strip will vibrate over that area of the armature which has short circuit. Replace armature if so.



1. Steel strip (hack-saw blade)
2. Growler

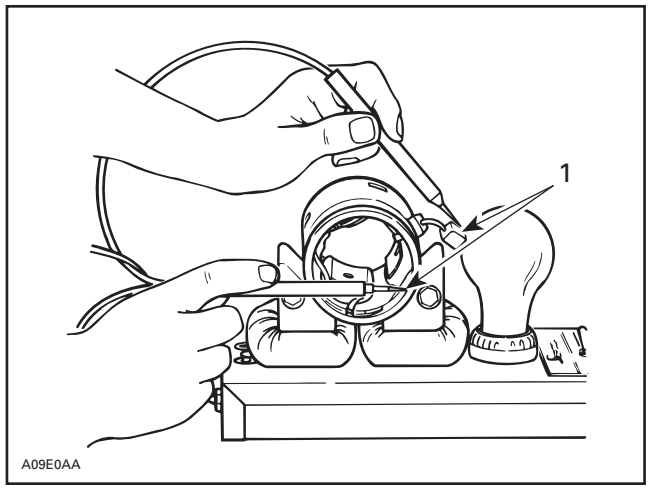
Test the Armature for Open Circuit:

Use growler test probes. Place one test probe on a commutator bar and the other test probe on the neighboring bar. Repeat this operation for all bars, moving one test probe at a time. If the growler lamp does not turn on, the armature circuit between these 2 bars is opened. The armature should be replaced or repaired; open circuits most often occur at the commutator riser where coils are soldered. (Burnt commutator bars are usually an indication of an open-circuit armature coil).

Field Windings and Brushes

Test the Field Winding for Open Circuit:

Use growler test probes. Place one test probe on the negative brush and the other test probe on the yoke. If growler lamp does not turn on, the field winding has an open-circuit. The yoke has to be repaired or replaced.



1. Test probes

Check the dynamic brake winding for open circuit by placing one test probe on the positive brush and the other probe on the negative brush.

If growler lamp does not turn on, the winding circuit is open-circuit and the yoke has to be repaired or replaced.

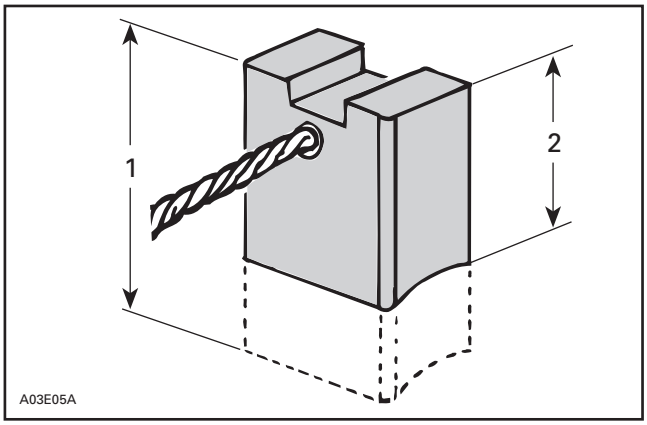
Brush Holder

Check the brush holder for insulation using growler test probes. Place one test probe on the insulated brush holder and the other test probe on the brush holder plate. If the growler lamp turns on, the brush holder has to be repaired or replaced.

Brush Length

Measure brush length. If less than the specified value, replace them.

MODEL	LENGTH	
	New	Wear limit
S-Series Skandic WT/SWT	10 mm (.400 in)	6 mm (.236 in)



TYPICAL

1. *New*
2. *Wear limit*

Overrunning Clutch

The pinion of the overrunning clutch should turn smoothly in a clockwise direction, and should not slip in a counterclockwise direction. If defective, replace.

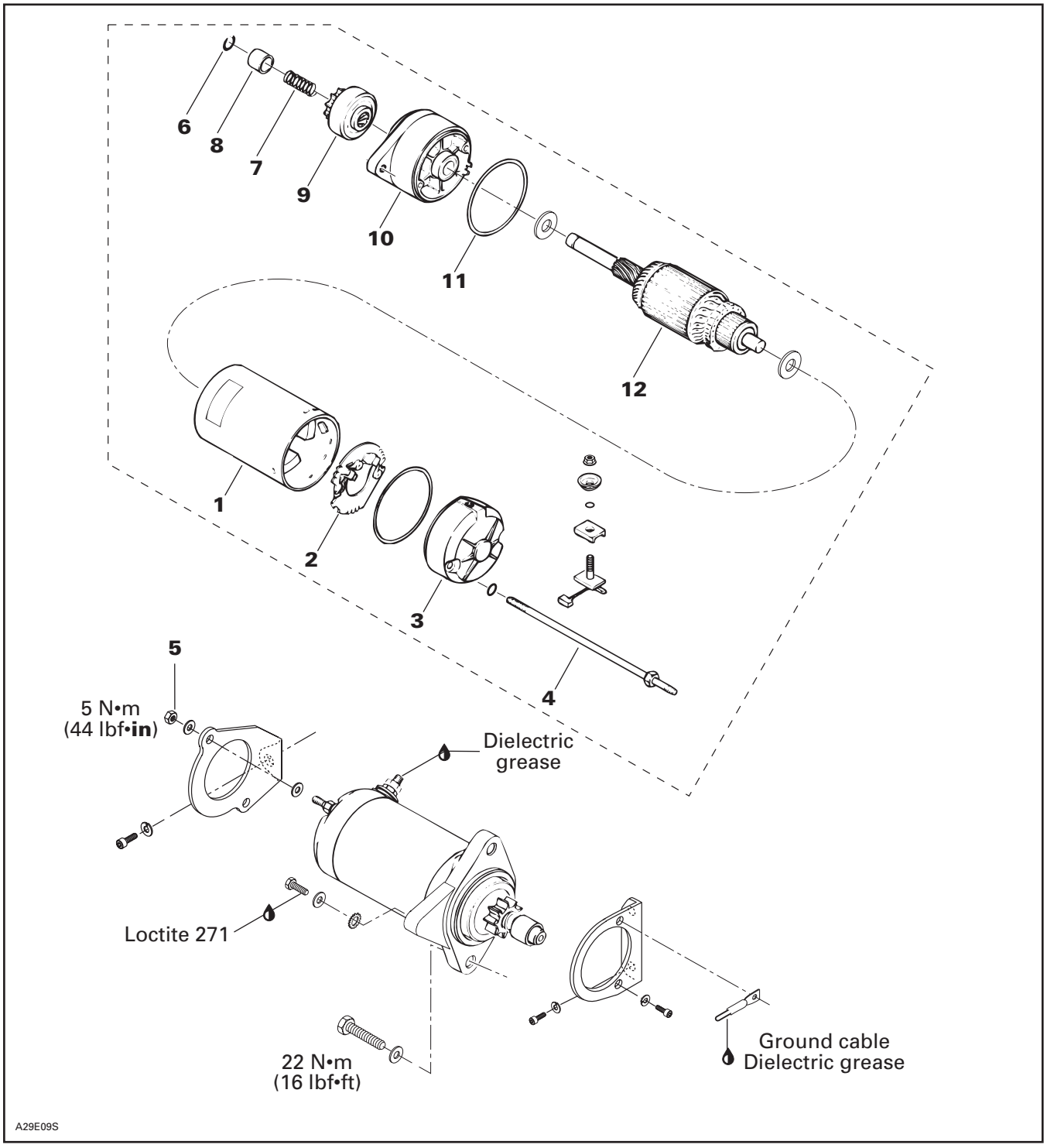
Check the pinion teeth for wear and damage. If defective, replace.

SOLENOID SWITCH

Inspect connections and clean as necessary. Solenoid switch condition can be checked with an ohmmeter. Install test probes on large connectors of solenoid when it is activated (+ on RED/GREEN wire and – on solenoid body).

IMPORTANT: No current must be present on large cables when using ohmmeter, otherwise meter could be damaged.

Skandic WT LC



STARTER REMOVAL

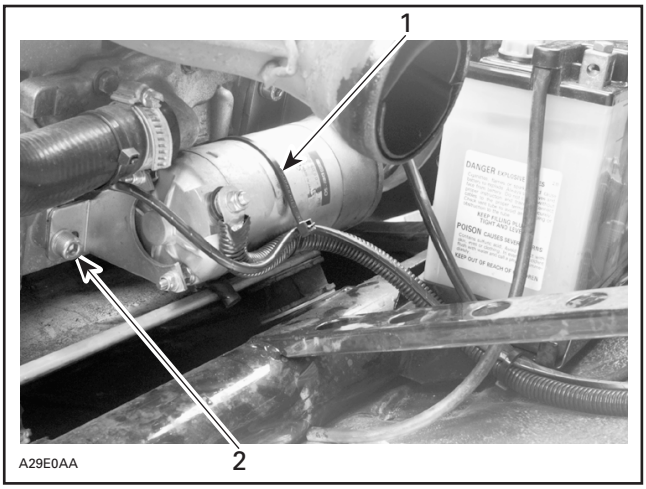
Disconnect BLACK cable ground connection from battery.

◆ WARNING

Always disconnect ground cable first and reconnect last.

Remove tuned pipe.

Cut locking tie retaining cable to starter.



1. Locking tie
2. Allen screw

Unplug positive cable from starter.

Unfasten Allen screw from rear of starter.

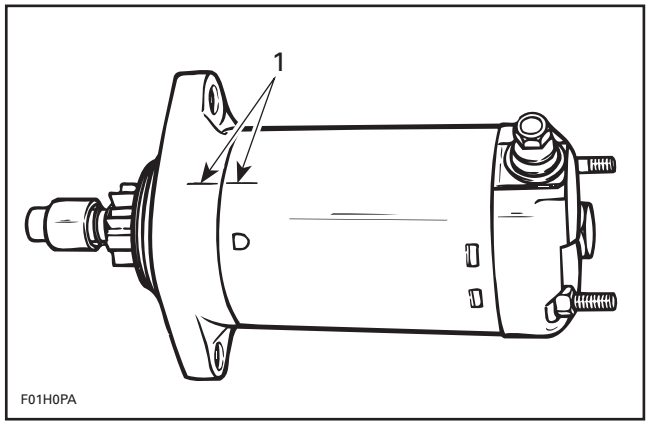
Remove 2 screws from front of starter. Top screw also retains positive cable.

Remove starter.

STARTER DISASSEMBLY

1,2,3,4,5, Yoke, Brush Holder, End Frame, Through Bolt and Nut

Before disassembling, trace index marks on yoke and clutch housing to ease further assembly.



TYPICAL
1. Trace indexing marks

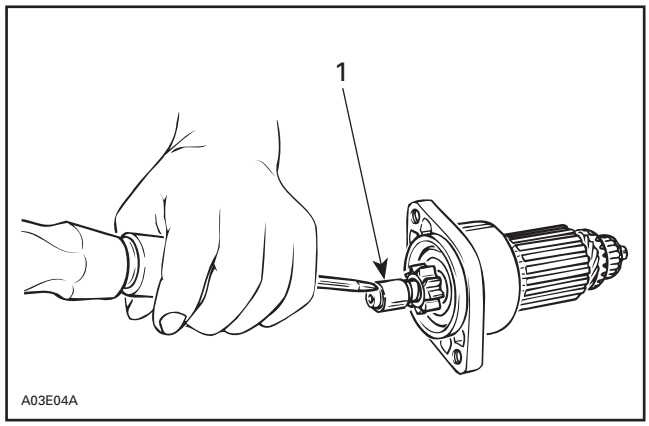
Remove starter support nuts then through bolts. Separate end frame from yoke assembly. Withdraw yoke assembly from armature.

Brush holder can be removed from end frame by unscrewing nut retaining terminal.

Check that the radial play between the armature shaft and end frame is not greater than 0.20 mm (.008 in). Replace end frame if so.

6,7,8, Circlip, Spring and Pinion Stop Collar

Tap the pinion stop collar using a screwdriver. Remove circlip. Disassemble pinion stop collar and spring.



1. Pinion stop collar

9,10,11,12, Clutch Ass'y, Housing, O-Ring and Armature

Turn assembly clockwise to remove it from armature assembly.

Pull housing from armature.

CLEANING

▼ CAUTION

Yoke ass'y and drive unit assembly must not be immersed in cleaning solvent.

Discard all O-rings and gasket.

Clean brushes and holders with a clean cloth soaked in solvent. Brushes must be dried thoroughly with a clean cloth.

Blow brush holders clean using compressed air.

◆ WARNING

Always wear safety glasses when using compressed air.

Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean, dry cloth.

Clean engine ring gear teeth and drive unit (clutch).

NOTE: Bushings must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean, dry cloth.

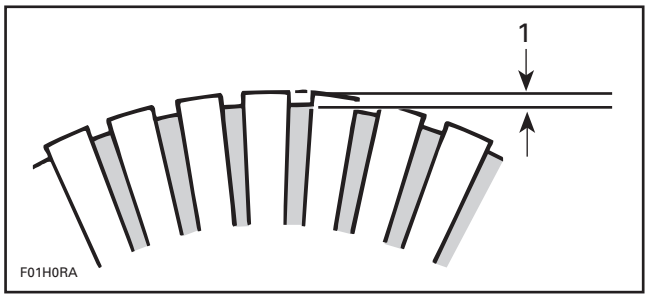
PARTS INSPECTION

Armature

NOTE: An ohmmeter may be used for the following testing procedures, except for the one concerning shorted windings in armature.

Check commutator for roughness, burnt or scored surface. If necessary, turn commutator on a lathe, enough to resurface only.

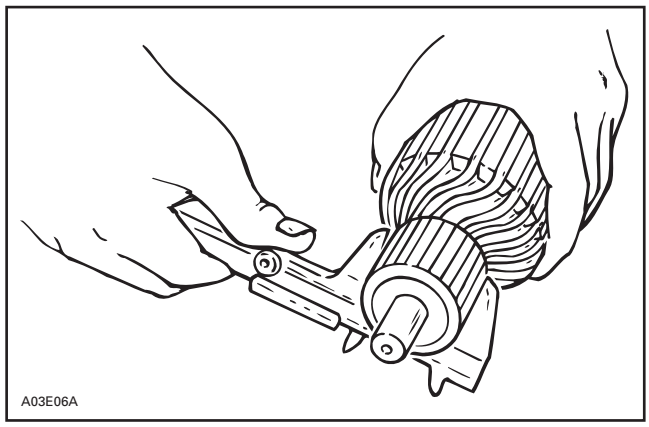
Check commutator for mica depth. If depth is less than 0.20 mm (.008 in), undercut mica. Be sure that no burrs are left and no copper dust remains between segments after undercutting operation is completed.



1. Commutator undercut 0.20 mm (.008 in)

Check commutator out of round condition with V-shaped blocks and an indicator. If commutator out of round is more than 0.40 mm (.016 in), commutator should be turned on a lathe.

Check commutator outer diameter. If less than 27 mm (1.063 in), replace.



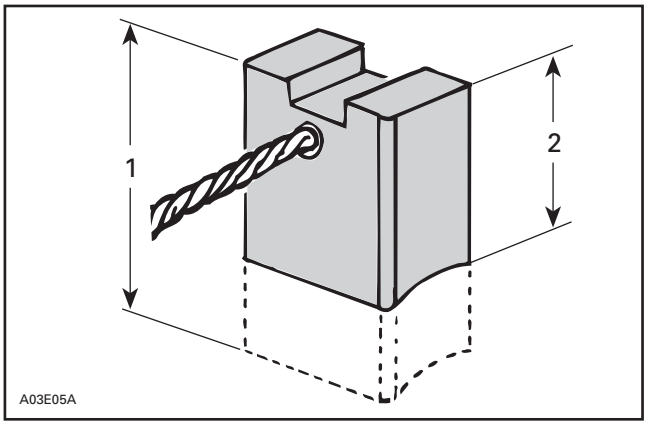
Brush Holder

Check brush holder for insulation using an ohmmeter. Place one test probe on insulated brush holder and the other test probe on brush holder plate. If continuity is found, brush holder has to be repaired or replaced.

Brush Length

Measure brush length. If less than 8.5 mm (.335 in), replace them.

NOTE: New brush length is 12 mm (.472 in).



1. New
2. Wear limit, 8.5 mm (.335 in)

Overrunning Clutch

Pinion of overrunning clutch should turn smoothly in a clockwise direction, and should not slip in a counterclockwise direction. If defective, replace.

Check pinion teeth for wear and damage. If defective, replace.

NOTE: Always check engine ring gear teeth for wear and damage. If defective replace ring gear. Refer to DRIVE PULLEY 05-03.

STARTER ASSEMBLY

Reverse the order of disassembly to reassemble starter. However, attention should be paid to the following operations.

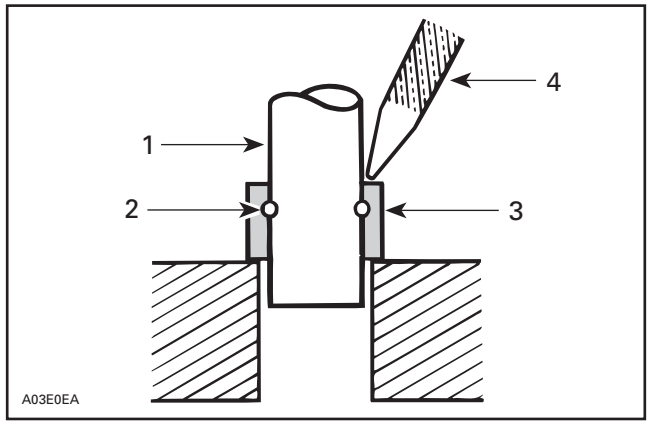
Prior to assembling, coat sliding surfaces on armature shaft splines, overrunning clutch and bushing with G.E. Versilube G 341 M or ESSO Beacon 325 lubricant or equivalent.

Apply motor oil on metal bushings.

6,8, Circlip and Pinion Stop Collar

After placing stop collar on armature shaft, fit circlip into armature shaft, then make sure that it is properly secured.

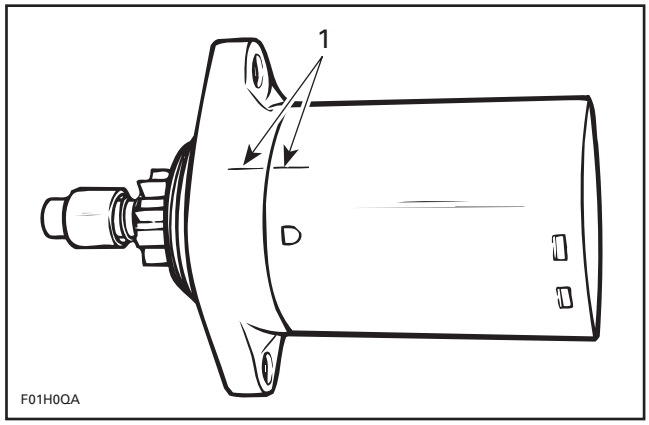
Slide stop collar over circlip and secure in place by punching it at 2 or 3 places.



1. Armature shaft
2. Circlip
3. Pinion stop collar
4. Punch

1,10, Housing and Yoke Ass'y

Align previously traced indexing marks.

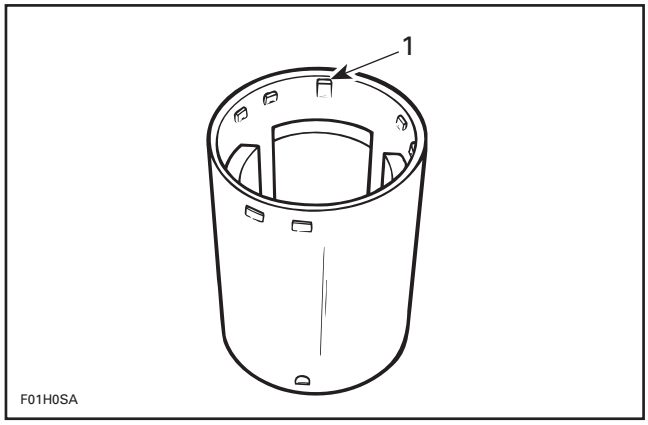


TYPICAL
1. Align marks

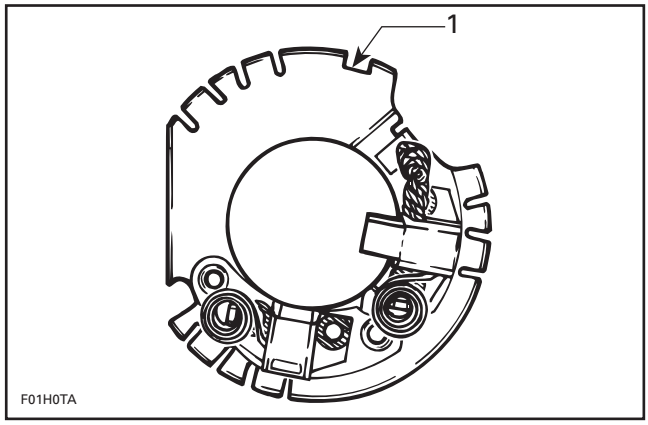
1,3,4, Yoke Ass'y, End Frame and Through Bolt

Open brushes and slide over commutator.

Align end frame locating notch with yoke locating protrusion and properly sit brush holder into yoke.

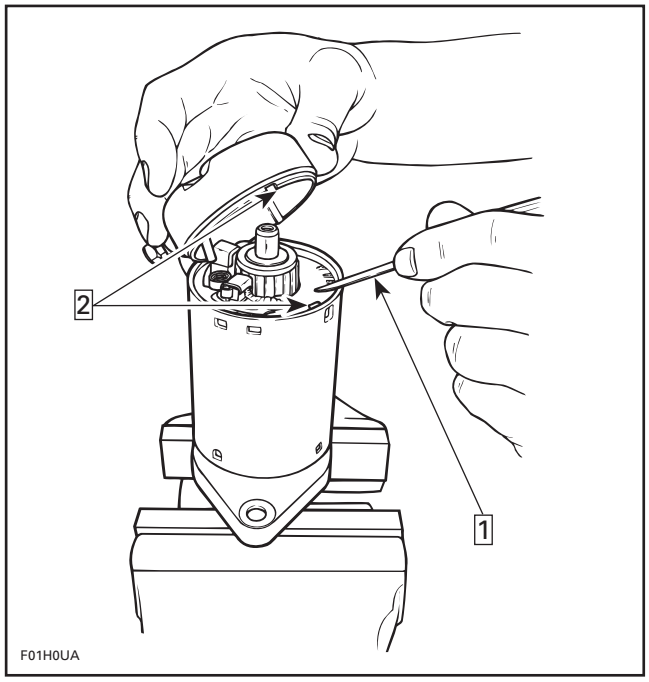


1. Locating protrusion is the higher one



1. Brush holder locating notch

To ease end frame installation, retain brush holder with a small screwdriver while installing end frame.



Step 1: Retaining brush holder with a screwdriver
Step 2: Align here

Align end frame notch with brush holder notch/ yoke protrusion.

▼ CAUTION

Make sure end frame fits perfectly on yoke.

STARTER INSTALLATION

Installation is essentially the reverse of removal procedure. However, pay particular attention to the following.

Make sure that starter and engine mating surfaces are free of debris. Serious trouble may arise if starter is not properly aligned.

◆ WARNING

Always connect RED positive cable first then BLACK negative cable last. Whenever connecting the RED positive cable to the starter motor make sure the battery cables are disconnected to prevent electric shock.

TESTING PROCEDURE

GENERAL

The following chart gives the engine types with their implemented system.

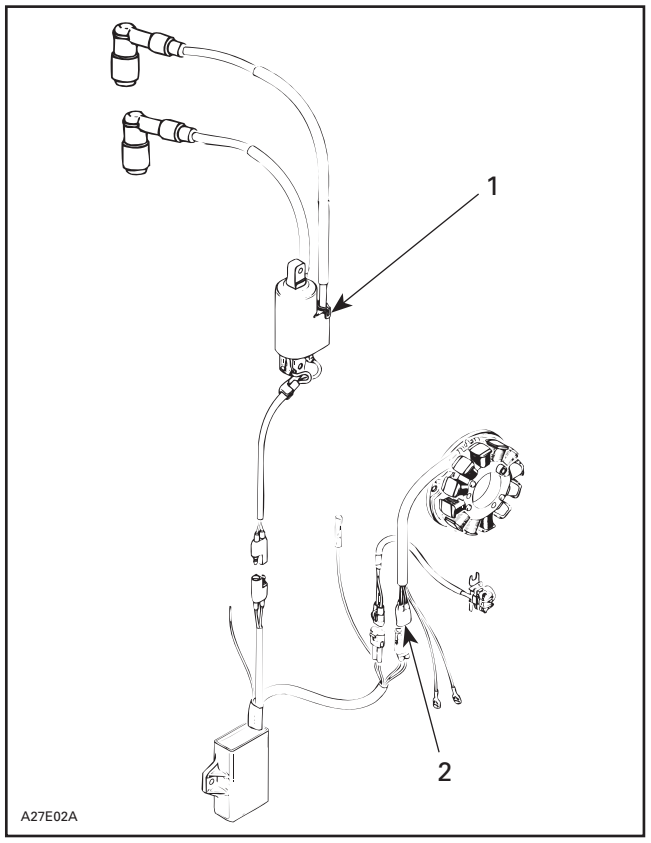
ENGINE TYPE	IGNITION SYSTEM	CHARGING SYSTEM OUTPUT
494, 583 and 670	① NIPPONDENSO (CDI) TRIGGER COIL	220
443 and 503	② DUCATI (CDI)	240

CDI System Identification

Nippondenso

The NIPPONDENSO CDI system has a separate ignition coil which is mounted on the reservoir support.

1. Ignition module is connected to the ignition generator coil via a 3-wire connector (RED, BLACK/RED and BLACK wires).



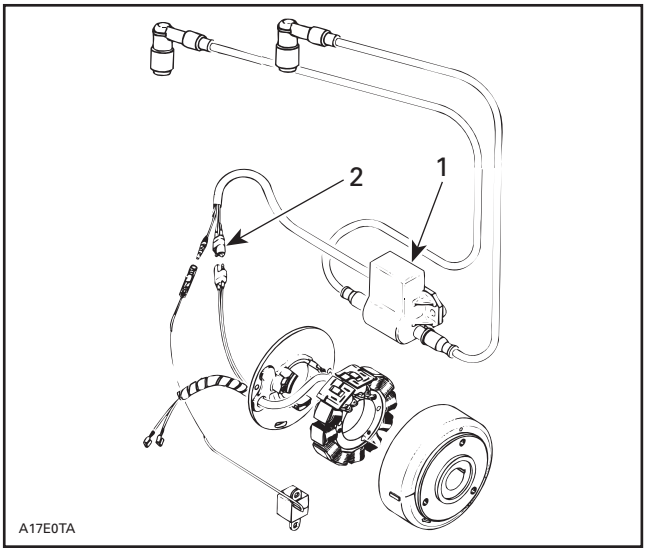
① *NIPPONDENSO CDI TRIGGER COIL SYSTEM*

1. Separate ignition coil mounted on reservoir support
2. Three-wire connector (RED, BLACK/RED and BLACK)

Ducati

The DUCATI CDI system has a combined ignition module/ignition coil which is mounted on air silencer.

2. Ignition module is connected to the ignition generator coils via a 4-wire connector (GREEN and WHITE wires).



② *DUCATI CDI SYSTEM*

1. *Combined ignition module/ignition coil mounted on air silencer below carburetor*
2. *Four-wire connector (GREEN and WHITE wires)*

NIPPONDENSO CDI SYSTEM TESTING

S-Series Liquid Cooled Models and Skandic WT LC

IGNITION SYSTEM TESTING SEQUENCE

In the case of ignition problems, check the following in the prescribed order until the problem can be solved.

1. Sparking/spark plug condition.
2. Electrical connectors.
3. Ignition switches, tether cord cap switch and emergency switch.
4. Ignition coil output.
5. Ignition module output.
6. High voltage coil output.

LIGHTING SYSTEM TESTING SEQUENCE

1. Electrical connectors.
2. Magneto output (lighting generator coil).

Testing Conditions

Voltage measurements are always taken upon vehicle starting. Readings when the engine is running will be higher than indicated range. Part temperature must be approximately 20°C (68°F) (room temperature), otherwise readings could be distorted.

Analysis of Readings

Voltage Readings

When testing the different magneto components, it is important to take into consideration that readings vary according to the force applied onto the manual starter. It is therefore important to employ enough force upon each trial.

The reading must be 3 times within or above the range indicated in the corresponding table. If the reading is too low, the part is considered to be defective and must be replaced.

Resistance Readings

Place multimeter selector switch to Ω in order to measure resistance. Readings must be within the indicated range. Otherwise, the part is considered to be defective and must be replaced.

▼ CAUTION

When taking measurements, it is useless to try to start the vehicle since readings would then be distorted.

Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing parts. Most problems cannot be detected when the engine is stopped.

Multiple Problems

As a matter of fact, more that one component can be defective. As a result, if the problem remains although a part was replaced, start over the whole verification from the beginning in order to identify the other defective component.

1. SPARKING

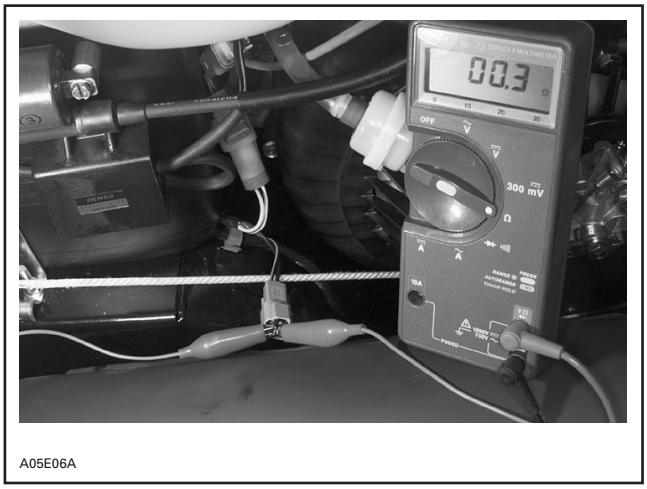
During this operation, it is important to use the snowmobile spark plug and not a new one. Bring the plug in contact with the engine. If no spark is produced, replace the spark plug with a new one and do the test again.

2. ELECTRICAL CONNECTOR TESTING

Make sure that none of the connectors are disconnected.

3. IGNITION SWITCH, TETHER CORD SWITCH AND EMERGENCY SWITCH TESTING

Disconnect connector housing from engine and check resistance as indicated in IGNITION table.



TYPICAL

If readings are acceptable, go on to next step.

If readings are inadequate, individually check each switch as follows.

Ignition Switch (key)

Disconnect switch housing. Using a multimeter, check between **MAG** and **GRD** terminals if the circuit is open (0.L $_{M\Omega}$) in operating position and if the circuit is closed (0 $_{\Omega}$) in off position.



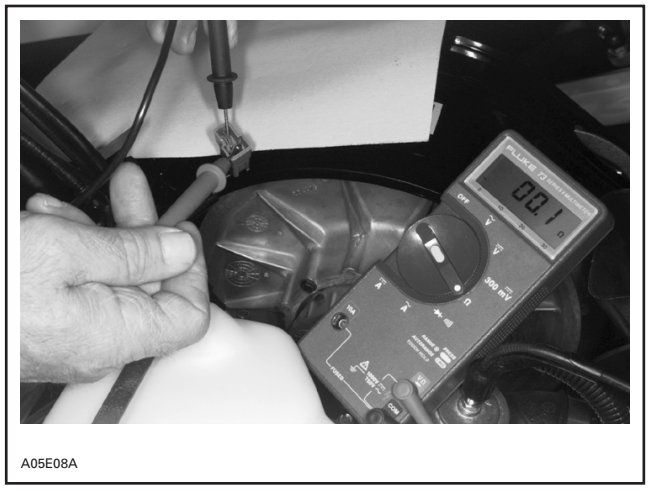
TYPICAL

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Emergency Switch

Unplug switch block connected to main wiring harness. Check using a multimeter. Connect probes to BLACK/YELLOW and BLACK wires. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 $_{\Omega}$) in off position.



TYPICAL

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Tether Cord Switch

Unplug switch block connected to main wiring harness. Check using a multimeter by connecting probes to BLACK/YELLOW and BLACK wires. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 $_{\Omega}$) in off position.


A05E09A

TYPICAL

If readings do not correspond to the above mentioned indications, replace switch.

If readings are acceptable, check other switches.

If none of these verifications are conclusive, the problem finds its source in the main wiring harness. Proceed as follows:

NOTE: For the next step, no switch must be connected to the main wiring harness.

Disconnect all switches from the main wiring harness and check the continuity of each wire by connecting probes to the end of wires of the same color. Repeat with all other wires. It is important to mention that all wires of the same color within a given harness are connected together. These wires should therefore have a closed circuit. On the other hand, BLACK and BLACK/YELLOW wires must have an open circuit ($0.L_{M\Omega}$).

Repair or replace if necessary.

4. IGNITION GENERATOR COIL VOLTAGE TESTING

General

When manually starting the engine while the spark plug is installed, the engine will tend to accelerate beyond the compression point. This will result in higher magneto output power.

1. Disconnect the 3-wire housing between the ignition module and the magneto wiring harness.
2. Connect multimeter probes to BLACK and BLACK/RED wires and bring the selector switch to $\tilde{V}$ and the scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.
5. Compare readings with those appearing in the IGNITION table.

5. IGNITION MODULE VOLTAGE TESTING

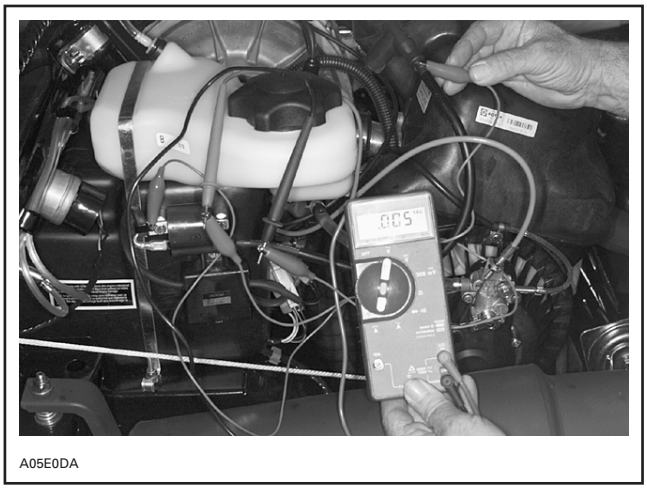
1. Disconnect the 2-wire connector between module and high voltage coil.
2. Connect multimeter probes to module. Place the selector switch to $\tilde{V}$ and the scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.


A05E0CA

5. Compare readings with those appearing in the IGNITION table.

6. HIGH VOLTAGE COIL VOLTAGE TESTING

1. Disconnect spark plug cap from spark plug.
2. Fasten alligator clip to spark plug cable, near the spark plug.
3. Connect other multimeter wire to engine (ground), then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
4. Activate the manual starter and check values indicated by the multimeter.
5. Repeat operation 3 times.



A05E0DA

6. Compare readings with those appearing in the IGNITION table.

CONCLUSION

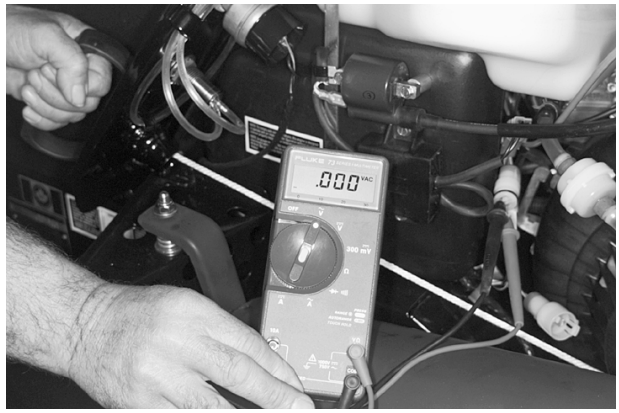
If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the IGNITION table.

Set the multimeter as indicated.

LIGHTING GENERATOR COIL VOLTAGE TESTING

NOTE: The lighting generator coil is not part of the ignition system. It is a self-contained system used to supply current to the lighting system and to other devices working on alternating current. However, this system can be tested using a multimeter.

1. Disconnect housing from engine (YELLOW, YELLOW and BLACK wires).
2. Connect multimeter probes to YELLOW wires, then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.



A05E0EA

5. Compare readings with those appearing in the LIGHTING table.

CONCLUSION

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the LIGHTING table.

Set the multimeter as indicated.

IGNITION SYSTEM TESTING (S-Series liquid cooled models and Skandic WT LC)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Emergency stop switch	Running insulation	BK and BK/YL	2-01A-F and 2-02-M	0.L	00.0 MW	—	—	No stop switch must be operational.
	Continuity in stop position	BK and BK/YL	2-01A-F and 2-02-M	00.0 - 00.5	00.0 W	—	—	At least one stop switch must be operational.
DESS stop switch	Insulation in stop position	BK/GN BK/WH	10-02B-M 10-02C-M	0.L	00.0 MW	—	—	Tether cord cap must be removed.
	Continuity in running position	BK/GN BK/WH	10-02B-M 10-02C-M	00.0 - 00.5	00.0 W	—	—	Tether cord cap must be in place.
Ignition generator coil	Output	RD BK/RD	2-05A-F and 2-05B-F	10.0 - 15.0	00.0 W	10.0 - 13.5	00.0 VAC	No stop switch must be operational.
	Coil insulation	BK BK/RD	2-05C-F and 2-05B-F	0.L	00.0 W	—	—	
		BK RD	2-05A-F and 2-04A-F	0.L	00.0 W	—	—	
	Ground continuity	BK and engine	2-05C-1-F and 2-01A-F	00.0 - 00.5	00.0 W	—	—	—
	Ground continuity	BK and engine	2-01A-F and engine	00.0 - 00.5	00.0 W	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
Trigger coil	Resistance and output	WH/YL and BL/YL	2-03-2 2-03-1 On DESS equipped vehicles: 2-02-1 2-02-2	190 - 270	00.0 W	.200 -350	.000 VAC	—
Ignition module	Output voltage	BK and WH/BL	3-01-1-F and 3-01-2-F	—	—	4.5 - 8.0	00.0 VAC	—
High voltage coil	Primary winding resistance	BK and WH/BL	3-01-1-M and 3-01-2-M	0.00 - 00.9	00.0 Ω	—	—	Disconnect WH/BL wire from coil in order to take measurements.
	Secondary winding resistance (spark plug cap included)	—	In spark plug caps	11.5 K - 14.5 K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding resistance	—	On spark plug wires	19.5 K - 26.5 K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding voltage	—	On spark plug wire and engine	—	—	0.1 - 1.4	0.00 VAC	The measurement must be taken on the spark plug wire (without the spark plug).
	Insulation	Cap and WH/BL	In cap and 3-01-2-M	0.L	00.0 Ω	—	—	—
		Cap and BK	In cap and 3-01-1-M	0.L	00.0 Ω	—	—	
Spark plug cap	Cap resistance	—	Spark plug side and wire side	4.0 K - 6.0 K	00.0 KΩ	—	—	—

M: Male
F: Female

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

LIGHTING SYSTEM TESTING (S-Series liquid cooled models and Skandic WT LC)

PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Lighting generator coil	Power	YL and YL	2-01A-F and 2-01B-F	0.05 - 0.6	00.0 Ω	3.0 - 7.0	00.0 VAC	—
	Insulation	YL and engine	2-01A-F and engine	0.L	00.0 MΩ	—	—	—
		YL and engine	2-01B-F and engine	0.L	00.0 MΩ	—	—	—

M: Male
F: Female

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

DUCATI CDI SYSTEM TESTING

S-Series and Skandic WT/SWT

IGNITION SYSTEM TESTING SEQUENCE

In case of ignition problems, check the following in the prescribed order until the problem can be solved.

1. Sparking/spark plug condition.
2. Electrical connectors.
3. Ignition switches, tether cord cap and emergency switch.
4. Ignition coil output.
5. Trigger coil output.
6. High voltage coil output.

LIGHTING SYSTEM TESTING SEQUENCE

1. Electrical connectors.
2. Magneto output (lighting generator coil).

Testing Conditions

Voltage measurements are always taken upon starting the vehicle. Readings taken when the engine is running will be higher than indicated range. Part temperature must be approximately 20°C (68°F) (room temperature), otherwise readings could be distorted.

Analysis of Readings

Voltage Readings

When testing the different magneto components, it is important to take into consideration that readings vary according to the force applied onto the manual starter. It is therefore important to employ enough force upon each trial.

The reading must be 3 times within or above the range indicated in the corresponding table. If the reading is too low, the part is considered to be defective and it must be replaced.

Resistance Readings

Place multimeter selector switch to Ω in order to measure resistance. Readings must be within the indicated range. Otherwise, the part is considered to be defective and must be replaced.

▼ CAUTION

When taking measurements, it is useless to try to start the vehicle since readings would then be distorted.

Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing parts. Most problems cannot be detected when the engine is stopped.

Multiple Problems

As a matter of fact, more that one component can be defective. As a result, if the problem remains although a part was replaced, start over the whole verification from the beginning in order to identify the other defective component.

1. SPARKING

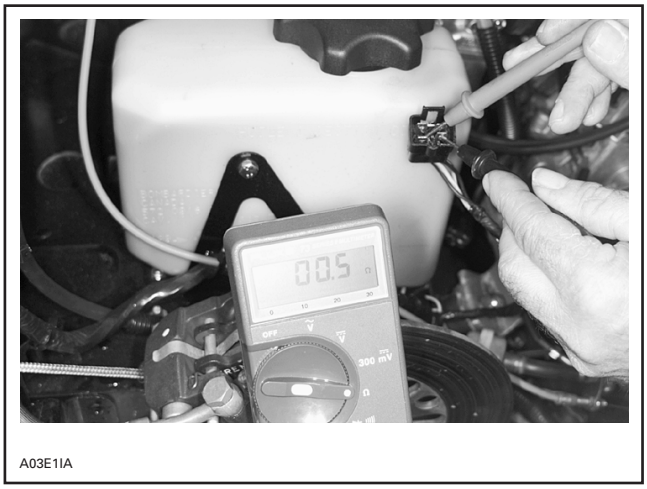
During this operation, it is important to use the snowmobile spark plug and not a new one. Bring the plug in contact with the engine. If no spark is produced, replace the spark plug with a new one and do the test again.

2. ELECTRICAL CONNECTOR TESTING

Make sure that none of the connectors are disconnected.

3. IGNITION SWITCH, TETHER CORD SWITCH AND EMERGENCY SWITCH TESTING

Disconnect connector housing 2-01 from engine, and using a multimeter, check resistance as indicated in IGNITION table.



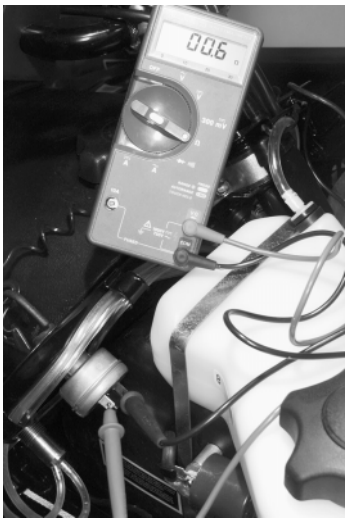
A03E1IA

If readings are acceptable, go on to next step.

If readings are inadequate, individually check each switch as follows.

Ignition Switch (key)

Disconnect switch housing. Using a multimeter, check between **MAG** and **GRD** terminals if the circuit is open (0.L $_{M\Omega}$) in operating position and if the circuit is closed (0 $_{\Omega}$) in off position.



A05E07A

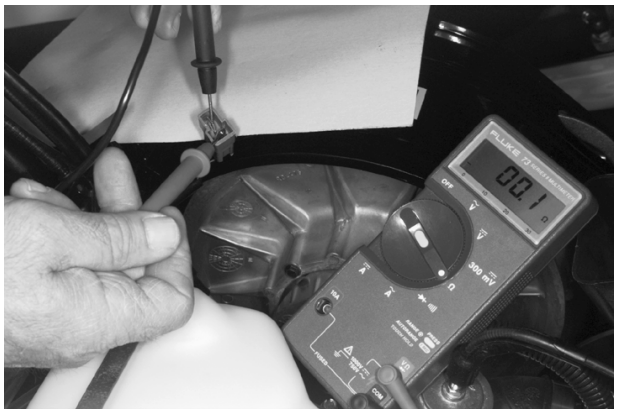
TYPICAL

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Emergency Switch

Unplug switch block connected to main wiring harness. Check using a multimeter. Connect probes to 6-02-C-M and 6-02-D-M terminals. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 $_{\Omega}$) in off position.



A05E08A

TYPICAL

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Tether Cord Switch

Unplug switch block connected to main wiring harness. Check using a multimeter by connecting probes to 6-03-B-M and 6-03-A-M wires. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 $_{\Omega}$) in off position.


A05E09A

TYPICAL

If readings do not correspond to the above mentioned indications, replace switch.

If readings are acceptable, check other switches.

If none of these verifications are conclusive, the problem finds its source in the main wiring harness. Proceed as follows:

NOTE: For this next step, no stop switch must be connected to the main wiring harness.

Disconnect all stop switches from the main wiring harness and check the continuity of each wire by connecting probes to the end of wires of the same color. Repeat with all other wires. It is important to mention that all wires of the same color within a given harness are connected together. These wires should therefore have a closed circuit. On the other hand, BLACK and BLACK/YELLOW wires must have an open circuit (0.L $_{M\Omega}$).

Repair or replace if necessary.

4. IGNITION GENERATOR COIL VOLTAGE TESTING

General

When manually starting the engine while the spark plug is installed, the engine will tend to accelerate beyond the compression point. This will result in higher magneto output power.

1. Disconnect the 4-wire housing between the ignition module and the magneto wiring harness (4-20).
2. Connect multimeter probes to GREEN and WHITE wires (female end), then bring selector to $\tilde{V}$ and scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.



A03E1JA

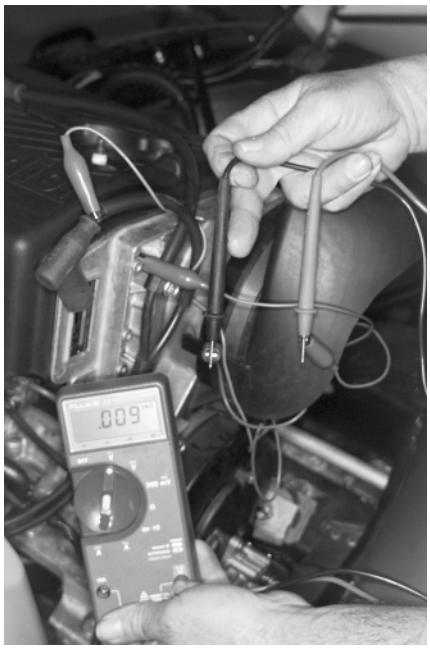
5. Compare readings with those appearing in the IGNITION table.

5. TRIGGER COIL VOLTAGE TESTING

1. Disconnect 4-wire housing between the ignition module and the engine (4-20).
2. Connect multimeter probes to RED/WHITE wire (female side) and to the engine, then bring selector switch to $\tilde{V}$ and scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.
5. Compare readings with those appearing in the IGNITION table.

6. HIGH VOLTAGE COIL VOLTAGE TESTING

1. Disconnect spark plug cap from right spark plug (magneto side).
2. Fasten alligator clip to spark plug cable, near the spark plug.
3. Connect other multimeter wire to high voltage coil screw, then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
4. Activate the manual starter and check values indicated by the multimeter.
5. Repeat operation 3 times.


A03E1KA

6. Compare readings with those appearing in the IGNITION table.

CONCLUSION

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the IGNITION table.

Set the multimeter as indicated.

LIGHTING GENERATOR COIL VOLTAGE TESTING

NOTE: The lighting generator coil is not part of the ignition system. It is a self-contained system used to supply current to the lighting system and to other devices working on alternating current. However, this system can be tested using a multimeter.

1. Disconnect housing from engine (2-01).
2. Connect multimeter wires to YELLOW and YELLOW/BLACK wires (female side), then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.


A03E1LA

5. Compare readings with those appearing in the LIGHTING table.

CONCLUSION

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the LIGHTING table.

Set the multimeter as indicated.

IGNITION SYSTEM TESTING (fan-equipped S-Series and Skandic WT/SWT)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Stop switch	Running insulation	BK and BK/YL	2-01-D-M and 2-01-C-M	0.L	00.0 MΩ	—	—	No stop switch must be operational.
	Continuity in stop position	BK and BK/YL	2-01-D-M and 2-01-C-M	00.0 - 00.5	00.0 Ω	—	—	At least one stop switch must be operational.
Ignition generator coil	Output	BL and GR	4-20-B-F and 4-20-A-FA	230.0 - 330.0	00.0 Ω	30.0 - 60.0	00.0VAC	No stop switch must be operational.
	Ground continuity	WH and engine	4-20-B-F and engine	00.0 - 00.5	00.0 Ω	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
	Ground continuity	BR and engine	4-01-C-F and engine	00.0 - 00.5	00.0 Ω	—	—	
Trigger coil	Continuity	RE/WH and engine	4-20-D-F and engine	140.0 - 180.0	00.0 Ω	2.0 - 9.0	00.0VAC	
Ignition module and high voltage coil	Secondary winding resistance with caps	—	Spark plug cap and on the engine	13.1 K - 18.3 K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
High voltage coil	Secondary winding resistance without caps	—	Inside spark plug wires and on the engine	5.1 K - 6.3 K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding voltage	—	On spark plug wire and on the engine	—	—	0.1 - 0.4	00.0VAC	The measurement must be taken on the spark plug wire (without the spark plug).
	Module insulation	BK	In the cap and on 4-20-A-F	0.L	00.0 MΩ	—	—	—
	Module insulation	—	In the cap and on 4-20-A-F	0.L	00.0 MΩ	—	—	—
Spark plug cap	Cap resistance	—	Spark plug side and wire side	4.0 K - 6.0 K	00.0 KΩ	—	—	—

M: Male
F: Female

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

LIGHTING SYSTEM TESTING (fan-equipped S-Series and Skandic WT/SWT)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				VALUE (OHMS)	MULTIMETER SCALE	VALUE (VOLTS)	MULTIMETER SCALE	
Lighting generator coil	Power	YL and YL/BK	2-01-B-F and 2-01-A-F	0.05 - 0.6	00.0 Ω	2.5 - 7.0	00.0 VAC	—
	Insulation	YL and engine	1-03-A-M and engine	0.L	00.0 MΩ	—	—	—
	Insulation	YL/BK engine	2-01-A-F and engine	0.L	00.0 MΩ	—	—	—

M: Male
F: Female

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

INSPECTION OF AC CIRCUIT ISOLATION

All Electric Start Models

If AC circuit is not isolated from frame, headlamp beam will weaken.

INSPECTION

Disconnect regulator/rectifier.

Connect one digital ohmmeter probe (needle ohmmeter will not offer enough precision) to frame and other probe to one of 2 YELLOW magneto wires.

Measured resistance must be infinite. If such is not the case, it means there is a connection between AC circuit and DC circuit.

Disconnect one accessory at the time to identify the faulty circuit.

INSPECTION OF HEATING ELEMENTS

All Models Except Skandic WT/SWT/WT LC

All measurements must be performed at 21°C (70°F).

Throttle Lever Heating Element

Resistance Measurement

HIGH INTENSITY	YELLOW/BLACK wire BROWN wire	1.96 to 3.64 ohms
LOW INTENSITY	YELLOW/BLACK wire BROWN/YELLOW wire	8.05 to 14.95 ohms

Current Measurement

HIGH INTENSITY	BROWN wire	0.23 A minimum
LOW INTENSITY	BROWN/YELLOW wire	0.13 A minimum

Handlebar Grip Heating Element

Resistance Measurement

HIGH INTENSITY	YELLOW/BLACK wire ORANGE wire	8.73 to ① 10.67 ohms
LOW INTENSITY	YELLOW/BLACK wire ORANGE/VIOLET wire	17.7 to ① 20.7 ohms

Skandic WT/SWT/WT LC

Throttle Lever Heating Element

Resistance Measurement

BLACK wire BLACK wire	48 ohms

Handlebar Grip Heating Element

Resistance Measurement

BLACK wire BLACK wire	9.6 ohms ①

① When measuring resistance at terminals the actual value will be half the measurement in table. The reason for that is the elements are connected in parallel. Therefore the total resistance is half the resistance of one element.

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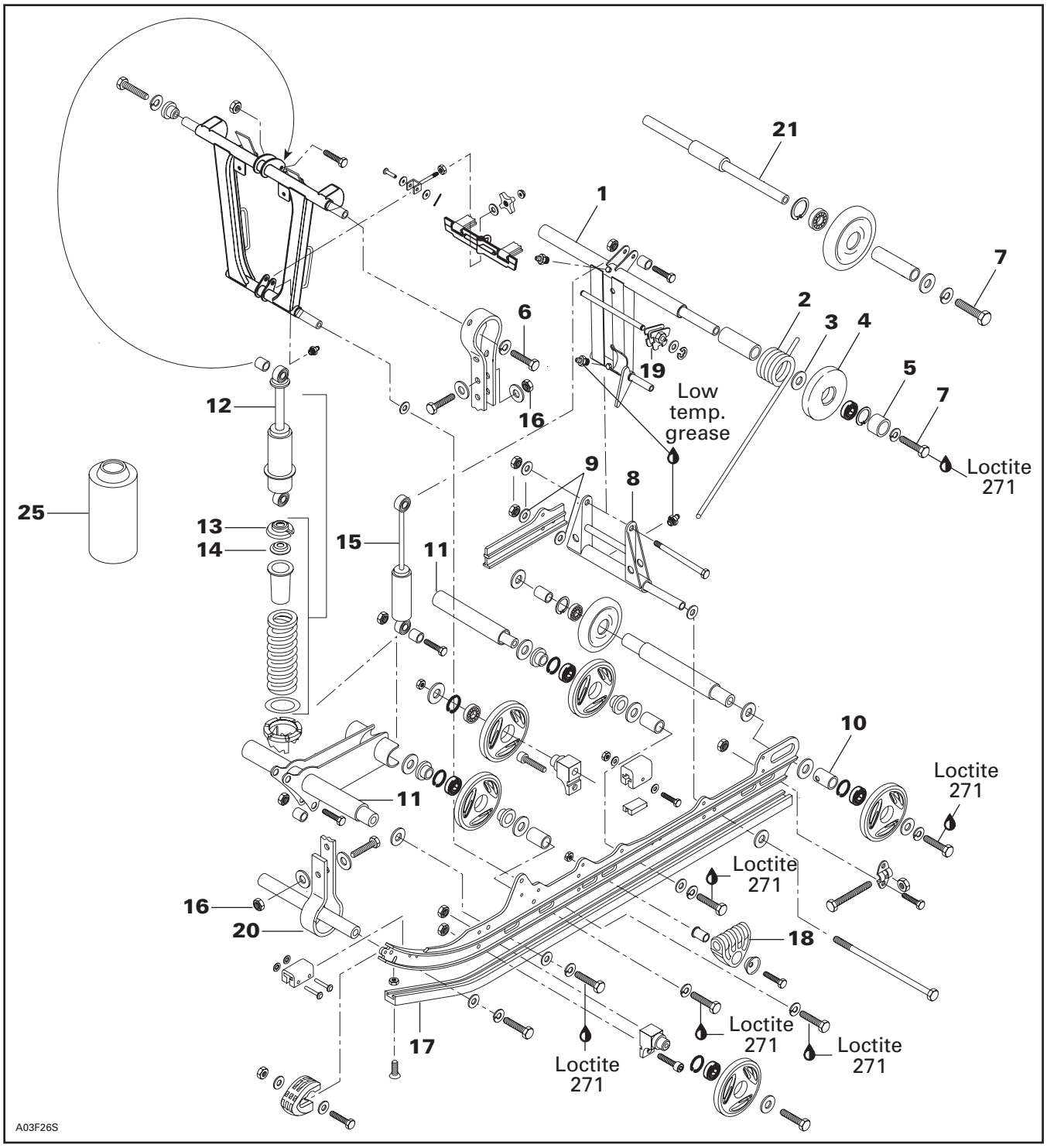
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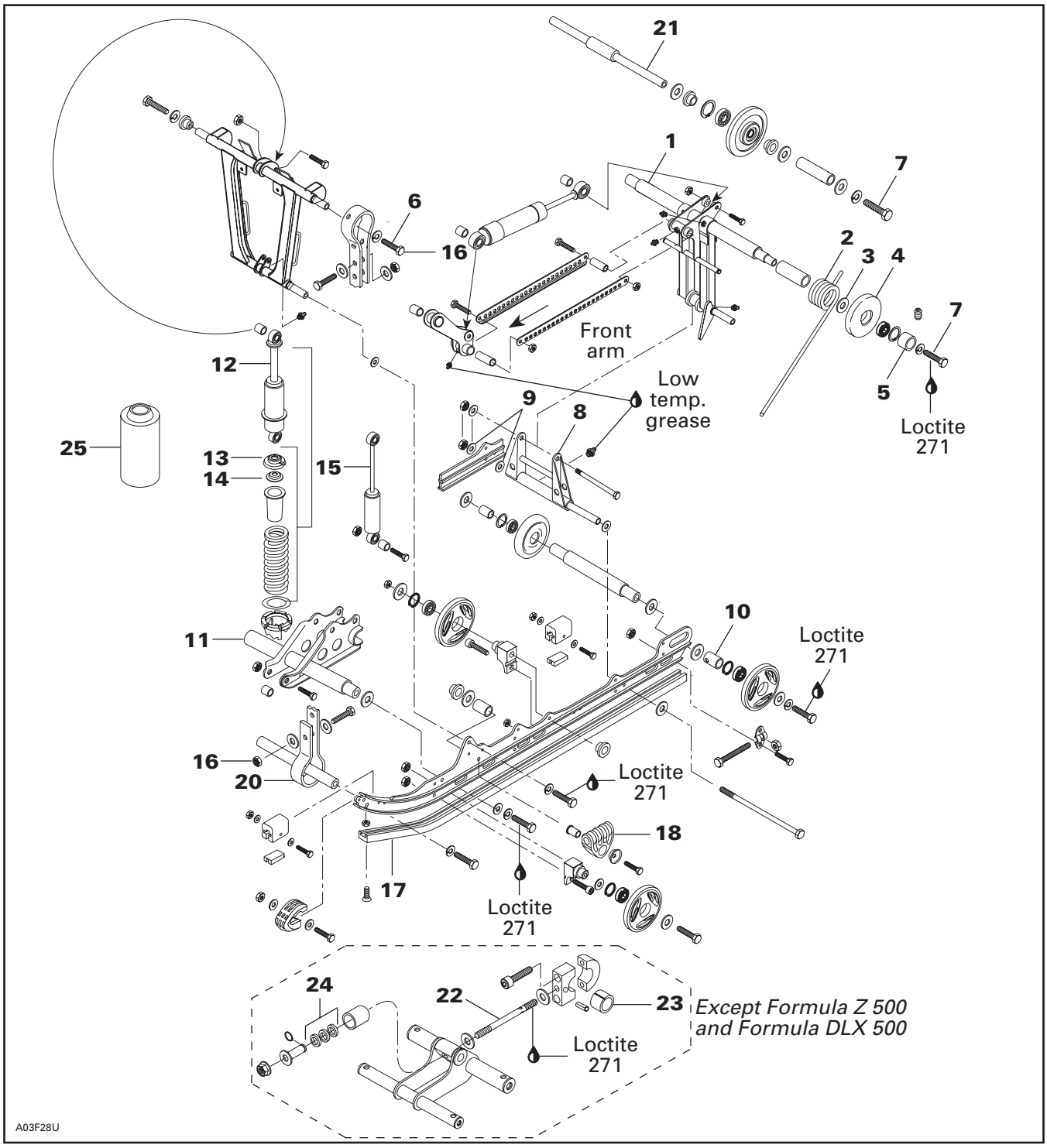
SC-10 SUSPENSIONS (ALL VERSIONS)

SC-10 Sport on MX Z 440

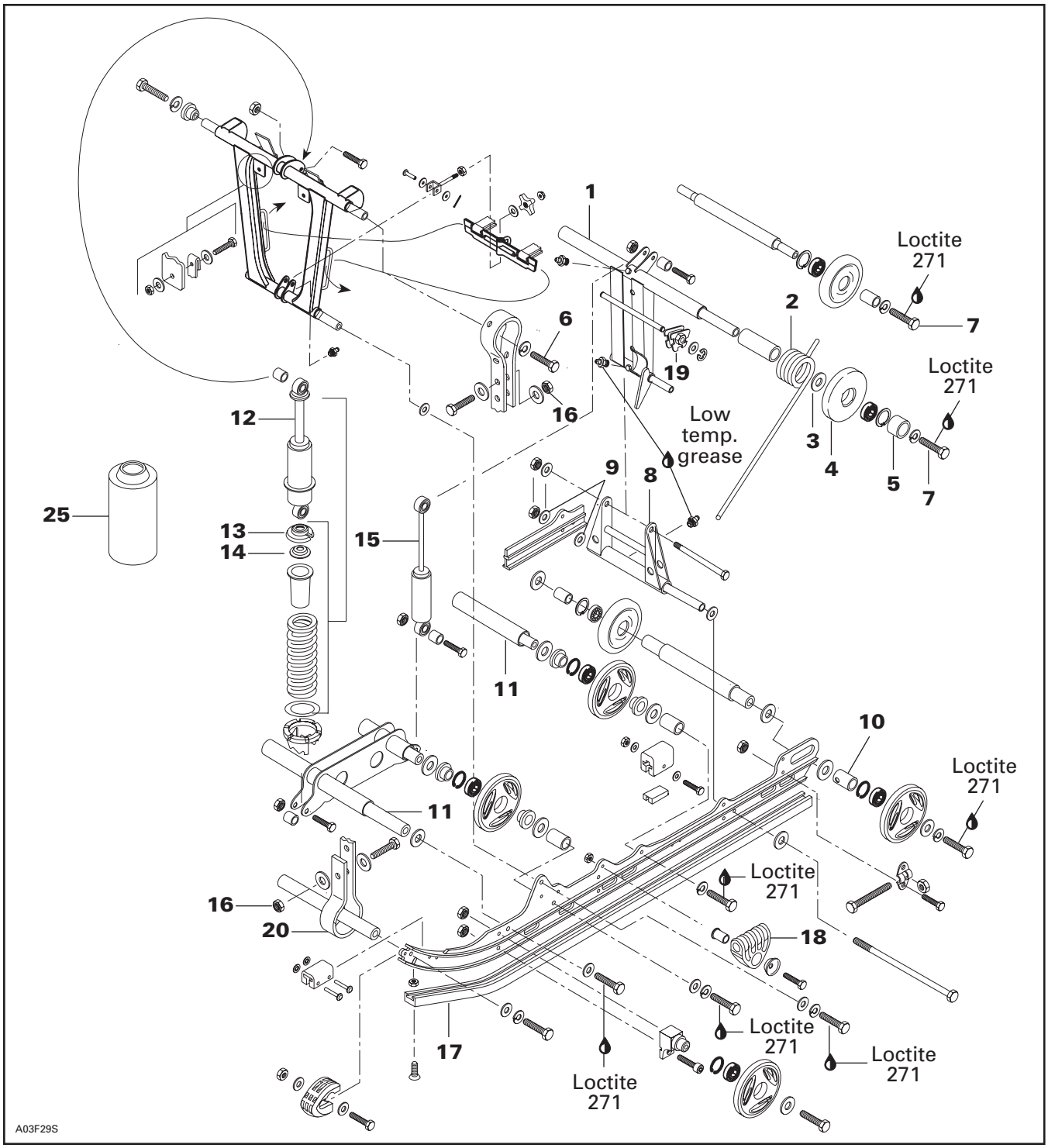


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SC-10 Cross-Country on MX Z 500/670 HO



SC-10 Mountain on Summit 500/X 670



COMPONENT REMOVAL AND INSTALLATION

Lift rear of vehicle and support it off the ground.

21, Rear Axle

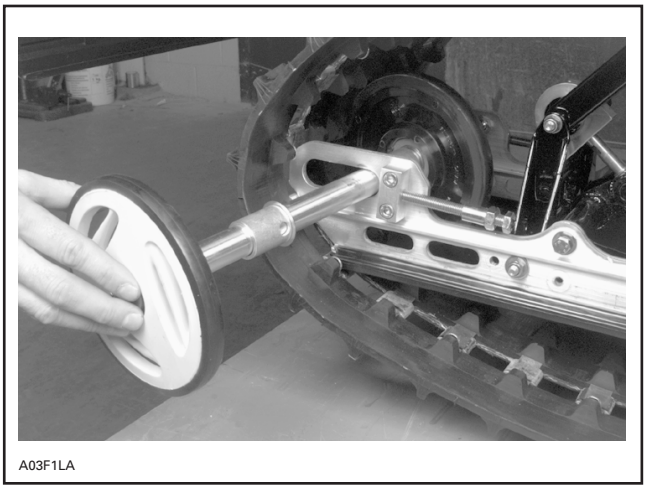
Completely loosen track tension.

Unscrew one rear idler wheel screw.

Pull out rear axle from opposite side of offset inner wheel. Proceed on either sides for models with 4 wheels on rear axle.

At assembly, temporary loosen rear shackle lower pivot nut and ACM (Acceleration and Control Modulator) support rear bolt.

Align spacer hole with adjusting bolt.



TYPICAL

SC-10 HP and XC

22, Threaded Rod

NOTE: Do not disassemble threaded rod ass'y needlessly.

Lift rear of vehicle.

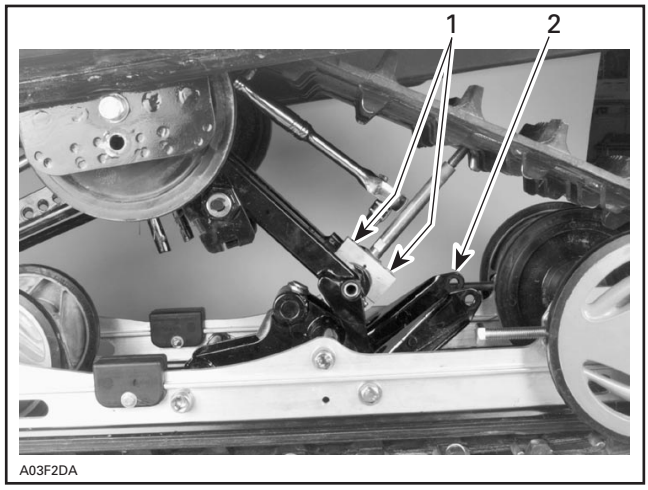
Unhook rear springs.

Unscrew threaded rod nut.

Remove through bolt from shackle.

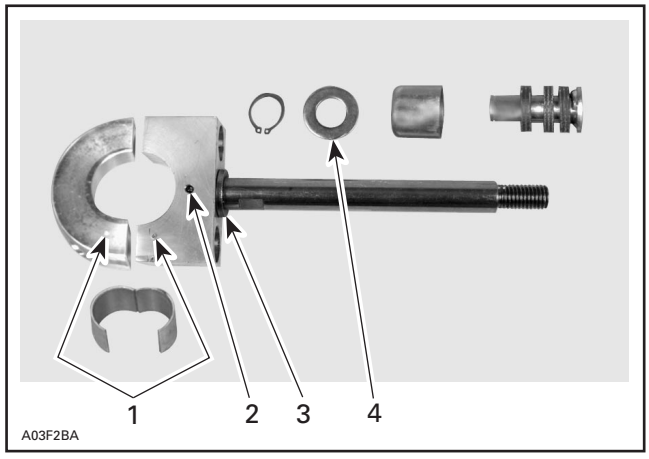
Swing shackle rearward.

Collapse suspension in order to disengage threaded rod from its support.



1. Block ass'y Allen screw
2. Schackle

Unscrew block ass'y Allen screws.



1. Marks
2. Roll pin
3. Smaller washer
4. Larger washer

23, Cushion

Separate pivot block.

Remove cushion.

Apply lithium grease on cushion at reassembly.

At assembly, match marked side of both pivot blocks.

When cup is disassembled, it may be too difficult to install circlip before reinstalling this assembly. Install all parts and the circlip loosely around threaded rod. Compress rear of vehicle or lift the front to easily install circlip in its groove.

25, ACM Support

Remove threaded rod ass'y. Loosen rear axle screw on one side and rear shackle screws.

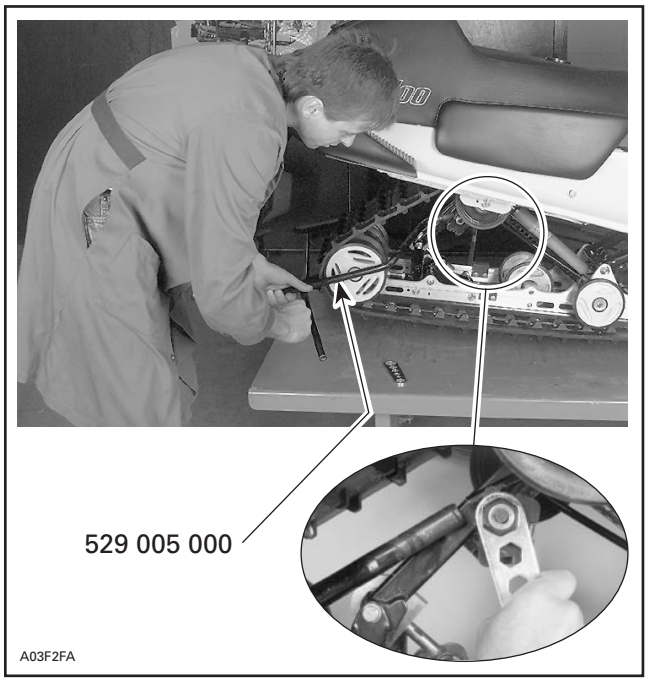
Unbolt ACM support and remove it.

Remove cup.

15, Rear Shock

Lift rear of vehicle.

Slightly turn adjusting cam to expose spring end. Using spring installer (P/N 529 005 000), remove left spring from adjusting cam.



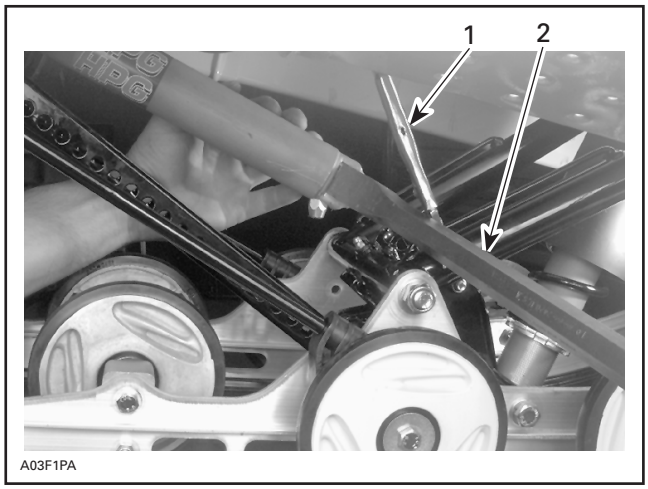
Remove nut on top end of shock.

Remove nut on bottom end of shock. Pry up shock bottom end to ease removing bolt (gas shock only). See installation illustration below.

Installation is reverse of removal procedure. To easily compress gas shock absorber, use a pry bar and locking pliers as a stopper.

▼ CAUTION

Take care not to damage grease fitting.



1. Locking pliers
2. Pry bar

All Models

12, Front Shock

Unfasten one end of stopper strap.

Unbolt shock and remove it.

All Models

2, Rear Spring

Remove spring ends from adjusting cams.

Unbolt rear arm top axle from chassis.

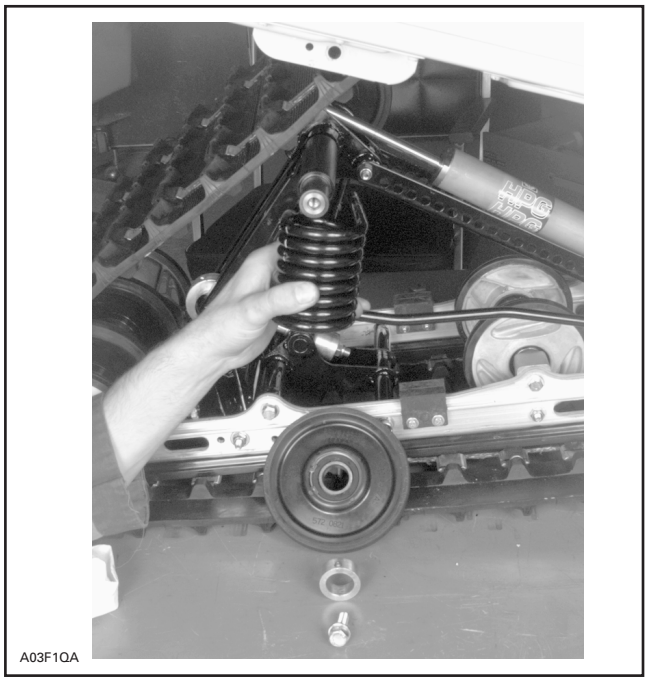
All Liquid Cooled Models

Unscrew set screws from locking ring at each end of top axle.

All Models

Remove locking rings (spacers on fan cooled models) and top idler wheels.

Remove springs.



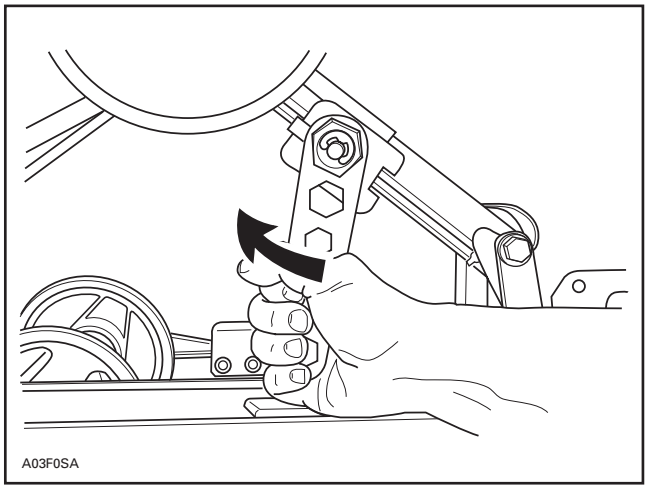
TYPICAL

At reassembly, wheel circlip must face outward.

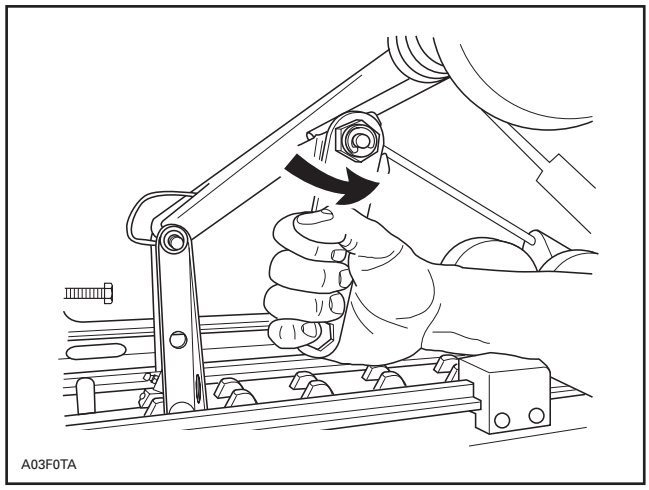
REMOVAL

19, Cam

Decrease spring preload by turning LH cam clockwise and RH cam counterclockwise.



LH SIDE SHOWN



RH SIDE SHOWN

Lift rear of vehicle and support it off the ground.

Loosen track tension.

7, Screw

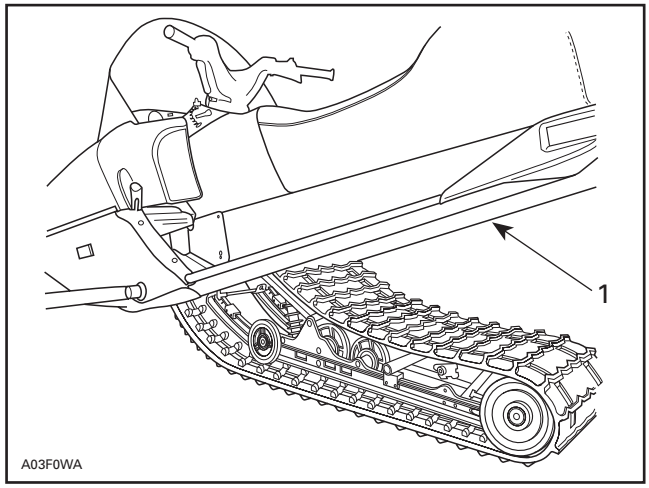
Unscrew rear arm top axle from chassis.

NOTE: To prevent axle from turning when unscrewing screws assembled with threadlocker, proceed as follows:

– Knock on screw head and/or heat to break threadlocker bond.
– Loosen one screw then retighten.
– Remove the opposite screw.
– Remove the first one.

Unscrew center idler wheel axle from tunnel then remove.

Lift rear of vehicle at least 1 m (3 ft).



1. At least 1 m (3 ft)

6, Screw

Remove both screws retaining front arm to tunnel.

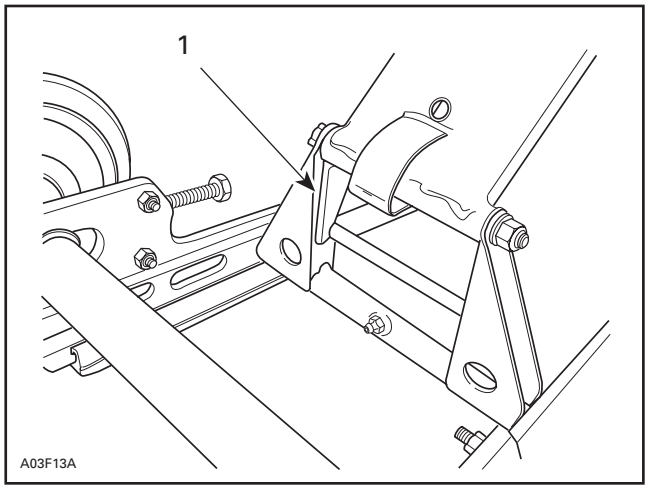
Remove suspension.

DISASSEMBLY AND ASSEMBLY

Inspect track thoroughly before reinstalling suspension. Refer to TRACK 07-06.

1, Rear Arm

At installation, rear arm stroke limiter must be on rear side.



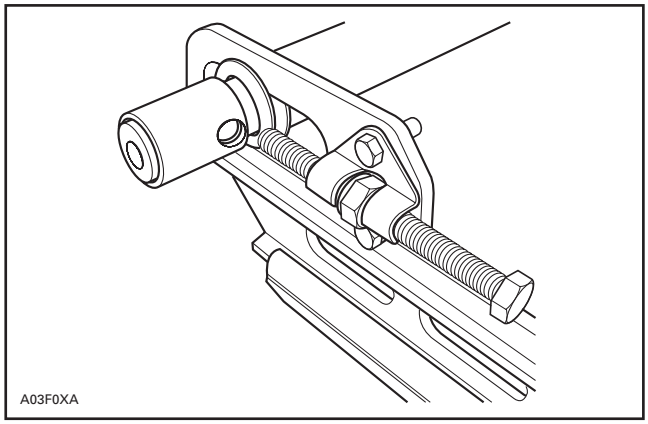
1. Stroke limiter on rear side

8,9, Pivot Arm and Flat Washer

At installation pivot arm grease fitting must face rearward.

10, Outer Bushing

At installation, hole must face adjustment screw.



11, Axle

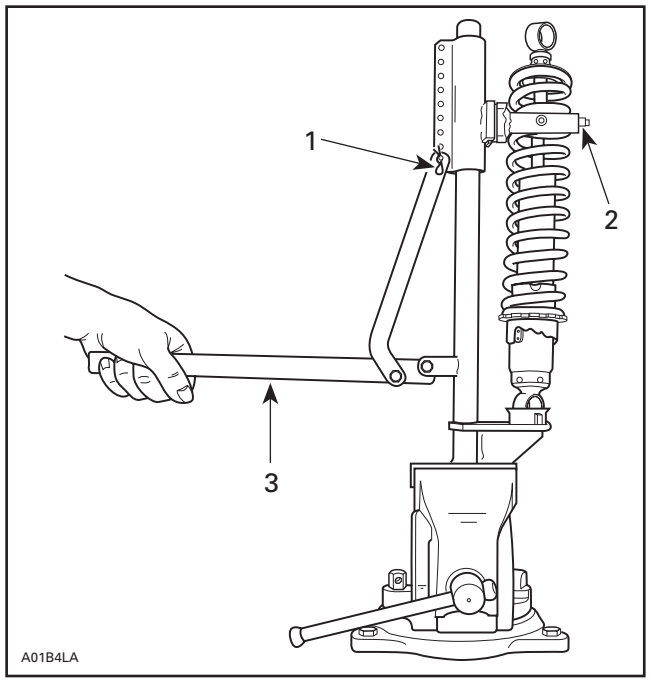
Note position of axles at disassembly. Axles with a paint stripe serve as idler wheel axles. These are more precise than those used as pivot axles. Idler wheel axles can be used as pivot axles but the opposite is not true.

12,13,14, Front Shock, Spring Stopper and Cap

Use shock spring remover (P/N 529 035 504) and put it in a vise. Mount shock in it and turn shock so that spring coils matched spring compressor.

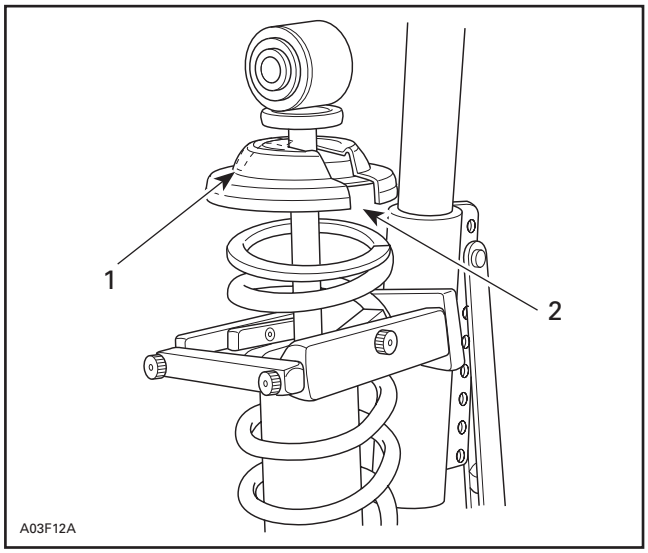
Close and lock bar. Adjust handle horizontal by changing position of clevis pin.

Push down on handle until it locks. Remove spring stopper and cap then release handle.



1. Clevis pin
2. Bar
3. Handle horizontal

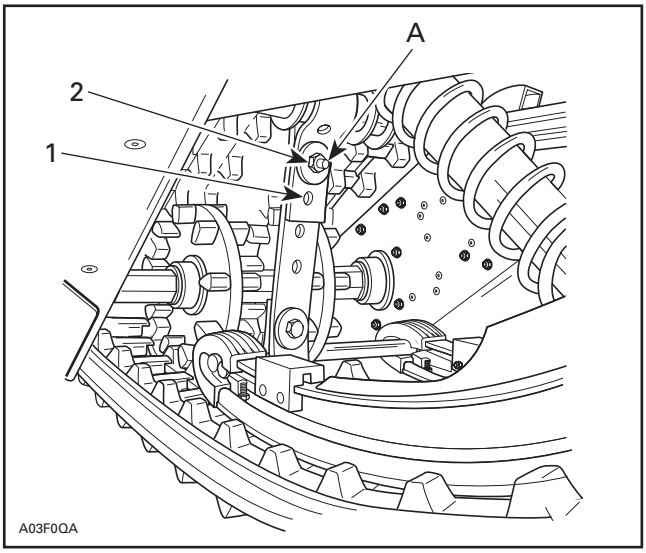
At installation, cap opening must be 180° from spring stopper opening.



1. Cap opening
2. Spring stopper opening

20, Stopper Strap

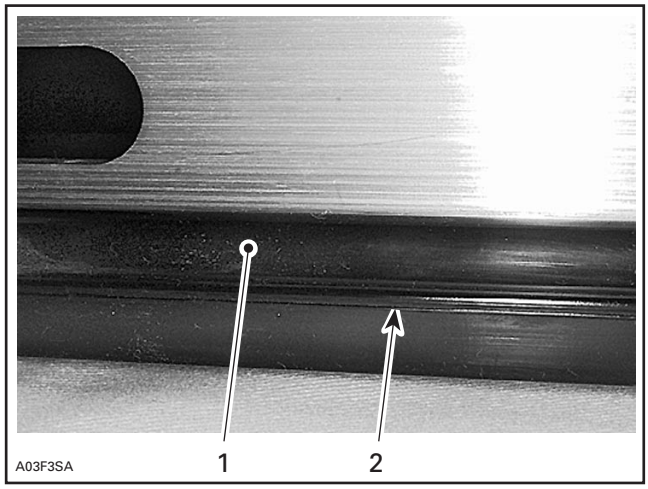
Inspect strap for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required. Make sure it is attached through proper hole from the end. Refer to TECHNICAL DATA 10-03. Torque nut to 11 N•m (97 lbf•**in**).



1. 1st hole
2. 2nd hole
*A. 11 N•m (97 lbf•**in**)*

17, Slider Shoe

Molding line is the wear limit indicator.



TYPICAL
1. Slider shoe
2. Molding line (wear limit indicator)

Replace slider shoes when wear limit is reached.

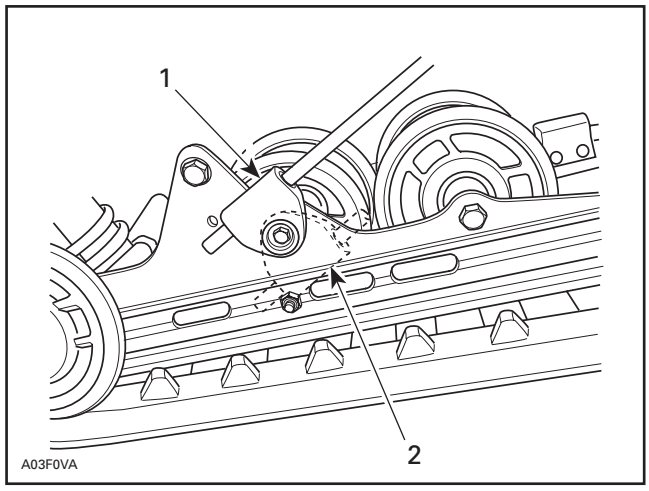
▼ CAUTION

Slider shoes must always be replaced in pairs.

18, Spring Support

▼ CAUTION

To avoid track damage, spring supports must be mounted upward.



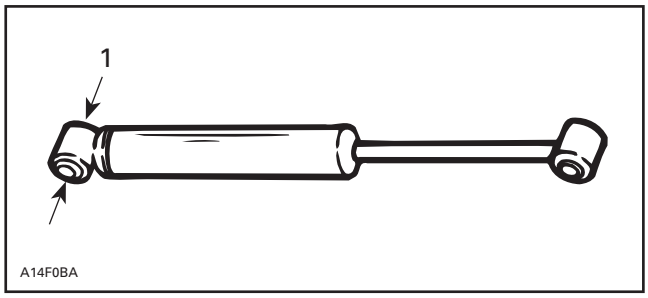
RIGHT SIDE SHOWN
1. Right position: upward
2. Wrong position

SHOCK ABSORBER INSPECTION

All Models Equipped with Hydraulic Shock

NOTE: Hydraulic shocks are painted black or dark gray.

Secure the shock body end in a vise with its rod upward.



1. Clamp

▼ CAUTION

Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with its rod upward.

Pay attention to the following conditions that will denote a defective shock:

– A skip or a hang back when reversing stroke at mid travel.
– Seizing or binding condition except at extreme end of either stroke.
– Oil leakage.
– A gurgling noise, after completing one full compression and extension stroke.

Renew if any faults are present.

All Models Equipped with Gas Pressurized Shock

NOTE: Gas pressurized shocks are light gray painted.

Gas shock can be inspected as follows:

Because of gas pressure, strong resistance is felt when compressing shock. When released, the shock will extend unassisted. Renew as required.

If suspecting an internal gas leak between oil chamber and gas chamber, check shock as follows:

Install shock in a vise clamping on its bottom eyelet with its rod upward.

Let it stand for 5 minutes.

Completely push down the shock rod then release.

Rod must come out at a steady speed. If speed suddenly increases particularly at end of extension, replace shock.

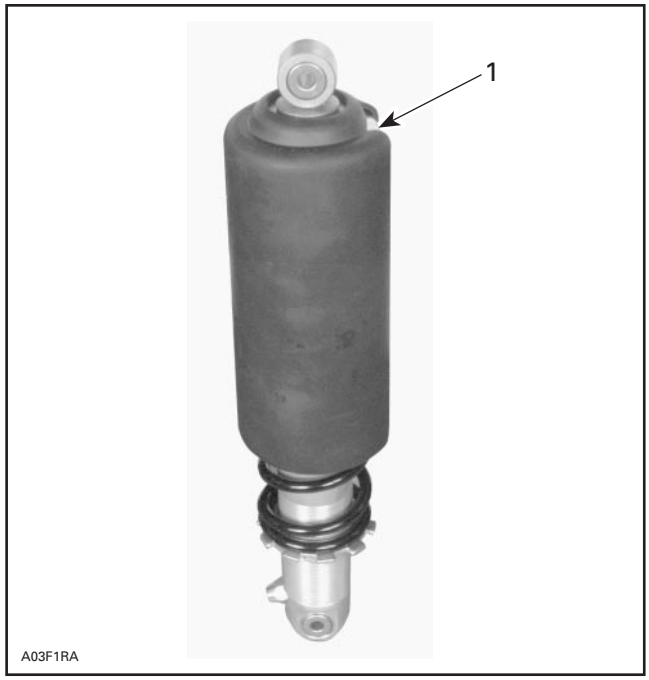
If suspecting a frozen gas shock proceed as follows:

Place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance, compare to a new shock. If shock is frozen it will be much more difficult to compress than for the new one.

25, Protector

At assembly, mount protector with its notch toward front.



1. Notch

INSTALLATION

Install assembled suspension into track with front portion first.

Insert rear portion of suspension into track.

Bolt front arm, rear arm then center top idler wheel axle.

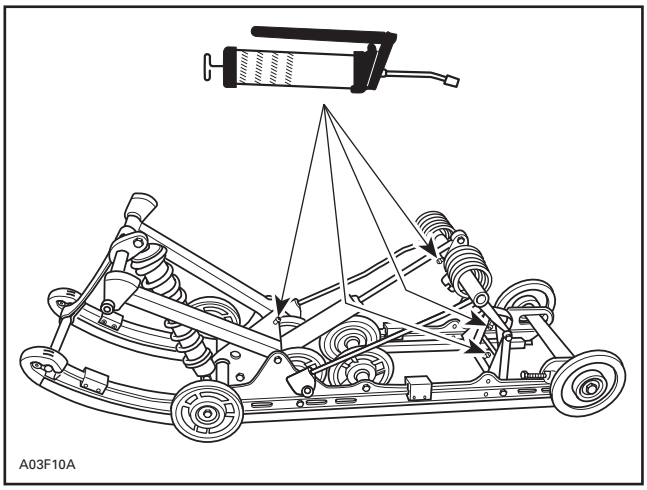
Adjust track tension.

RIDE ADJUSTMENT

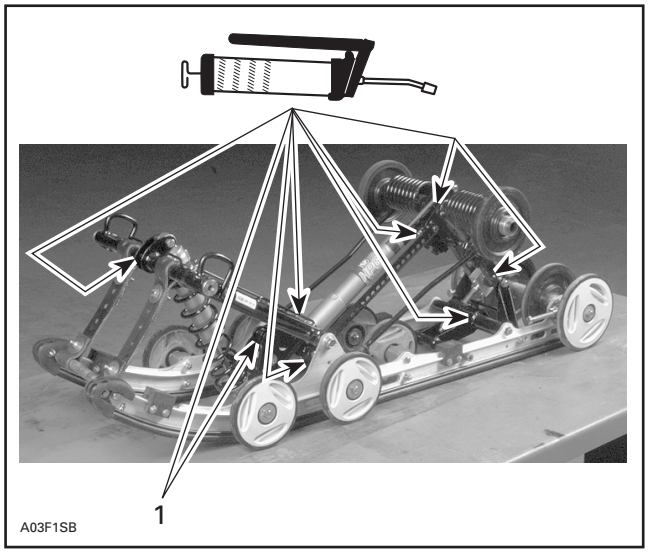
Refer to *Operator's Guide*.

LUBRICATION

Lubricate front and rear arms at grease fittings using synthetic grease (P/N 413 711 500).



SC-10 SPORT, MOUNTAIN AND TOURING: 4 GREASE FITTINGS

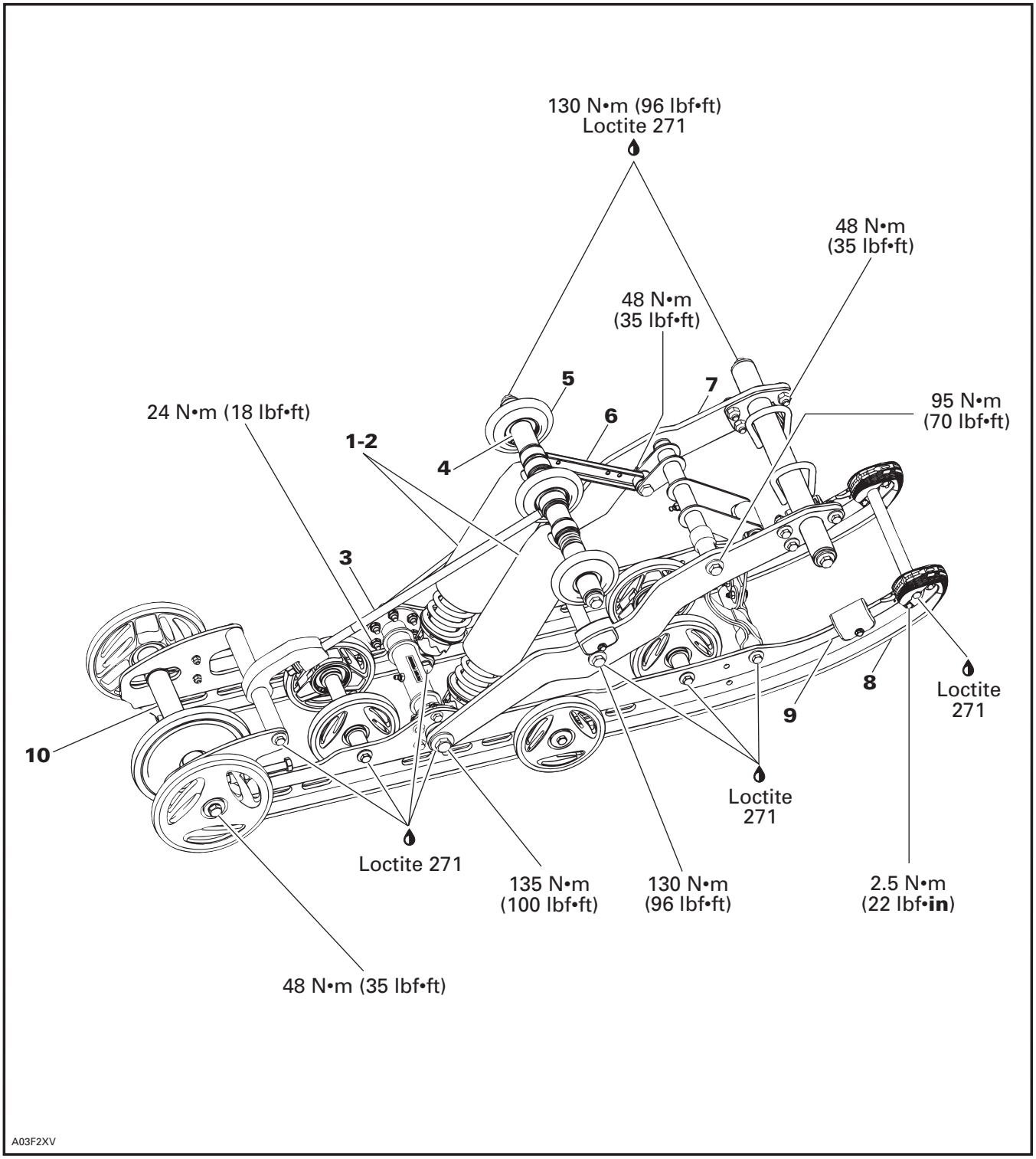


SC-10 XC AND HP: 7 GREASE FITTINGS

1. Only the GT 583 has this 8th grease fitting

ARM SUSPENSION

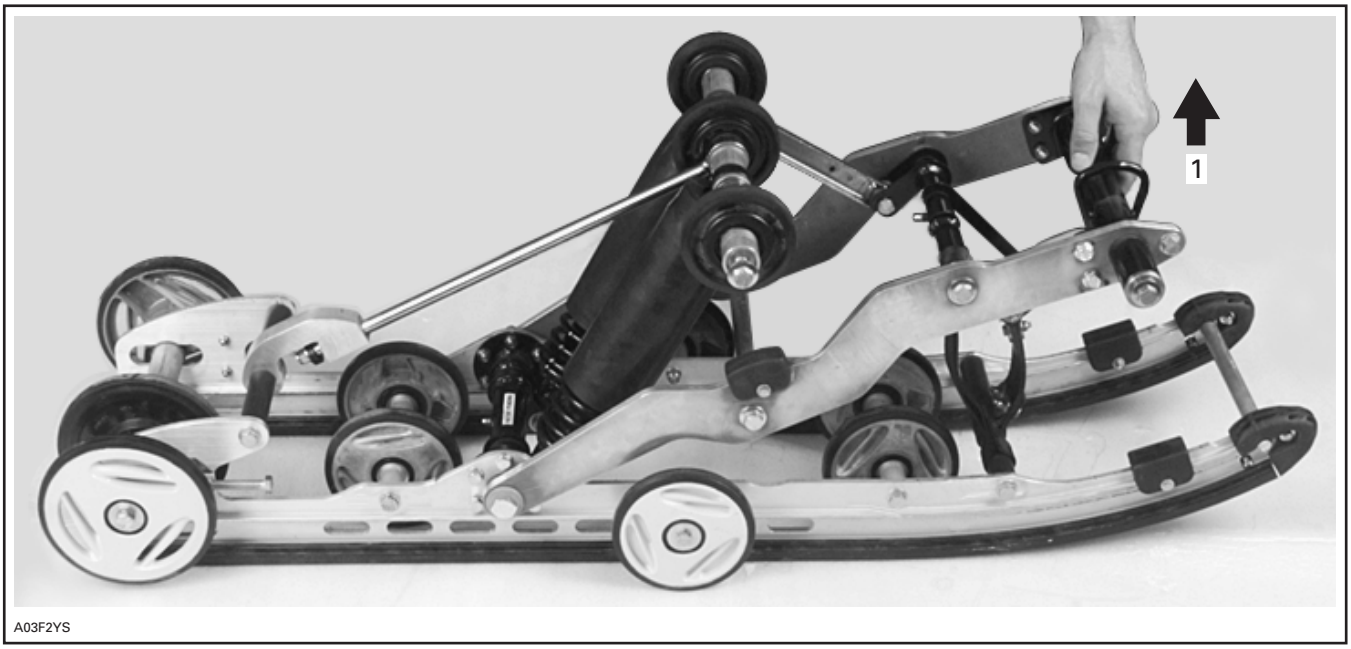
Formula Z 670 and Formula DLX 670



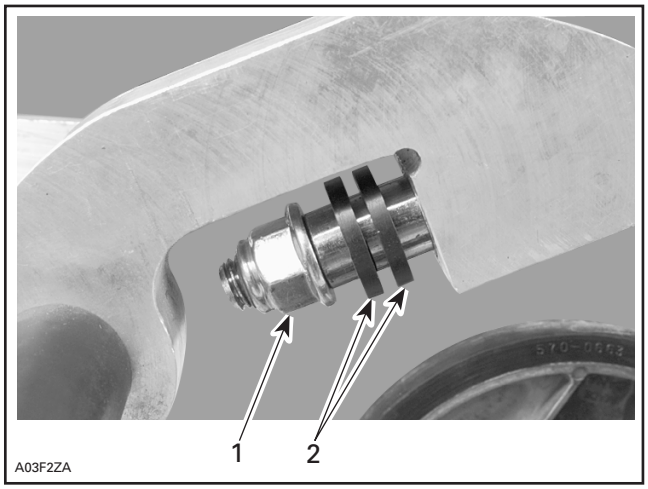
COMPONENT REMOVAL AND INSTALLATION

1,2, Shock and Spring

Lift swing arm to facilitate long torque rod nut removal.



1. Lift



1. Remove nut
2. Note plastic washers location

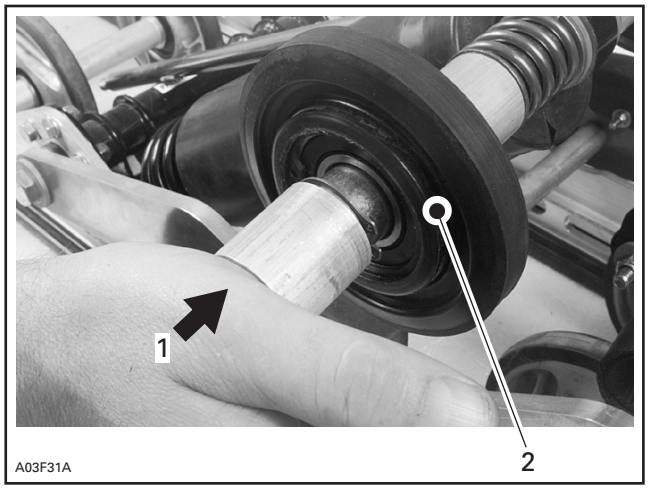
Remove outer sleeve, circlip, top idler wheel sleeve, spring and thrust washer from top idler wheel axle.



When reinstalling, push circlip into its groove.

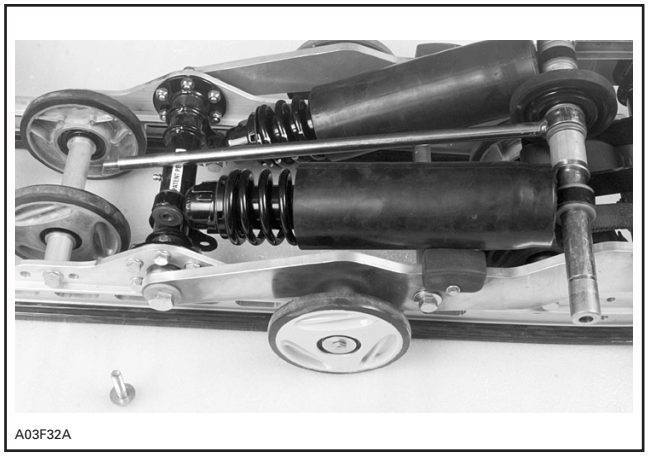
▼ CAUTION

Outer top idler wheels **no. 4** must be mounted on their shaft with the mention THIS SIDE OUT facing outside. Center wheel circlip must face left side.



1. Push circlip into its groove
2. THIS SIDE OUT mention

Unbolt bottom end of shock.



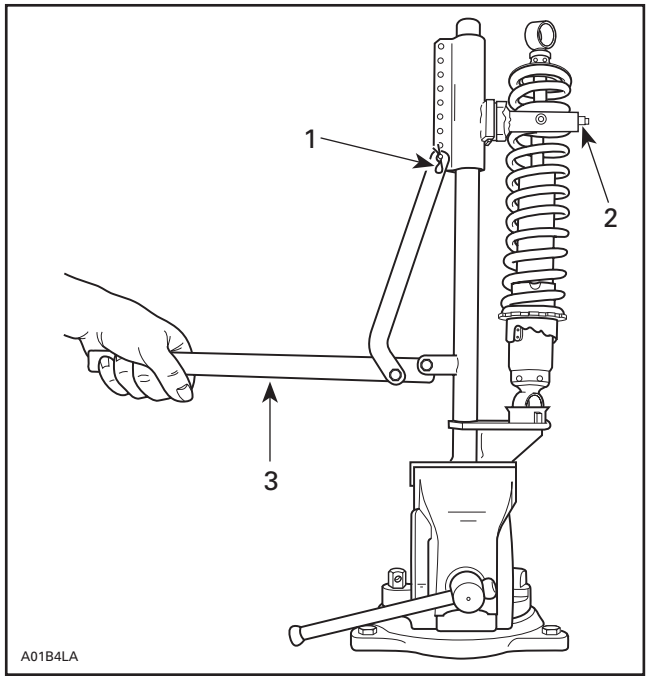
SHOCK READY TO BE REMOVED

When reassembling, tighten long torque rod nut to bottom.

Install shock spring remover (P/N 529 033 504) in a vise. Mount shock in it and turn shock so that spring coils matched spring compressor.

Close and lock bar. Adjust handle horizontal by changing position of clevis pin.

Push down on handle until it locks. Remove spring stopper and cap then release handle.

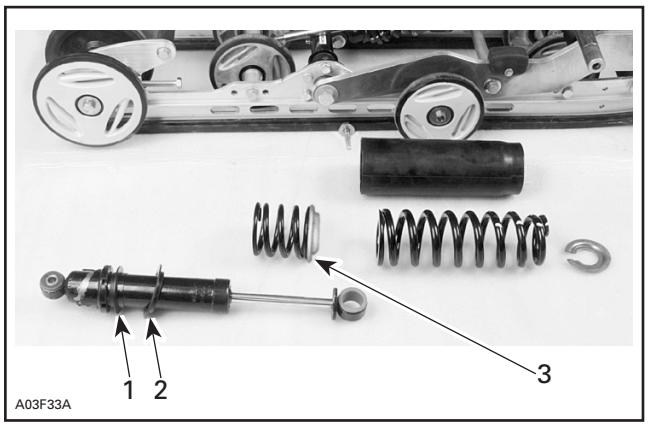


TYPICAL
1. *Clevis pin*
2. *Bar*
3. *Handle horizontal*

When reassembly note position of bottom spacers and mid spacer.

▼ CAUTION

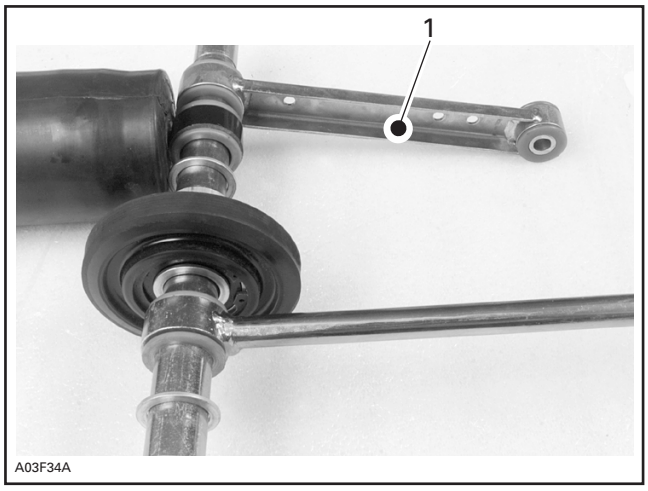
Install mid spacer with its mention THIS SIDE UP facing upward.



1. *Metal spacer*
2. *Plastic spacer*
3. *THIS SIDE UP mention*

4, Top Idler Wheel Axle

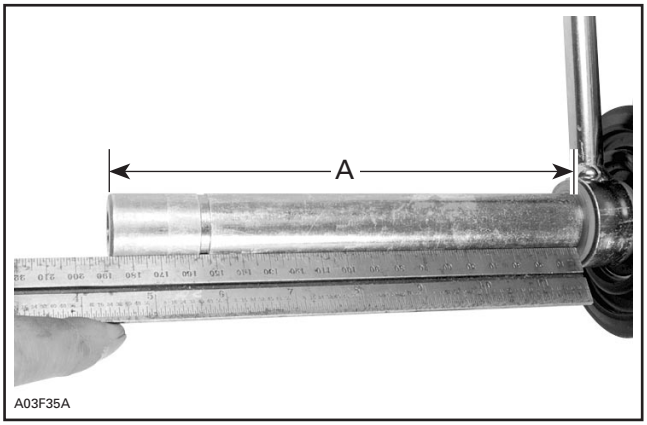
When assembling, the hollow side of small torque rod **no. 6** must face inner side.



1. *Hollow side*

Note position of all 6 friction washers. There is one each side of long tie rod **no. 3**. One goes between left hand side shock eyelet and inner spacer. Another goes between small torque rod and outer spacer. There is one each side of right hand side shock eyelet.

When reassembling, mount long torque rod **no. 3** at 188 mm (7-13/32 in) from axle end.

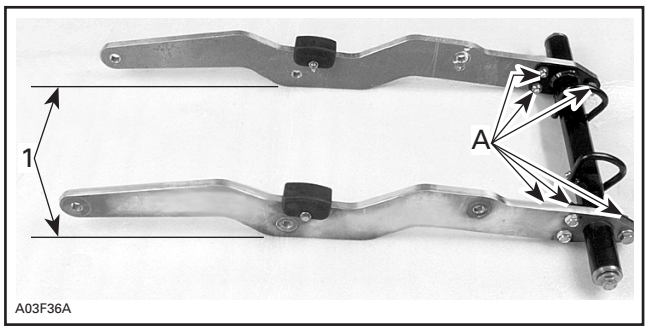


A. 188 mm (7-13/32 in)

7, Swing Arm

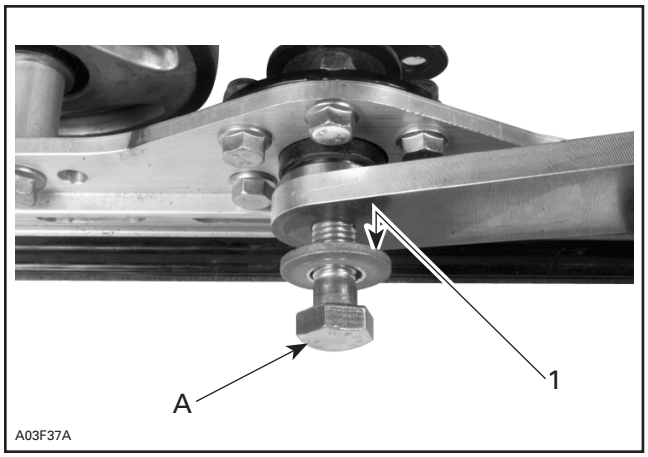
Remove both shock/springs, strap axle, long spacer then M14 screws.

When assembling, both arms must run parallel. Tighten nuts to 48 N•m (35 lbf•ft).



1. Parallel
A. 48 N•m (35 lbf•ft)

Install large washers with their concave side toward swing arm. Apply Loctite 271 on M14 screw threads and on female threads. Tighten to 135 N•m (100 lbf•ft).

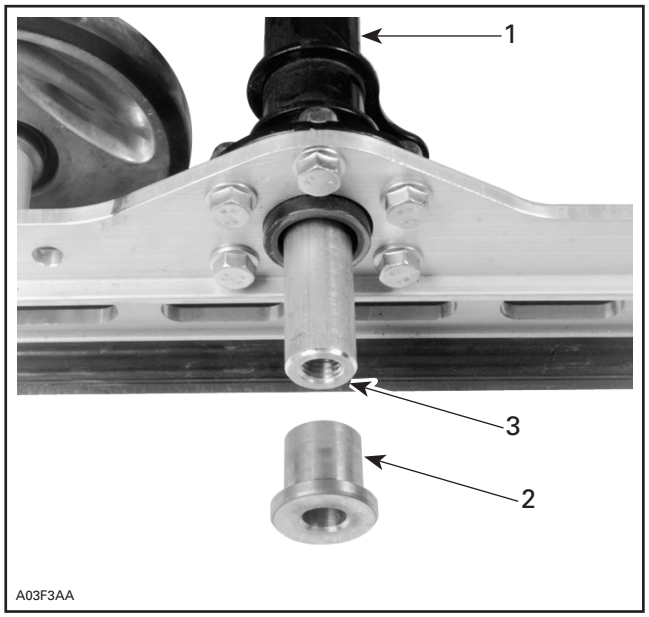


1. Concave side
A. 135 N•m (100 lbf•ft)

9, Rail

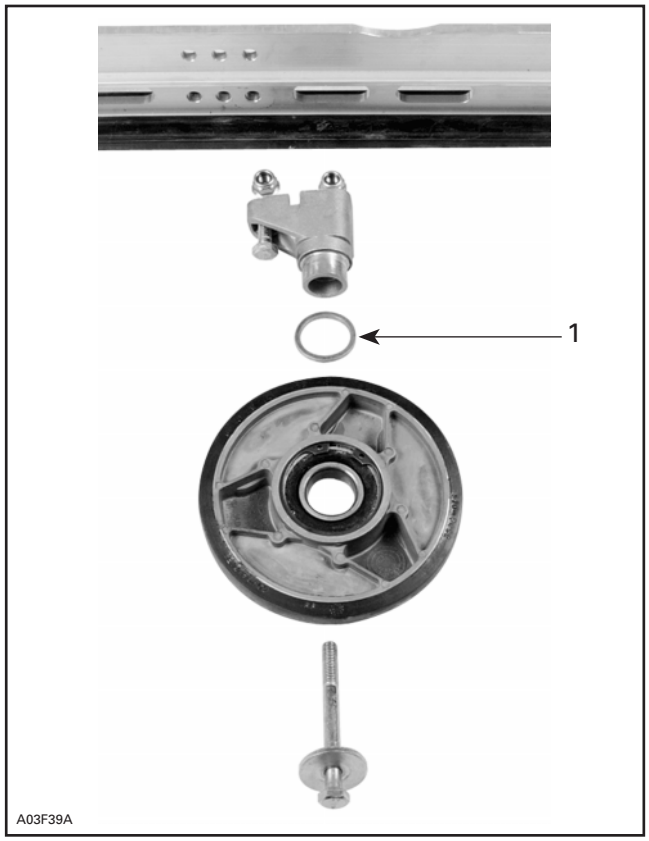
Remove swing arm.

Remove swing arm lower axle, bushing and long spacer.



1. Swing arm lower axle
2. Bushing
3. Long spacer

Remove outer idler wheels. Note position of spacer for reassembling.

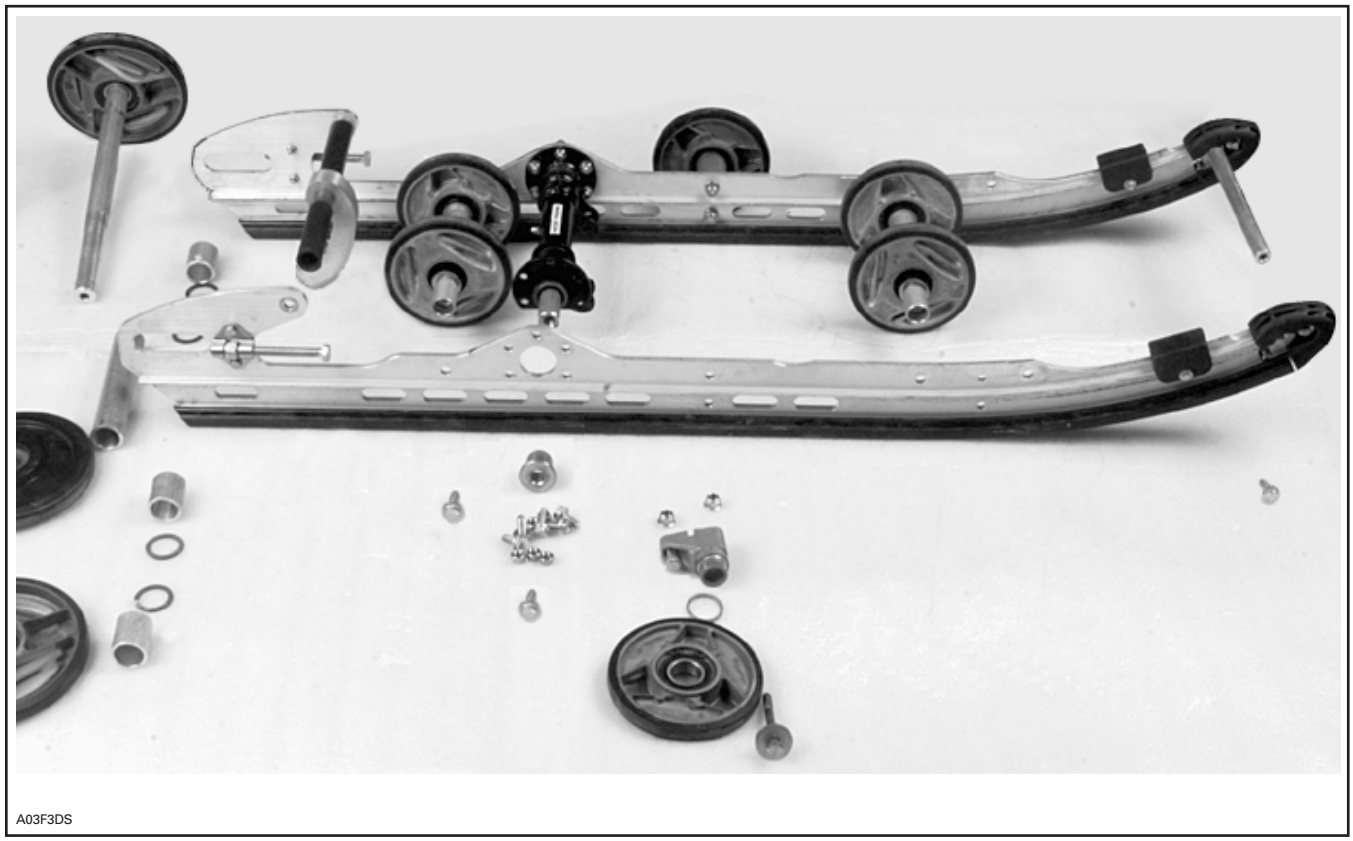


1. Spacer

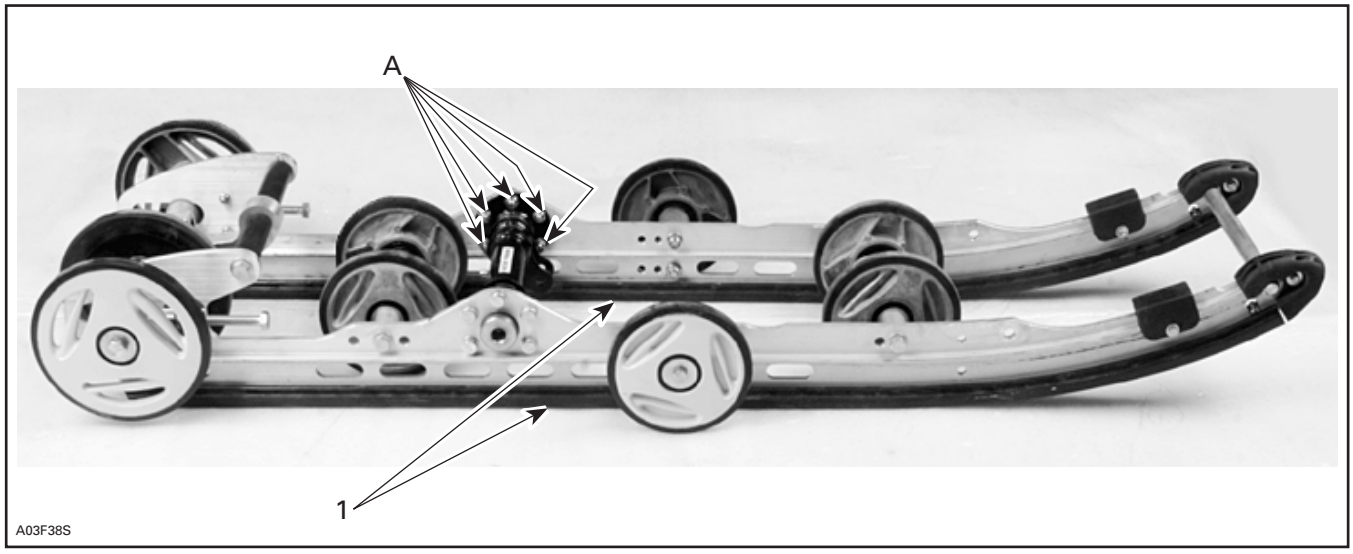
Remove rear axle idler wheel.


A03F3BA

Unscrew remaining axles.


A03F3DS

When assembling, both rails must run parallel. Tighten nuts to 24 N•m (18 lbf•ft).

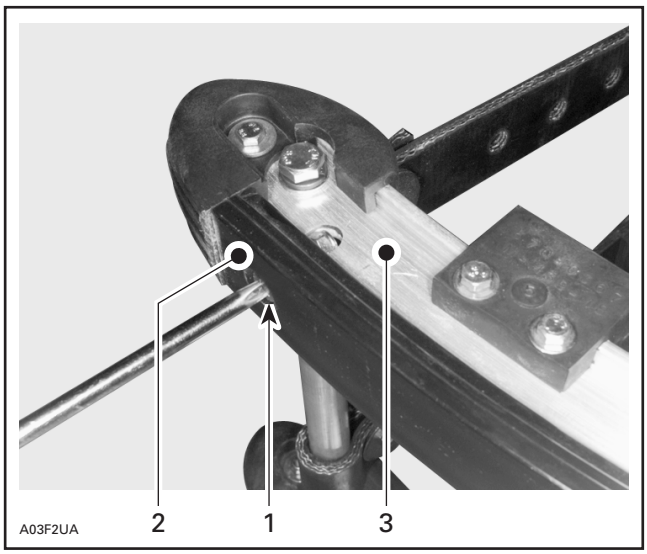


A03F38S

1. Parallel
A. 24 N•m (18 lbf•ft)

8, Slider Shoe

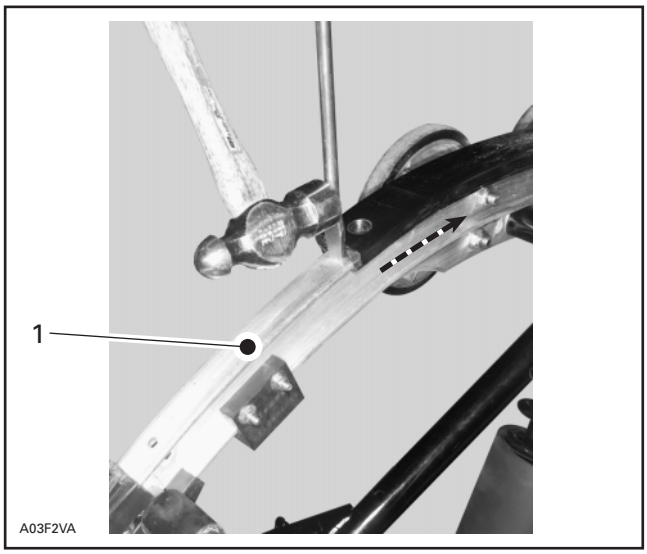
Remove screw retaining slider shoe to rail front end, as shown in the following photo.



1. *Remove screw*
2. *Slider shoe*
3. *Rail*

Using a soft material block or a flat screwdriver, as shown in the next photo, push slider shoe out of the rail.

NOTE: When using a screwdriver to remove slider shoe, ensure not to damage rail surface.



PUSH OUT SLIDER SHOE

1. *Rail surface*

When reinstalling, use a soft sand paper to smooth rail surface.

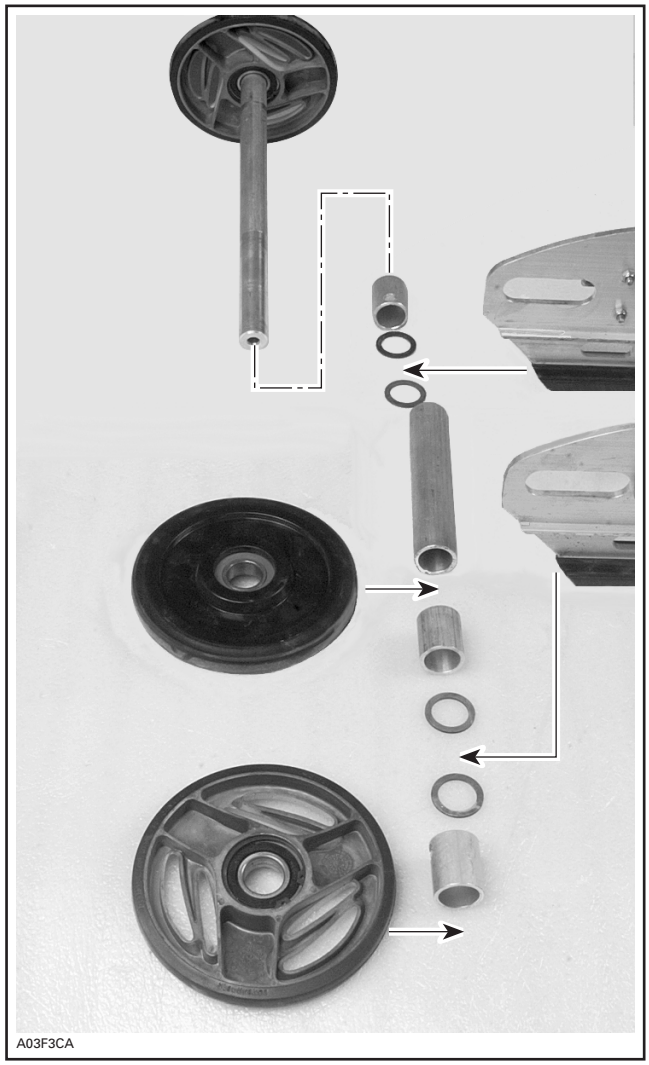
Apply BOMBARDIER LUBE (P/N 293 600 016 — 12 x 14 oz) on rail surface. This will ease new slider shoe installation.

Install new slider shoe and secure with **new** elastic nut (P/N 228 561 045) and original screw.

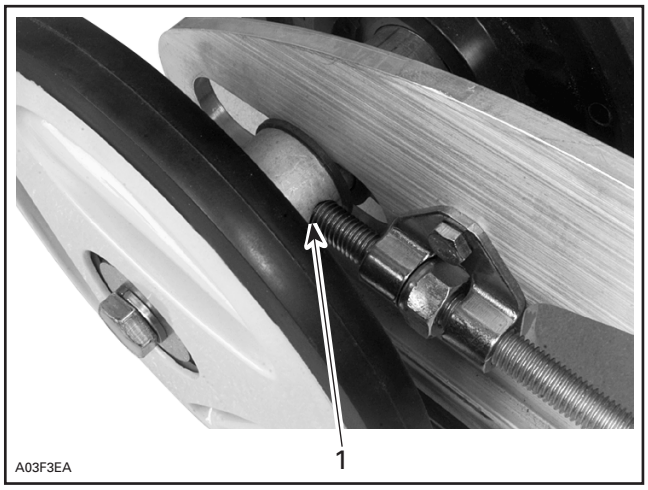
Repeat procedure for the other side.

10, Rear Axle

Remove screws retaining rear axle. Note position of spacers and thrust washers.



When assembling make sure to align screw and small spacer hole.



1. Screw in bushing hole

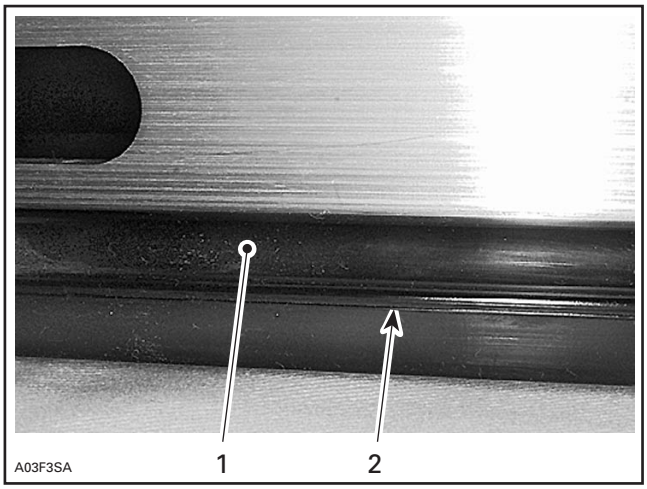
INSPECTION

Shock Absorber

Refer to SUSPENSION AND SKI SYSTEM 08-03 then look for **Shock Inspection**.

8, Slider Shoe

Molding line is the wear limit indicator.



TYPICAL

1. Slider shoe
2. Molding line (wear limit indicator)

Replace slider shoes when wear limit is reached.

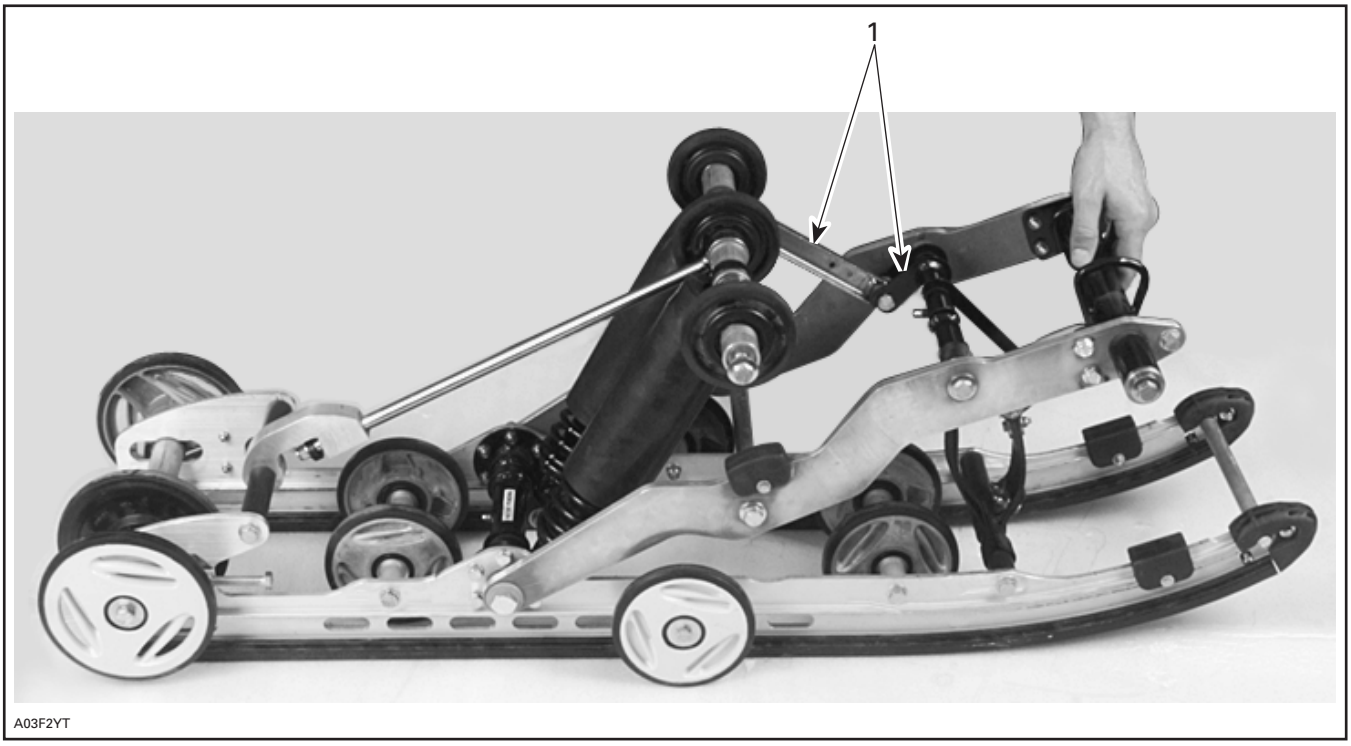
▼ CAUTION

Slider shoes must always be replaced in pairs.

INSTALLATION

▼ CAUTION

Before installing suspension, small torque rod **no. 5** and strap axle lever must be "bent" downward.



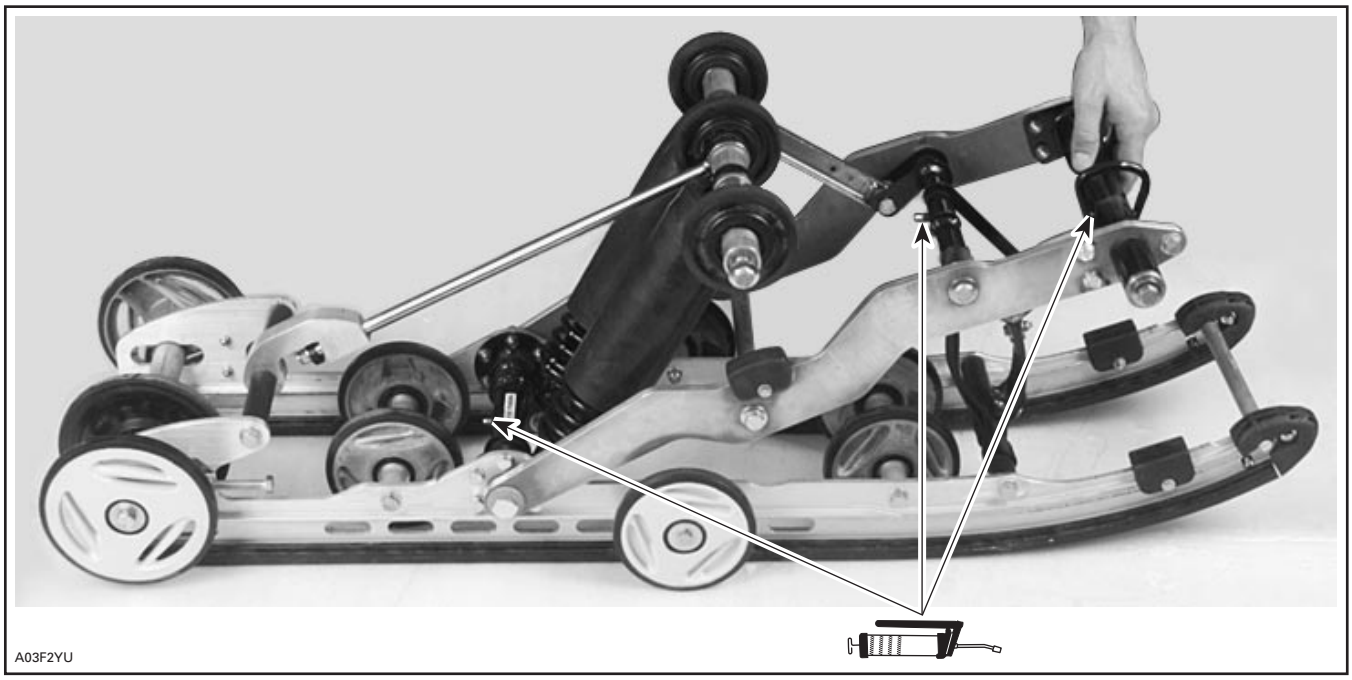
1. Torque rod and lever "bent" downward

RIDE ADJUSTMENT

Refer to *Operator's Guide*.

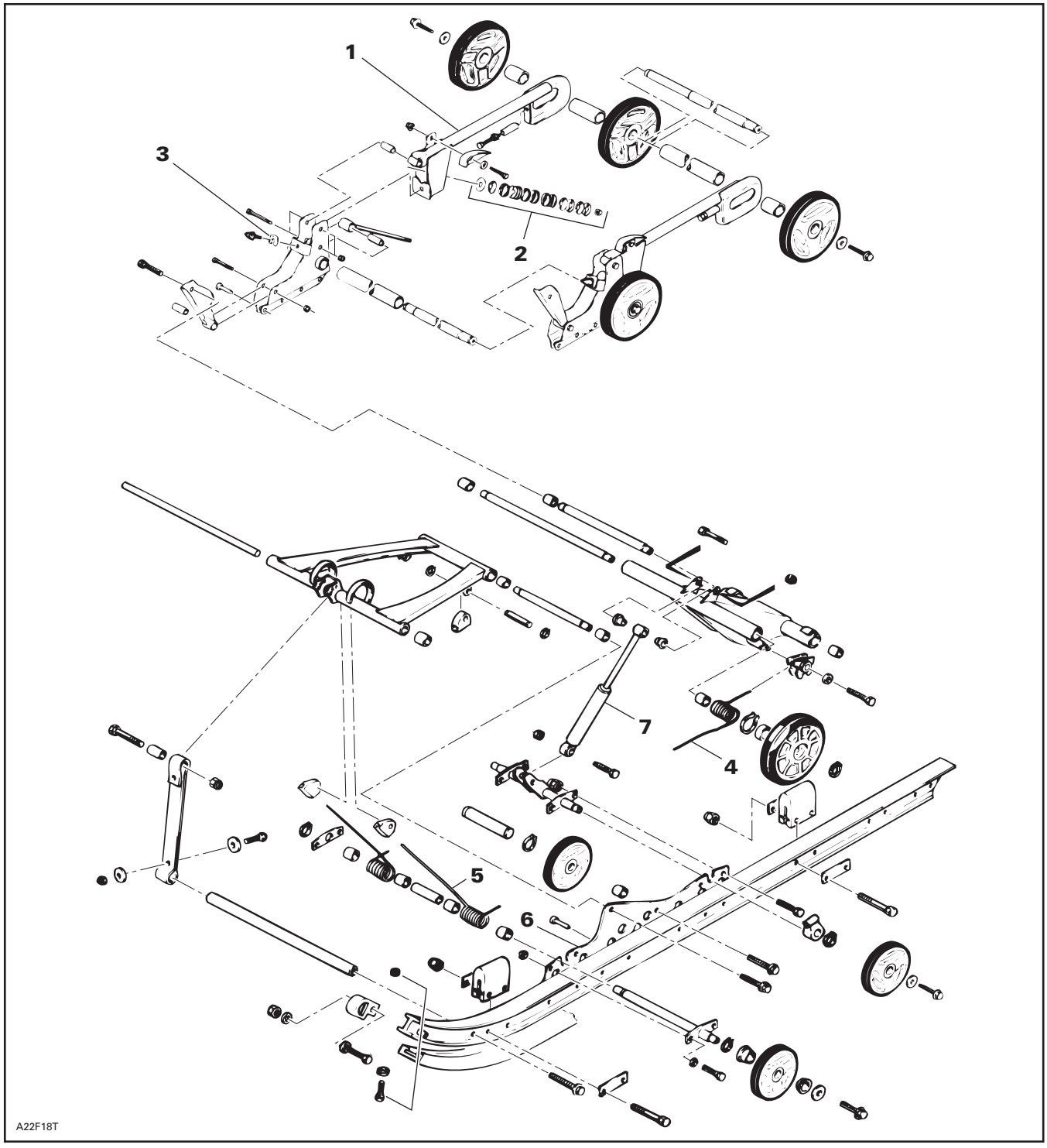
LUBRICATION

Lubricate front axle, strap axle and swing arm lower axle using synthetic grease (P/N 413 711 500).



SKANDIC WT SUSPENSION

Skandic WT/SWT/WT LC



TYPICAL

REMOVAL

Release track tension.

Lift rear of vehicle and support it off the ground.

Unbolt front arm then rear arm.

NOTE: To prevent cross shaft from turning when unscrewing screws assembled with threadlocker, proceed as follows:

– Knock on screw head to break threadlocker bond.
– Loosen one screw then retighten.
– Remove the opposite screw.
– Remove the first one.

Remove suspension ass'y.



A22F1EA

DISASSEMBLY AND ASSEMBLY

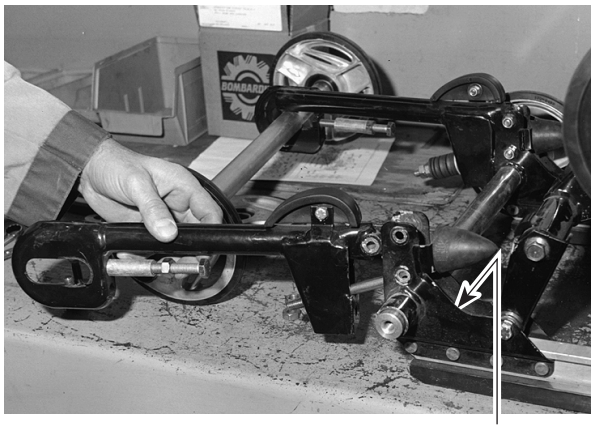
1, Extension

Remove nuts and conical washers from the eye bolt adjuster. Remove bolt retaining eye bolt adjuster to support.

Remove rear idler wheel on appropriate side.

Remove idler wheel from support.

Unbolt extension from its support.

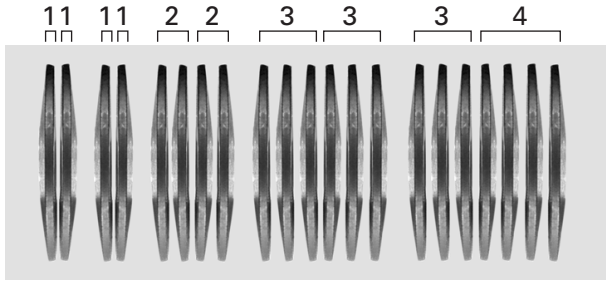


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1. Support

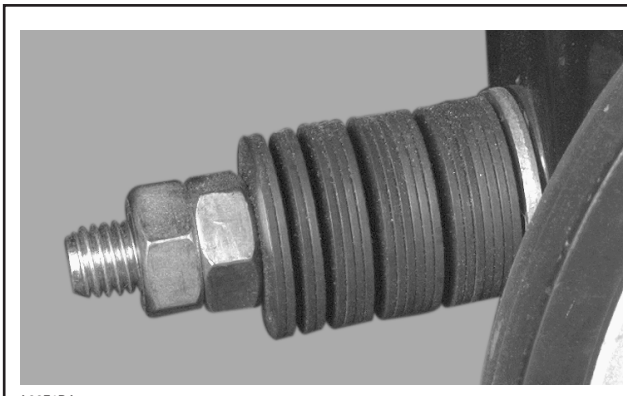
2, Conical Washer

At installation, position conical washers as shown.



A22F1AA

WASHER QUANTITY AND MOUNTING POSITION



A22F1BA

Tighten nut 3/4 turn after contacting washers for better deep snow performance. Maximum preload is 3 turns after nut touching washers. This last adjustment is for trail riding with or without a load and for pulling a load.

4, Rear Spring

Remove top idler wheels.

Unscrew one end of shock.

Remove spring.

5, Front Spring

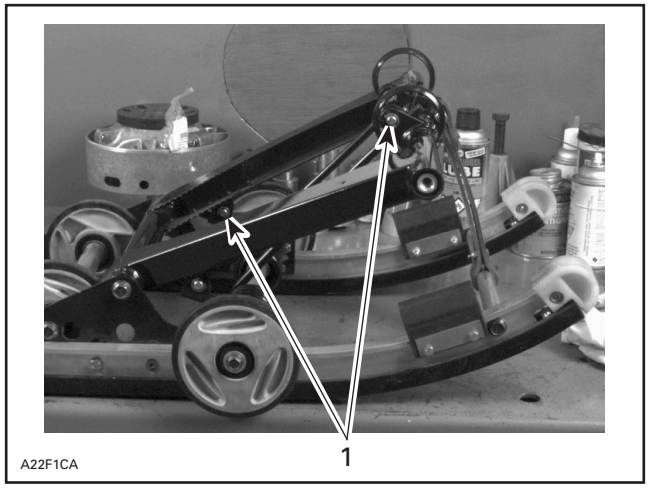
Remove circlips retaining spring support to top and bottom of front arm.

Holding spring end, remove lock pin of top spring support then bottom support lock pin.

Unbolt front idler wheel axle.

Remove idler wheel on side where axle retaining plate is not welded.

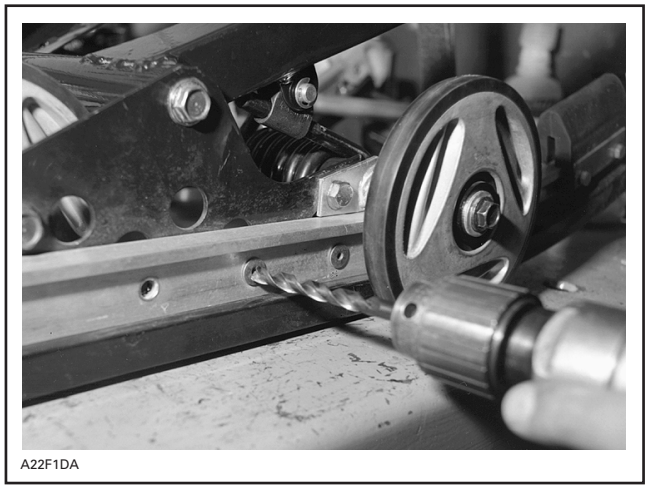
Remove springs.



1. Circlips

6, Support Plate

Drill rivets to remove support plate. Use a 8 mm (21/64 in) drill bit.



Rivets can be substitued by M8 x 20 bolts and nuts.

3, Horse-Shoe Washer

For deep snow riding, do not install washer nor rubber stoppers.

For trail riding with passenger and/or weight, install 1 washer under each rubber stoppers.

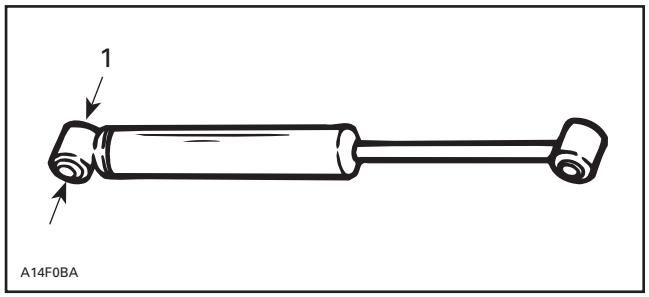
For trail riding with heavy load and/or pulling a load, use 2 washers under each rubber stoppers.

7, Shock

Install shock with its rod upward.

SHOCK ABSORBER SERVICING

Secure the shock body end in a vise.



TYPICAL

1. Clamp

▼ CAUTION

Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke then check that it moves smoothly and with uniform resistance.

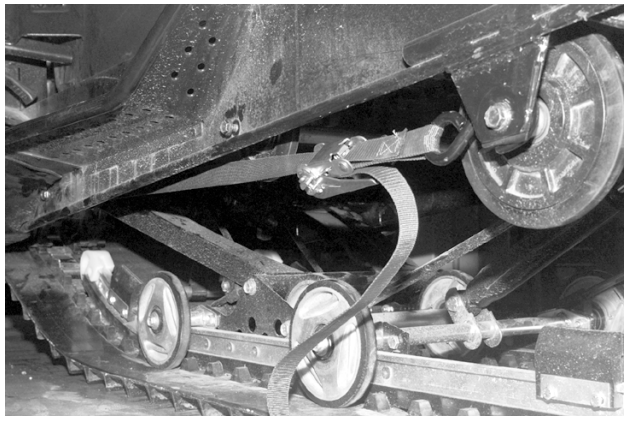
Pay attention to the following conditions that will denote a faulty shock:

– A skip or a hang back when reversing stroke at mid travel.
– Seizing or binding condition except at extreme ends of stroke.
– Oil leakage.
– A gurgling noise, after completing one full compression and extension stroke.

Renew if any fault is present.

INSTALLATION

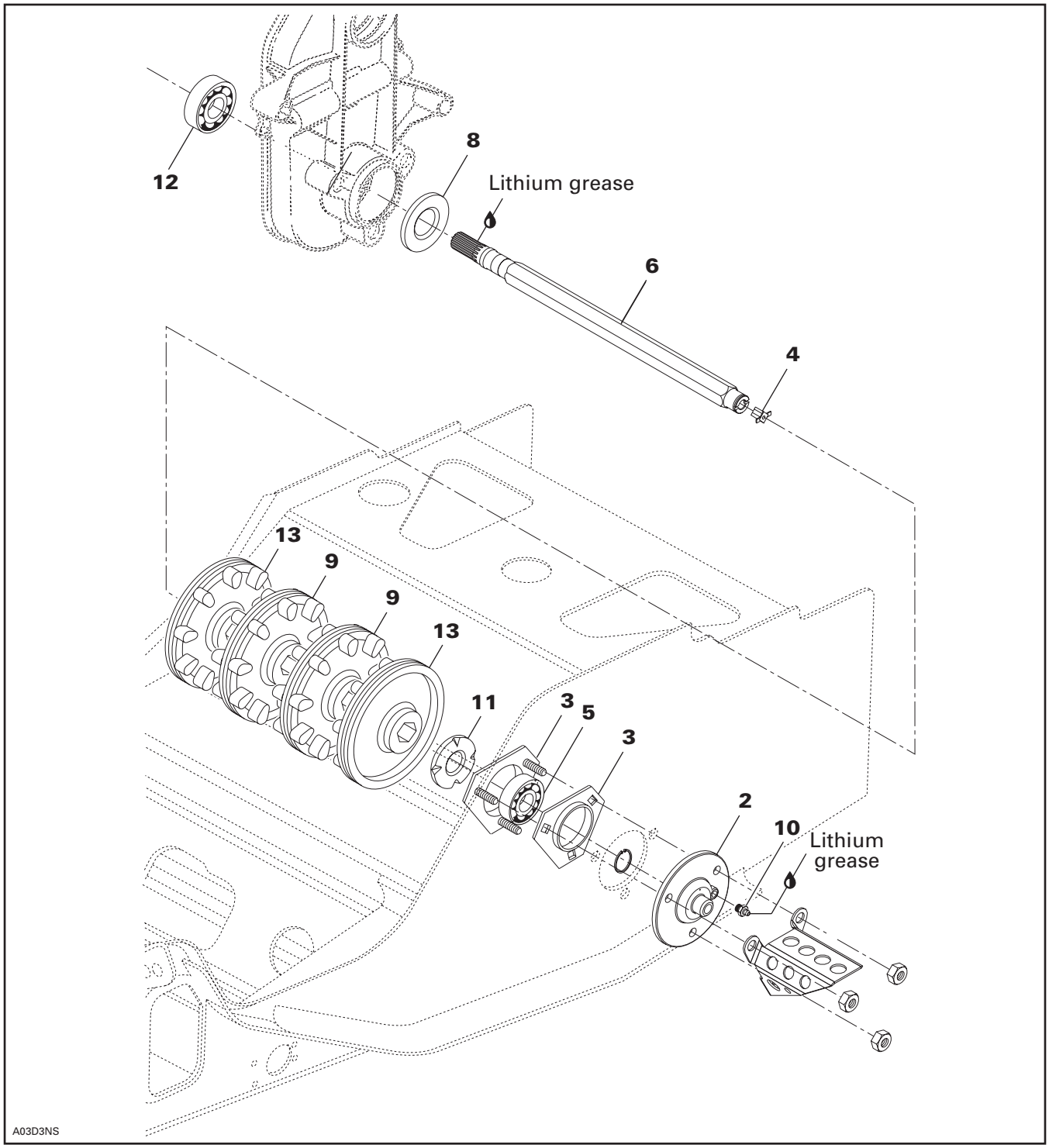
Use a tie-down between front arm and spring axle to ease installation of front arm screws.



A22F1FA

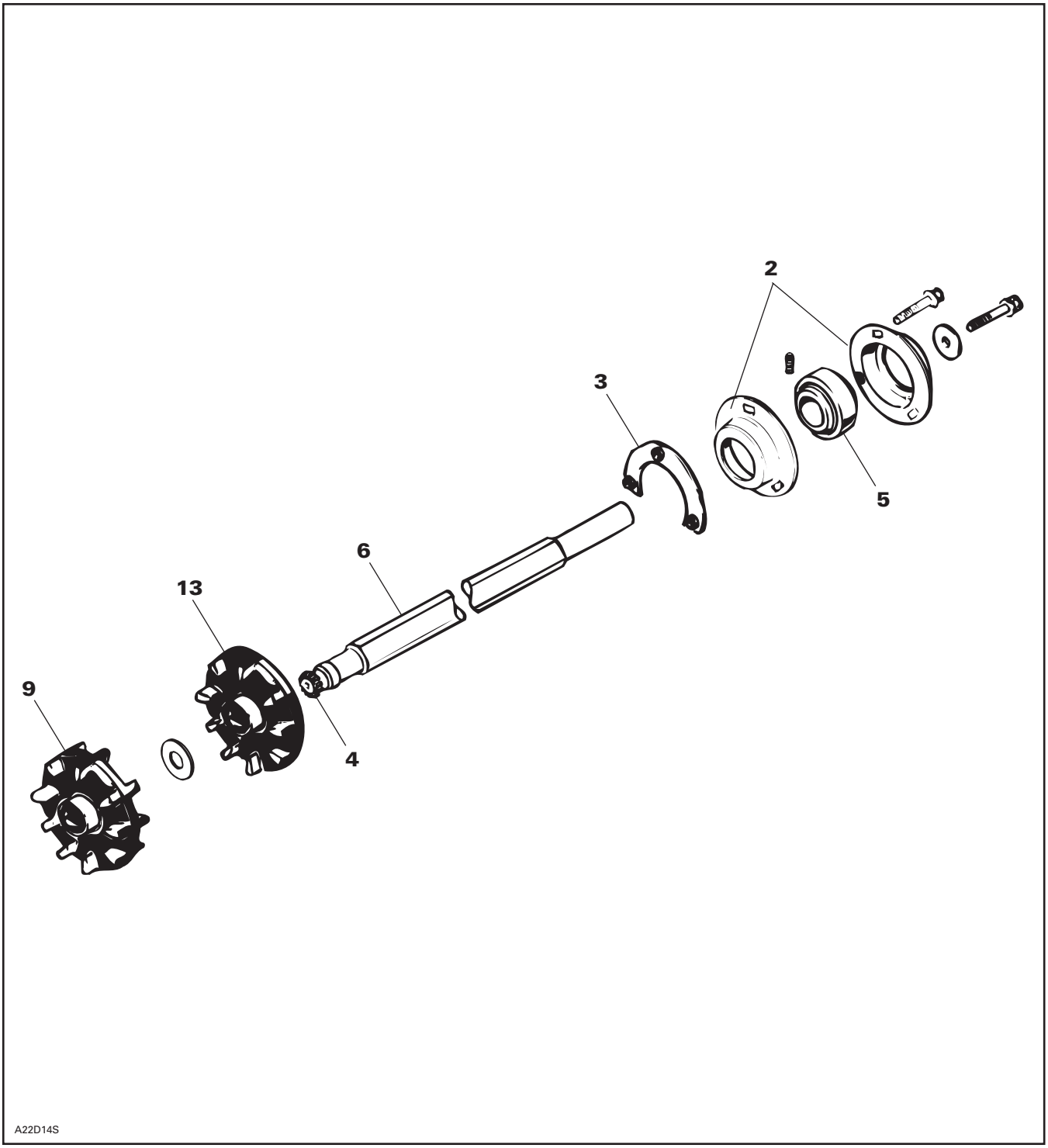
DRIVE AXLE

S-Series



PARTS

Skandic WT/SWT/WT LC



REMOVAL

All Models Except Skandic WT/SWT/WT LC

Drain oil from chaincase or gearbox. Release drive chain tension. Remove chaincase cover.

Raise and block rear of vehicle off the ground.

Remove suspension. Refer to SC-10 SUSPENSION 07-02.

2,8, End Bearing Housing and Seal

Remove speedometer cable, cable protector, and plastic bearing cover. Remove circlip from drive axle.

Remove chain and sprocket then circlip and bearing from drive axle.

Pry oil seals from chaincase and end bearing housing.

6,9,13, Drive Axle and Sprocket

Release drive axle sprocket from track and at the same time, pulling the drive axle towards the end bearing housing side.

Remove drive axle from vehicle.

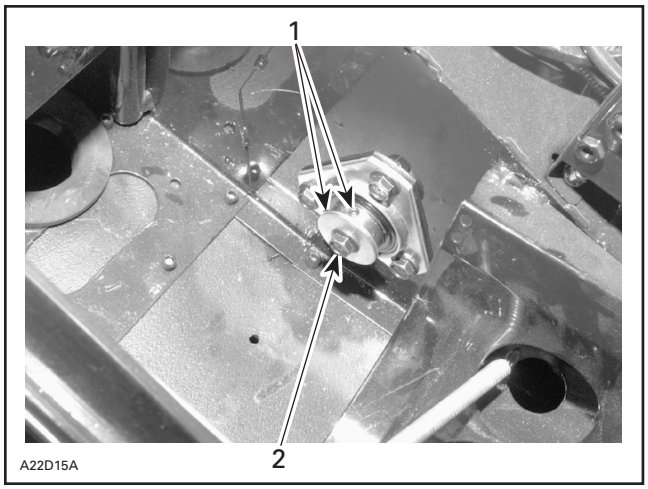
Skandic WT/SWT/WT LC Only

Drain gearbox.

Raise and block rear of vehicle off the ground.

Remove suspension. Refer to SKANDIC WT SUSPENSION 07-04.

Remove muffler. Unfasten screw from drive axle end. Loosen both Allen screws from end bearing.



1. Allen screws
2. Screw

Remove 3 screws retaining end bearing then remove inner plate.

Remove drive axle.

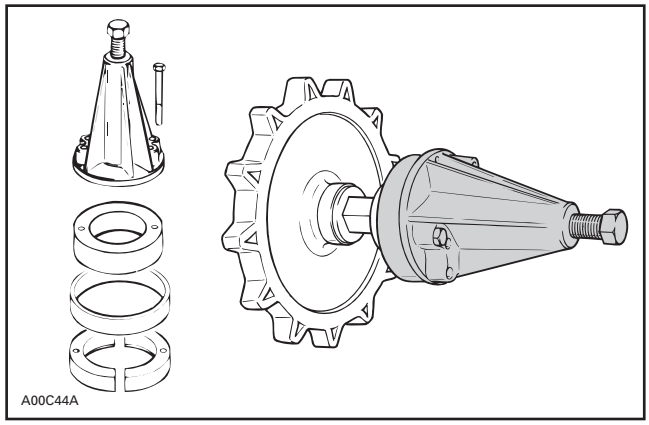
DISASSEMBLY

4, Speedometer Drive Insert

Remove speedometer drive insert.

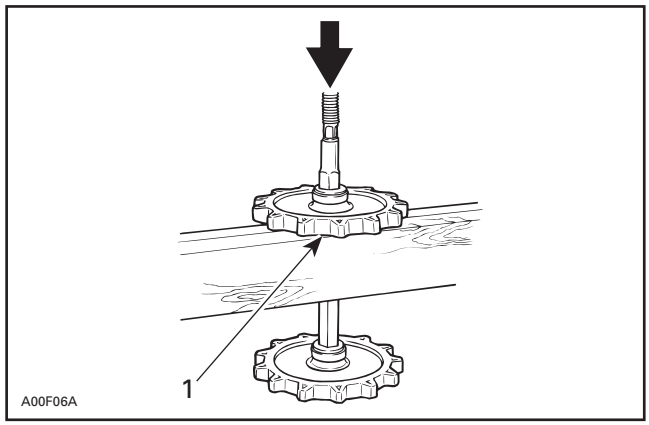
5,12, Bearing

To remove bearings, use puller assembly, ring and half rings as illustrated.



9,13, Sprocket and Half-Sprocket

To remove press fit sprockets, use a press and a suitable support as illustrated.



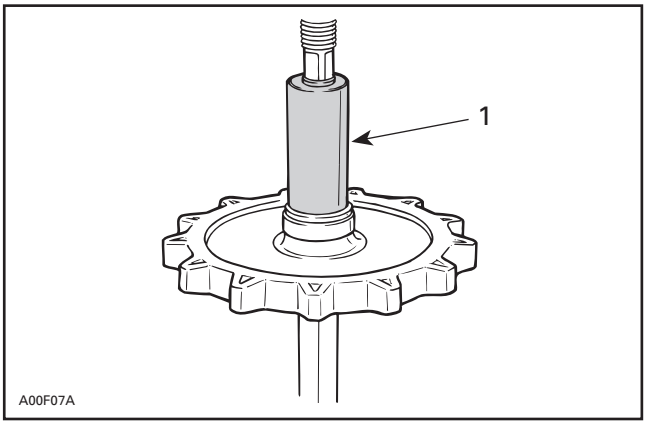
TYPICAL
1. Support sprocket near hub

NOTE: Two different types of sprocket press fit can be found. Ensure to replace ring reinforced sprockets with the same type.

ASSEMBLY

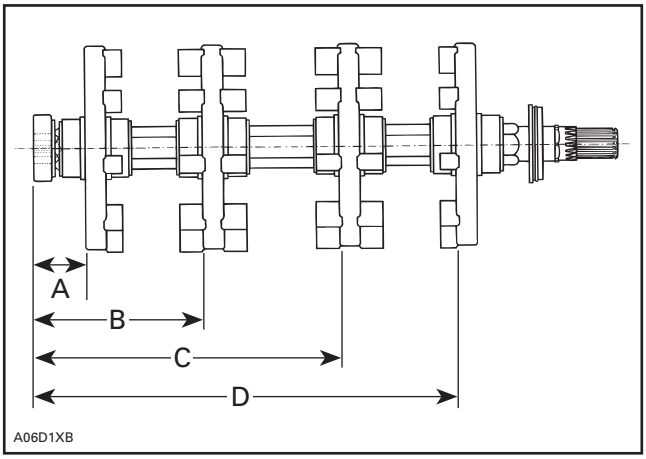
8,9,13, Drive Axle and Sprocket

To assemble press fit sprockets, use a press and a suitable pipe as illustrated. Sprockets must be assembled according to the following dimensions.



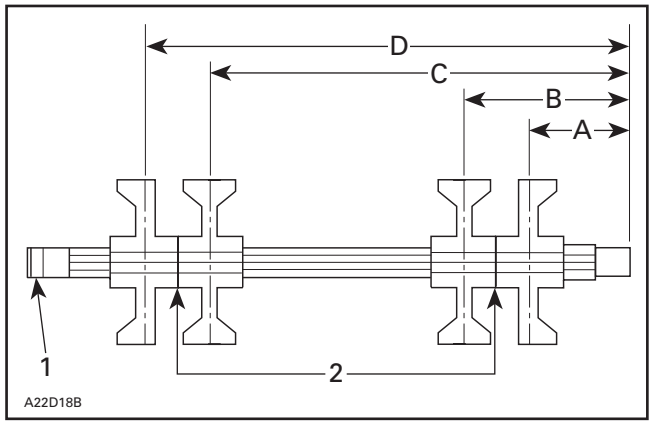
1. Pipe

S-Series



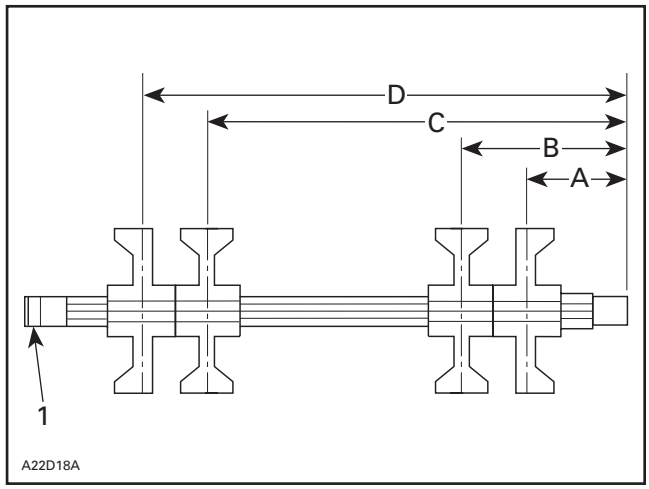
A. 49 mm (1.929 in)
B. 151.2 mm (4.724 in)
C. 274.2 mm (10.795 in)
D. 376.3 mm (14.815 in)

Skandic WT/WT LC



1. Gearbox side
2. Washer
A. 93.5 mm (3-43/64 in)
B. 157 mm (6-11/64 in)
C. 399 mm (15-45/64 in)
D. 462.5 mm (18-13/64 in)

Skandic SWT

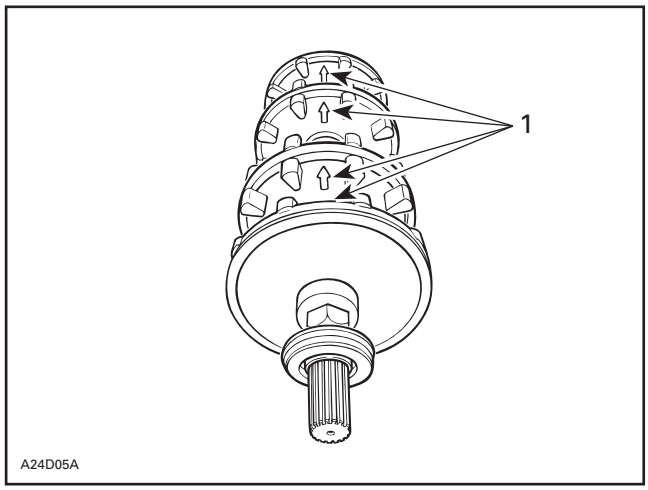


TYPICAL

1. Gearbox side
A. 105 mm (4-9/64 in)
B. 207mm (8-5/32 in)
C. 449 mm (17-43/64 in)
D. 551 mm (21-11/16 in)

All Models

Ensure to align indexing marks of each sprocket when assembling.

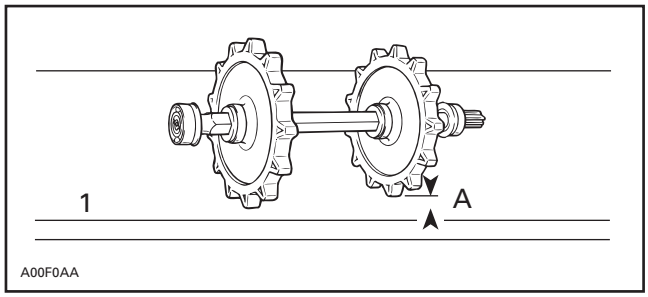


TYPICAL

1. Indexing marks aligned

The maximum desynchronization for the sprockets is 1.5 mm (1/16 in).

To check this tolerance, place axle assembly on a plane surface and measure the gap between sprocket tooth and surface.



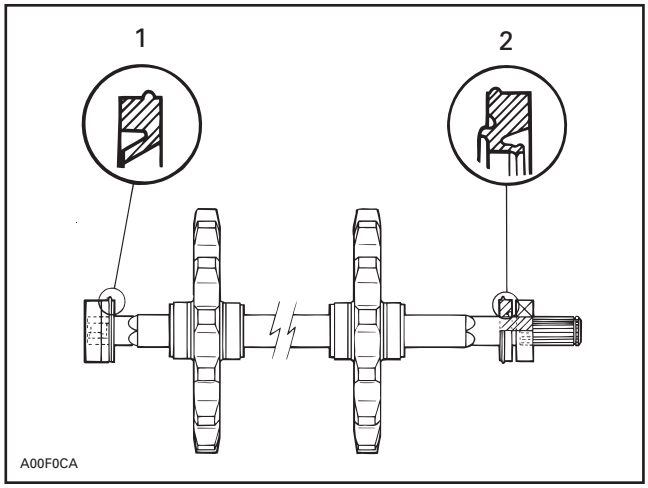
1. Plane surface
A. 1.5 mm (1/16 in) MAXIMUM

▼ CAUTION

The same sprocket must not be pressed twice on the axle. If synchronization is found to be defective, use a new sprocket.

6,8, Drive Axle and Seal

When assembling drive axle, always position a new seal on each end of drive axle (if applicable). Locate seal lip as illustrated.



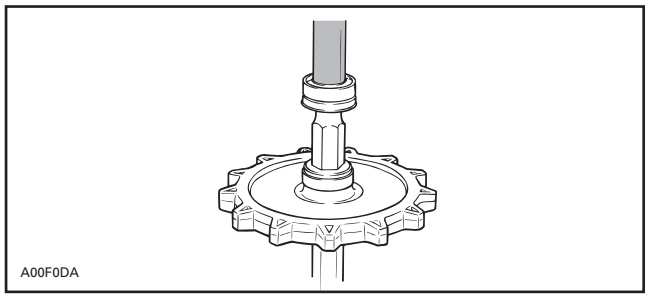
1. Grease seal type
2. Oil seal type

11, Bearing Protector

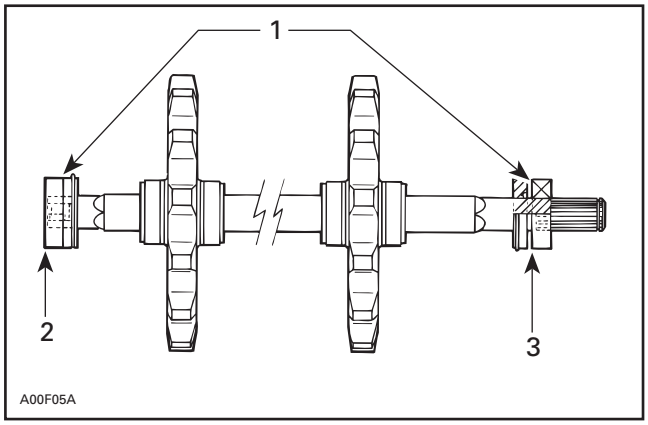
At assembly, flat side of bearing protector must be against bearing.

5,12, Bearing

Always push bearing by inner race.



The bearing on the splined side of axle must be pushed until it is seated on shaft shoulder. The end bearing housing bearing must be flush with end of drive axle. Each bearing must have its shield facing the sprocket.



1. Bearing shield on this side
2. Flush with drive axle
3. Seated on shaft shoulder

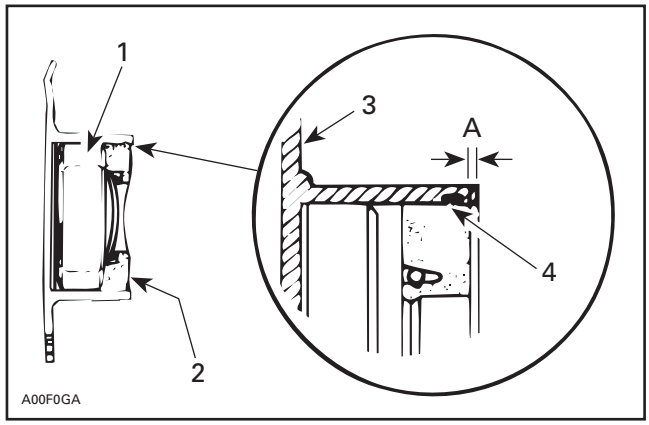
INSTALLATION

4, Speedometer Drive Insert

If the drive axle to be installed is a new part and the vehicle is equipped with a speedometer, a correct size speedometer drive insert must be installed into the axle end. Ensure that insert is flush with end of axle.

Position drive axle assembly into location. Install end bearing housing. Install spacer (if applicable) between bearing and lower chaincase sprocket.

Install chaincase and position seals (if applicable), making sure that a gap of approximately 2 mm (1/16 in) exists between end of bearing housing and each seal.



SIDE VIEW

1. Bearing
2. Seal
3. Housing
4. Seal lip
A. 2 mm approx.

3, Retainer Ring

Make sure that welded nuts are toward inside of tunnel.

Lock drive axle sprocket with a circlip.

Reinstall the chaincase cover.

Refill with chaincase oil. Refer to TECHNICAL DATA 10-03.

Install the suspension. Refer to TRACK 07-06 and adjust track tension and carry out track alignment procedure.

LUBRICATION

15, Grease Fitting

Lubricate end housing bearing with synthetic grease (P/N 513 711 500).

ADJUSTMENT

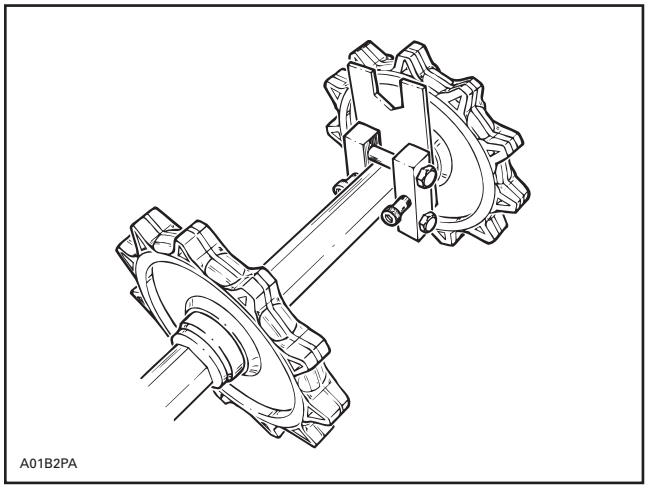
Sprocket/Track Alignment

▼ CAUTION

Do not tamper with sprocket/track alignment if frame or suspension is damaged.

Sprockets might be repositioned to fit lugs without removing drive axle.

Use drive axle sprocket adjuster kit (P/N 861 725 700).



TYPICAL

TRACK

TRACK TYPE APPLICATION

Refer to TECHNICAL DATA section 10-03.

GENERAL

This section gives guidelines for track removal. Some components require more detailed disassembly procedures. In these particular cases, refer to the pertaining section in this manual.

INSPECTION

Visually inspect track for:

– cuts and abnormal wear
– broken rods
– broken or missing track cleats

If track is damaged or rods are broken, replace track. For damaged or missing cleats, replace by new ones, using cleat remover (P/N 529 028 700). Use small-cleat installer (P/N 529 008 500).

◆ WARNING

Do not operate a snowmobile with a cut, torn or damaged track.

REMOVAL

S-Series

Remove the following parts:

– speedometer cable
– muffler
– chaincase cover
– suspension
– drive axle seal
– end bearing housing
– sprockets and chain
– drive axle (toward end bearing housing)
– track

Skandic WT/SWT/WT LC

Remove the following parts:

– rear suspension
– muffler

Drain gearbox.

Remove drive axle then track.

INSTALLATION

All Models

Reverse the removal procedure.

NOTE: When installing the track, respect rotation direction indicated by an arrow on track thread.

Check sprocket/track alignment as described in DRIVE AXLE 07-05.

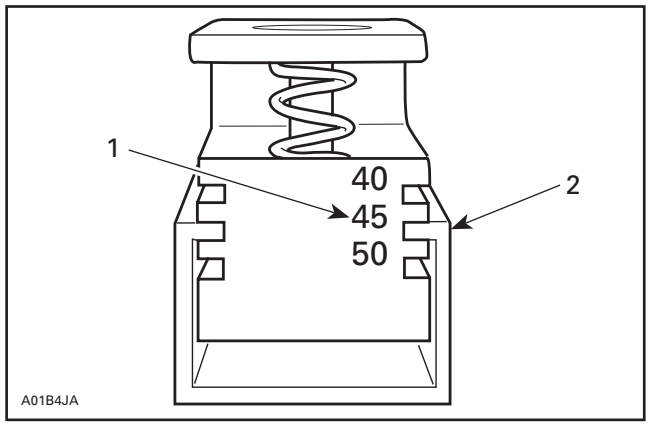
Track Tension and Alignment

Track tension and alignment are inter-related. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

Tension

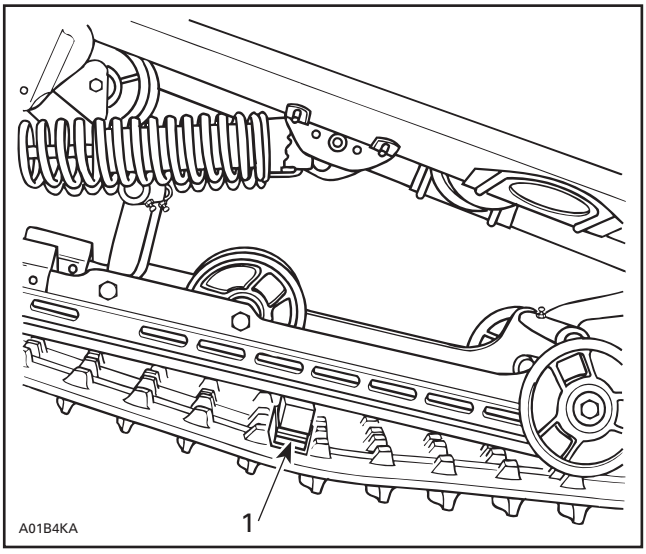
Lift the rear of vehicle and support with a mechanical stand. Allow the slide to extend normally. Check the gap halfway between front and rear idler wheels. Measure between slider shoe and bottom inside of track.

When using the track tension gauge (P/N 529 021 500), slide U-shape extrusion to proper deflection. Refer to TECHNICAL DATA 10.



1. Example: 45 mm
2. Extrusion

Insert preset gauge between slider shoe and track. Allow gauge to settle by forcing track up and down. Track tension is as specified when edge of gauge reaches line.



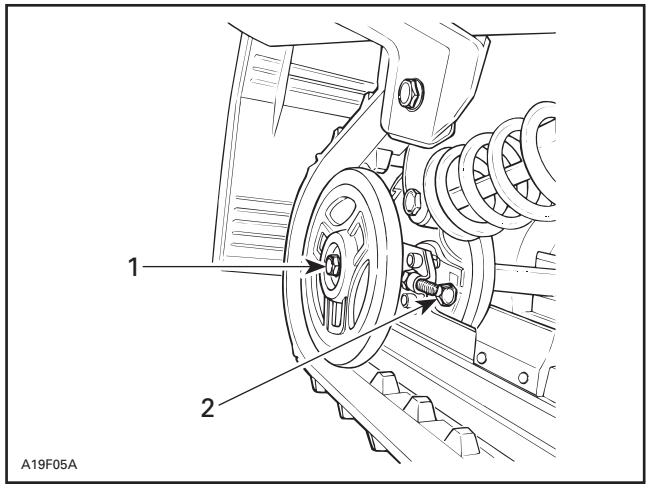
TYPICAL
1. Line

NOTE: Lightly oil track tension gauge center pin to avoid sticking.

▼ CAUTION

Too much tension will result in power loss and excessive stress on suspension components. If too loose, the track will have a tendency to thump.

To adjust, loosen the rear idler wheel retaining screws then loosen or tighten the adjuster bolts located on the inner side of the rear idler wheels.



TYPICAL
1. Retaining screw
2. Adjuster bolt

Alignment

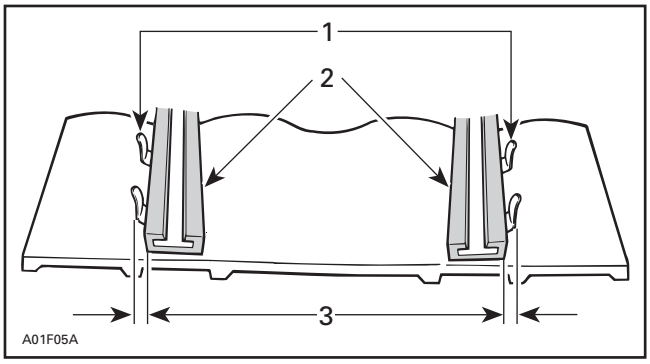
◆ WARNING

Before checking track tension, ensure that the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

All Models

With rear of vehicle supported off the ground, start engine and allow the track to rotate **slowly**.

Check that the track is well centered; equal distance on both sides between edges of track guides and slider shoes.

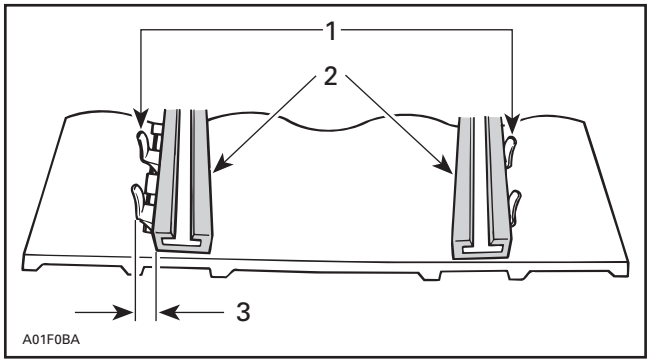


1. Guides
2. Slider shoes
3. Equal distance

◆ WARNING

Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track.

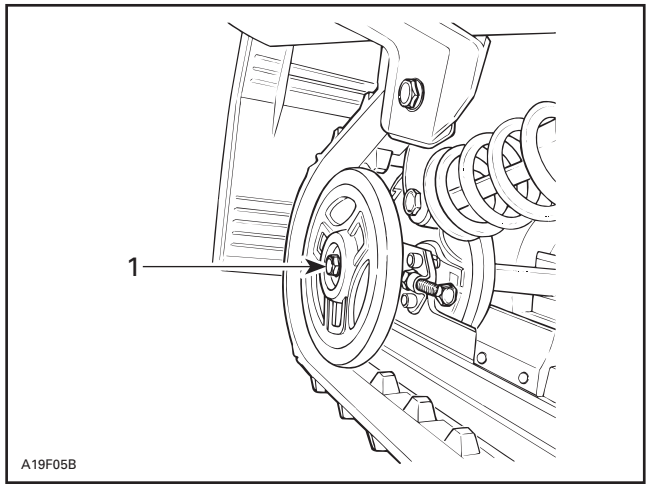
To correct, stop engine then tighten the adjuster bolt on side where guides are farthest to slide. Recheck alignment.



1. Guides
2. Slider shoes
3. Tighten on this side

NOTE: Torque retaining screw to 48 N•m (35 lbf•ft) after adjustment.

Tighten the idler wheel retaining screws.



TYPICAL
1. Retighten

Restart engine, rotate track **slowly** and recheck alignment.

Track Cleat

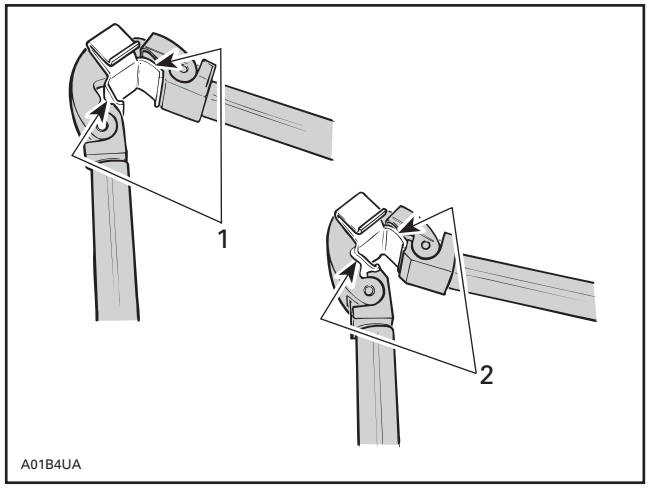
Removal

– Raise rear of vehicle off the ground and lift snowguard then rotate track to expose a cleat to be replaced.
– Using track cleat remover (P/N 529 008 700) for all models.

Installation

NOTE: Keep the same pitch between guide cleats.

– Place new cleat in position and using small track cleat installer (P/N 529 008 500) bend cleat then push tabs into rubber.



TYPICAL
1. First step
2. Second step (to push tabs into rubber)

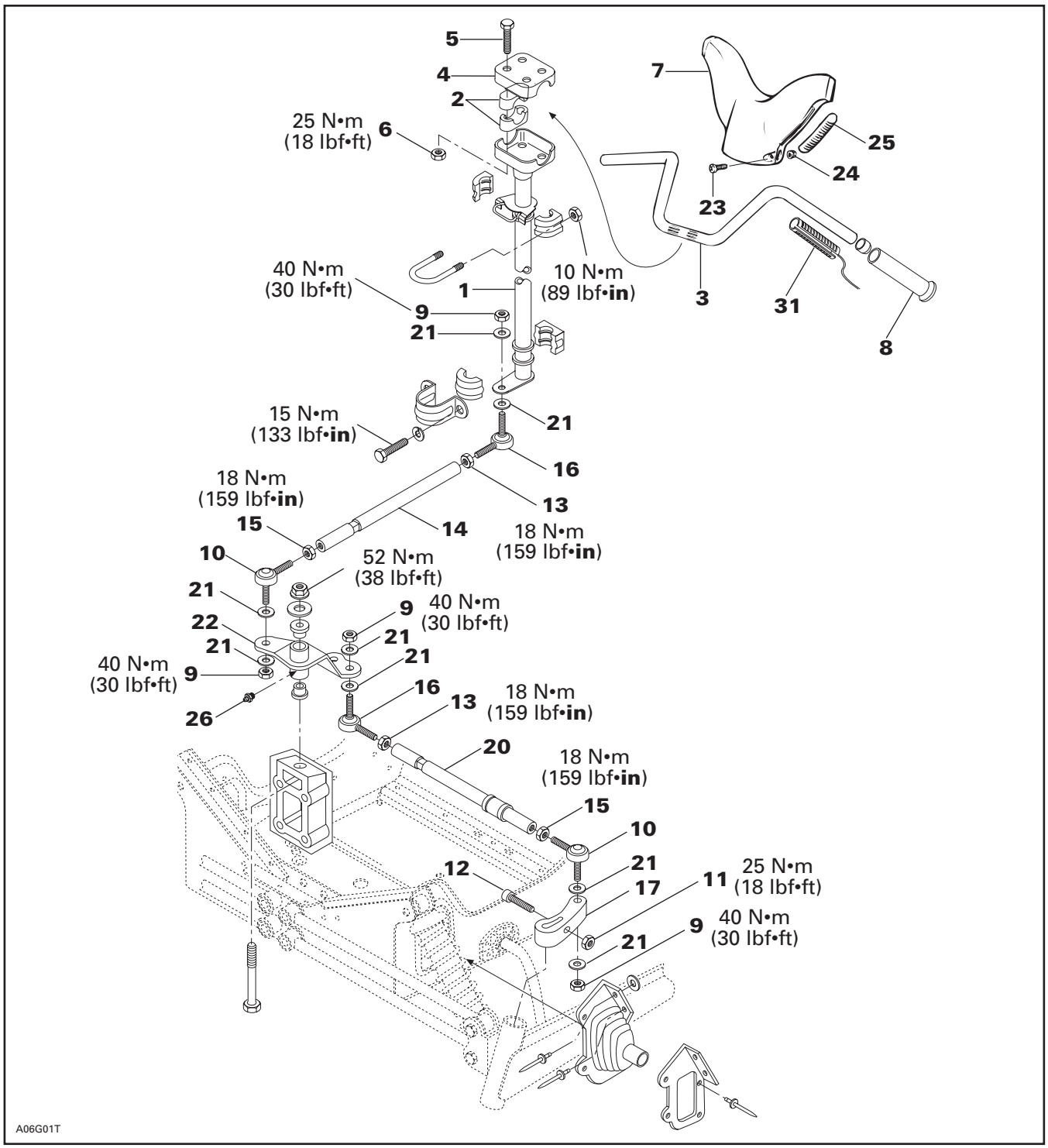
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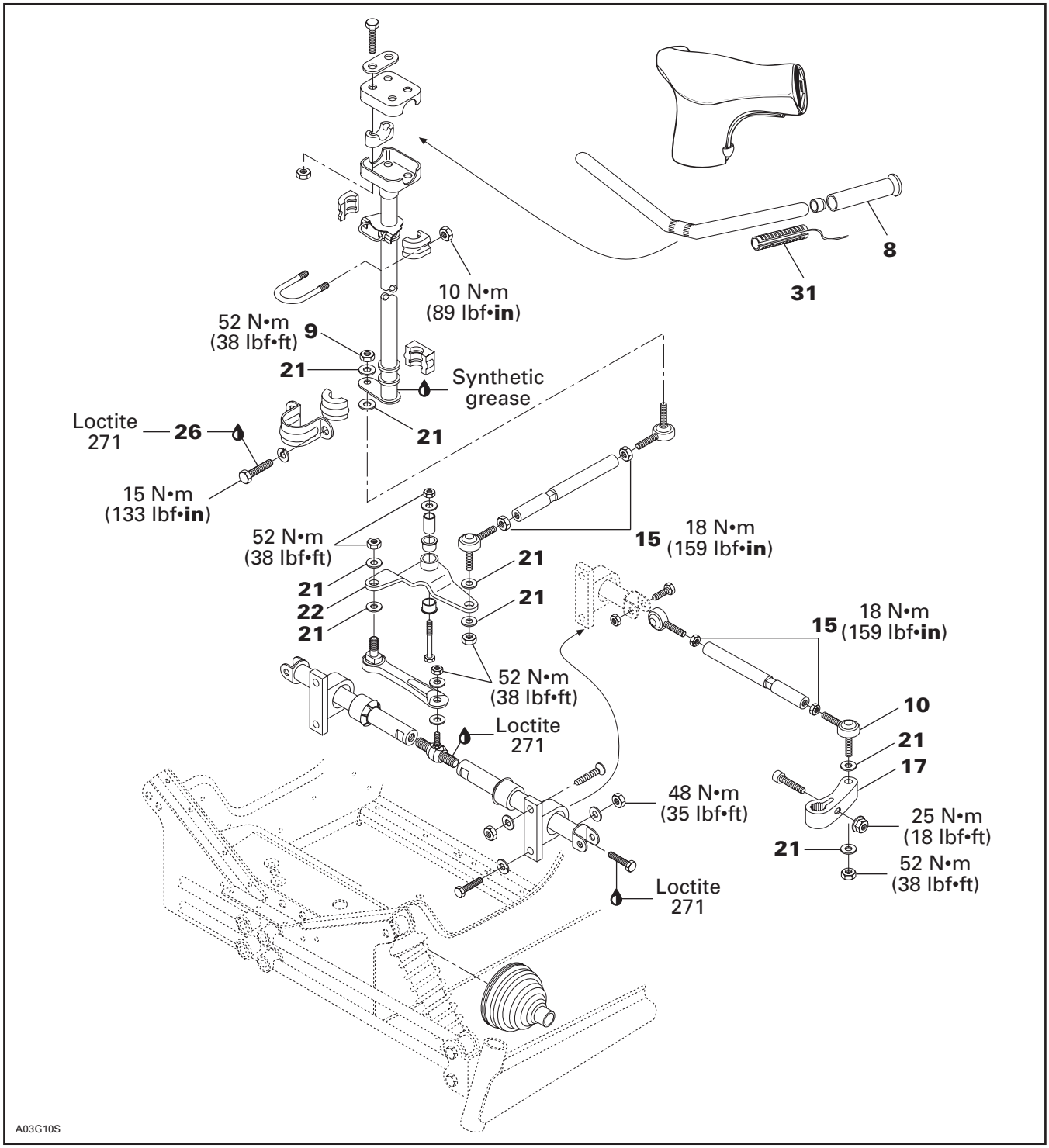
STEERING SYSTEM

Formula DLX 500/583/670, MX Z 440, Grand Touring 500/583 and Summit 500/X 670



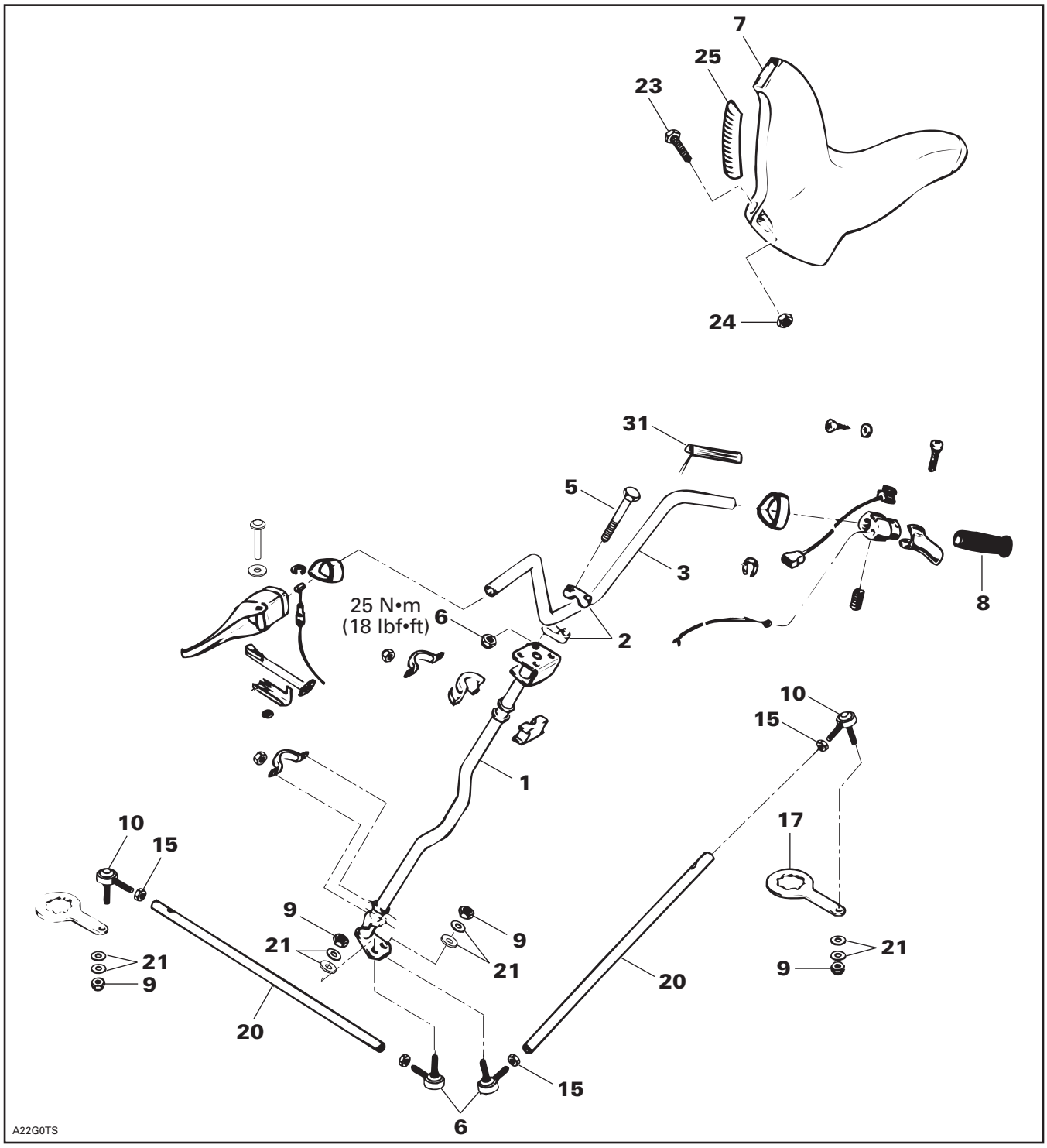
PARTS

MX Z 500/670 HO and Formula 500/583/670



PARTS

Skandic WT/SWT/WT LC



TYPICAL

INSPECTION

Check skis and runner shoes for wear, replace as necessary. (See section 08-03).

17, Steering Arm and Ski Leg

Make sure steering arm and ski leg splines interlock.

◆ WARNING

Any parts having worn splines have to be replaced with new ones.

Check the general condition of the steering system components for wear. Replace if necessary.

DISASSEMBLY AND ASSEMBLY

8, Grip

Grips can be removed and installed without any damage by injecting compressed air into the handlebar or by heating them with a heat gun.

1, Steering Column

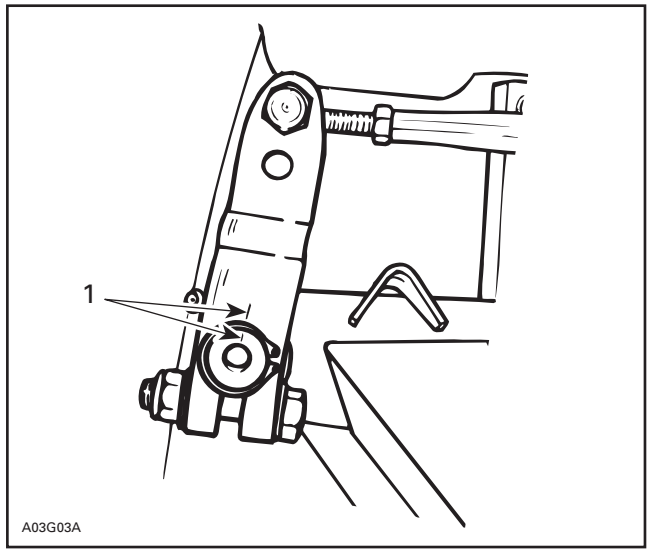
Remove steering pad then handlebar ass'y.

To gain access remove the air intake silencer and carburetor(s).

Detach the short tie rod (under the engine) from the steering column.

17, Steering Arm

To maintain correct steering geometry for reassembling, punch mark the steering arm and ski leg before disassembly.

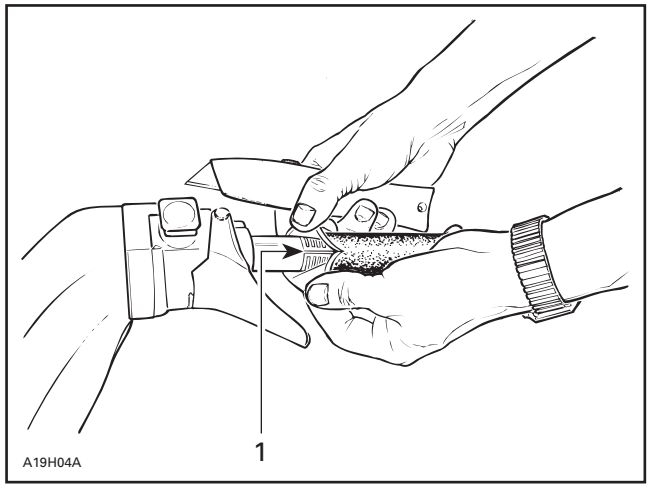


TYPICAL
1. Punch marks

31, Heating Grip Element

On vehicles equipped with heating, the grips, might be unremovable as explained above. In this case, carefully proceed as follows to prevent damaging the heating elements.

Locate the element wires inside the handlebar; look through end of grip. Start cutting the grip exactly opposite the element wires and immediately peel it open to locate the gap in the heating element, as shown.



1. Gap in the heating element opposite the wires

Continue cutting along the gap and remove the grip. If required, slowly peel heating element from handlebar and remove it.

To install, stick the heating element to the handlebar making sure the wires do not interfere with operation of the accelerator or brake handle.

◆ WARNING

Never use lubricants (e.g. soap, grease, etc.) to install the handlebar grip, use a mix of soap and water. Mix 40 parts of water with one part of dish washing soap (recommended: Ultra Joy, Sunlight or Palmolive).

Heat the grip with a heater gun or a spotlight to ease installation. Insert new grip with a rubber mallet.

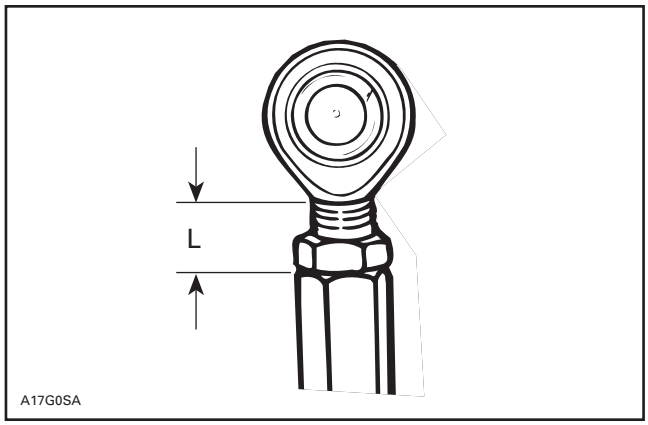
INSPECTION

Refer to TESTING PROCEDURE 06-06.

10,16, Ball Joint (left hand and right hand threads)

Inspect ball joint ends for wear or looseness, if excessive, replace them.

Screw threaded end of the ball joint into the tie rod. The maximum external threaded length not engaged in the tie rod must not exceed the value L in the following thread length chart:

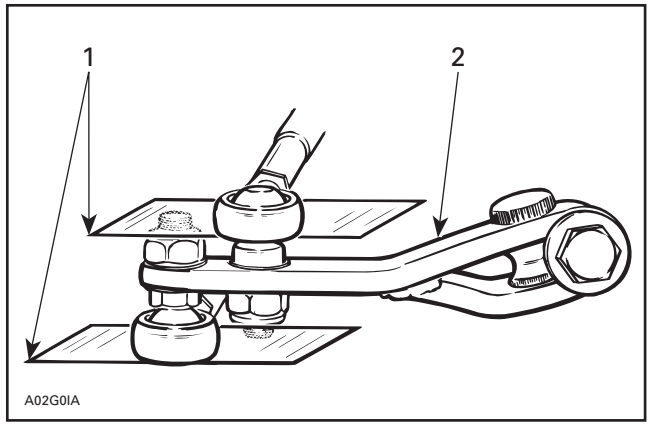


TYPICAL

MODEL	L	
	mm	(in)
All	20	(25/32)

The ball joint should be restrained when tightening the tie rod end lock nut. Align it so the tie rod end is parallel to the steering arm when assembled on the vehicle, refer to the following illustration.

For proper torque specifications refer to the specific exploded view for the vehicle being serviced.



TYPICAL

1. *Parallel with steering arm*
2. *Steering arm*

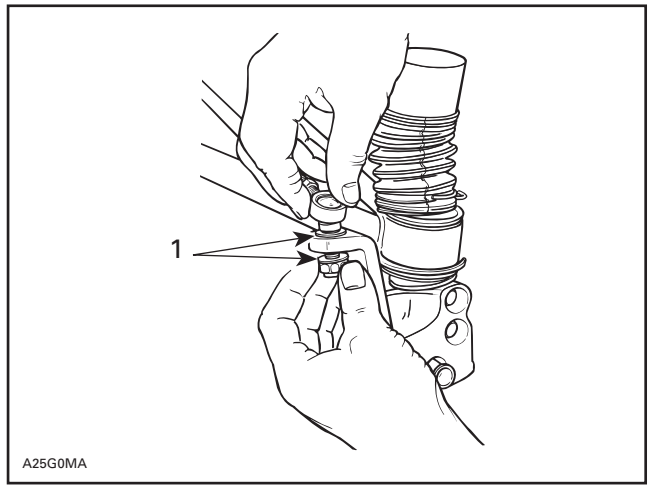
◆ WARNING

The cut off section of the ball joint must run parallel with the steering arm. When tightening lock nuts, restrain ball joint with appropriate size wrench. Ensure not too many threads are kept outside of the tie rod according to the thread length chart.

21, Hardened Washer

All Models Except Skandic WT/SWT/WT LC

Install a hardened washer on each side of the arm.

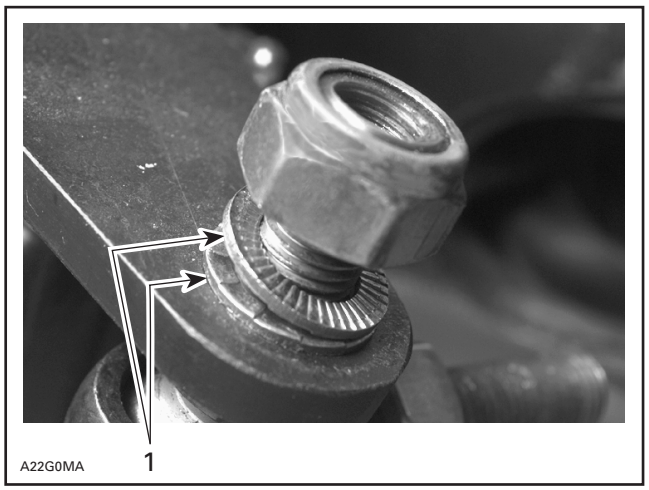


TYPICAL

1. *Hardened washers*

Skandic WT/SWT/WT LC Only

Install special washers (locking disks) with teeth facing each others.



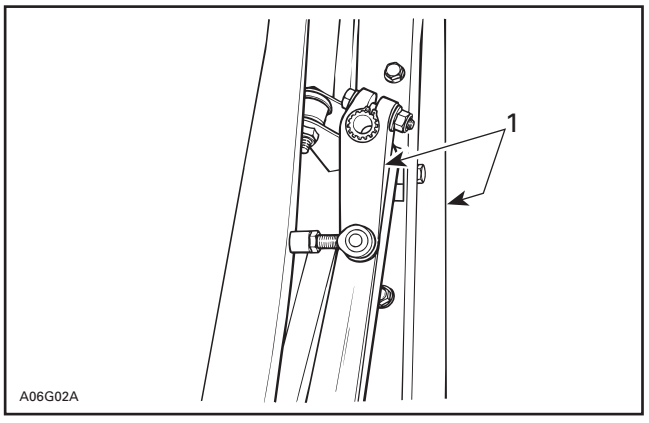
1. Large teeth

All Models Except Skandic WT/SWT/WT LC

17, Steering Arm

The steering arm angles should be equal on both sides when skis are parallel with vehicle.

Steering arm must run parallel to ski.



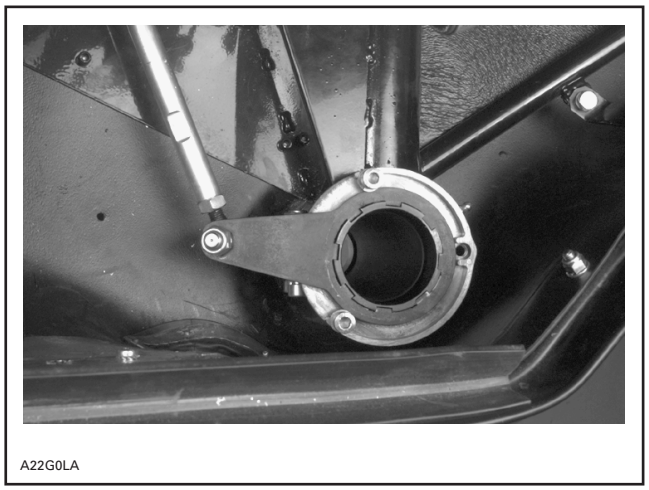
TYPICAL

1. Parallel

Tighten the steering arm pinch bolt to the torque specified in the exploded view.

Skandic WT/SWT/WT LC Only

Install steering arm at mid-travel position when handlebar is facing straight ahead.



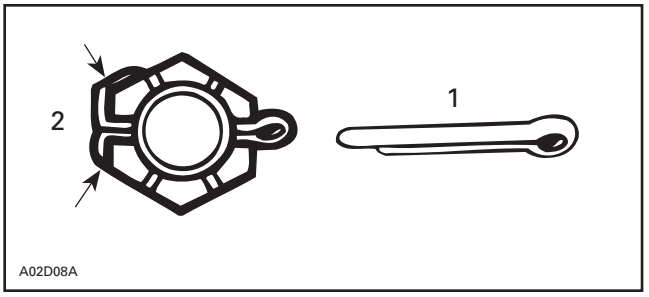
TYPICAL

9,13,15, Ball Joint Nut and Jam Nut

Tighten ball joint, nuts and jam nuts to specified torque (see exploded view).

9, Vehicles with a Castle Nut

After proper torque has been applied to the ball joint nut, insert a cotter pin through the hole in the tie rod end bending the ends around the nut as shown in the following illustration.



1. New
2. Fold cotter pin over castellated nut flats only

11,12, Steering Arm Nut and Bolt

Tighten steering arm nuts to specified torque (see exploded view).

ADJUSTABLE HANDLEBAR

1,3, Steering Column and Handlebar

If applicable, remove the steering clamp and nuts holding the handlebar to the steering column.

2,4,5,6, Handlebar Support, Steering Clamp, Bolt and Nut

Install the handlebar support, steering clamp, the 4 screws and nuts to the column, as illustrated.

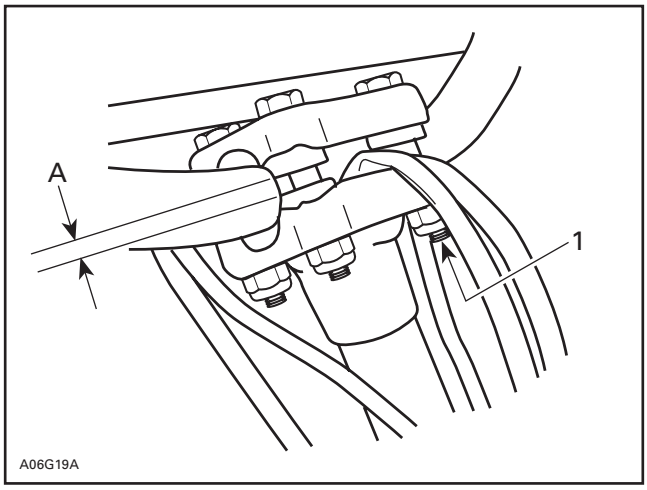
See applicable exploded view for each model.

Adjust the steering handlebar to the desired position.

Lock the handlebar in place by tightening the 4 nuts as specified in the illustrations.

▼ CAUTION

Tighten the nuts equally in a criss-cross sequence and ensure there is an equal gap on each side of the clamps.



TYPICAL

1. Torque to 26 N•m (19 lbf•ft)
A. Equal gap all around

◆ WARNING

Avoid contact between the brake handle and the windshield by NOT adjusting the handlebar too high.

◆ WARNING

Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.

7,23,24,25, Steering Pad, Bolt, Nut and Rubber Attachment

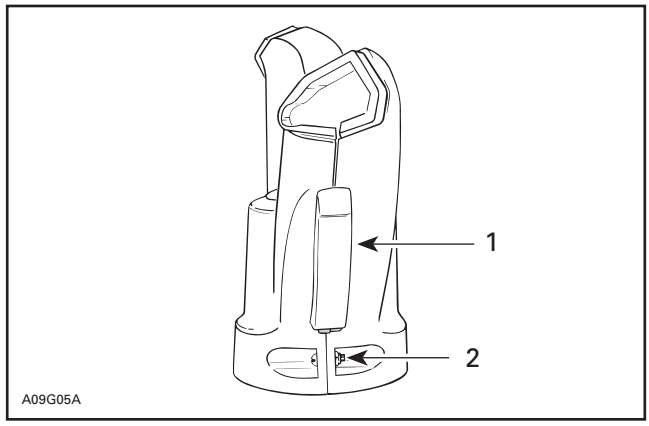
▼ CAUTION

Prior to installation, perform handlebar adjustment.

Properly fit the steering pad to the handlebar. Assemble using the 2 rubber attachments, nuts and bolts where applicable.

◆ WARNING

Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.



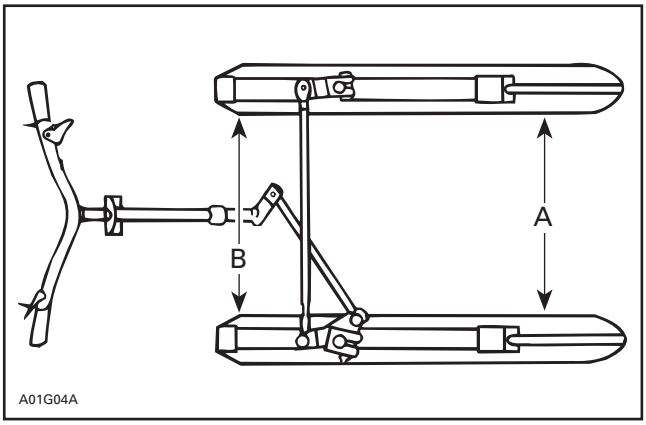
1. Rubber attachment
2. Nut and bolt (where applicable)

STEERING ADJUSTMENT (SKIS)

Definitions

TOE-OUT:

A difference measured between the front edge of the skis A and rear edge B as viewed from the top. It is adjustable.



CAMBER:

A specific inward or outward tilt angle of ski leg compared to a vertical line when viewing the vehicle from front. **This angle is adjustable on some models only.**

Adjustments

S-Series

Adjustments should be performed following this sequence:

– Pivot arm centering.
– Set camber angle (some models).
– Check for an horizontal handlebar.
– Set toe-out.

DSA System

PIVOT ARM CENTERING

◆ WARNING

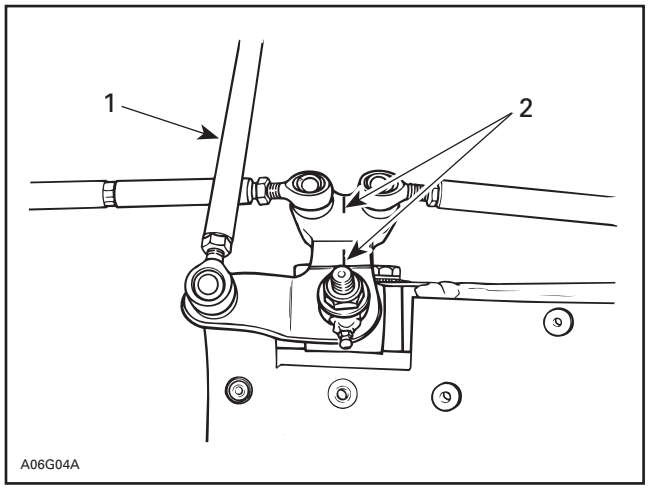
Do not attempt to adjust straight-ahead ski position by turning the ball joint on tie rod no. 14.

13,14,15,22, Jam Nut, Tie Rod and Pivot Arm

With handlebar in straight-ahead position, the center of the pivot arm must be in line with the end of the bolt. Loosen the jam nuts on tie rod no. 14 (LH threads on steering column end) and turn tie rod accordingly. Align and retighten the jam nuts to 18 N•m (159 lbf•**in**).

◆ WARNING

Never lengthen tie rod making threaded portion of ball joint exceed 20 mm (25/32 in).



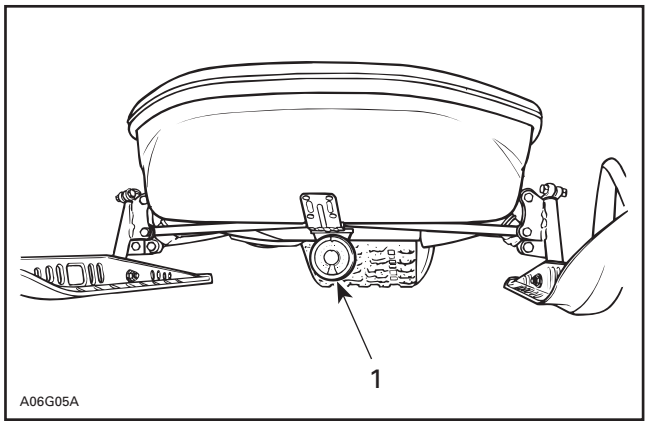
*1. Tie rod **no. 14***
2. Center of pivot arm in line with bolt end

CAMBER

NOTE: On vehicles without adjustable radius arms (no. 7) the camber is not adjustable.

NOTE: Identical adjustments are required on both sides of the vehicle.

– Make sure the vehicle is leveled by placing an angle finder under the main frame member as shown on the following illustration.



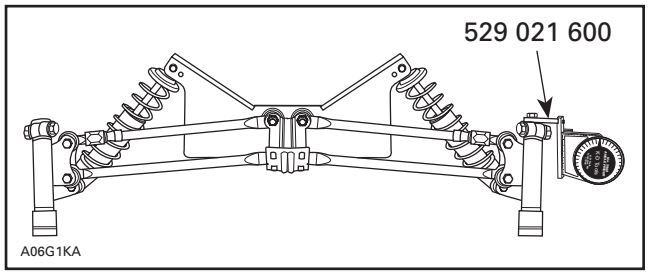
1. Angle finder

Using special tool (P/N 529 021 600) mounted to the ski leg, position the angle finder on the tool as shown in the following illustration. An alternative location for the angle finder, if the special tool is not available, is the outside of the ski leg housing.

Adjust the camber to 0° ± 0.5°.

▼ CAUTION

Angle finder must sit square against swing arm. Positioning angle finder against weld bead or decal may result in false reading.



TYPICAL — DSA CAMBER ADJUSTMENT SET-UP

Adjusting

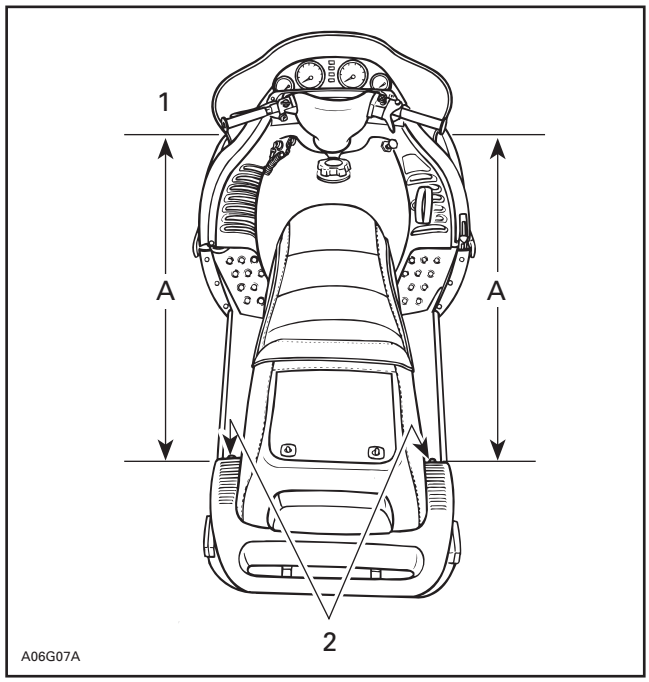
– Loosen lock nut on both lower control arms.

– Unbolt both upper control arms at ski leg housing. Turn tie rod half a turn at a time to obtain a vertical ski leg (0° ± 0.5°). Bolt upper control arms.

HANDLEBAR AND SKI TOE-OUT

Check that handlebar is horizontal when skis are in straight-ahead position by measuring from the extremities of the grips to the rearmost edge of the tunnel, as shown.

NOTE: The reference point must be the same relative to each side.



TYPICAL

1. Equal distance A on each side
2. Same reference point (rivet)

Adjustment is performed by adjusting length of left and right tie rods **no. 20**.

◆ WARNING

Do not attempt to adjust skis straight-ahead position by turning ball joint on tie rod no. 14.

Procedure:

– Loosen jam nuts **no. 13** and **no. 15** of both tie rods **no. 20**.

– Turn the tie rod on one side to shorten its length.

– Lengthen the other one by turning it exactly the same amount, so that toe-out is not changed.

◆ WARNING

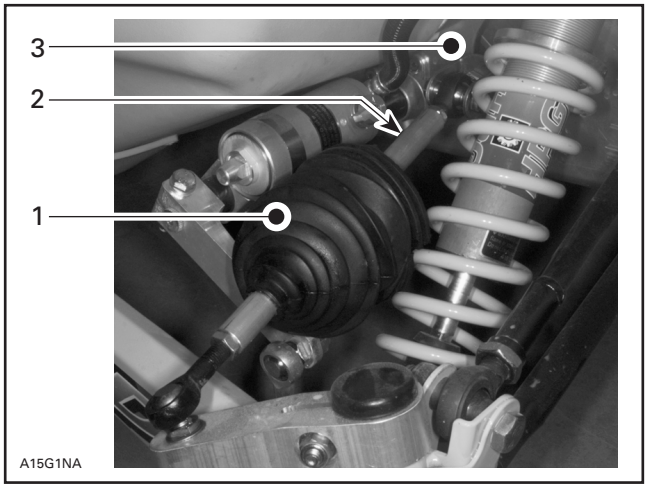
Never lengthen tie rod making threaded portion of ball joint exceed 20 mm (25/32 in).

– Close front of skis manually to take all slack from steering mechanism.

NOTE: A rubber cord must be hooked in front of skis to keep them closed.

Some Models Only

In order to ease steering tie rod loosening, detach rubber boot from snowmobile frame. Refer to the following photo.



TYPICAL

1. *Rubber boot*
2. *Steering tie rod*
3. *Snowmobile frame*

Skandic WT/SWT/WT LC Only

– Skis should have a toe-out of 10 mm (3/8 in) when they are in a straight-ahead position and the vehicle is resting on the ground.

NOTE: To make sure skis are in a straight-ahead position, place a straight edge against pre-adjusted track and measure the distance between front and rear of skis and straight edge. Distances should be equal. After the ski toe-out adjustment, distance at front of ski must be 5 mm (3/16 in) more than at rear on both sides for a total toe-out of 10 mm (3/8 in).

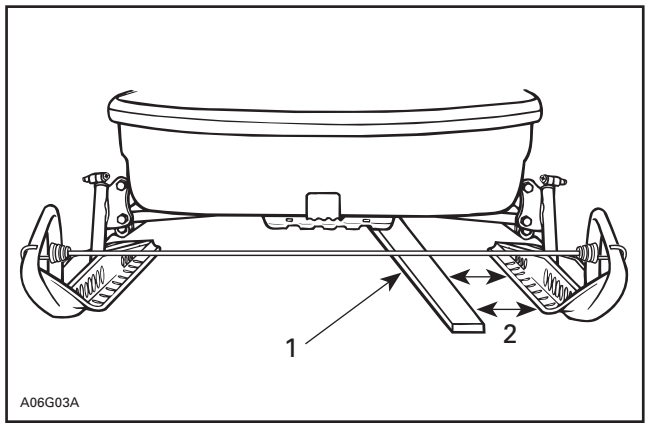
S-Series

Toe-out is 0 mm (0 in) when skis are in a straight-ahead position and the front of vehicle is lifted off the ground.

NOTE: To make sure skis are in a straight-ahead position, place a straight edge against pre-adjusted track and measure the distance between front and rear of skis and straight edge. Distances should be equal. After the ski toe-out adjustment, distance must be equal.

All Models

To reduce tolerance when measuring, set one ski to proper toe-out then measure from that ski to the opposite ski.



TYPICAL

1. *Straight edge*
2. *Measure here*

LUBRICATION

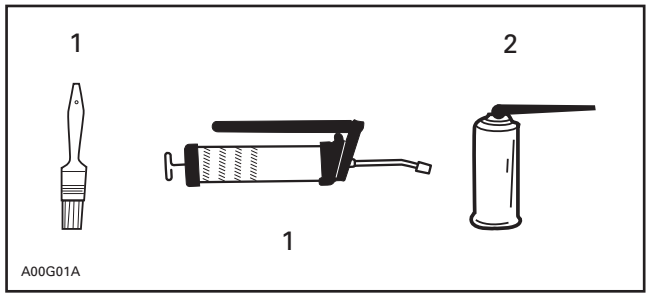
◆ WARNING

Do not lubricate throttle and/or brake cable nor their housing.

26, Grease Fittings

Only use synthetic grease (P/N 413 711 500).

The following symbols will be used to show what type of lubricant should be used at the suitable locations.



1. *Synthetic grease*
2. *Penetrating lubricant (P/N 293 600 016)*

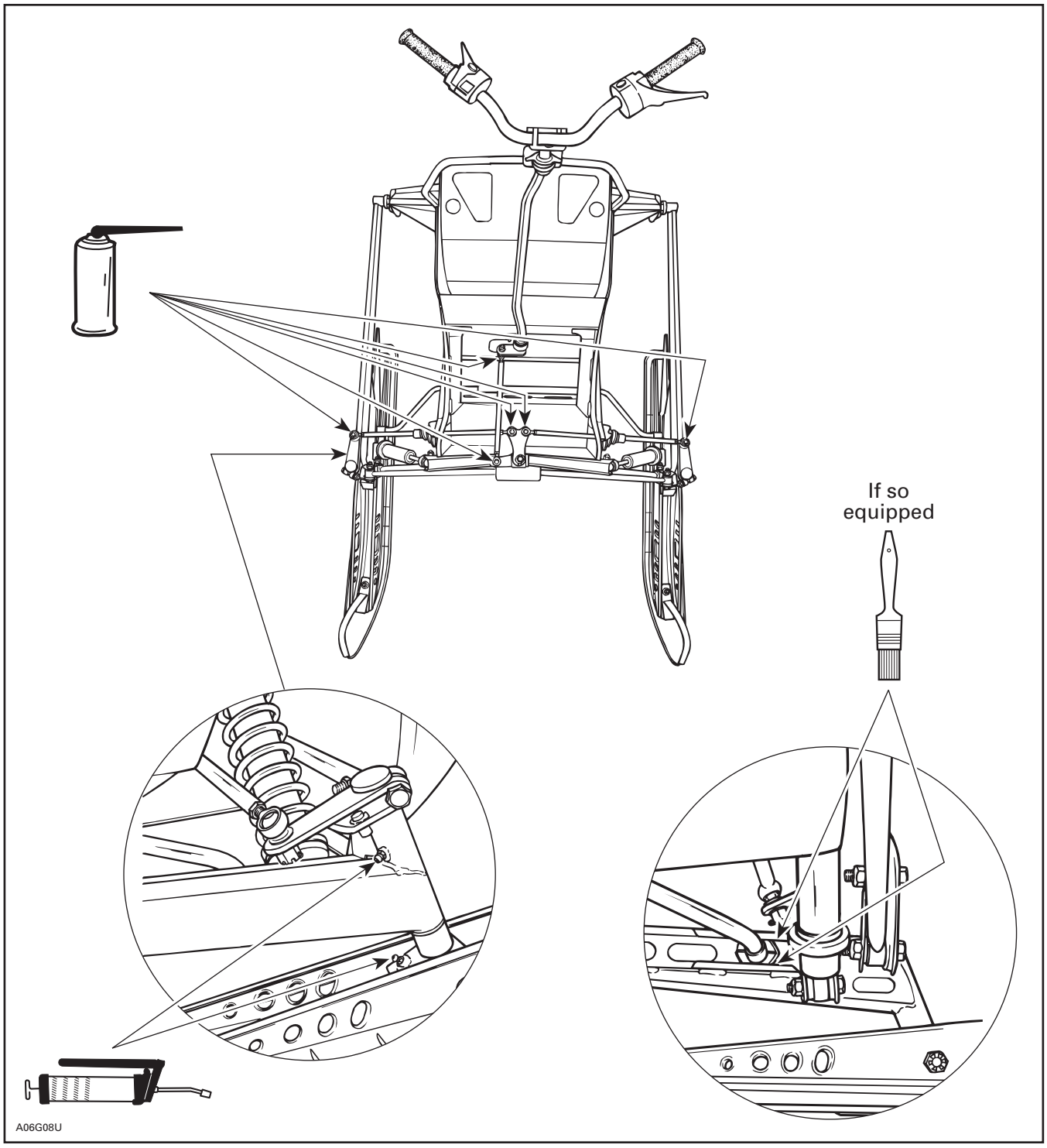
Lubricate:

– Steering column.

– Grease ski legs, ski pivots and idler arm.

– Coat stabilizer sliders with grease, and oil their ball joints if so equipped.

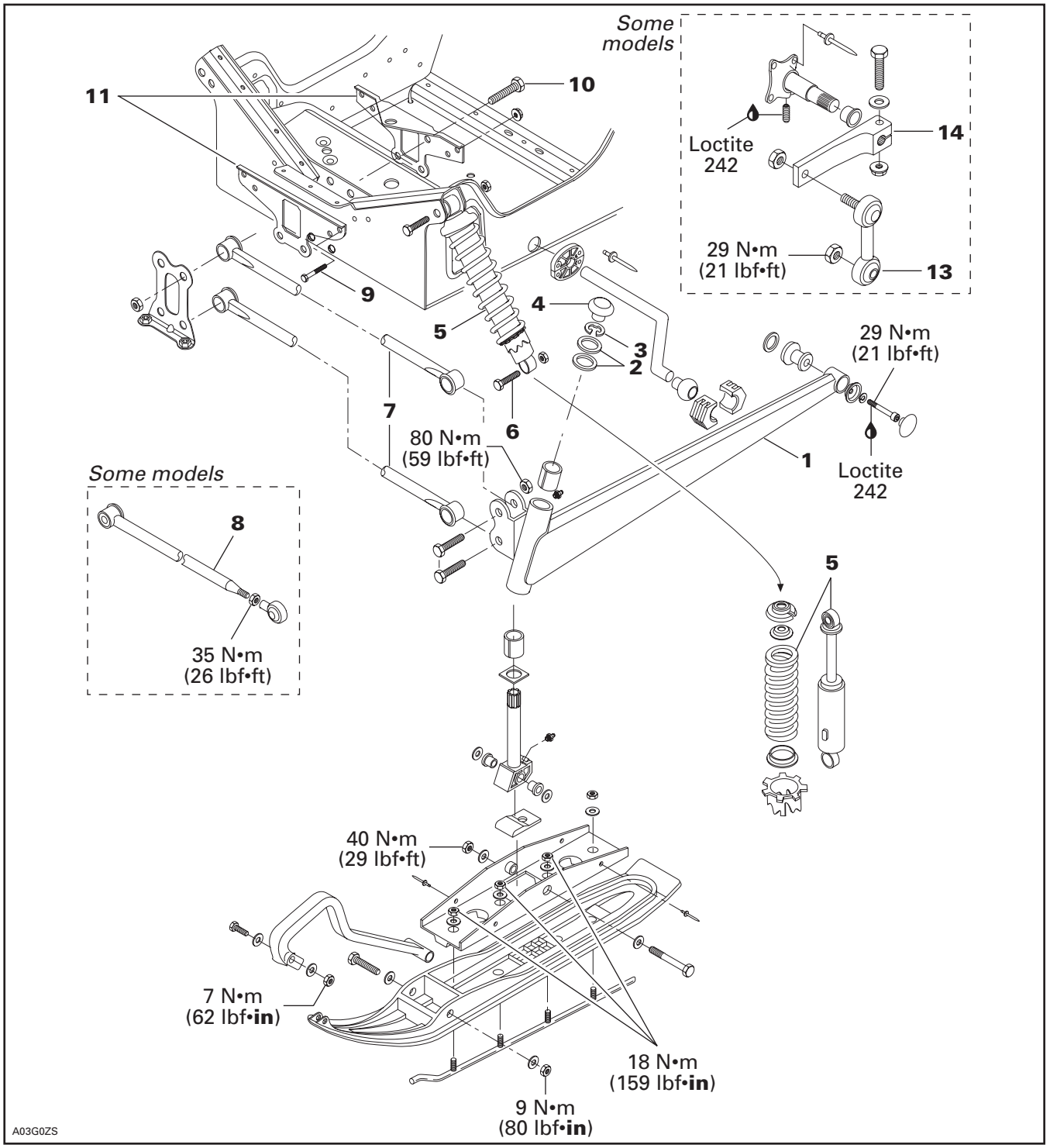
S-Series



TYPICAL

SUSPENSION AND SKI SYSTEM

S-Series

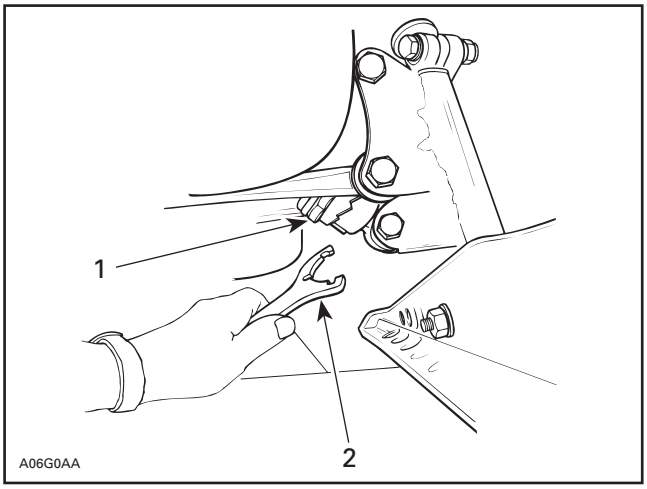


DISASSEMBLY

5, Shock

Lift front of vehicle and support it off the ground.

Reduce spring preload by turning adjusting ring accordingly with the adjustment wrench in vehicle tool box.



1. Shock cam
2. Adjustment wrench

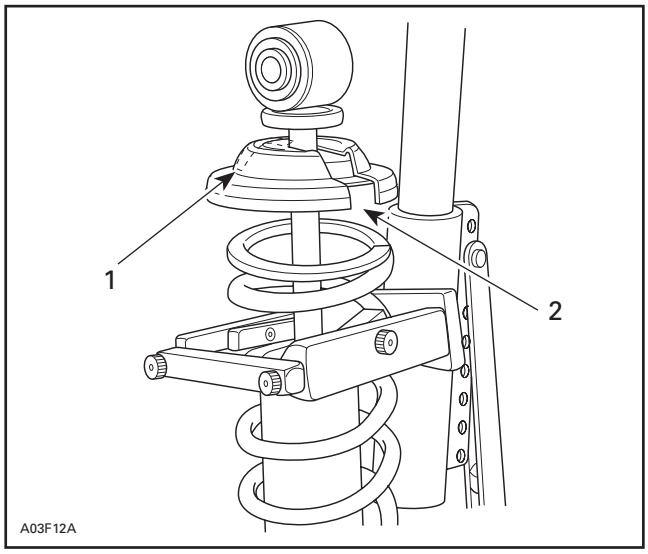
Remove lower bolt then upper bolt of shock.

For shock spring disassembly use shock spring remover (P/N 529 035 504) in a vise. Mount shock in it and turn shock so that spring coils match spring compressor.

Close and lock the bar. Adjust the handle horizontal position by changing the position of the clevis pin.

Push down on the handle until it locks. Remove spring stopper and cap then release handle.

When installing the cap opening must be 180° from the spring stopper opening.



1. Cap opening
2. Spring stopper opening

MX Z 500/670 HO

On these models, install shocks on vehicle with their adjusting ring at top.

1, Swing Arm

All Models

Lift front of vehicle and support it off the ground.

Remove cap, circlip then loosen steering arm bolt and pull up steering arm. Note shim positions. Ski leg may fall off from swing arm.

Unbolt lower end of shock from swing arm.

Unbolt radius rod.

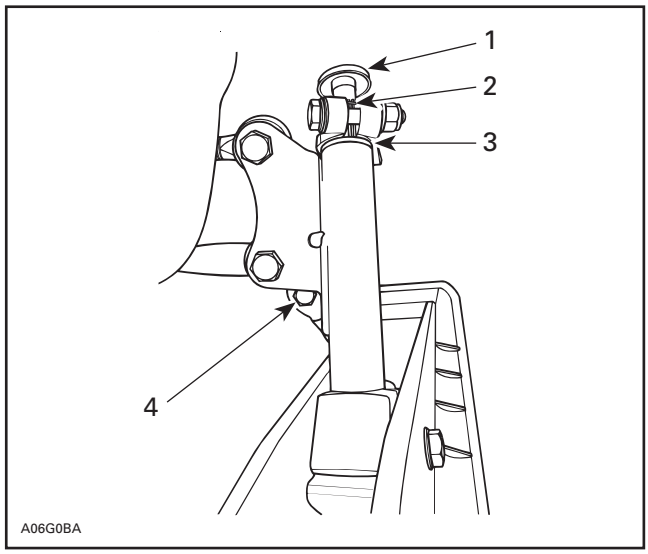
14, Lever

Models with Adjustable Stabilizer Bar

Unbolt tie rod no. 13 ball joint from swing arm, do not change stabilizer adjustments at this time.

Unbolt rear of swing arm from frame.

Pull swing arm off the vehicle. Stabilizer bar will disengage ball joint at swing arm inside rails.



1. *Cap* ***no. 4***
2. *Circlip* ***no. 3***
3. *Shims* ***no. 2***
4. *Bolt retaining lower end of shock* ***no. 6***

INSPECTION

Check all rubber cushions for crack and wear. Replace as required.

Check straightness of splines and proper interlocking with steering arm. Replace as required.

Check for straightness of swing arm. Replace as required.

Check for clogged grease fittings. Clean or replace as required.

Check for proper action of sliding blocks in swing arm.

Check skis and runners for wear, replace as necessary.

Check condition of ski stopper. Replace it when deteriorated.

To check condition of shock, refer to SC-10 SUSPENSION 07-02 then look for **Shock Absorber Inspection**.

INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Apply synthetic grease (P/N 413 711 500) to ski leg components.

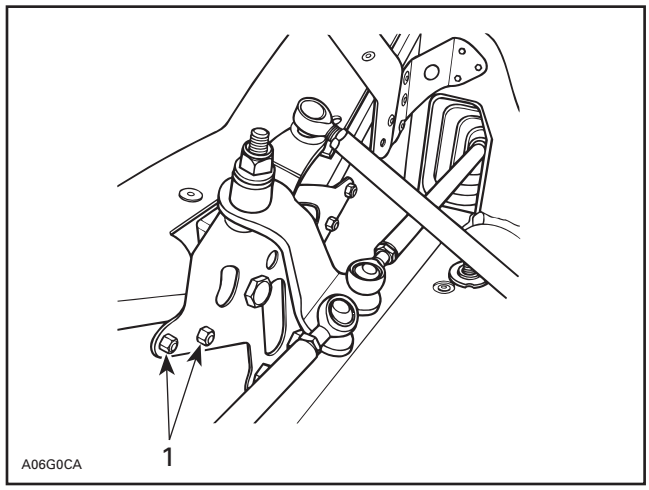
Tighten nuts and screws to proper torque as mentioned in exploded view.

7,8, Upper and Lower Half Arms

Position half arms and tie rods horizontally before tightening nuts.

9,10,11, Bolt, Nut and Link Plate

Attach link plate to frame with additional nuts and bolts, if applicable.

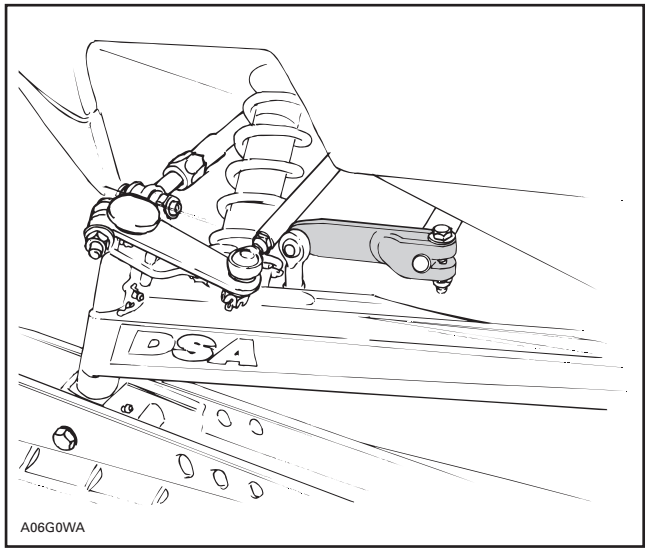


SOME MODELS

1. *Nuts and bolts*

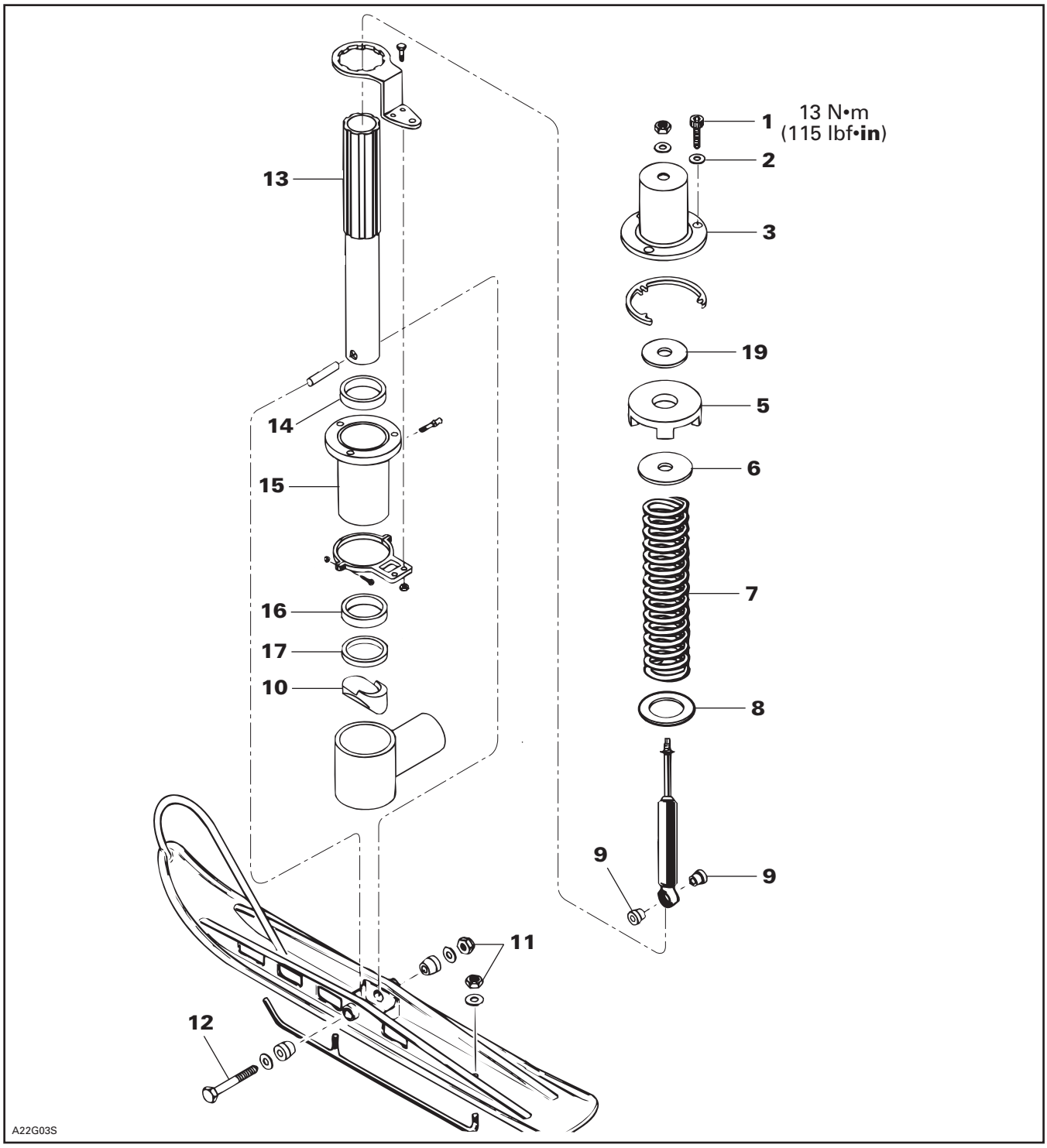
13,14, Tie Rod and Lever

Install levers on both sides at same angle (about horizontal).



TYPICAL

Skandic WT/SWT/WT LC



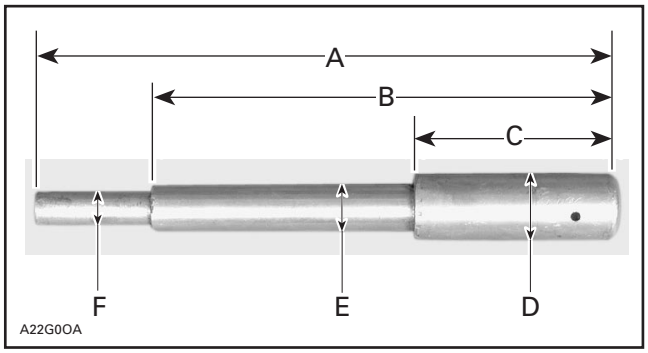
ON-VEHICLE COMPONENT VERIFICATION

8, Shock

Lift front of vehicle and support off the ground.

Remove ski bolt and nut.

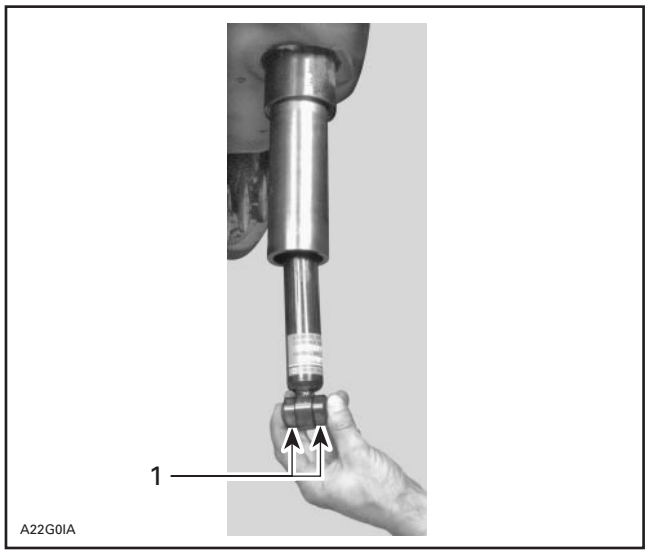
Remove steel bushing from ski using a pusher. See pusher dimensions below.



A. 220 mm (8.66 in)
B. 180 mm (7.09 in)
C. 70 mm (2.75 in)
D. 25 mm (1.0 in)
E. 15 mm (.59 in)
F. 9 mm (.35 in)



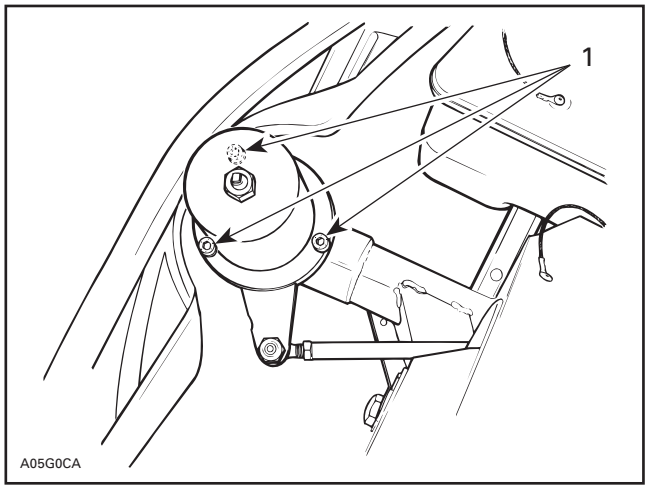
Unfasten rod nut then pull out shock from bottom. Check shock as described below in INSPECTION. At installation, make sure bushings are in place.



1. Bushings

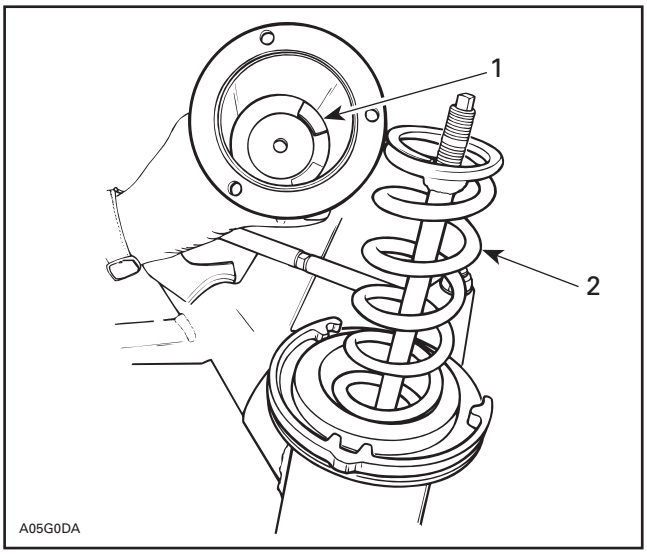
7, Spring

Unscrew shock piston pin nut then remove washer. Unscrew 3 Allen screws retaining cover **no. 3**, then remove stopper **no. 5**, washers **no. 6**, washer **no. 19**.



1. Allen screws

NOTE: These washers and stopper can be wedged in cover.



1. Washers and stopper wedged in cover
2. Spring

Pull out spring.

Suspension Free Operation

Remove cover and check for free movement of ski leg by lifting end of ski.

DISASSEMBLY

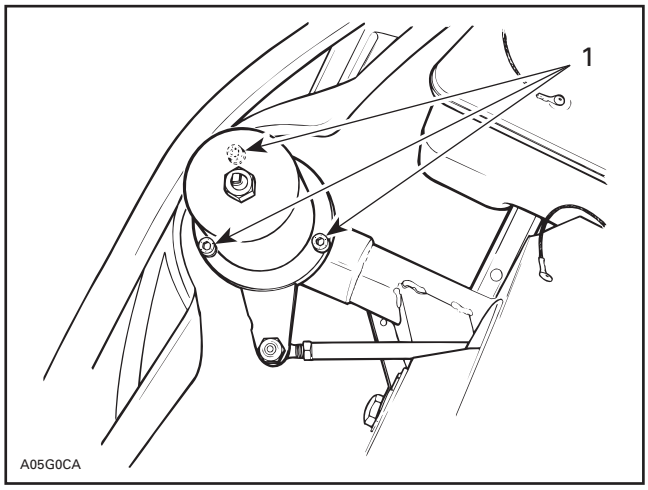
Lift front of vehicle and support off the ground.

1,2,3,5,6,9,11,12, Bolt, Lock Washer, Cover, Stopper, Bushing and Nut

Remove ski bolt, nut, bushings and ski.

Unscrew shock piston pin nut then remove washer. Shock will fall off the ski leg.

Unscrew 3 Allen screws retaining cover, then remove stopper and washers.

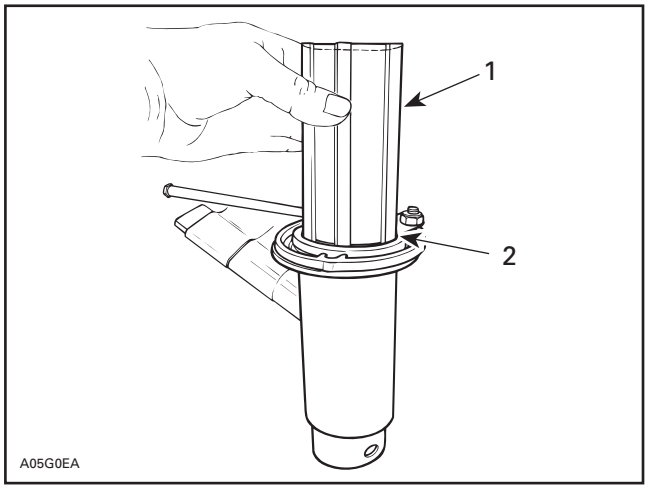


1. Allen screws

NOTE: These washers and stopper can be wedged in cap.

13,14,16,17, Ski Leg, Bushing and Seal

Pull up ski leg. Steering arm will not interfere.



1. Pull up ski leg
2. Steering arm in place

Remove seal. Drive out bushing if worn out.

INSPECTION

All Models

13, Ski Leg

Check straightness of ski leg. Check for scored or scratched surface. Replace as required.

Check that splines on ski leg and steering arm interlock properly with no excessive free play. Renew as necessary.

5, Stopper

Check condition of stopper. Replace it when deteriorated.

Grease Fitting

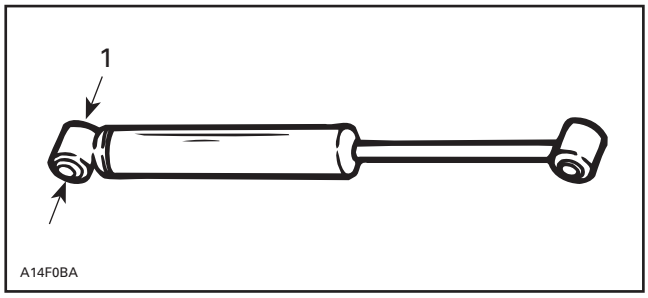
Ensure that grease fittings are not clogged.

10, Stopper

Check stopper for crack or deterioration. Replace as required.

8, Shock Absorber

Secure the shock body end in a vise with its rod upward.



1. Clamp

▼ CAUTION

Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke with its rod upward. Check that it moves smoothly and with uniform resistance.

Pay attention to the following conditions that will denote a defective shock:

– A skip or a hang back when reversing stroke at mid travel.
– Seizing or binding condition except at extreme end of either stroke.
– Oil leakage.
– A gurgling noise, after completing one full compression and extension stroke.

Renew if any faults are present.

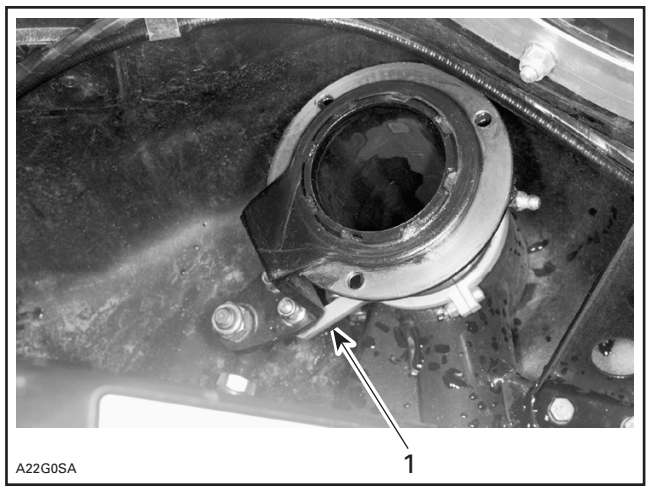
INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Apply synthetic grease (P/N 413 711 500) as illustrated in exploded view above.

Tighten nuts and screws to proper torque as mentioned in exploded view.

Reinstall steering arm reinforcement.



1. Reinforcement

16,17, Seal

Install seal before reinstalling ski leg.

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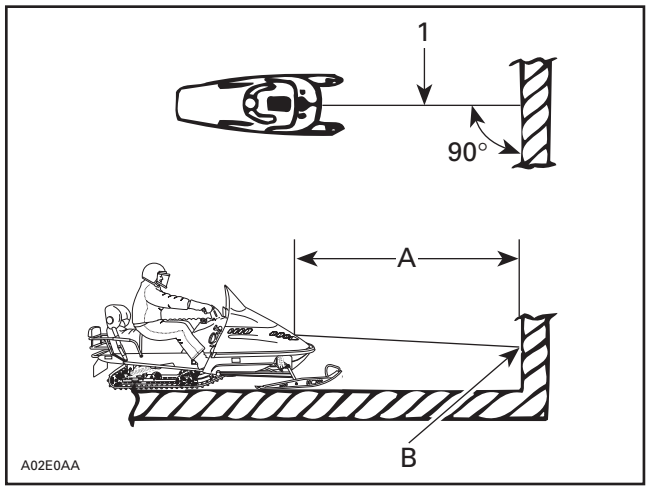
BODY

INSTALLATION AND ADJUSTMENT

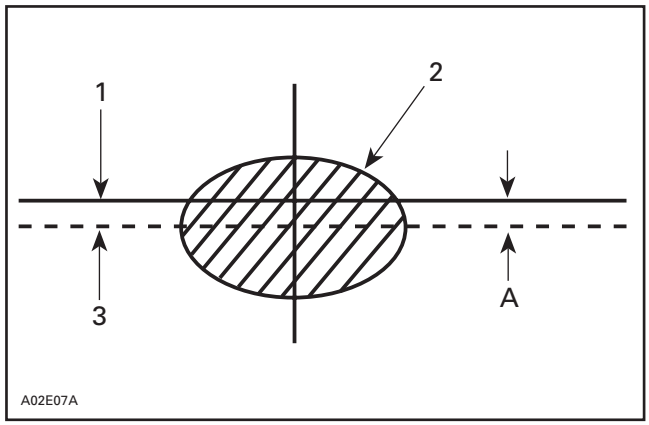
HEADLAMP BEAM AIMING

Beam aiming is correct when center of high beam is 25 mm (1 in) below the headlamp horizontal center line, scribed on a test surface, 381 cm (12 ft 6 in) away.

Measure headlamp center distance from ground. Scribe a line at this height on test surface (wall or screen). Light beam center should be 25 mm (1 in) below scribed line.



1. Headlamp center line
A. 381 cm (12 ft 6 in)
B. 25 mm (1 in) below center line



1. Headlamp horizontal
2. Light beam (high beam) (projected on the wall)
3. Light beam center
A. 25 mm (1 in)

Required Conditions

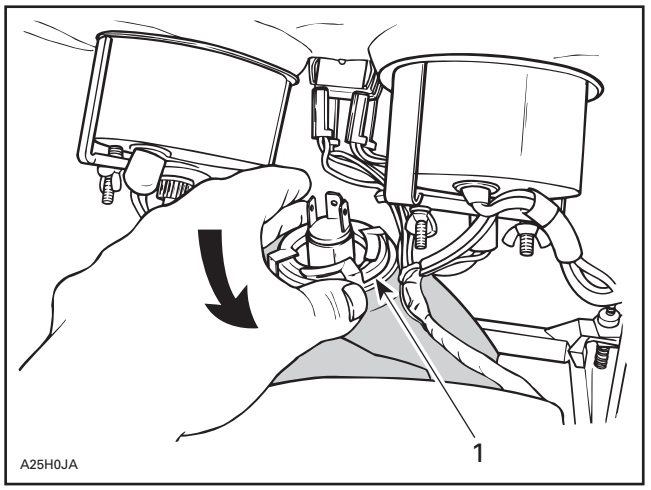
Place the vehicle on a flat surface perpendicular to test surface (wall or screen) and 381 cm (12 ft 6 in) away from it.

Rider or equivalent weight must be on the vehicle.

Select **high** beam.

BULB REPLACEMENT

If headlamp bulb is burnt, tilt cab and unplug the connector from the headlamp. Remove the rubber boot and unfasten the bulb retainer clips or locking ring.



TYPICAL
1. Locking ring

Replace bulb. If the taillight bulb is burnt, expose the bulb by removing red plastic lens. To remove, unscrew the 2 retaining screws. Verify all lights after replacement.

▼ CAUTION

Never touch glass portion of an halogen bulb with bare fingers, as it shortens its operating life. If by mistake glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

DECAL

To remove a decal; heat old decal with a heat gun and peel off slowly.

Using isopropyl alcohol, clean the surface and dry thoroughly.

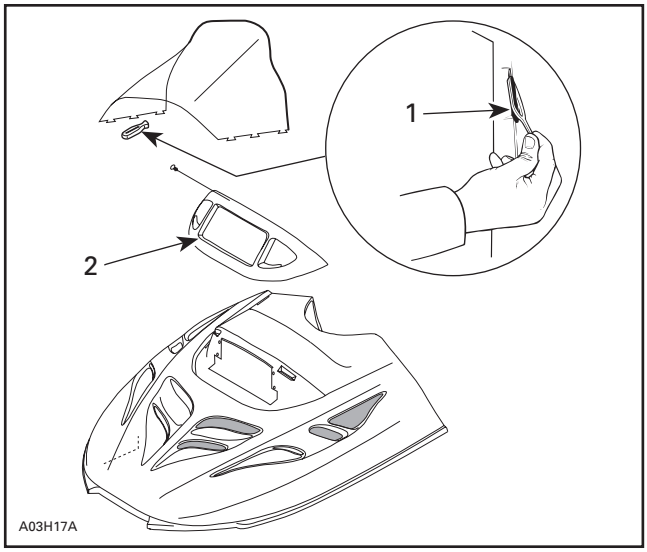
Apply liquid soap to new decal and carefully position the decal. Using a sponge or a squeegee, remove the air bubbles and surplus water working from the center toward the edges. Allow to air dry.

▼ CAUTION

Do not apply isopropyl alcohol or solvent directly on decals.

WINDSHIELD INSTALLATION

Position the windshield on the hood then push it down until the tabs are fully inserted into the hood slots. Lock the windshield tabs in position using latches as shown.



S-SERIES

1. *Latch*
2. *Temporary remove headlamp molding for windshield installation*

HOOD

S-Series

Working from within engine compartment, remove exterior nuts retaining both hinges. Then, close hood and remove interior nuts through the access holes.



1. *Access hole*

At installation, loosely install nuts, close hood then adjust before tightening interior nuts through access holes.

BELT GUARD

Disassembly and Assembly

NOTE: For additional information (ex.: exploded view) refer to the corresponding *Parts Catalog*.

◆ WARNING

Engine should be running only with belt guard well-secured in place.

Inspection

All Models

Check belt guard mounting bosses, clips and retainers for wear.

WIRING HARNESS

◆ WARNING

Ensure all terminals are properly crimped on the wires and that all connector housings are properly fastened. Keep wires away from any rotating, moving, heating and vibrating parts. Use proper fastening devices as required.

CABLES

◆ WARNING

Before installation, ensure that all cables are in perfect condition. Properly install the cable ends and secure them in place. Pay attention to route them properly, away from any rotating, moving, heating, or vibrating parts.

PIPING

◆ WARNING

Always ensure that the fuel, vent, primer, impulse, injection oil and rotary valve oil lines are properly fixed to their connectors, that they are not perforated or kinked and that they are properly routed away from any rotating, moving, heating or vibrating parts. Also check for leaks. Replace if required.

NOTE: Refer to proper *Parts Catalog* to find suitable clip part numbers.

PLASTIC MAINTENANCE AND REPAIR

MAINTENANCE

Clean the vehicle thoroughly, removing all dirt and grease accumulation.

To clean use a soft clean cloth and either soapy water or isopropyl alcohol.

To remove grease, oil or glue use isopropyl alcohol.

▼ CAUTION

Do not apply isopropyl alcohol or acetone directly on decals.

▼ CAUTION

The following products must not be used to clean or wax any of the plastic components used on the vehicles:

- gasoline
- brake fluid
- kerosene
- diesel fuel
- lighter fluid
- varsol
- naphtha
- acetone
- strong detergents
- abrasive cleaners
- waxes containing an abrasive or a cleaning agent in their formula

Apply wax on glossy finish only. Protect the vehicle with a cover to prevent dust accumulation during storage.

▼ CAUTION

If for some reason the snowmobile has to be stored outside it is preferable to cover it with an opaque tarpaulin. This will prevent the sun rays from affecting the plastic components and the vehicle finish.

REPAIR

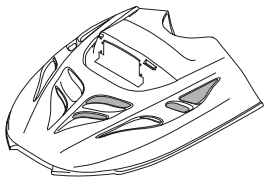
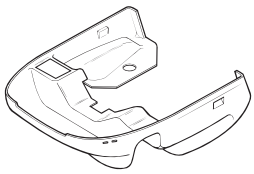
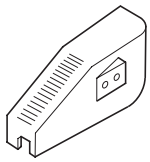
The very first step before repairing plastic materials is to find out exactly which type of material is involved. Refer to following chart.

▼ CAUTION

Consult chart and repair kit instructions carefully, some repair products are not compatible with certain plastics.

◆ WARNING

Polycarbonate windshields must never be repaired by welding or otherwise.

		REPAIRABLE		
PART	MODEL	POLYPROPYLENE	R.I.M. URETHANE	POLYETHYLENE
HOOD  A06H194	Skandic WT SWT/ WT LC			
	S-Series			
BOTTOM PAN  A06H1A4	Skandic WT/SWT/WT LC			
	S-Series			
SIDE PANEL AND REAR MOLDING  A06H1B4	S-Series			

MATERIAL REPAIR PROCEDURE

Fiberglass

This material is repairable and repaintable, using any one of several kits available on the market.

R.I.M. Urethane

R.I.M. urethane is light colored (tan) on the inside with a smooth surface.

◆ WARNING

Material should be repaired and repainted in a well-ventilated area only.

▼ CAUTION

Clean R.I.M. with isopropyl alcohol or Crest Hi-Solv product. Never use cleaners or products that contain chlorine.

▼ CAUTION

R.I.M. should never be exposed to temperatures exceeding 93°C (200°F).

NOTE: When working on a R.I.M. surface, never use a grinder or a high revolution tool such as an air or electric buffer. Use of such tools could overheat material and liberate agents in it thus causing a bad adhesion.

REPAIR PROCEDURE FOR R.I.M. URETHANE

Small Scratches

– Sand and scuff area.
– Feather out edges.
– Paint with a matching acrylic auto touch-up paint.

Deep Scratches

– Sand and scuff area.
– Make a V groove using a knife or a rough round file.
– Clean surface with isopropyl alcohol or Crest Hi-Solv stock no. AH-S product.
– Cover with TP-E epoxy mixed in equal quantities.
– Heat the surface with a heater lamp placed at 38 cm (15 in) for a period of 15 minutes.
– Sand the surface using a smooth dry sand paper.
– Use the same product if a final finish is required.
– Clean surface with Crest Hi-Solv product.
– Apply a flexible primer such as Crest Prima Flex stock no. AP-F.
– Wait 10 minutes.
– Repaint (air dry during 72 hours (approximately)).

Large Crack

– Sand and scuff outside and inside area by exceeding it 31.7 mm (1-1/4 in) on each side and 12.7 mm (1/2 in) at each end.
– Make a V groove (appr. 90°) on both sides of hood using a knife or a rough round file.
– Enlarge the crack to 2.4 mm (3/32 in) – 3.2 mm (1/8 in) using a sharp knife.
– Clean outside and inside surface with isopropyl alcohol or Crest Hi-Solv product.
– Repair inside surface first.
– Cover inside area with Crest TP-E epoxy.
– Apply a 50 mm × 30 mm (2 in × 1-1/4 in) patch. If no room for the patch, use tape.
– Cover exterior surface with same product. Damaged area should be slightly higher.
– Heat surface with a heater lamp placed at 38 mm (15 in) for a period of 15 minutes.
– Sand outside surface using a smooth dry sand paper.
– Use same product if a final finish is required.
– Apply a flexible primer.
– Wait 10 minutes.
– Repaint (air dry during 72 hours approximately).

NOTE: Both R.I.M. materials are high static plastics, painting must be done in a dust free area such as a paint booth.

Crest products used in R.I.M. repair procedure are available from following locations:

CREST MAIN OFFICE AND MANUFACTURING PLANT	
CREST INDUSTRIES, INC. 3841 13th Street Wyandotte, Michigan 48192	Phone: 313-283-4100 Toll Free: 1-800-822-4100 Fax: 1-800-344-4461 Fax: 313-283-4461

DISTRIBUTOR WAREHOUSE LOCATIONS		
UNITED STATES		CANADA
CREST EAST COAST, INC. P.O. Box 550 1109 Industrial Parkway Brick, New Jersey 08723 Phone: 908-458-9000 Fax: 908-458-5753 CREST PRODUCTS, INC. *Shipping Address:* 125 Production Drive Yorktown, Virginia 23693 Phone: 757-599-6572 Virginia: 1-800-572-5025 Outstate: 1-800-368-5033 Fax: 757-599-6630 *Mailing Address:* P.O. Box 2018 Grafton, Virginia 23692 CREST INDUSTRIES SOUTHEAST, INC. *Shipping Address:* 4300 Glen Haven Drive Decatur, Georgia 30035 Phone: 404-288-4658 Toll Free: 1-800-552-0876 Fax: 404-288-4658 *Mailing Address:* P.O. Box 254 Decatur, Georgia 30031	CREST INDUSTRIES, INC. (CREST MID-WEST) 231 Larkin Williams Ind. Court St. Louis, Missouri 63026 Phone: 314-349-4800 Toll Free: 1-800-733-2737 Fax: 314-349-4888 Toll Free Fax: 1-800-776-2737 **CREST MID WEST** **Regional Branch Warehouses** CREST INDUSTRIES, INC. P.O. Box 635 Mountain Home, Arkansas 72653 Phone: 501-491-5583 Toll Free: 1-800-733-2737 CREST INDUSTRIES, INC. 4200 Jackson Street, Unit 9 Denver, Colorado 80216 Phone: 303-320-3900 Toll Free: 1-800-733-2737 Fax: 303-320-6509 REM-CO DISTRIBUTING, INC. 5625 S. Adams Tacoma, Washington 98409 Phone: 206-474-5414 Toll Free: 1-800-735-7224 Fax: 206-474-7339	J2 PRODUCTS A Division of Sawill Ltd. 54 Audia Court, Unit 2A Concord, Ontario, L4K 3N4 *Phone:* Toronto: 416-665-1404 Concord: 905-669-9410 Montréal: 514-962-3932 *Fax:* Concord: 905-669-9419 Montréal: 514-962-3932 WHEEL-IN AUTOMOTIVE SUPPLY *Shipping Address:* No. 1, 3911A Brandon St. S.E. Calgary, Alberta, T2G 4A7 Office: 403-287-0775 *Mailing Address:* P.O. Box 40036 929-42nd Avenue S.E. Calgary, Alberta, T2G 5G5

FRAME

FRAME CLEANING

NOTE: For aluminum frames use only aluminum cleaner and follow instructions on container. (Dursol cleaner or equivalent).

Clean frame and tunnel with appropriate cleaners and rinse with high pressure hose.

Touch up all metal spots where paint has been scratched off. Spray all bare metal parts of vehicle with metal protector.

Seat Cleaning

For all models, it is recommended to clean the seat with a solution of **warm soapy water**, using a soft clean cloth.

▼ CAUTION

Avoid use of harsh detergents such as strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc. that may cause damage to the seat cover.

FRAME WELDING

Steel Frame:

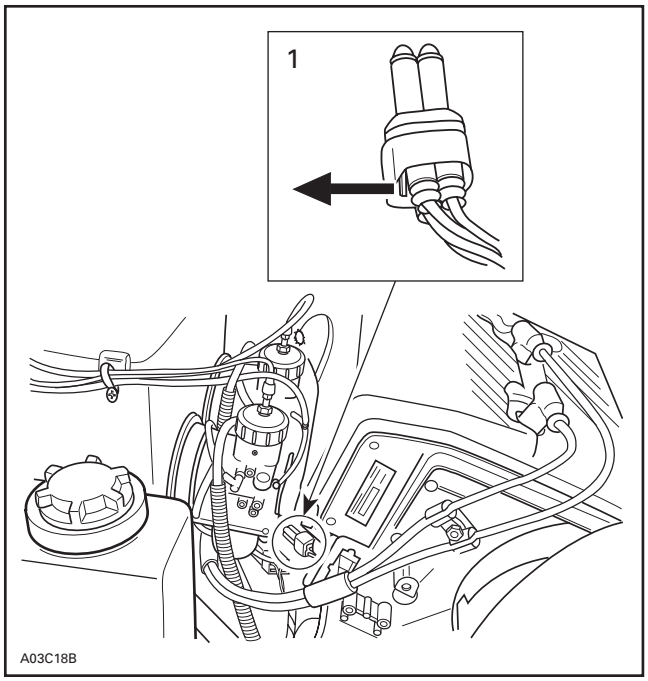
– electric welding
– amperage: 70-110 A
– voltage: 20-24 V
– rod: E-7014 (3/32 in)

Aluminum Frame
(refer to specialized welding shop):

– argon-oxygen/acetylene welding
– rod: ER-4043 (3/32 in)

▼ CAUTION

Before performing electrical welding anywhere on the vehicle, unplug the multiple connector at the electronic box. On models equipped with a battery, also unplug the negative cable. This will protect the electronic box and battery against damage caused by flowing current when welding.



TYPICAL
1. Unplug before electrical welding

▼ CAUTION

If welding is to be done near plastic material, it is recommended to either remove the part from the area or to protect it with aluminum foil to prevent damage.

FRAME COMPONENT REPLACEMENT

S-Series

Drilling Procedure

When drilling self-piercing rivets, use Supertanium™ drill bit (P/N 529 031 800), available in a 5 mm (3/16 in) size and shipped in packs of 2.

For proper drilling instructions and to prevent premature wear, follow the procedure below.

Always use a variable speed electric drill.

Partially drill rivet end — not the rivet head.


A03H2FA

Ground rivet end to the part retained by the rivet.

Remove part riveted.

Ground rivet to the chassis.

Drive out remaining rivet head using a punch.

Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant chip is ejected.

NOTE: To increase bit life, use Bombardier synthetic chaincase oil (P/N 413 803 300) as a cutting oil.

▼ CAUTION

High speed drilling will cause excessive heat which may destroy the cutting edge of the bit, therefore avoid using pneumatic drills.

TECHNICAL DATA

SI* METRIC INFORMATION GUIDE

BASE UNITS

DESCRIPTION	UNIT	SYMBOL
length	meter	m
mass	kilogram	kg
force	newton	N
liquid	liter	L
temperature	Celsius	°C
pressure	kilopascal	kPa
torque	newton•meter	N•m
speed	kilometer per hour	km/h

PREFIXES

PREFIX	SYMBOL	MEANING	VALUE
kilo	k	one thousand	1 000
centi	c	one hundredth	0.01
milli	m	one thousandth	0.001
micro	µ	one millionth	0.000001

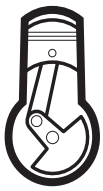
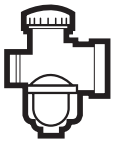
CONVERSION FACTORS

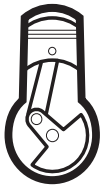
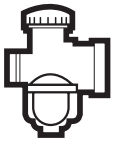
TO CONVERT	TO †	MULTIPLY BY
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in	cm	2.54
in^2	cm^2	6.45
in^3	cm^3	16.39
ft	m	0.3
oz	g	28.35
lb	kg	0.45
lbf	N	4.4
lbf•**in**	N•m	0.11
lbf•ft	N•m	1.36
lbf•ft	lbf•**in**	12
PSI (lbf/in^2)	kPa	6.89
imp. oz	U.S. oz	0.96
imp. oz	mL	28.41
imp. gal	U.S. gal	1.2
imp. gal	L	4.55
U.S. oz	mL	29.57
U.S. gal	L	3.79
MPH	km/h	1.61
Fahrenheit	Celsius	(°F – 32) ÷ 1.8
Celsius	Fahrenheit	(°C × 1.8) + 32

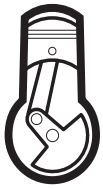
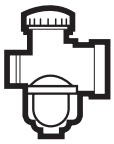
* The international system of units abbreviates SI in all languages.

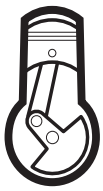
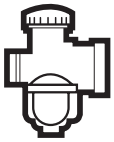
† To obtain the inverse sequence, divide by the given factor. To convert **mm** to **in**, divide by 25.4.

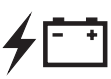
NOTE: Conversion factors are rounded off to 2 decimals for easier use.

	VEHICLE MODEL			MX Z 440	MX Z 500	MX Z 670 HO
	ENGINE TYPE			**443**	**494**	**670**
	Number of Cylinders			2	2	2
	Bore		mm (in)	67.5 (2.6575)	69.5 (2.736)	78.0 (3.071)
	Stroke		mm (in)	61.0 (2.402)	65.8 (2.59)	70.0 (2.760)
	Displacement		cm^3 (in^3)	436.6 (26.64)	499.3 (30.47)	668.97 (40.82)
	Compression Ratio (corrected)			6.4	6.8	6.2
	Maximum Power Engine Speed ①		± 100 RPM	7000	7800	8000
	Piston Ring Type		1st/2nd	ST/R	ST/R	ST/R
	Ring End Gap	New Wear Limit	mm (in) mm (in)	0.2 (.008) 1.0 (.039)	0.25 (.010) 1.0 (.039)	0.25 (.010) 1.0 (.039)
	Ring/Piston Groove Clearance	New Wear Limit	mm (in) mm (in)	0.04 (.0016) 0.2 (.0079)	0.04 (.0016) 0.2 (.0079)	0.04 (.0016) 0.2 (.0079)
	Piston/Cylinder Wall Clearance	New Wear Limit	mm (in) mm (in)	0.07 (.0028) 0.2 (.008)	0.11 (.0043) 0.15 (.0059)	0.10 (.0039) 0.15 (.0059)
	Connecting Rod Big End Axial Play	New Wear Limit	mm (in) mm (in)	0.2 (.0079) 1.0 (.0394)	0.39 (.0156) 1.2 (.0472)	0.39 (.0156) 1.2 (.0472)
	Maximum Crankshaft End-Play ②		mm (in)	0.3 (.012)	0.3 (.012)	0.3 (.012)
	Maximum Crankshaft Deflection		mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)
	Rotary Valve Timing ③ and P/N 420 924 XXX		Opening Closing	N.A.	146° – 65° 502	145° – 71° 500
	Magneto Generator Output		W	240	220	220
	Ignition Type			CDI	CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ④⑧		mm (in)	1.38 (.054)	1.81 (.071)	3.20 (.126)
	Trigger Coil ⑤		Ω	140 – 180	190 – 300	190 – 300
	Generating Coil ⑤		Ω	230 – 330	10 – 17	10 – 17
	Lighting Coil ⑤		Ω	0.23 – 0.28	0.20 – 0.35	0.20 – 0.35
	High Tension Coil ⑤	Primary Secondary	Ω kΩ	N.A. 5.1 – 6.3	0.3 – 0.7 8 – 16	0.3 – 0.7 8 – 16
	Carburetor Type		PTO/MAG	VM 34 530/531	VM 38 412/413	VM 44 36/37
	Main Jet		PTO/MAG	205/195	300/280	340/310
	Needle Jet			159 P-0	480-Q4	224 AA-4
	Pilot Jet			35	50	55
	Needle Identification — clip position			6DH2-3	6DGY9-3	7ECY1-3
	Slide Cut-Away			2.5	2.5	2.5
	Float Adjustment		± 1 mm (± .040 in)	23.9 (.94)	18.1 (.71)	22.9 (.90)
	Air Screw Adjustment		± 1/16 Turn	1-1/2	2-1/2	1-3/4
	Idle Speed		± 200 RPM	1650	1800	1700
	Gas Type/Pump Octane Number			Unleaded/87	Unleaded/87	Super Unleaded/91
	Gas/Oil Ratio			Injection	Injection	Injection
	Type			Axial Fan	Liquid	Liquid
	Axial Fan Belt Adjustment	Deflection ⑥ Force	mm (in) kg (lbf)	9 – 10 (.35 – .39) 5 (11)	N.A. N.A.	N.A. N.A.
	Thermostat Opening Temperature		°C (°F)	N.A.	42 (108)	42 (108)
	Radiator Cap Opening Pressure		kPa (PSI)	N.A.	90 (13)	90 (13)
	**ENGINE COLD N•m (lb•ft)**	Drive Pulley Retaining Screw		⑦	⑦	⑦
		Exhaust Manifold Nuts or Bolts		22 (16)	23 (17)	23 (17)
		Magneto Ring Nut		105 (77)	125 (92)	125 (92)
		Crankcase Nuts or Screws	M6 M8	10 (7) 22 (16)	9 (6.5) 29 (21)	9 (6.5) 29 (21)
		Crankcase/Engine Support Nuts or Screws		38 (28)	39 (29)	39 (29)
		Cylinder Head Nuts		22 (16)	29 (21)	29 (21)
		Crankcase/Cylinder Nuts or Screws		N.A.	29 (21)	29 (21)
		Axial Fan Shaft Nut		50 (37)	N.A.	N.A.

	VEHICLE MODEL			FORMULA Z 500 FORMULA DLX 500	FORMULA DLX 583	FORMULA Z 583	FORMULA Z 670 FORMULA DLX 670
	ENGINE TYPE			**494**	**583**	**583**	**670**
	Number of Cylinders			2	2	2	2
	Bore		mm (in)	69.5 (2.736)	76.0 (2.992)	76.0 (2.992)	78.0 (3.071)
	Stroke		mm (in)	65.8 (2.59)	64.0 (2.52)	64.0 (2.52)	70.0 (2.760)
	Displacement		cm^3 (in^3)	499.3 (30.47)	580.7 (35.44)	580.7 (35.44)	668.97 (40.82)
	Compression Ratio (corrected)			6.7	6.7	6.7	6.2
	Maximum Power Engine Speed ①		± 100 RPM	7800	7900	7900	7700
	Piston Ring Type		1st/2nd	ST/R	ST/N.A.	ST/N.A.	ST/R
	Ring End Gap	New Wear Limit	mm (in) mm (in)	0.25 (.010) 1.0 (.039)	0.25 (.010) 1.0 (.039)	0.25 (.010) 1.0 (.039)	0.35 (.014) 1.0 (.039)
	Ring/Piston Groove Clearance	New Wear Limit	mm (in) mm (in)	0.04 (.0016) 0.2 (.0079)	0.04 (.0016) 0.2 (.0079)	0.04 (.0016) 0.2 (.0079)	0.04 (.0016) 0.2 (.0079)
	Piston/Cylinder Wall Clearance	New Wear Limit	mm (in) mm (in)	0.11 (.0043) 0.15 (.0059)	0.11 (.0043) 0.15 (.0059)	0.11 (.0043) 0.15 (.0059)	0.10 (.0039) 0.15 (.0059)
	Connecting Rod Big End Axial Play	new wear limit	mm (in) mm (in)	0.39 (.0156) 1.2 (.0472)	0.39 (.0156) 1.2 (.0472)	0.39 (.0156) 1.2 (.0472)	0.39 (.0156) 1.2 (.0472)
	Maximum Crankshaft End-Play ②		mm (in)	0.3 (.012)	0.3 (.012)	0.3 (.012)	0.3 (.012)
	Maximum Crankshaft Deflection		mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)
	Rotary Valve Timing ③ and P/N 420 924 XXX		Opening Closing	135° – 64° 509	140° – 71° 502	140° – 71° 502	144° – 72° 500
	Magneto Generator Output		W	220	220	220	220
	Ignition Type			CDI	CDI	CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES	NGK BR9ES
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ④⑧		mm (in)	1.81 (.071)	1.75 (.069)	1.75 (.069)	1.93 (.076)
	Trigger Coil ⑤		Ω	190 – 300	190 – 300	190 – 300	190 – 300
	Generating Coil ⑤		Ω	10 – 17	10 – 17	10 – 17	10 – 17
	Lighting Coil ⑤		Ω	0.20 – 0.35	0.20 – 0.35	0.20 – 0.35	0.20 – 0.35
	High Tension Coil ⑤	Primary	Ω	0.3 – 0.7	0.3 – 0.7	0.3 – 0.7	0.3 – 0.7
		Secondary	kΩ	8 – 16	8 – 16	8 – 16	8 – 16
	Carburetor Type		PTO/MAG	VM 38 408/409	VM 38 416/417	VM 40 105/106	VM 40 109/110
	Main Jet		PTO/MAG	300/280	270/260	280/260	310/290
	Needle Jet			480-Q3	480-P7	224 AA-2	224 AA-3
	Pilot Jet			50	50	60	60
	Needle Identification — clip position			6DGY9-2	6DEY4-2	7ECY1-3	7EDY1-3
	Slide Cut-Away			2.5	2.5	2.5	2.5
	Float Adjustment		± 1 mm (± .040 in)	18.1 (.71)	18.1 (.71)	18.1 (.71)	18.1 (.71)
	Air Screw Adjustment		± 1/16 Turn	2	2.0	2.0	2-1/4
	Idle Speed		± 200 RPM	1800	1800	1800	1700
	Gas Type/Pump Octane Number			Unleaded/87	Unleaded/87	Unleaded/87	Unleaded/87
	Gas/Oil Ratio			Injection	Injection	Injection	Injection
	Type			Liquid	Liquid	Liquid	Liquid
	Axial Fan Belt Adjustment	Deflection ⑥	mm (in)	N.A.	N.A.	N.A.	N.A.
		Force	kg (lbf)	N.A.	N.A.	N.A.	N.A.
	Thermostat Opening Temperature		°C (°F)	42 (108)	42 (108)	42 (108)	42 (108)
	Radiator Cap Opening Pressure		kPa (PSI)	90 (13)	90 (13)	90 (13)	90 (13)
	**ENGINE COLD N•m (lb•ft)**	Drive Pulley Retaining Screw		⑦	⑦	⑦	⑦
		Exhaust Manifold Nuts or Bolts		23 (17)	23 (17)	23 (17)	23 (17)
		Magneto Ring Nut		125 (92)	125 (92)	125 (92)	125 (92)
		Crankcase Nuts or Screws	M6 M8	9 (6.5) 29 (21)	9 (6.5) 23 (17)	9 (6.5) 23 (17)	9 (6.5) 29 (21)
		Crankcase/Engine Support Nuts or Screws		39 (29)	39 (29)	39 (29)	39 (29)
		Cylinder Head Nuts		29 (21)	29 (21)	29 (21)	29 (21)
		Crankcase/Cylinder Nuts or Screws		29 (21)	29 (21)	29 (21)	29 (21)
		Axial Fan Shaft Nut		N.A.	N.A.	N.A.	N.A.

	VEHICLE MODEL			SUMMIT 500	SUMMIT X 670	GRAND TOURING 500	GRAND TOURING 583
	ENGINE TYPE			**494**	**670**	**494**	**583**
	Number of Cylinders			2	2	2	2
	Bore		mm (in)	69.5 (2.736)	78.0 (3.071)	69.5 (2.736)	76.0 (2.992)
	Stroke		mm (in)	65.8 (2.59)	70.0 (2.760)	65.8 (2.59)	64.0 (2.52)
	Displacement		cm^3 (in^3)	499.3 (30.47)	668.97 (40.82)	499.3 (30.47)	580.7 (35.44)
	Compression Ratio (corrected)			6.8	6.2	6.7	6.7
	Maximum Power Engine Speed ①		± 100 RPM	7800	8000	7800	7900
	Piston Ring Type		$1^{st}/2^{nd}$	ST/R	ST/R	ST/R	ST/N.A.
	Ring End Gap	New Wear Limit	mm (in) mm (in)	0.25 (.010) 1.0 (.039)	0.25 (.0098) 1.0 (.039)	0.25 (.010) 1.0 (.039)	0.25 (.010) 1.0 (.039)
	Ring/Piston Groove Clearance	New Wear Limit	mm (in) mm (in)	0.04 (.0016) 0.2 (.0079)	0.04 (.0016) 0.2 (.0079)	0.04 (.0016) 0.2 (.0079)	0.04 (.0016) 0.2 (.0079)
	Piston/Cylinder Wall Clearance	New Wear Limit	mm (in) mm (in)	0.11 (.0043) 0.15 (.0059)	0.10 (.0039) 0.15 (.0059)	0.11 (.0043) 0.15 (.0059)	0.11 (.0045) 0.15 (.0059)
	Connecting Rod Big End Axial Play	New Wear Limit	mm (in) mm (in)	0.39 (.0156) 1.2 (.0472)	0.39 (.0154) 1.2 (.0472)	0.39 (.0154) 1.2 (.0472)	0.39 (.0154) 1.2 (.0472)
	Maximum Crankshaft End-Play ②		mm (in)	0.3 (.012)	0.3 (.012)	0.3 (.012)	0.3 (.012)
	Maximum Crankshaft Deflection		mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)
	Rotary Valve Timing ③ and P/N 420 924 XXX		Opening Closing	135° – 64° 509	145° – 71° 500	135° – 64° 509	140° – 71° 502
	Magneto Generator Output		W	220	220	220	220
	Ignition Type			CDI	CDI	CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES	NGK BR9ES
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ④⑧		mm (in)	1.81 (.071)	3.20 (.126)	1.81 (.071)	1.75 (.069)
	Trigger Coil ⑤		Ω	190 – 300	190 – 300	190 – 300	190 – 300
	Generating Coil ⑤		Ω	10 – 17	10 – 17	10 – 17	10 – 17
	Lighting Coil ⑤		Ω	0.20 – 0.35	0.20 – 0.35	0.20 – 0.35	0.20 – 0.35
	High Tension Coil ⑤	Primary Secondary	Ω kΩ	0.3 – 0.7 8 – 16	0.3 – 0.7 8 – 16	0.3 – 0.7 8 – 16	0.3 – 0.7 8 – 16
	Carburetor Type		PTO/MAG	VM 38 (H.A.C.) 414/415	VM 44 38/39	VM 38 410/411	VM 38 416/417
	Main Jet		PTO/MAG	350/330	350/340	300/280	270/260
	Needle Jet			480-Q6	224 AA-8	480-Q3	480-P7
	Pilot Jet			75	55	50	50
	Needle Identification — clip position			6DHY48-4	7ECY1-2	6DGY9-2	6DEY4-2
	Slide Cut-Away			2.5	2.5	2.5	2.5
	Float Adjustment		± 1 mm (± .040 in)	18.1 (.71)	22.9 (.90)	18.1 (.71)	18.1 (.71)
	Air Screw Adjustment		± 1/16 Turn	2	1-3/4	2	2
	Idle Speed		± 200 RPM	1800	1700	1800	1800
	Gas Type/Pump Octane Number			Unleaded/87	Super Unleaded/91	Unleaded/87	Unleaded/87
	Gas/Oil Ratio			Injection	Injection	Injection	Injection
	Type			Liquid	Liquid	Liquid	Liquid
	Axial Fan Belt Adjustment	Deflection ⑥ Force	mm (in) kg (lbf)	N.A. N.A.	N.A. N.A.	N.A. N.A.	N.A. N.A.
	Thermostat Opening Temperature		°C (°F)	42 (108)	42 (108)	42 (108)	42 (108)
	Radiator Cap Opening Pressure		kPa (PSI)	90 (13)	90 (13)	90 (13)	90 (13)
	**ENGINE COLD N•m (lb•ft)**	Drive Pulley Retaining Screw		⑦	⑦	⑦	⑦
		Exhaust Manifold Nuts or Bolts		23 (17)	23 (17)	23 (17)	23 (17)
		Magneto Ring Nut		125 (92)	125 (92)	100 (74)	125 (92)
		Crankcase Nuts or Screws	M6 M8	9 (6.5) 29 (21)	9 (6.5) 29 (21)	9 (6.5) 29 (21)	9 (6.5) 23 (17)
		Crankcase/Engine Support Nuts or Screws		39 (29)	39 (29)	39 (29)	39 (29)
		Cylinder Head Nuts		29 (21)	29 (21)	29 (21)	29 (21)
		Crankcase/Cylinder Nuts or Screws		29 (21)	29 (21)	29 (21)	29 (21)
		Axial Fan Shaft Nut		N.A.	N.A.	N.A.	N.A.

	VEHICLE MODEL			SKANDIC WT	SKANDIC SWT	SKANDIC WT LC
	ENGINE TYPE			**503**	**503**	**494**
	Number of Cylinders			2	2	2
	Bore		mm (in)	72.0 (2.835)	72.0 (2.835)	69.5 (2.736)
	Stroke		mm (in)	61.0 (2.402)	61.0 (2.402)	65.8 (2.59)
	Displacement		cm^3 (in^3)	496.7 (30.31)	496.7 (30.31)	499.3 (30.47)
	Compression Ratio (corrected)			6.2	6.2	6.8
	Maximum Power Engine Speed ①		± 100 RPM	6800	6800	7000
	Piston Ring Type		1st/2nd	ST/R	ST/R	ST/R
	Ring End Gap	New Wear Limit	mm (in) mm (in)	0.2 (.0079) 1.0 (.039)	0.2 (.0079) 1.0 (.039)	0.25 (.010) 1.0 (.039)
	Ring/Piston Groove Clearance	New Wear Limit	mm (in) mm (in)	0.04 (.0016) 0.2 (.0079)	0.04 (.0016) 0.2 (.0079)	0.04 (.0016) 0.2 (.0079)
	Piston/Cylinder Wall Clearance	New Wear Limit	mm (in) mm (in)	0.9 (.0035) 0.2 (.0079)	0.9 (.0035) 0.2 (.0079)	0.11 (.0043) 0.15 (.0059)
	Connecting Rod Big End Axial Play	New Wear Limit	mm (in) mm (in)	0.2 (.0079) 1.0 (.0394)	0.2 (.0079) 1.0 (.0394)	0.39 (.0154) 1.2 (.0472)
	Maximum Crankshaft End-Play ②		mm (in)	0.3 (.012)	0.3 (.012)	0.3 (.012)
	Maximum Crankshaft Deflection		mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)
	Rotary Valve Timing ③ and P/N 420 924 XXX		Opening Closing	N.A.	N.A.	148° – 52° 509
	Magneto Generator Output		W	240	240	220
	Ignition Type			CDI	CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ④⑧		mm (in)	1.66 (.065)	1.66 (.065)	1.81 (.071)
	Trigger Coil ⑤		Ω	140 – 180	140 – 180	190 – 300
	Generating Coil ⑤		Ω	230 – 330	230 – 330	10 – 17
	Lighting Coil ⑤		Ω	0.23 – 0.28	0.23 – 0.28	0.20 – 0.35
	High Tension Coil ⑤	Primary	Ω	N.A.	N.A.	0.3 – 0.7
		Secondary	kΩ	5.1 – 6.3	5.1 – 6.3	8 – 16
	Carburetor Type		PTO/MAG	2 x VM 34	2 x VM 34	VM 34 501/500
	Main Jet		PTO/MAG	210	185	250/240
	Needle Jet			159 P4	159 P-1	159-P2
	Pilot Jet			40	40	40
	Needle Identification — clip position			6DH2-3	6DH2-3	6DH4-2
	Slide Cut-Away			2.5	2.5	2.5
	Float Adjustment		± 1 mm (± .040 in)	36.5 (1.44)	36.5 (1.44)	36.5 (1.44)
	Air Screw Adjustment		± 1/16 Turn	1	1-1/4	1
	Idle Speed		± 200 RPM	1900	1900	1900
	Gas Type/Pump Octane Number			Unleaded/87	Unleaded/87	Unleaded/87
	Gas/Oil Ratio			Injection	Injection	Injection
	Type			Axial Fan	Axial Fan	Liquid
	Axial Fan Belt Adjustment	Deflection ⑥	mm (in)	9 – 10 (.35 – .39)	9 – 10 (.35 – .39)	N.A.
		Force	kg (lbf)	5 (11)	5 (11)	N.A.
	Thermostat Opening Temperature		°C (°F)	N.A.	N.A.	42 (108)
	Radiator Cap Opening Pressure		kPa (PSI)	N.A.	N.A.	90 (13)
	**ENGINE COLD N•m (lb•ft)**	Drive Pulley Retaining Screw		⑦	⑦	⑦
		Exhaust Manifold Nuts or Bolts		22 (16)	22 (16)	22 (16)
		Magneto Ring Nut		105 (77)	105 (77)	125 (92)
		Crankcase Nuts or Screws	M6 M8	— 22 (16)	— 22 (16)	9 (6.5) 21 (16)
		Crankcase/Engine Support Nuts or Screws		39 (29)	39 (29)	39 (29)
		Cylinder Head Nuts		22 (16)	22 (16)	29 (21)
		Crankcase/Cylinder Nuts or Screws		N.A.	N.A.	29 (21)
		Axial Fan Shaft Nut		48 (35)	48 (35)	N.A.

	VEHICLE MODEL				MX Z 440	MX Z 500	MX Z 670 HO	FORMULA Z 500
	ENGINE TYPE				**443**	**494**	**670**	**494**
	Chain Drive Ratio				21/44	23/43	25/43	23/43
	Chain	Pitch		in	3/8	3/8	3/8	3/8
		Type/Links Qty/Plates Qty			Silent 72/11	Silent 72/13	Silent 74/13	Silent 72/11
	Drive Pulley	Type of Drive Pulley			TRA	TRA	TRA	TRA
		Ramp Identification			291X ⑤	281 ⑤	297 ⑥	281 ⑤
		Calibration Screw Position or — Calibration Disc Quantity			3	2	2	2
		Spring Color			Blue/Yellow	Violet/Yellow	Green/Blue	Violet/Yellow
		Spring Length		± 1.5 mm (± .060 in)	115.1 (4.53)	157.9 (6.22)	147.4 (5.80)	157.9 (6.22)
		Clutch Engagement		± 200 RPM	3700	4100	4200	4100
	Driven Pulley Spring Preload Cam Angle			± 0.7 kg (± 1.5 lb) Degree	6.1 (13.4) 47°	7.0 (15.4) 50°	7.0 (15.4) 50°	7.0 (15.4) 50°
	Pulley Distance Z			(+ 0, - 1) mm ((+ 0, - 1/32) in)	16.5 ± 0.5 (.650 ± .020)	16.5 (.650)	16.5 (21/32)	16.5 (21/32)
	Offset	X		± 0.5 mm (± .020 in)	35.5 (1.398)	35.5 (1.398)	35.5 (1.398)	35.5 (1.398)
		Y – X	MIN. – MAX.	mm (in)	+ 0.5 (+ .020) + 1.5 (+ .059)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)
	Drive Belt Part Number (P/N)				414 060 600	414 860 700	417 300 067	414 860 700
	Drive Belt Width (new) ①			mm (in)	34.7 (1.366)	35.3 (1.390)	35.0 (1-3/8)	35.3 (1-3/8)
	Drive Belt Adjustment		Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)
			Force ②	kg (lbf)	11.3 (25)	11.3 (25)	11.3 (25)	11.3 (25)
	Track	Width		cm (in)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)
		Length		cm (in)	307 (121)	307 (121)	307 (121)	307 (121)
		Profile Height		mm (in)	18.4 (.724)	22.3 (.878)	22.3 (.878)	18.4 (.724)
		Adjustment	Deflection	mm (in)	35 – 40 (1-3/8 – 1-3/4)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)
			Force ③	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type		Track		SC-10 Sport	SC-10 XC	SC-10 XC	SC-10 Sport
			Ski		DSA	DSA	DSA	DSA
	Length			cm (in)	272.5 (107.3)	272.5 (107.3)	272.5 (107.3)	272.5 (107.3)
	Width			cm (in)	117.4 (46.2)	117.4 (46.2)	117.4 (46.2)	117.4 (46.2)
	Height			cm (in)	108 (42.5)	108 (42.5)	108 (42.5)	118 (46.5)
	Ski Stance			cm (in)	104.1 (41)	104.1 (41)	104.1 (41)	104.1 (41)
	Mass (dry)			kg (lb)	201 (442)	216 (475)	228 (502)	216 (475)
	Ground Contact Area			cm^2 (in^2)	6671 (1034)	6671 (1034)	6671 (1034)	6671 (1034)
	Ground Contact Pressure			kPa (PSI)	2.96 (.429)	3.18 (.461)	3.35 (.486)	3.18 (.461)
	Frame Material				Aluminum	Aluminum	Aluminum	Aluminum
	Bottom Pan Material				Impact Copolymer	Impact Copolymer	Impact Copolymer	Impact Copolymer
	Hood Material				RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane
	Battery			V (A•h)	N.A.	N.A.	N.A.	N.A.
	Headlight			W	H4 60/55	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27	8/27	8/27
	Tachometer and Speedometer Bulbs			W	3	3	3	3
	Fuel and Temperature Gauge Bulbs			W	N.A.	N.A.	N.A.	N.A.
	Fuse	Starter Solenoid		A	N.A.	N.A.	N.A.	N.A.
		Tachometer		A	N.A.	N.A.	N.A.	N.A.
	Fuel Tank			L (U.S. gal)	37 (9.8)	40 (10.6)	40 (10.6)	40 (10.6)
	Chaincase/Gearbox			mL (U.S. oz)	250 (8.5)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System ④			L (U.S. oz)	N.A.	4.7 (159)	4.7 (159)	4.7 (159)
	Injection Oil Reservoir			L (U.S. oz)	2.55 (86)	2.8 (95)	2.8 (95)	2.8 (95)

	VEHICLE MODEL				FORMULA DLX 500 LC	FORMULA Z 583	FORMULA DLX 583	FORMULA Z 670
	ENGINE TYPE				**494**	**583**	**583**	**670**
	Chain Drive Ratio				23/44	25/43	23/44	25/43
	Chain	Pitch		in	3/8	3/8	3/8	3/8
		Type/Links Qty/Plates Qty			Silent 72/11	Silent 74/13	Silent 72/13	Silent 74/13
	Drive Pulley	Type of Drive Pulley			TRA	TRA	TRA	TRA
		Ramp Identification			286 ⑤	286 ⑤	286 ⑤	286 ⑥
		Calibration Screw Position or — Calibration Disc Quantity			2	3	3	3
		Spring Color			Violet/Blue	Violet/Blue	Violet/Blue	Violet/Yellow
		Spring Length		± 1.5 mm (± .060 in)	114.6 (4.51)	114.6 (4.51)	114.6 (4.51)	157.9 (6.22)
		Clutch Engagement		± 200 RPM	3800	4100	4100	3800
	Driven Pulley Spring Preload Cam Angle			± 0.7 kg (± 1.5 lb) Degree	7.0 (15.4) 50°	7.0 (15.4) 50°	7.0 (15.4) 50°	7.0 (15.4) 50°
	Pulley Distance Z			(+ 0, - 1) mm ((+ 0, - 1/32) in)	16.5 (21/32)	16.5 (21/32)	16.5 (21/32)	16.5 (21/32)
	Offset	X		± 0.5 mm (± .020 in)	35.5 (1.398)	35.5 (1.398)	35.5 (1.398)	35.5 (1.398)
		Y – X	MIN. – MAX.	mm (in)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)
	Drive Belt Part Number (P/N)				414 860 700	414 860 700	414 860 700	417 300 067
	Drive Belt Width (new) ①			mm (in)	35.3 (1-3/8)	35.3 (1-3/8)	35.3 (1-3/8)	35.0 (1-3/8)
	Drive Belt Adjustment		Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)
			Force ②	kg (lbf)	11.3 (25)	11.3 (25)	11.3 (25)	11.3 (25)
	Track	Width		cm (in)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)
		Length		cm (in)	307 (121)	307 (121)	307 (121)	307 (121)
		Profile Height		mm (in)	18.4 (.724)	22.3 (.878)	22.3 (.878)	22.3 (.878)
		Adjustment	Deflection	mm (in)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)
			Force ③	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type		Track		SC-10 HP	SC-10 HP	SC-10 HP	ARM
			Ski		DSA	DSA	DSA	DSA
	Length			cm (in)	272.5 (107.3)	272.5 (107.3)	272.5 (107.3)	272.5 (107.3)
	Width			cm (in)	120.0 (47.2)	117.4 (46.2)	120.0 (47.2)	117.4 (46.2)
	Height			cm (in)	106.9 (42.1)	108 (42.5)	106.9 (42.1)	108 (42.5)
	Ski Stance			cm (in)	106.7 (42)	104.1 (41)	106.7 (42)	104.1 (41)
	Mass (dry)			kg (lb)	230 (505)	227 (499)	240 (529)	227 (499)
	Ground Contact Area			cm^2 (in^2)	6671 (1034)	6671 (1034)	6671 (1034)	6771 (1034)
	Ground Contact Pressure			kPa (PSI)	3.38 (.490)	3.34 (.484)	3.53 (.512)	3.34 (.484)
	Frame Material				Aluminum	Aluminum	Aluminum	Aluminum
	Bottom Pan Material				Impact Copolymer	Impact Copolymer	Impact Copolymer	Impact Copolymer
	Hood Material				RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane
	Battery			V (A•h)	12 (22)	N.A.	12 (22)	N.A.
	Headlight			W	H4 60/55	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27	8/27	8/27
	Tachometer and Speedometer Bulbs			W	3	3	3	3
	Fuel and Temperature Gauge Bulbs			W	N.A.	3/3	N.A.	3/3
	Fuse	Starter Solenoid		A	30	N.A.	N.A.	N.A.
		Tachometer		A	N.A.	N.A.	N.A.	N.A.
	Fuel Tank			L (U.S. gal)	40 (10.6)	40 (10.6)	40 (10.6)	40 (10.6)
	Chaincase/Gearbox			mL (U.S. oz)	250 (8.5)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System ④			L (U.S. oz)	4.7 (159)	4.7 (159)	4.7 (159)	4.7 (159)
	Injection Oil Reservoir			L (U.S. oz)	2.8 (95)	2.8 (95)	2.8 (95)	2.8 (95)

	VEHICLE MODEL				FORMULA DLX 670	SUMMIT 500	SUMMIT X 670	GRAND TOURING 500
	ENGINE TYPE				**670**	**494**	**670**	**494**
	Chain Drive Ratio				25/43	21/43	23/43	23/44
	Chain	Pitch		in	3/8	3/8	3/8	3/8
		Type/Links Qty/Plates Qty			Silent 74/13	Silent 72/11	Silent 72/13	Silent 72/11
	Drive Pulley	Type of Drive Pulley			TRA	TRA	TRA	TRA
		Ramp Identification			286 ⑥	294 ⑤	286 ⑤	228 ⑤
		Calibration Screw Position or — Calibration Disc Quantity			3	4	5	2
		Spring Color			Violet/Yellow	Violet/Yellow	Violet/Yellow	Blue/Green
		Spring Length		± 1.5 mm (± .060 in)	157.9 (6.22)	157.9 (6.22)	157.9 (6.22)	105.7 (4.16)
		Clutch Engagement		± 200 RPM	3800	4200	4100	3600
	Driven Pulley Spring Preload Cam Angle			± 0.7 kg (± 1.5 lb) degree	7.0 (15.4) 50°	7.0 (15.4) 44°	7.0 (15.4) 50°	7.0 (15.4) 44°
	Pulley Distance Z			(+ 0, - 1) mm ((+ 0, - 1/32) in)	16.5 (21/32)	16.5 (21/32)	16.5 (21/32)	16.5 (21/32)
	Offset	X		± 0.5 mm (± .020 in)	35.5 (1.398)	35.5 (1.398)	35.0 (1-3/8)	35.5 (1.398)
		Y – X	MIN. – MAX.	mm (in)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)
	Drive Belt Part Number (P/N)				417 300 067	415 860 700	415 099 000	414 860 700
	Drive Belt Width (new) ①			mm (in)	35.0 (1-3/8)	35.3 (1-3/8)	35.0 (1-3/8)	35.3 (1-3/8)
	Drive Belt Adjustment		Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)
			Force ②	kg (lbf)	11.3 (25)	11.3 (25)	11.3 (25)	11.3 (25)
	Track	Width		cm (in)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)
		Length		cm (in)	307 (121)	345.5 (136)	345.5 (136)	345.5 (136)
		Profile Height		mm (in)	22.3 (.878)	36.8 (1.449)	50.8 (2.000)	18.4 (.724)
		Adjustment	Deflection	mm (in)	30 – 35 (1-3/16 – 1-3/8)	35 – 40 (1-3/8 – 1-3/4)	35 – 40 (1-3/8 – 1-3/4)	30 – 35 (1-3/16 – 1-3/8)
			Force ③	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type		Track		ARM	SC-10 Mountain	SC-10 Mountain	SC-10 Touring
			Ski		DSA	DSA	DSA	DSA
	Length			cm (in)	272.5 (107.3)	293.9 (115.7)	293.9 (115.7)	297.8 (117.2)
	Width			cm (in)	120.0 (47.2)	107.3 (42.3)	107.3 (42.3)	120.0 (47.2)
	Height			cm (in)	107 (42.1)	113 (44.5)	113 (44.5)	128.3 (50.5)
	Ski Stance			cm (in)	106.7 (42)	94 (37)	94 (37)	106.7 (42)
	Mass (dry)			kg (lb)	242 (533)	220 (484)	229 (503)	251 (553)
	Ground Contact Area			cm^2 (in^2)	6771 (1034)	7356.7 (1140.3)	7357 (1140)	7423.2 (1150.6)
	Ground Contact Pressure			kPa (PSI)	3.56 (.516)	2.93 (.425)	3.05 (.442)	3.32 (.481)
	Frame Material				Aluminum	Aluminum	Aluminum	Aluminum
	Bottom Pan Material				Impact Copolymer	Impact Copolymer	Impact Copolymer	Impact Copolymer
	Hood Material				RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane
	Battery			V (A•h)	12 (22)	N.A.	N.A.	12 (22)
	Headlight			W	H4 60/55	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27	8/27	8/27
	Tachometer and Speedometer Bulbs			W	3	3	3	3
	Fuel and Temperature Gauge Bulbs			W	3/3	N.A.	N.A.	3
	Fuse	Starter Solenoid		A	30	N.A.	N.A.	30
		Tachometer		A	N.A.	N.A.	N.A.	N.A.
	Fuel Tank			L (U.S. gal)	40 (10.6)	40 (10.6)	40 (10.6)	40 (10.6)
	Chaincase/Gearbox			mL (U.S. oz)	250 (8.5)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System ④			L (U.S. oz)	4.7 (159)	5.0 (169)	5.0 (169)	5.0 (169)
	Injection Oil Reservoir			L (U.S. oz)	2.8 (95)	2.8 (95)	2.8 (95)	2.8 (95)

	VEHICLE MODEL				GRAND TOURING 583	SKANDIC WT	SKANDIC SWT	SKANDIC WT LC
	ENGINE TYPE				**583**	**503**	**503**	**494**
	Chain Drive Ratio				23/44	N.A.	N.A.	N.A.
	Chain	Pitch		in	3/8	N.A.	N.A.	N.A.
		Type/Links Qty/Plates Qty			Silent 72/13	N.A.	N.A.	N.A.
	Drive Pulley	Type of Drive Pulley			TRA	TRA	TRA	TRA
		Ramp Identification			285 ⑤	290 ⑤	290 ⑤	290 ⑥
		Calibration Screw Position or — Calibration Disc Quantity			3	4	2	4
		Spring Color			Red/Orange	Yellow/Orange	Yellow/Orange	Yellow/Blue
		Spring Length		± 1.5 mm (± .060 in)	91.2 (3.56)	105.7 (4.16)	105.7 (4.16)	90.7 (3.57)
		Clutch Engagement		± 200 RPM	3100	3000	3000	3000
	Driven Pulley Spring Preload Cam Angle			± 0.7 kg (± 1.5 lb) Degree	7.0 (15.4) 47°	7.0 (15.4) 40°	7.0 (15.4) 40°	7 (15.4) 40°
	Pulley Distance Z			(+ 0, - 1) mm ((+ 0, - 1/32) in)	16.5 (21/32)	32.3 (1-9/32)	32.3 (1-9/32)	32.3 (1-9/32)
	Offset	X		± 0.5 mm (± .020 in)	35.5 (1.398)	35.0 (1.380)	35.0 (1.380)	35.0 (1.380)
		Y – X	MIN. – MAX.	mm (in)	1.0 – 2.0 (.039 – .079)	0.75 – 2.25 (.030 – .086)	1.0 – 2.0 (.039 – .079)	0.75 – 2.25 (.030 – .086)
	Drive Belt Part Number (P/N)				414 860 700	414 633 800	414 633 800	414 633 800
	Drive Belt Width (new) ①			mm (in)	35.3 (1-3/8)	34.6 (1-3/8)	34.6 (1-3/8)	34.6 (1-3/8)
	Drive Belt Adjustment		Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)
			Force ②	kg (lbf)	11.3 (25)	11.3 (25)	11.3 (25)	11.3 (25)
	Track	Width		cm (in)	38.1 (15.0)	50.0 (19.7)	60.0 (23.6)	50.0 (19.7)
		Length		cm (in)	345.5 (136)	396.8 (156.2)	396.8 (156.2)	396.8 (156.2)
		Profile Height		mm (in)	18.4 (.724)	23.5 (.925)	23.5 (.925)	23.5 (.925)
		Adjustment	Deflection	mm (in)	30 – 35 (1-3/16 – 1-3/8)	40 – 50 (1-9/16 – 1-31/32)	40 – 50 (1-9/16 – 1-31/32)	40 – 50 (1-9/16 – 1-31/32)
			Force ③	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type		Track		SC-10 Touring	Skandic WT	Skandic WT	Skandic WT
			Ski		DSA	Telescopic Strut	Telescopic Strut	Telescopic Strut
	Length			cm (in)	297.8 (117.2)	302.0 (118.9)	315.0 (124.0)	302.0 (118.9)
	Width			cm (in)	120.0 (47.2)	104.5 (41.1)	110.0 (43.3)	104.5 (41.1)
	Height			cm (in)	128.3 (50.5)	122 (48)	133 (52.4)	122 (48)
	Ski Stance			cm (in)	106.7 (42)	90.0 (35.4)	90.0 (35.4)	90.0 (35.4)
	Mass (dry)			kg (lb)	251 (553)	255 (562)	277 (611)	281 (620)
	Ground Contact Area			cm^2 (in^2)	7423.2 (1150.6)	10793 (1672.9)	13986 (2167.8)	11213 (1738)
	Ground Contact Pressure			kPa (PSI)	3.32 (.481)	2.35 (.341)	1.98 (.287)	2.27 (.329)
	Frame Material				Aluminum	Steel	Steel	Steel
	Bottom Pan Material				Impact Copolymer	HD Polyethylene	HD Polyethylene	HD Polyethylene
	Hood Material				RRIM Polyurethane	RRIM	RRIM	RRIM
	Battery			V (A•h)	12 (22)	12 (22)	12 (22)	12 (22)
	Headlight			W	H4 60/55	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27	8/27	8/27
	Tachometer and Speedometer Bulbs			W	3	3	3	3
	Fuel and Temperature Gauge Bulbs			W	3	N.A.	N.A.	N.A.
	Fuse	Starter Solenoid		A	30	20	20	20
		Tachometer		A	N.A.	N.A.	N.A.	N.A.
	Fuel Tank			L (U.S. gal)	40 (10.6)	42 (11.1)	42 (11.1)	42 (11.1)
	Chaincase/Gearbox			mL (U.S. oz)	250 (8.5)	400 (13.5)	400 (13.5)	400 (13.5)
	Cooling System ④			L (U.S. oz)	5.0 (169)	N.A.	N.A.	N.A.
	Injection Oil Reservoir			L (U.S. oz)	2.8 (95)	2.5 (84.5)	2.5 (84.5)	2.5 (84.5)

ENGINE LEGEND

BTDC: Before Top Dead Center
CDI: Capacitor Discharge Ignition
CTR: Center
K: Kilo (× 1000)
MAG: Magneto Side
N.A.: Not Applicable
PTO: Power Take Off Side
R: Rectangular
ST: Semi-trapeze

① The maximum horsepower RPM applicable on the vehicle. It may be different under certain circumstances and BOMBARDIER INC. reserves the right to modify it without obligation.

② Crankshaft end-play is not adjustable on these models. Specification is given for verification purposes only.

③ Rotary valve to crankcase clearance: 0.27 - 0.48 mm (.011 - .019 in).

④ All models except MX Z 670 HO and Summit X 670: At 6000 RPM (engine cold) with headlamp turned on.

⑤ All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.

⑥ Force applied midway between pulleys to obtain specified tension deflection.

⑦ Drive pulley retaining screw: torque to 90 to 100 N•m (66 to 74 lbf•ft), install drive belt, accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake; repeat 5 times. Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

⑧ MX Z 670 HO and Summit X 670: At 3500 RPM (engine cold) with headlamp turned on.

VEHICLE LEGEND

DSA: Direct Shock Action
RRIM: Reinforced Reaction Injection Molding
TRA: Total Range Adjustable
N.A.: Not Applicable

① Minimum allowable width may not be less than 3.0 mm (1/8 in) of a new drive belt.

② Force applied midway between pulleys to obtain specified tension deflection.

③ Force or downward pull applied to track to obtain specified tension deflection.

④ Coolant mixture: 60% antifreeze/40% water.

⑤ Lever with roller pin P/N 417 004 309 (hollow).

⑥ Lever with roller pin P/N 417 004 308 (solid).

WIRING DIAGRAMS

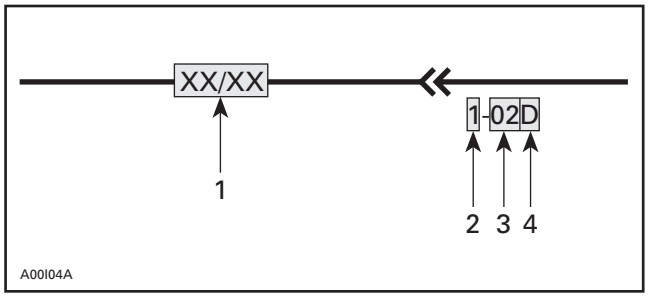
MODEL	WIRING DIAGRAM PAGE	HEADLIGHT (watt)	TAILLIGHT (watt)	ELECTRICAL SYSTEM OUTPUT (watt)
Skandic WT/SWT	Annex 1	60/55 hal.	8/27	240
Skandic WT LC	Annex 2	60/55 hal.	8/27	220
MX Z 440	Annex 3	60/55 hal.	8/27	240
Formula Z 500/583/670 MX Z 500 and Summit 500	Annex 4	60/55 hal.	8/27	220
Formula DLX 500/583/670	Annex 5	60/55 hal.	8/27	220
MX Z 670 HO and Summit X 670	Annex 6	60/55 hal.	8/27	220
Grand Touring 500/583	Annex 7	60/55 hal.	8/27	220

hal. = halogen

WIRING DIAGRAM LEGEND

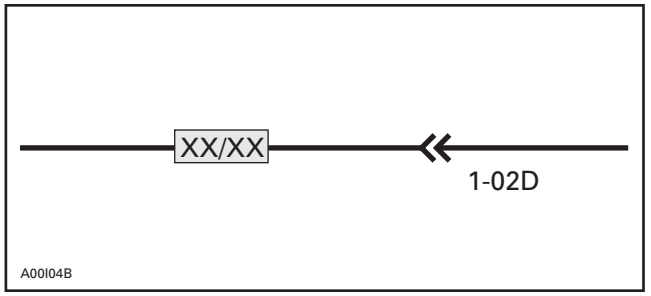
◆ WARNING

Ensure all terminals are properly crimped on the wires and all connector housings are properly fastened.



1. *Wire colors*
2. *Housing area*
3. *Housing number per area*
4. *Wire connector location in housing*

WIRE COLORS AND CIRCUIT



The first color of a wire is the main color, second color is the stripe.

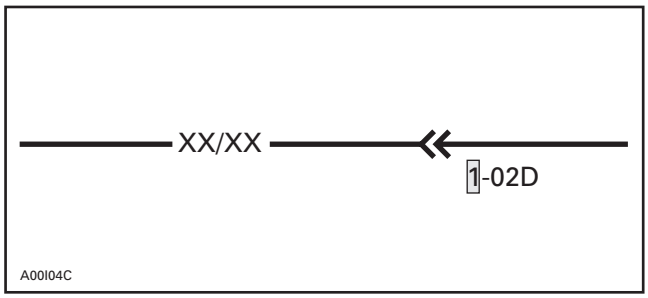
Example: YL/BK is a YELLOW wire with a BLACK stripe.

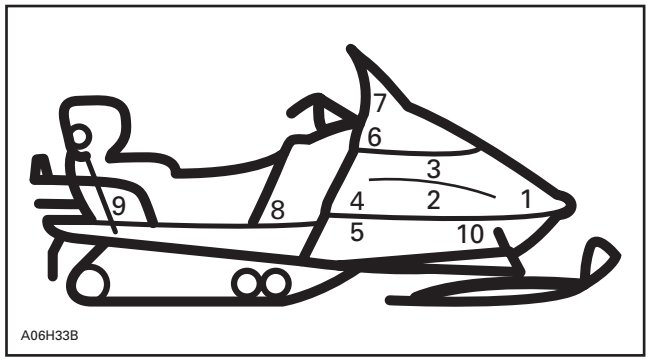
COLOR CODE	
BE – BEIGE	OR – ORANGE
BK – BLACK	RD – RED
BL – BLUE	VI – VIOLET
BR – BROWN	WH – WHITE
GN – GREEN	YL – YELLOW
GY – GREY	

Following table shows wire colors related to electrical circuits.

WIRE COLOR	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – key switch – tether cord switch – emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off, RER pilot lamp, beeper and beeper switch	
BLACK (big)	Ground for starter (–)	
BEIGE	RER switch	Must be grounded to activate RER.
BEIGE/BLACK	Reverse alarm and pilot lamp	Current returns by BLACK wire.
YELLOW YELLOW/BLACK	12 volts (AC)	If shorted, magneto stops producing electricity.
RED	12 volts (DC) (+) For starter motor	
RED/GREEN	12 volts (DC) (+) For starter solenoid	
RED/BLUE	12 volts (DC) (+) Rectifier output	
GREY	12 volts (AC) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (AC) Low beam	
WHITE	12 volts (AC) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (AC) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (AC) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (AC) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (AC) Heated grips (min.)	
BROWN	12 volts (AC) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (AC) Heated throttle lever (min.)	
GREEN	12 volts (AC) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (AC) Engine overheating light	

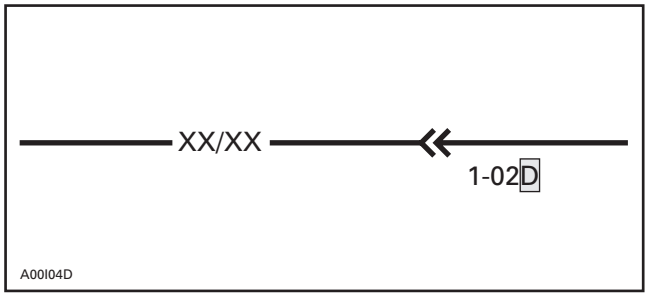
CONNECTOR HOUSING AREA

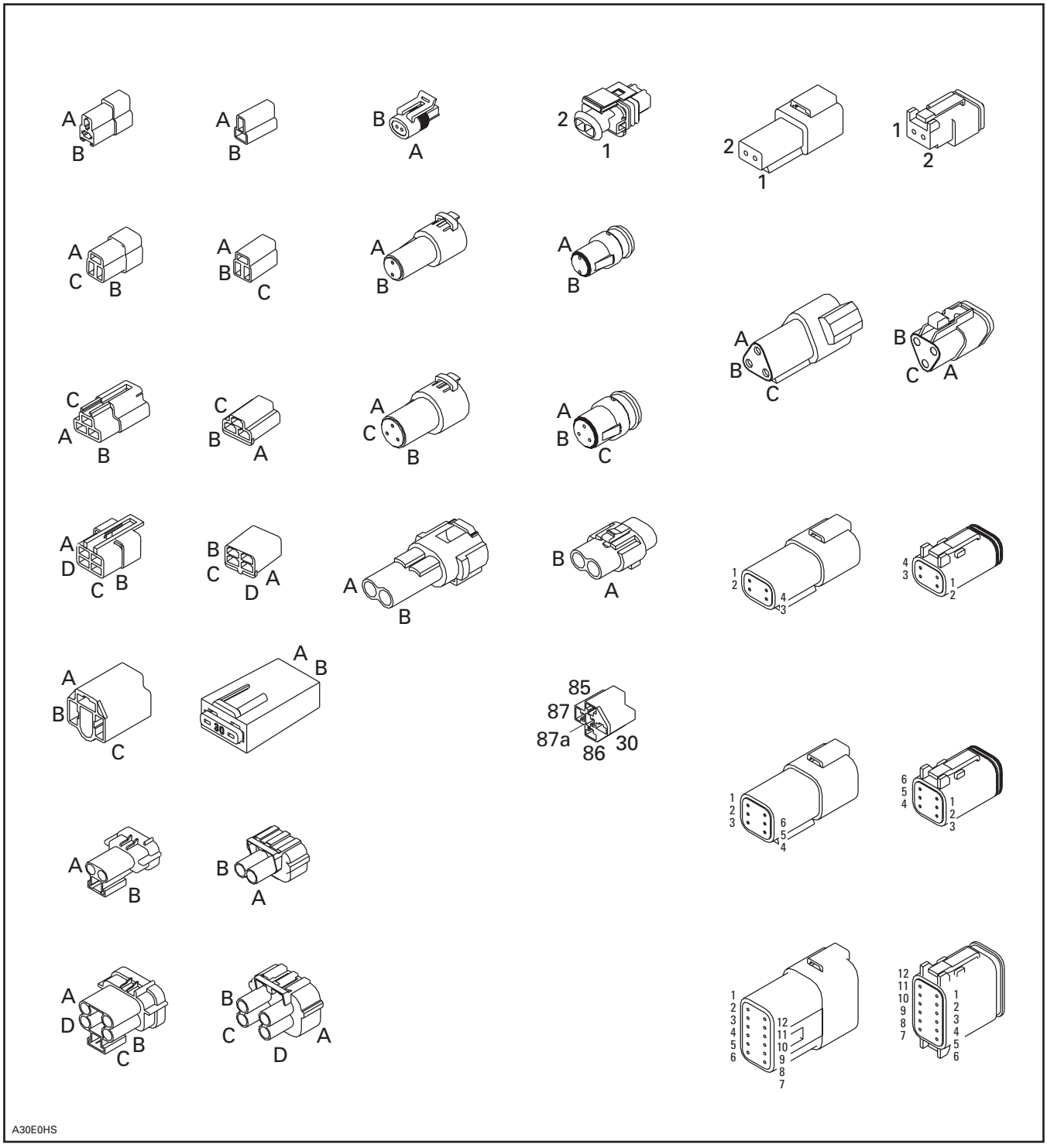




AREA	LOCATION
1	Front of engine compartment
2	Magneto
3	Carburetors
4	Near of intake silencer
5	Near driven pulley
6	Under console
7	Under hood
8	Near fuel tank
9	Rear of seat
10	Under engine

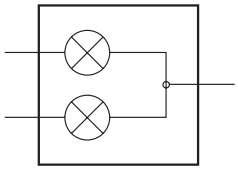
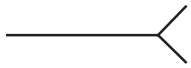
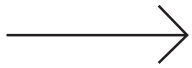
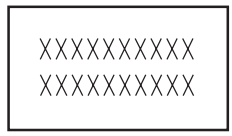
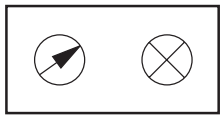
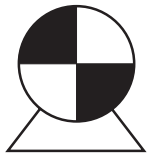
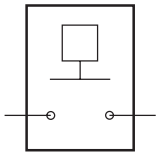
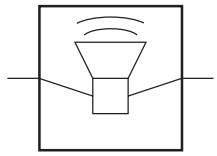
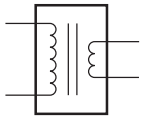
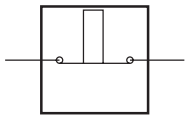
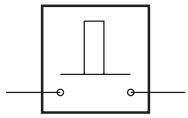
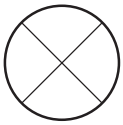
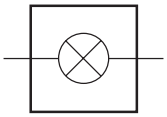
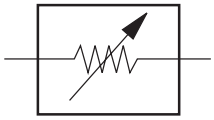
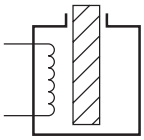
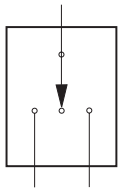
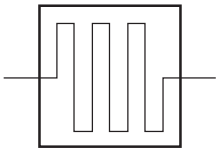
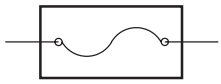
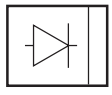
CONNECTOR LOCATION IN HOUSING




A
B
A
B
B
A
2
1
2
1
1
2
A
C
B
A
B
C
A
B
A
B
A
B
C
A
B
C
B
A
A
C
B
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C
A
B
C
A
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D
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B
B
C
D
A
A
B
B
A
1
2
4
3
4
3
1
2
A
B
C
A
B
30
85
87
87a
86
30
1
2
3
6
5
4
6
5
4
1
2
3
A
B
B
A
A
D
C
B
B
C
D
A
1
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3
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6

A30E0HS

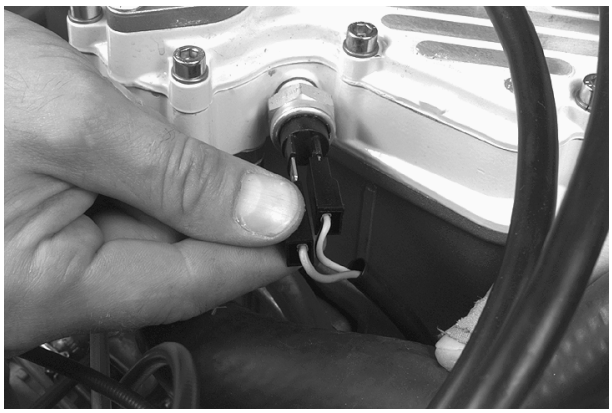
SYMBOLS DESCRIPTION

Beam and tail light 	Female terminal 	Male terminal 	Electronic module 
Meter 	Electric motor 	Low level sensor 	Buzzer 
Ignition coil 	Normally close switch 	Normally open switch 	Male terminal on instrument 
Engine ground 	Frame ground  Frame	Spark plug 	Meter movement 
Bulb 	Pilot lamp 	Analog sensor 	Solenoid valve 
Magneto (Delta) 	3 position switch 	Heating element 	Fuse 
Trigger coil 	Battery 	Diode 	

A00E52S

UNPLUGING CONNECTORS

Always unplug connectors by pulling on housing not on wire.



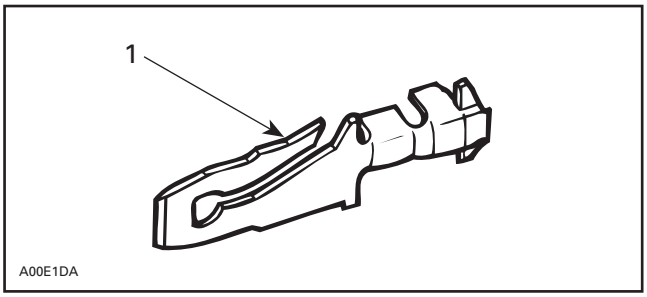
A06E1PA

TYPICAL

TAB AND RECEPTACLE CONNECTORS REMOVAL

Tab Connector

It is locked in its housing by a spring tab on its side. Removal is done by squeezing this tab.

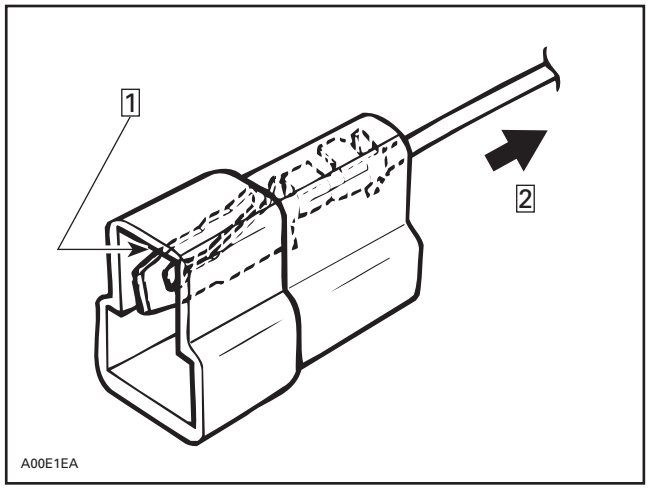


A00E1DA

TAB CONNECTOR
1. Locking tab

To remove:

– Insert a screwdriver or Snap-on TT 600-5 from opposite side of wire and pry locking tab.
– While holding locking tab pried, pull connector toward wire side.



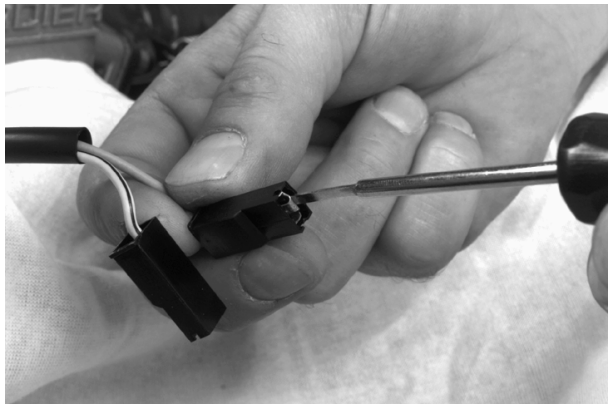
A00E1EA

Step 1: Insert screwdriver here
Step 2: Pull this side

Locking Receptacle Connector

To remove:

– Insert tool Snap-on TT 600-5 in access opening then pull housing toward wire side.



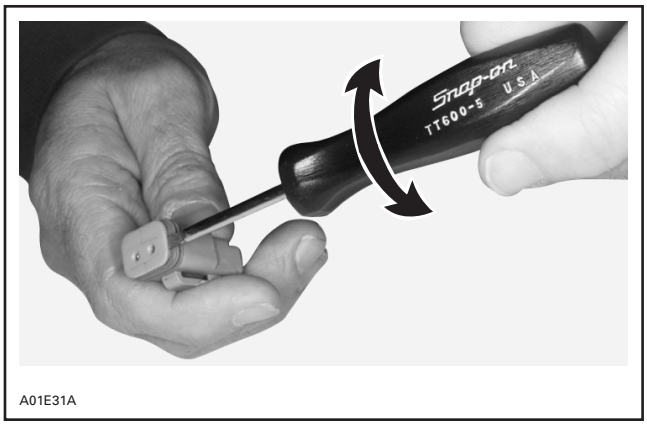
A06E1QA

Waterproof Connector Housing

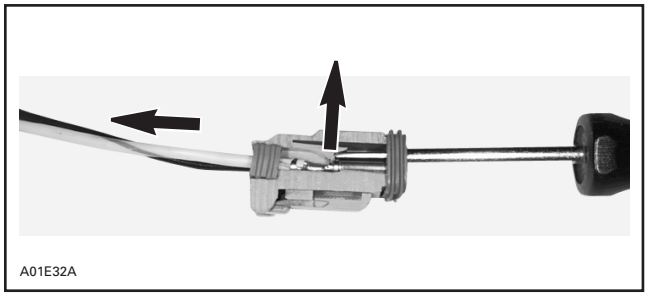
Female Connector Housing

To remove:

– Insert tool Snap-on TT 600-5 under lock and twist to lift it.



– Pry tab to free connector then pull wire out of housing.

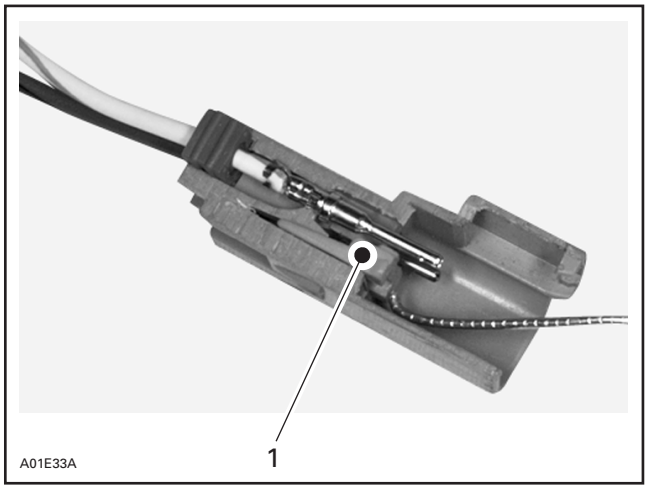


FEMALE CONNECTOR HOUSING — CUT-AWAY

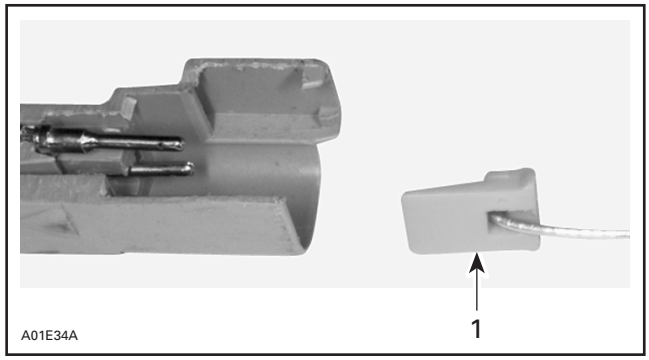
Male Connector Housing

To remove:

– Using a small hook, pull out the lock.

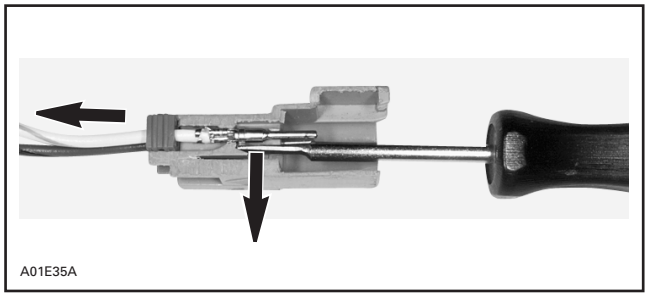


1. Lock



1. Lock

– Pry tab to free connector then pull wire out of housing.

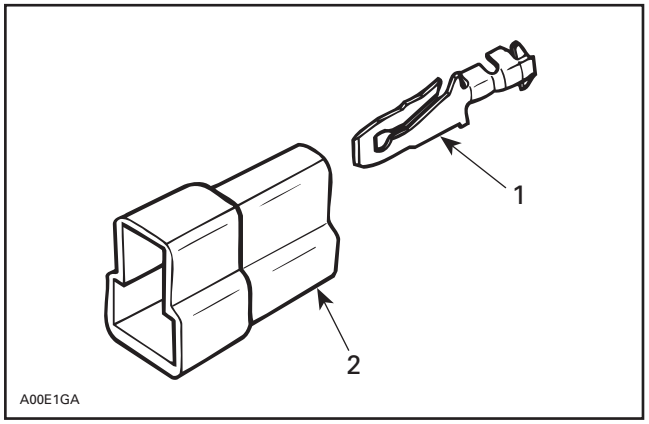


MALE CONNECTOR HOUSING — CUT-AWAY

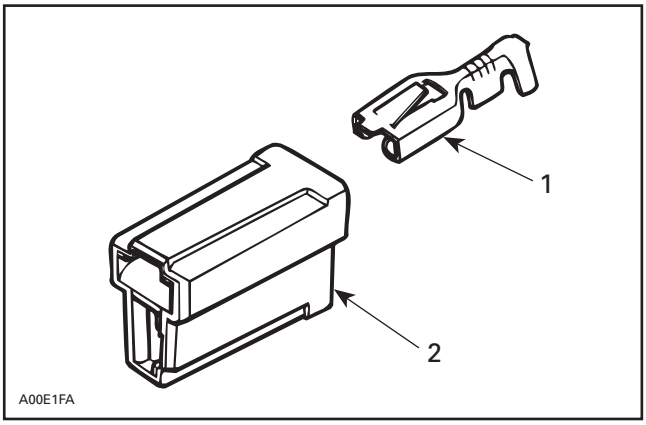
TAB AND RECEPTACLE CONNECTORS INSTALLATION

Prior to installing, make sure locking tab is sufficiently lifted to properly lock.

Insert tab and receptacle connectors in their respective housings as shown in following illustrations. Push sufficiently so that they snap. Try pulling wire to ensure they are properly locked.



1. Tab
2. Housing



TYPICAL

1. Receptacle
2. Housing

ACCESSORIES INSTALLATION

On all **electric start models**: The direct current (DC) utilizes the snowmobile frame as ground "wire" while all alternating current (AC) consumers (lights, heated grips, fuel gauge, etc.) utilize a separate ground wire.

Never interconnect AC and DC grounds as an AC voltage drop will result. When installing accessories on **any** snowmobile, connect their wires directly to the YELLOW and YELLOW/BLACK lighting coil wires.

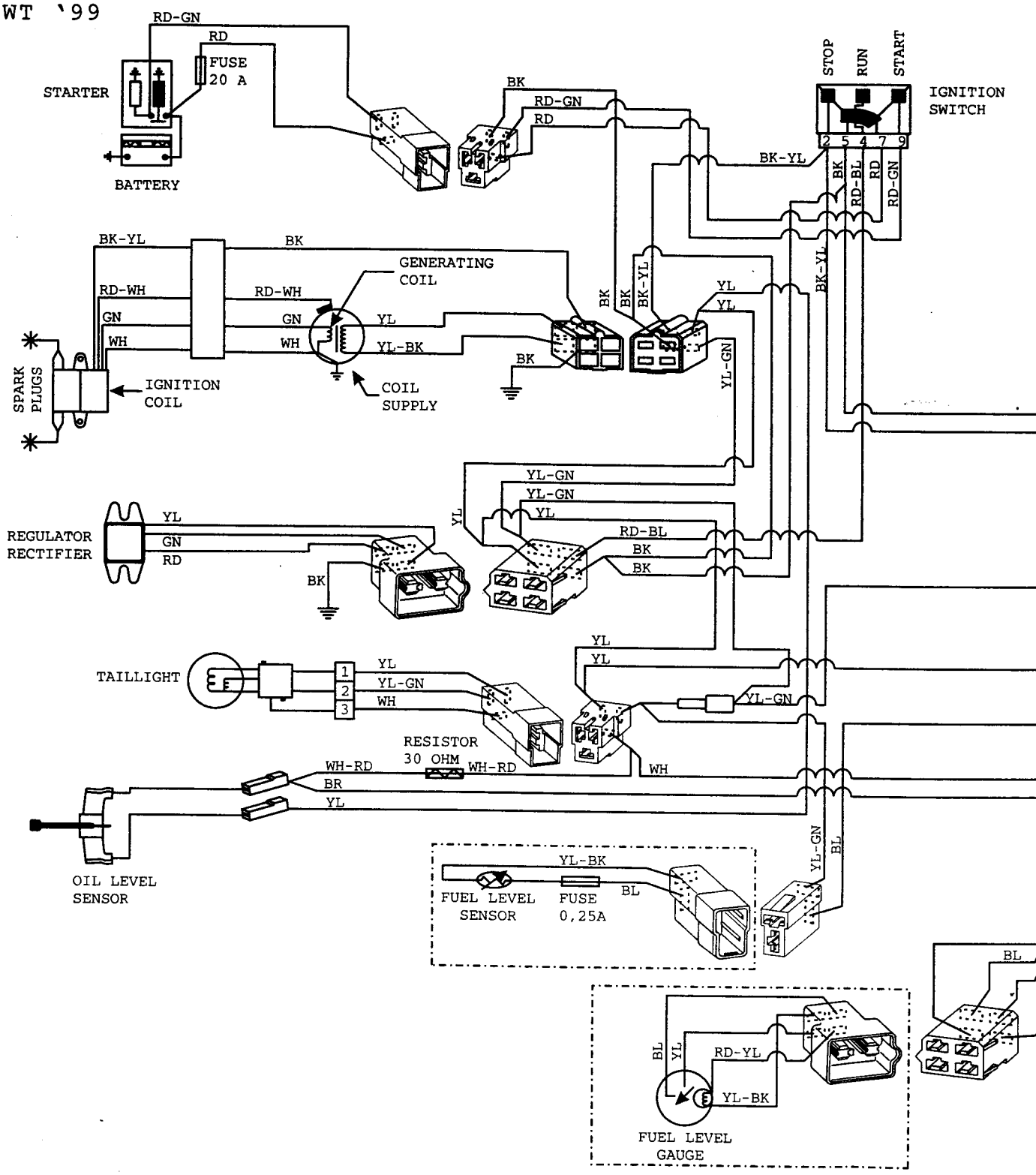
Even if **manual start models** have an AC ground to the chassis (on voltage regulator), all accessories utilize a ground wire isolated from chassis. When an electric starter kit is installed, the voltage regulator and its ground wire are replaced by a voltage rectifier/regulator unit permitting a completely isolated AC circuit.

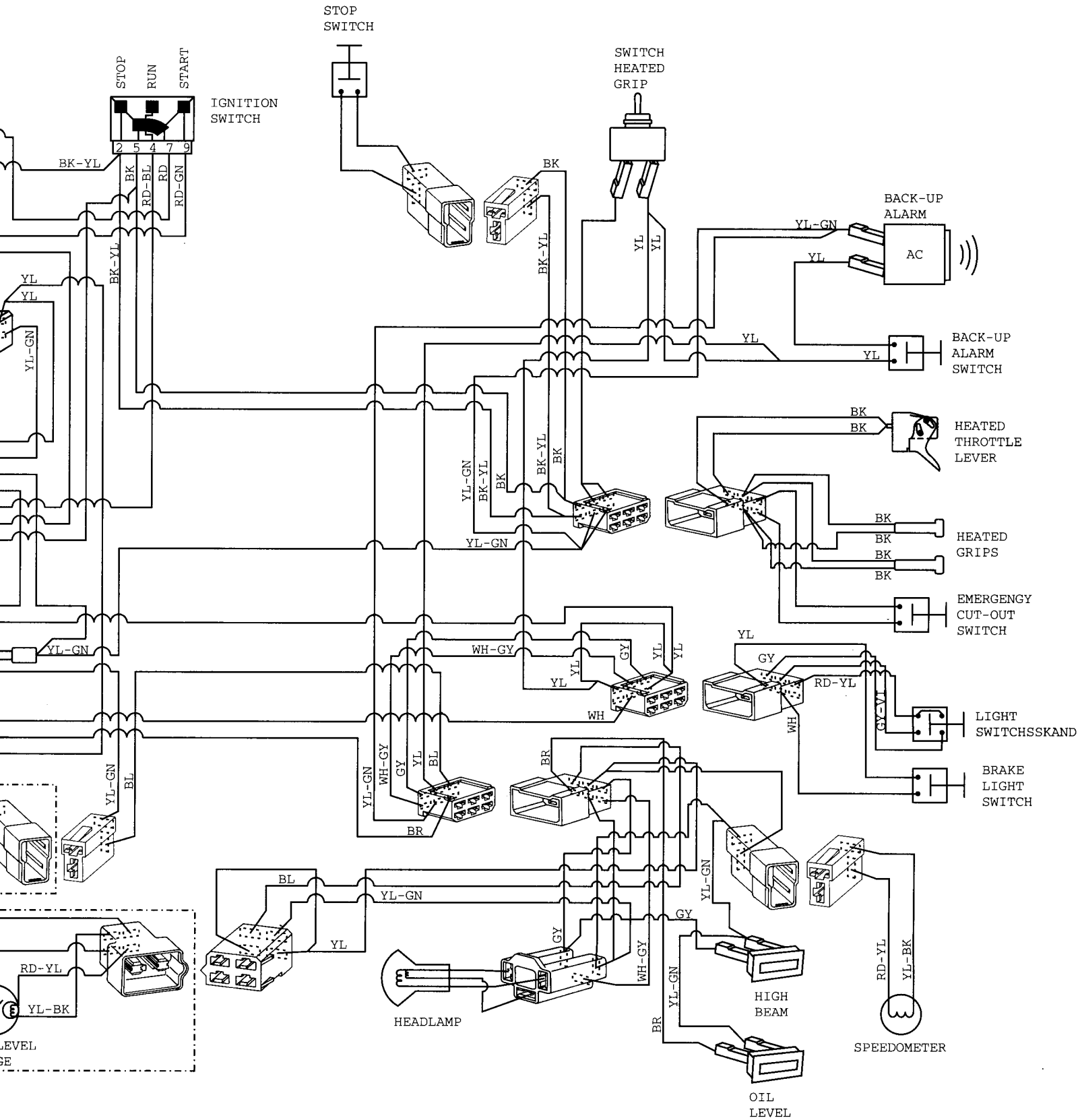
◆ WARNING

Never secure electrical wires/cables with fuel lines. Keep wires away from any rotating, moving, heating, vibrating or sharp edge. Use proper fastening devices as required.

ANNEX 1 SKANDIC WT/SWT

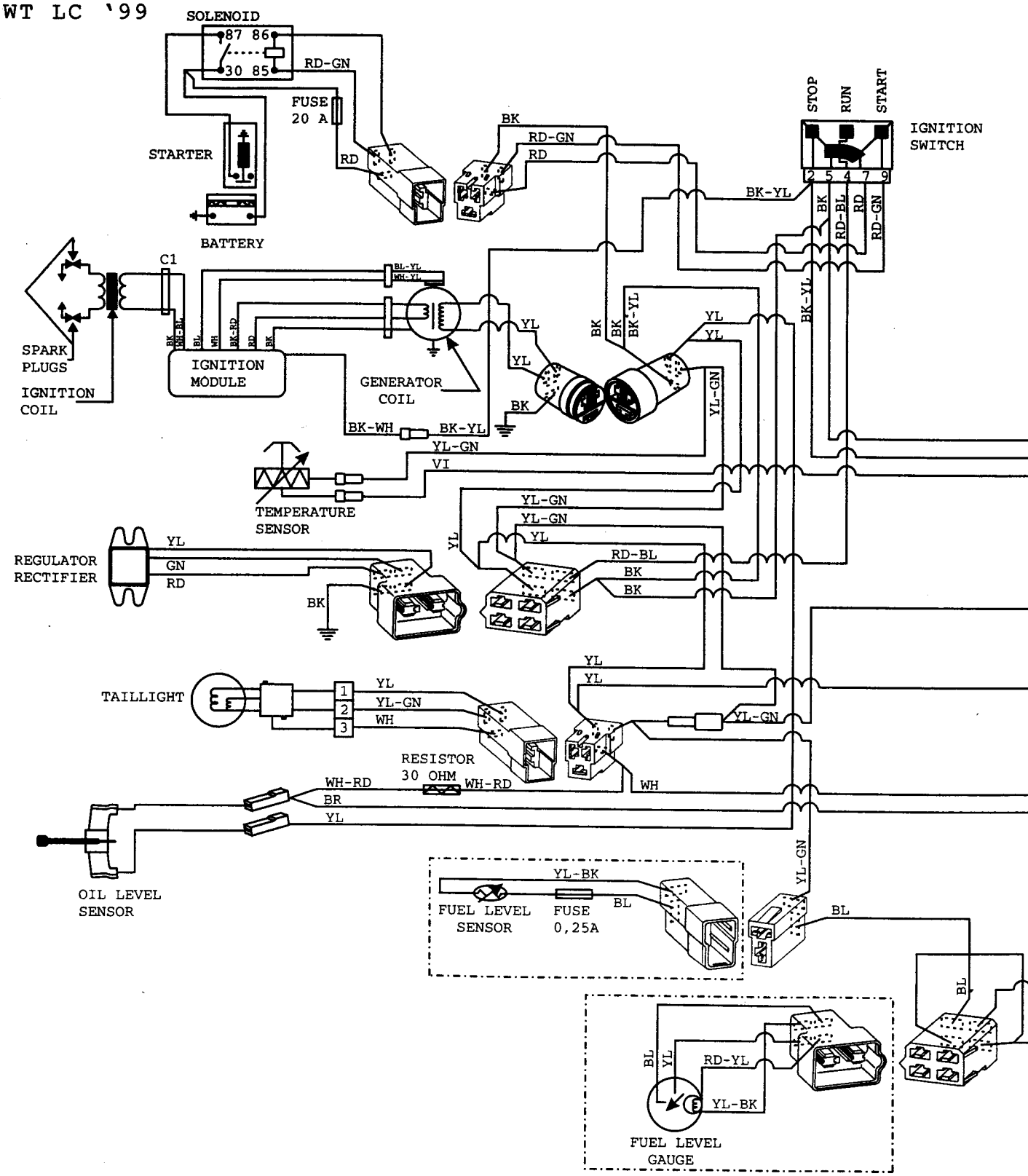
SKANDIC WT '99
SKANDIC SWT '99

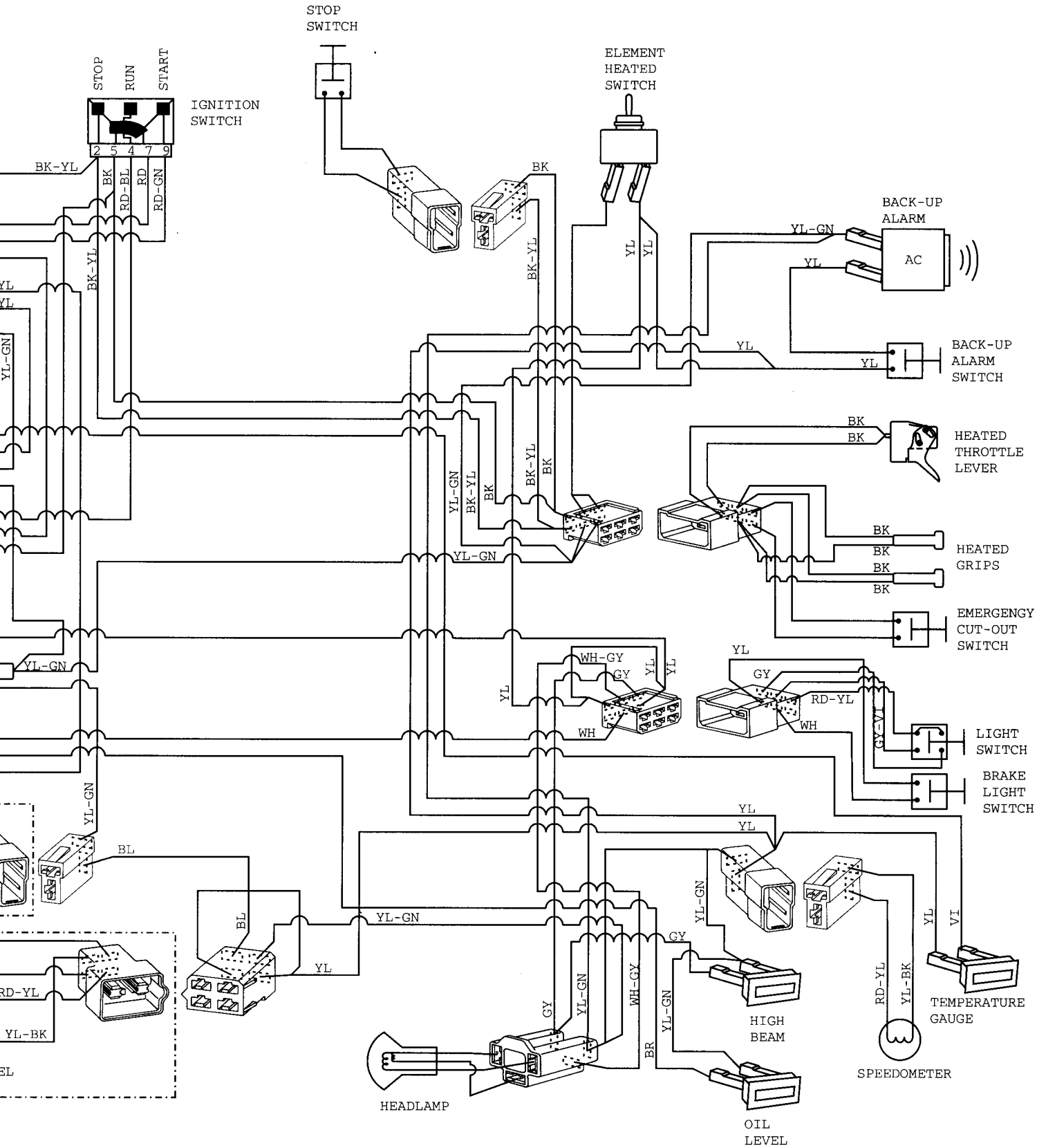



STOP
SWITCH
SWITCH
HEATED
GRIP
STOP
RUN
START
IGNITION
SWITCH
2 5 4 7 9
BK-YL
BK
RD-BL
RD
RD-GN
BK
BK-YL
YL
YL
BACK-UP
ALARM
YL-GN
AC
YL
BACK-UP
ALARM
SWITCH
YL
YL
YL-GN
BK
BK
HEATED
THROTTLE
LEVER
YL-GN
BK-YL
BK
BK-YL
BK
YL-GN
BK
BK
HEATED
GRIPS
BK
BK
EMERGENGY
CUT-OUT
SWITCH
YL-GN
WH-GY
YL
GY
YL
YL
YL
GY
RD-YL
WH
GY-YL
LIGHT
SWITCHSSKAND
BRAKE
LIGHT
SWITCH
YL-GN
BL
YL-GN
WH-GY
GY
YL
BL
BR
BR
BL
YL-GN
YL
GY
YL-GN
GY
WH-GY
YL-GN
BR
HIGH
BEAM
RD-YL
YL-BK
RD-YL
YL-BK
HEADLAMP
SPEEDOMETER
OIL
LEVEL
LEVEL
GE

ANNEX 2 SKANDIC WT LC

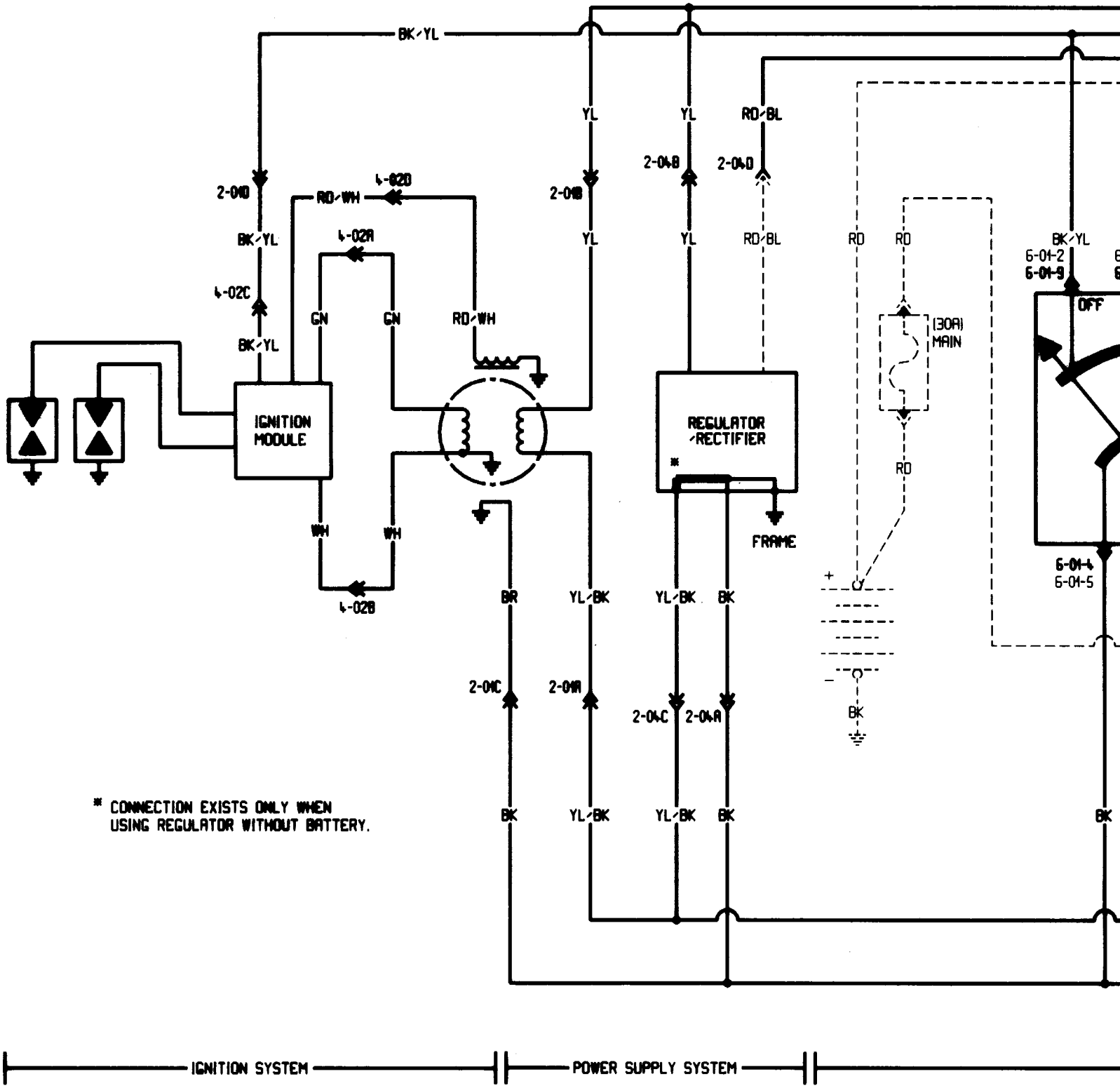
SKANDIC WT LC '99

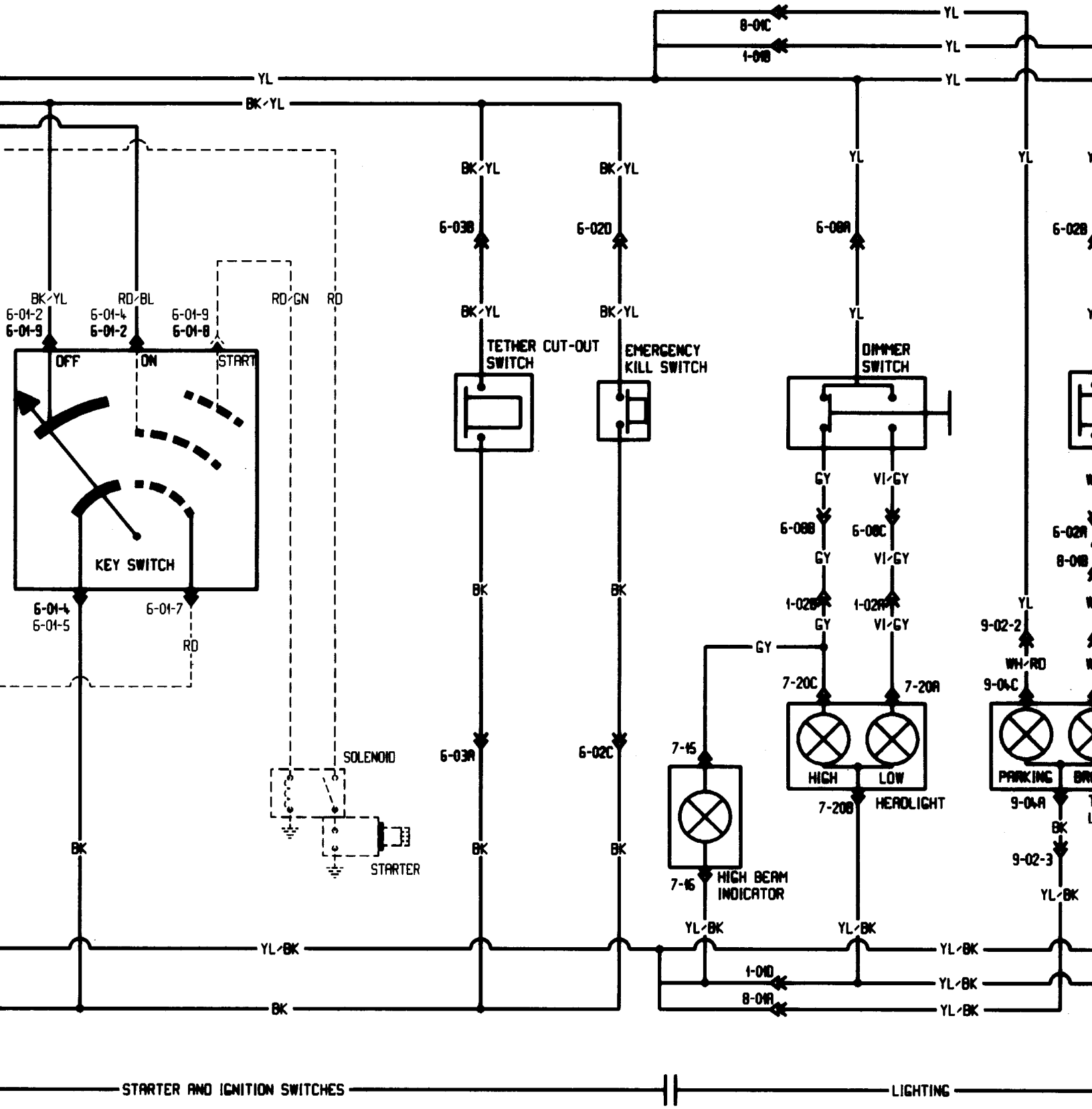


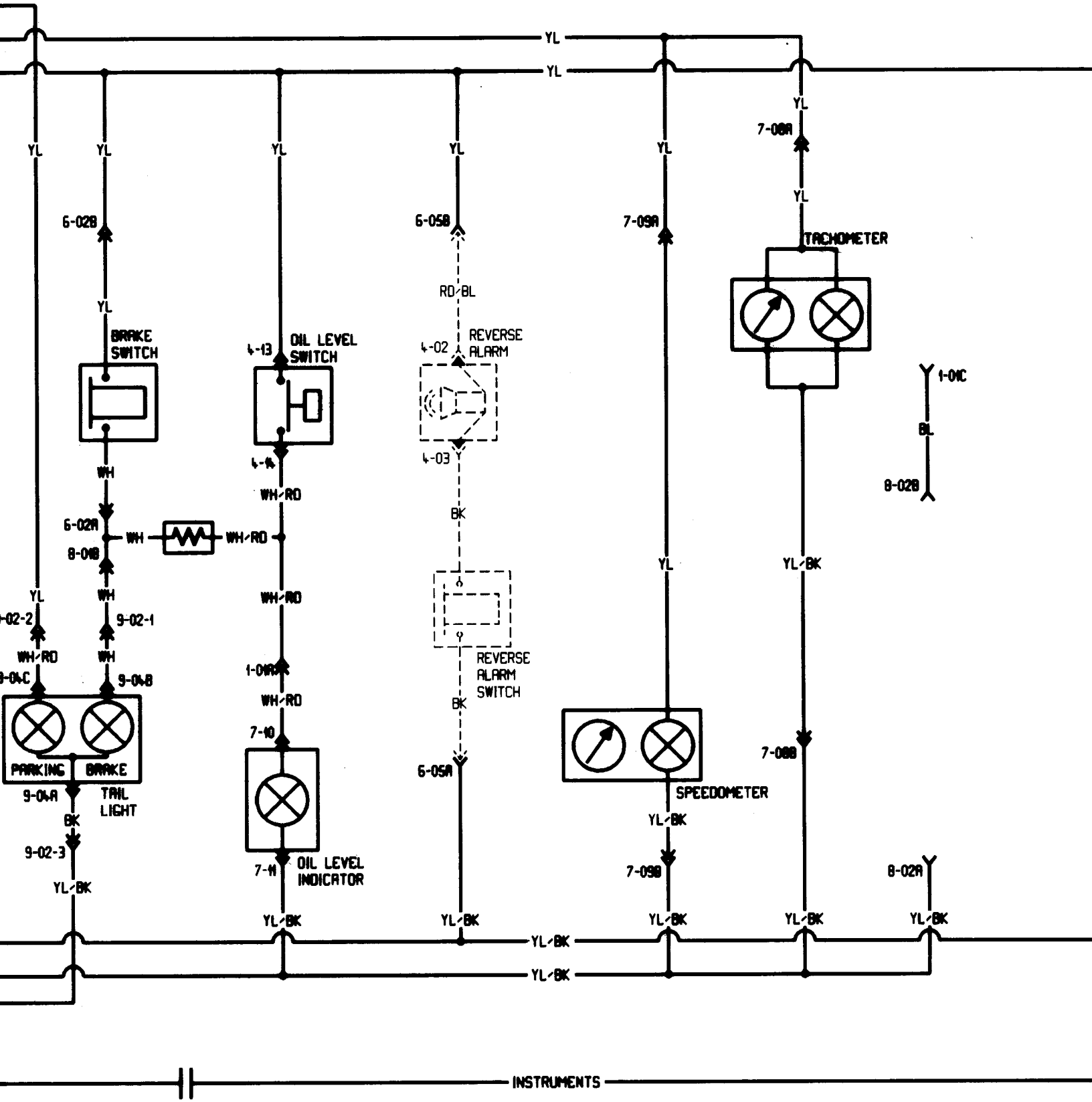

STOP
SWITCH
ELEMENT
HEATED
SWITCH
STOP
RUN
START
IGNITION
SWITCH
2 5 4 7 9
BK-YL
BK
RD-BL
RD
RD-GN
BK-YL
YL
YL
YL-GN
BK
BK-YL
YL
YL
BACK-UP
ALARM
YL-GN
YL
AC
YL
YL
BACK-UP
ALARM
SWITCH
BK
BK
HEATED
THROTTLE
LEVER
YL-GN
BK-YL
BK
BK-YL
BK
YL-GN
BK
BK
HEATED
GRIPS
BK
BK
EMERGENGY
CUT-OUT
SWITCH
YL-GN
WH-GY
GY
YL
YL
YL
WH
YL
GY
RD-YL
WH
GY-YL
LIGHT
SWITCH
BRAKE
LIGHT
SWITCH
YL-GN
BL
YL
YL
BL
YL-GN
YL-GN
GY
RD-YL
YL-BK
EL
GY
YL-GN
WH-GY
YL-GN
BR
HIGH
BEAM
RD-YL
YL-BK
YL
VI
TEMPERATURE
GAUGE
SPEEDOMETER
HEADLAMP
OIL
LEVEL

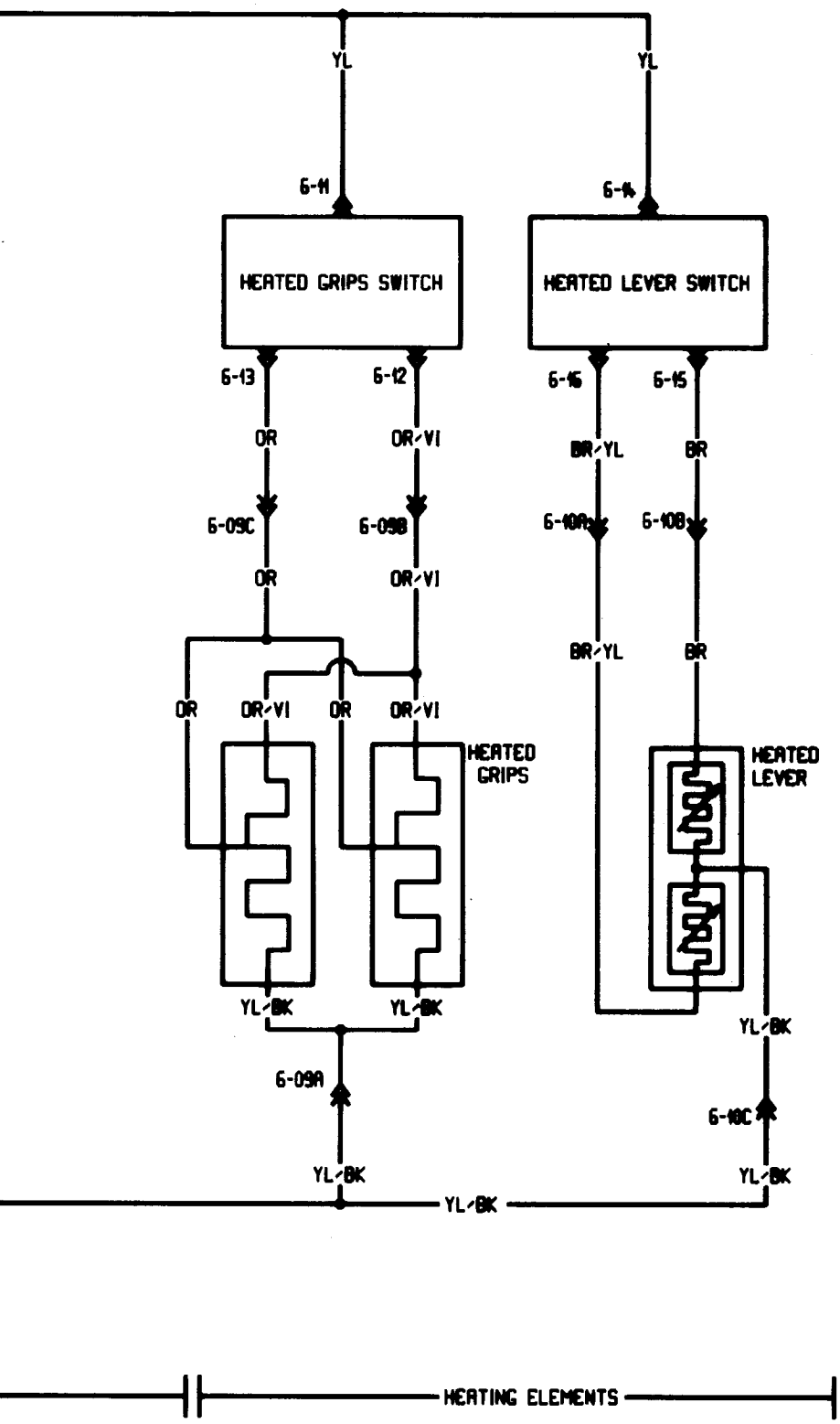
ANNEX 3 MX Z 440

'99 MXZ 440


BK/YL
YL
YL
RD/BL
2-04B
2-04D
2-04
RD/WH
4-02B
2-01
BK/YL
4-02A
YL
YL
RD/BL
RD
RD
BK/YL
6-01-2
6-01-9
4-02C
GN
GN
RD/WH
OFF
BK/YL
(30A)
MAIN
IGNITION
MODULE
REGULATOR
/RECTIFIER
*
RD
FRAME
WH
WH
6-01-4
6-01-5
4-02B
BR
YL/BK
YL/BK
BK
2-01C
2-01A
2-04C
2-04A
BK
BK
YL/BK
YL/BK
BK
BK
* CONNECTION EXISTS ONLY WHEN
USING REGULATOR WITHOUT BATTERY.
IGNITION SYSTEM
POWER SUPPLY SYSTEM


8-01C
YL
1-01B
YL
YL
YL
BK/YL
BK/YL
BK/YL
6-03B
6-02D
6-08A
6-02B
BK/YL
BK/YL
YL
YL
BK/YL
RD/BL
RD/GN
RD
6-01-2
6-01-9
6-01-4
6-01-2
6-01-9
6-01-8
OFF
ON
START
KEY SWITCH
TETHER CUT-OUT SWITCH
EMERGENCY KILL SWITCH
DIMMER SWITCH
GY
VI/GY
6-08B
6-08C
GY
VI/GY
1-02B
1-02A
GY
VI/GY
YL
9-02-2
WH/RD
6-01-4
6-01-5
6-01-7
RD
SOLENOID
STARTER
BK
BK
BK
6-03A
6-02C
GY
7-15
7-20C
7-20A
9-04C
HIGH
LOW
PARKING
7-20B
HEADLIGHT
9-04A
BK
9-02-3
7-16
HIGH BEAM INDICATOR
YL/BK
YL/BK
YL/BK
YL/BK
1-01D
8-01A
YL/BK
YL/BK
BK
BK
BK
BK
STARTER AND IGNITION SWITCHES
LIGHTING


YL
YL
YL
YL
YL
YL
YL
7-08A
6-02B
6-05B
7-09A
TACHOMETER
RD/BL
BRAKE SWITCH
4-13
OIL LEVEL SWITCH
4-02
REVERSE ALARM
4-03
1-01C
BL
8-02B
WH
4-14
WH/RD
6-02A
WH
WH/RD
8-01B
BK
YL
YL/BK
WH
WH/RD
9-02-1
9-02-2
WH/RD
WH
1-01A
9-04C
9-04B
WH/RD
7-10
REVERSE ALARM SWITCH
BK
PARKING
BRAKE
TAIL LIGHT
6-05A
7-08B
SPEEDOMETER
9-04A
YL/BK
BK
9-02-3
7-09B
8-02A
7-11
OIL LEVEL INDICATOR
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
INSTRUMENTS

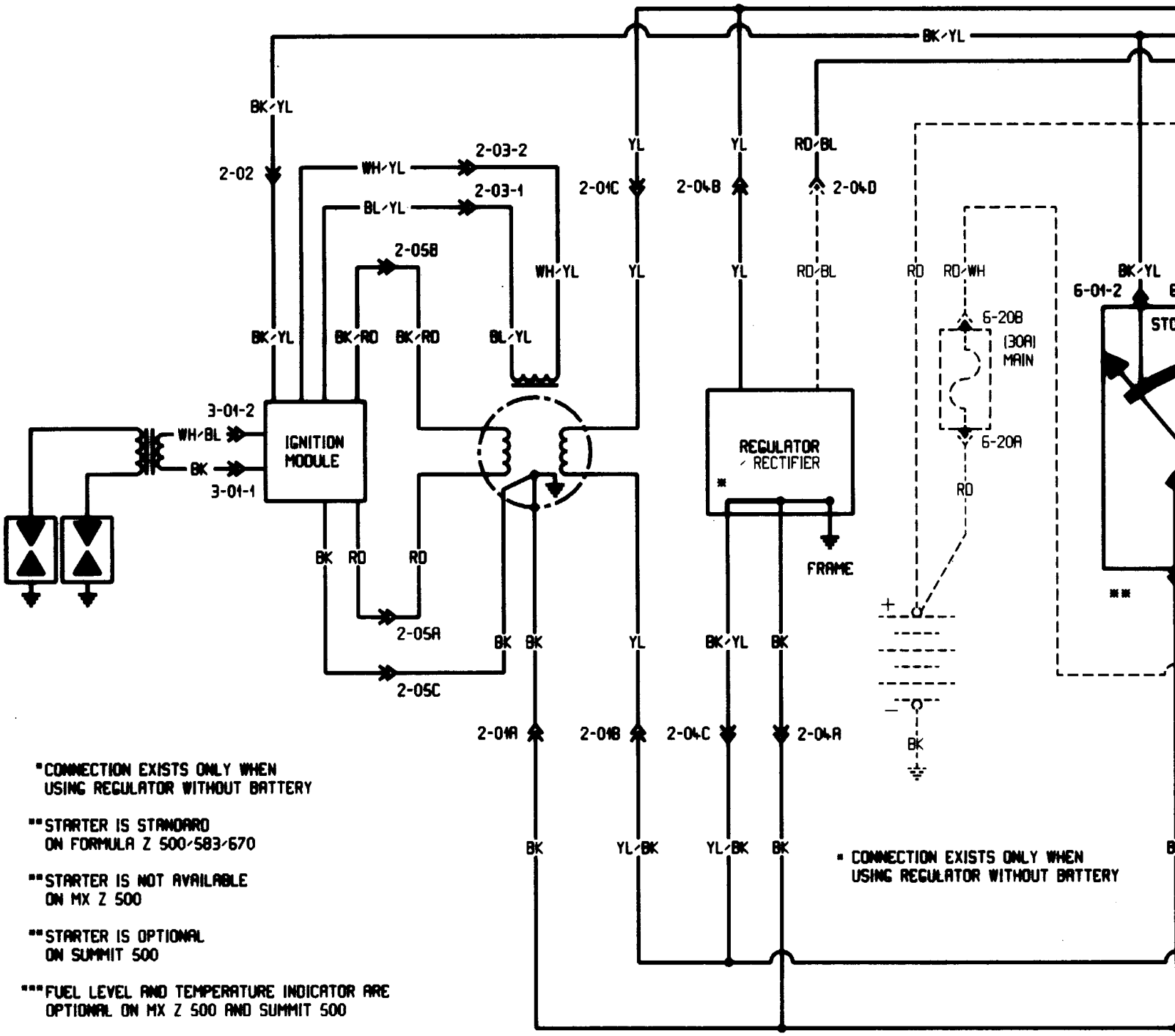


HEATING ELEMENTS

ANNEX 4

FORMULA Z 500/583/670
MX Z 500 AND SUMMIT 500

'99 FORMULA Z 500/583/670
'99 MXZ 500
'99 SUMMIT 500



*CONNECTION EXISTS ONLY WHEN USING REGULATOR WITHOUT BATTERY

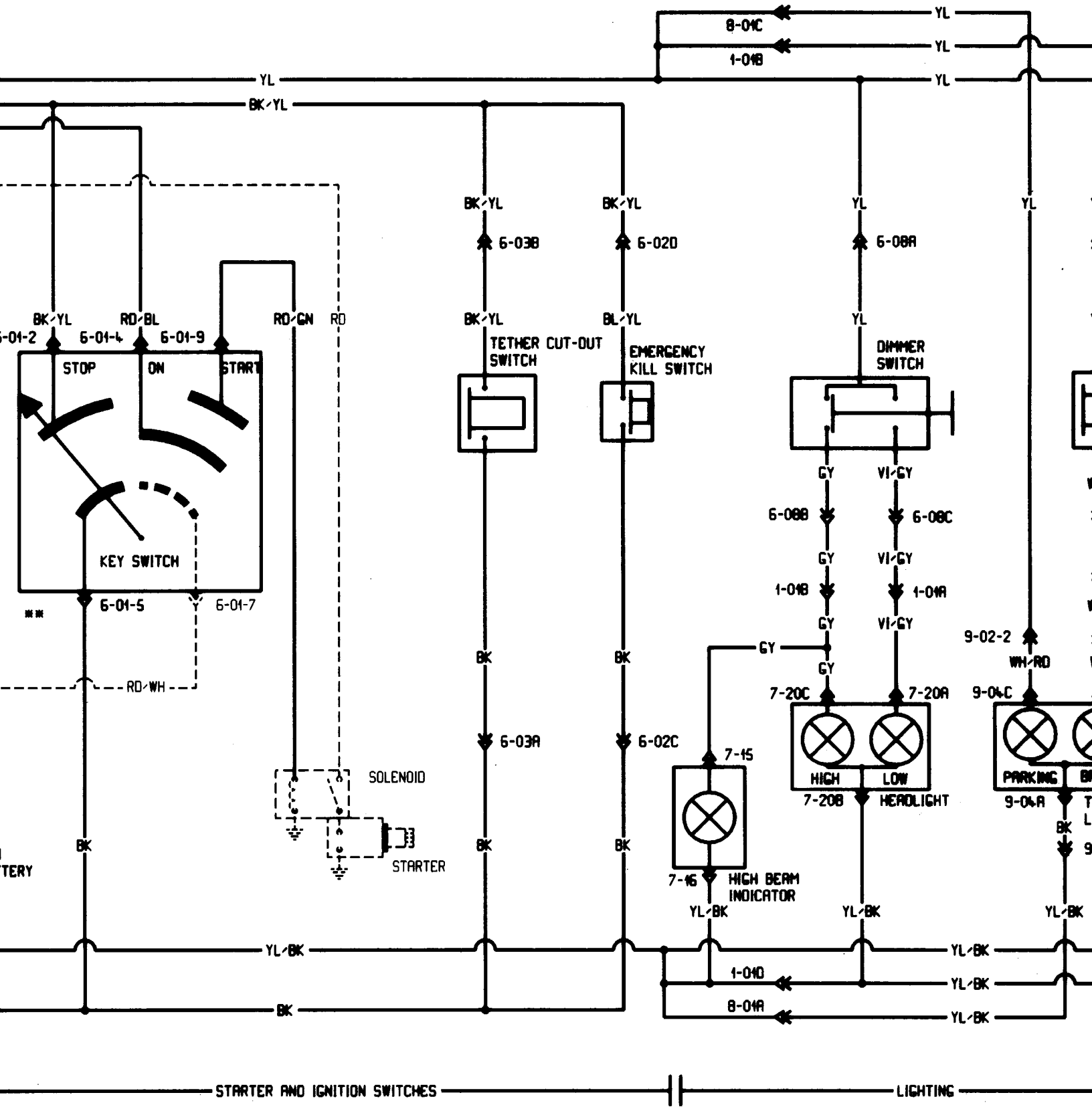
**STARTER IS STANDARD ON FORMULA Z 500/583/670

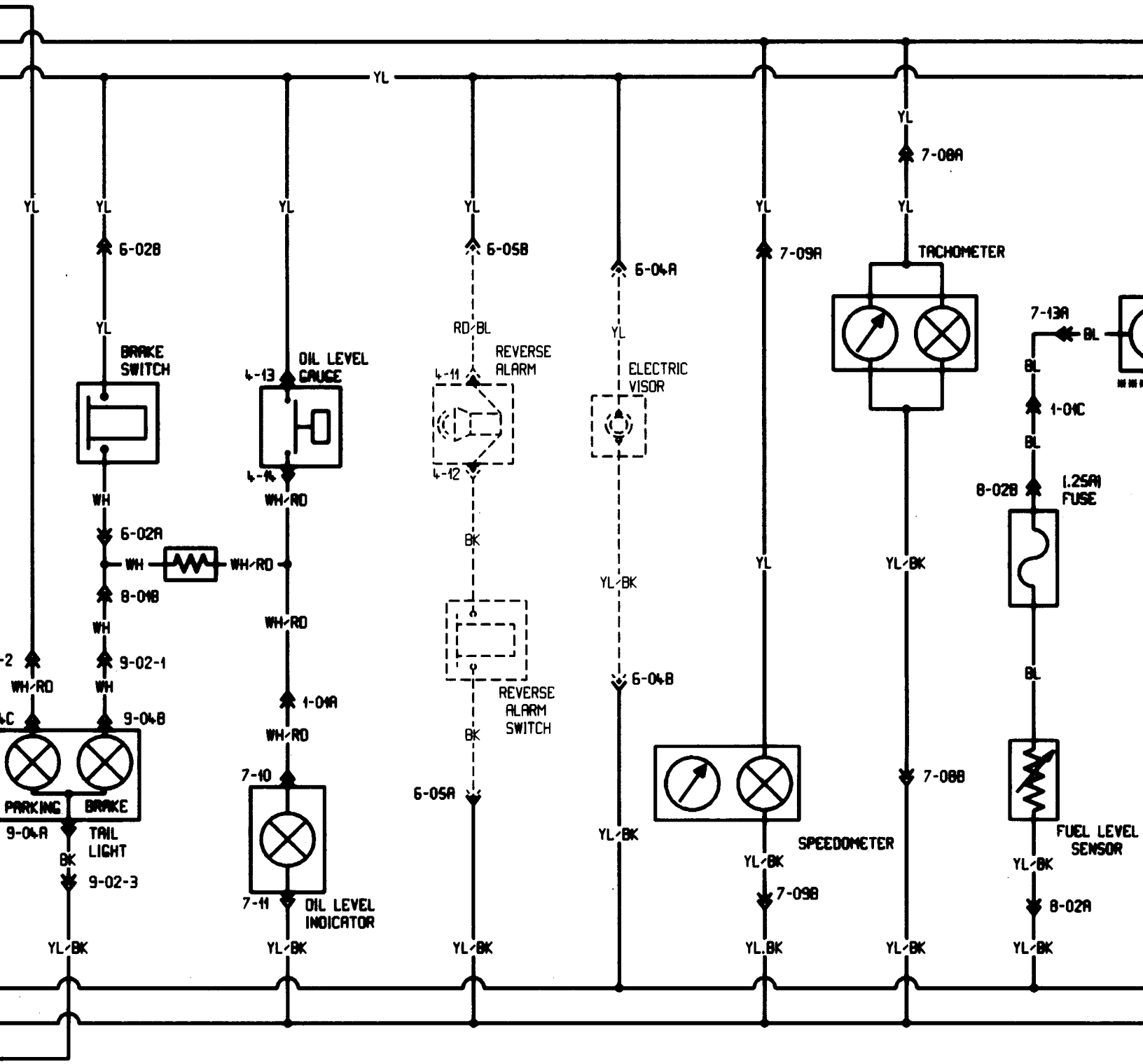
**STARTER IS NOT AVAILABLE ON MX Z 500

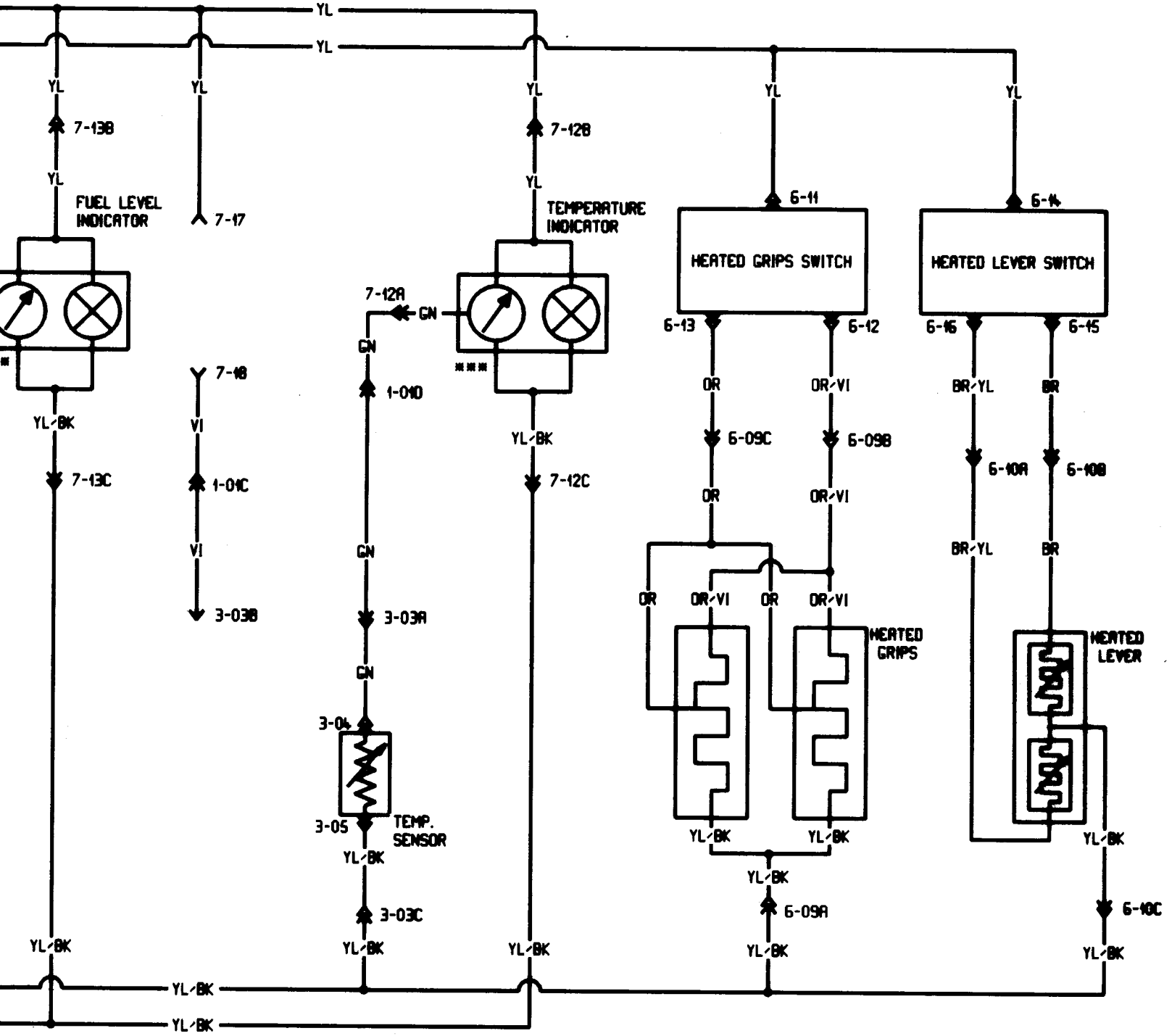
**STARTER IS OPTIONAL ON SUMMIT 500

***FUEL LEVEL AND TEMPERATURE INDICATOR ARE OPTIONAL ON MX Z 500 AND SUMMIT 500

* CONNECTION EXISTS ONLY WHEN USING REGULATOR WITHOUT BATTERY

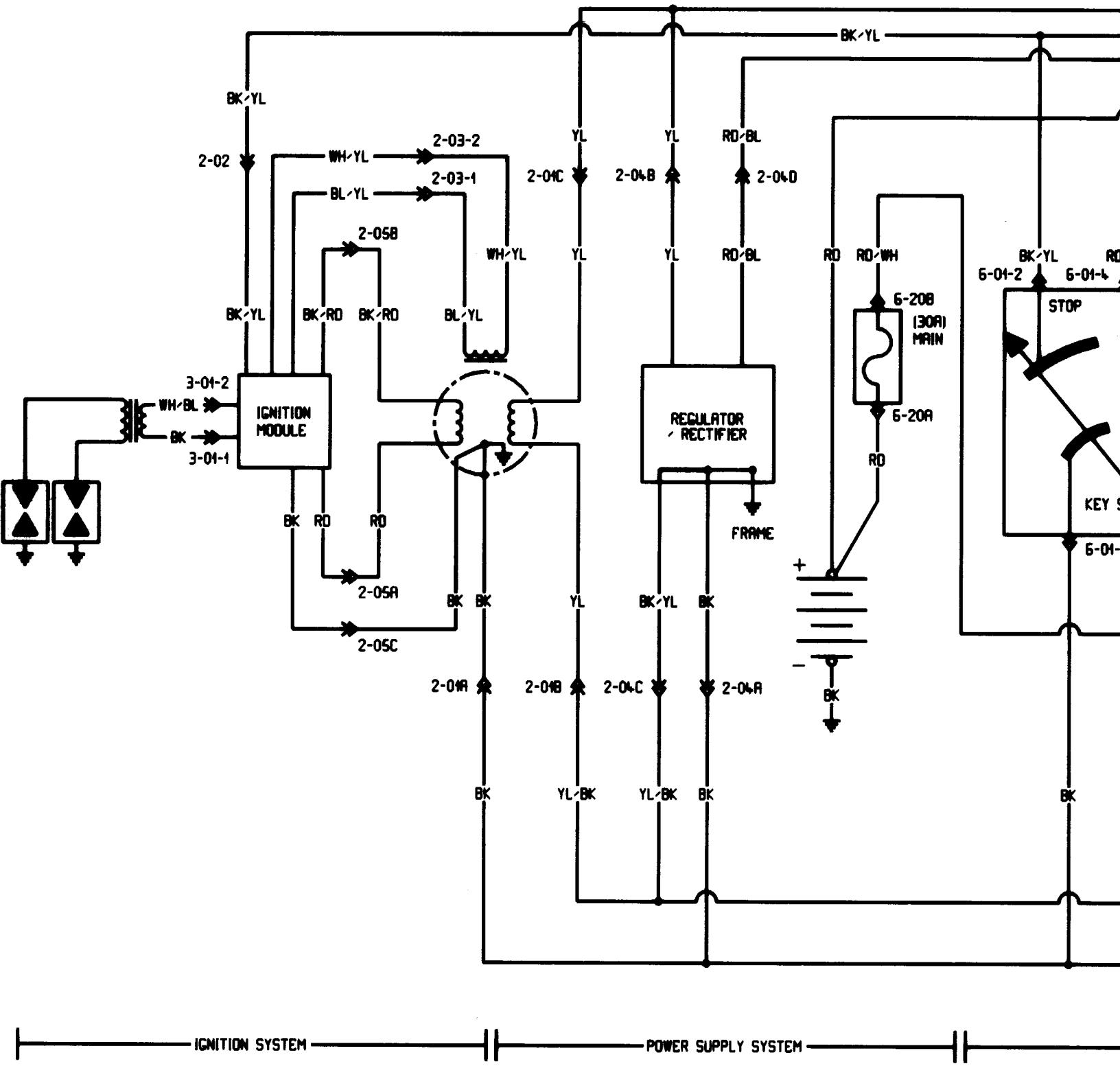

8-01C
YL
1-01B
YL
YL
YL
BK/YL
BK/YL
6-03B
6-02D
BK/YL
BL/YL
TETHER CUT-OUT SWITCH
EMERGENCY KILL SWITCH
YL
6-08A
YL
DIMMER SWITCH
YL
BK/YL
RD/BL
RD/GN
RD
6-01-2
6-01-4
6-01-9
STOP
ON
START
KEY SWITCH
6-01-5
6-01-7
RD/WH
GY
VI/GY
6-08B
6-08C
GY
VI/GY
1-01B
1-01A
GY
VI/GY
GY
GY
9-02-2
WH/RD
7-20C
7-20A
9-04C
BK
BK
6-03A
6-02C
7-15
HIGH
LOW
HEADLIGHT
7-20B
PARKING
9-04A
SOLENOID
STARTER
BK
BK
BK
7-16
HIGH BEAM INDICATOR
YL/BK
YL/BK
YL/BK
YL/BK
1-01D
YL/BK
BK
8-01A
YL/BK
STARTER AND IGNITION SWITCHES
LIGHTING

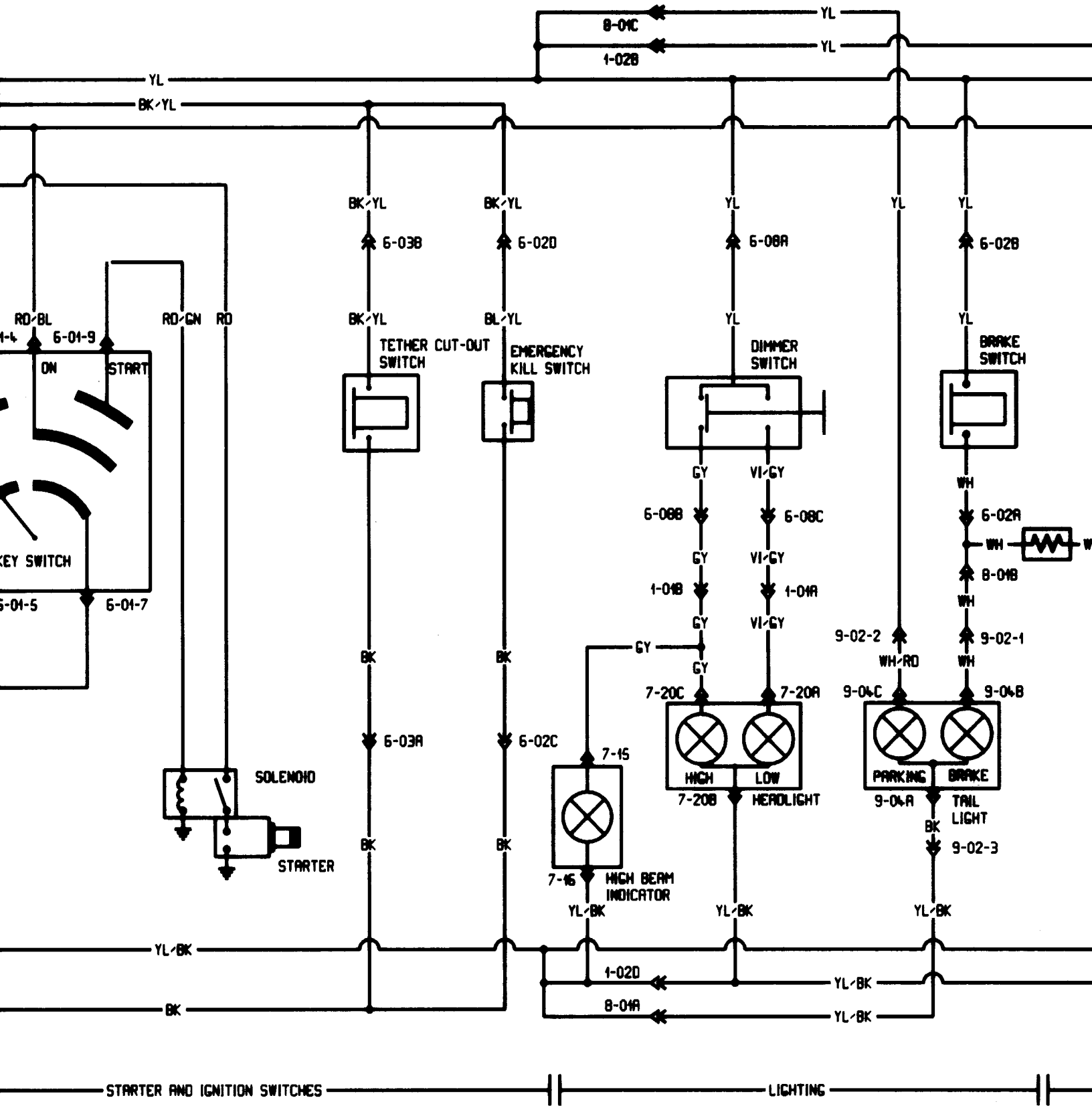

YL
6-02B
BRAKE SWITCH
WH
6-02A
WH
WH-RD
8-01B
WH
9-02-1
WH
9-04B
PARKING
BRAKE
9-04A
TAIL LIGHT
BK
9-02-3
YL/BK
4-13
OIL LEVEL GAUGE
4-14
WH-RD
WH-RD
1-01A
WH-RD
7-10
7-11
OIL LEVEL INDICATOR
YL/BK
6-05B
RD/BL
4-11
REVERSE ALARM
4-12
BK
REVERSE ALARM SWITCH
BK
6-05A
YL/BK
6-04A
YL
ELECTRIC VISOR
YL/BK
6-04B
YL/BK
7-09A
YL
YL/BK
7-09B
YL.BK
SPEEDOMETER
7-08A
YL
TACHOMETER
YL/BK
7-08B
YL/BK
7-13A
BL
BL
1-01C
BL
8-02B
1.25A FUSE
BL
FUEL LEVEL SENSOR
YL/BK
8-02A
YL/BK
INSTRUMENTS

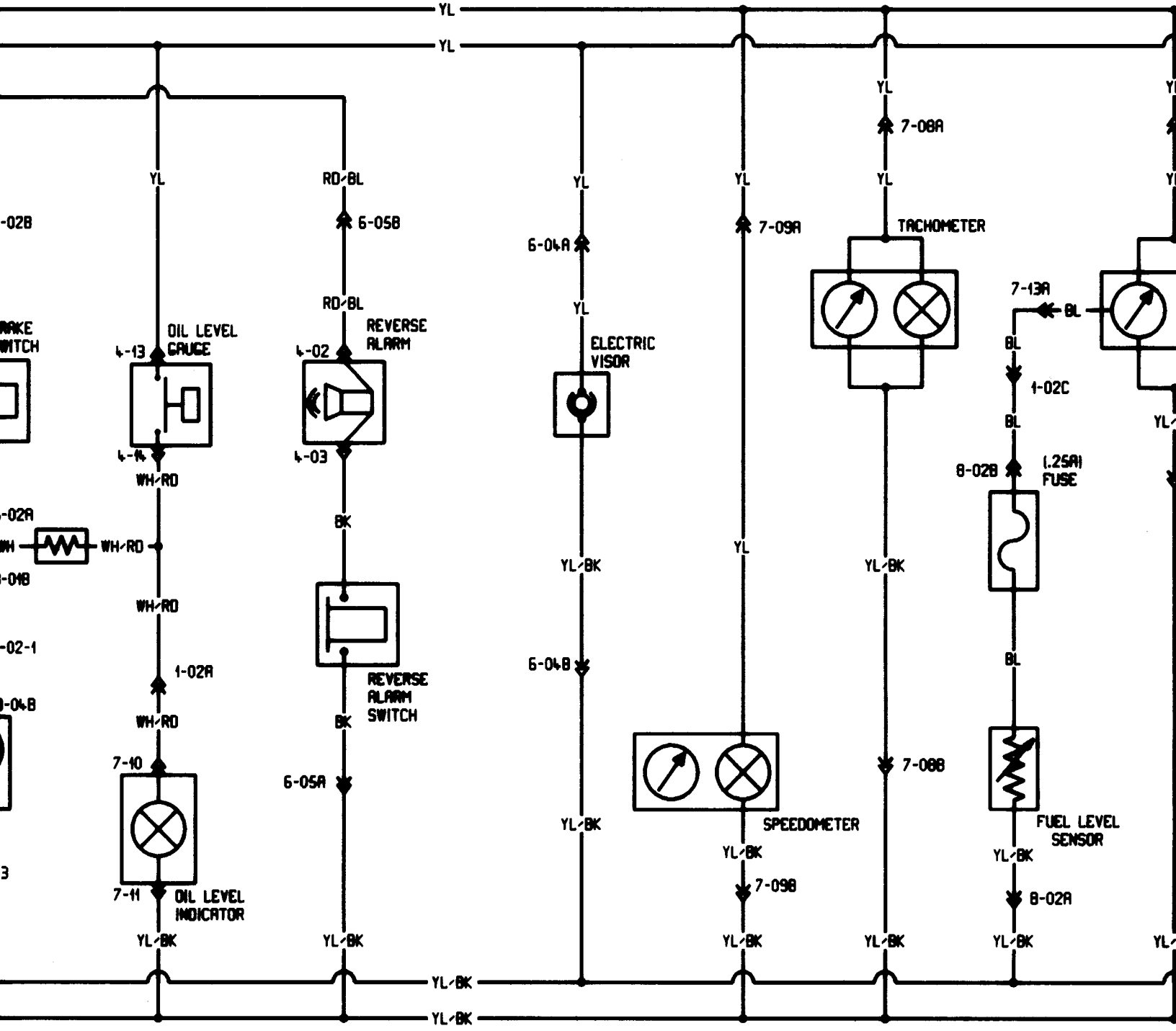

YL
YL
YL
YL
YL
YL
7-13B
7-12B
FUEL LEVEL INDICATOR
7-17
TEMPERATURE INDICATOR
6-11
6-14
HEATED GRIPS SWITCH
HEATED LEVER SWITCH
7-12A
GN
6-13
6-12
6-16
6-15
OR
OR/VI
BR/YL
BR
7-16
1-01D
6-09C
6-09B
6-10A
6-10B
YL/BK
VI
1-01C
OR
OR/VI
BR/YL
BR
7-13C
7-12C
VI
3-03B
OR
OR/VI
OR
OR/VI
HEATED GRIPS
HEATED LEVER
GN
GN
3-04
3-05
TEMP. SENSOR
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
3-03C
6-09A
6-10C
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
HEATING ELEMENTS

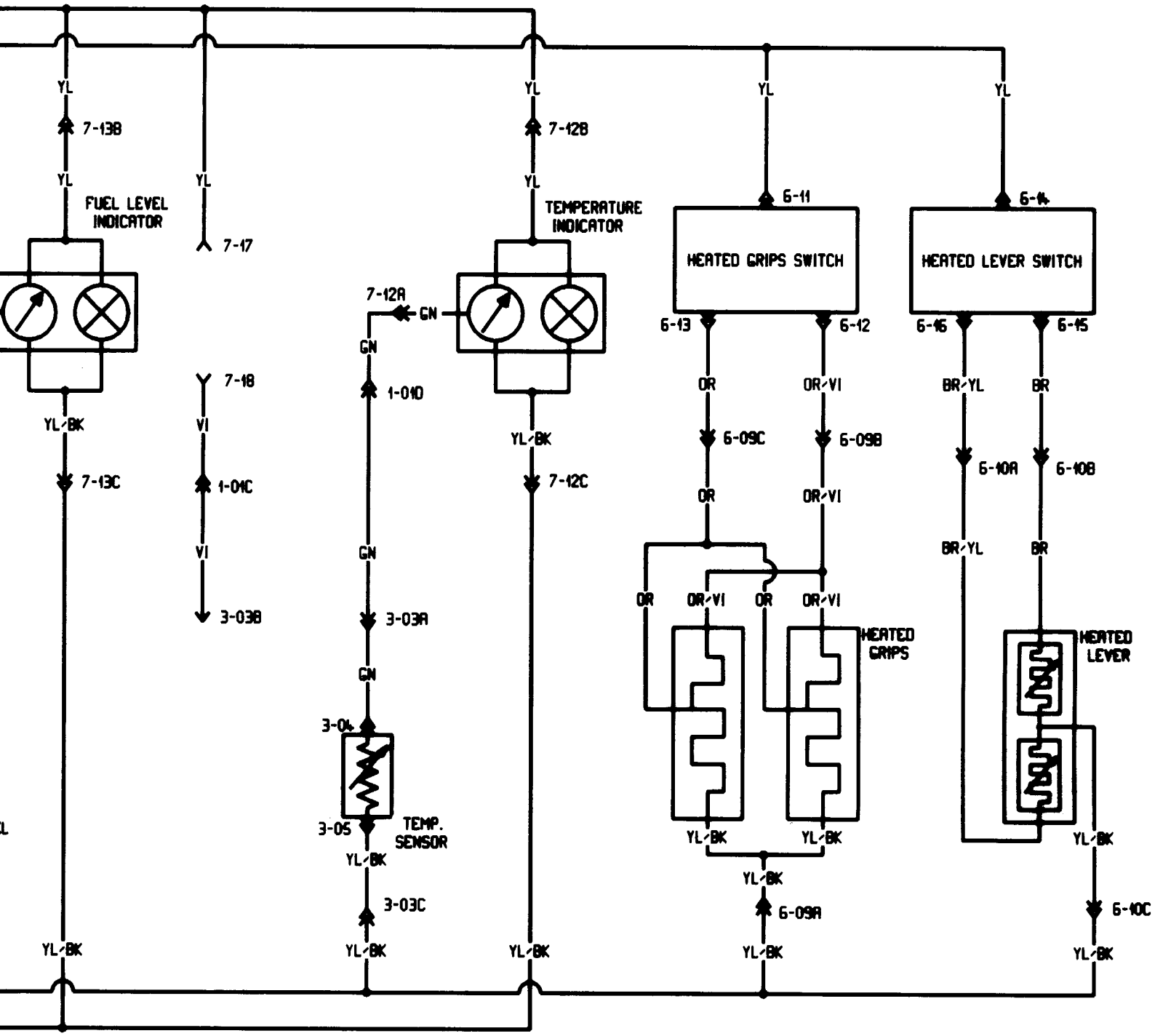
ANNEX 5 FORMULA DLX 500/583/670

'99 FORMULA DLX 500/583/670




8-01C
YL
1-02B
YL
YL
BK/YL
BK/YL
6-03B
BK/YL
6-02D
BL/YL
YL
6-08A
YL
6-02B
YL
RD/BL
6-01-9
RD/GN
RD
ON
START
KEY SWITCH
6-01-5
6-01-7
TETHER CUT-OUT SWITCH
EMERGENCY KILL SWITCH
DIMMER SWITCH
BRAKE SWITCH
GY
VI/GY
6-08B
6-08C
GY
VI/GY
1-01B
1-01A
GY
VI/GY
WH
6-02A
WH
8-01B
WH
9-02-1
9-02-2
WH/RD
WH
GY
GY
7-20C
7-20A
9-04C
9-04B
BK
6-03A
BK
6-02C
BK
BK
SOLENOID
STARTER
7-15
7-15
HIGH BEAM INDICATOR
HIGH
LOW
7-20B
HEADLIGHT
PARKING
BRAKE
9-04A
TAIL LIGHT
BK
9-02-3
YL/BK
YL/BK
YL/BK
YL/BK
1-02D
YL/BK
BK
8-01A
YL/BK
STARTER AND IGNITION SWITCHES
LIGHTING

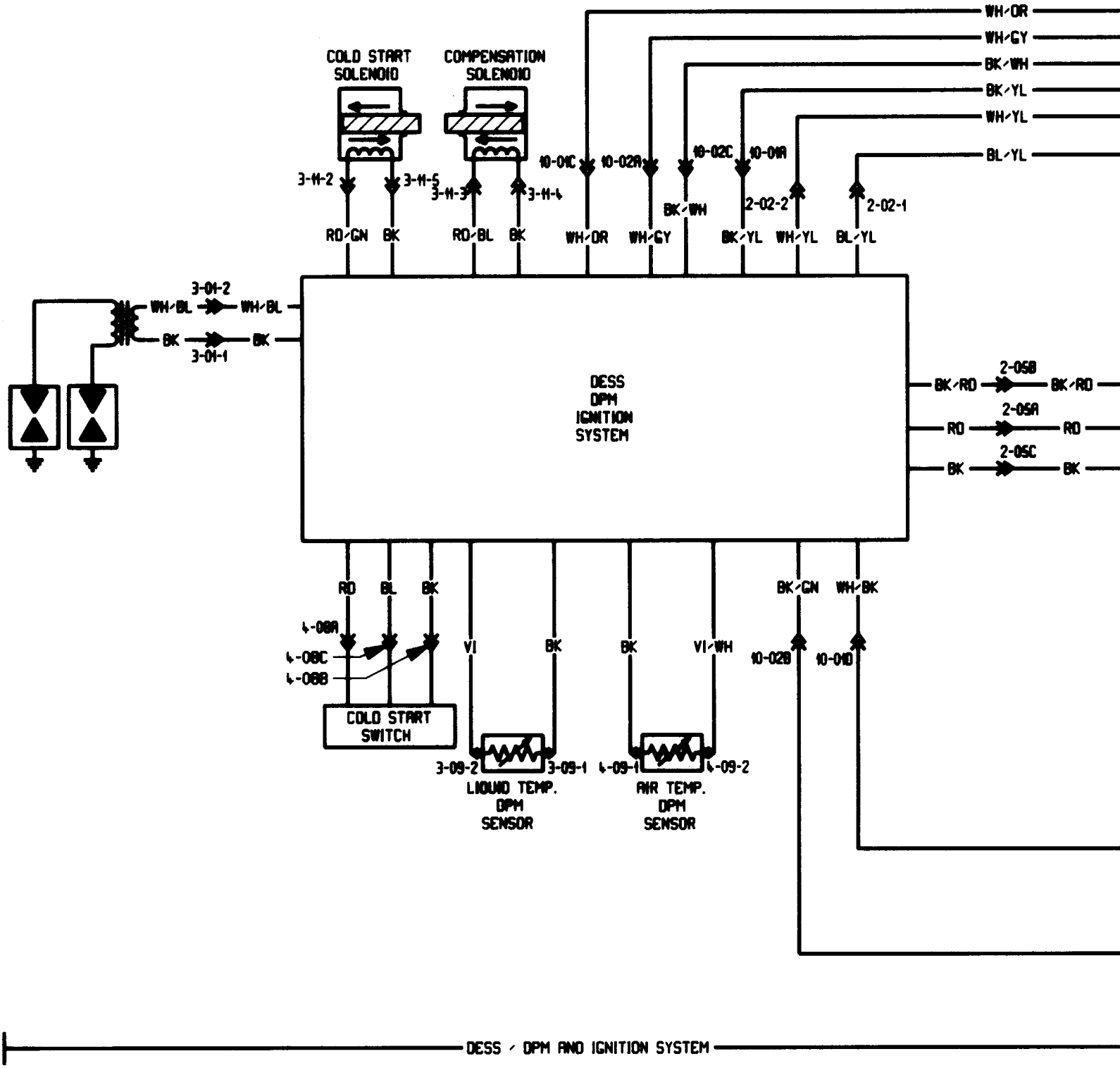

YL
YL
YL
RD/BL
6-05B
RD/BL
REVERSE
ALARM
4-02
4-03
BK
REVERSE
ALARM
SWITCH
6-05A
OIL LEVEL
GAUGE
4-13
4-14
WH/RD
WH/RD
1-02A
WH/RD
7-10
7-11
OIL LEVEL
INDICATOR
YL/BK
YL/BK
6-04A
YL
ELECTRIC
VISOR
YL/BK
6-04B
YL/BK
YL
7-09A
YL
7-09B
YL/BK
SPEEDOMETER
YL/BK
YL
7-08A
YL
TACHOMETER
YL/BK
7-08B
YL/BK
7-13A
BL
BL
1-02C
BL
8-02B
1.25A
FUSE
BL
FUEL LEVEL
SENSOR
YL/BK
8-02A
YL/BK
YL/BK
YL/BK
YL/BK

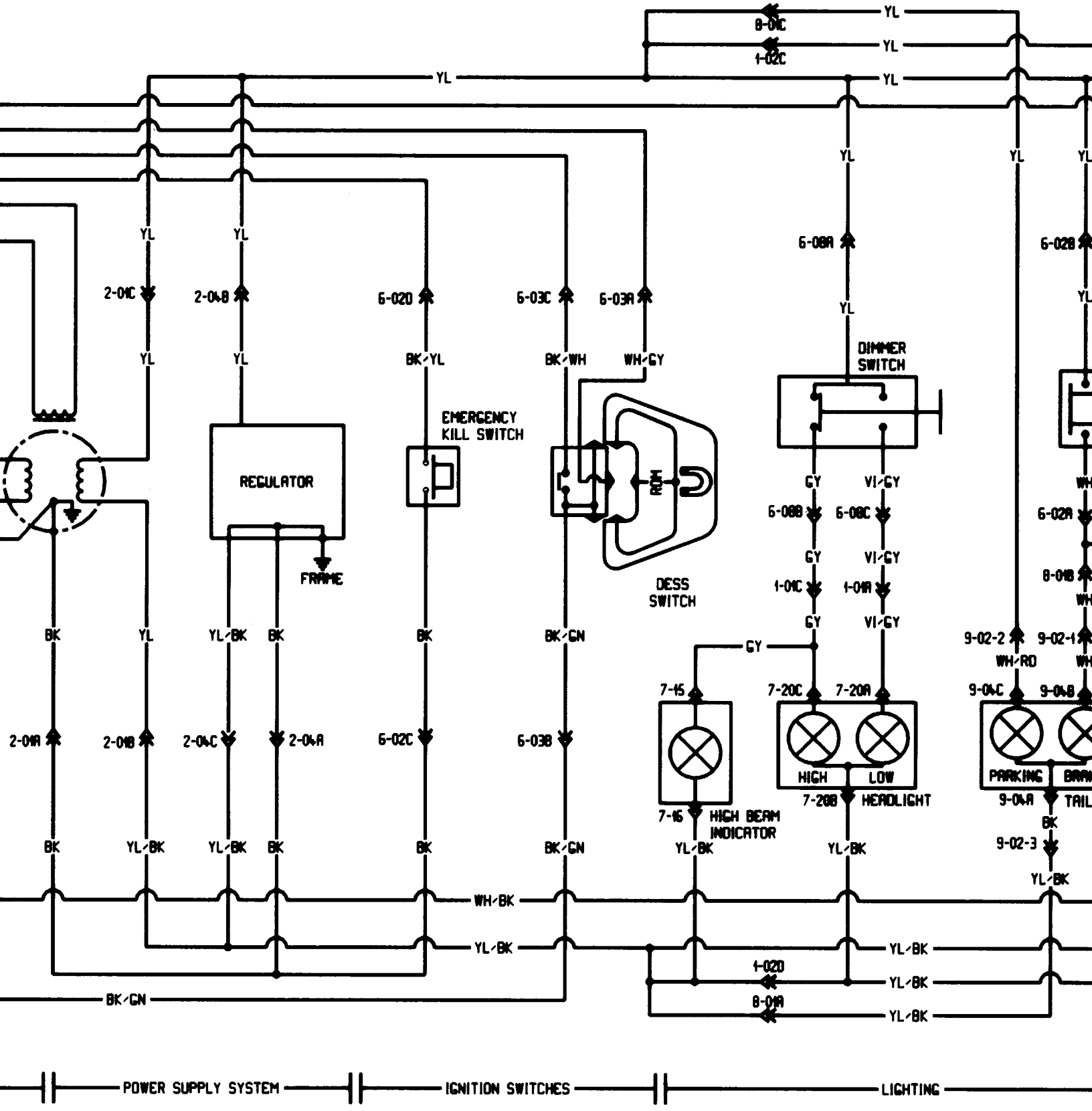

YL
7-13B
YL
FUEL LEVEL INDICATOR
YL/BK
7-13C
YL
7-17
7-18
VI
1-04C
VI
3-03B
YL
7-12B
YL
TEMPERATURE INDICATOR
7-12A
GN
GN
1-01D
GN
3-03A
GN
3-04
3-05
TEMP. SENSOR
YL/BK
3-03C
YL/BK
YL
7-12B
YL/BK
7-12C
YL/BK
YL
6-11
HEATED GRIPS SWITCH
6-13
6-12
OR
OR/VI
6-09C
6-09B
OR
OR/VI
OR
OR/VI
OR
OR/VI
HEATED GRIPS
YL/BK
YL/BK
YL/BK
6-09A
YL/BK
YL
6-14
HEATED LEVER SWITCH
6-16
6-15
BR/YL
BR
6-10A
6-10B
BR/YL
BR
HEATED LEVER
YL/BK
6-10C
YL/BK
HEATING ELEMENTS

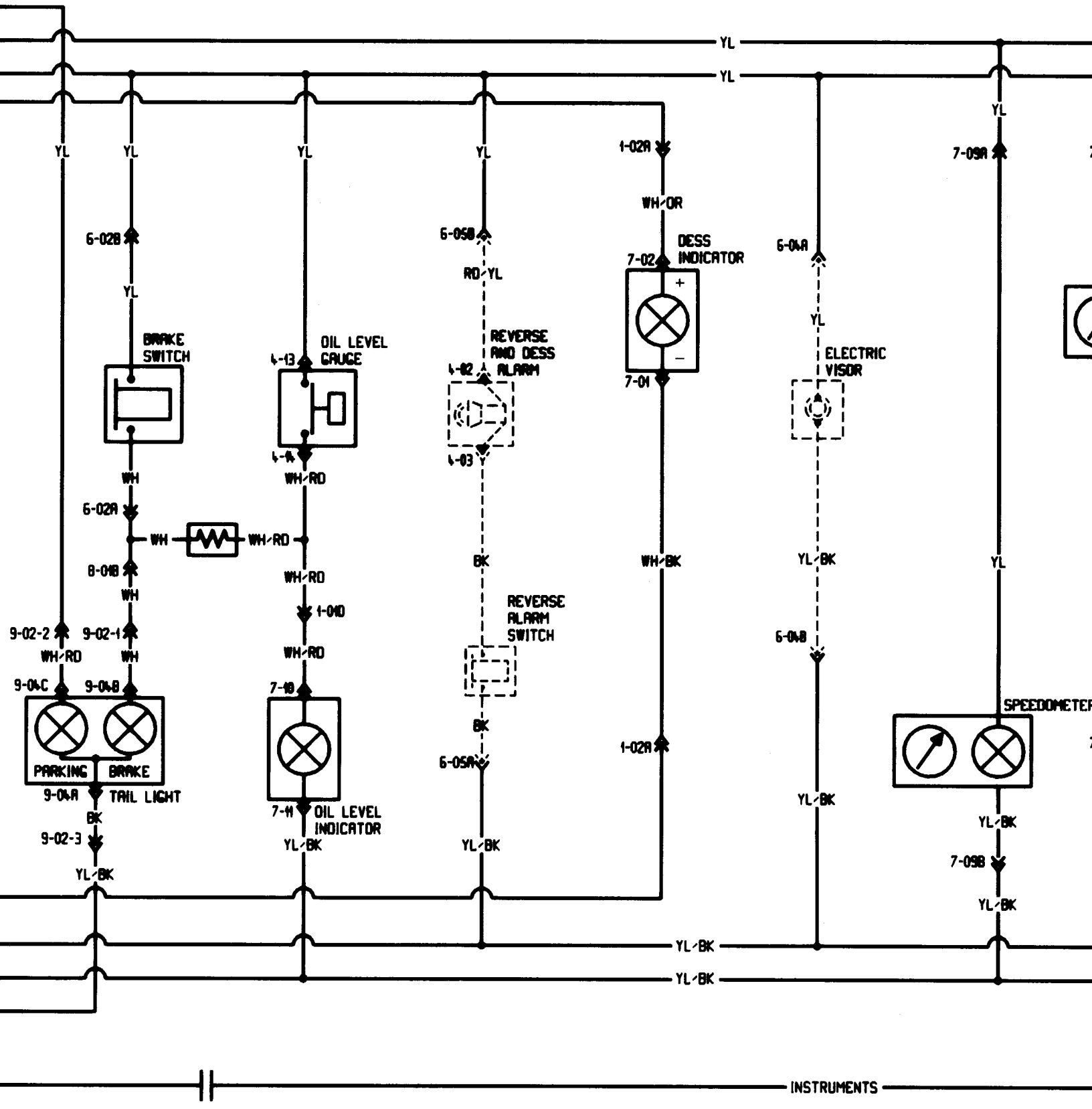
ANNEX 6

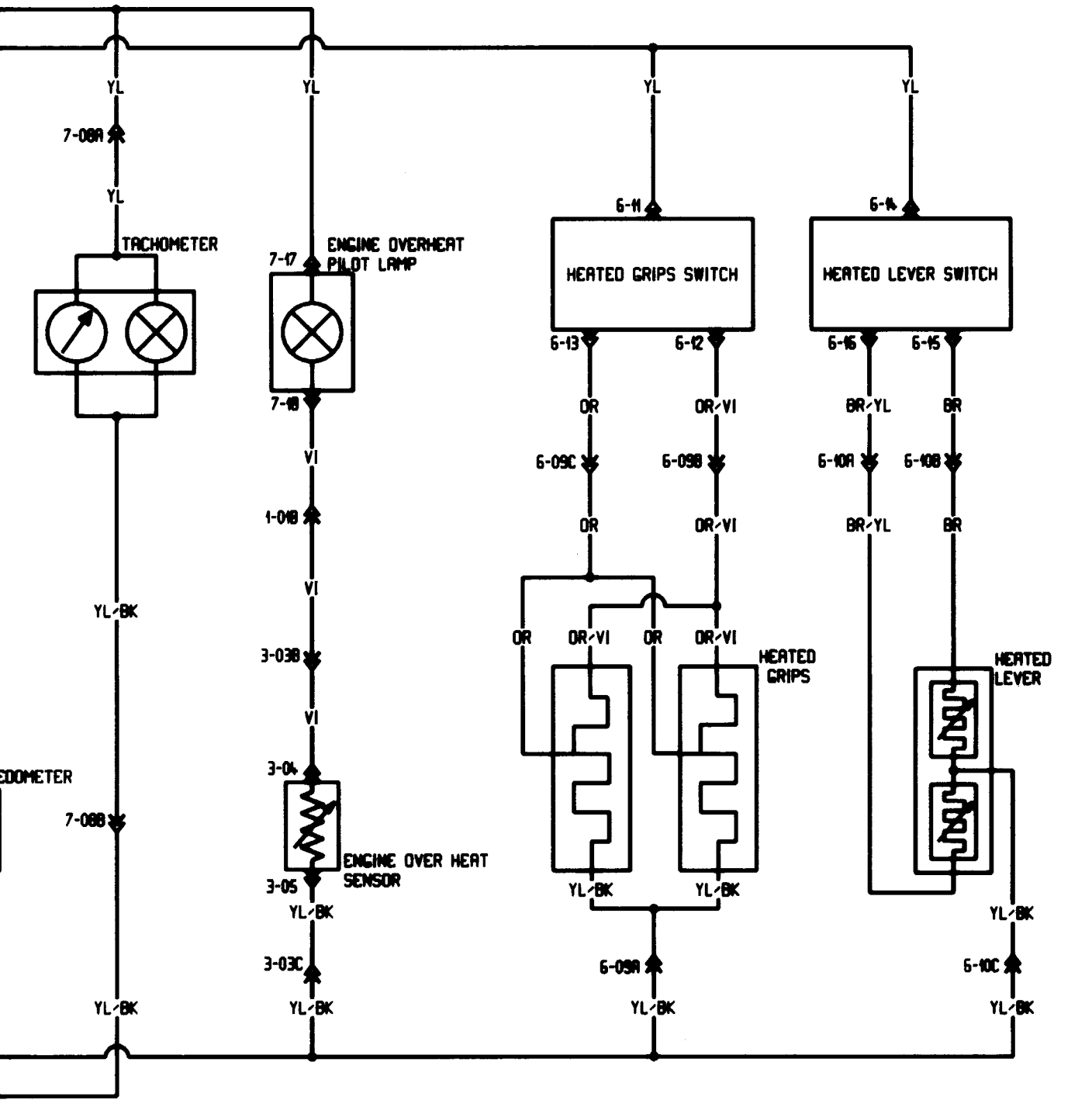
MX Z 670 HO AND SUMMIT X 670

'99 SUMMIT X 670 / MX Z 670 HO




8-04C
1-02C
YL
2-04C
2-04B
6-02D
6-03C
6-03A
6-08A
6-02B
BK/YL
BK/WH
WH/GY
DIMMER SWITCH
EMERGENCY KILL SWITCH
REGULATOR
FRAME
RUN
DESS SWITCH
GY
VI/GY
6-08B
6-08C
1-04C
1-04A
9-02-2
9-02-1
WH/RD
7-15
7-20C
7-20A
9-04C
9-04B
HIGH
LOW
PARKING
7-20B
HEADLIGHT
9-04A
7-16
HIGH BEAM INDICATOR
9-02-3
2-04A
2-04B
2-04C
2-04A
6-02C
6-03B
BK
YL/BK
BK/GN
WH/BK
1-02D
8-04A
POWER SUPPLY SYSTEM
IGNITION SWITCHES
LIGHTING

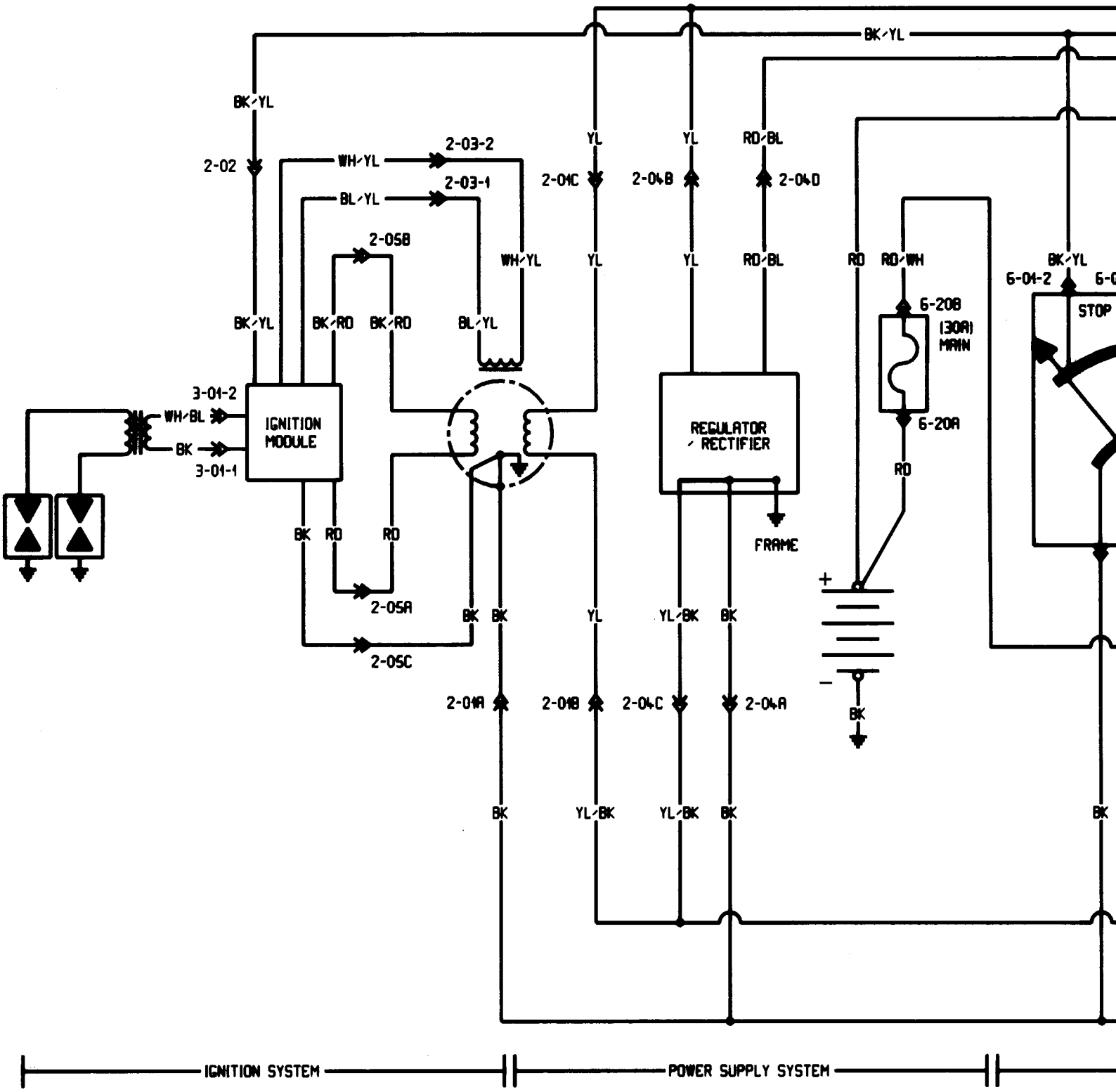

YL
YL
YL
YL
YL
YL
YL
1-02A
WH/OR
6-02B
6-05B
RD/YL
7-02
DESS INDICATOR
6-04A
7-09A
YL
BRAKE SWITCH
OIL LEVEL GAUGE
4-13
REVERSE AND DESS ALARM
4-02
4-03
4-14
7-01
ELECTRIC VISOR
WH
WH/RD
6-02A
WH
WH/RD
8-04B
WH
BK
WH/BK
YL/BK
YL
WH/RD
1-04D
9-02-2
9-02-1
WH/RD
WH
WH/RD
REVERSE ALARM SWITCH
6-04B
9-04C
9-04B
7-10
BK
SPEEDOMETER
PARKING
BRAKE
1-02A
6-05A
9-04A
TAIL LIGHT
BK
9-02-3
7-11
OIL LEVEL INDICATOR
YL/BK
YL/BK
YL/BK
YL/BK
7-09B
YL/BK
YL/BK
YL/BK
INSTRUMENTS

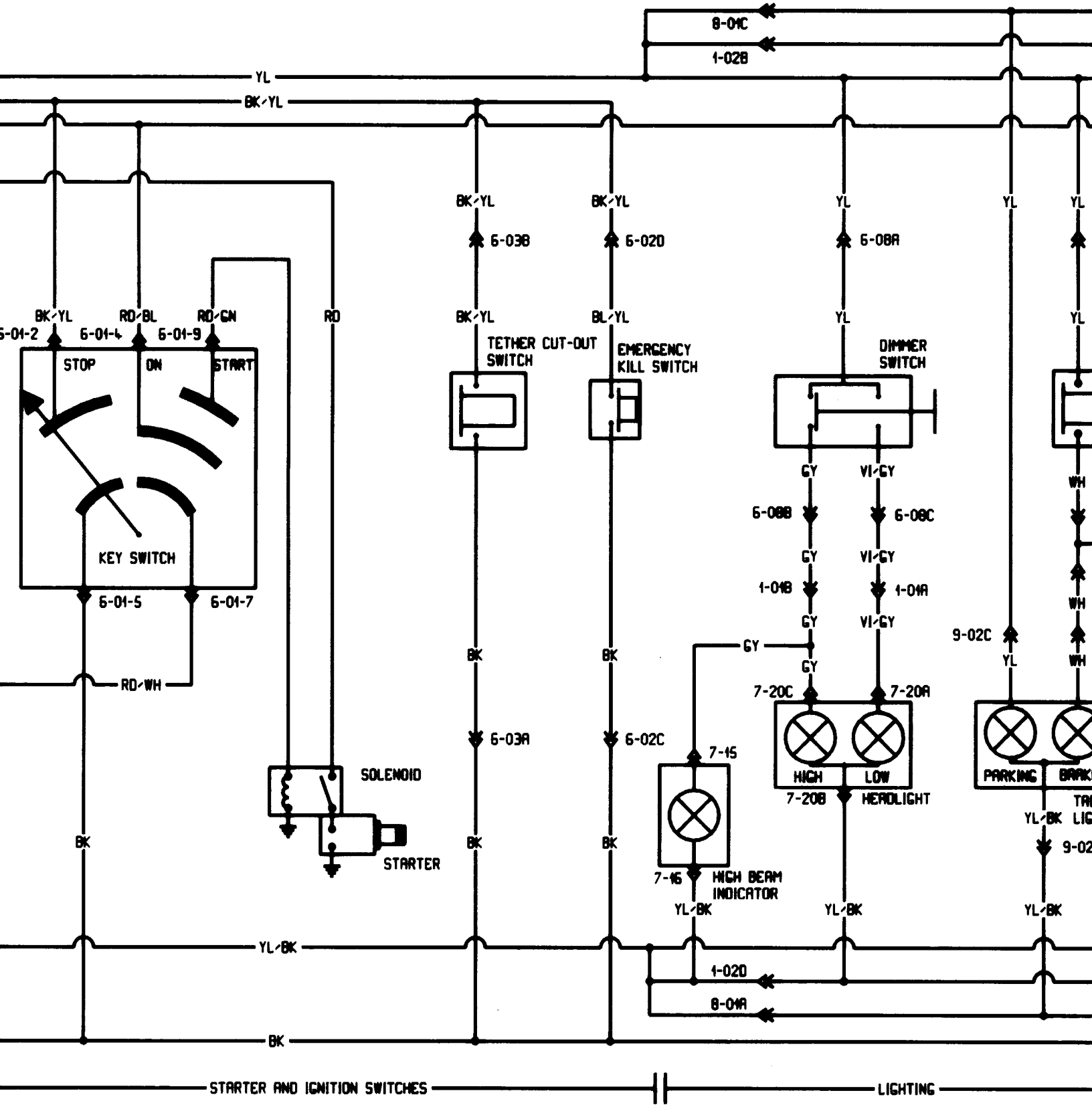


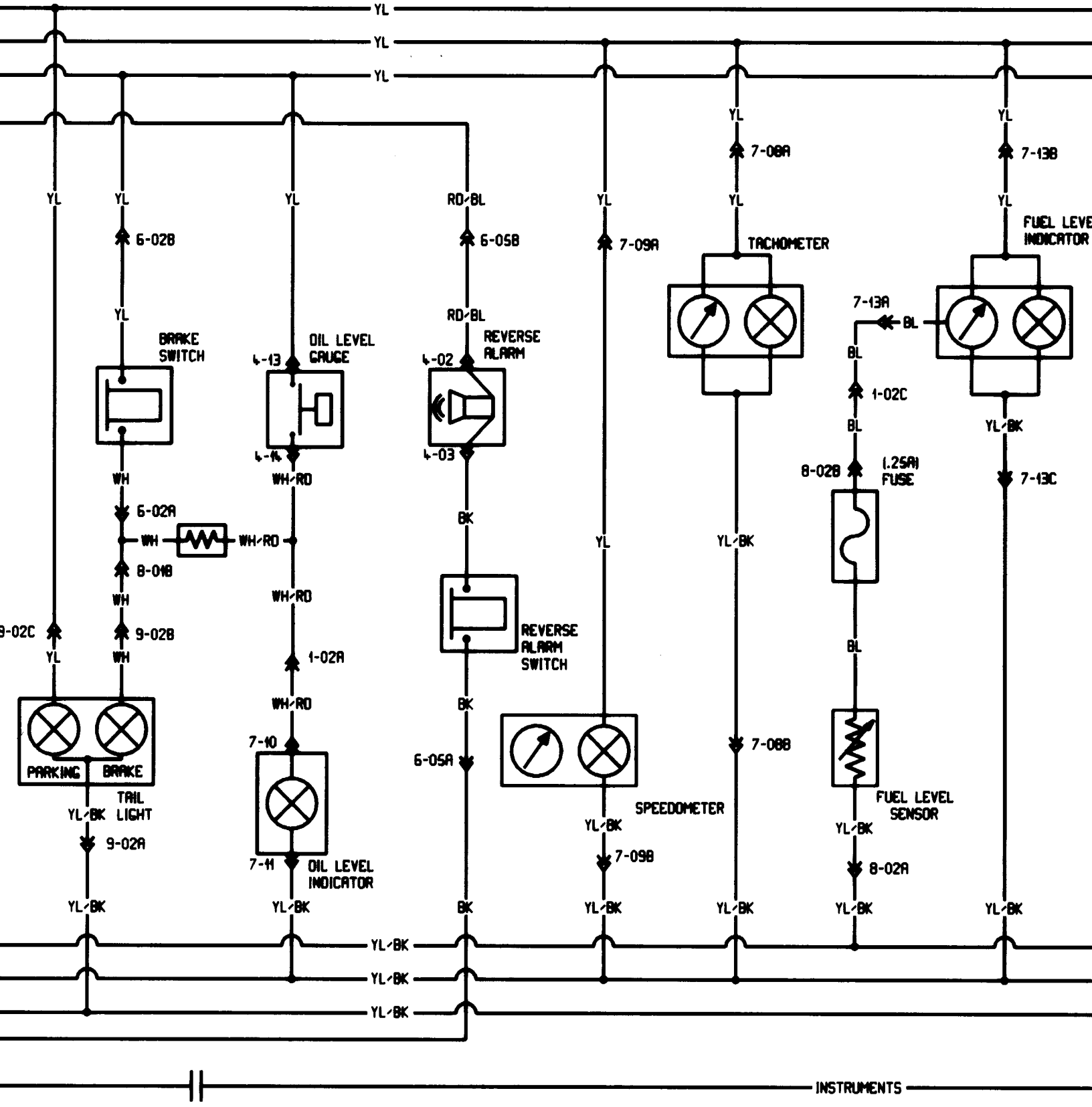
HEATING ELEMENTS

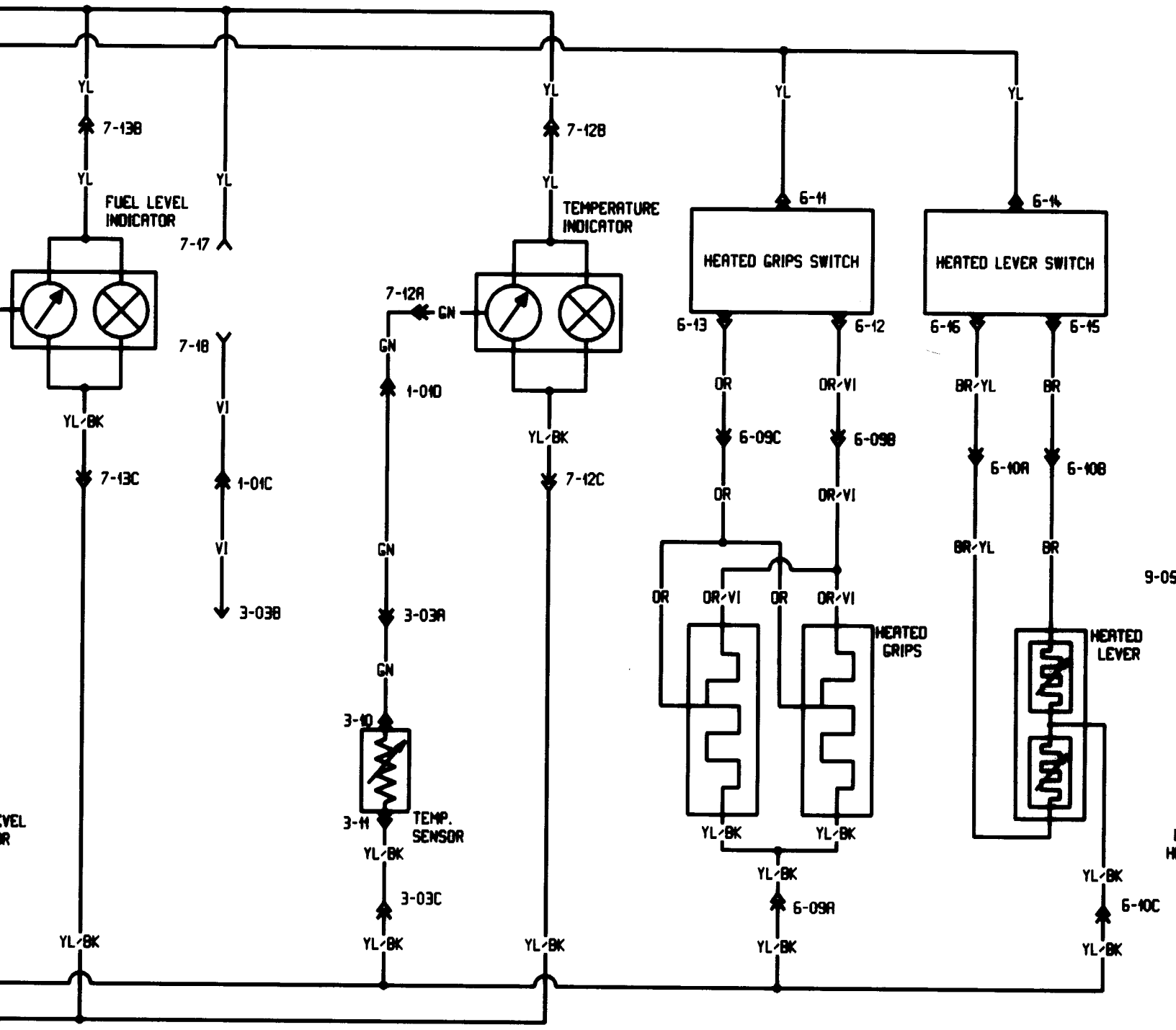
ANNEX 7 GRAND TOURING 500/583

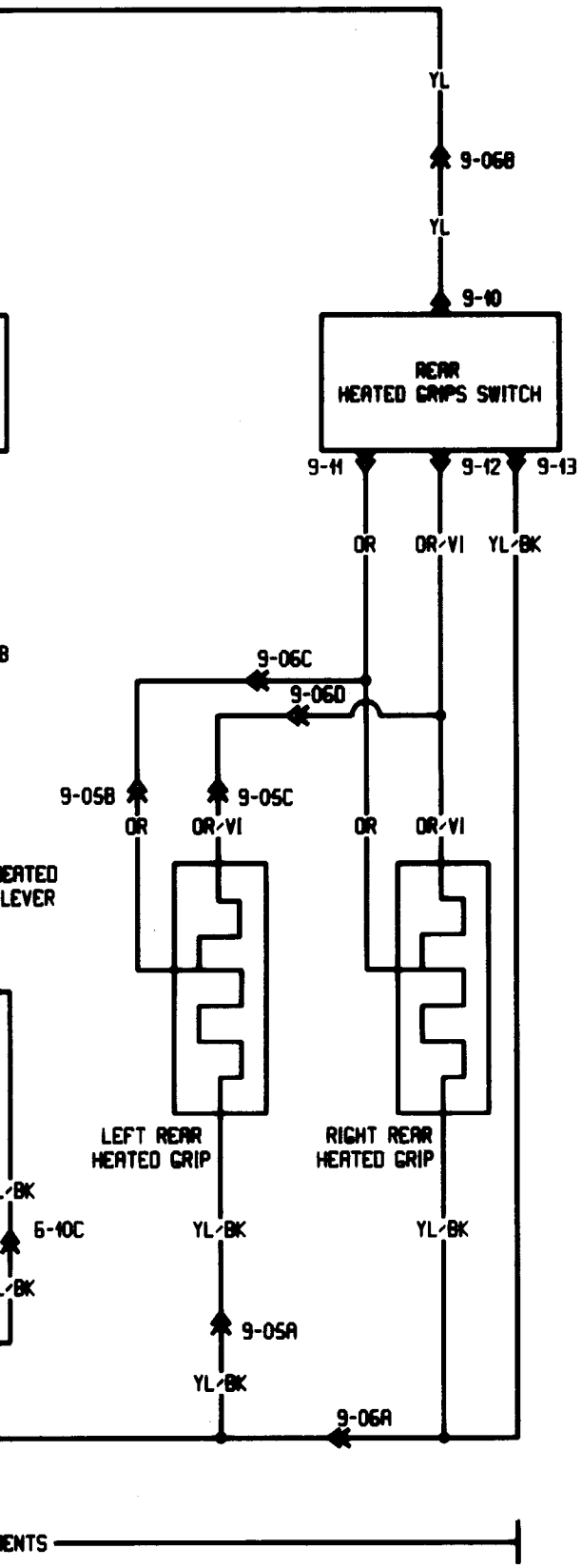
'99 GRAND TOURING 500/583




8-04C
1-02B
YL
BK/YL
BK/YL
6-03B
BK/YL
TETHER CUT-OUT SWITCH
BK/YL
6-02D
BL/YL
EMERGENCY KILL SWITCH
YL
6-08A
YL
DIMMER SWITCH
YL
YL
BK/YL
RD/BL
RD/GN
RD
6-01-2
6-01-4
6-01-9
STOP
ON
START
KEY SWITCH
6-01-5
6-01-7
RD/WH
GY
VI/GY
6-08B
6-08C
GY
VI/GY
1-01B
1-01A
GY
VI/GY
GY
GY
7-20C
7-20A
HIGH
LOW
7-20B
HEADLIGHT
9-02C
YL
WH
PARKING
YL/BK
9-02
BK
BK
BK
6-03A
6-02C
7-15
SOLENOID
STARTER
BK
BK
BK
7-16
HIGH BEAM INDICATOR
YL/BK
YL/BK
YL/BK
YL/BK
1-02D
8-01A
BK
STARTER AND IGNITION SWITCHES
LIGHTING


YL
YL
YL
YL
YL
YL
RD/BL
YL
YL
YL
YL
7-08A
7-13B
6-02B
6-05B
7-09A
TACHOMETER
FUEL LEVE
INDICATOR
YL
YL
YL
RD/BL
7-13A
BL
BRAKE
SWITCH
4-13
OIL LEVEL
GAUGE
4-02
REVERSE
ALARM
BL
1-02C
4-14
4-03
YL/BK
WH
WH/RD
8-02B
1.25A)
FUSE
7-13C
6-02A
BK
WH
WH/RD
8-01B
WH
WH/RD
YL
YL/BK
9-02C
9-02B
YL
WH
BL
1-02A
REVERSE
ALARM
SWITCH
WH/RD
BK
7-10
7-08B
6-05A
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TAIL
LIGHT
SPEEDOMETER
FUEL LEVEL
SENSOR
YL/BK
YL/BK
YL/BK
9-02A
7-09B
8-02A
7-11
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INDICATOR
YL/BK
YL/BK
BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
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OR
OR/VI
YL/BK
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OR
OR/VI
OR
OR/VI
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HEATED GRIP
RIGHT REAR
HEATED GRIP
6-10C
YL/BK
YL/BK
9-05A
YL/BK
9-06A



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RECREATIONAL PRODUCTS

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VERSION FRANÇAISE ÉGALEMENT DISPONIBLE

ski-doo®



SHOP MANUAL 1999

Volume 3

GRAND TOURING 700/SE
FORMULA III 600/700/800
MACH 1/1 R/Z/Z R/Z LT/Z LT R

484 200 005

1999
Shop Manual

VOLUME 3

GRAND TOURING 700/SE

FORMULA III 600/700/800

MACH 1/1 R/Z/Z R/Z LT/Z LT R/Z M.H. R

BOMBARDIER
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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair some 1999 Ski-Doo snowmobiles. See model list on next page.

This edition was primarily published to be used by snowmobile mechanics who are already familiar with all service procedures relating to Bombardier made snowmobiles.

Please note that the instructions will apply only if proper hand tools and special service tools are used.

This *Shop Manual* uses technical terms which may be slightly different from the ones used in the *Parts Catalog*.

It is understood that this manual may be translated into another language. In the event of any discrepancy, the English version shall prevail.

The content depicts parts and/or procedures applicable to the particular product at its time of manufacture. It does not include dealer modifications, whether authorized or not by Bombardier, after manufacturing the product.

In addition, the sole purpose of the illustrations throughout the manual, is to assist identification of the general configuration of the parts. They are not to be interpreted as technical drawings or exact replicas of the parts.

The use of Bombardier parts is most strongly recommended when considering replacement of any component. Dealer and/or distributor assistance should be sought in case of doubt.

The engines and the corresponding components identified in this document should not be utilized on product(s) other than those mentioned in this document.

Torque wrench tightening specifications must be strictly adhered to. Locking devices (ex.: locking tab, elastic stop nut, etc.) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be renewed.

This manual emphasizes particular information denoted by the wording and symbols:

◆ WARNING

Identifies an instruction which, if not followed, could cause serious personal injury including possibility of death.

▼ CAUTION

Denotes an instruction which, if not followed, could severely damage vehicle components.

NOTE: Indicates supplementary information needed to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use. Always use common shop safety practice.

This information relates to the preparation and use of Bombardier snowmobiles and has been utilized safely and effectively by Bombardier Inc. However, Bombardier Inc. disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic. It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

WHAT'S NEW

INTRODUCTION

- Loctite application procedure as published in *Service Bulletin 97-14*.

ELECTRICAL SYSTEM 03-05

- Troubleshooting of RER system.

599, 699 AND 809 ENGINE TYPES 04-02

- Procedure for lubrication of PTO outer bearing.

OIL INJECTION SYSTEM 04-05

- Procedure for leak test.

DRIVEN PULLEY 05-04

- Repair procedures for HPV27 driven pulley type.

IGNITION TIMING 06-02

- Ignition timing procedure.

TESTING PROCEDURE 06-06

- Testing values.

SC-10 SUSPENSION (ALL VERSIONS) 07-02

- Wear limit of slider shoe is now indicated by a line.

STEERING SYSTEM 08-02

- Ski alignment specifications.

INTRODUCTION

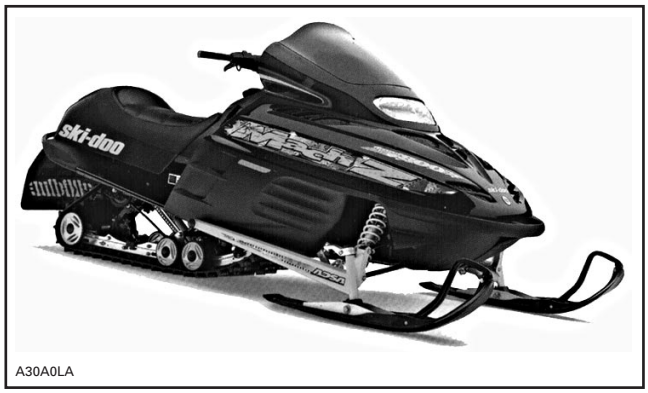
This *Shop Manual Volume 3* covers the following Bombardier made 1999 snowmobiles:

MODELS	MODEL NUMBER
FORMULA* III 600 (Canada)	1396
FORMULA* III 600 (U.S.)	1397
FORMULA* III 600 (Europe)	1398
FORMULA* III 700 (Canada)	1399
FORMULA* III 700 (U.S.)	1400
FORMULA* III 800 (Canada)	1401
FORMULA* III 800 (U.S.)	1402
MACH* 1 (Canada)	1422
MACH* 1 (U.S.)	1437
MACH* 1 (Europe)	1423
MACH* 1 R (Canada)	1442
MACH* 1 R (U.S.)	1443
MACH* 1 R (Europe)	1444
MACH* Z (Canada)	1418
MACH* Z (U.S.)	1435
MACH* Z (Europe)	1419
MACH* Z R (Canada)	1439
MACH* Z R (U.S.)	1440
MACH* Z R (Europe)	1441
MACH* Z M.H. R (U.S.)	1462
MACH* Z LT (Canada)	1420
MACH* Z LT (U.S.)	1436
MACH* Z LT R (Canada)	1445
MACH* Z LT R (U.S.)	1446
MACH* Z LT R (Europe)	1447
GRAND TOURING 700 (Can. and U.S.)	1373
GRAND TOURING 700 (Europe)	1374
GRAND TOURING SE (Can. and U.S.)	1375
GRAND TOURING SE (Europe)	1376

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Grand Touring 700/SE
Formula III 600/700/800
Mach 1/1 R/Z/Z R/Z M.H. R/Z LT/Z LT R

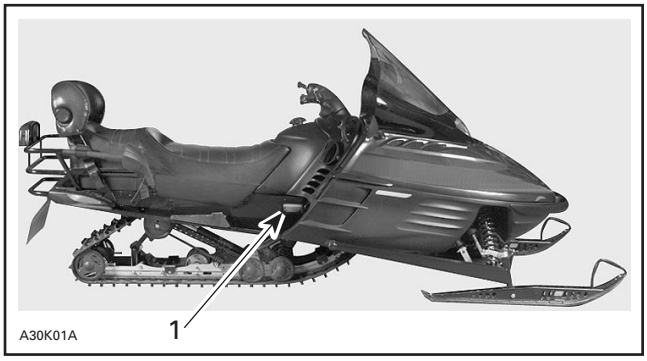
These are CK3 Series models.



TYPICAL — CK3 SERIES

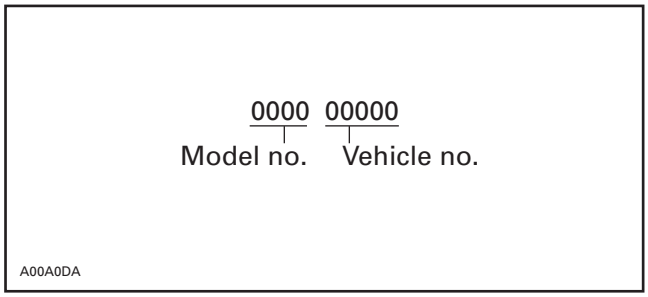
VEHICLE SERIAL NUMBER

Vehicle Serial Number Location



TYPICAL
1. Vehicle serial number

Serial Number Meaning



ENGINE SERIAL NUMBER

Engine Serial Number Location



1. Engine serial number

ARRANGEMENT OF THE MANUAL

The manual is divided into 11 major sections:

01 SERVICE TOOLS AND SERVICE PRODUCTS
02 LUBRICATION AND MAINTENANCE
03 TROUBLESHOOTING
04 ENGINE
05 TRANSMISSION
06 ELECTRICAL
07 REAR SUSPENSION
08 STEERING/FRONT SUSPENSION
09 BODY/FRAME
10 TECHNICAL DATA
11 WIRING DIAGRAMS

Each section is divided in various subsections, and again, each subsection has one or more division.

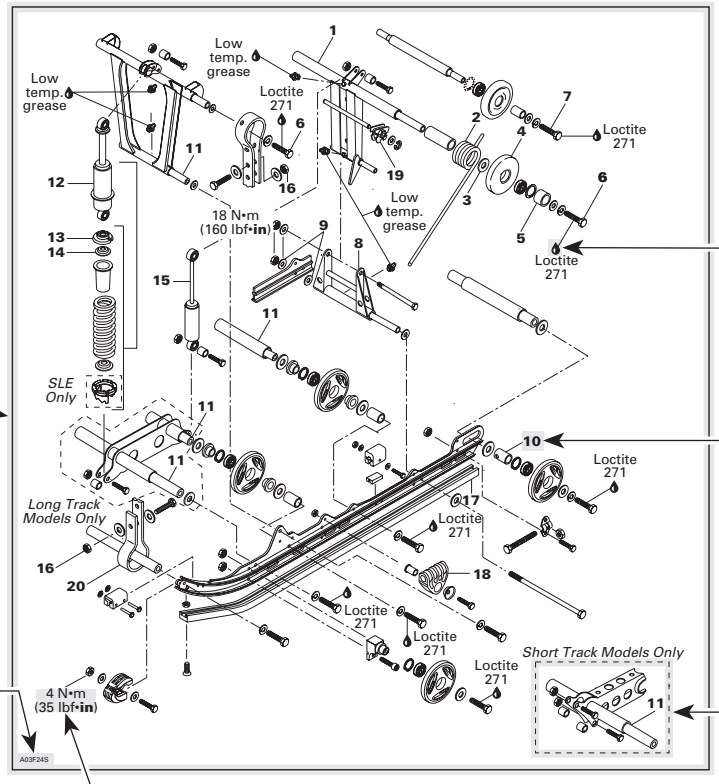
LIST OF ABBREVIATIONS USED IN THIS MANUAL

A	ampere
amp	ampere
A•h	ampere-hour
AC	alternate current
ACM	acceleration and control modulator
ADSA	advanced direct shock action
BDC	bottom dead center
BTDC	before top dead center
°C	degree Celsius
CDI	capacitor discharge ignition
CTR	center
cm	centimeter
cm^2	square centimeter
cm^3	cubic centimeter
DC	direct current
DESS	digitally encoded security system
DPM	digital performance management
°F	degree Fahrenheit
FC	fan cooled
fl. oz	fluid ounce
ft	foot
GRD	ground
H.A.C.	high altitude compensator
hal.	halogen
HI	high
imp. oz	imperial ounce
in	inch
in^2	square inch
in^3	cubic inch
k	kilo (thousand)
kg	kilogram
km/h	kilometer per hour
kPa	Kilopascal
L	liter
lb	pound
lbf	pound (force)
lbf/in^2	pound per square inch
LH	left hand
LO	low
LT	long track
m	meter
MAG	magneto
Max.	maximum
Min.	minimum
mL	milliliter
mm	millimeter
MPEM	multi-purpose electronic module
MPH	mile per hour
N	newton
N.A.	not applicable
no.	number
00.0	continuity
0.L	open line (open circuit)
O.D.	outside diameter
OPT	optional
oz	ounce
P/N	part number
PSI	pound per square inch
PTO	power take off
R	rectangular
RH	right hand
RAVE	rotax adjustable variable exhaust
RPM	revolution per minute
RMS	root mean square
RRIM	reinforced reaction injection molding
Sp. Gr.	specific gravity
ST	semi-trapeze
TDC	top dead center
TRA	total range adjustable
U.S. oz	ounce (United States)
V	volt
Vac	volt (alternative current)

INTRODUCTION

This *Shop Manual* uses technical terms wich may be slightly different from the ones in the parts catalog.

TYPICAL PAGE



Page heading indicates section and subsection detailed.

Subsection title indicates beginning of the subsection.

Italic subtitle above exploded view indicate pertaining models.

Exploded view assists you in identifying parts and related positions.

Drop represents a liquid product to be applied to a surface. In this case Loctite 271 to screw threads.

Bold face number indicates special procedure concerning this part.

Illustration number for publishing process.

Dotted box contains parts of a particular model in this case the short track models only.

Tightening torque nearby fastener. In this case, nut must be torqued to 4 N•m or 35 lbf•**in**.

Page numbering system:
07: REAR SUSPENSION section
01: SUSPENSION SC-10 SPORT, TOURING AND MOUNTAIN subsection
1: First page of this subsection

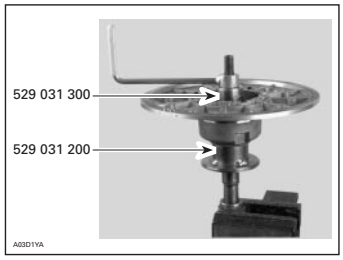
▼ CAUTION

Pay attention to torque specifications. Some of these are in lbf•**in** instead of lbf•ft. Use appropriate torque wrench.

A01A28S

TYPICAL PAGE

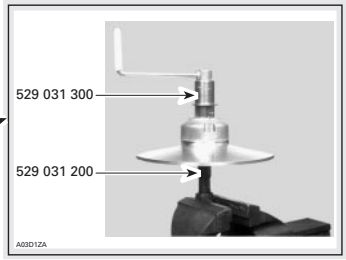
Turn puller handle and sliding half at once to extract the bushing.



IMPORTANT: Large bushing retaining screws and washers must be removed before small bushing installation.

Coat bushing outside diameter with Loctite 609 (P/N 413 703 100).

Install bushing as following photo.



ASSEMBLY

Came Slider Shoe

When replacing slider shoes **no. 4**, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

Cam

Coat cam **no. 18** interior with anti-seize lubricant.

INSTALLATION

Countershaft

▼ CAUTION

Always apply anti-seize lubricant (P/N 413 701 000) on the countershaft before final pulley installation.

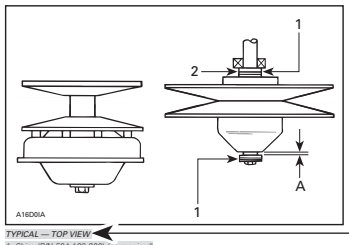
F-Series and S-Series Only

Should installation procedure be required, refer to BRAKE 05-05 then look for **Brake Disc and Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

All Models

Check end play of driven pulley on countershaft by pushing pulley towards outer housing so that the inner shims (P/N 504 108 200) contact it. Measure end play at the mounting screw end between shim(s) and puley. See illustration.



TYPICAL — TOP VIEW

1. Shim (P/N 504 108 200) (as required)
2. Contact
A. 0 to 1 mm (0 to 3/64 in)

Torque retaining screw **no. 13** to 25 N•m (18 lbf•ft).

ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT 05-04 to adjust pulley distance. Adjust drive belt height between pulley halves to obtain specified belt deflection.

05-03-5

Title indicates main procedure to be carried-out.

Italic bold face type setting indicates a particular procedure concerning a model.

Italic bold face setting in this case indicates that particular procedure for F and S-Series is finished, so from this point, all models are concerned.

"TYPICAL" caption indicates a general view which does not represent full detail. "TOP VIEW" caption helps you in understanding illustration.

Illustration always follows text to which it pertains.

Call-outs for above illustration.

Subtitle indicates a particular procedure for the named part.

Reference to look up a certain section and subsection. In this case it concerns pulleys adjustment.

Bold face number following part name refers to exploded view at beginning of subsection.

A01A27S

INTRODUCTION

GENERAL INFORMATION

The information and component/system descriptions contained in this manual are correct at time of publication. Bombardier Inc. however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

Due to late changes, it may have some differences between the manufactured product and the description and/or specifications in this document.

Bombardier Inc. reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligation.

USEFUL PUBLICATIONS

Refer to *Parts Catalogs* to order the right parts.

PARTS CATALOG	
MODELS	P/N
FORMULA III 600 FORMULA III 700 FORMULA III 800	480 400 009
MACH 1 MACH 1 R	480 400 011
MACH Z MACH Z R MACH Z LT MACH Z LT R MACH Z M.H. R	480 400 012
GRAND TOURING 700 GRAND TOURING SE	480 400 013

Use *Specification Booklet* to find rapidly the right specs.

1995-1999 SPECIFICATION BOOKLET (P/N 484 300 002).

ILLUSTRATIONS AND PROCEDURES

Illustrations and photos show the typical construction of the different assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts shown. However, they represent parts which have the same or a similar function.

▼ CAUTION

Most components of those vehicles are built with parts dimensioned in the metric system. Most fasteners are metric and must not be replaced by customary fasteners or vice versa. Mismatched or incorrect fasteners could cause damage to the vehicle or possible personal injury.

As many of the procedures in this manual are interrelated, we suggest, that before undertaking any task, you read and thoroughly understand the entire section or subsection in which the procedure is contained.

A number of procedures throughout the book require the use of special tools. Before commencing any procedure, be sure that you have on hand all the tools required, or approved equivalents.

The use of RIGHT and LEFT indications in the text, always refers to driving position (when sitting on vehicle).



TYPICAL
1. *Left*
2. *Right*

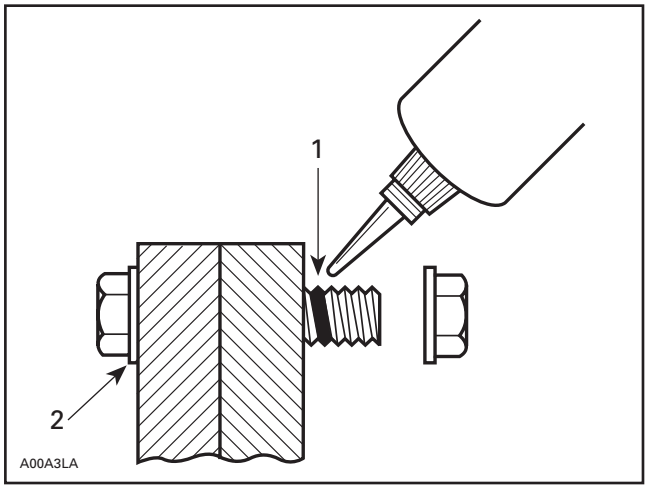
LOCTITE APPLICATION PROCEDURE

The following describes the most common application procedures when working with Loctite products.

NOTE: Always use proper strength Loctite product as recommended in this *Shop Manual*.

THREADLOCKER

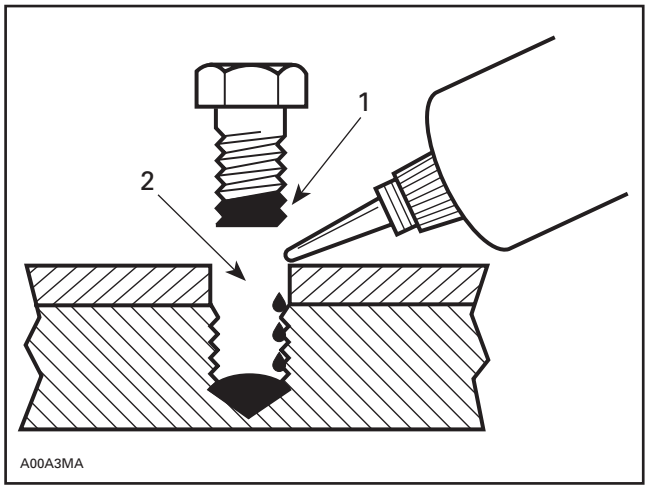
Uncovered Holes (bolts and nuts)



1. *Apply here*
2. *Do not apply*

1. Clean threads (bolt and nut) with solvent.
2. Apply Loctite Primer N (P/N 293 800 041) on threads and allow to dry.
3. Choose proper strength Loctite threadlocker.
4. Fit bolt in the hole.
5. Apply a few drops of threadlocker at proposed tightened nut engagement area.
6. Position nut and tighten as required.

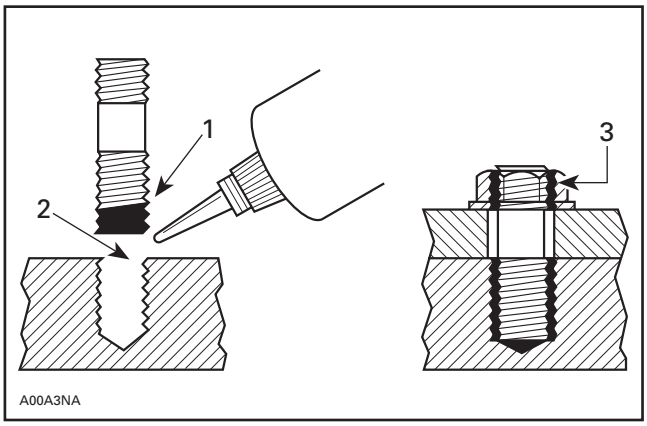
Blind Holes



1. *On threads*
2. *On threads and at the bottom of hole*

1. Clean threads (bolt and hole) with solvent.
2. Apply Loctite Primer N (P/N 293 800 041) on threads (bolt and nut) and allow to dry for 30 seconds.
3. Choose proper strength Loctite threadlocker.
4. Apply several drops along the threaded hole and at the bottom of the hole.
5. Apply several drops on bolt threads.
6. Tighten as required.

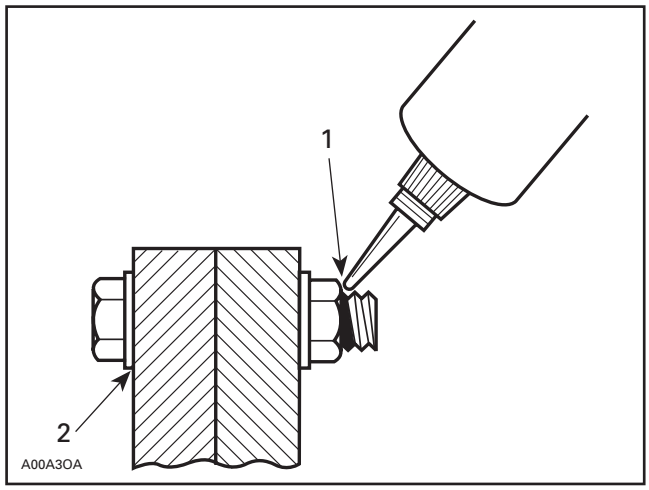
Blind Holes



1. On threads
2. On threads and in the hole
3. Onto nut threads

1. Clean threads (bolt and hole) with solvent.
2. Apply Loctite Primer N (P/N 293 800 041) on threads and allow to dry.
3. Put several drops of proper strength Loctite threadlocker on female threads and in hole.
4. Apply several drops of proper strength Loctite on stud threads.
5. Install stud.
6. Install cover, etc.
7. Apply drops of proper strength Loctite on uncovered threads.
8. Tighten nuts as required.

Preassembled Parts

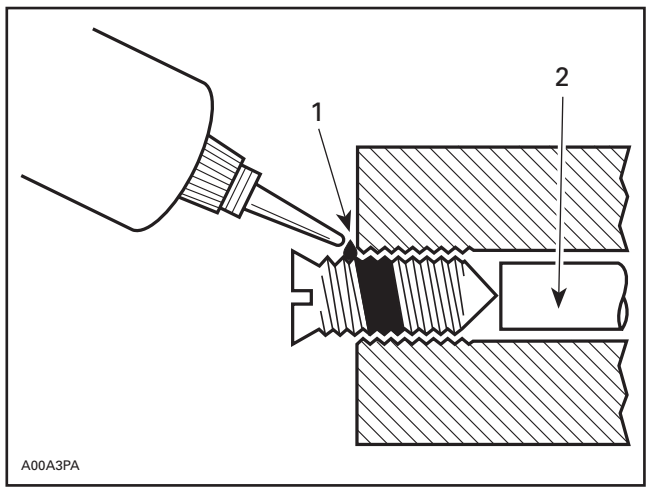


1. Apply here
2. Do not apply

1. Clean bolts and nuts with solvent.
2. Assemble components.
3. Tighten nuts.
4. Apply drops of proper strength Loctite on bolt/nut contact surfaces.
5. Avoid touching metal with tip of flask.

NOTE: For preventive maintenance on existing equipment, retighten nuts and apply proper strength Loctite on bolt/nut contact surfaces.

Adjusting Screw



1. Apply here
2. Plunger

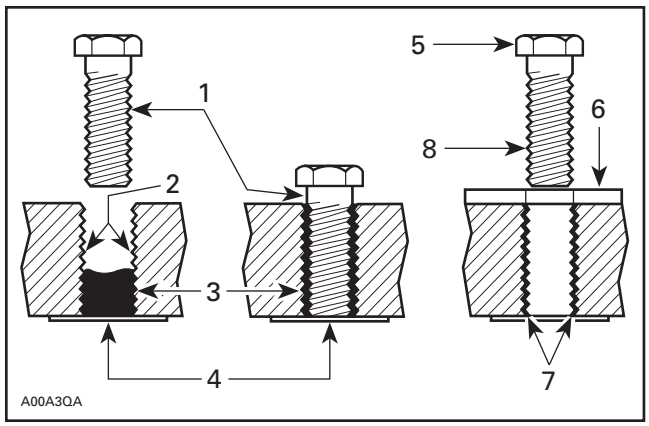
1. Adjust screw to proper setting.
2. Apply drops of proper strength Loctite threadlocker on screw/body contact surfaces.

3. Avoid touching metal with tip of flask.

NOTE: If it is difficult to readjust, heat screw with a soldering iron (232°C (450°F)).

STRIPPED THREAD REPAIR

Stripped Threads



1. Release agent
2. Stripped threads
3. Form-A-Thread
4. Tape
5. Cleaned bolt
6. Plate
7. New threads
8. Threadlocker

Standard Thread Repair

1. Follow instructions on Loctite FORM-A-THREAD (P/N 413 708 600) package.
2. If a plate is used to align bolt:
   a. Apply release agent on mating surfaces.
   b. Put waxed paper or similar film on the surfaces.
3. Twist bolt when inserting it to improve thread conformation.

NOTE: NOT intended for engine stud repairs.

Repair of Small Holes/Fine Threads

Option 1: Enlarge damaged hole, then follow **Standard Thread Repair** procedure.

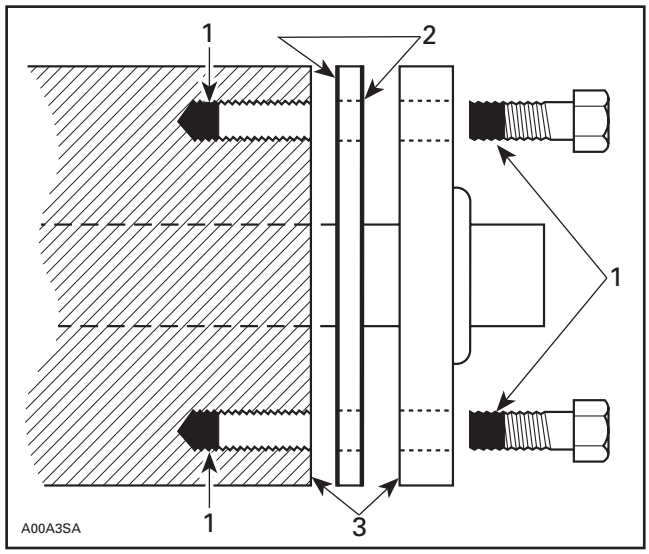
Option 2: Apply FORM-A-THREAD on the screw and insert in damaged hole.

Permanent Stud Installation (light duty)

1. Use a stud or thread on desired length.
2. DO NOT apply release agent on stud.
3. Do a **Standard Thread Repair**.
4. Allow to cure for 30 minutes.
5. Assemble.

GASKET COMPOUND

All Parts



1. Proper strength Loctite
2. Loctite Primer N (P/N 413 708 100) and Gasket Eliminator 515 (P/N 413 702 700) on both sides of gasket
3. Loctite Primer N only

1. Remove old gasket and other contaminants with Loctite Chisel remover (P/N 413 708 500). Use a mechanical mean if necessary.

NOTE: Avoid grinding.

2. Clean both mating surfaces with solvent.
3. Spray Loctite Primer N on both mating surfaces and on both sides of gasket. Allow to dry 1 or 2 minutes.
4. Apply GASKET ELIMINATOR 515 (P/N 413 702 700) on both sides of gasket, using a clean applicator.
5. Place gasket on mating surfaces and assemble immediately.

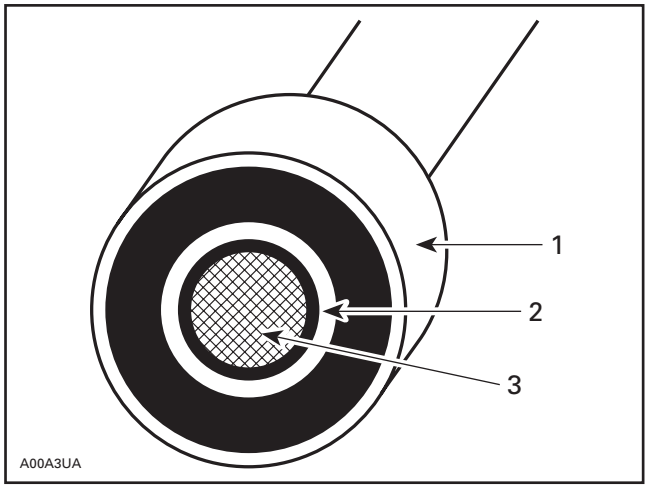
NOTE: If the cover is bolted to blind holes (above), apply proper strength Loctite in the hole and on threads. Tighten.

If holes are sunken, apply proper strength Loctite on bolt threads.

6. Tighten as usual.

MOUNTING ON SHAFT

Mounting with a Press



1. Bearing
2. Proper strength Loctite
3. Shaft

Standard

1. Clean shaft external part and element internal part.
2. Apply a strip of proper strength Loctite on shaft circumference at insert or engagement point.

NOTE: Retaining compound is always forced out when applied on shaft.

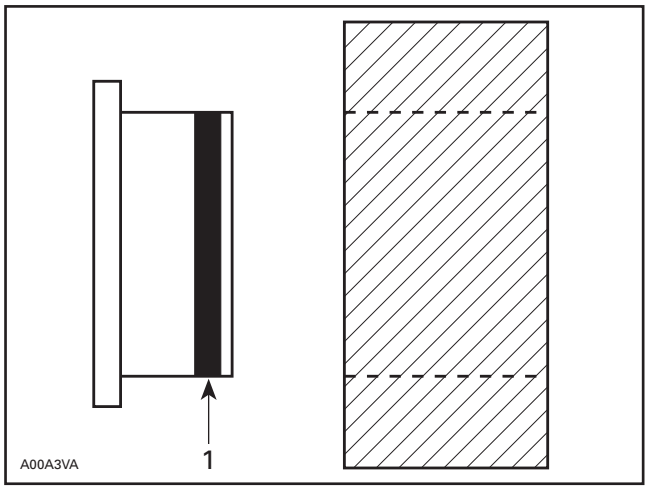
3. DO NOT use anti-seize Loctite or any similar product.
4. No curing period is required.

Mounting in Tandem

1. Apply retaining compound on internal element bore.
2. Continue to assemble as shown above.

CASE-IN COMPONENTS

Metallic Gaskets



1. Proper strength Loctite

1. Clean inner housing diameter and outer gasket diameter.
2. Spray housing and gasket with Loctite Primer N (P/N 293 800 041).
3. Apply a strip of proper strength Loctite on leading edge of outer metallic gasket diameter.

NOTE: Any Loctite product can be used here. A low strength liquid is recommended as normal strength and gap are required.

4. Install according to standard procedure.
5. Wipe off surplus.
6. Allow it to cure for 30 minutes.

NOTE: Normally used on worn-out housings to prevent leaking or sliding.

It is generally not necessary to remove gasket compound applied on outer gasket diameter.

TIGHTENING TORQUES

Tighten fasteners to torque mentioned in exploded views and text. When they are not specified refer to following table. Bold face size (e.g. **M4)** indicates nominal value (mean value).

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•**in**
2	**M4**	18
3	M4	27
4	**M5**	35
8	M6	71
9	M6	80
10	**M6**	89
11	M6	97
12	M6	106

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•ft
21	M8	15
22	M8	16
23	**M8**	17
24	M8	18
25	M8	18
43	M10	32
44	M10	32
45	M10	33
46	M10	34
47	M10	35
48	**M10**	35
49	M10	36
50	M10	37
51	M10	38
52	M10	38
53	M10	39
76	M12	56
77	M12	57
78	M12	58
79	M12	58
80	**M12**	59
81	M12	60
82	M12	60
83	M12	61
84	M12	62
121	M14	89
122	M14	90
123	M14	91

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•ft
124	M14	91
125	M14	92
126	M14	93
127	M14	94
128	M14	94
129	M14	95
130	M14	96
131	M14	97
132	M14	97
133	M14	98
134	M14	99
135	**M14**	100
136	M14	100
137	M14	101
138	M14	102
139	M14	103
140	M14	103
141	M14	104
142	M14	105
143	M14	105
144	M14	106
145	M14	107
146	M14	108
147	M14	108
148	M14	109
149	M14	110
150	M14	111

We would be pleased if you could communicate to Bombardier any suggestions you may have concerning our publications.

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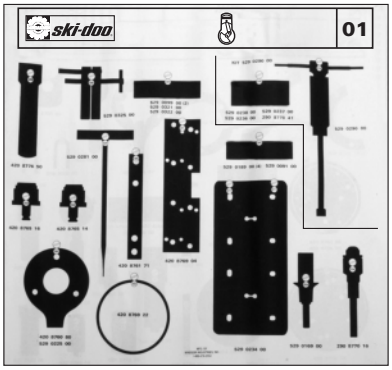
SERVICE TOOLS

This is a list of tools to properly service Ski-Doo snowmobiles. The list includes both the mandatory tools included in a kit (P/N 861 743 700) and the optional tools that are ordered separately. The list of Service Products, both mandatory and optional, are not part of any kit and must all be ordered separately. If you need to replace or add to your tool inventory these items can be ordered through the regular parts channel.

Following mention points out new tool: 

WORKSHOP — MANDATORY SERVICE TOOLS

Tool board
(P/N 529 034 000)

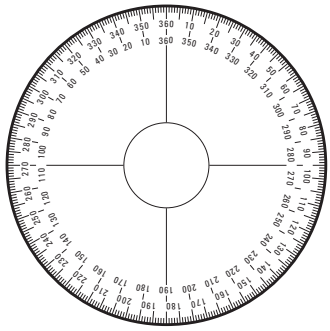


A00A3X4

APPLICATION
All models.

ENGINE — MANDATORY SERVICE TOOLS

Degree wheel
(P/N 295 000 007)

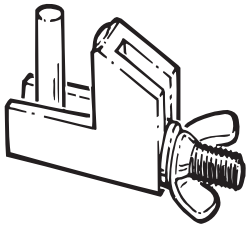


A00B514

APPLICATION
All rotary valve engines.

NOTE: Only the P/N has been changed. This degree wheel is identical to the P/N 414 352 900.

Hose pincher (2)
(P/N 295 000 076)

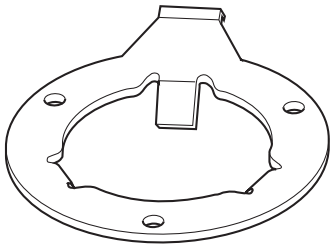


A01B2I4

APPLICATION
All vehicles.

NOTE: Only the P/N has been changed. This hose pincher is identical to the P/N 529 009 900.

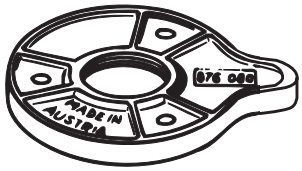
Fan holder
(P/N 420 876 357)



A00C0Q4

APPLICATION
377, 443 and 503 engines.

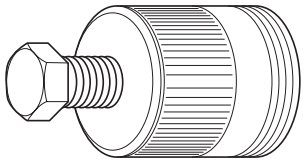
Magneto puller ring
(P/N 420 876 080)



A00C1R4

APPLICATION
All engines except 247.

Magneto puller
(P/N 529 033 547)



A00C1A4

APPLICATION
All engines except 247.

NOTE: The previous extractor (P/N 529 022 500) can be upgraded by replacing the screw with the new one (P/N 529 035 549).

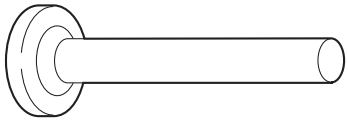
Aligning pin (4)
(P/N 529 018 900)



A00A1D4

APPLICATION
467, 494 and 582 engines.

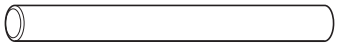
Pusher
(washer behind the impeller)
(P/N 529 020 700)



A00C3H4

APPLICATION
Rotary valve engines.

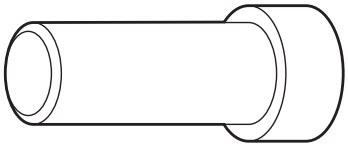
Rotary valve shaft pusher
(P/N 420 876 612)



A00C0F4

APPLICATION
Rotary valve engines with a 10 mm impeller shaft.

Rotary valve seal pusher
(valve side)
(P/N 420 876 607)



A00C0Y4

APPLICATION
Rotary valve engines.

ENGINE (continued) — MANDATORY SERVICE TOOLS

Rotary valve shaft seal pusher (inner, water pump side)
(P/N 420 876 512)

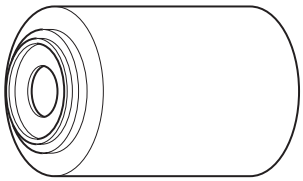


A00C374

APPLICATION

Rotary valve engines, 1991 and newer with a 10 mm impeller shaft.

Rotary valve shaft seal pusher (outer, water pump side)
(P/N 420 877 050)

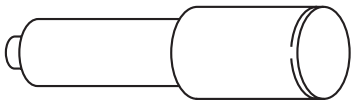


A00C0X4

APPLICATION

Rotary valve engines.

Bearing pusher (rotary valve)
(P/N 420 876 500)

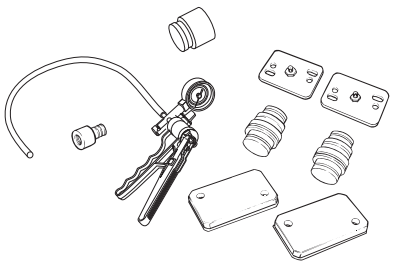


A00B2J4

APPLICATION

Rotary valve engines.

Engine leak tester kit
(P/N 861 749 100)



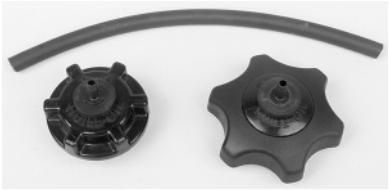
A01B2D5

APPLICATION

All engines.

Fuel and oil system leak tester kit
(P/N 529 033 100)

NEW

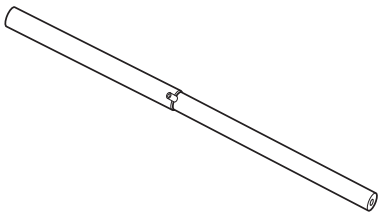


A01B5E4

APPLICATION

All models.

Choke plunger tool
(P/N 529 032 100)

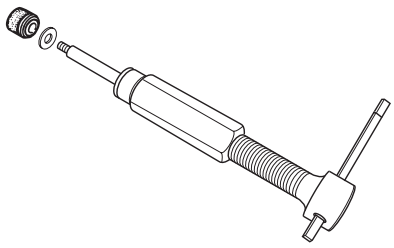


A01C5D4

APPLICATION

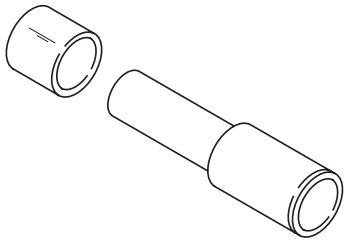
All models equipped with chokes except ZX series.

1) Piston pin puller
(P/N 529 035 503)



A02B094

2) Sleeve kit 18 mm
(P/N 529 035 541)
3) Sleeve kit 20 mm
(P/N 529 035 542)



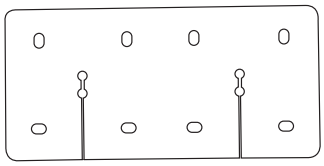
A01B5A4

APPLICATION

1) All engines.
2) 277, 443, 503 and 809 engine.
3) 670 engine.

NOTE: The previous piston pin puller (P/N 529 029 000) can be upgraded by adding protector (P/N 529 035 513) and replacing the locating sleeve and expansion sleeve with appropriate sleeve kit.

Rubber pad
(P/N 529 023 400)



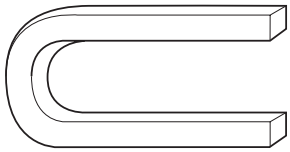
A01B4C4

APPLICATION

All cageless bearing engines.

ENGINE (continued) — MANDATORY SERVICE TOOLS

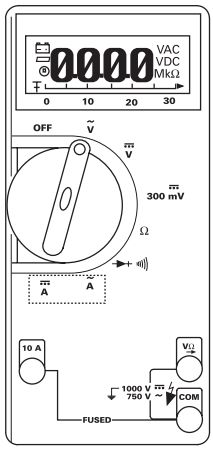
Rotary valve circlip tool
A) (P/N 529 029 100)
B) (P/N 529 020 800)



A00C3I4

APPLICATION
A) 1994 and on rotary valve engines.
B) Up to 1993 rotary valve engines.

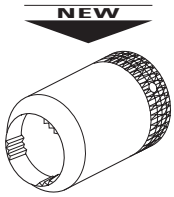
Multimeter
(P/N 529 022 000)



F01B1O4

APPLICATION
All models.

Choke/DESS nut tool
(P/N 529 034 600)



A01B554

APPLICATION
All models equipped with a choke and/or a DESS.

NOTE: This tool replaces choke nut tool (P/N 529 032 200).

Programmer
(P/N 529 035 589)



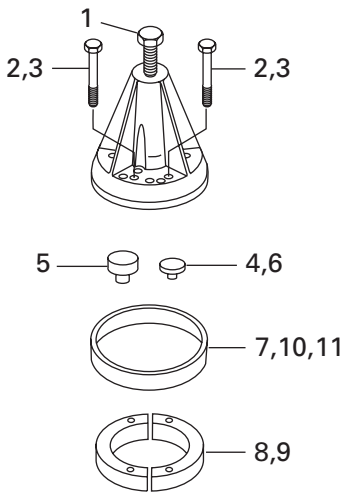
A01B5B4

APPLICATION
All models equipped with a DESS.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

1-2) Crankshaft bearing puller with screw (P/N 420 877 635)



A01B546

APPLICATION
All engines.

1) Screw (M16 x 1.5 x 150)	(P/N 420 940 755)
2) Screw M8 x 40 (4)	(P/N 420 840 681)
3) Screw M8 x 70 (4)	(P/N 420 841 201)
4) Crankshaft protector 247 engine.	(P/N 420 976 890)
5) Crankshaft protector PTO All engines except 247.	(P/N 420 876 552)
6) Crankshaft protector MAG All engines except 247.	(P/N 420 876 557)
7) Puller ring Use with half rings (P/N 420 977 475 or 420 276 025).	(P/N 420 977 490)
8) Half ring (2) For 72 mm O.D. bearings.	(P/N 420 977 475)
9) Half ring For 62 mm O.D. bearings.	(P/N 420 276 025)
10) Puller ring For half rings (P/N 420 977 479).	(P/N 420 977 494)
11) Half ring For 80 mm O.D. bearings.	(P/N 420 977 479)

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

Piston circlip installer

A) (P/N 529 035 561) 18 mm

B) (P/N 529 035 562) 20 mm

NEW



A00B4Y4

APPLICATION

A) All engines except 670.

NOTE: This tool replaces circlip installer (P/N 529 016 900).

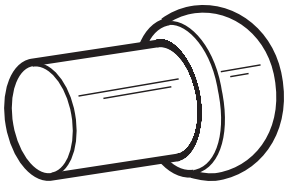
B) 670 engine.

NOTE: This tool replaces circlip installers (P/N 529 035 562 and 290 877 016).

Piston pin/connecting rod bearing centering tool

(P/N 529 009 100)

NOTE: New diameter is 9.65 mm (0.380 in).



A01B1R4

APPLICATION

All engines except cageless and 670 engines.

Ring compressor

A) (P/N 420 876 090) (62 mm)

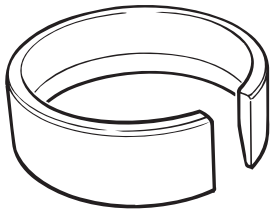
B) (P/N 420 876 974) (69.5 mm)

C) (P/N 420 876 970) (72 mm)

D) (P/N 420 876 972) (76 mm)

E) (P/N 420 876 975) (67.5 mm)

F) (P/N 529 030 800) (78 mm)



A01B1T4

APPLICATION

A) 377 engine.

B) 467 and 494 engines.

C) 503, 253 and 536 engines.

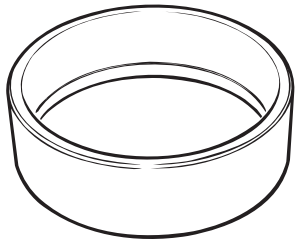
D) 582, 583 and 643 engines.

E) 443 and 447 engines.

F) 670 engine.

Magneto coil centering ring

(P/N 420 876 922)



A01B1V4

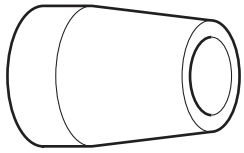
APPLICATION

All engines with Nippondenso CDI (160 W).

Seal protector sleeve

(P/N 420 276 900)

(MAG)



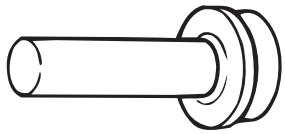
A00C0D4

APPLICATION

247 engine.

Polyamid ring pusher

(P/N 420 276 930)



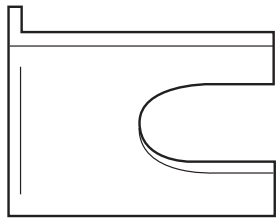
A00C0Z4

APPLICATION

247 engine.

Crankshaft feeler gauge

(P/N 420 876 620)



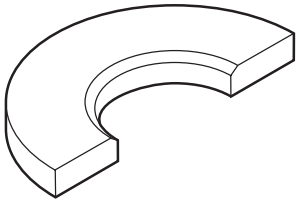
A00C114

APPLICATION

377, 443, 447 and 503 engines.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

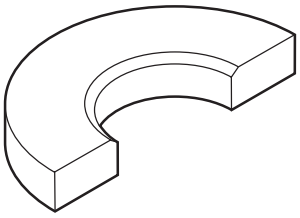
Crankshaft distance gauge (5.7 mm)
(P/N 420 876 822)



A00C294

APPLICATION
377, 443 and 447 engines.

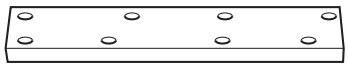
Crankshaft distance gauge (12.7 mm)
(P/N 420 876 824)



A00C3A4

APPLICATION
503 engine.

Cylinder aligning tool
A) (P/N 420 876 904) (on exhaust side)
B) (P/N 420 876 171) (on intake side)



A00B084

APPLICATION
A) 2-cylinder liquid cooled engines.
B) 2-cylinder fan cooled engines.

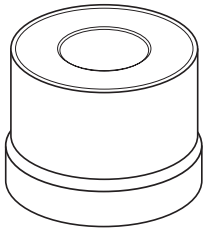
Driver tool
(P/N 529 035 521)



A00B4O4

APPLICATION
Mini Z.

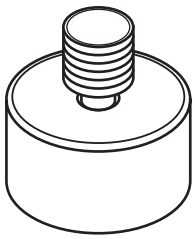
Attachment
(P/N 529 035 522)



A00B4P4

APPLICATION
Mini Z.

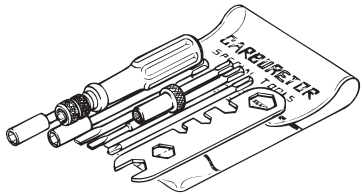
Pilot 22 mm
(P/N 529 035 523)



A00B4Q4

APPLICATION
Mini Z.

Carburetor tool kit
(P/N 404 112 000)



A00B2F4

APPLICATION
All models.

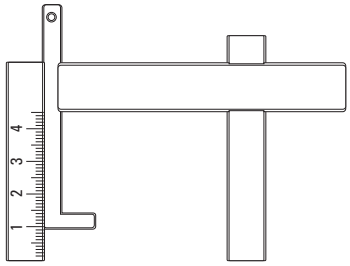
Adaptor
(P/N 529 033 800)
(TYPICAL)



A00B4H4

APPLICATION
1997 and 1998 Grand Touring SE
1998 Summit x 670.

Float level gauge
(P/N 529 035 520)

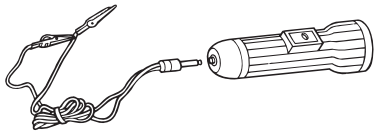


A00B4N4

APPLICATION
All models.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

Circuit tester
(continuity light)
(P/N 414 012 200)



A00C214

APPLICATION
All vehicles.

Stroboscopic timing light
(P/N 529 031 900)



A00B4F4

APPLICATION
All engines.

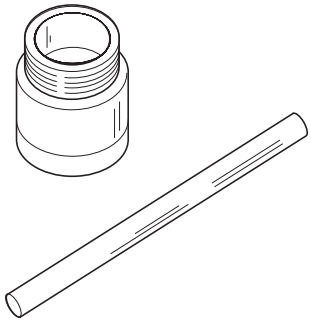
Bypass wires
(P/N 529 033 300)



A00I094

APPLICATION
360 W magneto
(Grand Touring 700/SE).

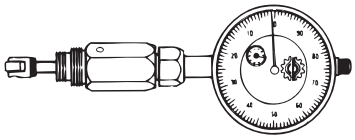
RAVE movement indicator
(P/N 861 725 800)



A18B014

APPLICATION
All RAVE equipped engines.

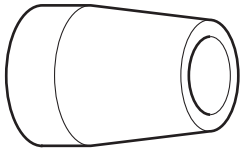
Dial indicator
(TDC gauge)
(P/N 414 104 700)



A00B4E4

APPLICATION
All engines.

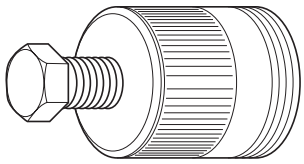
Seal protector sleeve
A) (P/N 420 876 980)
B) (P/N 420 876 490)



A00C0D4

APPLICATION
A) Rotary valve engines with 10 mm shaft.
B) Rotary valve engines with 12 mm shaft.

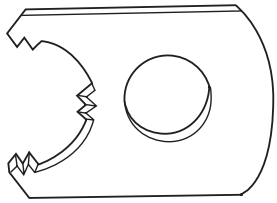
Magneto puller
(P/N 420 976 235)



A00C1A4

APPLICATION
247 engine.

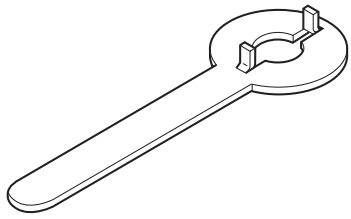
Injection pump gear holder
(P/N 420 876 695)



A00B314

APPLICATION
253, 377, 447 and 503 engines.

Injection pump gear holder
(P/N 420 277 905)

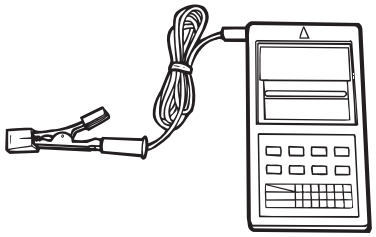


A00C164

APPLICATION
All liquid cooled engines.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

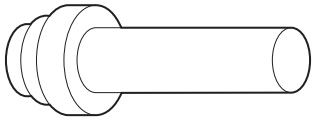
Digital/induction type tachometer
(P/N 529 014 500)



F01B1G4

APPLICATION
All engines.

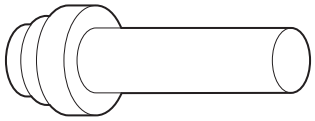
MAG seal pusher
(P/N 420 277 875)



A00C0V4

APPLICATION
277 engine.

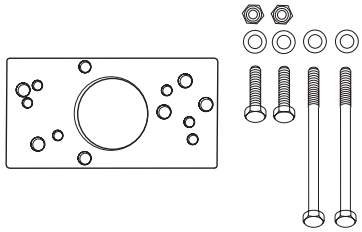
PTO seal pusher
(P/N 420 876 660)



A00C0V4

APPLICATION
277 engine.

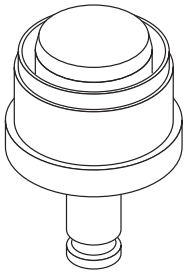
Base puller plate kit
(P/N 529 024 900)



A05C0M4

APPLICATION
277 engine.

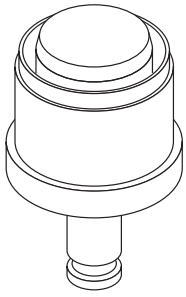
Insertion jig
(magneto side seal)
(P/N 420 876 516)



A00C3T4

APPLICATION
779 engine.

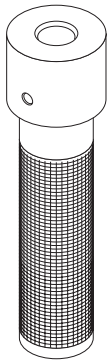
Insertion jig
(magneto seal)
(P/N 420 876 514)



A00C3U4

APPLICATION
454, 494, 599, 670, 699 and 809 engines.

Handle for insertion jig
(P/N 420 877 650)



A00C3V4

APPLICATION
454, 494, 599, 670, 699, 779 and 809 engines.

Exhaust spring installer/remover
(P/N 529 035 559)

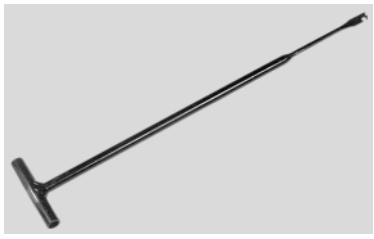


A00C3S4

APPLICATION
All models except CK3 series.

NOTE: This tool replaces exhaust spring installer/remover (P/N 529 028 100).

Exhaust spring installer/remover
(P/N 529 035 400)

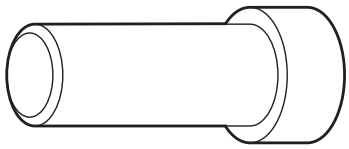


A01B584

APPLICATION
CK3 series.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

Rotary valve seal and shaft pusher
(P/N 420 876 605)



A00C0Y4

APPLICATION
Rotary valve engines 1990 models and older.

Seal pusher (rotary valve)
(P/N 420 876 510)



A00C374

APPLICATION
All rotary valve shaft seals with a 12 mm I.D.

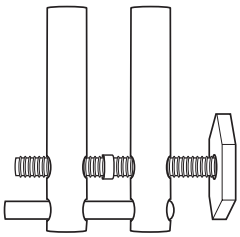
Rotary valve shaft pusher
(P/N 420 876 610)



A00C0F4

APPLICATION
All rotary valve engines with 12 mm shaft.

Large hose pincher
(P/N 529 032 500)
(TYPICAL)



F01B234

APPLICATION
All vehicles.

TRANSMISSION — MANDATORY SERVICE TOOLS

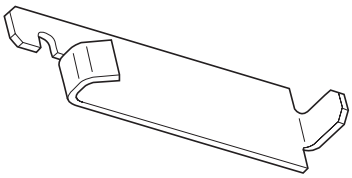
Transmission alignment bar
A) (P/N 529 026 900)
B) (P/N 529 030 000)
C) (P/N 529 026 700)
D) (P/N 529 035 530)
E) (P/N 529 035 545)
F) (P/N 529 031 000)
G) (P/N 529 035 527)
H) (P/N 529 035 572)



A01B4D4

APPLICATION
A) Tundra II LT/R.
B) S-Series with Bombardier Lite.
C) F-Series and S-Series with TRA.
D) S-Series with TRA and RER.
E) Skandic WT.
F) Skandic WT LC/SWT.
G) CK3 series except Mach Z series.
H) Mach Z series.

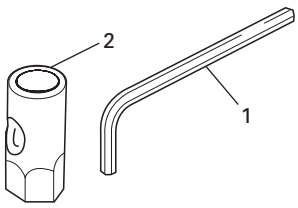
Spring scale hook (long)
A) (P/N 529 006 500)
B) (P/N 529 030 900)
C) (P/N 529 035 557)
(TYPICAL)



A00B4A4

APPLICATION
A) Tundra II LT.
B) F-Series and S-Series (1995 and newer).
C) CK3 without RER.

Drive belt tension adjuster tool
(P/N 529 008 700)

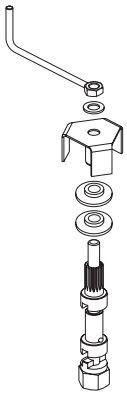


A15B044

APPLICATION
All vehicles except Élan, Tundra II and Skandic WT.

Parts included:
1) Hex. wrench (P/N 420 876 730)
2) Socket wrench (P/N 529 015 000)

Pulley spring compressor
(P/N 529 035 524)

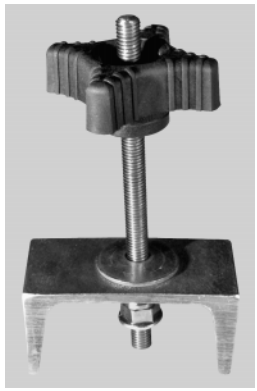


A02D1P4

APPLICATION
All models.

NOTE: This tool has Acme threads and replaces spring compressor (P/N 529 018 600).

Driven pulley spring compressor
(P/N 529 035 300)



A05B034

APPLICATION
Tundra R.

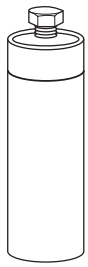
Tension tester
(P/N 414 348 200)



A00C074

APPLICATION
All models.

Countershaft bearing installer
(P/N 529 030 200)

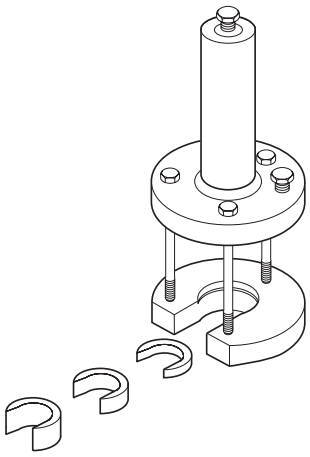


A00A194

APPLICATION
S-Series and F-Series.

TRANSMISSION (continued) — MANDATORY SERVICE TOOLS

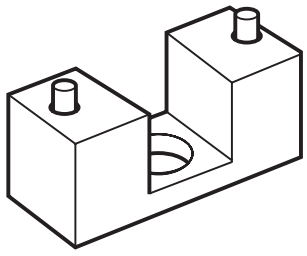
Countershaft bearing remover
(P/N 529 030 100)



A00A274

APPLICATION
S-Series and F-Series.

Spring cover tool
(P/N 529 027 300)



A01B4M4

APPLICATION
Bombardier Lite drive pulley.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

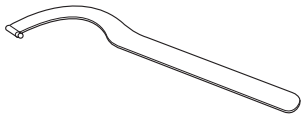
Clutch holder
(P/N 529 006 400)



A01B154

APPLICATION
All TRA drive pulleys.

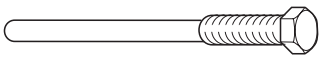
Clutch holder
(P/N 529 027 600)



A02B034

APPLICATION
Bombardier Lite drive pulley.

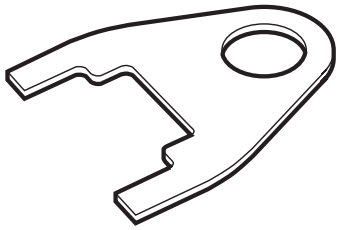
Drive pulley puller
(P/N 529 031 400)



A18B044

APPLICATION
Bombardier Lite drive pulley, except Élan.

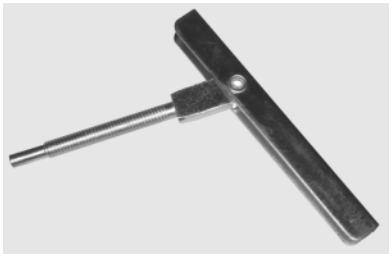
Forks (3)
(P/N 529 005 500)



A16B014

APPLICATION
All vehicles equipped with a TRA drive pulley.

Driven pulley opening tool
(P/N 529 019 400)



A02D1O4

APPLICATION
All vehicles except Élan, Tundra series, Skandic WT series and all vehicles with RER.

Driven pulley opening tool
(P/N 529 035 501)



A03D2P4

APPLICATION
S and CK3 series with RER.

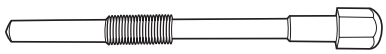
Driven pulley opening tool
(P/N 529 034 200)



A05B044

APPLICATION
Tundra R.

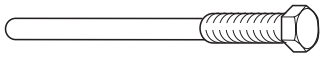
TRA drive pulley puller
(P/N 529 022 400)



A06B014

APPLICATION
TRA drive pulley for the 454, 494, 599, 670, 699, 779 and 809 engines.

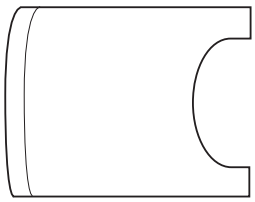
TRA drive pulley puller
(P/N 529 007 900) (25 mm)



A18B044

APPLICATION
TRA drive pulley for 443 and 503 engines.

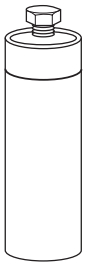
Alignment tool
(P/N 420 476 010)



A00C1D4

APPLICATION
Skandic WT and Alpine II gearbox.

Countershaft bearing installer
(P/N 529 018 800)

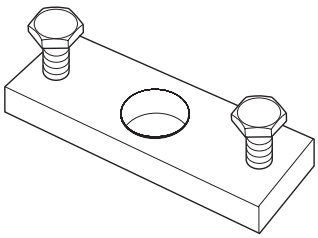


A00A194

APPLICATION
PRS chassis.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

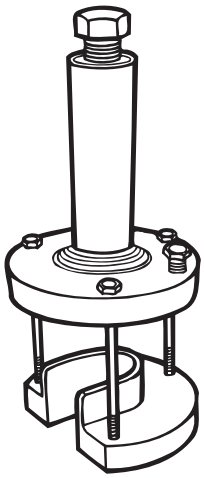
Cam pusher
(P/N 529 012 900)



A18B064

APPLICATION
Tundra II LT.

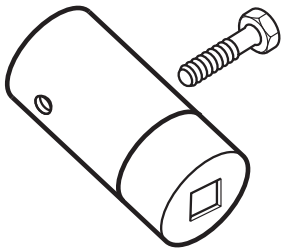
Countershaft bearing remover
(P/N 529 018 700)



A00A164

APPLICATION
PRS chassis.

Drive pulley puller
(P/N 529 023 100)



A00C3J4

APPLICATION
Élan.

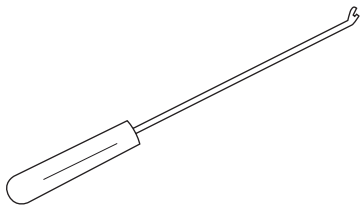
Transmission ball mounting pin
(P/N 420 476 020)



A00C1C4

APPLICATION
Alpine II 3-speed gearbox.

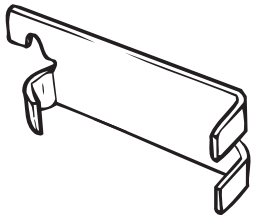
Transmission adjuster
(P/N 529 028 500)



A00D0X4

APPLICATION
F-Series equipped with "twist shifter" reverse transmission.

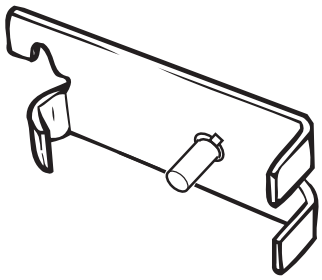
Spring scale hook (long)
(P/N 529 015 200)



A01B514

APPLICATION
1994 models and older except Alpine II.

Spring scale hook (short)
(P/N 529 006 500)



A01B174

APPLICATION
Alpine II 1994 and older.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

Alignment bar
A) (P/N 529 025 600)
B) (P/N 529 028 200)
C) (P/N 529 028 300)
D) (P/N 529 026 800)
E) (P/N 529 031 000)



A01B4D4

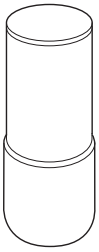
F) (P/N 529 008 300)



A03B034

APPLICATION
A) PRS chassis.
B) Alpine II.
C) Élan.
D) Safari L.
E) Skandic WT 1996.
F) Scout.

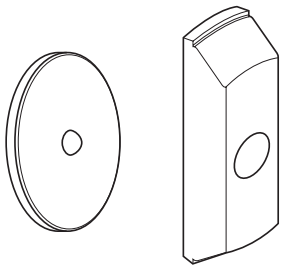
Burnishing bar
(P/N 529 026 402)



A00B464

APPLICATION
Tundra II LT, Safari L and Skandic.

Large bushing extractor
(P/N 529 031 100)

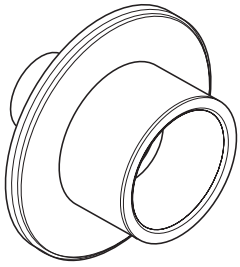


A00B4I4

APPLICATION
All models except Tundra/R, Skandic WT/SWT/WT LC and S-Series with RER.

NOTE: Use this tool only with former puller (P/N 529 018 600) that has regular threads.

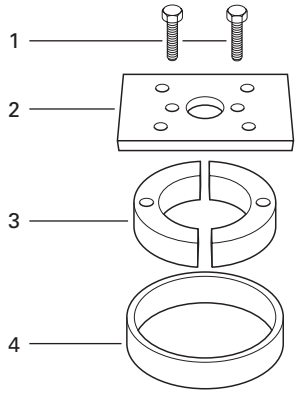
Large bushing installer and small bushing extractor
(P/N 529 031 200)



A00B4J4

APPLICATION
All models except Tundra/R, Skandic WT/SWT/WT LC and S-Series with RER.

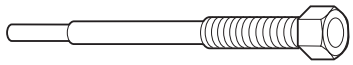
3-speed transmission bearing extractor
1) Screw M8 x 25 (2) (P/N 222 082 565)
2) Plate
3) Half ring (2) (P/N 420 876 330)
4) Ring (P/N 420 977 480)



A00C1B4

APPLICATION
Alpine II 3-speed transmission.

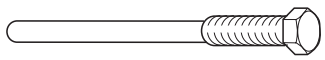
Drive pulley puller
(P/N 529 002 100)
(standard threads)



A00C084

APPLICATION
Square shaft, standard (SAE) threads.

TRA drive pulley puller (27 mm)
(P/N 529 010 100)

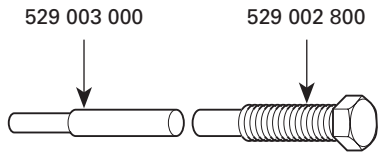


A18B044

APPLICATION
TRA drive pulley (27 mm) shaft except 454, 670 and 779 engines.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

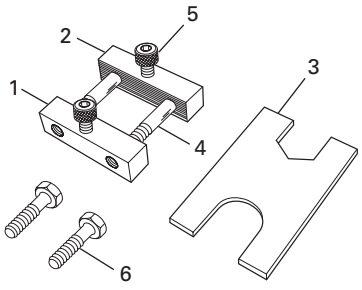
Drive pulley puller
(P/N 860 414 200)
(square shaft metric)
Consists of:



A00C095

APPLICATION
Square shaft, metric threads drive pulley.

Drive axle sprocket adjuster
(P/N 861 725 700)



A01B2O4

APPLICATION
All vehicles except Élan.

Parts included in the kit:

1) Block with threads
   (P/N 529 010 700)
2) Block without threads
   (P/N 529 010 800)
3) Plate
   (P/N 529 010 600)
4) Bolt M10 (2)
   (P/N 222 007 565)
5) Allen screw M8 (2)
   (P/N 222 983 065)
6) Screw M8 (2)
   (P/N 222 082 565)

NOTE: When the tool is to be used between tunnel and sprocket use screws M8.

Transmission adjuster
(P/N 529 030 300)

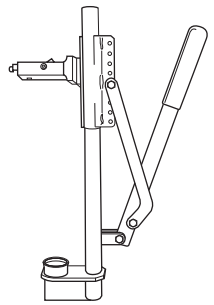


A03D1T4

APPLICATION
Vehicles equipped with "push-pull shifter" reverse transmission.

SUSPENSION — MANDATORY SERVICE TOOLS

Shock spring removal kit
(P/N 529 035 504)
Replacement clevis pin:
(P/N 414 528 400)



A01B4O4

APPLICATION

All suspensions with coil spring.

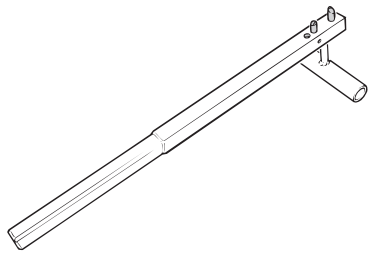
NOTE: The previous shock spring removal kit (P/N 529 027 100) can be upgraded by replacing the stopper with a wider stopper (P/N 529 035 551).

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

A) Track cleat remover
(P/N 529 008 200)

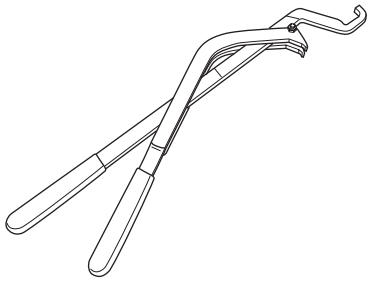
Pins
(P/N 529 008 204)

NOTE: Pins can be rotated 180° depending on whether the tool is used by a left-hander or right-hander.



A01B1J4

B) Track cleat remover
(P/N 529 028 700)



A01F224

APPLICATION

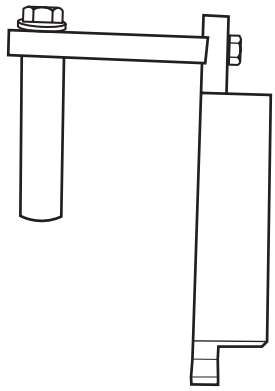
A) 1993 and older.

B) 1994 and newer except Élan and Tundra II.

Camber angle tool
(P/N 529 021 600)

NOTE: Angle finder with a magnetic base must be used.

Suggestion: K-D tool no. 2968

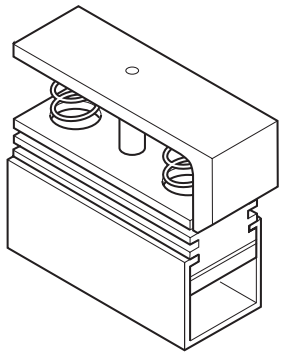


A06B024

APPLICATION

All DSA front suspensions.

Track tension gauge
(P/N 529 021 500)



A00B3X4

APPLICATION

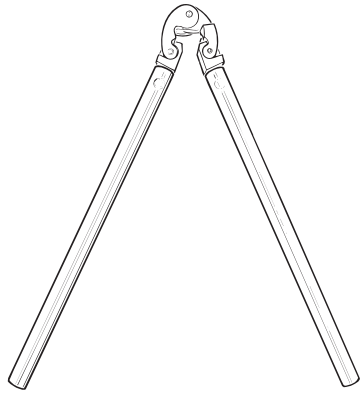
All models except Élan.

Track cleat installer

A) (P/N 529 008 500)
Narrow

B) (P/N 529 028 800)
Narrow

C) (P/N 529 007 700)
Wide



A01B1M4

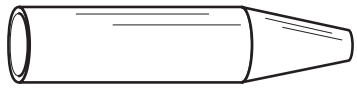
APPLICATION

A) 1993 and older.

B) 1994 and newer.

C) 1992 and older with wide cleat opening.

Dome guide
(P/N 529 026 500



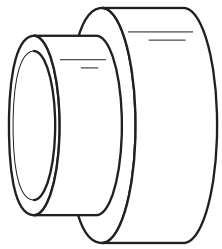
A06F1B4

APPLICATION

T/A shocks.

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

Piston guide
(P/N 529 026 600)

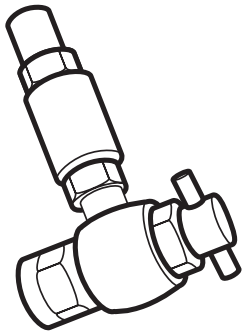


A06F1C4

APPLICATION
T/A shocks.

Gas shock valve tool
(P/N 529 035 570)

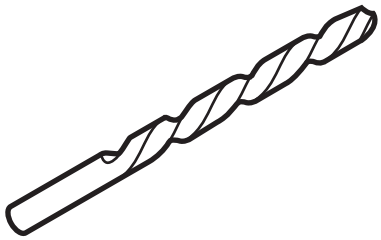
NEW



A02F134

APPLICATION
T/A shocks.

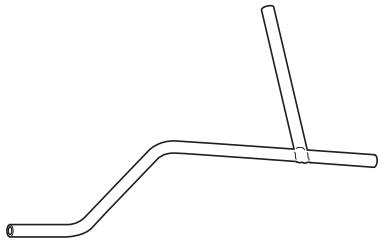
Drill bit
(P/N 529 031 800)



A01B564

APPLICATION
All 3/16 inch rivets.

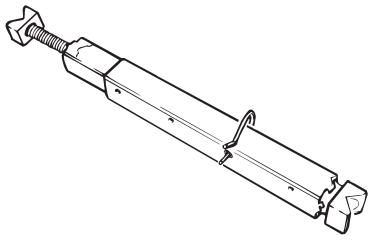
Spring installer (bar)
(P/N 529 005 000)



A00C1I4

APPLICATION
Tundra II LT, Scout and all SC-10 suspensions.

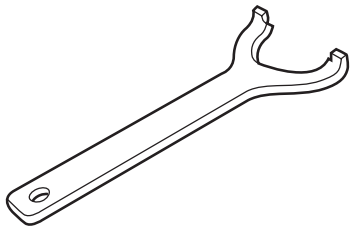
Drive axle holder
(P/N 529 007 200)



A01B1E4

APPLICATION
All models.

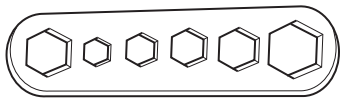
Kayaba shock adjustment tool
(P/N 529 019 000)



A00A1K4

APPLICATION
C-7 suspension.

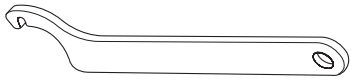
Hexagonal wrench
(P/N 529 014 700)



A19B024

APPLICATION
All SC 10 suspensions, Safari and Skandic prior to 1995.

Suspension adjustment wrench
(P/N 529 017 100)



A15B094

APPLICATION
1992 and old Formula C-7.

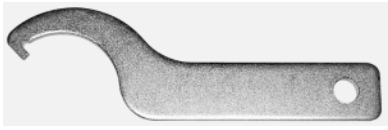
Suspension adjustment wrench
(P/N 529 032 900)



A02F114

APPLICATION
ARM suspension.

Suspension adjustment wrench
(P/N 529 034 100)

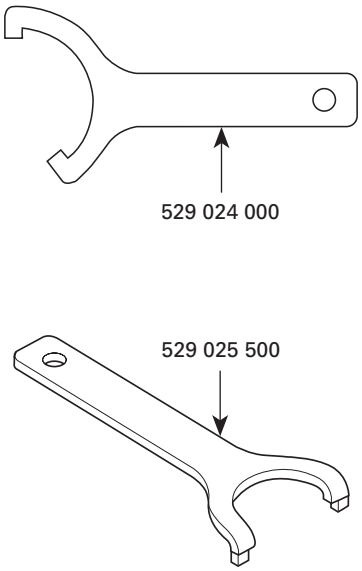


A02F124

APPLICATION
CK3 series.

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

Adjustment wrench
(P/N 861 743 900)
Consists of:



APPLICATION
T/A shock.

VEHICLES — RECOMMENDED SERVICE TOOLS

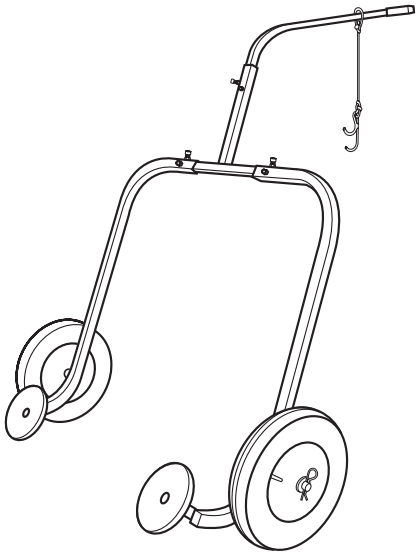
Protective mat
(P/N 529 030 600)



A01B45W

APPLICATION
All vehicles.

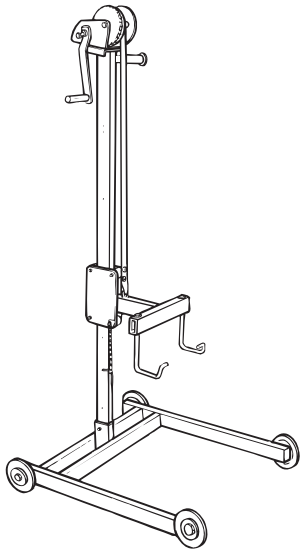
Dolly
(P/N 529 029 900)



A00B4CJ

APPLICATION
All models.

Snowmobile jack
(P/N 529 020 000)



A01A1JJ

APPLICATION
All models.

VEHICLES (continued) — RECOMMENDED SERVICE TOOLS

Template for hood drilling
(P/N 529 034 400)

NEW



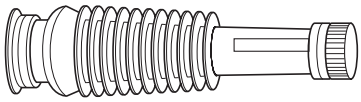
A02H154

APPLICATION

S-Series.

NOTE: To drill new hood prior to install meters.

Flexible spout for oil container
(P/N 414 837 300)



F04B044

APPLICATION

All models.

SERVICE PRODUCTS

MANDATORY SERVICE PRODUCTS

Loctite® is a trademarks of Loctite Corporation.

Dow Corning® is a trademarks of Dow Corning Corporation.

Retaining compound
(P/N 413 703 100)
Loctite® RC/609:
Retaining compound (10 mL)
(green)



A00B2S4

APPLICATION

Used for retaining bushings, bearings in slightly worn housing or on shaft.

Paste gasket
(P/N 413 702 700)
Loctite® 515:
Gasket eliminator (50 mL)



A00B2T4

APPLICATION

Crankcase halves, transmission and gearbox mating surfaces.

Medium-strength threadlocker
(P/N 293 800 015)
Loctite® 242:
Threadlocker (10 mL)
(blue, medium strength)



A00B324

APPLICATION

Flywheel nut, crankcase studs, etc.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 703 000.

High strength threadlocker
(P/N 293 800 005)
Loctite® 271:
Threadlocker (10 mL)
(red, high strength)



A00B2U4

APPLICATION

Fasteners and studs up to 1 in diameter.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 707 400.

Gasket/paint remover
(P/N 413 708 500)
Loctite® 79040 Chisel
510 g (18 oz)



A00B3L4

APPLICATION

Clean mating surfaces of cylinders and crankcase. Remove carbon in combustion chambers.

MANDATORY SERVICE PRODUCTS (continued)

Loctite® primer
(P/N 293 800 041)
Loctite® 764-56
Primer N
170 g (6 oz)



A00B3N4

APPLICATION

To prepare mating surfaces before applying paste gasket, retaining compound or threadlockers.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 708 100.

Silicone compound
(P/N 420 897 061)
Dow Corning® MS4



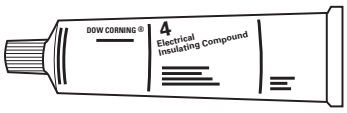
A00B3R4

APPLICATION

Lubricate pawl and pawl lock of rewind starter.

RECOMMENDED SERVICE PRODUCTS

Silicone dielectric grease
(3 oz)
(P/N 293 550 004)



A00B1X4

APPLICATION

On all electric connections. High tension coil and spark plug connections. Connector housings, etc.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 701 700.

Grease LMZ no. 1
(400 g)
(P/N 413 707 500)



A00B1Y4

APPLICATION

Mainly used between regulators or rectifiers and upper column to transfer the heat build-up and to assure a good ground.

Grease Isoflex
(50 g)
(P/N 293 550 021)

NEW

APPLICATION

To lubricate PTO outer bearing on 3-cylinder and 593 engines.

Chaincase oil
(16 x 250 mL)
(P/N 413 801 900)



A00B2R4

APPLICATION

Chaincase lubricant on all fan-cooled models except Skandic WT series.

Synthetic chaincase oil
(12 x 355 mL)
(P/N 413 803 300)



A01B4Q4

APPLICATION

Chaincase lubricant on all liquid-cooled models and Skandic WT series.

Blizzard oil
(12 x 500 mL)
(P/N 413 803 100)



A00B2Q4

APPLICATION

All pre-mix models.

Injection oil
(P/N 413 802 900)
(12 x 1 liter)
(P/N 413 803 000)
(3 x 4 liter)
(P/N 413 803 200)
(205 liters)



F01B2H4

APPLICATION

All engines.

RECOMMENDED SERVICE PRODUCTS (continued)

BOMBARDIER-ROTAX Formula XP-S synthetic injection oil
(P/N 413 711 000)
(3 x 4 liter)
(P/N 413 710 700)
(205 liters)



F01B354

APPLICATION
All engines.

BOMBARDIER-ROTAX Formula XP-S synthetic injection oil
(P/N 413 710 500)
(12 x 1 liter)



F01B2G4

APPLICATION
All models.

Pipe sealant
(P/N 413 702 300)
Loctite 592 (50 mL)



A00B2W4

APPLICATION
Engine plugs and senders.

High temperature threadlocker
(P/N 420 899 788)
Loctite 648 (green)
(5 g)



A00B3D4

APPLICATION
For RAVE valve rod distance nut.

Anti-seize lubricant
(P/N 413 701 000)
Loctite anti-seize lubricant 454 g (16 oz)



F01B174

APPLICATION
Unpainted surfaces of driven pulley countershaft.

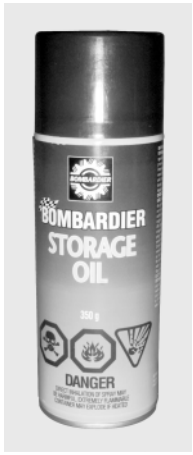
Synthetic grease
(400 g)
(P/N 413 711 500)



A01B574

APPLICATION
For idler bearings, ski legs, leaf spring cushion pads, seal interior lips, rear hub bearings, bogie wheels, countershaft bearings, etc.

Storage oil
(350 g spray can)
(12 x 350 g)
(P/N 496 014 100)



A02B054

APPLICATION
All models.

RECOMMENDED SERVICE PRODUCTS (continued)

Degreaser
(P/N 413 708 400)
Permatex® 48 TA
433 g (15 oz)



A00B3K4

APPLICATION
Engine, chaincase and any greasy surfaces.

Plastic & vinyl cleaner
(P/N 413 711 200)
6 x 1 L



A00B4V4

APPLICATION
Hood, bottom pan and seat.

Parts cleaner
(P/N 413 711 809)
320 g



A00B4X4

APPLICATION
Engine crankcase joining surfaces, pulleys and any greasy surfaces.

NOTE: This product replaces Loctite Safety solvent (P/N 413 708 200).

Gel instant adhesive
(P/N 413 708 300)
Loctite 454-40
20 g (.70 oz)



A00B3O4

APPLICATION
Isolating foam and rubber strip.

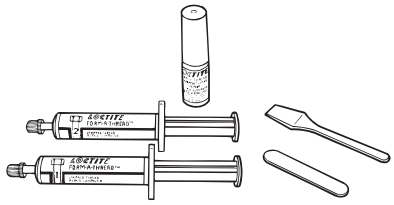
Tough adhesive
(P/N 413 408 300)
Loctite Black Max 38004
3 mL (.10 oz)



A00B3P4

APPLICATION
Shifter boot or grip.

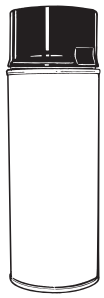
Stripped threads repair kit
(P/N 413 708 600)
Loctite 81668
Form-A-thread 81668



A00A1J4

APPLICATION
Repair damaged threads of grade 5 (SAE) or 8.8 (metric) maximum. Do not use in applications where temperatures will exceed 149°C (300°F) or on critical assemblies.

Paint for frame touch-up
(P/N 413 401 000)
Black semi-gloss
(spray can)

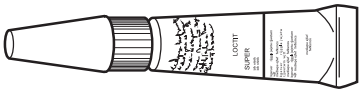


A00B3H4

APPLICATION
All models with a black frame.

RECOMMENDED SERVICE PRODUCTS (continued)

General purpose instant adhesive
Loctite 495 (3 g)
(P/N 413 703 200)



A00B2V4

APPLICATION
Rubber to metal bonding and most hard plastic.

High temperature RTV sealant
Ultra Copper
(P/N 413 710 300)
Loctite 17914 (80 mL)



A02B044

APPLICATION
All models.

Bombardier cleaner
(P/N 293 110 001) (400 g)
(P/N 293 110 002) (4 L)



F01B2J4

APPLICATION
All models.

Clear silicone
(P/N 293 800 033)



F01B1S4

APPLICATION
All models to seal bottom pan.

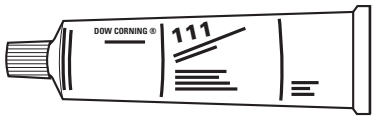
Fuel stabilizer
(12 x 8 oz)
(P/N 413 408 600)



A00B3V4

APPLICATION
All models.

Molykote 111
(P/N 413 707 000)



A00B3W4

APPLICATION
Engine crankshaft seals.

Shock oil
(32 oz)
(P/N 413 709 400)



A06F0P4

APPLICATION
T/A shocks.

Bombardier Lube
(12 x 14 oz)
(P/N 293 600 016)



A00B4W4

APPLICATION
Steering ball joints on all models.

RECOMMENDED SERVICE PRODUCTS (continued)

Super Lube (grease)
(P/N 293 550 014)



A00B474

APPLICATION
Exhaust tail pipe grommet.

LUBRICATION AND MAINTENANCE CHART

SYSTEM	PART/TASK	10-HOUR OR 500 km (300 mi) INSPECTION (To be performed by dealer)	WEEKLY OR EVERY 240 km (150 mi)	MONTHLY OR EVERY 800 km (500 mi)	ONCE A YEAR OR EVERY 3200 km (2000 mi)	STORAGE (To be performed by dealer)	PRE-SEASON PREPARATION (To be performed by dealer)	REFER TO
	Rewind Starter Lubrication and Rope Condition						✔	Subsection 04-07
	Engine Head Nuts	✔			✔			Appropriate section: See Top End
	Engine Mount Nuts	✔			✔			Appropriate section: See ENGINE REMOVAL
	Exhaust System	✔		✔				Appropriate section: See ENGINE REMOVAL
	Engine Lubrication					✔		This section no. 1
	Cooling System Condition	✔			✔			Subsection 04-06
	Coolant Replacement						✔	Subsection 04-06
	Condition of Seals						✔	Subsection 04-02
	Injection Oil Filter Condition			✔				Subsection 04-05
	Injection Oil Filter Replacement						✔	Subsection 04-05
	Oil Injection Pump Adjustment	✔			✔			Subsection 04-05
	Fuel Stabilizer					✔		This section no. 2
	Fuel Filter Replacement						✔	This section no. 3
	Fuel Lines and Connections	✔					✔	Subsection 04-09
	Carburetor Adjustment	✔			✔			Subsection 04-08
	Throttle Cable Inspection	✔			✔		✔	Subsection 04-09
	Air Filter Cleaning			✔				This section no. 4
	DPM Air Pump Hose Cleaning				✔		✔	This section no. 9
	Drive Belt Condition	✔	✔					This section no. 5
	Condition of Drive and Driven Pulleys	✔		✔		✔		Subsections 05-03 and 05-04
	Cleaning of Drive and Driven Pulleys						✔	Subsections 05-03 and 05-04
	Retorquing of Drive Pulley Screw	✔						Subsection 05-03
	Driven Pulley Preload	✔			✔			Subsection 05-04
	Brake Condition	✔	✔					Subsection 05-06
	Brake Adjustment			✔				Subsection 05-06
	Brake Fluid Change						✔	Subsection 05-06
	Drive Chain Tension	✔		✔				Subsection 05-07
	Countershaft Lubrication	✔		✔		✔		Subsection 05-06
	Chaincase Oil Level	✔		✔			✔	Subsection 05-07
	Chaincase Oil Change					✔		Subsection 05-07
	Lubrication of Drive Axle Bearing	✔		✔		✔		Subsection 07-03

SYSTEM	PART/TASK	10-HOUR OR 500 km (300 mi) INSPECTION (To be performed by dealer)	WEEKLY OR EVERY 240 km (150 mi)	MONTHLY OR EVERY 800 km (500 mi)	ONCE A YEAR OR EVERY 3200 km (2000 mi)	STORAGE (To be performed by dealer)	PRE-SEASON PREPARATION (To be performed by dealer)	REFER TO
	Handlebar Bolts. Retorque to 26 N•m (19 lbf•ft)	✔						Subsection 08-02
	Steering and Front Suspension Mechanism	✔		✔		✔		Subsections 08-02 and 08-03
	Wear and Condition of Skis and Runners	✔	✔					Subsection 08-03
	Steering and Ski Leg Camber Adjustment	✔		✔				Subsection 08-02
	Suspension Adjustments	AS REQUIRED						Section 07-02 and *Operator's Guide*
	Suspension Lubrication			✔		✔		Section 07-02
	Suspension Condition	✔			✔			Section 07-02
	Suspension Stopper Strap Condition				✔			Section 07-02
	Track Condition	✔		✔				Subsection 07-04
	Track Tension and Alignment	✔	AS REQUIRED					Subsection 07-04
	Spark Plugs*	✔		✔				Subsection 06-03
	Engine Timing	✔					✔	Subsection 06-02
	Battery Condition	✔		✔		✔		Subsection 06-04
	Headlight Beam Aiming				✔			Subsection 09-02
	Wiring Harnesses, Cables and Lines	✔		✔				Subsection 09-02
	Operation of Lighting System (HI/LO beam, brake light, etc.) Test Operation of Emergency Cut-Out Switch and Tether Cut-Out Switch	✔	✔			✔		*Operator's Guide*
	Rags in Air Intake and Exhaust System					✔	✔	This section no. 6
	Engine Compartment	✔		✔				This section no. 7
	Vehicle Cleaning and Protection	✔		✔		✔		This section no. 8

* Before installing new spark plugs at pre-season preparation, it is suggested to burn excess storage oil by starting the engine with the old spark plugs. Only perform this operation in a well-ventilated area.

NO. 1 ENGINE LUBRICATION

Engine internal parts must be lubricated to protect them from possible rust formation during the storage period.

Proceed as follows:

Start the engine and allow it to run at idle speed until the engine reaches its operating temperature.

◆ WARNING

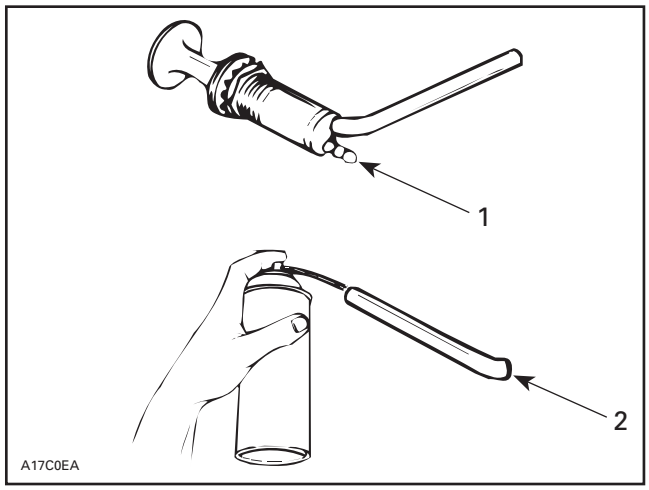
Ensure the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

Stop the engine.

Models with a Primer

To prevent fuel from draining, primer button should be pushed all the way in.

Disconnect the outlet primer hose from the primer valve (straight coupling).



1. Straight coupling
2. To intake manifold

Insert storage oil (P/N 496 014 100) nozzle into primer outlet hose.

Models with a Choke

Remove air silencer to spray storage oil into each carburetor bore.

All Models

Restart engine and run at idle speed.

Inject storage oil until the engine stalls or until a sufficient quantity of oil has entered the engine (approximately half a can).

With the engine stopped, remove the spark plug and spray storage oil (P/N 496 014 100) into each cylinder.

Crank slowly 2 or 3 revolutions to lubricate cylinders.

Reinstall the spark plugs and the outlet primer hose or air silencer.

◆ WARNING

This procedure must only be performed in a well-ventilated area. Do not run engine during storage period.

NO. 2 FUEL STABILIZER

With the new fuel additives, it is critical to use the fuel stabilizer (P/N 413 408 600) (250 mL) to prevent fuel deterioration, gum formation and fuel system components corrosion. Follow manufacturer's instructions for proper use.

Pour fuel stabilizer in fuel tank prior to starting engine for internal parts lubrication so that stabilizer flows everywhere in fuel system.

After engine starting, use primer several times so that stabilizer flows inside it.

Do not drain fuel system.

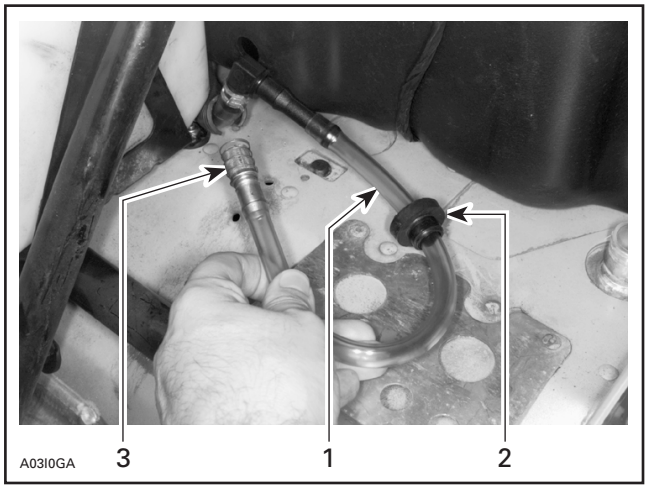
▼ CAUTION

Fuel stabilizer should be added prior engine lubrication to ensure carburetor(s) protection against varnish deposit.

NO. 3 FUEL FILTER REPLACEMENT

Drain fuel tank.

Remove fuel line grommet from fuel tank and pull out inlet fuel line from tank.



TYPICAL

1. *Inlet fuel line*
2. *Position of grommet when installing*
3. *Fuel filter*

Replace fuel filter. To facilitate the fuel line installation, slide grommet on fuel line about 50 mm (2 in) away from elbow then install grommet on fuel tank and push elbow through grommet.

NO. 4 AIR FILTER CLEANING

▼ CAUTION

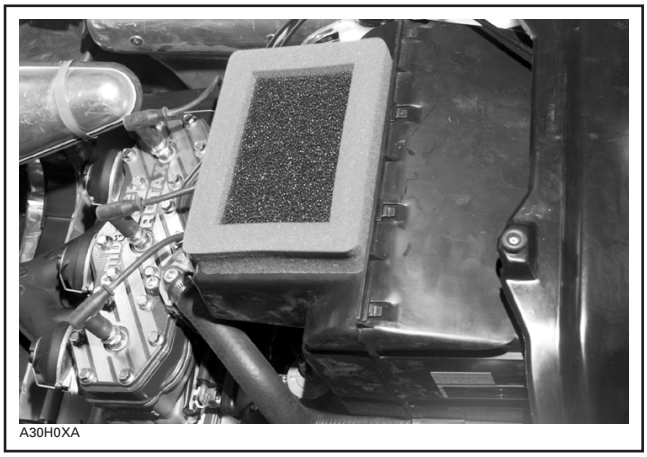
These snowmobiles have been calibrated with the filter installed. Operating the snowmobile without it may cause engine damage.

Remove air filter from air deflector by pulling it.

Lift hood and remove air filter from air intake silencer.

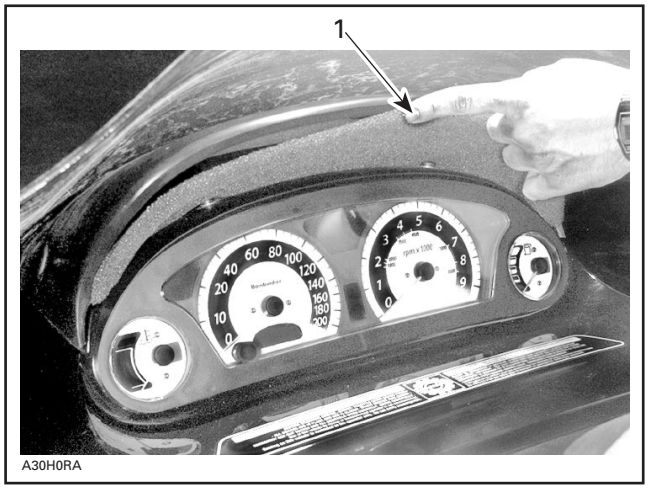
To clean the filter, shake the snow out of it then, dry it out.

Check that the air box is clean and dry then properly reinstall the filter.



AIR FILTER INSTALLED

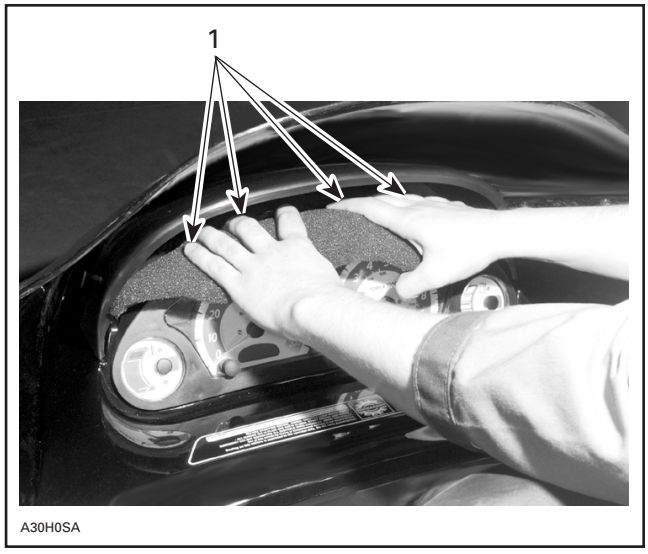
Insert air filter so its top edge is flush with air deflector.



TYPICAL

1. *Top edge of filter flush with air deflector*

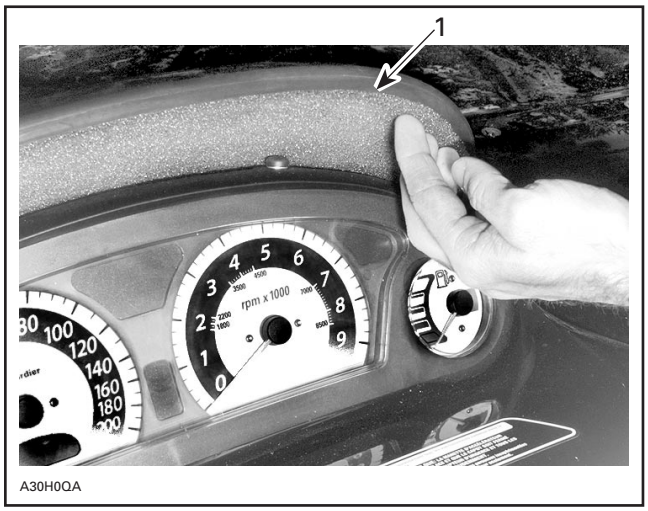
Reinstall filter over dashboard sticking bottom edge first.



TYPICAL

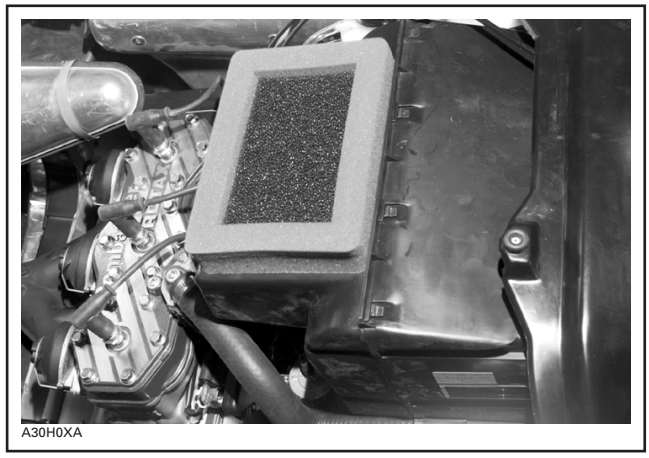
1. Stick bottom edge first

Finalize filter top edge installation.



TYPICAL

1. Push top edge of filter under air deflector lip



NO. 5 DRIVE BELT CONDITION

Inspect belt for cracks, fraying or abnormal wear (uneven wear, wear on one side, missing cogs, cracked fabric). If abnormal wear is noted, probable cause could be pulley misalignment, excessive RPM with frozen track, fast starts without warm-up period, burred or rusty sheave, oil on belt or distorted spare belt.

Check the drive belt width. Replace the drive belt if width is less than the minimum width recommended. Refer to DRIVE BELT 05-02.

NO. 6 RAGS IN AIR INTAKE AND EXHAUST SYSTEM

At storage preparation, block air intake hole and exhaust system hole using clean rags.

Remove those rags at pre-season preparation.

NO. 7 ENGINE COMPARTMENT

Keep clean of grass, twigs, cloth, etc. These are combustible under certain conditions.

NO. 8 VEHICLE CLEANING AND PROTECTION

Remove any dirt or rust.

To clean the entire vehicle, use only flannel clothes or Kimtowels® wipers no. 58-380 from Kimberly-Clark.

▼ CAUTION

It is necessary to use flannel cloths or Kimtowels wipers on windshield and hood to avoid damaging further surfaces to clean.

To clean the entire vehicle, including metallic parts with a **thick** coat of grease, use Endust® imported by Bristol Myers, available at hardware stores or supermarkets.

For bottom pan cleaning, use Bombardier Cleaner (P/N 293 110 001 (spray can 400 g) and 293 110 002 (4 L)).

▼ CAUTION

Do not use Bombardier Cleaner on decals or vinyl.

To clean the entire vehicle, including metallic parts with a **thin** coat of grease, use Simple Green® from Sunshine Makers Inc., available at hardware stores or at automotive parts retailer.

For vinyl and plastic parts, use Vinyl & Plastic Cleaner (P/N 413 711 200 (6 x 1 L)).

To remove scratches on windshield or hood: Start with "Slip Streamer Motorcycle Windshield Heavy Duty Scratch, Remover". Finish with "Slip Streamer Motorcycle Cleaner and Polish".

NOTE: The latest product may be use alone if only light scratches are noticeable.

▼ CAUTION

Never clean plastic parts or hood with strong detergent, degreasing agent, paint thinner, acetone, products containing chlorine, etc.

Inspect the hood and repair any damage. Touch up all metal spots where paint has been scratched off. Spray all metal parts including shock chromed rods with BOMBARDIER LUBE (P/N 293 600 016). Wax the hood and the painted portion of the frame for better protection.

NOTE: Apply wax on glossy finish only. Protect the vehicle with a cover to prevent dust accumulation during storage.

▼ CAUTION

The snowmobile has to be stored in a cool and dry place and covered with an opaque tarpaulin. This will prevent sun rays and grime from affecting plastic components and vehicle finish.

Lift rear of vehicle until track is clear of the ground. Install on a snowmobile mechanical stand.

NOTE: Do not release track tension.

NO. 9 DPM AIR PUMP HOSE CLEANING

Unplug hose coming from air pump at DPM manifold.

Run engine at 3000 RPM until all liquid has escaped from that hose (about 2 to 3 minutes).

Reconnect hose.

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ENGINE

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**ENGINE BACKFIRES.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check spark plugs.** a. Carbon accumulation caused by defective spark plug(s). *Clean carbon accumulation and replace spark plugs.*
	2. Check ignition timing. a. Timing is too advanced. *Set timing according to specifications (refer to TECHNICAL DATA 10).*
	3. Check carburetor. a. Fuel passages obstruted. *Clean carburetor and install new filter(s).* b. Fuel level too low. *Adjust float level according to specifications.*
	4. Check cooling system. a. Loose fan belt. *Adjust or replace fan belt (refer to TECHNICAL DATA 10).* b. Low antifreeze level. *Adjust antifreeze level. Then check clamps or hoses.* c. Defective tank cap. *Replace cap.* d. Air in system. *Bleed system.*

SYMPTOM	**ENGINE SUDDENLY TURNS OFF AT HIGH RPM AND/OR WITH LIGHT LOAD.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check that all 3 ground wires are well connected.**

SYMPTOM	ENGINE SUDDENLY TURNS OFF.
CONDITION	NORMAL USE.
Test/Inspection	**1. Perform engine leak test. Refer to ENGINE LEAK VERIFICATION FLOW CHART. Check possible piston seizure.** a. Damaged gasket and/or seal. *Replace defective parts.*
	2. "Four-corner" seizure of piston(s). a. Accelerating too fast when engine is cold. Piston expands faster than cylinder. *Replace piston(s). Ask driver to refer to warm-up procedure in* Operator's Guide.
	3. Piston(s) seizure on exhaust side (color on piston dome is correct). a. Kinked fuel tank vent tube. *Relocate fuel tank vent tube.* b. Leaks at fuel line connections or damaged fuel lines. *Replace defective lines.* c. Fuel does not flow through carburetor(s) (foreign particles in needle area and/or varnish formation in carburetor(s)). *Clean carburetor(s) and install new filter(s).* d. Spark plug heat range is too warm. *Install spark plugs with appropriate heat range (refer to TECHNICAL DATA 10).* e. Improper ignition timing. *Adjust according to specifications (refer to TECHNICAL DATA 10).* f. Restriction in exhaust system. *Replace.* g. Compression ratio is too high. *Install genuine parts.* h. Carburetor calibration is too lean. *Adjust according to specifications (refer to TECHNICAL DATA 10).* i. Improper rotary valve timing or improper valve. *Adjust according to specifications (refer to TECHNICAL DATA 10) and/or install Bombardier's recommended rotary valve.* j. Poor quality oil. *Use BOMBARDIER-ROTAX oil.* k. Leaks at air intake silencer. *Replace air intake silencer grommets.*
	4. Melted and/or perforated piston dome; melted section at ring end gap. a. When piston reaches TDC, mixture is ignited by heated areas in combustion chamber. This situation is due to an incomplete combustion of a poor quality oil. *Clean residue accumulation in combustion chamber and replace piston(s). Use BOMBARDIER-ROTAX injection oil.* b. Spark plug heat range is too high. *Install recommended spark plugs (refer to TECHNICAL DATA 10).* c. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).* d. Inadequate fuel quality. *Use appropriate fuel.* e. Carburetion is too lean. *Adjust according to specifications (refer to TECHNICAL DATA 10).*

	5. Seized piston all around the circumference (dry surface). a. Lack of oil, damaged oil line or defective injection pump. *Replace defective part(s).*
	6. Grooves on intake side of piston only. a. Oil film eliminated by water (snow infiltration in engine). *Replace piston(s) and check if intake system leaks.*
	7. Piston color is dark due to seizure on intake and exhaust sides. a. Broken or loose fan belt. *Replace fan belt or adjust its tension (refer to TECHNICAL DATA 10).* b. Cooling system leaks and lowers coolant level. *Tighten clamps or replace defective parts. Add antifreeze in cooling system until appropriate level is reached.* c. Accumulation of foreign particles in needle and/or main jet area. *Clean carburetor(s).*
	8. Cracked or broken piston(s). a. Cracked or broken piston(s) due to excessive piston/cylinder clearance or engine overreving. *Replace piston(s). Check piston/cylinder clearance (refer to TECHNICAL DATA 10). Adjust drive pulley according to specifications (refer to TECHNICAL DATA 10) and/or clean pulley sheaves if they are contaminated with greasy particles.*

SYMPTOM	**PISTON RING AND CYLINDER SURFACES ARE GROOVED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check oil quality.** a. Poor oil quality. *Use BOMBARDIER-ROTAX injection oil.*
	2. Check injection pump and its hoses. a. Inadequate injection pump adjustment and/or defective hoses. *Adjust pump according to specifications (refer to ENGINE 04) and/or replace hoses.*

SYMPTOM	ENGINE DOES NOT OFFER MAXIMUM POWER AND/OR DOES NOT REACH MAXIMUM OPERATING RPM.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check spark plug condition.** a. Fouled spark plugs. *Replace.*
	2. Check if there is water in fuel. a. There is water in fuel. *Drain fuel system, then fill it with appropriate fuel.*
	3. Check items listed in ENGINE RUNS OUT OF FUEL (refer to fuel and oil system subsection 03).
	4. Check carburetor adjustments and cleanliness. a. Inadequate carburetor adjustments or dirt accumulation. *Adjust according to specifications (refer to TECHNICAL DATA 10) or clean.*
	5. Check drive belt. a. Worn belt. *Replace belt if width is 3 mm (1/8") less than nominal dimension (refer to TECHNICAL DATA 10).*
	6. Check track adjustment. a. Too much tension and/or improper alignment. *Align track and adjust its tension to specifications (refer to TECHNICAL DATA 10).*
	7. Check drive pulley. a. Improper calibration screw adjustments (TRA pulley) and/or worn bushing(s). *Adjust according to specifications (refer to TECHNICAL DATA 10) and/or replace bushing(s).*
	8. Check driven pulley. a. Worn bushing and/or spring tension. *Replace spring and/or adjust its tension according to specifications (refer to TECHNICAL DATA 10).*
	9. Check exhaust system. a. Restriction. *Replace.*
	10. Check ignition timing. a. Decrease in power due to retarded ignition. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	11. Check engine compression. a. Worn piston(s) and ring(s). *Replace (refer to TECHNICAL DATA 10 for specifications).*
	12. Check engine cooling system. a. Engine overheats. Improper fan belt tension. *Adjust fan belt (refer to TECHNICAL DATA 10).* b. Antifreeze level is low, cap fails to pressurize system or air circulates through lines. *Adjust level, replace cap or bleed cooling system.*
	13. Check reed valve. a. Improper tightness and/or opening. *Replace or adjust. Refer to proper engine subsection.*

SYMPTOM	ENGINE DETONATION AT MAXIMUM RPM.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check which type of fuel is used.** a. Octane number is too low and/or alcohol level is too high. *Use recommended fuel type.*
	2. Check spark plug type. a. Improper spark plug heat range. *Install recommended spark plugs (refer to TECHNICAL DATA 10).*
	3. Check exhaust system. a. Too much restriction. *Replace.*
	4. Check ignition timing. a. Timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check carburetion. a. Fouled and/or improper carburetor components. *Clean or replace according to specifications (refer to TECHNICAL DATA 10).*
	6. Check compression ratio and combustion chamber volume. a. Compression ratio is too high. *Install genuine parts.*

SYMPTOM	ENGINE TURNS OVER BUT FAILS TO START.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check switches.** a. Ignition switch, emergency cut-out switch or tether switch is in the OFF position. *Place all switches in the RUN or ON position. If it still does not work, connect DESS switch BK/GN and BK/WH wires together (harness side).*
	2. Check fuel valve. a. fully open fuel valve.
	3. Check fuel level. a. Mixture not rich enough to start cold engine. *Check fuel tank level and use primer.*
	4. Check spark plug. a. Defective spark plug (no spark). *Replace spark plugs.*
	5. Check amount of fuel on spark plug. a. Flooded engine (spark plug wet when removed). *Do not overprime or overchoke. Remove wet spark plugs, turn ignition switch to OFF and crank engine several times. Install clean dry spark plugs. Start engine following usual starting procedure.*
	6. Check fuel lines. a. No fuel to the engine (spark plugs dry when removed). *Check fuel tank level; turn fuel valve on if applicable; check fuel filter, replace if clogged; check condition of fuel and impulse lines and their connections.*
	7. Check engine compression. a. Insufficient engine compression. *Replace defective part(s) (ex.: piston(s), ring(s), etc.).*

SYMPTOM	**IRREGULAR ENGINE IDLE.**
CONDITION	NORMAL USE AFTER ENGINE WARM UP.
Test/Inspection	**1. Check primer.** a. Fuel leaks at primer nipple which is mounted to carburetor. *Replace.*
	2. Check choke. a. Choke plunger may be partially opened. *Readjust.*
	3. Check carburetor adapter. a. Air enters through a crack. *Replace.*
	4. Check air screw position. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check ignition system trigger coil air gap. a. Air gap is too large. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	6. Check dimension of pilot jet. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	7. Check reed valve. a. Improper tightness and/or opening. *Replace or adjust. Refer to proper engine subsection.*
	8. Perform engine leak test. a. Leaking gaskets allow air to enter in engine. *Replace defective parts.*

SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check temperature gauge sensor.** a. False reading. *Check terminal connections. If problem still persists, replace sensor.*
	2. Check fan belt. a. Belt slides because it is too loose. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	3. Verify antifreeze level and check if there is air infiltration in the system or if there are leaks in gasket areas. a. Low antifreeze level or air in system. *Add antifreeze until recommended level is reached, bleed system and/or tighten clamps at fitting.*
	4. Check if antifreeze flows through system properly. a. Foreign particles and/or broken coolant pump impeller. *Clean cooling system and/or replace coolant pump impeller.*
	5. Check thermostat. a. Thermostat reacts slowly or not at all. *Replace.*
	6. Check antifreeze concentration. a. Antifreeze concentration is too high. *Adjust concentration according to Bombardier's recommendations.*
	7. Check tank cap. a. Cap does not hold pressure. *Replace.*
	8. Check carburetion. a. Improperly adjusted or inadequate carburetor components. *Adjust according to specifications (refer to TECHNICAL DATA 10) or replace inadequate component(s).*
	9. Check cylinder head gaskets. a. Worn gaskets. *Replace.*
	10. Check ignition timing. a. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	11. Check if there are leaks at air intake silencer and/or engine crankcase. a. Leak(s). *Repair or replace.*
	12. Check condition and heat range of spark plugs. a. Melted spark plug tip or inadequate heat range. *Replace.*

SYMPTOM	ENGINE EQUIPPED WITH RAVE VALVE DOES NOT REACH ITS FULL OPERATING RPM (500 TO 1000 RPM SLOWER).
CONDITION	NORMAL USE.
Test/Inspection	**1. Check RAVE valve pistons.** a. Valve piston(s) is (are) too far out. *Screw valve piston(s) to bottom.*
	2. Check RAVE valve stems. a. Bent RAVE valve stem(s). *Replace.*
	3. Check RAVE valves. a. Jammed valve(s). *Clean.*
	4. Check tension of RAVE springs. a. Inadequate spring tension. *Replace.*
	5. Check RAVE pressure holes. a. Clogged holes. *Clean.*
	6. Check clamps or sleeves. a. Damaged clamp(s) or sleeve(s). *Replace.*
	7. Check exhaust tightness. a. Exhaust system is leaking leading to a too low back pressure. *Replaces parts and reseal.*

SYMPTOM	ENGINE EQUIPPED WITH RAVE. ENGINE HESITATES AT MID-SPEED AND REACHES MAXIMUM PERFORMANCE ONLY AFTER A WHILE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check RAVE valve spring(s).** a. Spring tension is too weak or spring(s) is (are) broken. *Replace.*
	2. Check RAVE valve cover red adjustment screws. a. Adjustment screw(s) is (are) too loose. *Adjust according to ASSEMBLY PROCEDURE in appropriate engine subsections.*
	3. Check RAVE valve movement (RAVE movement indicator P/N 861 7258 00). a. Valve(s) is (are) stuck in open position. *Clean.*

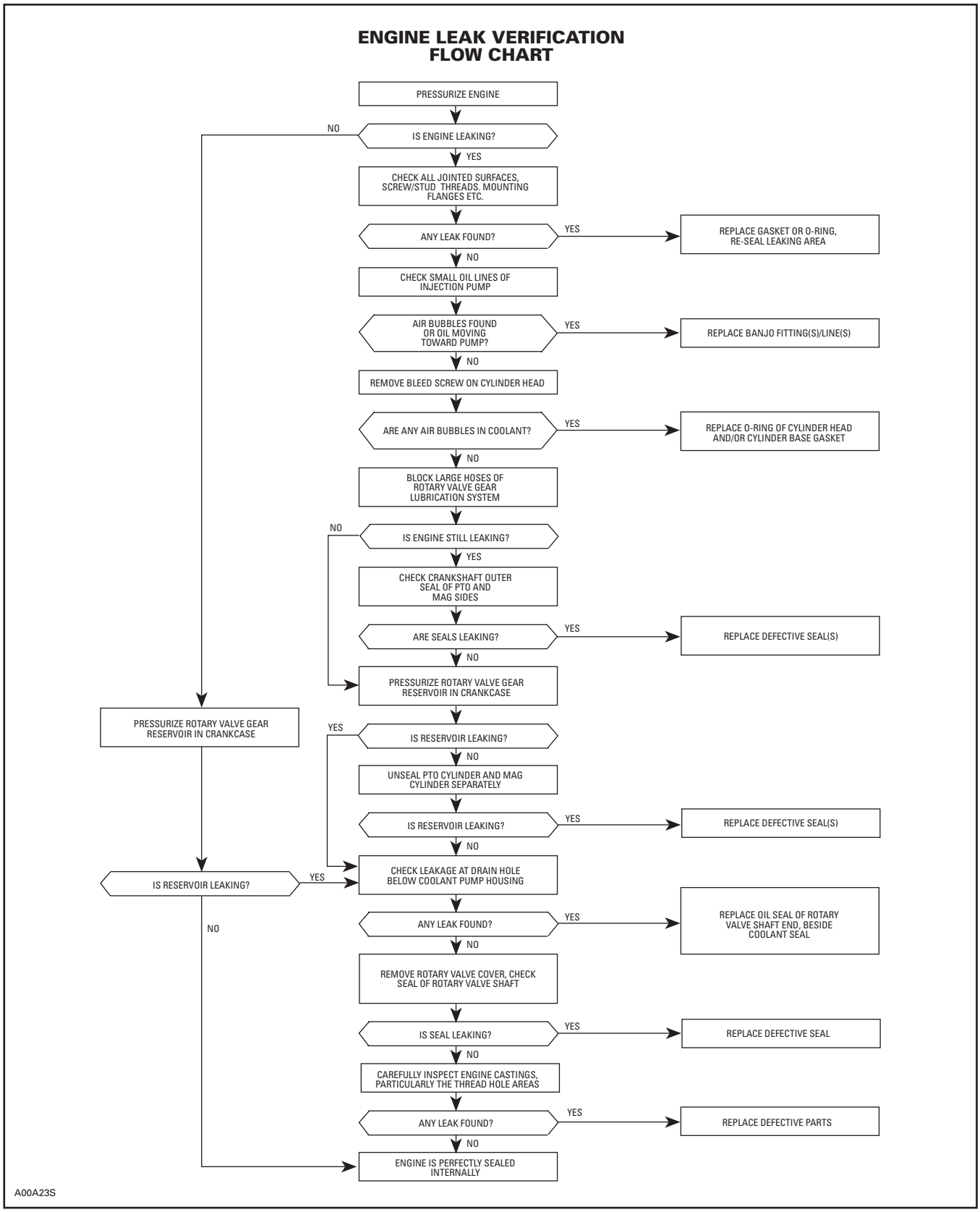
SYMPTOM	REWIND STARTER ROPE DOES NOT REWIND.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check rewind spring.** a. Broken spring. *Replace spring.*

SYMPTOM	REWIND STARTER PAWL DOES NOT ENGAGE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check stopper spring.** a. Broken stopper spring. *Replace.*
	2. Check pawl and pawl lock. a. Pawl and pawl lock have stuck together because of heat. *Replace.*
	3. Check pawl and rope sheave. a. Pawl and rope sheave have stuck together because of heat. *Replace.*

SYMPTOM	ENGINE PINGING.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel lines.** a. Bent fuel lines (preventing fuel from flowing through). *Relocate or replace fuel lines.*
	2. Check if carburetor(s) is (are) clean. a. Dirt prevents fuel from flowing through. *Clean.*
	3. Check ignition timing. a. Timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	4. Check compression ratio. a. Compression ratio is too high. *Replace inadequate part(s) to obtain manufacturer's recommended compression ratio or use a higher grade fuel.*

SYMPTOM	ENGINE GENERATES A LOT OF VIBRATIONS.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check engine supports and stopper.** a. Loose and/or broken supports or interference between support(s) and chassis. *Retighten to specification (refer to TECHNICAL DATA 10) or replace.*
	2. Check drive pulley (refer to: vibrations coming from drive pulley).
	3. Check carburetor synchronization. a. Throttle slide heights are adjusted differently and/or throttle slide openings are unsynchronized. *Adjust throttle slide heights and throttle cable.*

ENGINE LEAK VERIFICATION FLOW CHART



FUEL AND OIL SYSTEMS

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**HIGH FUEL CONSUMPTION OR RICH MIXTURE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel tank.** a. Perforated fuel tank. *Replace fuel tank.*
	2. Check fuel pump reservoir and carburetor fittings. a. Leaking fittings. *Replace defective part.*
	3. Check primer. a. Fuel flows through primer while engine runs. *Replace primer.*
	4. Check float height in carburetor(s). a. Fuel level is too high in float bowl(s). *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check needle valve. a. Foreign particles prevent needle valve(s) from closing and/or worn seating area. *Clean or replace needle valve(s), then clean seating area.*

SYMPTOM	**FUEL LEAKS IN ENGINE BASE WHEN ENGINE IS STOPPED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check items 3, 4 and 5 of HIGH FUEL CONSUMPTION.**
	2. Check fuel pump diaphragm. a. Cracked diaphragm. *Replace.*

SYMPTOM	ENGINE LACKS POWER OR STALLS AT HIGH RPM.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel tank vent hose.** a. Kinked or clogged hose. *Relocate or replace.*
	2. Check fuel filter. a. Clogged filter. *Replace.*
	3. Check fuel lines. a. Kinked or clogged lines. *Relocate or replace.*
	4. Check fuel pump flow. a. Dried diaphragm. *Replace.*
	5. Check if carburetor(s) is (are) clean. a. Varnish. *Clean.*

SYMPTOM	HIGH INJECTION OIL CONSUMPTION.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check oil injection pump adjustment.** a. Oil injection pump adjusted too rich. *Adjust.*
	2. Check injection pump identification. a. Wrong pump installed. *Replace with the appropriate pump. Refer to OIL INJECTION SYSTEM 04-05.* **3. Check injection oil lines and their fitting.** a. Leaking lines and/or cover. *Replace defective part(s).*
	4. Check injection pump cover gasket. a. Worn gasket. *Replace.*
	5. Pressurize crankcase rotary valve gear reservoir. a. Leaking gasket(s). *Replace gasket(s).*

SYMPTOM	**ENGINE RUNS OUT OF FUEL (OR LEAN MIXTURE).**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if lines are perforated or kinked and make sure they do not leak at fittings.** a. Lines are too big for their fittings or are improperly routed. *Replace or properly relocate lines.*
	2. Check fuel pump outlet flow. a. Dirt clogging fuel pump lines or torn membrane. *Clean or replace fuel pump.*
	3. Check carburetor needle valve(s). a. Dirt (varnish, foreign particle) clogging fuel line inlets. *Clean.*
	4. Check main jet. a. Dirt (varnish, foreign particle) accumulation at main jet. *Clean.*
	5. Check float height in carburetor bowl(s). a. Running out of fuel at high speed because float height is too low. *Adjust float lever height according to specifications.*

TRANSMISSION AND BRAKE SYSTEMS

The following charts are provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

TRANSMISSION

SYMPTOM	THE SNOWMOBILE ACCELERATES SLOWLY, ESPECIALLY WHEN IT IS STOPPED.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive belt condition.** a. Belt is too narrow (drive belt engagement is higher in drive pulley). *Replace belt if width is 3 mm (1/8") less than a new one (refer to TECHNICAL DATA 10).*
	2. Check distance between pulleys and/or drive belt deflection. a. Distance is too small between pulleys or deflection is too high (drive belt engagement is higher in drive pulley). *Adjust distance between pulleys and/or drive belt deflection according to specifications (refer to TECHNICAL DATA 10).*
	3. Check driven pulley sliding half play. a. Jammed sliding half. *Replace.*
	4. Check spring tension of driven pulley sliding half. a. Sliding half rotation is accelerated when spring tension is too weak. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Refer to VIBRATIONS ORIGINATING FROM DRIVEN PULLEY and check items listed.
	6. Check drive pulley spring tension. a. Spring tension is too weak. *Replace.*

SYMPTOM	ENGINE MAXIMUM RPM IS TOO HIGH AND TOP SPEED IS NOT REACHED.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check items 1, 2 and 3 of THE SNOWMOBILE ACCELERATES SLOWLY, ESPECIALLY WHEN IT IS STOPPED.**
	2. Check driven pulley spring tension. a. Spring tension is too stiff. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	3. Check position of the calibration screws. (TRA drive pulley) a. Selected numbers are too high. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	4. Refer to VIBRATIONS ORIGINATING FROM DRIVEN PULLEY and check items listed.

SYMPTOM	LOOSENESS IS FELT IN DRIVE SYSTEM WHEN ACCELERATING/DECELERATING.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive chain tension.** a. Drive chain is too loose. *Adjust.*
	2. Check play of driven pulley splines. a. Worn splines. *Replace.*

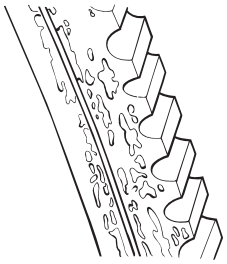
SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVE PULLEY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive belt.** a. Belt width is uneven at many places. *Replace (refer to TECHNICAL DATA 10 for the part number).*
	2. Check tightening torque of drive pulley screw. a. Moving governor cup. *Retighten screw.*
	3. Spring cover screws. a. Spring cover moves and restrains sliding half movement. *Retighten screws.*
	4. Check spring cover (TRA TYPE) and/or outer half bushings. a. Excessive gap between bushings and inner half shaft, thus restraining sliding half movements. *Replace bushing(s).*
	5. Check sliding half slider shoes. a. Worn slider shoes. *Replace.*

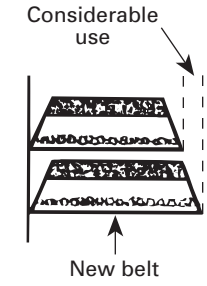
SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVEN PULLEY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check sliding half play.** a. Sliding half runout. *Replace sliding half bushing.*
	2. Check sliding half and fixed half straightness. a. Sliding half/fixed half runout. *Replace.*
	3. Check cam slider shoes. a. One or two slider shoes out of three are broken. *Replace.*

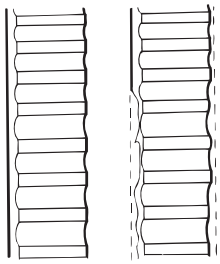
SYMPTOM	**PULLEYS DO NOT DOWN SHIFT PROPERLY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check driven pulley spring tension.** a. Spring tension is too weak. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Refer to VIBRATIONS COMING FROM DRIVEN PULLEY and check items listed.
	3. Check drive pulley bushings (cleanliness, wear, etc.). a. Bushings stick to fixed half pulley shaft. *Clean or replace.*
	4. Check driven pulley spring tension. a. Spring tension is too weak. *Replace.*

SYMPTOM	**IT IS DIFFICULT TO ENGAGE TRANSMISSION IN FORWARD OR REVERSE GEAR.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check position of gear shift lever adjustment screw.** a. Improper adjustment. *Adjust according to specifications (refer to TRANSMISSION 05).*

SYMPTOM	**UNEVEN BELT WEAR ON ONE SIDE ONLY.**
CONDITION	NORMAL USE.
Test/Inspection  A00D09Y	**1. Check tightening torque of engine mount bolts.** a. Loose engine mount. *Tighten engine mount nuts/bolts equally.*
	2. Check pulley alignment. a. Pulley misalignment. *Align pulleys.*
	3. Check drive belt contact area on pulleys. a. Rough or scratched pulley surfaces. *Repair or replace pulley half.*
	4. Check driven pulley sliding half play. a. Driven pulley bushing worn. *Replace bushing.*

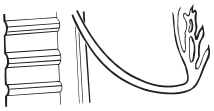
SYMPTOM	BELT GLAZED EXCESSIVELY OR HAVING BAKED APPEARANCE.
CONDITION	NORMAL USE.
Test/Inspection  A00D0AY	**1. Check if drive pulley bushings are worn.** a. Insufficient pressure on belt sides. *Replace bushing.* **2. Check condition of drive pulley fixed half shaft.** a. Rusted drive or driven pulley shafts. *Clean shaft with fine steel wool.* **3. Check if pulley halves are clean.** a. Oil on pulley surfaces. *Clean pulley halves.* **4. Check pulley calibration.** a. Improper pulley calibration. *Calibrate according to specifications.*

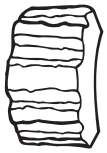
SYMPTOM	BELT WORN EXCESSIVELY IN TOP WIDTH.
CONDITION	NORMAL USE.
Test/Inspection  A00D0BY	**1. Check drive pulley.** a. Excessive slippage due to irregular outward actuation movement of drive pulley. *Carry out drive pulley inspection.* **2. Check drive belt identification number.** a. Improper belt angle. (wrong type of belt). *Replace belt with an appropriate drive belt.* **3. Check drive belt width.** a. Considerable use. *Replace belt if 3 mm (1/8") less than recommended width (see TECHNICAL DATA 10).*

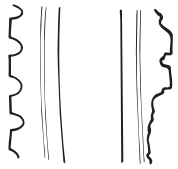
SYMPTOM	BELT WORN NARROW IN ONE SECTION.
CONDITION	NORMAL USE.
Test/Inspection  A00D0CY	**1. Check if parking brake is released.** a. Parking brake is engaged. *Release parking brake.*
	2. Check track tension/alignment. a. Frozen or too tight track. *Liberate track from ice or check track tension and alignment.*
	3. Check drive pulley. a. Drive pulley not functioning properly. *Repair or replace drive pulley.*
	4. Check idle speed. a. Engine idle speed too high. *Adjust according to specifications.*
	5. Check drive belt length. a. Incorrect belt length. *Replace belt with an appropriate drive belt (refer to TECHNICAL DATA 10).*
	6. Check distance between pulleys. a. Incorrect pulley distance. *Readjust according to specifications.*
	7. Check belt deflection. a. Deflection is too small. *Adjust according to specifications.*

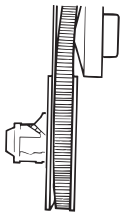
SYMPTOM	BELT SIDES WORN CONCAVE.
CONDITION	NORMAL USE.
Test/Inspection  A00D0DY	**1. Check pulley half surfaces.** a. Rough or scratched pulley half surfaces. *Repair or replace.*
	2. Check drive belt identification number. a. Unspecified type of belt. *Replace belt with an appropriate drive belt (refer to TECHNICAL DATA 10).*

SYMPTOM	**BELT DISINTEGRATION.**
CONDITION	NORMAL USE.
Test/Inspection  A00DOEY	**1. Check drive belt identification number.** a. Excessive belt speed. *Using unspecified type of belt. Replace belt with proper type of belt (refer to TECHNICAL DATA 10).* **2. Check if pulley halves are clean.** a. Oil on pulley surfaces. *Clean pulley surfaces with fine emery cloth and wipe clean using Loctite Safety Solvent (P/N 413 708 200) and a cloth.*

SYMPTOM	**BELT EDGE CORD BREAKAGE.**
CONDITION	NORMAL USE.
Test/Inspection  A00DOFY	**1. Check pulley alignment.** a. Pulley misalignment. *Align pulley according to specifications (refer to TECHNICAL DATA 10).*

SYMPTOM	**FLEX CRACKS BETWEEN COGS.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0GY	**1. Check drive belt condition.** a. Considerable use, belt wearing out. *Replace.*

SYMPTOM	**SHEARED COGS, COMPRESSION SECTION FRACTURED OR TORN.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0HY	**1. Check drive belt rotational direction.** a. Improper belt installation. *Replace.* **2. Check if drive belt rubs against components.** a. Belt rubbing on stationary object. *Relocate components.* **3. Check drive pulley.** a. Violent engagement of drive pulley. *Check drive pulley engagement speed, drive pulley bushings and components.*

SYMPTOM	**BELT "FLIP-OVER" AT HIGH SPEED.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0IY	**1. Check pulley alignment.** a. Pulley misalignment. *Align pulley according to specifications (refer to TECHNICAL DATA 10).* **2. Check drive belt identification number.** a. Using unspecified type of belt. *Replace belt with an appropriate drive belt.*

BRAKE SYSTEM

HYDRAULIC BRAKE

SYMPTOM	**SPONGY BRAKE CONDITION.**
CONDITION	NORMAL USE.
Test/Inspection	*Replace brake fluid and bleed system. If problem still occurs, replace master cylinder.*

SYMPTOM	**BRAKE FLUID LEAKING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check for loosen hose connectors.** *Replace copper washers and retighten.* **2. Check for damaged hose, master cylinder and caliper.** *Replace part(s) and check for proper mounting.*

SYMPTOM	**BRAKE SYSTEM IS NOISY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check brake pad thickness.** a. Pads are worn up to wear warner. *Replace.*

ELECTRICAL SYSTEM

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**STARTER DOES NOT TURN.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuse.** a. Burnt fuse. *Check wiring condition and replace fuse.*
	2. Check continuity of starter switch contact points. a. Poor contact of starter switch contact points. *Repair or replace switch.*
	3. Check continuity between starter switch and solenoid. a. Open circuit between starter switch and solenoid switch. *Repair.*

SYMPTOM	**STARTER TURNS; BUT DOES NOT CRANK THE ENGINE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check battery capacity.** a. Shorted battery cell(s). *Replace.*
	2. Check battery charge. a. Weak battery. *Recharge battery and verify recharge system and wires.*
	3. Check wire connection. a. Inadequate connection (too much resistance). *Clean and reconnect.*
	4. Check solenoid switch contact disc. a. Burnt or poor contact of solenoid switch contact disc. *Replace solenoid switch.*
	5. Check continuity of solenoid switch pull-in winding. a. Open circuit of solenoid switch pull-in winding. *Replace solenoid switch.*
	6. Check brushes. a. Poor contact of brushes. *Replace brushes.*
	7. Check commutator. a. Burnt commutator. *Turn commutator on a lathe. Respect outer diameter wear limit.* *Refer to ELECTRIC STARTER 06-05.*

	8. Check height of commutator mica. a. Commutator mica too high. *Undercut mica.*
	9. Check field coil resistance. a. Shorted field coil. *Repair or replace yoke.*
	10. Check armature resistance. a. Shorted armature. *Repair or replace armature.*
	11. Check tension of brush springs. a. Weak brush spring tension. *Replace springs.*
	12. Check yoke assembly magnets. a. Weak magnets. *Replace yoke assembly.*
	13. Check if bushings are worn. a. Worn bushings. *Replace bushings.*

SYMPTOM	**STARTER TURNS, BUT OVERRUNNING CLUTCH PINION DOES NOT MESH WITH RING GEAR.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check clutch pinion gear.** a. Worn clutch pinion gear. *Replace clutch.*
	2. Check clutch. a. Defective clutch. *Replace clutch.*
	3. Check movement of clutch on splines. a. Poor movement of clutch on splines. *Clean and correct.*
	4. Check clutch bushing. a. Worn clutch bushing. *Replace clutch.*
	5. Check starter bushings. a. Worn starter bushing(s). *Replace bushing(s).*
	6. Check ring gear. a. Worn ring gear. *Replace ring gear.*

SYMPTOM	**ELECTRIC STARTER KEEPS TURNING WHEN ENGINE IS STARTED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check clutch.** a. Jammed clutch pinion gear. *Replace or clean.*
	2. Check movement of clutch on splines. a. Clutch is stuck on splines. *Clean.*
	3. Check starter brackets. a. Broken bracket(s). *Replace bracket(s).*
	4. Check ignition switch. a. Ignition switch does not return to its ON position or is short-circuited. *Adjust retaining screw or replace switch.*
	5. Check solenoid. a. Shorted solenoid switch winding(s). *Replace solenoid switch.*
	6. Check solenoid switch contacts. a. Melted solenoid switch contacts. *Replace solenoid switch.*
	7. Check starter switch. a. Starter switch returns poorly. *Replace ignition switch.*

SYMPTOM	**NOISE OCCURENCE WHEN STARTING ENGINE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if ring gear is well-mounted to drive pulley inner half.** a. Loose and/or broken bolts. *Retighten bolts using thread locker or replace ring gear and drive pulley inner half.*

SYMPTOM	**REGULATOR BLACK WIRE IS MELTED (HARNESS SIDE).**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check that big ground wire at battery is well connected to chassis.** a. Corroded and/or loose connection(s). *Clean and/or retighten.*

SYMPTOM	OPTIONAL ELECTRIC STARTER DOES NOT WORK WHEN TURNING IGNITION SWITCH.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check connection of BLACK wire (solenoid ground) in 3-wire housing coming from magneto (white housing).** a. Corroded and/or loose connection(s). *Clean and/or retighten.*

SYMPTOM	ELECTRIC STARTER SOMETIMES DOES NOT WORK WHEN TURNING IGNITION SWITCH.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check battery cables and starter wires.** a. Corroded and/or loose connection(s). *Clean and/or retighten.*
	2. Check fuse. a. Oxidized or burnt fuse. *Clean or replace.*
	3. Check wiring harness connections. a. Oxidized connections. *Clean or replace defective terminals.*
	4. Check ignition switch. a. Defective contacts in ignition switch. *Replace.*
	5. Check solenoid of electric starter. a. Shorted solenoid wiring harness or eroded contact washer. *Replace.*

SYMPTOM	**ENGINE DOES NOT START — NO SPARK AT SPARK PLUG.**
CONDITION	AT ENGINE CRANKING.
Test/Inspection	**1. Verify spark plug condition.** a. Defective, improperly set, worn-out, fouled. *Identify source of problem and correct. Replace spark plugs.*
	2. Verify spark plug cap resistance with an ohmmeter. a. Defective part. *Replace cap.*
	3. Verify if problem originated from electrical system wiring harness and/or accessories and/or ignition cut-out switches by unplugging the 3-wire connectors between the magneto/generator and the vehicle wiring harness. Check condition of connectors. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. Defective switch(es). Corroded connector terminals. *Replace or repair damaged wires. Reroute where necessary. Replace defective switch(es). Clean terminals and apply silicone dielectric grease.*
	4. Verify trigger coil resistance with an ohmmeter and connector condition. a. Defective coil. Corroded connector terminals. *Replace defective coil. Clean terminals and apply silicone dielectric grease.*
	5. Verify condition of ignition coil. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace ignition coil.*
	6. Verify condition of ignition generator coils. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace coils.*
	7. Verify MPEM. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace MPEM, retest and verify ignition timing.*

SYMPTOM	**CDI MODULE DOES NOT WORK.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check that high tension coil wires do not touch any metal parts.** a. Short circuit. *Isolate and reroute wires.*

SYMPTOM	**ENGINE STALLS.**
CONDITION	AT LOW SPEED.
Test/Inspection	**1. Verify items 4, 5 and 6 above.**

SYMPTOM	**IRREGULAR ENGINE SPEED.**
CONDITION	AT HIGH SPEED.
Test/Inspection	**1. Verify items 4, 5 and 6 above.**
CONDITION	AT LOW SPEED.
Test/Inspection	**1. Verify items 4 and 5 above and trigger coil/flywheel protrusion air gap.** a. Air gap too large. *Readjust air gap.*

SYMPTOM	**ENGINE IS MISFIRING — ERRATIC SPARK AT SPARK PLUG.**
CONDITION	RIDING ON WET SNOW.
Test/Inspection	**1. Verify if spark plug wires and/or spark plug cap seals are sealing out moisture.** a. Defective wires and/or seals. *Replace defective part.*
	2. Verify if ignition system wiring harness connectors are in good condition and/or are sealing out moisture. a. Loose connectors, corroded terminals or defective parts. *Clean terminals and apply silicone dielectric grease. Replace defective parts.*
CONDITION	NORMAL USE.
Test/Inspection	**1. Verify misfiring by observing flash of stroboscopic timing light; unplug connectors between magneto/generator and vehicle wiring harness to isolate problem. Check condition of connectors.** a. Defective spark plug(s) and/or cable(s)/cap(s). Defective electrical system wiring harness and/or accessories and/ignition cut-out switches. Condition of connector terminals. *Replace defective parts and/or repair damaged wires. Replace defective switch(es). Clean terminals and apply silicone dielectric grease.*
CONDITION	RIDING IN DEEP AND THICK SNOW.
Test/Inspection	**1. Perform all verifications outlined under ENGINE DOES NOT START — NO SPARK AT SPARK PLUG.**
	2. Verify spark plugs. Proceed with spark plug analysis in order to identify source of problem. a. Defective and/or worn spark plug(s) and/or cable(s) and/or cap(s). *Replace defective part(s). Proceed with ignition system testing procedures. Perform engine analysis.*

SYMPTOM	**FOULED (BLACK) SPARK PLUG TIP.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check carburetor(s).** a. Carburetion is too rich. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Check injection oil consumption. a. Injection pump flow is too high. *Adjust according to specifications or replace.*
	3. Check oil quality. a. Poor oil quality that creates deposits. *Use BOMBARDIER-ROTAX injection oil.*
	4. Check engine compression. a. Leaking piston ring(s). *Replace.*

SYMPTOM	**SPARK PLUG TIP(S) IS (ARE) LIGHT GREY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Refer to ENGINE SLOWS DOWN OR STOPS AT HIGH RPM and check items listed.**
	2. Check spark plug heat range. a. Spark plug heat range is too high. *Replace by Bombardier's recommended spark plug (refer to TECHNICAL DATA 10).*
	3. Check if air intake silencer leaks. a. Air surplus coming from opening(s) located between halves. *Seal.*
	4. Check carburetor adapter collars. a. Loose collar(s). *Tighten.*
	5. Check carburetor adapter(s). a. Cracked or deformed adapter(s). *Replace.*

SYMPTOM	**RER (ROTAX ELECTRONIC REVERSE) DOES NOT WORK.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check idle speed.** a. Wrong idle speed. *Adjust according to specification (refer to TECHNICAL DATA 10).*
	2. Check spark plug. a. Faulty spark plug. *Replace.*
	3. Check drive belt deflection. a. Wrong deflection. *Adjust according to specification (refer to TECHNICAL DATA 10).*
	4. Check carburetor synchronization and air screw adjustment. a. Wrong adjustment. *Adjust according to specification (refer to TECHNICAL DATA 10) and read carburetor subsection.*
	5. Check electrical connections. a. Bad electrical connections or damaged wires. *Clean or replace.*
	6. Check MPEM. a. Faulty MPEM. *Replace.*

SYMPTOM	**HEADLAMP NOT LIGHTING.**
CONDITION	WHITE BULB.
Test/Inspection	**1. Check bulb.** a. Gas leak. *Replace bulb.*
CONDITION	BROKEN ELEMENT.
Test/Inspection	**1. Check for loose headlamp housing and bulb socket.** a. Vibration problem. *Tighten headlamp mounting screws. Lock bulb in socket. Replace bulb.*
CONDITION	MELTED FILAMENT (ENDS OF ELEMENT HOLDER) AND BLACK BULB.
Test/Inspection	**1. Check voltage at headlamp at different speeds. It must not be above 15 Vac.** NOTE: If quartz halogen bulb is involved, ensure that proper voltage regulator is installed. a. Excessive voltage in lighting circuit. *Replace voltage regulator and ensure proper grounding. Retest.*

SYMPTOM	**HEADLAMP DIMING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check voltage at headlamp at different speeds. It must not be below 11 Vac.** a. Insufficient voltage in lighting circuit. *Replace voltage regulator and retest.*
	2. Visually inspect wiring harness for damaged and/or melted wires and/or bad wire terminal crimping and/or connections. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. *Repair/replace damaged wires and/or terminals. Reroute harness where necessary.*
	3. On manual start models: Verify regulator ground. a. Rusted or loose retaining screws. *Clean, apply lithium grease (LMZ1) and firmly tighten screws.*
	4. Verify if there is an interconnection between AC and DC current. *b.* Faulty installation of optional equipment. *Find optional equipment connected directly to DC ground (BK wire or chassis) or to any DC hot wire (RD, RD/BL). Disconnect and reconnect to AC current (YL and YL/BK wires).*
	5. Verify if optional electric accessories are overloading the magneto/generator. a. Excessive electrical load to magneto/generator. *Reduce the electrical load by removing excess accessories. Reconnect as recommended by manufacturer.*
	6. Hot Grips brand: Verify if they were connected in parallel by mistake. a. Excessive electrical load to magneto/generator. *Reconnect as recommended by manufacturer.*
	7. Bombardier heating grips: Verify if the return wires of the elements were grounded to the chassis by mistake. a. Faulty installation of optional equipment. *Reconnect as recommended by manufacturer.*
	8. Verify if heating grips installation overloads the magneto/generator capacity. a. Excessive electrical load to magneto/generator. *Reduce the electrical load by removing accessories.*

SYMPTOM	FALSE FUEL AND/OR TEMPERATURE GAUGE READINGS.
CONDITION	NORMAL USE.
Test/Inspection	**1. Verify if gauge was connected on DC current by mistake (in case of optional installation).** a. Faulty installation of optional equipment. *Find optional wires connected directly to DC ground (BK wire to chassis) or to any DC hot wire (RD, RD/BL). Disconnect and reconnect to AC current (YL and YL/BK wires).*
	2. Verify sender unit for free movement and/or correct arm position. a. Defective or damaged part. *Correct or replace sender unit.*
	3. Verify sender unit/gauge wiring harness condition. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. *Replace or repair damaged wires. Reroute where necessary.*

SYMPTOM	WITH ENGINE IDLING NO ELECTRICAL ACCESSORIES WORK.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check idle speed.** a. Too low idle speed. *Readjust to specifications.*
	2. Verify regulator. a. Faulty regulator. *Replace.*

SYMPTOM	BRAKE LIGHT REMAINS ON.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if bulb is properly installed.** a. Bulb is not installed correctly (contact elements are reversed). *Install bulb correctly.*
	2. Check brake switch. a. Switch contact remains closed. *Replace brake switch.*

SYMPTOM	**REAR LIGHT BULB FLASHES.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check bulb tightness in housing.** a. Looseness at bulb contact elements. *Install bulb correctly.*
	2. Check if rear light is properly connected. a. Connector housing is partially connected. *Install connector housing properly.*
	3. Check continuity of wires. a. Corroded terminals and/or broken wires. *Replace terminal(s) or crimp defective wires.*

SYMPTOM	**TACHOMETER DOES NOT WORK.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check continuity of wires.** a. Corroded terminals and/or broken wires. *Replace terminal(s) or crimp defective wires.*
	2. Check tachometer part number. a. Models with 360 W magneto have a different tachometer. *Replace with appropriate one.*

SYMPTOM	**HIGH BEAM PILOT LAMP LIGHTS UP WHEN LOW BEAM IS SELECTED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check proper connections.** a. YELLOW wire connected to pilot lamp. Mixed-up connections with heating element pilot lamps. *Reconnect a YELLOW/BLACK wire to pilot lamp. YELLOW wires are connected to heating element pilot lamps.*

SUSPENSION AND TRACK

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	**REAR SUSPENSION BOTTOMS OUT.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check rear spring preload or rear arm spring preload.** a. Spring tension is too low. *Increase rear arm spring preload.*

SYMPTOM	**SLIDER SHOES WEAR OUT PREMATURELY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Pressure is too great on slider shoes. *Adjust according to specifications (refer to TECHNICAL DATA 10).* *Replace defective parts.*

SYMPTOM	**TRACK CLEATS BECOME BLUE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Pressure is too great on cleats. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Check slider shoes and/or suspension retaining screws. a. Worn slider shoes or lost retaining screws. *Replace defective parts and/or tighten loose screws.*

SYMPTOM	NOISE OR VIBRATIONS ORIGINATING FROM THE TRACK.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check slide suspension retaining bolts.** a. Missing bolt(s) allowing movement of certain components which in turn interfere with track rotation. *Replace missing bolt(s).*
	2. Check condition of idler wheel(s). a. Idler wheel rubber is damaged. *Replace.*
	3. Check guide cleats. a. Top portion of guide cleat(s) is bent. *Replace.*
	4. Check sprockets. a. One or various teeth of drive shaft sprockets are broken. *Replace sprocket(s).*
	5. Check track rods and/or internal traction teeth. a. One or various track rods and/or teeth are broken. *Replace track.*

SYMPTOM	DERAILING TRACK.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Track is too loose. *Adjust.*
	2. Check if track and slider shoes are properly aligned. a. Improper alignment. *Adjust.*

SYMPTOM	REAR SUSPENSION IS LOW OR TOO STIFF.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Track is too tight. *Adjust.*
	2. Check if axles are properly lubricated. a. Improper lubrication and/or contaminated grease (sticky oil sludge). *Clean and/or lubricate.*
	3. Check rear spring preload. a. Insufficient preload. *Increase preload using adjustment cams.*

SYMPTOM	WHEN HANDLEBAR IS TURNED, SNOWMOBILE UNDERSTEERS.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ski runner condition.** a. Worn ski runners. *Replace.*
	2. Check tension of front spring adjustment cams. a. Insufficient ski pressure on the ground. *Increase spring preload.*
	3. Check if front arm stopper strap is too long. a. Insufficient ski pressure on the ground. *Shorten stopper strap.*
	4. Check front arm spring tension. a. Insufficient ski pressure on the ground. *Loosen spring tension.*

SYMPTOM	HANDLEBAR IS DIFFICULT TO TURN.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check position of front spring adjustment cams.** a. More pressure on the ground when cam increases spring preload. *Reduce front spring preload.*
	2. Check position of stopper strap. a. More weight when stopper strap is short. *Lengthen front arm stopper strap.*
	3. Check position of front arm shock adjustment cam(s). a. When spring tension is weak, more weight is transferred to the skis. *Increase spring preload.*
	4. Check condition of ball joints. a. Corrosion restrains movement. *Lubricate or replace.*
	5. Check swing arm camber (liquid cooled models). a. Too much ski leg inclination. *Adjust camber to specifications.*

SYMPTOM	**THE SNOWMOBILE IS UNSTABLE (IT MOVES FROM LEFT TO RIGHT AND VICE VERSA).**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ski runner condition.** a. Worn or bent ski runners. *Replace ski runners.*
	2. Check ski alignment. a. Improper ski alignment. *Align skis in order to obtain proper toe-out (opening) (to adjust, refer to STEERING SYSTEM 08).*
	3. Check if bushings are too loose in steering system. a. Bushings are too loose. *Replace.*

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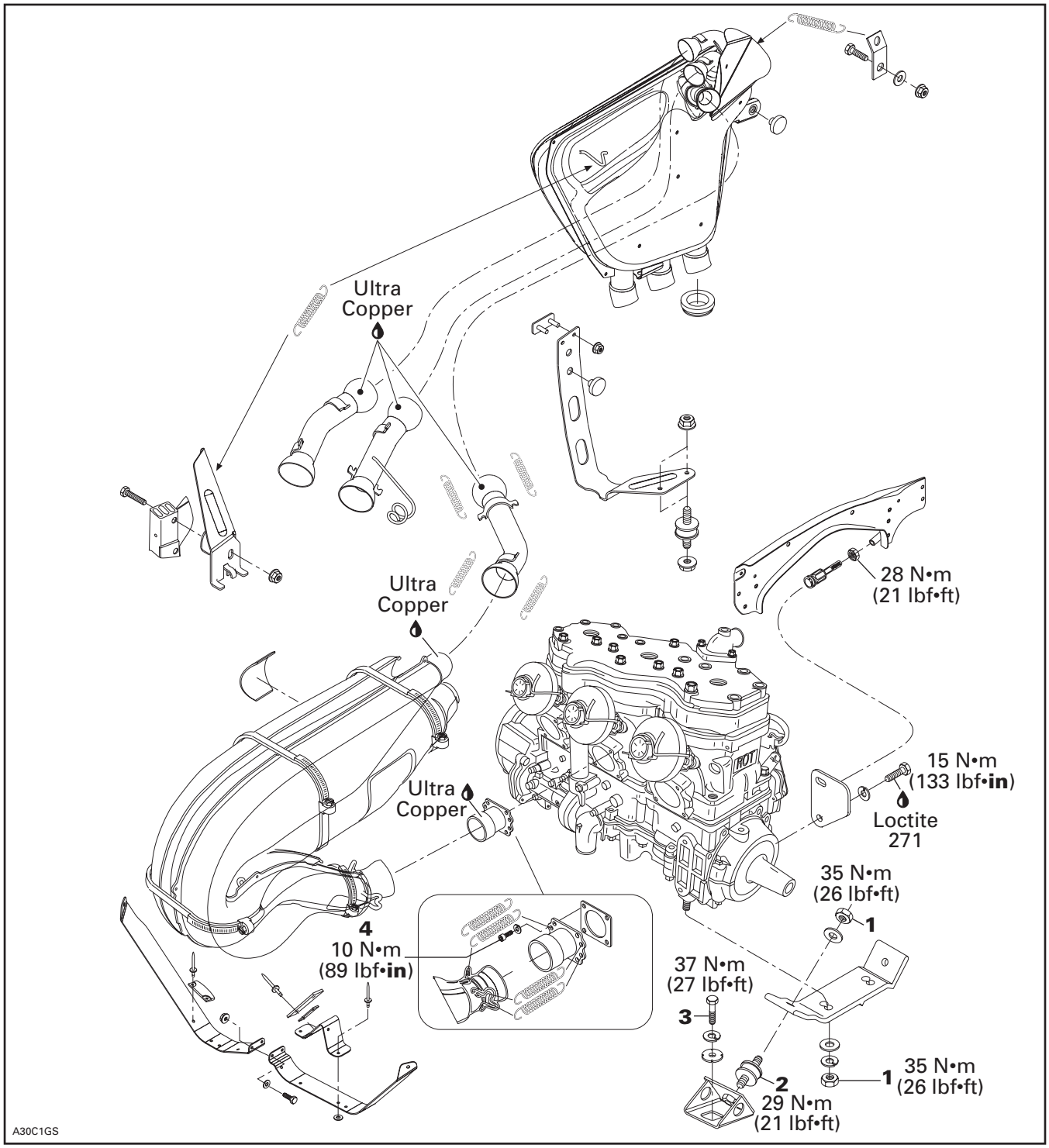
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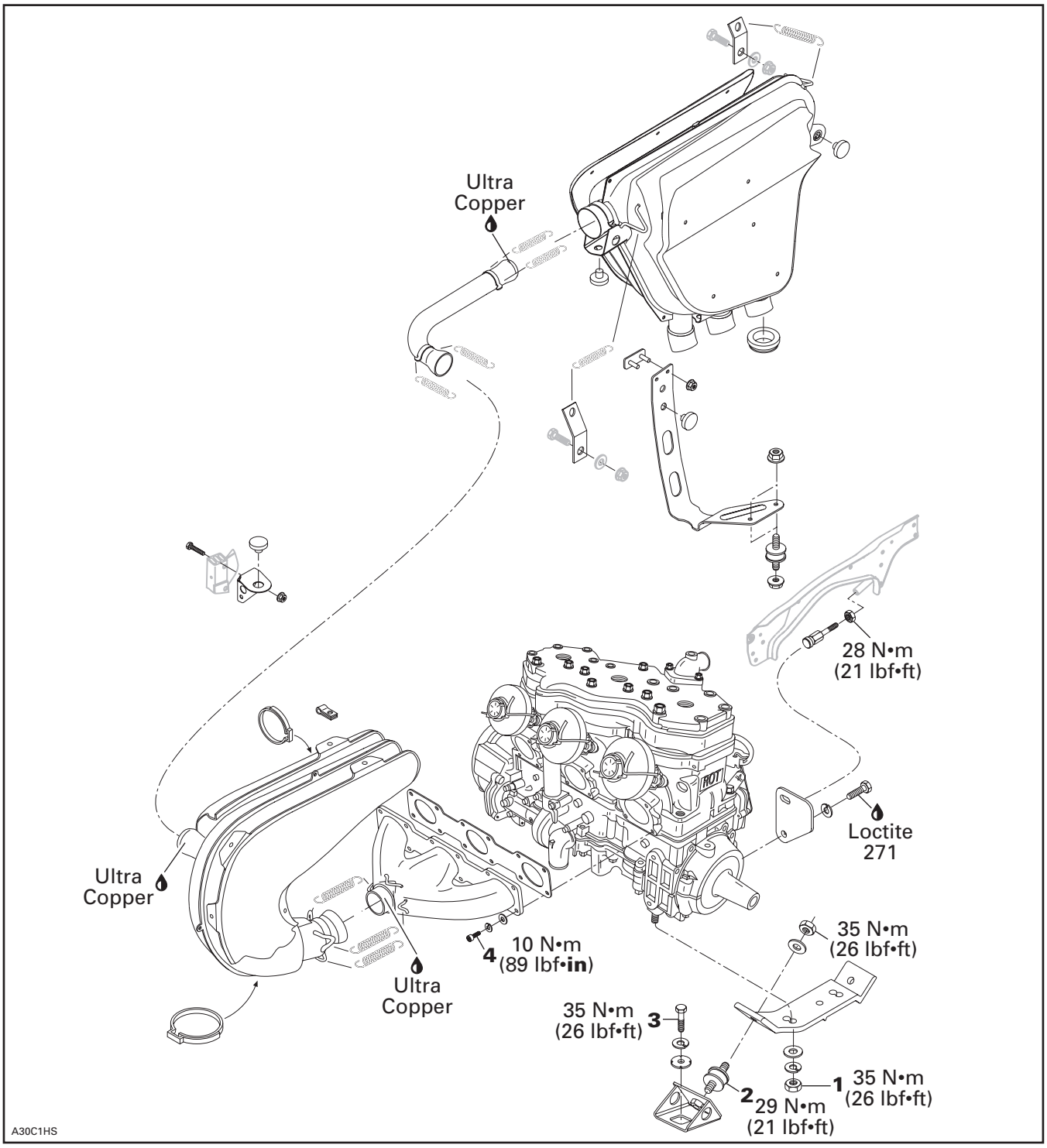
599, 699 AND 809 ENGINE TYPES

Formula III 600, Mach 1/1R and Mach Z Series



TYPICAL

Formula III 700/800 and Grand Touring 700/SE



PARTS

REMOVAL FROM VEHICLE

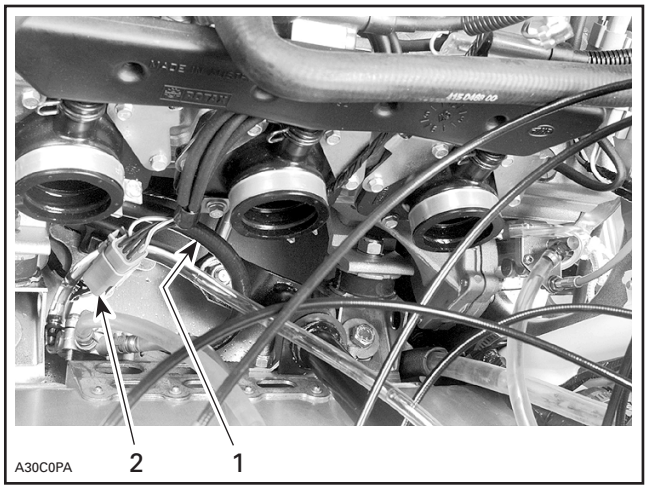
Open hood and close fuel shut-off valve.

Drain engine coolant.

Remove or unplug the following then lift off engine from engine compartment.

NOTE: 3-cylinder engine is more heavy then a 2 cylinder engine. It weights about 45 kg (100 lb). Use of a hoist is recommended.

– guard
– air silencer
– drive belt
– driven pulley
– speedometer cable from angle drive
– rewind starter handle
– drive pulley (not necessary if engine has not to be disassemble)
– hood, refer to 09-02 BODY
– carburetors
– impulse hose and high tension coil connector housing



TYPICAL

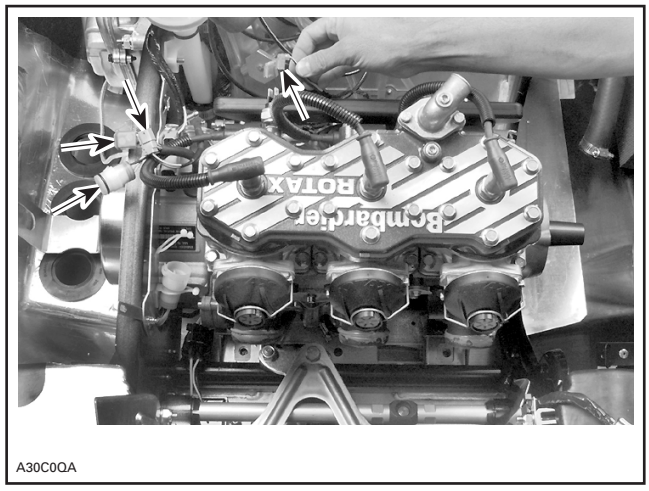
1. *Impulse hose*
2. *High tension coil connector housing*

– exhaust pipes using exhaust spring remover/installer (P/N 529 035 400)

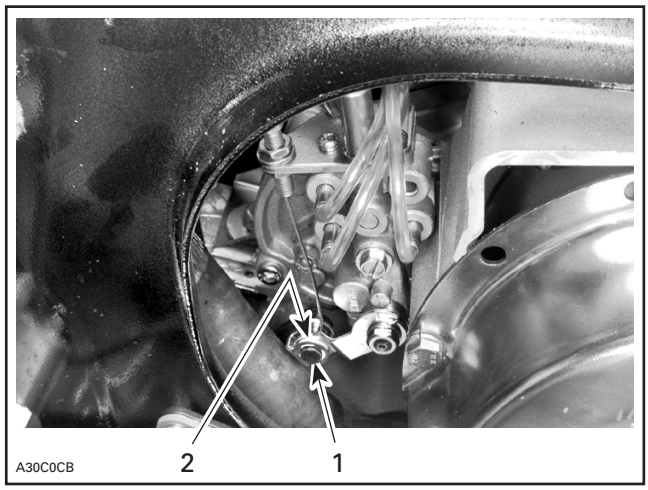


TYPICAL

– tuned pipes
– after muffler
– wiring connections



– oil injection inlet line at oil injection pump, install hose pincher
– oil pump cable



1. Remove circlip
2. Plastic washer

– coolant hoses at cylinder head and at front bottom of engine
– engine support screws
– engine stopper (left rear of engine)
– removable side member

Turn steering left side. Remove engine from vehicle.

1,2,3,4, Engine Support Nut and Manifold Screw

Torque the engine/support nuts **no. 1** to 35 N•m (26 lbf•ft).

Torque rubber mount **no. 2** to support bracket to 29 N•m (21 lbf•ft).

Torque rubber mount/support screw to 37 N•m (27 lbf•ft).

Torque manifold screws **no. 4** to 10 N•m (89 lbf•**in**).

Torque removable side member screws to 7 N•m (62 lbf•**in**).

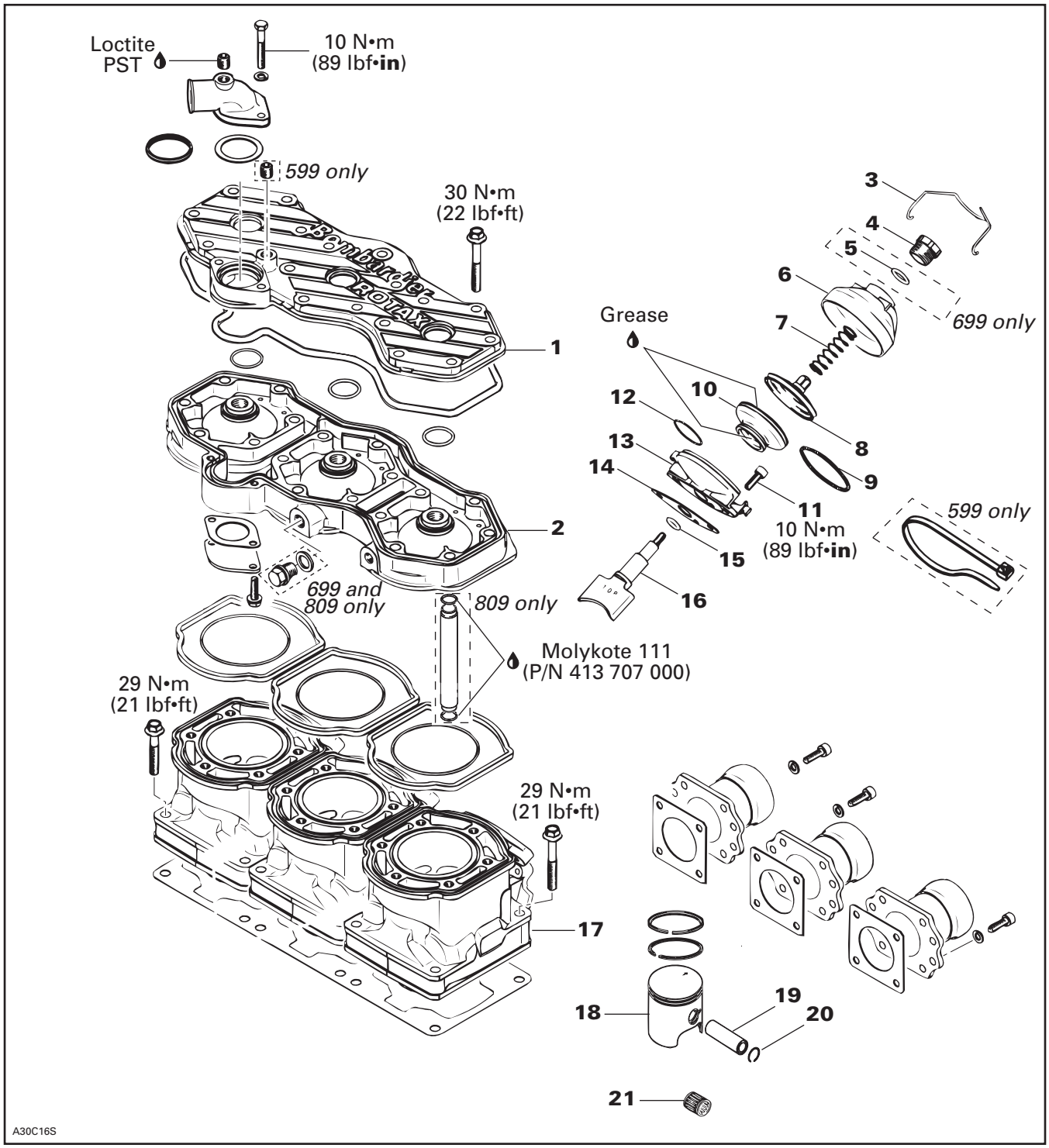
Torque removable side member nut over countershaft support to 15 N•m (133 lbf•**in**).

INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention, to all appropriate component/system reinstallation procedures described throughout this *Shop Manual* and to the following:

– It is easier to install oil pump cable before installing engine on vehicle.
– After throttle cable installation, check carburetor maximum throttle opening and oil injection pump adjustment.
– Check pulley alignment and drive belt tension.
– Should a light exhaust leak be experienced at muffler ball joint, Ultra Copper (P/N 413 710 300) can be used.

TOP END


Loctite PST
10 N•m (89 lbf•in)
599 only
30 N•m (22 lbf•ft)
Rotax
1
2
699 and 809 only
809 only
Molykote 111 (P/N 413 707 000)
29 N•m (21 lbf•ft)
29 N•m (21 lbf•ft)
17
18
19
20
21
Grease
3
4
5
6
7
699 only
8
9
10
11
10 N•m (89 lbf•in)
12
13
14
15
16
599 only
A30C16S

COMPONENT REMOVAL

Most engine components can be removed with engine on vehicle such as:

– cylinder head
– piston(s)
– cylinder(s)
– rewind starter
– oil pump
– water pump
– magneto flywheel
– RAVE valve(s)

CLEANING

Discard all gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port cylinder head and piston dome using a wooden spatula.

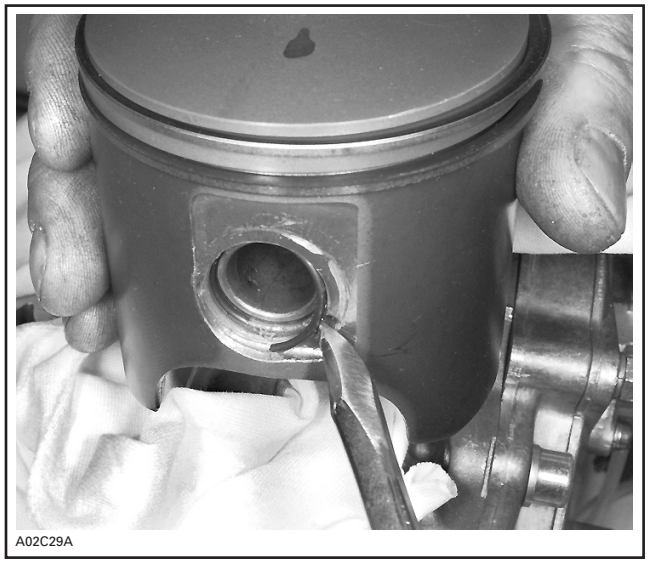
NOTE: The letters ''AUS'' (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring groove with a groove cleaner tool or with a piece of broken ring.

DISASSEMBLY

18, Piston

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase then with a pointed tool inserted in piston notch, remove circlip **no. 20** from piston **no. 18**.



TYPICAL

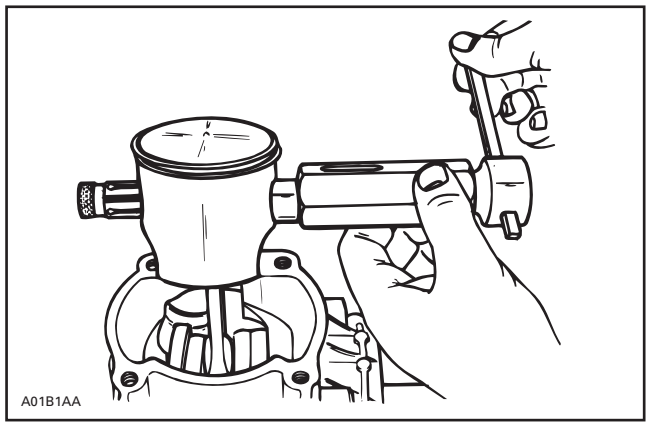
To remove piston pin **no. 19**, use piston pin puller (P/N 529 035 503) as follows:

Fully screw puller handle.

Insert puller end into piston pin.

Screw (LH threads) extracting nut.

Hold puller firmly and rotate puller handle counterclockwise to pull piston pin.



TYPICAL

RAVE System

NOTE: RAVE stands for Rotax Adjustable Variable Exhaust.

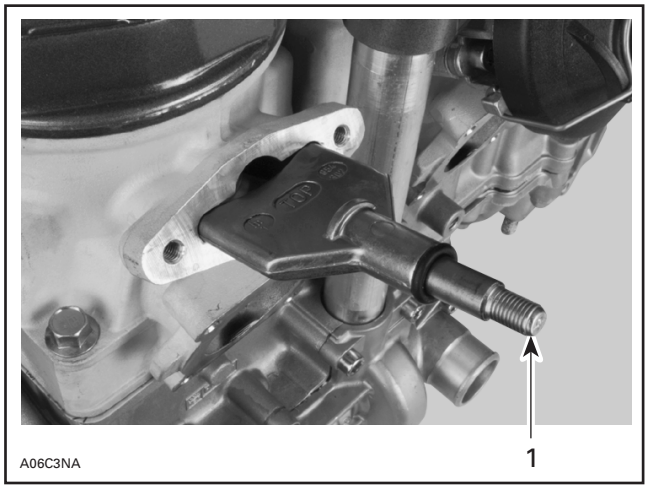
Remove spring clip **no. 3**, cover **no. 6** and spring **no. 7**.

Remove spring or locking tie **no. 3**.

Unscrew valve piston **no. 8**.

Remove cylindrical screws **no. 11** then valve rod housing **no. 13**. Remove bellows **no. 10** and spring **no. 12**.

Pull out exhaust valve **no. 16**.



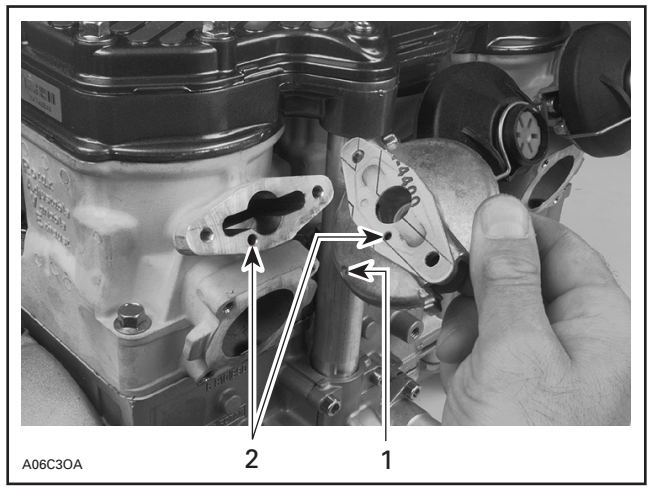
1. Exhaust valve

INSPECTION

NOTE: Refer to LEAK TEST AND ENGINE DIMENSIONS MEASUREMENT 04-03.

RAVE System

Check valve rod housing and cylinder for clogged passages.



1. Draining hole
2. Passages

NOTE: Oil dripping from draining hole indicates a loosen spring or damaged bellows.

10, Bellows

Check for cracked, dried or perforated bellows.

7, Spring

ENGINE TYPE	SPRING P/N	WIRE DIA. mm (in)	FREE LENGTH mm (in)	PRELOAD IN N (LBF) AT COMPRESSED LENGTH OF 14.7 mm (.579 in)
599	420 239 940	0.8 (.031)	48.5 (1.91)	0.0100 (.00224)
699 on Mach 1	420 239 944	0.9 (.031)	48.5 (1.91)	0.0169 (.0038)
699 on Formula III 700 and GT 700	420 239 945	1.0 (.039)	48.5 (1.91)	0.0203 (.0045)
809 on Formula III 800 and GT SE	420 239 945	1.0 (.039)	48.5 (1.91)	0.0203 (.0045)
809 on Mach Z	420 239 941	0.8 (.031)	52.5 (2.07)	0.0110 (.0025)

ASSEMBLY

RAVE System

Install rave valve with its mention top as illustrated in the removal photo. Tighten red cap **no. 4** screw to bottom.

17,18, Cylinder and Piston

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.

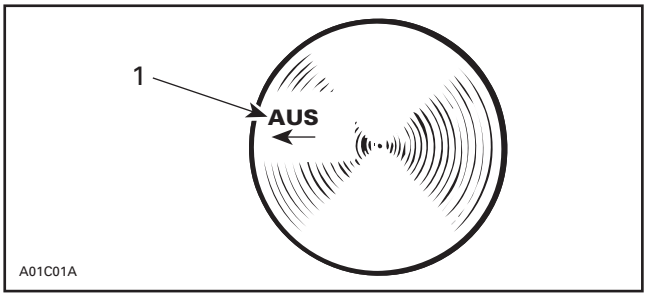
Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

1,2,17, Cylinder Head Cover, Cylinder Head and Cylinder

Check flatness of part sealing surfaces.

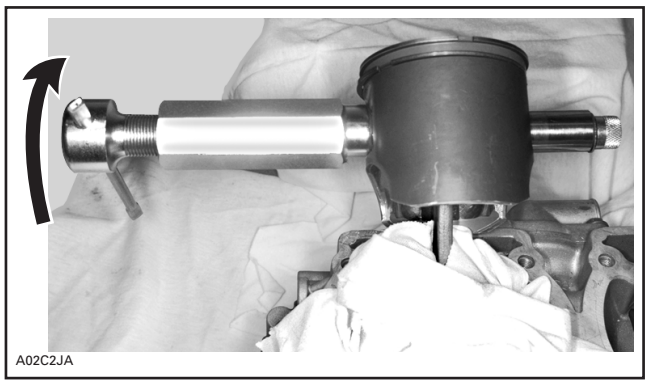
Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT 04-03 and look for **Checking Surface Flatness**.

– Mount piston over connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in the direction of exhaust port (see illustration below).



1. Exhaust

Install piston pin puller and turn handle until piston pin is correctly positioned in piston.



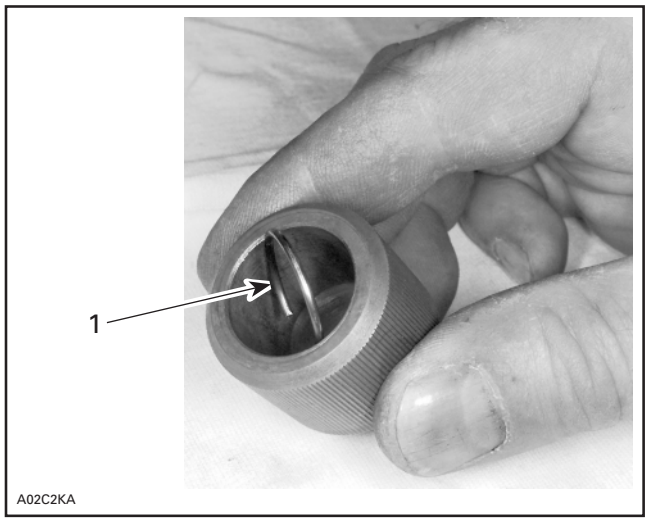
TYPICAL

▼ CAUTION

Always install new circlips.

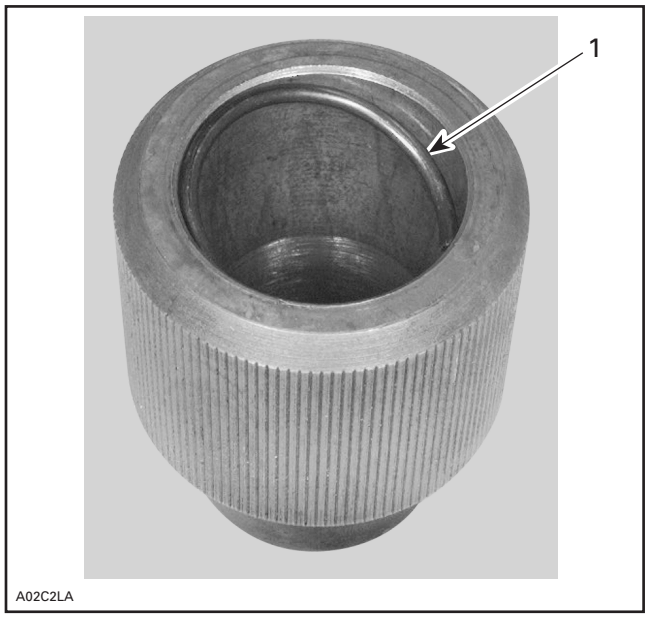
To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 035 561).

Insert circlip in tool at an angle.



TYPICAL
1. Circlip

Square it up using a finger.



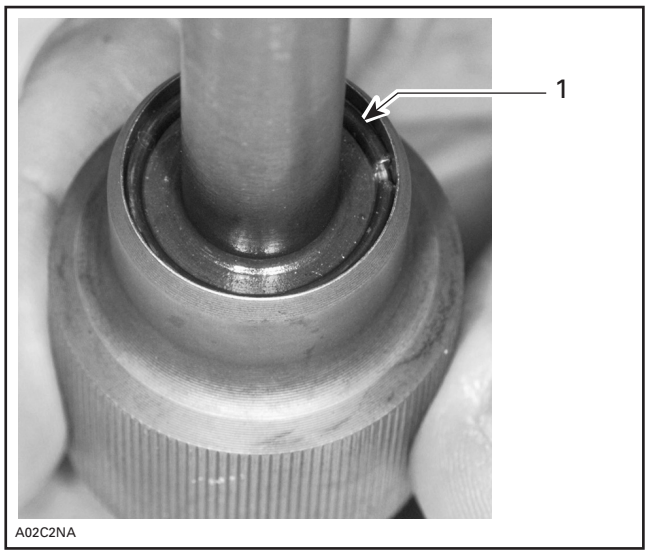
TYPICAL
1. Circlip

Continue to square it up using round end of circlip installer.


A02C2MA

TYPICAL

Using square end of tool, push circlip in until it rests in groove.

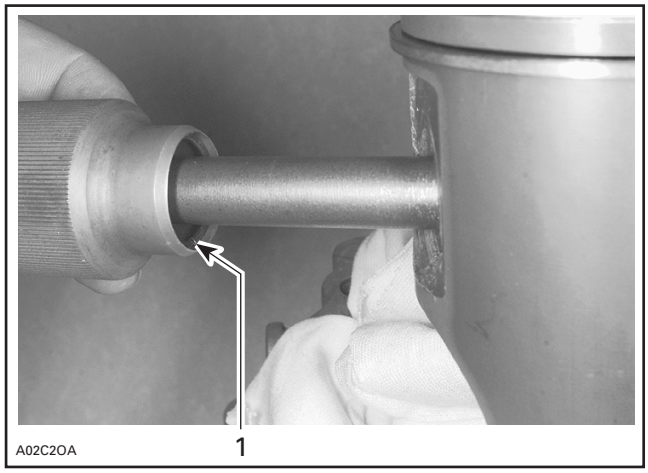


A02C2NA

TYPICAL

1. Circlip in groove

Mount tool in piston making sure that circlip break is facing down.



A02C2OA

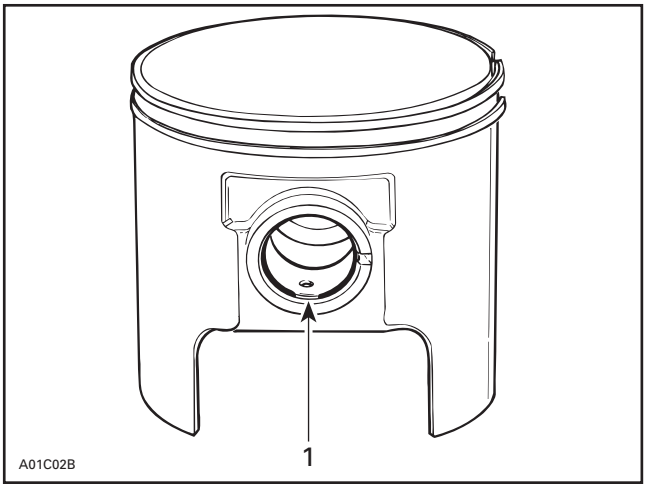
TYPICAL

1. Circlip break facing down

Hold tool firmly against piston then strike on round end of tool. Circlip will move from tool groove to piston groove.


A02C2PA

TYPICAL

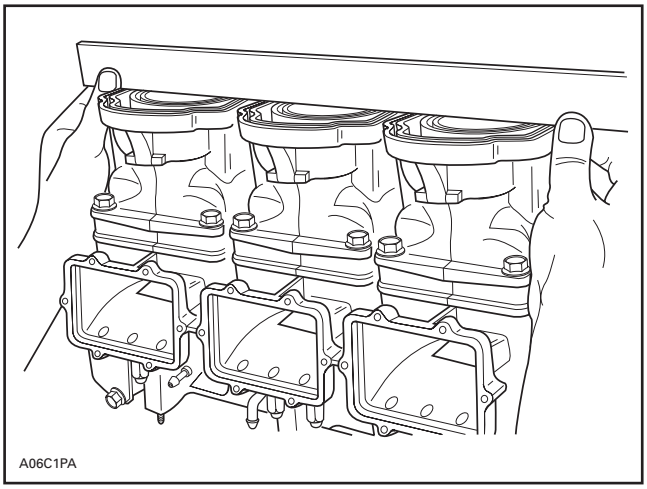


TYPICAL
1. Circlip break

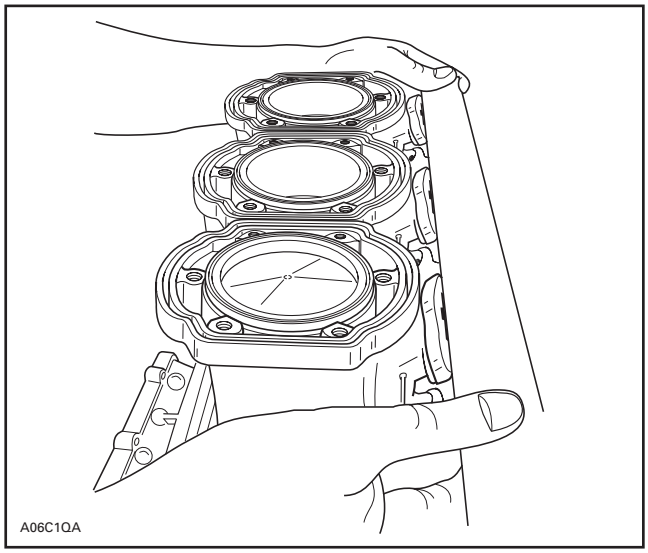
▼ CAUTION

Circlips must not move freely after installation; if so, replace them.

Install cylinders and check for same height.



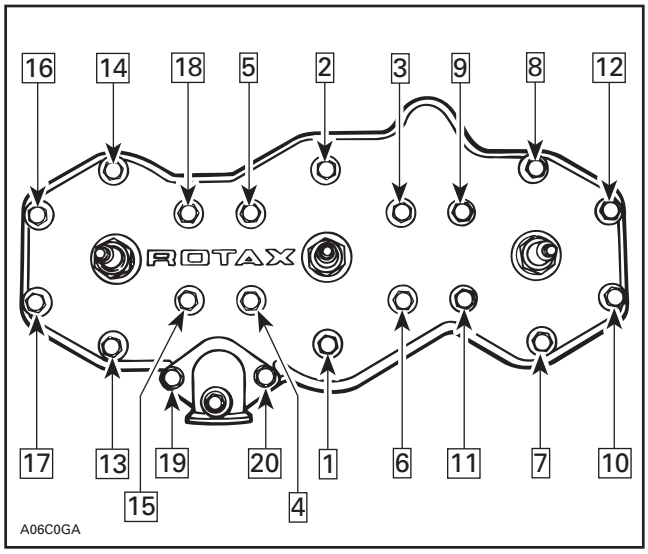
Also check for proper cylinder alignment.



At assembly, torque cylinder head screws in the following illustrated sequence. Tightening torques are:

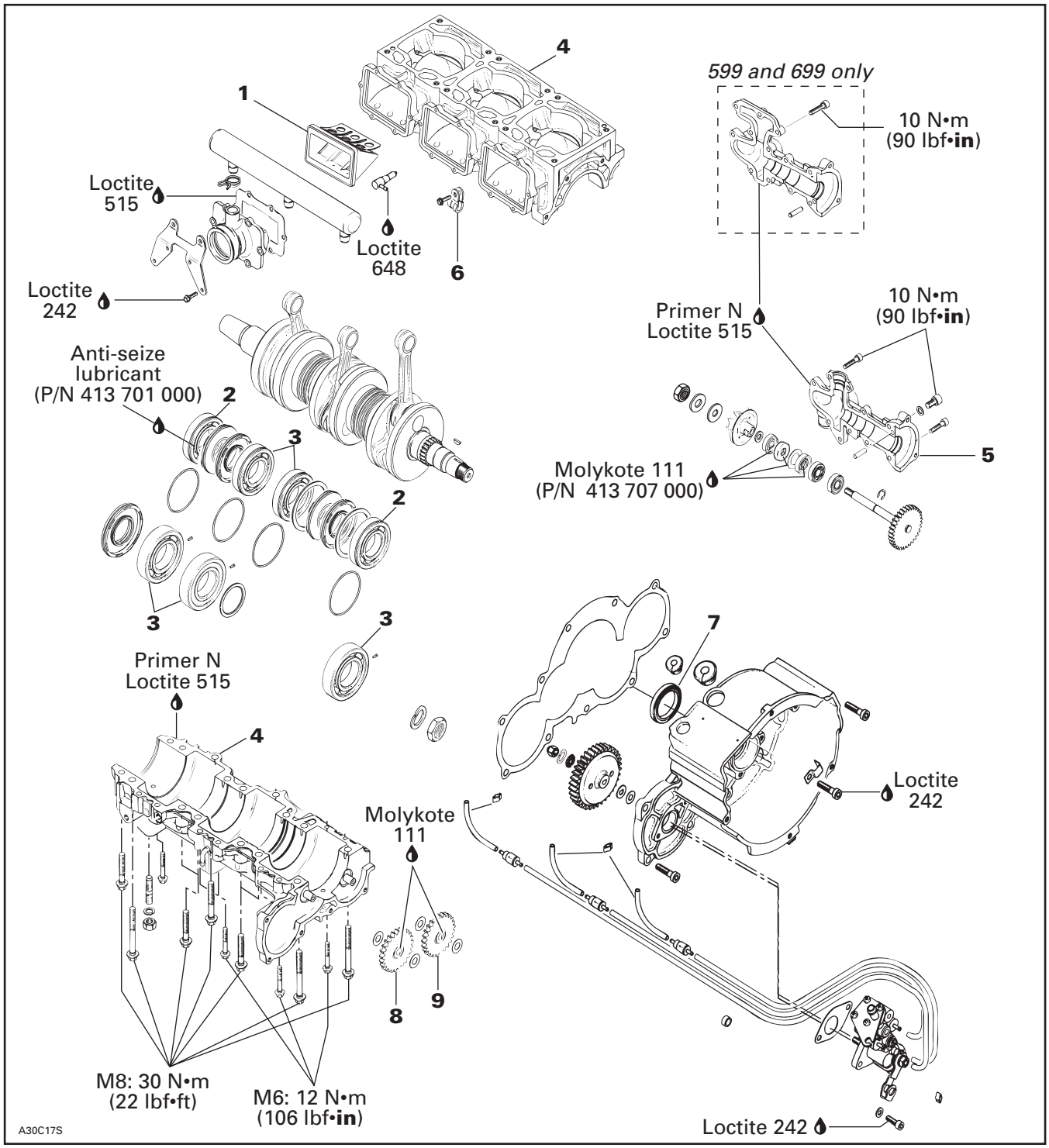
M6 screws: 12 N•m (106 lbf•**in**)

M8 screws: 30 N•m (22 lbf•ft)



TYPICAL

BOTTOM END


4
1
599 and 699 only
10 N•m
(90 lbf•in)
Loctite
515
Loctite
648
6
Loctite
242
Primer N
Loctite 515
10 N•m
(90 lbf•in)
Anti-seize
lubricant
(P/N 413 701 000)
2
3
2
5
Molykote 111
(P/N 413 707 000)
3
3
7
Primer N
Loctite 515
4
Loctite
242
Molykote
111
8
9
M8: 30 N•m
(22 lbf•ft)
M6: 12 N•m
(106 lbf•in)
Loctite 242
A30C17S

NOTE: Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all oil seals, gaskets, O-rings and sealing rings.

Clean all metal components in a non-ferrous metal cleaner. Use Gasket remover (P/N 413 708 500) accordingly.

Remove old paste gasket from crankcase mating surfaces with Gasket remover (P/N 413 708 500).

▼ CAUTION

Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

DISASSEMBLY

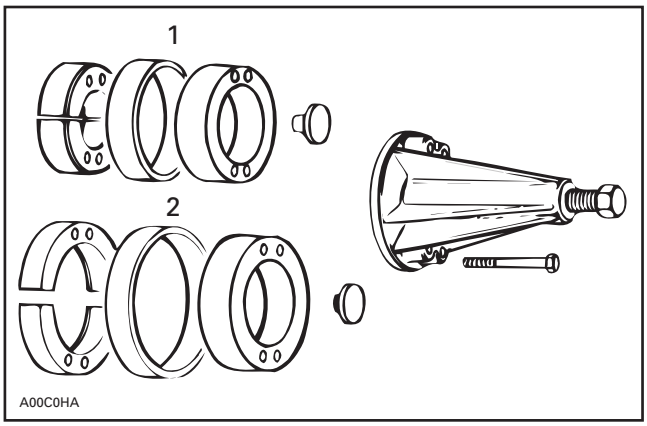
General

To remove drive pulley, refer to DRIVE PULLEY 05-03.

To remove magneto, refer to CDI SYSTEM 04-04.

2,3, Crankshaft Bearing

To remove bearings from crankshaft, use a protective cap and special puller, as illustrated.



1. PTO side
2. MAG side

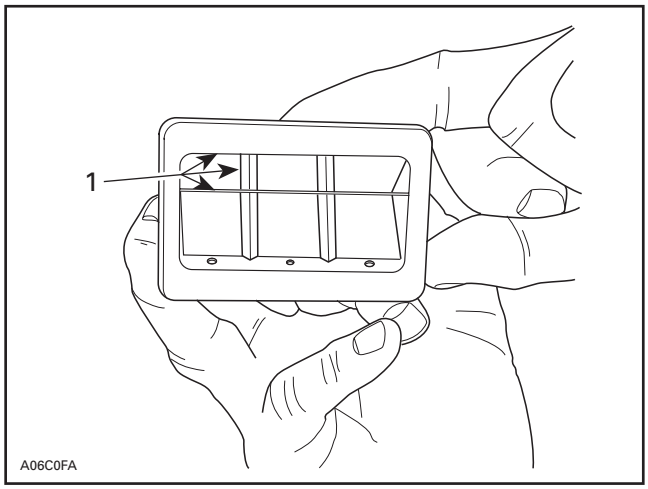
INSPECTION

NOTE: Refer to LEAK TEST AND ENGINE DIMENSIONS MEASUREMENT 04-03.

1, Reed Valve

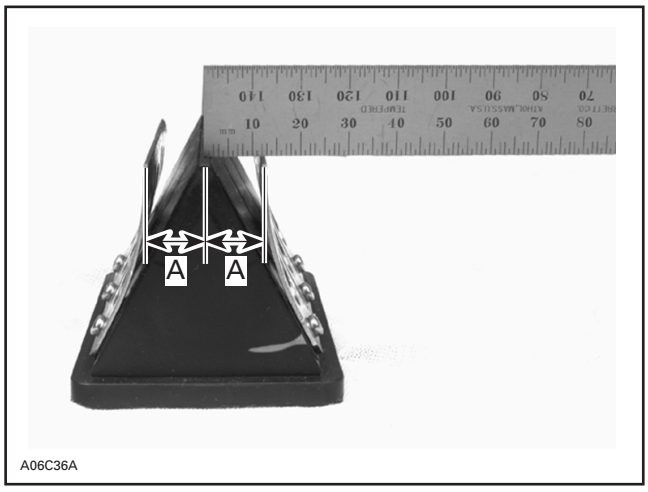
With blade stopper removed, check reed valve for proper tightness. There must be no play between blade and valve body when exerting a finger pressure on blade at blade stopper location.

In case of a play, turn blade upside down and recheck. If there is still a play, replace blade and/or valve body.



1. No play

Check blade stopper distance from center of reed valve block.



TYPICAL

A. 599 Engine: 14 ± 0.25 mm (.551 ± .010 in)
699 Engine: 12 ± 0.25 mm (.472 ± .010 in)
809 Engine: 12 ± 0.25 mm (.472 ± .010 in)

Bent blade stopper as required to obtain the proper distance.

ASSEMBLY

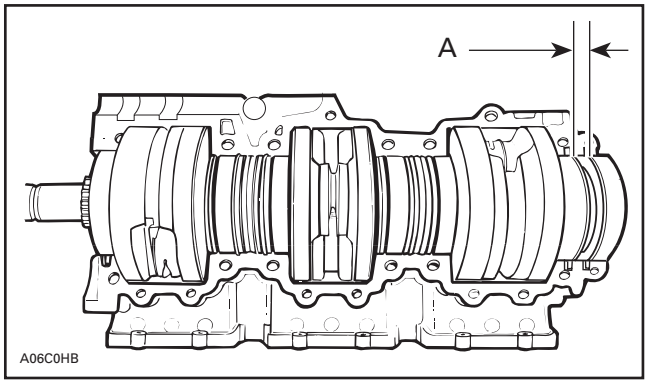
2,3, Crankshaft Bearing, Anti-Seize Lubricant and Labyrinth Sleeve

Smear anti-seize lubricant (P/N 413 701 000) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container filled with oil previously heated to 75°C (167°F). This will expand bearing and ease installation.

809 Engine Only

Outer PTO bearing is 8 mm (5/16 in) from inner bearing.



TYPICAL — 809 ENGINE
A. 8 mm (5/16 in)

Outer PTO Bearing Lubrication

All Engines

Outer PTO bearing must be lubricated with Isoflex grease (P/N 293 550 021).

▼ CAUTION

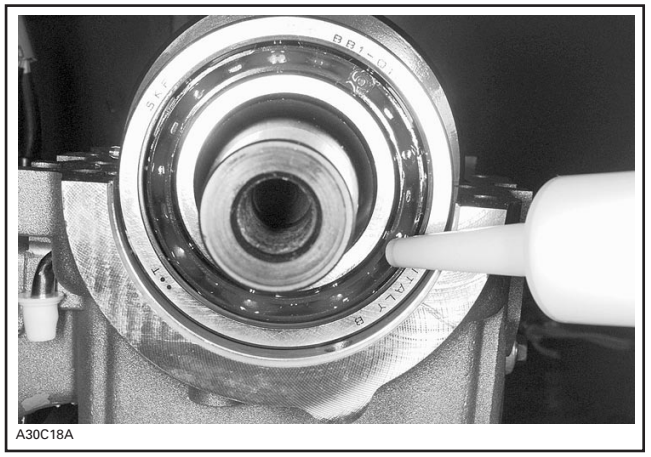
Make sure not to push Isoflex grease between outside bearing race and half crankcase.

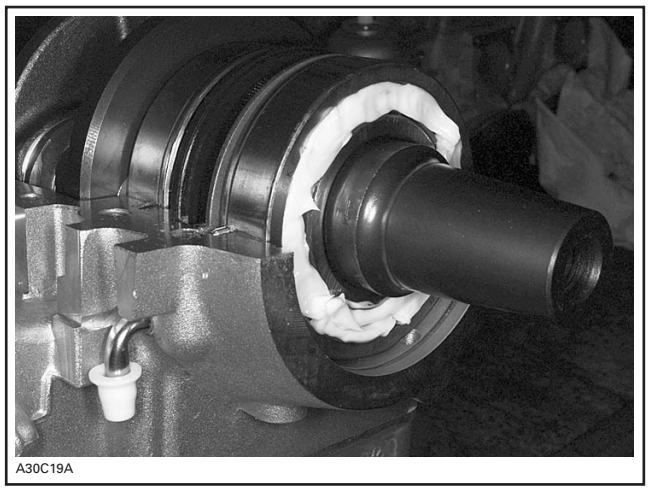
NOTE: The 50 g tube corresponds to 50 cc of grease.

599 and 699 Engines

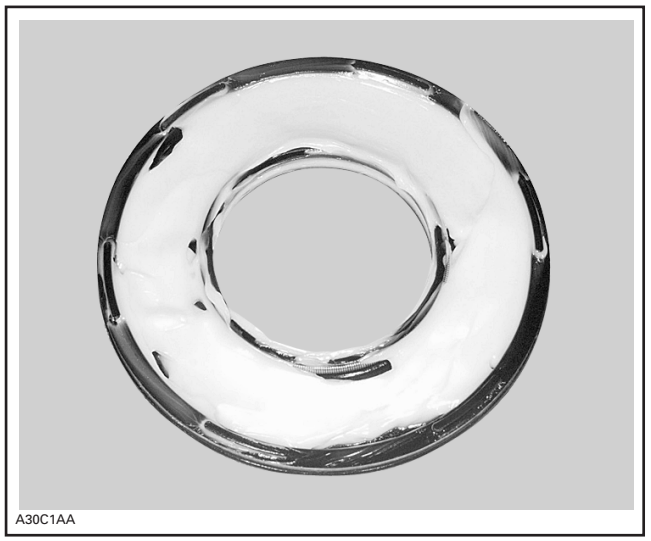
Total quantity of Isoflex grease to be applied is 50 cc.

Apply about 7 cc of Isoflex grease to outside bearing cage.

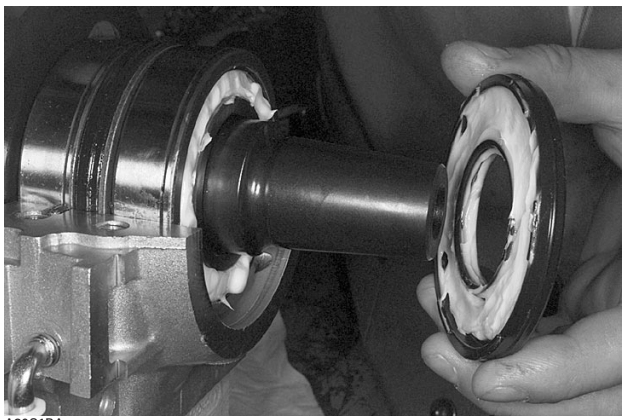




Fill up PTO seal with about 10 cc of Isoflex grease.

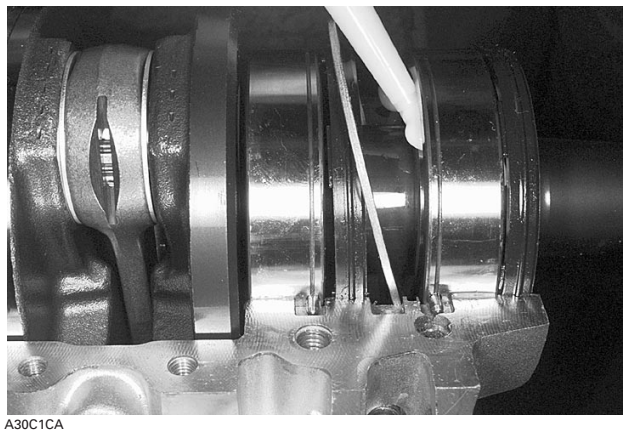


Install PTO seal on crankshaft.


A30C1BA

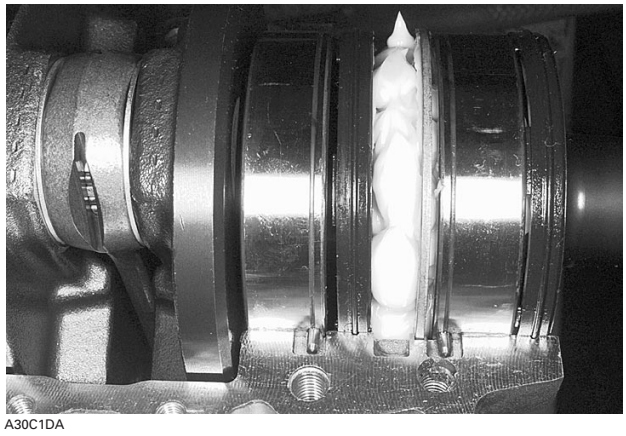
TYPICAL

Apply Isoflex grease to inner side of bearing cage.


A30C1CA

Install washer in its crankcase groove.

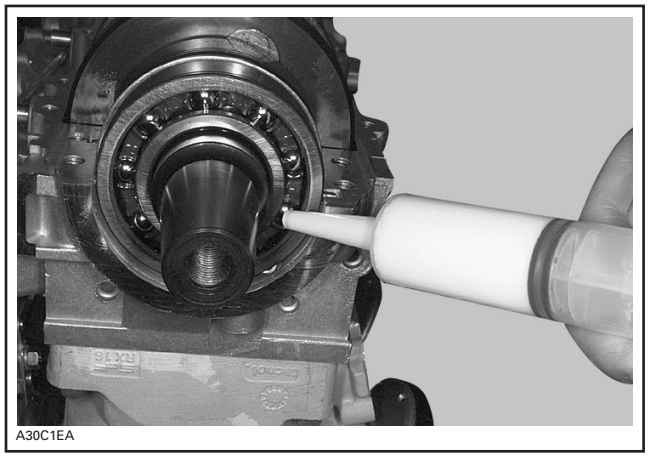
Fill space between inner side of bearing cage and seal with remaining quantity of Isoflex grease.

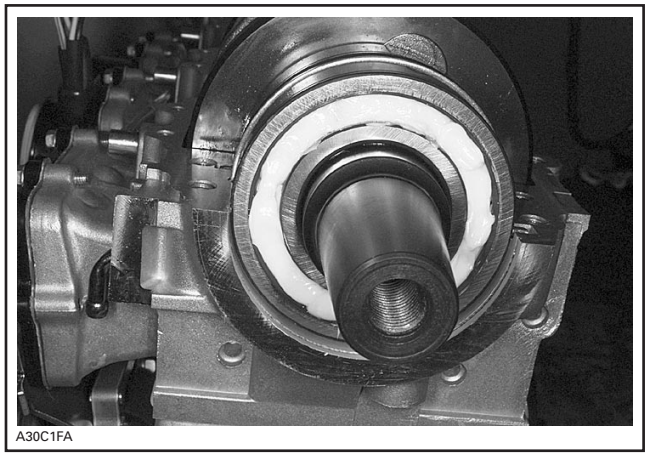

A30C1DA

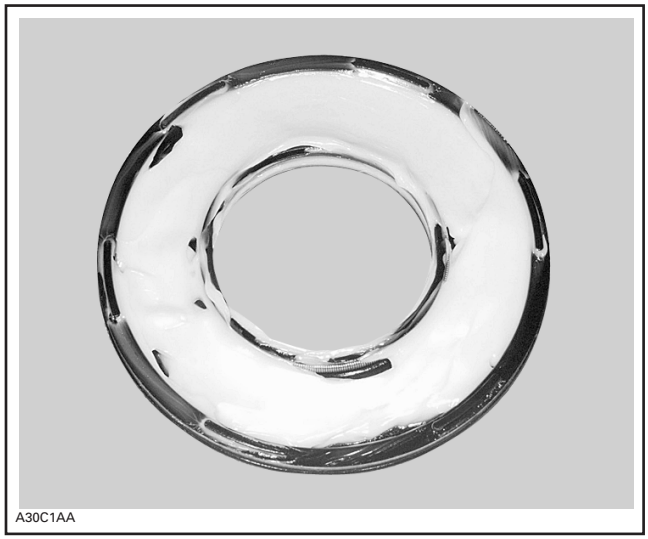
809 Engine

Total quantity of Isoflex grease to be applied is 21 cc.

Apply 21 cc of grease to outside bearing cage and seal.

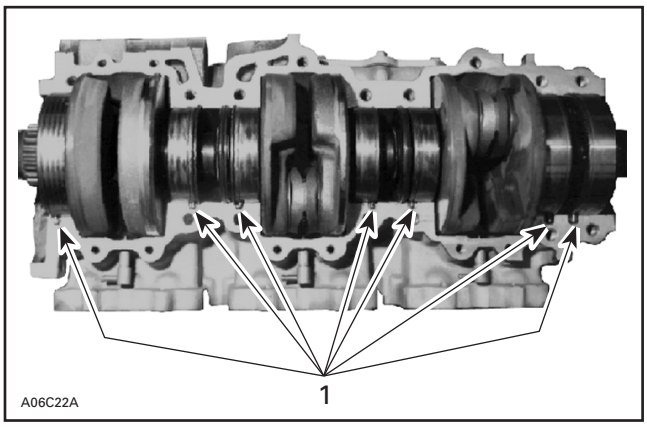

A30C1EA


A30C1FA


A30C1AA

4, Crankcase

At crankshaft installation, position drive pins as illustrated.



TYPICAL
1. Drive pins

Crankcase halves no. 4 and water pump housing are factory matched and therefore, are not interchangeable as single halves.

Prior to joining of crankcase halves, spray some new injection oil (or equivalent) in bearings and on all moving parts of the crankshaft. Spray Primer N (P/N 413 708 100) on one of mating surfaces. Let it dry for 10 to 20 minutes.

Apply Loctite 515 (P/N 413 702 700) on the other mating surface.

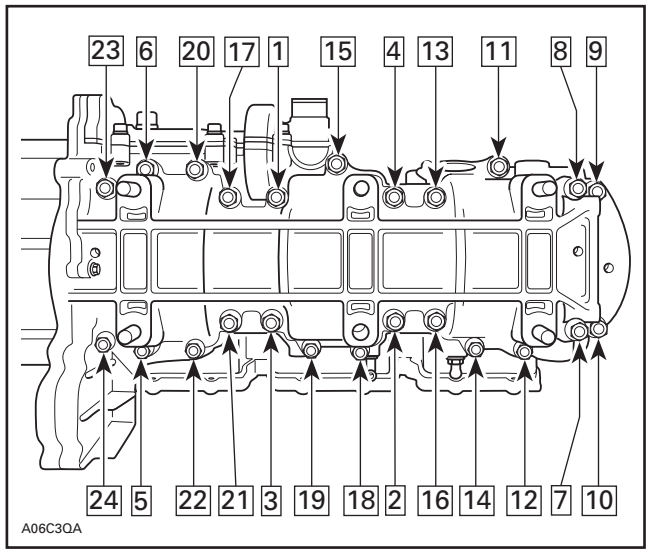
NOTE: Primer N allows Loctite 515 to fully cure on aluminum surfaces. It increases filling capacity and reduce curing time.

Align both crankcase halves before tightening screws.

Torque crankcase screws in the following illustrated sequence. Tightening torques are:

M6 screws: 12 N•m (106 lbf•**in**)

M8 screws: 30 N•m (22 lbf•ft)



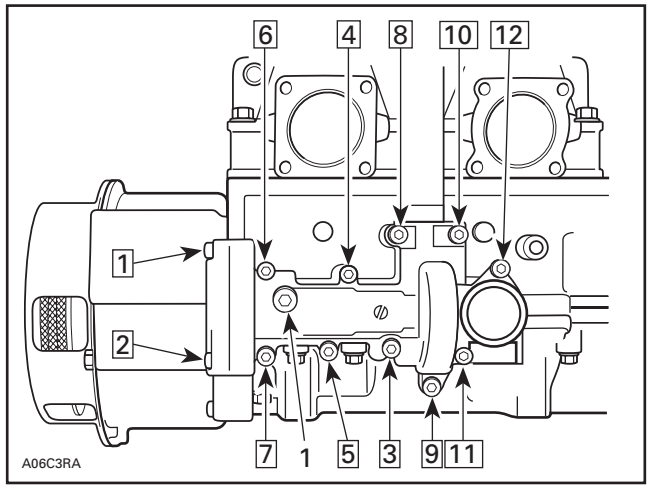
TYPICAL

5, Water Pump Housing

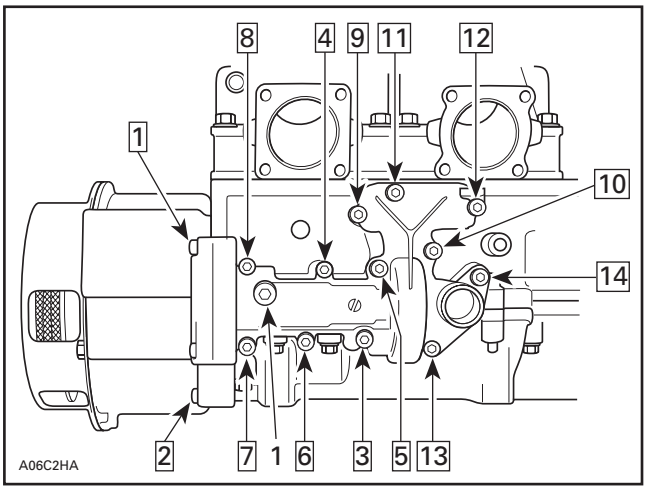
Spray Primer N (P/N 413 708 100) on one of mating surfaces. Let it dry for 10 to 20 minutes.

Apply Loctite 515 (P/N 413 702 700) on the other mating surface.

Tighten water pump housing screws to 10 N•m (90 lbf•**in**) following sequence as illustrated.



809 ENGINE
1. Oil level plug



599 AND 699 ENGINES
1. Oil level plug

Add chaincase synthetic oil (P/N 413 802 800) into water pump housing until oil level reach bottom of plug hole. See above illustration. Total capacity is about 14 cc (.47 U.S. oz).

This oil addition is needed only when servicing water pump. During normal engine operation, this oil can flow through engine. After that fuel/oil mixture will lubricate water pump bearings by scavenging.

6, Screw

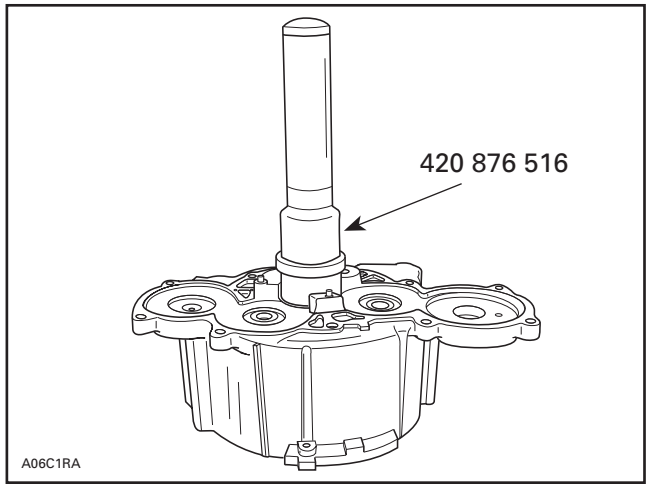
Apply Loctite 242 on screw threads. Install the screw retaining oil line clip first. If experiencing leaks at carburetor adaptor, use primer N and Loctite 515 on sealing surfaces of crankcase and adaptor.

7, Seal

Install seal using pusher (P/N 420 876 516).

▼ CAUTION

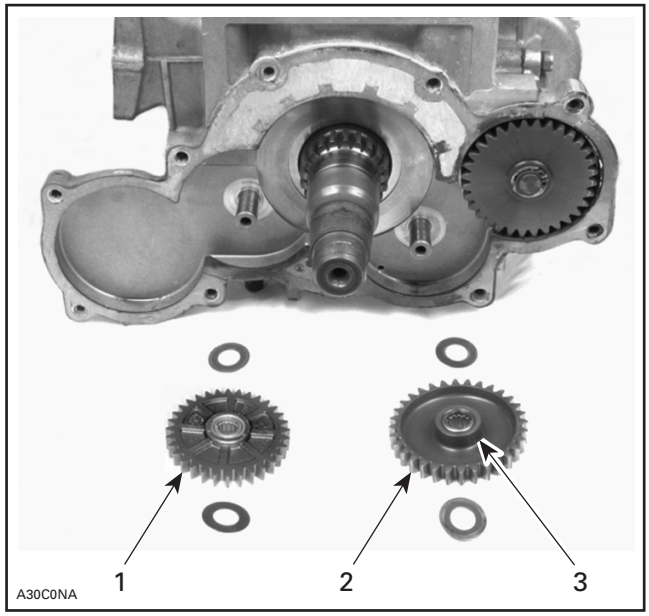
Make sure oil seal is fully pushed against stator shoulder.



8,9, Plastic Gear and Steel Gear

Apply Molykote 111 to needle bearing of each gear.

Install plastic gear on oil pump side. Steel gear goes on water side, its shoulder first.



TYPICAL
1. Plastic gear
2. Steel gear
3. Shoulder facing crankcase

LEAK TEST AND ENGINE DIMENSION MEASUREMENT

LEAK TEST

The following gives verification procedures for liquid cooled engines though it also applies to fan cooled engines. For FC engines, do not consider information pertaining to coolant system and crankcase rotary valve gear reservoir/components.

On twin-cylinder engines, each cylinder cannot be verified individually due to leakage from one cylinder to the other through rotary valve (except on engines with separate intake manifolds). Besides, on FC engines, leak will occur through labyrinth sleeve in center of crankshaft.

PREPARATION

1. Remove tuned pipe/muffler and exhaust manifold.
2. Install plugs over exhaust flanges. Tighten with previously removed screws.
3. On engines with RAVE system, remove RAVE valves and install plugs over flanges. Tighten with previously removed screws.
4. Remove carburetor(s).
5. Insert plug(s) in intake rubber boot(s). Tighten with clamps already there.
6. Using a hose pincher(s) (P/N 529 009 900), block impulse hose(s).

NOTE: Do not block large hoses of rotary valve gear lubrication system.

7. Install air pump on any valve of exhaust plug.

NOTE: If necessary, lubricate air pump piston with mild soap.

▼ CAUTION

Using hydrocarbon lubricant (such as engine oil) will damage rubber seal of pump piston.

8. Rotate crankshaft so that piston goes to BDC (Bottom Dead Center) on side where the pump is installed. This will open exhaust port.
9. Activate pump and pressurize engine to 34 kPa (5 PSI). Do not exceed this pressure.
10. Engine must stand this pressure during 3 minutes. If pressure drops before 3 minutes, check tester kit by spraying a soapy solution on pump piston, all plugs and fittings.
    - If tester kit is leaking, bubbles will indicate where leak comes from.
    - If tester kit is not leaking, check engine as per following procedure.

PROCEDURE

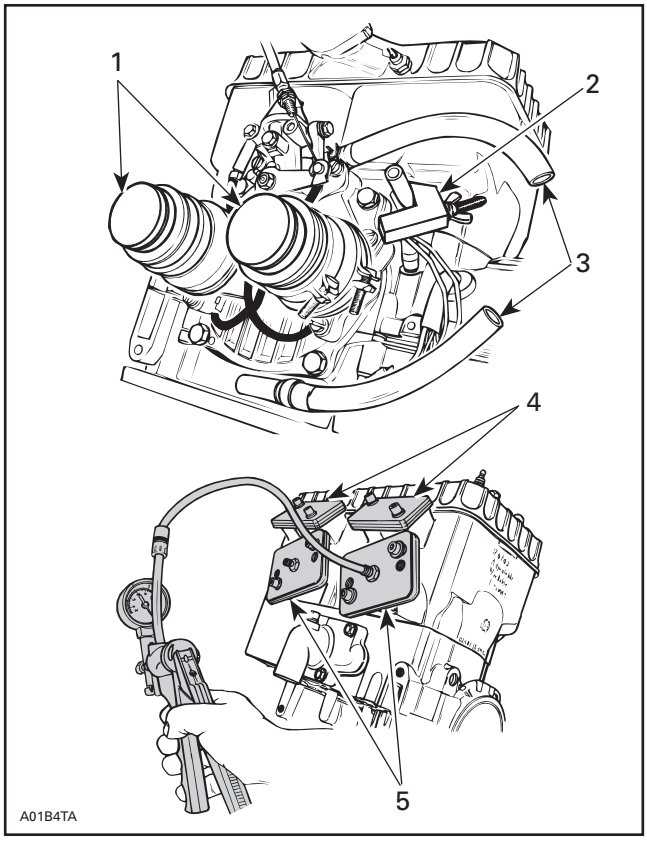
NOTE: A flow chart has been prepared as a visual reference. See last page of this chapter.

Using flow chart and following text, pressurize area to be tested and spray soapy solution at the indicated location.

TEST PRESSURE: 34 kPa (5 PSI) for 3 minutes

- If there is a leak at the tested location, it is recommended to continue testing next items before overhauling engine. There is a possibility of more than one leak.
- If there is no leak at the tested location, continue pumping to maintain pressure and continue with next items until leak is found.

Engine



TYPICAL

1. *Blocked intake flanges*
2. *Blocked impulse fitting*
3. *Open ends (if applicable)*
4. *Blocked RAVE valve flanges (if applicable)*
5. *Blocked exhaust flanges*

When exhaust manifold is installed, use rubber plug. (In this case it is not necessary to move piston to BDC).

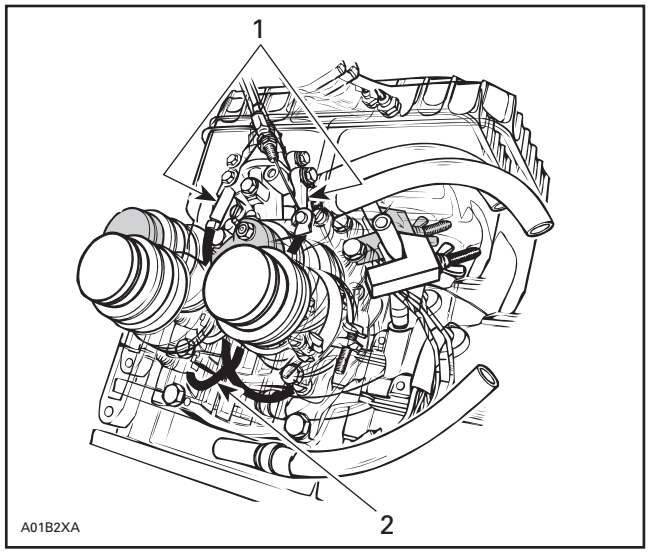


TYPICAL

1. *Rubber plug*

Check the following:

1. All jointed surfaces and screw/stud threads of engine:
   - spark plug base, insulator
   - cylinder head
   - cylinder base
   - crankcase halves (joint)
   - rotary valve cover
   - oil injection pump mounting flange (O-ring, seal)
   - coolant pump housing
   - bleed screws/plugs
2. Small injection oil lines coming from pump.



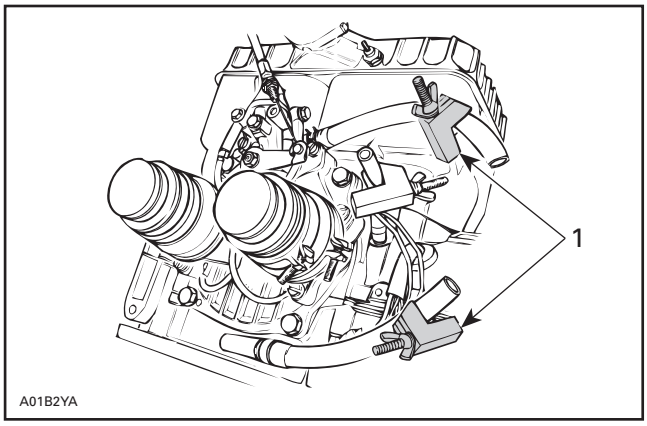
1. *Banjo fittings*
2. *Small injection oil lines*

Check for air bubbles or oil column going toward pump. It indicates defective check valve in banjo fitting (or lines).

3. Remove cooling system cap.

Check for air bubbles in antifreeze. It indicates defective cylinder head O-ring or cylinder base gasket.

4. Block both hoses of rotary valve gear lubrication system with hose pinchers.



1. Block both hoses

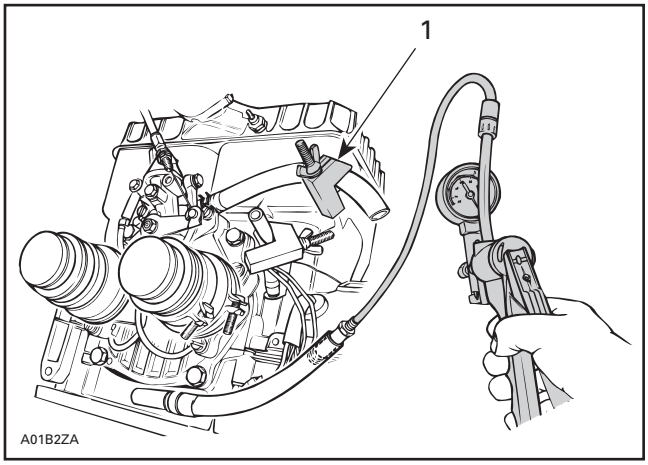
If leakage stops, ignore remaining items and check crankcase rotary valve gear reservoir as per **Crankcase Rotary Valve Gear Reservoir** of this section.

5. Remove drive pulley then check crankshaft outer seal.
6. Remove rewind starter and magneto system then check crankshaft outer seal.
7. Check crankcase rotary valve gear reservoir.

Crankcase Rotary Valve Gear Reservoir

Block one hose of rotary valve gear lubrication system with a hose pincher and install an adapter in remaining hose.

Install air pump on adapter and pressurize as before.

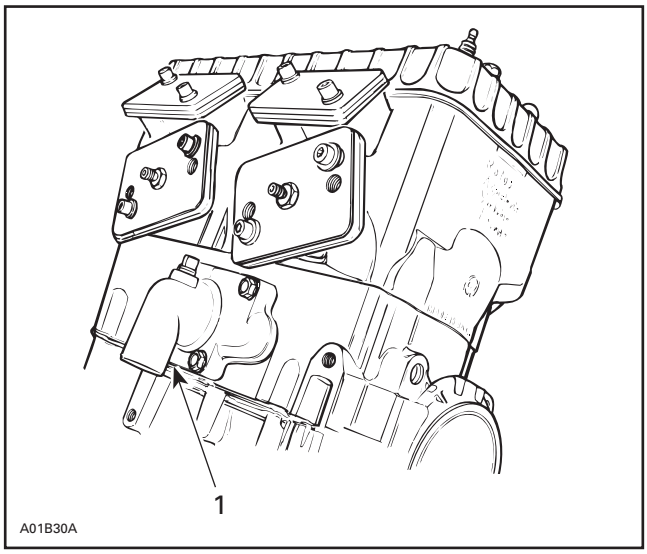


1. Blocked hose

1. Remove a spark plug or any plug of leak tester kit on PTO side.

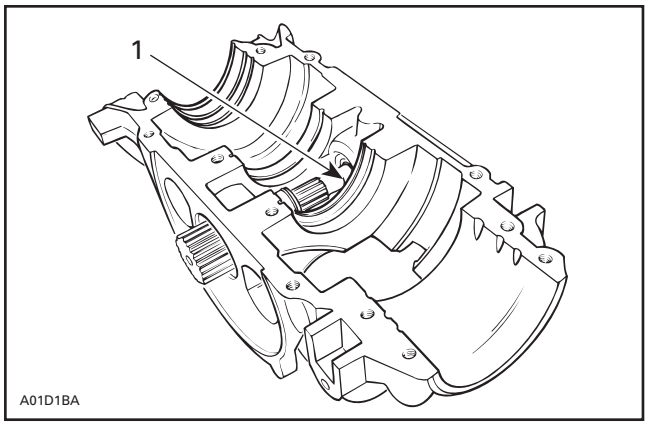
   If pressure drops, it indicates defective crankshaft inner seal on PTO side.
2. Remove a spark plug or any plug of leak tester kit on MAG side.

   If pressure drops, it indicates defective crankshaft inner seal on MAG side.
3. Check drain hole below coolant pump housing with soapy water.



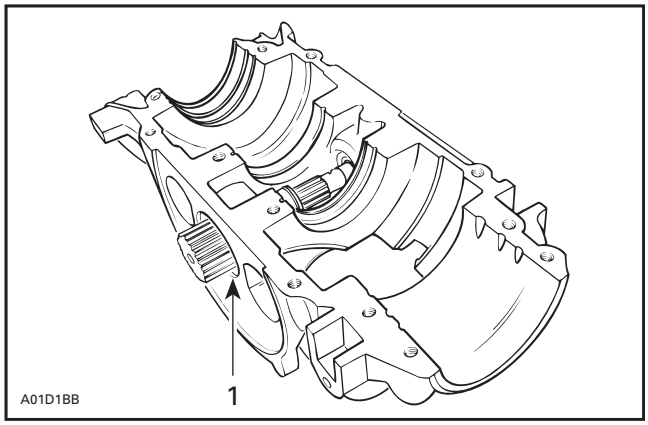
1. Drain hole

If there is a leak, it indicates defective seal of rotary valve shaft (oil seal beside coolant seal).



1. Oil seal

4. Remove rotary valve cover and check for leak of rotary valve seal with soapy water.



1. Seal

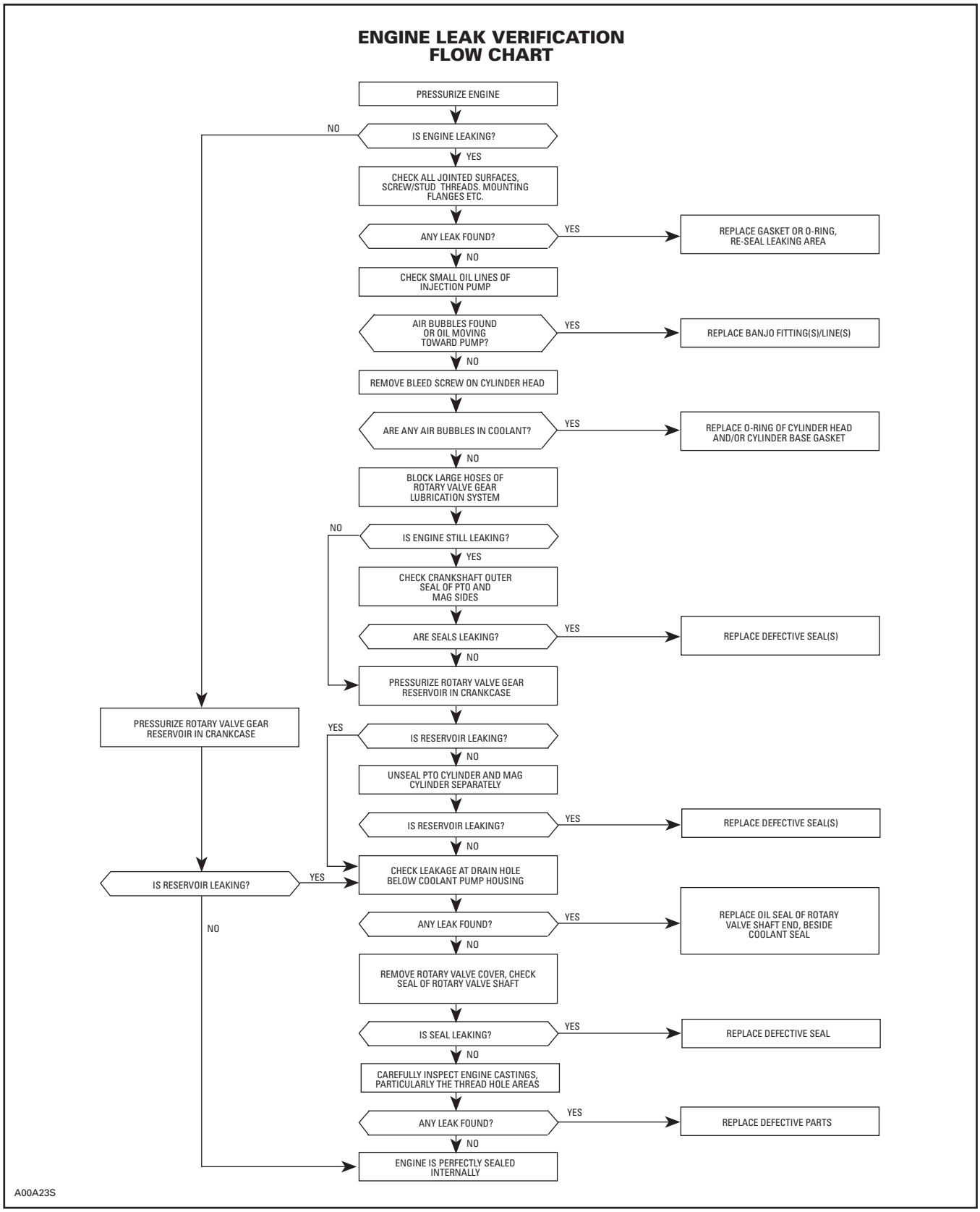
5. If leak still persists, it indicates a defective casting somewhere in engine.

   Disassemble engine and carefully check for defects in castings. Pay attention to tapped holes which may go through engine sealed area and thus lead to leakage.

FINALIZING REASSEMBLY

After reassembling engine, always recheck for leakage.

ENGINE LEAK VERIFICATION FLOW CHART



ENGINE DIMENSION MEASUREMENT

This section covers all engine types.

CYLINDER HEAD WARPAGE

ENGINE TYPE	MAXIMUM
All	0.05 mm (.002 in) per 50 mm (2 in) of surface
	0.5 mm (.020 in) for total length of cylinder head

Check gasketed surface of the cylinder head with a straightedge and a feeler gauge.

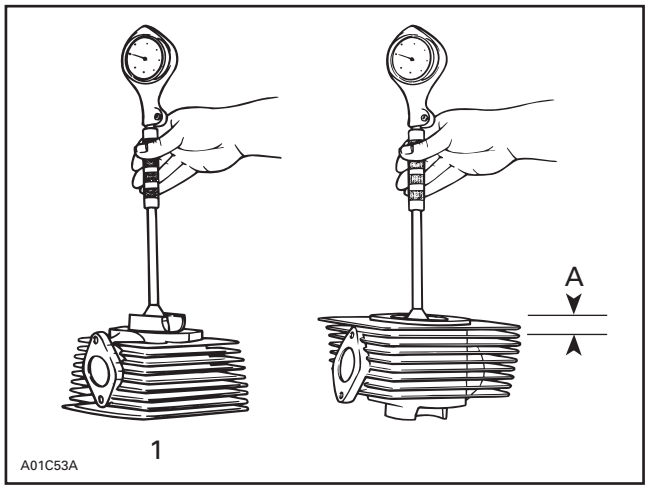
CYLINDER TAPER

ENGINE TYPE	MAXIMUM
All	0.10 mm (.004 in)

Compare cylinder diameter 16 mm (5/8 in) from top of cylinder to just below its intake port area.

On rotary valve engines, measure just below auxiliary transfer port, facing exhaust port. If the difference exceeds the specified dimension the cylinder should be rebored and honed or should be replaced.

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



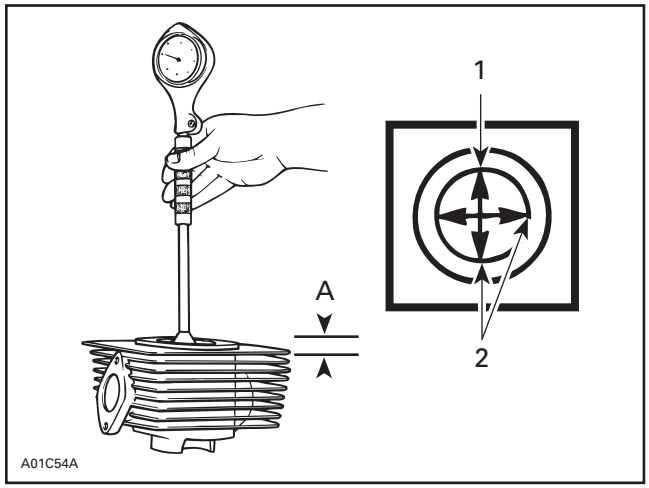
1. Below the intake port
A. 16 mm (5/8 in) from top

CYLINDER OUT OF ROUND

ENGINE TYPE	MAXIMUM
599 and 699	0.05 mm (.002 in)
809	0.08 mm (.003 in)

Measuring 16 mm (5/8 in) from top of cylinder with a cylinder gauge, check if the cylinder out of round is more than the specified dimension. If larger, cylinder should be rebored and honed or should be replaced.

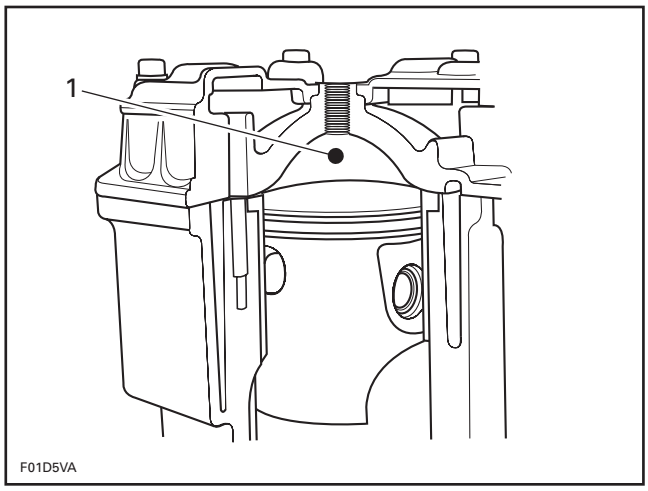
NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



1. Piston pin position
2. Measures to be compared
A. 16 mm (5/8 in)

COMBUSTION CHAMBER VOLUME MEASUREMENT

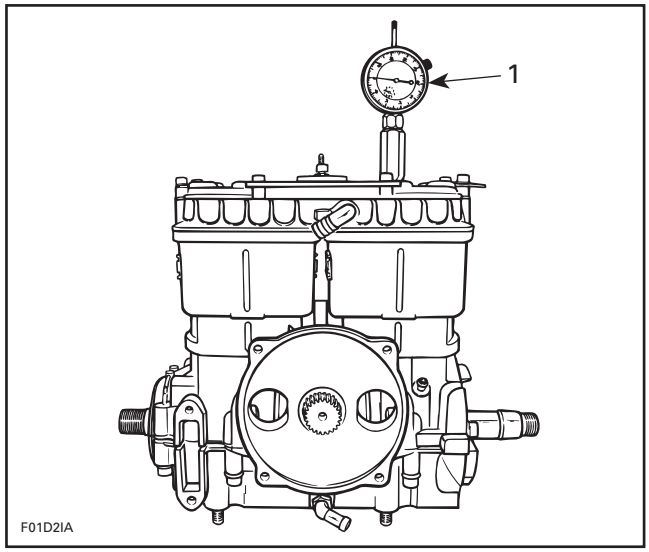
The combustion chamber volume is the region in the cylinder head above the piston at Top Dead Center. It is measured with the cylinder head installed on the engine.



1. Combustion chamber

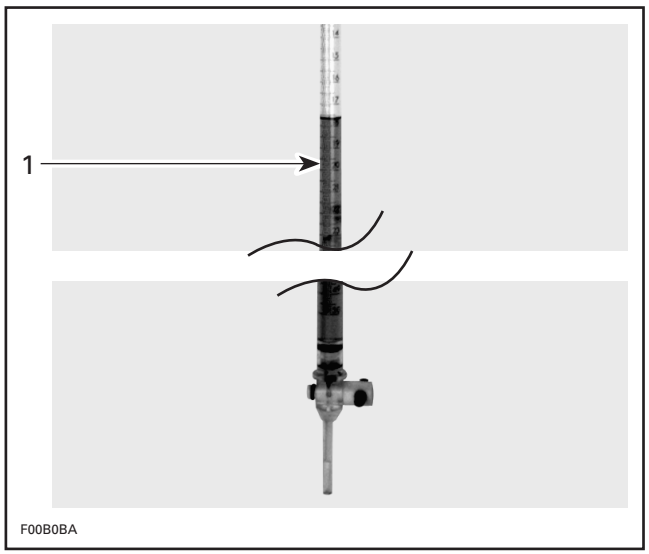
NOTE: When checking the combustion chamber volume, engine must be cold, piston must be free of carbon deposit and cylinder head must be leveled.

1. Remove both spark plugs and bring one piston to Top Dead Center a using a TDC gauge.



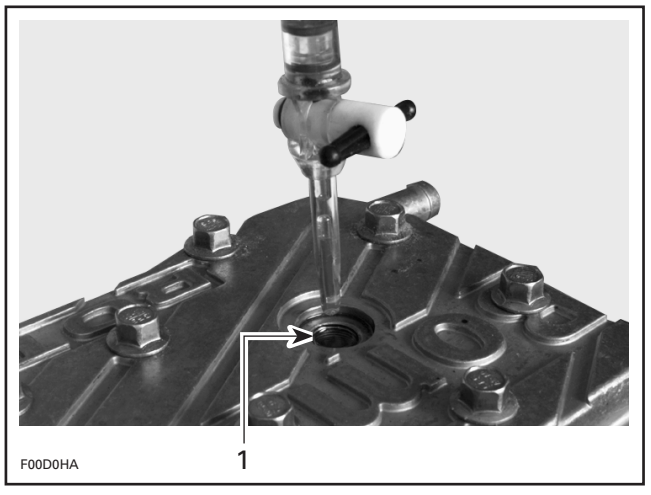
1. Bring piston to TDC

2. Obtain a graduated burette (capacity 0-50 cc) and fill with an equal part (50/50) of gasoline and injection oil.



1. Graduated burette (0-50 cc)

3. Open burette valve to fill its tip. Add liquid in burette until level reaches 0 cc.
4. Inject the burette content through the spark plug hole until liquid touches the top spark plug hole.



1. Top of spark plug hole

NOTE: The liquid level in cylinder must not drop for a few seconds after filling. If so, there is a leak between piston and cylinder. The recorded volume would be false.

5. Let burette stand upward for about 10 minutes, until liquid level is stabilized.
6. Read the burette scale to obtain the quantity of liquid injected in the combustion chamber.

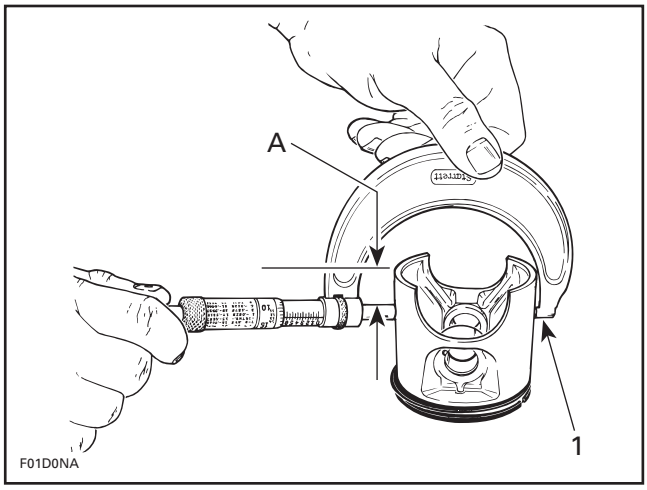
NOTE: When the combustion chamber is filled to top of spark plug hole, it includes an amount of 2.25 cc corresponding to the spark plug tip.

7. Repeat the procedure for the other cylinder.

ENGINE TYPE	COMBUSTION CHAMBER VOLUME (cc) (up to top thread of spark plug hole)
599	20.35 ± 0.8
699	23.45 ± 1.0
809	26.35 ± 1.1

USED PISTON MEASUREMENT

Using a micrometer, measure piston at A perpendicularly (90°) to piston pin.



1. Measuring perpendicularly (90°) to piston pin axis
A. See table below

ENGINE TYPE	DIMENSION A mm (in)
599	26.2 (1.03)
699 and 809	28.7 (1.13)

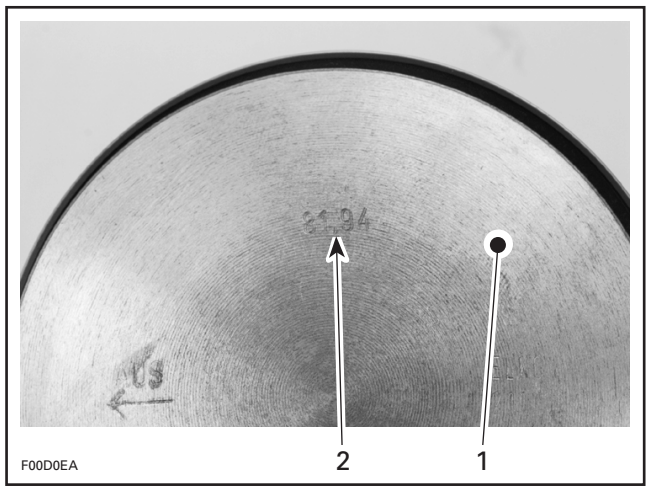
The measured dimension should be the same as the one scribed on piston dome. If not, install a new piston.

CYLINDER/PISTON CLEARANCE

Used and New Pistons

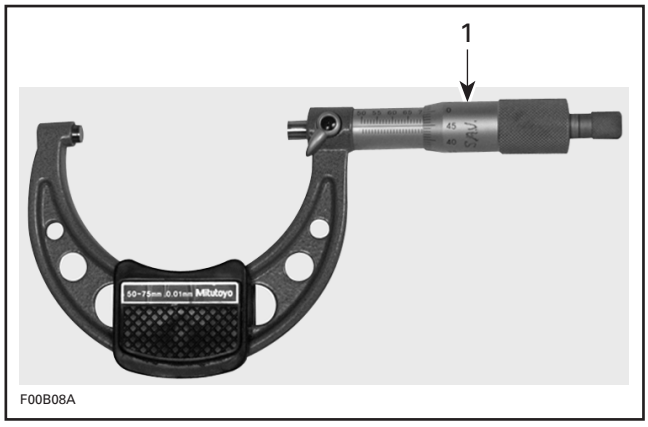
NOTE: Make sure used piston is not worn. See USED PISTON MEASUREMENT above.

Take the measurement on the piston dome.



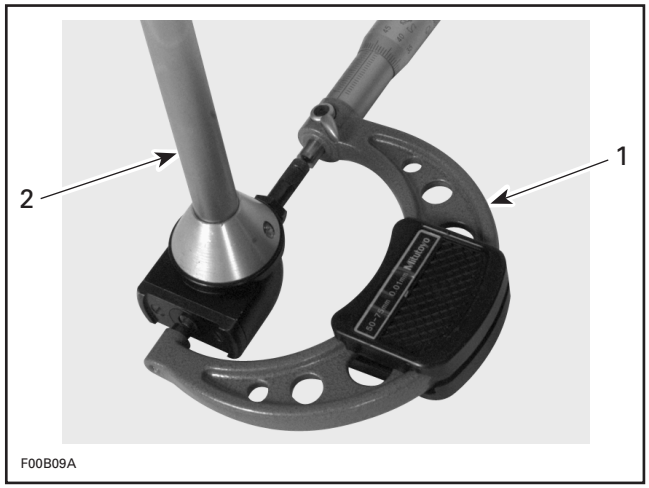
1. Piston dome
2. Piston measurement

Adjust and lock a micrometer to the specified value on the piston dome.

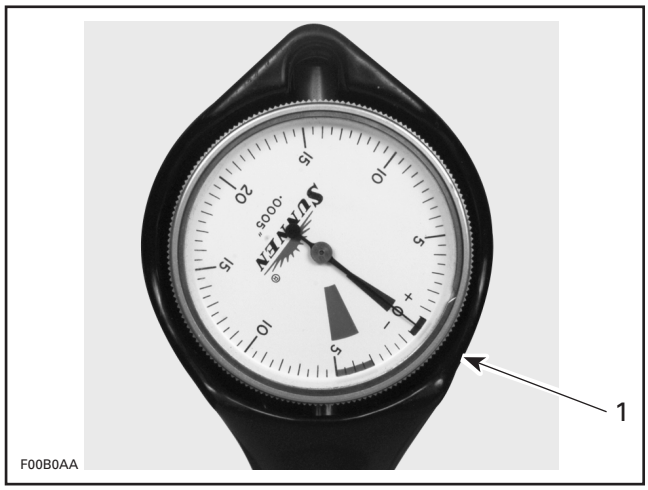


1. Micrometer set to the piston dimension

With the micrometer set to the piston dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0.

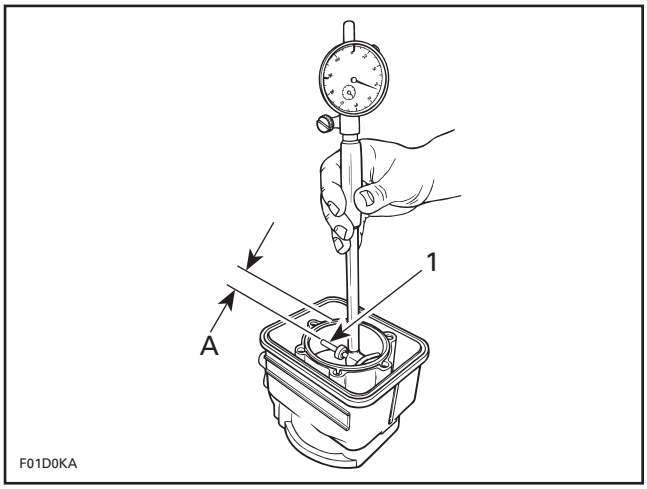


1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



1. Indicator set to 0 (zero)

Position the dial bore gauge at 16 mm (5/8 in) below cylinder top edge.



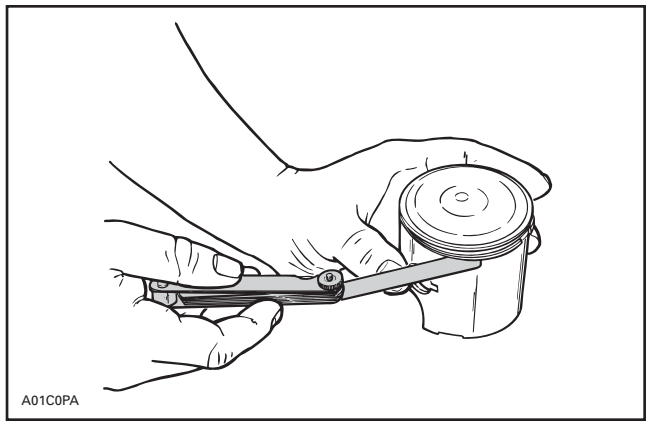
1. Measuring perpendicularly (90°) to piston pin axis
A. 16 mm (5/8 in)

Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance. If clearance exceeds specified tolerance, replace cylinder or rebore. Refer to TECHNICAL DATA 10.

NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.

RING/PISTON GROOVE CLEARANCE

Using a feeler gauge check clearance between rectangular ring and groove. Replace piston if clearance exceeds specified tolerance. Refer to TECHNICAL DATA 10.

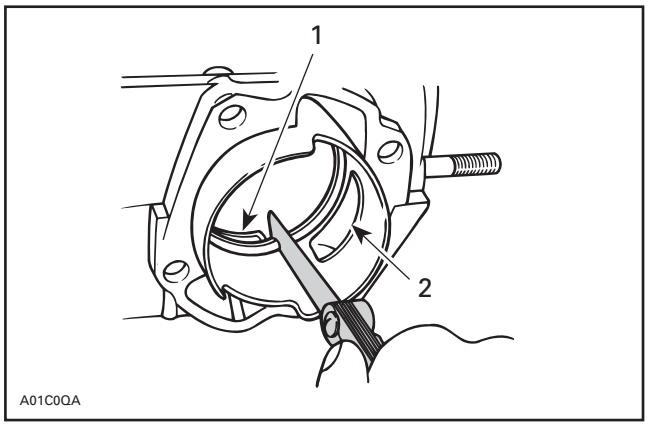


RING END GAP

Position ring half-way between transfer ports and intake port. On rotary valve engines, position ring just below transfer ports.

NOTE: In order to correctly position the ring in the cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. Replace ring if gap exceeds specified tolerance. Refer to TECHNICAL DATA 10.



1. Transfer port
2. Intake port

CRANKSHAFT DEFLECTION

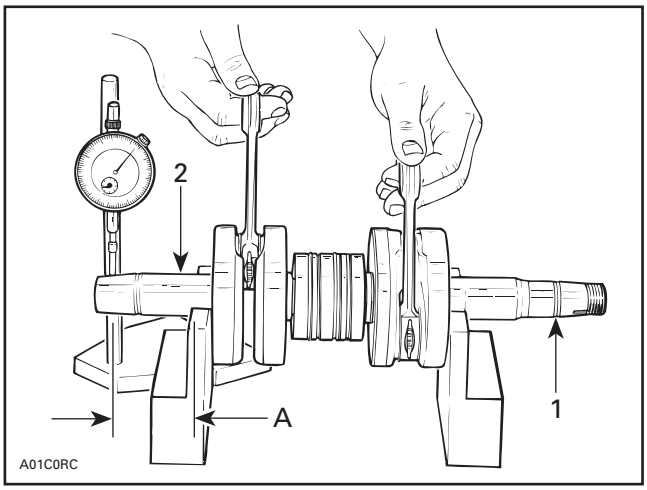
Crankshaft deflection is measured with a dial indicator.

Measuring (in engine)

First, check deflection with crankshaft in engine. If deflection exceeds the specified tolerance, recheck deflection using V-shaped blocks to determine the defective part(s). See below.

Measuring (on bench)

Once engine is disassembled, check crankshaft deflection on V-shaped blocks. If deflection exceeds the specified tolerance, it can be worn bearings or a bent crankshaft. Remove crankshaft bearings and check deflection again on V-shaped blocks to determine the defective part(s). See measurement A in following illustration.



TYPICAL

1. Measure at mid point between the key and the first thread
2. Mid point of crankshaft bearing
A. See table below

Crankshaft Deflection on PTO Side

ENGINE TYPE	DISTANCE A mm (in)	MAXIMUM ON PTO SIDE mm (in)
599 and 699	105.9 (4.169)	0.06 (.0024)
809	94.4 (3.717)	

Crankshaft Deflection on MAG Side

ENGINE TYPE	MAXIMUM ON MAG SIDE mm (in)
All	0.05 (.002)

Crankshaft Deflection in Center of Crankshaft

ENGINE TYPE	MAXIMUM IN CENTER OF CRANKSHAFT
All	0.08 mm (.0031 in)

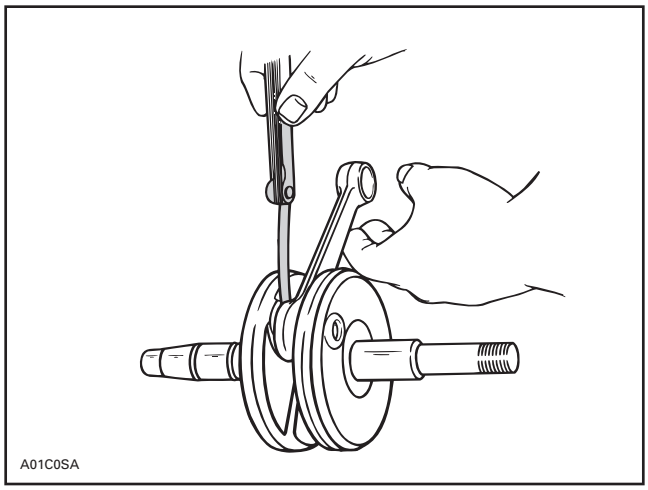
NOTE: Crankshaft deflection cannot be correctly measured between centers of a lathe.

If the deflection exceeds the specified tolerance, crankshaft should be repaired or replaced.

CONNECTING ROD BIG END AXIAL PLAY

ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
599 and 699	0.39 - 0.74 mm (.015 - .029 in)	1.20 mm (.047 in)
809	0.31 - 0.68 (.012 - .027 in)	1.20 mm (.047 in)

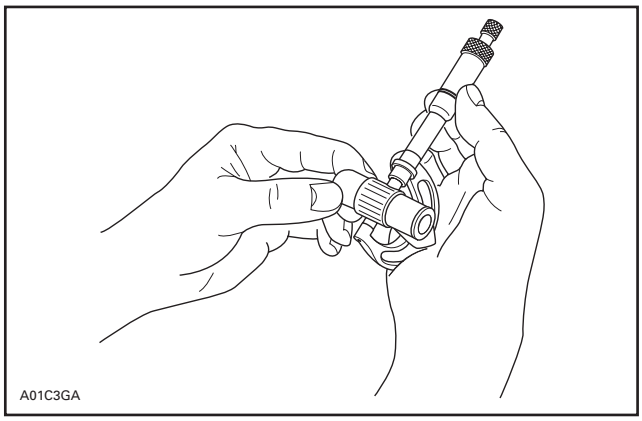
Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight. If the distance exceeds specified tolerance, repair or replace the crankshaft.

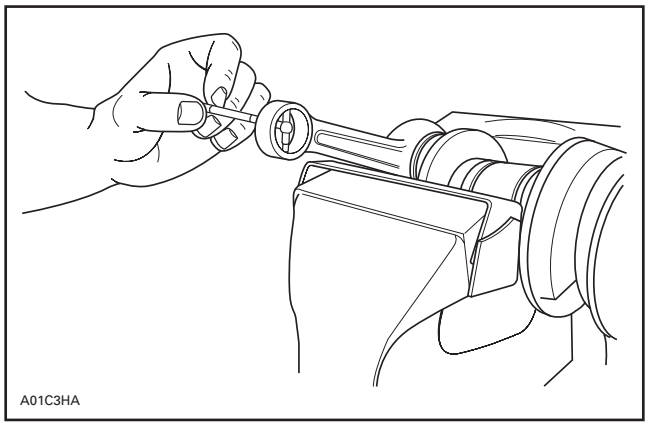


TYPICAL

CONNECTING ROD/PISTON PIN CLEARANCE

Measure piston pin with its needle bearing. Compare to inside diameter of connecting rod.





ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
All	0.003 - 0.012 mm (.0001 - .0005 in)	0.015 mm (.0006 in)

CONNECTING ROD/CRANKPIN CLEARANCE

ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
All	0.024 - 0.038 mm (.0004 - .0015 in)	0.06 mm (.0024 in)

CRANKSHAFT END-PLAY

All Engine Types

End-play is not adjustable but it should be between 0.10 - 0.30 mm (.004 - .012 in).

CHECKING SURFACE FLATNESS

Intake manifold, intake manifold cover, rotary valve cover can be checked for perfectly mating surfaces.

Lay part on a surface plate (marble, mirror or thick glass plate).

Holding down one end of part, try pushing down the other end.

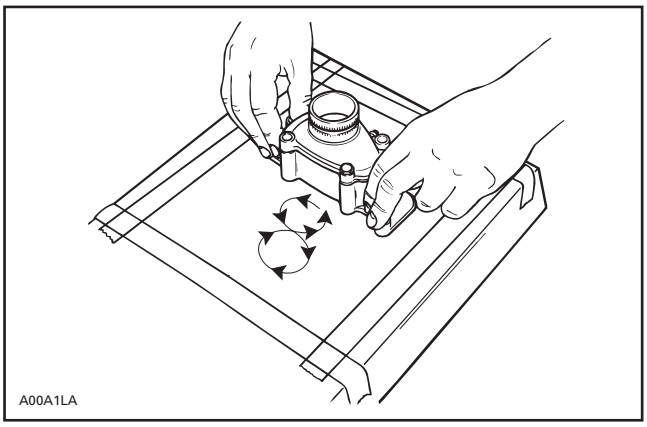
If any play is felt, part must be rectified.

RECTIFYING SURFACES

Stick a fine sand paper sheet on the surface plate then lightly oil the sand paper.

Rub manifold mating surface on sand paper using 8-figure movements.

Sand until mating surface is perfectly straight.



CHECKING CRANKSHAFT ALIGNMENT

Install a degree wheel (P/N 414 352 900) on crankshaft end.

Remove both spark plugs.

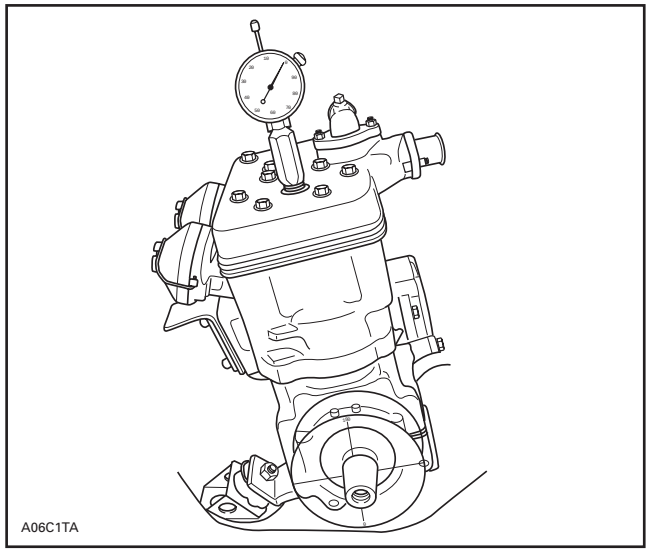
Install a TDC gauge (P/N 414 104 700) in spark plug hole on MAG side.

Bring MAG piston at top dead center.

Rotate degree wheel (not crankshaft) so that 360° mark aligns with center of crankcase. Scribe a mark on crankcase.

Remove TDC gauge and install it on center cylinder.

Bring center piston to top dead center. Degree wheel must rotate with crankshaft.



TYPICAL

Interval between cylinders must be 120° ± 0.5.

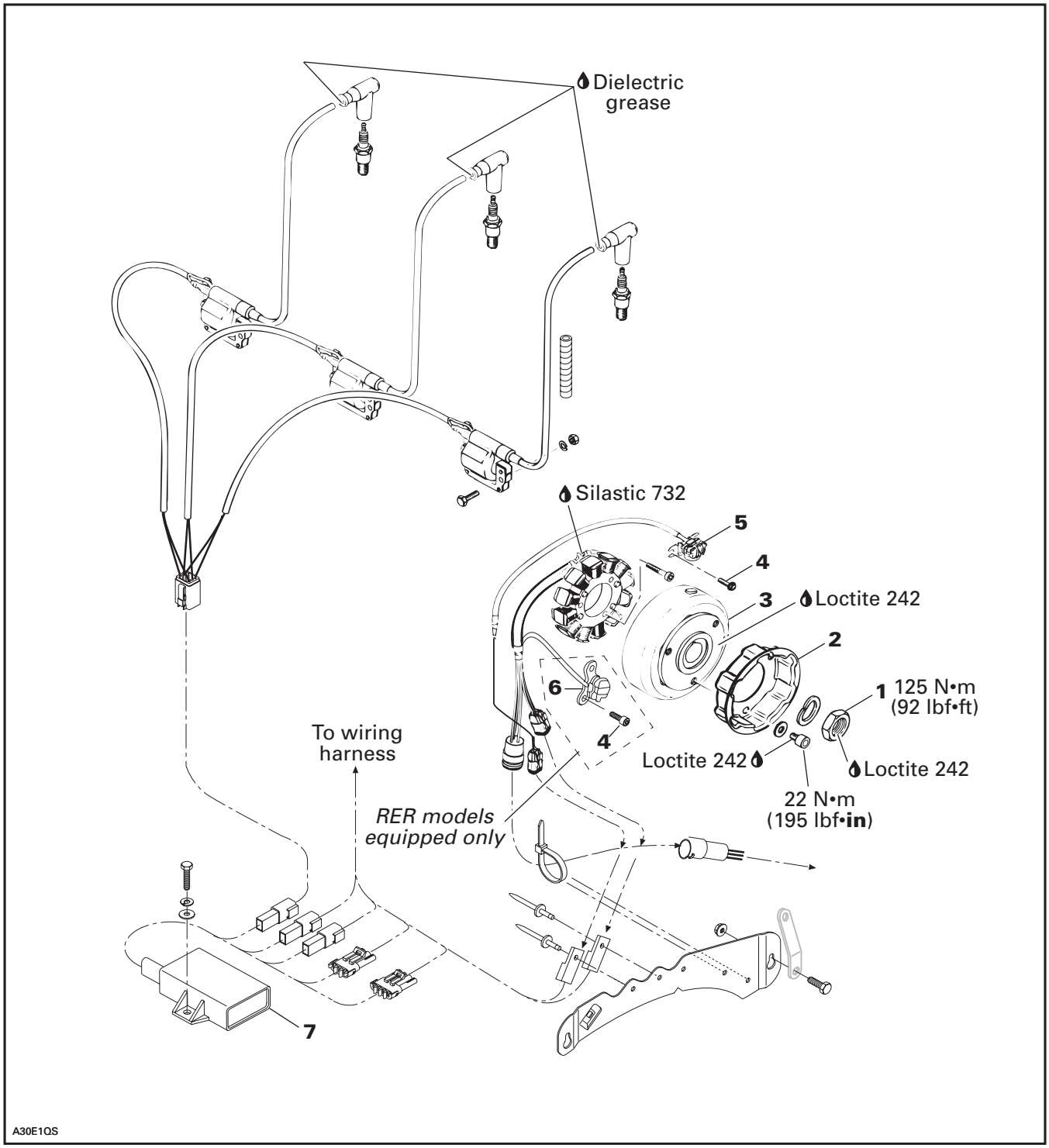
Proceed the same with MAG side piston.

Any other reading indicates a misaligned (twisted) crankshaft.

CDI SYSTEM

NIPPONDENSO TRIGGER COIL IGNITION SYSTEM

290 W on 599, 699 and 809 Engines



NOTE: The following procedures can be done without removing the engine from chassis. To facilitate magneto removal, hold drive pulley with tool (P/N 529 027 600).

CDI means Capacitor Discharge System.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ CAUTION

Clean stator and magneto using only a clean cloth.

DISASSEMBLY

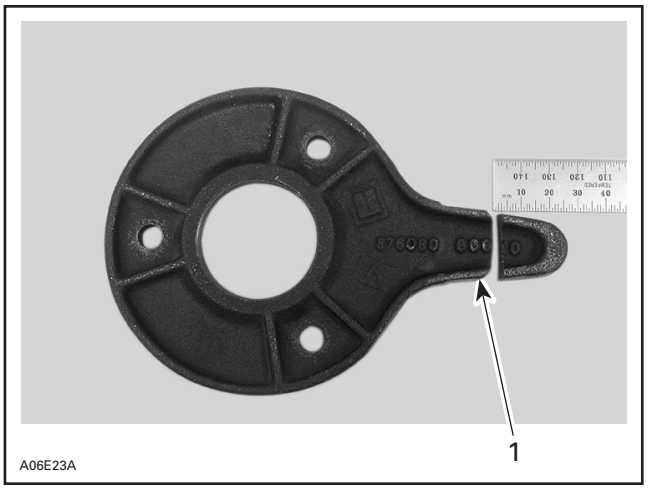
3, Magneto Flywheel

To gain access to magneto assembly, remove the following parts as needed on different engines:

– tuned pipe(s) and muffler
– rewind starter
– starting pulley **no. 2**

To remove magneto flywheel retaining nut **no. 1**:

Use magneto puller ring (P/N 420 876 080). Former puller has to be modified as shown.

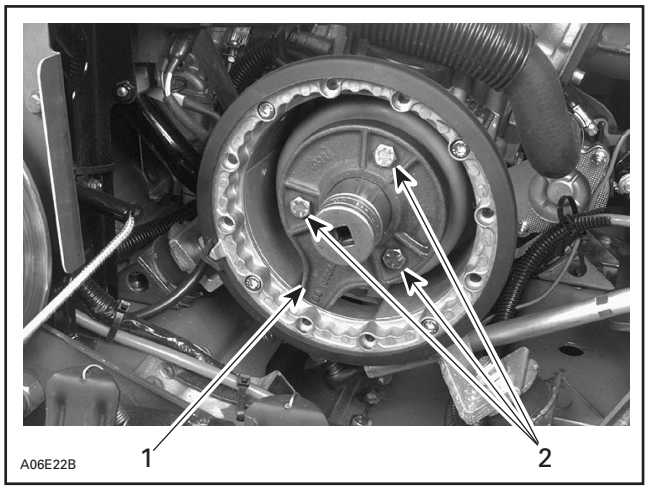


1. Cut by 25 mm (1 in)

Install puller with its tab in magneto housing opening.

▼ CAUTION

Use only M8 x 20 mm screws to bolt puller to magneto.



TYPICAL

1. Tab in magneto housing opening
2. M8 x 20 mm screws

– Remove magneto flywheel nut, using a 30 mm socket machined to 40 mm (1.580 in) outside diameter by 16 mm (5/8 in) long.

NOTE: To correctly remove a threadlocked fastener it is first necessary to tap on the fastener to break threadlocker bond. This will eliminate the possibility of thread breakage.

To remove magneto flywheel, install the puller (P/N 529 022 500).

– Tighten puller bolt and at the same time, tap on bolt head using a hammer to release magneto flywheel from its taper.

5,6, Trigger Coil

NOTE: As spare parts only trigger coil with GN/BL and GY/BL wires is available. This trigger coil can replace any of both trigger coils installed on RER models.

Magneto and stator plate must be removed before trigger coil removal.

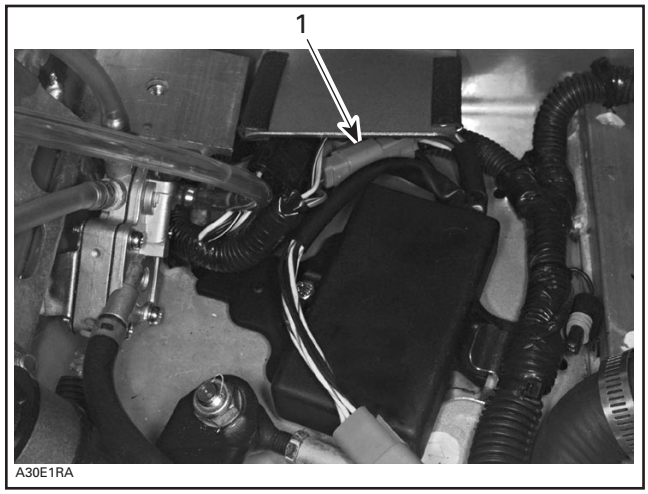
To replace trigger coil:

– Disconnect trigger coil connector housing.
– Remove grommet from crankcase where trigger coil wire exits magneto housing.
– Remove retaining screws **no. 4**.
– Remove trigger coil and carefully pull wires.
– Install new trigger coil and other parts removed.

ASSEMBLY

7, MPEM

After bolting MPEM to its bracket make sure that housings are located as illustrated.



1. Housings under protector

3, Magneto Flywheel

Clean crankshaft extension (taper) and apply Loctite 242 (blue) on taper, then position Woodruff key, flywheel and lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue) then tighten nut 125 N•m (92 lbf•ft).

At reassembly coat all electric connections except Deutsch housings (waterproof gray housing) with silicone dielectric grease (P/N 413 701 700) to prevent corrosion or moisture penetration.

▼ CAUTION

Do not use silicone "sealant", this product will corrode contacts. Do not apply silicone dielectric grease on any Deutsch (gray) housing otherwise housing seal will be damaged.

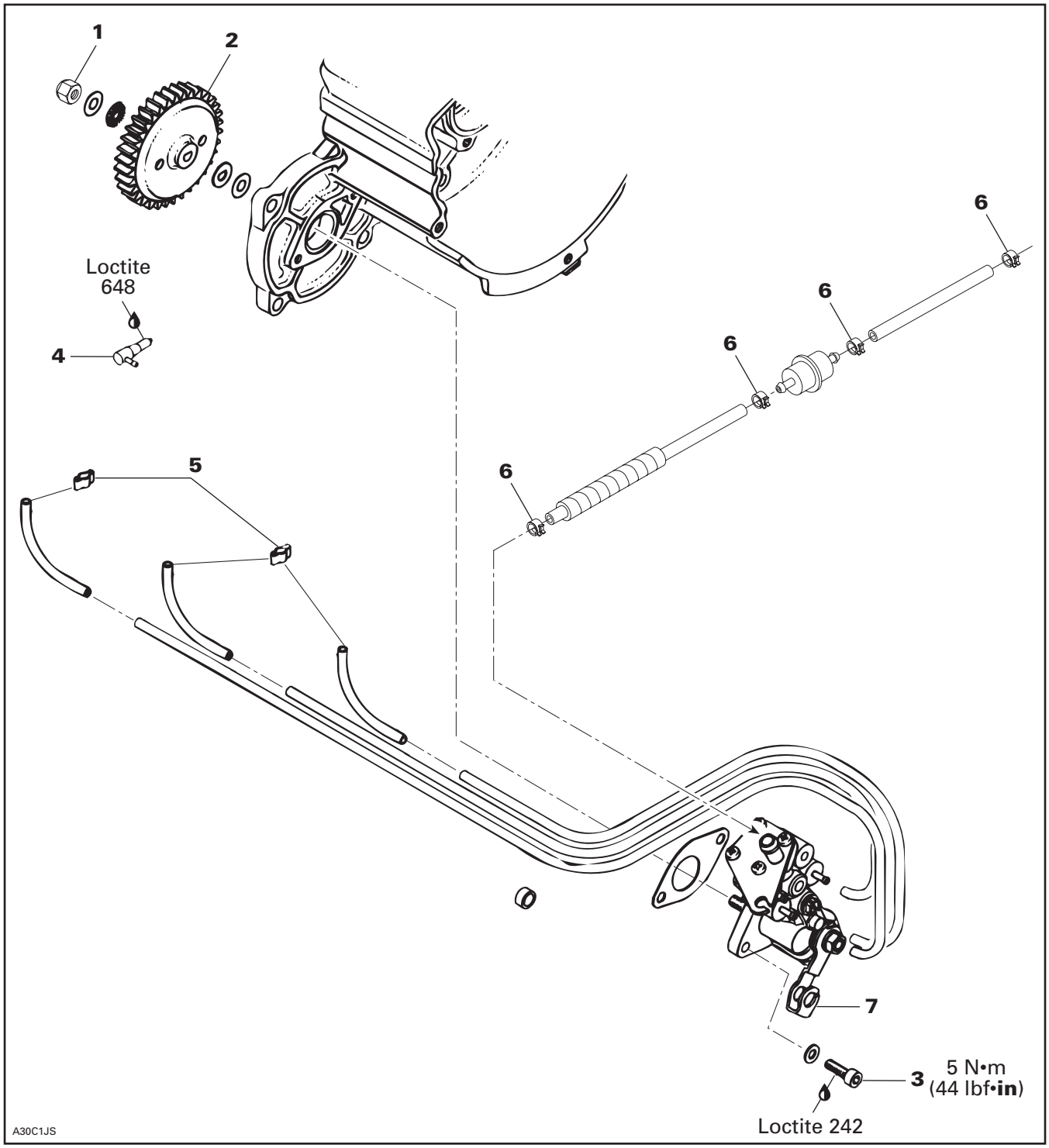
Ignition Timing

Check as described in IGNITION TIMING 06-02.

OIL INJECTION SYSTEM

OIL INJECTION PUMP

599, 699 and 809 Engines



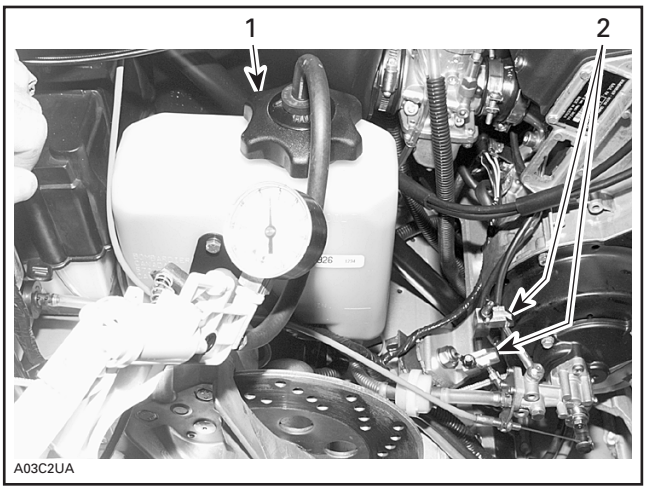
OIL SYSTEM LEAK TEST

All Models

The following test will indicate any leak from oil reservoir to the banjo fitting(s).

Install on oil reservoir special cap of leak testing kit (P/N 529 033 100).

Install hose pinchers (P/N 295 000 076) on outlet hoses.



TYPICAL

1. *Special cap on reservoir*
2. *Hose pinchers on outlet hoses*

Connect pump of leak testing kit to special cap.

Pressurize oil system to 34 kPa (5 PSI). That pressure must not drop during 3 minutes.

If pressure drops, locate leak(s) and repair/replace leaking component(s). To ease locating leak(s) spray soapy water on components, bubbles will indicate leak location(s).

OIL PUMP IDENTIFICATION

7, Pump Lever

Different engines need different pumps. See identification on lever no. 7.

▼ CAUTION

Always mount proper pump on engine.

ENGINE TYPE	OIL PUMP IDENTIFICATION
599	12
699	12
809	13

NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

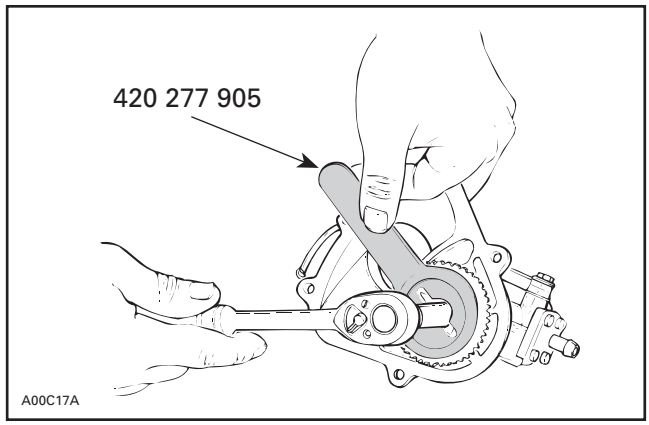
DISASSEMBLY

NOTE: Some oil pump components are not available as single parts.

1,2, Gear Retaining Nut and Oil Pump Gear

To remove gear retaining nut, first extract the needle roller with pliers then lock gear in place using one of the following gear holder.

ENGINE TYPE	TOOL P/N
599/699/809	420 277 905



TYPICAL

ASSEMBLY

2, Oil Pump Gear

At gear assembly, apply a light coat of low temperature grease (P/N 413 706 100) on gear teeth.

5,6, Spring Clip and Clamp

Always check for spring clips tightness.

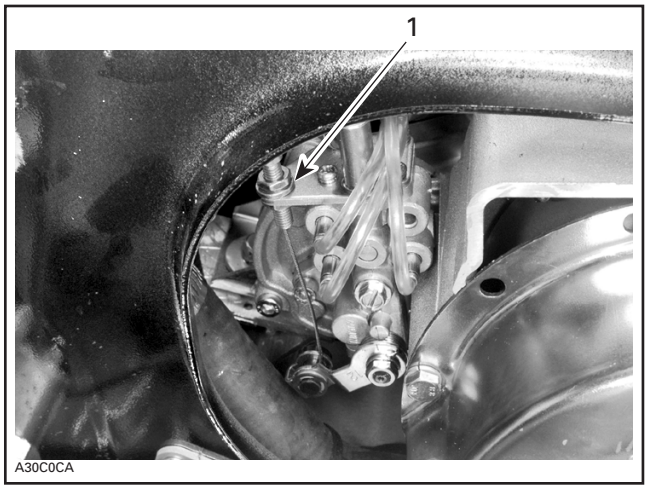
3, Screw

Torque to 5 N•m (44 lbf•**in**).

Make sure cable barrel is well seated in oil pump lever.

Secure barrel with plastic washer and circlip.

Install cable lock washer above support.



1. Lock washer

Verify cable and oil pump lever operation.

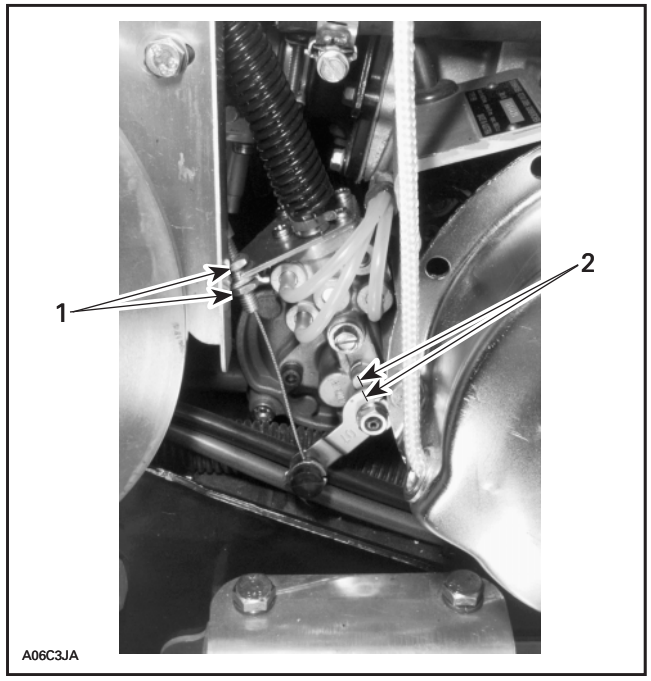
ADJUSTMENT

Prior to adjusting the pump, make sure all carburetor adjustments are completed.

Synchronizing Pump with Carburetor

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place. The aligning marks on the pump casting and on the lever must align. If not, loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.



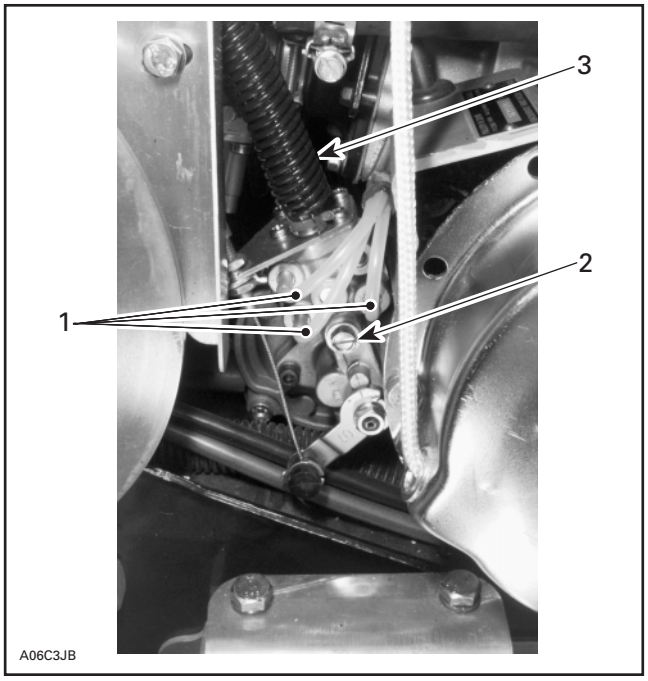
1. Adjuster nut
2. Marks in line

▼ CAUTION

Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

To Bleed Oil Lines

Bleed main oil line (between tank and pump) by loosening the bleeder screw until air has escaped from the line. Add injection oil as required.

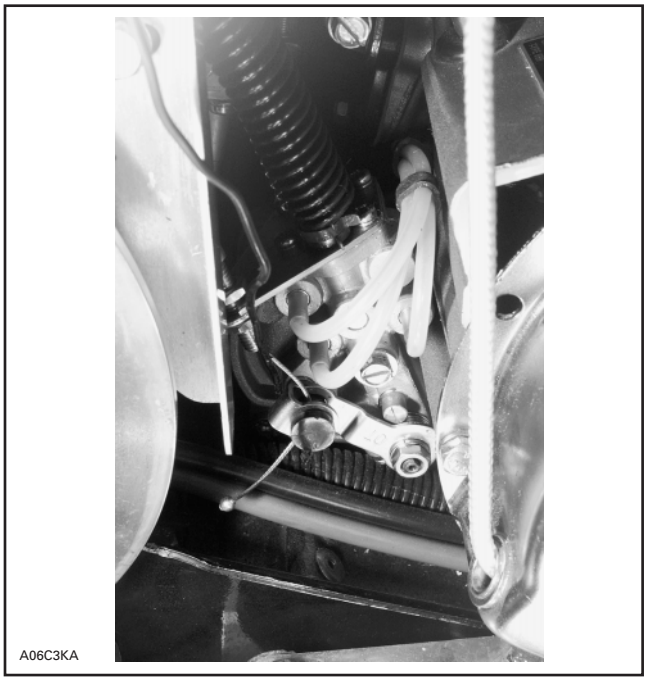


1. Small oil lines
2. Bleeder screw
3. Main oil line

Reinstall all parts.

Bleed the small oil line between pump and intake manifold by running engine at idle while holding the pump lever in fully open position.

NOTE: Make a J hook out of mechanical wire to lift the lever.



TYPICAL — ENGINE AT IDLE

◆ WARNING

Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

CHECKING OPERATION

Oil Pump

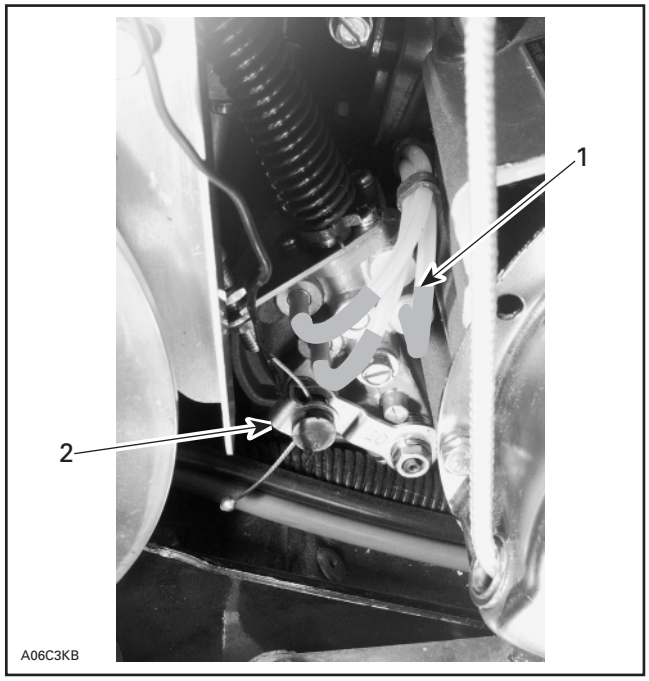
On Vehicle

NOTE: Main oil line must be full of oil. See bleeding procedure above.

Lift rear of vehicle and support with a mechanical stand. Unplug oil lines from pump. Start engine and stop it as soon as it fires.

Check that oil in small oil lines has been sucked up (this will be indicated by a clear section of small oil lines). Repeat the procedure until this condition is attained.

Reconnect small oil lines, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.



TYPICAL — ENGINE AT IDLE

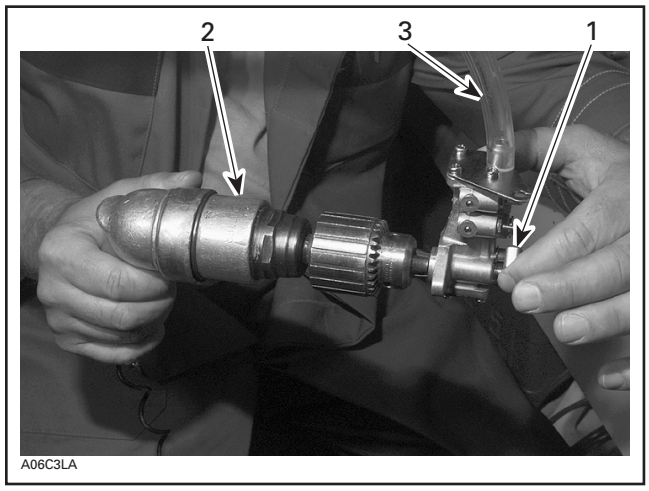
1. Oil columns advancing
2. Fully open position

If not, remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as describes below.

NOTE: Through normal use, oil level must not drop in small tubes. If oil drops, verify check valve operation in injection nozzle. Replace as necessary.

Test Bench

Connect a hose filled with injection oil to main line fitting. Insert other hose end in an injection oil container. Using a clockwise rotating drill rotate pump shaft. Oil must drip from outer fittings while holding lever in a fully open position. If not replace pump.



TYPICAL

1. *Fully open position*
2. *Clockwise rotating drill*
3. *Main line*

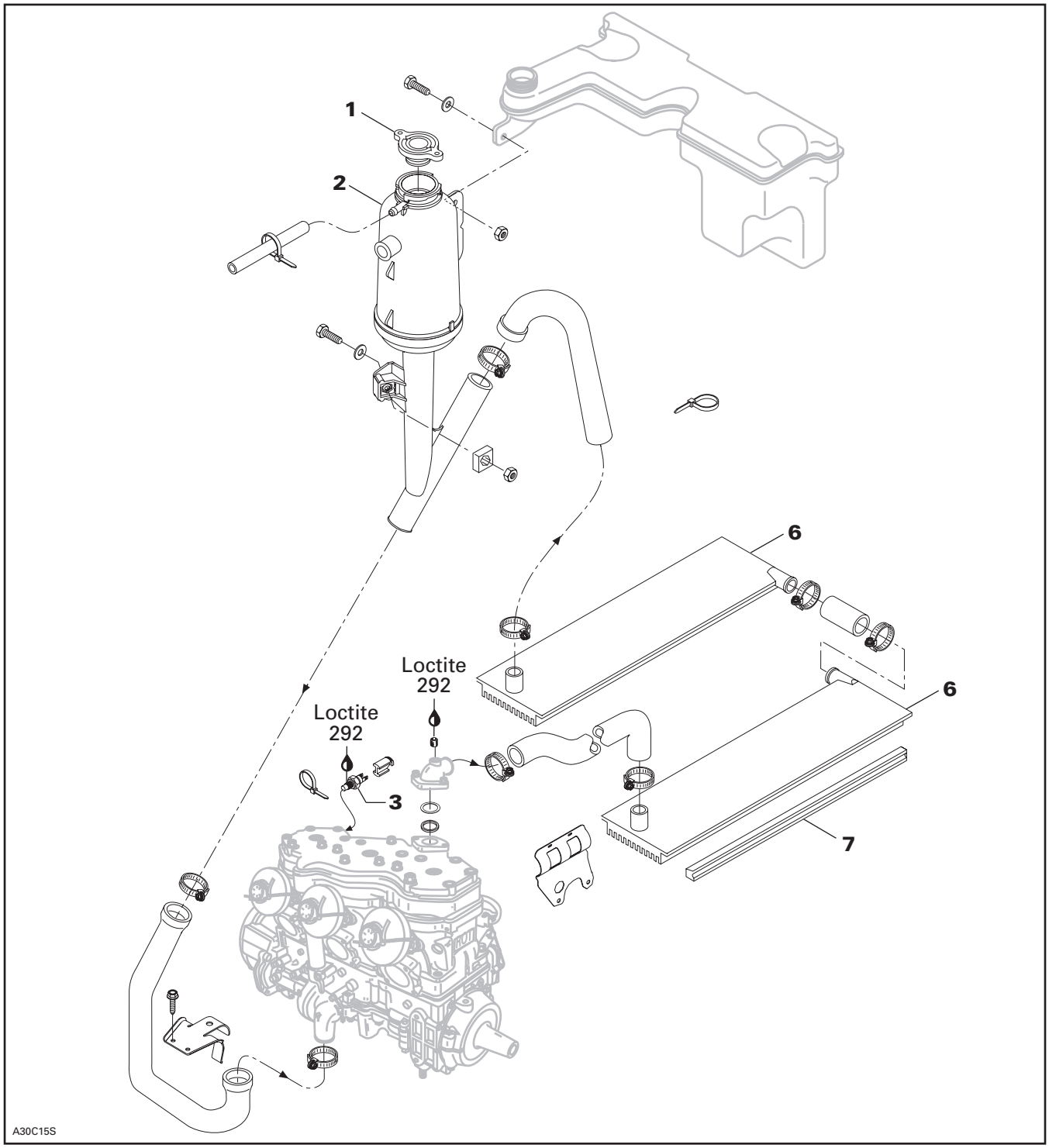
Check Valve

To verify this check valve, proceed the same as for checking pump operation on vehicle. First unplug oil line from check valve. After restarting the engine, check that a clear section in small oil line is present. Reconnect oil line.

Run engine at idle. Oil column must advance. If the check valve is faulty, oil column will go back and forth. Replace if so.

LIQUID COOLING SYSTEM

599, 699 and 809 Engines



THEORY

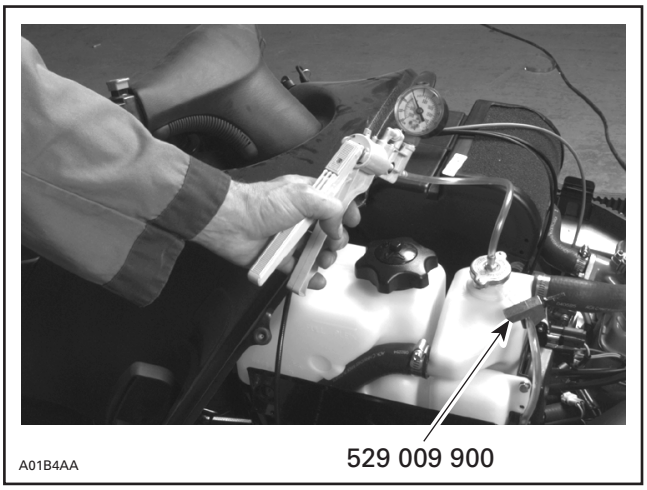
2, Coolant Tank

The coolant expands as the temperature (up to 90-100°C (195-212°F)) and pressure rise in the system. When the limiting system working pressure (cap) is reached (90 kPa (13 PSI)), the pressure relief valve in the pressure cap is lifted from its seat and allows coolant to flow through the overflow hose.

COOLING SYSTEM LEAK TEST

Install special plug (radiator cap) (P/N 529 021 400) and hose pincher (P/N 529 009 900) on overflow hose. Pressurize all system through coolant reservoir to 100 kPa (15 PSI).

Check all hoses and cylinder/base for coolant leaks. Spray a soap/water solution and look for air bubbles.



TYPICAL

INSPECTION

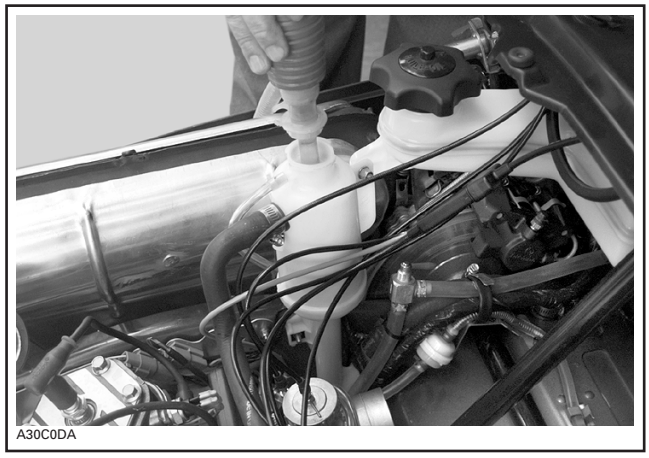
Check general condition of hoses and clamp tightness.

DRAINING THE SYSTEM

◆ WARNING

Never drain or refill the cooling system when engine is hot.

To drain the cooling system, siphon the coolant mixture from the coolant tank. Use a primer pump with a plastic hose inserted as deep as possible into the lower hose.



TYPICAL

When the coolant level is low enough, lift the rear of vehicle to drain the radiators.

DISASSEMBLY AND ASSEMBLY

3,4, Sender and Plug

Apply Loctite 592 (P/N 413 702 300) thread sealant on sender and plug to avoid leaks.

1, Pressure Cap

Check if the cap pressurizes the system. If not, install a new 90 kPa (13 PSI) cap (do not exceed this pressure).

6,7, Radiator and Radiator Protector

Insert radiator protector into radiator C-rail and crimp C-rail at both ends. Refer to FRAME 09-03 for radiator removal.

COOLING SYSTEM REFILLING PROCEDURE

Recommended Coolant

Use a blend of 60% antifreeze with 40% water. Do not reinstall pressure cap.

▼ CAUTION

To prevent rust formation or freezing condition, always replenish the system with 60% antifreeze and 40% water. Pure antifreeze without water freezes. Always use ethylglycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

System Capacity

Refer to TECHNICAL DATA 10.

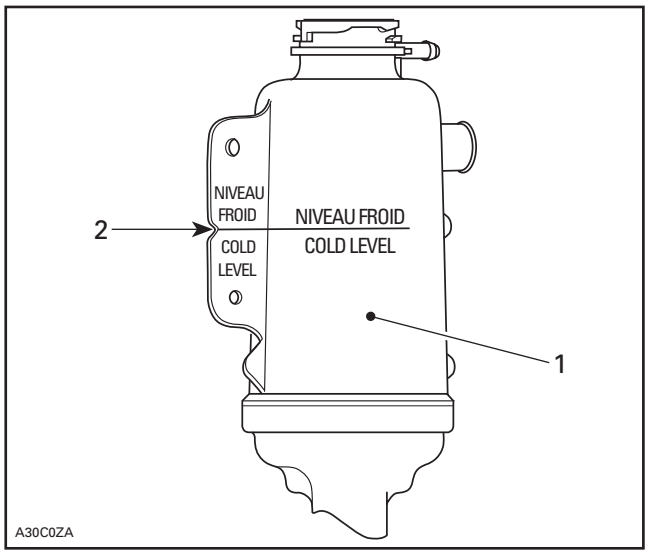
Refilling Procedure

Lift front of vehicle until the tunnel is horizontal. With engine cold, refill coolant tank up to cold level line. Wait a few minutes then refill to line. Install pressure cap. Start engine. Refill up to line while engine is idling until all air bubles have excaped from system (about 4 to 5 minutes). Install pressure cap.

To make sure coolant flows through radiators, touch them by hand. They must feel warm.

Put back front of vehicle on the ground.

When engine has completely cooled down, recheck coolant level in coolant tank and refill up to line.

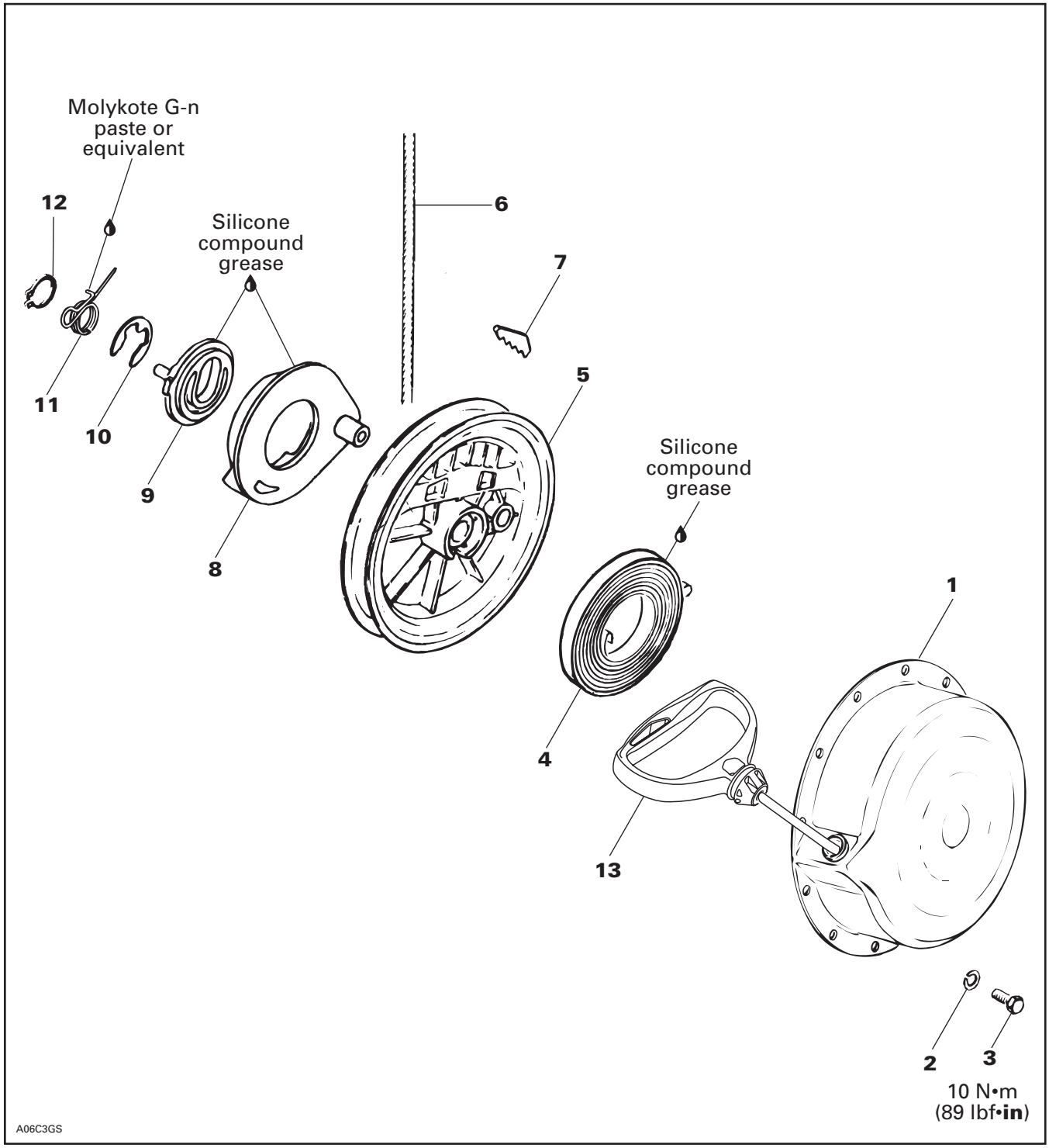


1. Coolant tank
2. COLD LEVEL line

Check coolant concentration (freezing point) with proper tester.

REWIND STARTER

All Models



REMOVAL

Using a small screwdriver, extract rope knot from starter grip **no. 13**. Cut rope close to knot. Tie a knot near starter.

Remove screws **no. 3** and washers **no. 2** securing rewind starter **no. 1** to engine then remove rewind starter.

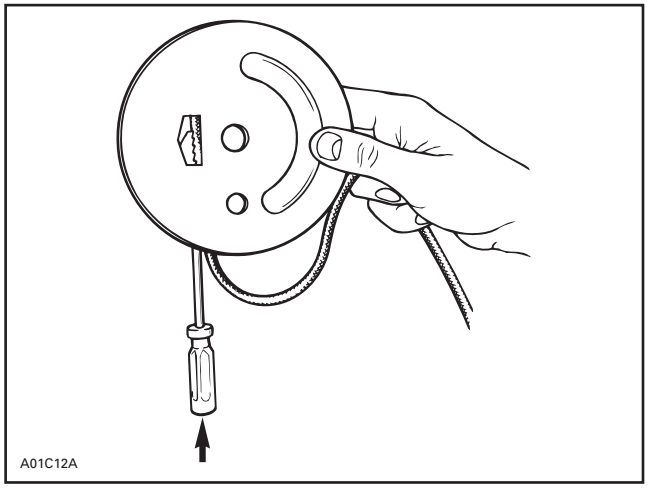
DISASSEMBLY

To remove rope from rewind starter mechanism:

– First remove locking ring **no. 12**, locking spring **no. 11**, circlip **no. 10**, pawl lock **no. 9** and pawl **no. 8**.

– Remove sheave **no. 5** from starter housing **no. 1**.

– Disengage key **no. 7** and pull out rope **no. 6**.



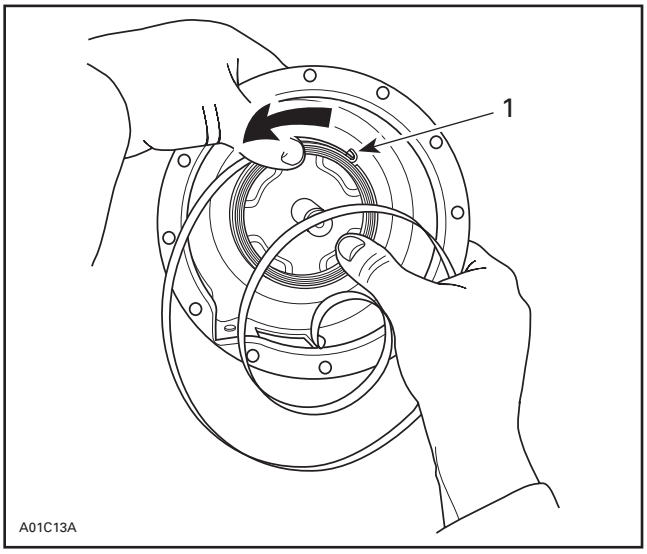
GENTLY TAP ON KEY

ASSEMBLY

At assembly, position spring **no. 4** outer end into spring guide notch then wind the spring counterclockwise into guide.

◆ WARNING

Since the spring is tightly wound inside the guide it may fly out when rewind is handled. Always handle with care.



1. Outer end into guide notch

NOTE: Due to dust accumulation, rewind starter must be periodically cleaned, inspected and relubricated.

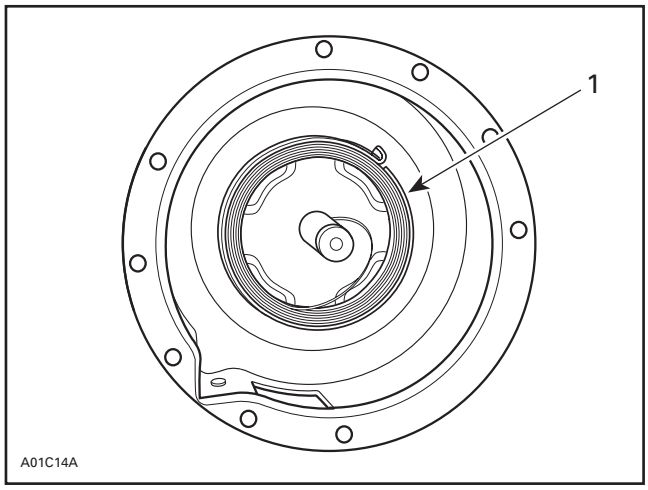
▼ CAUTION

It is of the utmost importance that the rewind starter spring(s) be lubricated periodically using specific lubricants. Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Lubricate spring assembly with silicone compound grease (P/N 420 897 061) and position into starter housing as illustrated.

▼ CAUTION

This lubricant must NOT be used on rewind starter locking spring as it does not stay on under vibration.

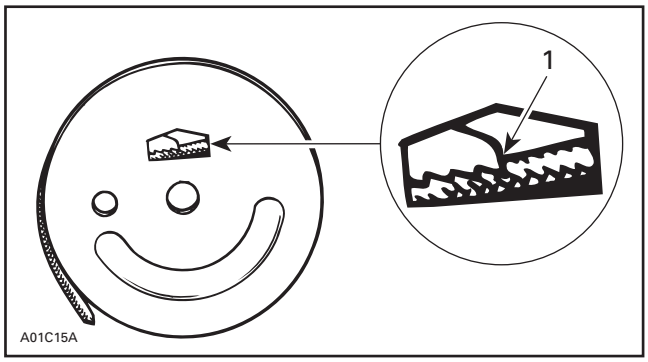


1. Grease inside spring guide

▼ CAUTION

The use of standard multi-purpose grease could result in rewind starter malfunction.

To install a new rope **no. 6**: insert rope into sheave **no. 5** orifice and lock it with the key **no. 7** as illustrated.



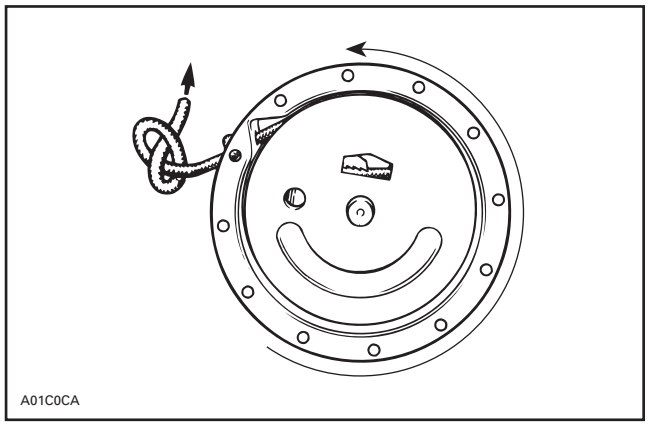
1. Push to lock

To adjust rope tension:

Wind rope on sheave and place rope sheave into starter housing making sure that the sheave hub notch engages in the rewind spring hook.

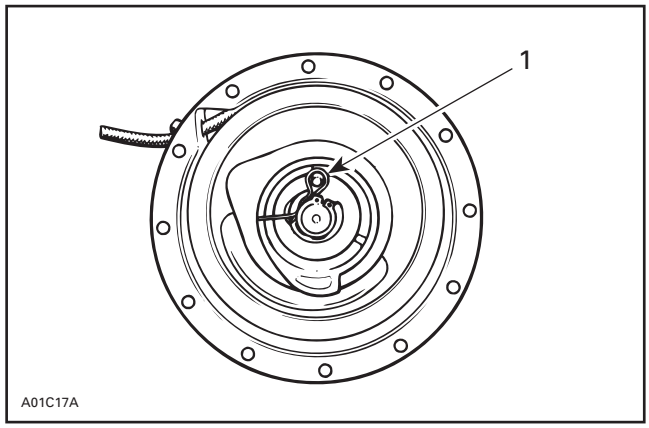
Rotate the sheave counterclockwise until rope end is accessible through starter housing orifice.

Pull the rope out of the starter housing and temporarily make a knot to hold it. One turn preload will give 7 turns of tension when fully extended.



Position pawl **no. 8**, pawl lock **no. 9** and circlip **no. 10**.

Install locking spring **no. 11** and lubricate with MOLYKOTE G-n paste from Dow Corning® or equivalent.



1. Spring coated with MOLYKOTE G-n paste

Install locking ring.

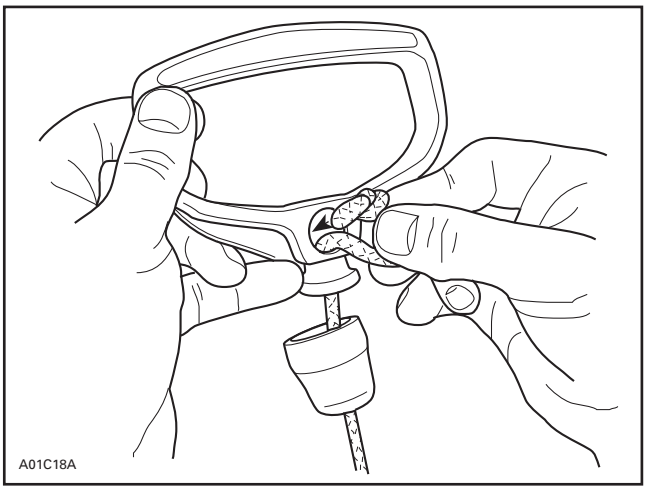
▼ CAUTION

This lubricant must NOT be used on rewind springs as it does not stay on when dry.

INSTALLATION

Reinstall rewind starter assembly on engine.

Prior to installing starter grip no. 13 on new rope, it is first necessary to fuse the rope end with a lit match. Pass rope through starter grip and tie a knot in the rope end. Fuse the knot with a lit match then insert rope end down and pull the starter grip over the knot.

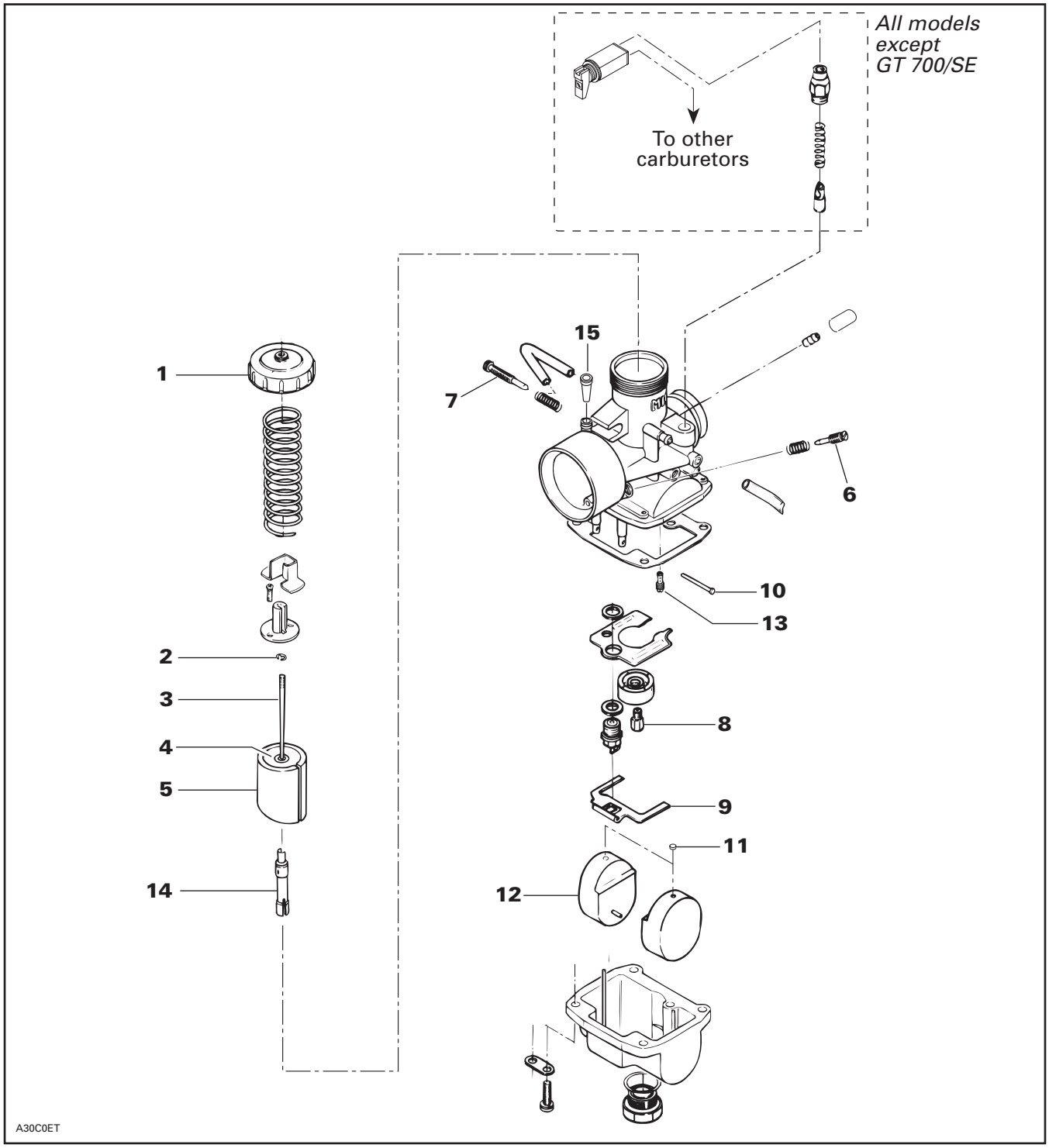


TYPICAL

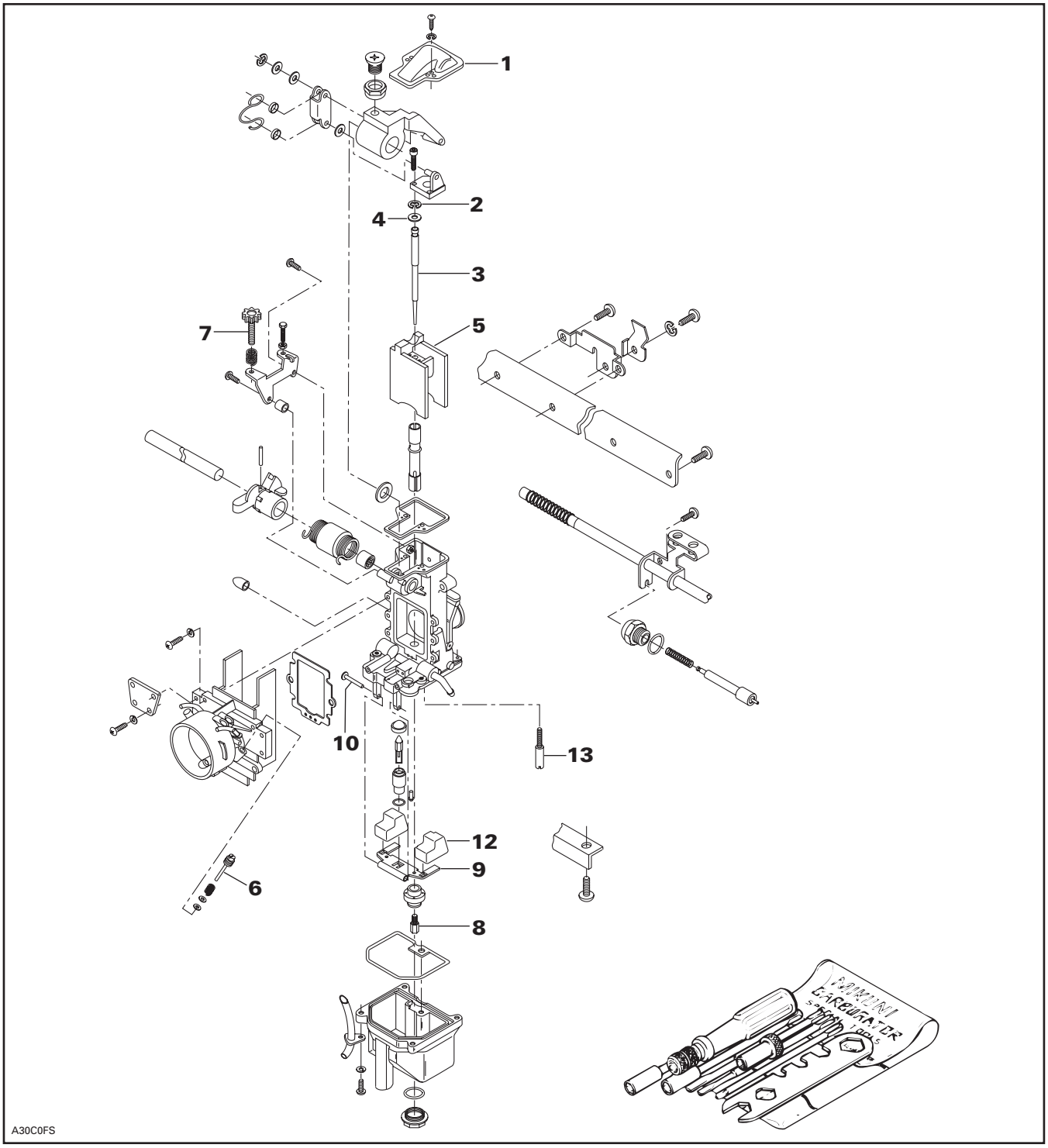
CARBURETOR AND FUEL PUMP

CARBURETOR

VM Type on Formula 600/700 and GT 700

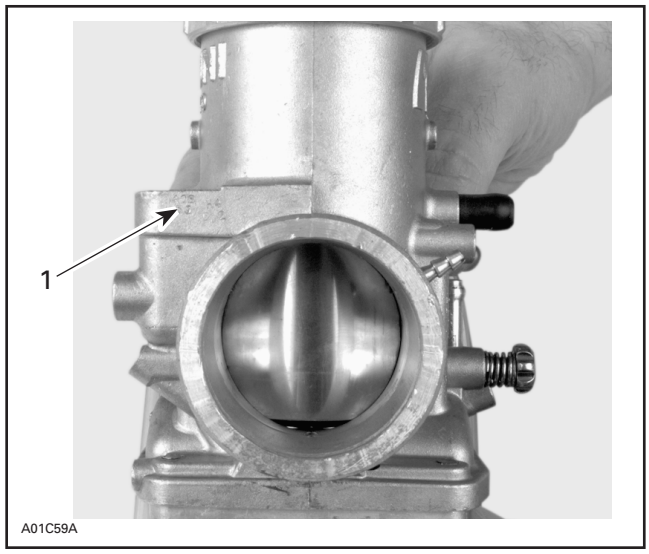


TM Type on GT SE, Formula III 800, Mach 1 and Mach Z Series



IDENTIFICATION

All carburetors are identified on their body.



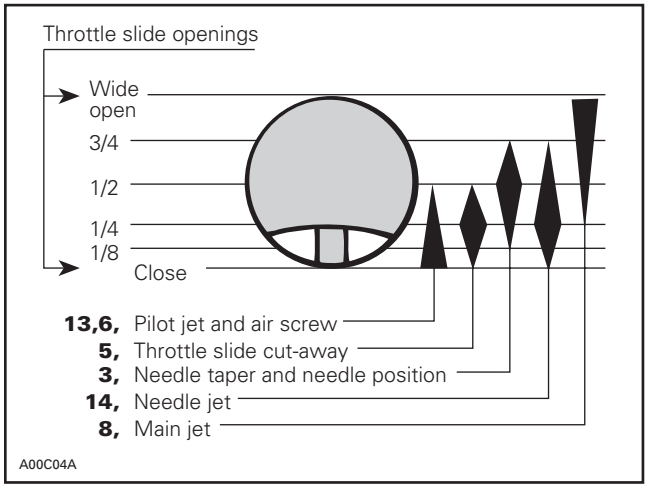
TYPICAL

1. Identification: 34-482

CARBURETOR CIRCUIT OPERATION VERSUS THROTTLE OPENING

The following illustration shows the part of the carburetor which begins and stops to function at different throttle slide openings.

Note that the wider part of symbol corresponds to the opening mostly affected. For instance, throttle slide cut-away begins to function at closed position but it is most effective at 1/4 opening and decreases up to 1/2 opening.



VIEW FROM AIR INTAKE OPENING

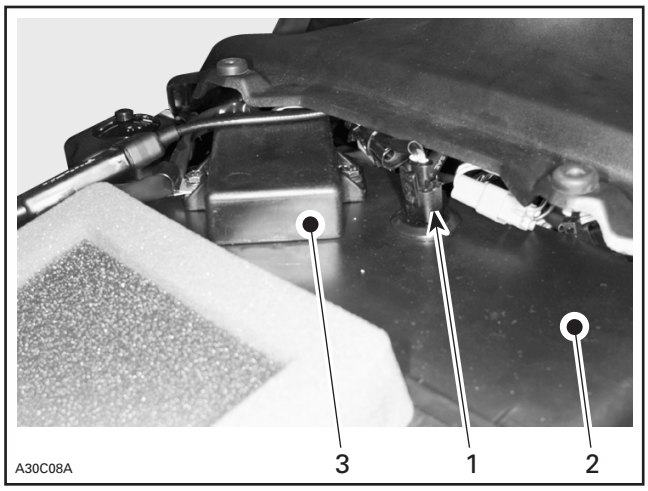
NOTE: For fine tuning refer to TECHNICAL DATA 10 and to SPARK PLUG 06-03.

NOTE: For high altitude regions, the *High Altitude and Sea Level Technical Data Booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude and temperature.

REMOVAL

Grand Touring 700/SE Only

Unplug air temperature sensor connector from air intake silencer and remove MPEM, as shown in the next photo.



TYPICAL

1. Air temperature sensor
2. Air intake silencer
3. MPEM

Twist DPM manifold and detach from air intake silencer.

All Models

Unhook latches then, remove air intake silencer from left hand side.

Disconnect fuel inlet lines.

Grand Touring 700/SE Only

Unplug DPM solenoid connectors. Disconnect air pump inlet at DPM manifold.

VM Type Carburetor

Unscrew carburetor cover no. 1 then pull out throttle slide no. 5 from carburetor.

◆ WARNING

Exercise care when handling throttle slide. Scratches incurred may cause throttle slide to stick open in operation.

Disconnect throttle cable from throttle slide.

TM Type Carburetor

Disconnect throttle cable from throttle shaft.

Disconnect choke cable.

All Models

Remove carburetors from engine.

VM Type Carburetor

Unscrew choke plunger from each carburetor.

CLEANING AND INSPECTION

All Models

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

▼ CAUTION

Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O-rings, etc. Therefore, it is recommended to remove those parts prior to cleaning.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions.

◆ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

15, Filter

VM Type Carburetor Only

Check for clogged filter. Clean or replace as required.

Check inlet needle tip condition. If worn, the inlet needle and seat must be replaced as a matched set.

NOTE: Install needle valve for snowmobile carburetor only. It is designed to operate with a fuel pump system.

Check throttle slide for wear. Replace as necessary.

Check idle speed screw straightness. Replace as necessary.

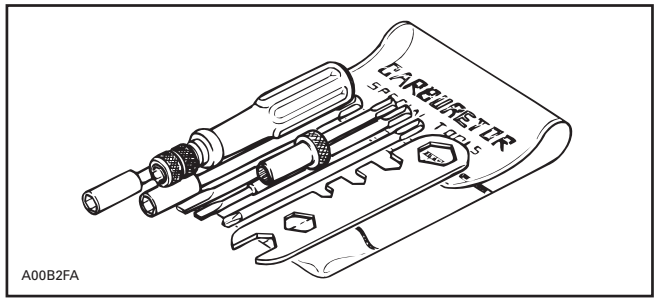
Check for fuel soaked into float no. 12; replace as necessary.

Check float for cracks or other damages affecting free movement; replace as necessary.

Inspect throttle cable and housing for any damages. Replace as necessary.

DISASSEMBLY AND ASSEMBLY

NOTE: To ease the carburetor disassembly and assembly procedures it is recommended to use carburetor tool kit (P/N 404 112 000).



A00B2FA

2,3, E-Clip and Needle

VM Type Carburetor

Remove screws from needle retaining plate to withdraw the needle.

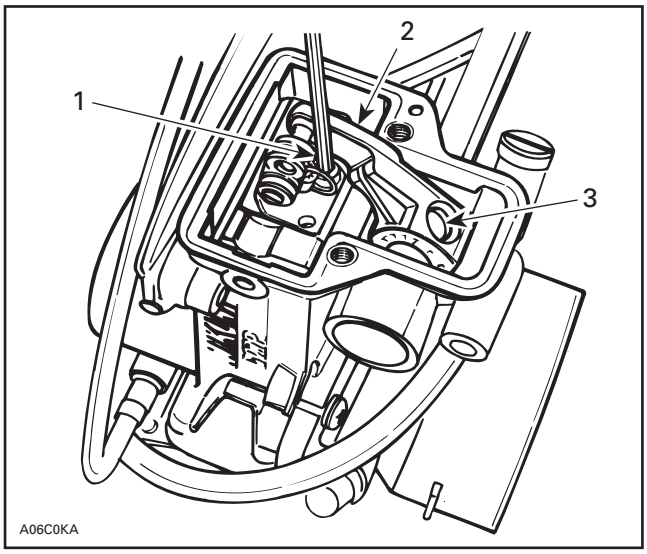
TM Type Carburetor

To remove needle or to change its position or to remove throttle slide, remove carburetor cover.

Except for MAG side carburetor, unscrew locking screw and adjusting nut form throttle shaft.

Move arm aside just enough for unscrewing Allen screw retaining throttle slide.

For MAG side carburetor, raise throttle slide half way then unscrew Allen screws.



1. Allen screw
2. Arm moved aside
3. Locking screw and adjusting nut removed

All Models

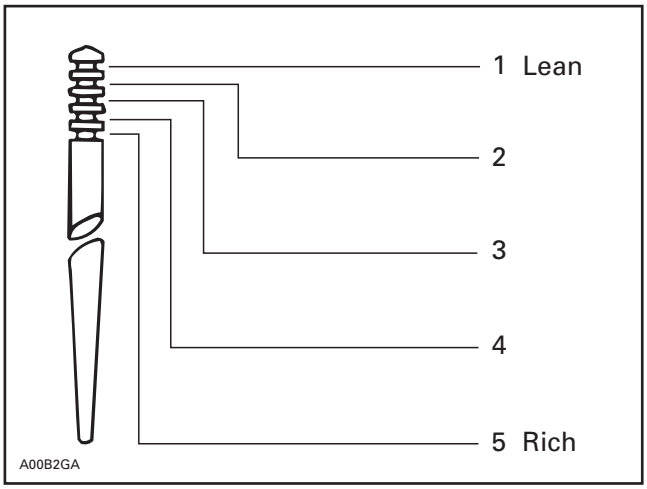
The position of the needle in the throttle slide is adjustable by means of an E-clip inserted into 1 of 5 grooves located on the upper part of the needle. Position 1 (at top) is the leanest, 5 (at bottom) the richest.

NOTE: The last digit of the needle identification number gives the recommended calibrated position of the E-clip **from the top** of the needle.

Example: 6DH4-3

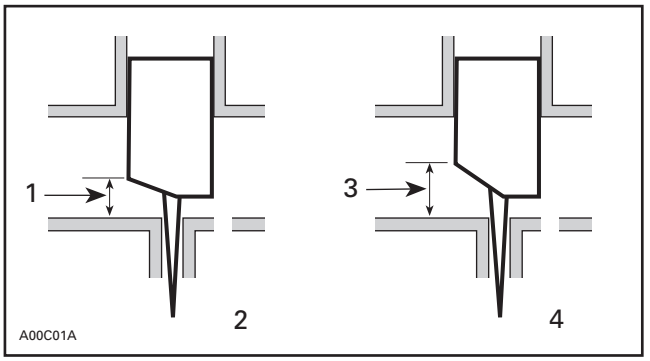
Needle identification

Recommended calibrated position. of the E-clip **from top**



CLIP POSITIONS

The size of the throttle slide cut-away affects the fuel mixture between 1/8 to 1/2 throttle opening.



1. Low cut-away
2. Rich mixture
3. High cut-away
4. Lean mixture

8, Main Jet

The main jet installed in the carburetor has been selected for a temperature of - 20°C (0°F) at sea level. Different jetting can be installed to suit temperature and/or altitude changes. Refer to *High Altitude and Sea Level Technical Data Booklet* (P/N 484 300 003).

CARBURETOR FLOAT LEVEL ADJUSTMENT

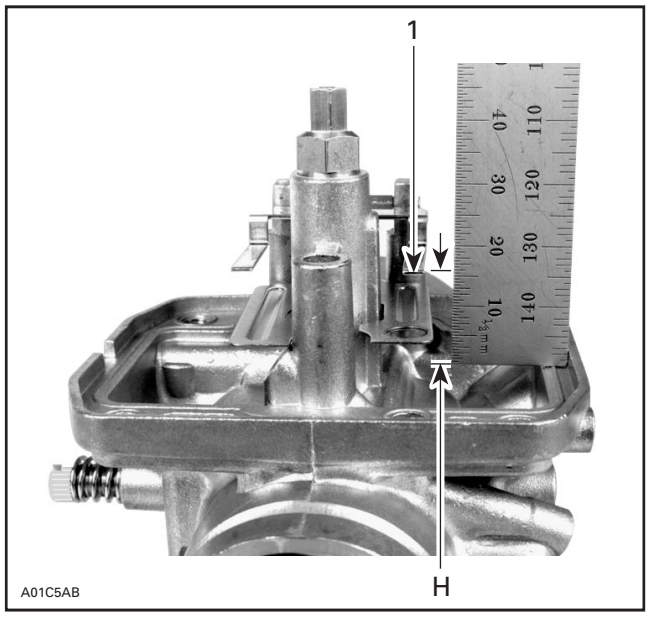
▼ CAUTION

Spark plugs will foul if float is adjusted too low. Engine may be damaged if float is adjusted too high.

9,10, Float Arm and Float Arm Pin

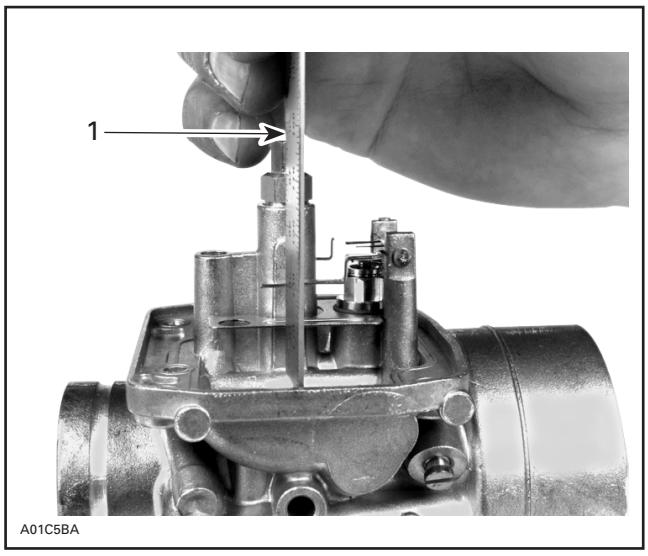
Correct fuel level in float chamber is vital toward maximum engine efficiency. To check for correct float level proceed as follows:

– Make sure that float arm is symmetrical — not distorted.
– Remove float bowl and gasket from carburetor.
– With carburetor chamber upside-down on a level surface, measure height H between bowl seat and **top** edge of float arm. Keep ruler perfectly vertical and in line with main jet hole.



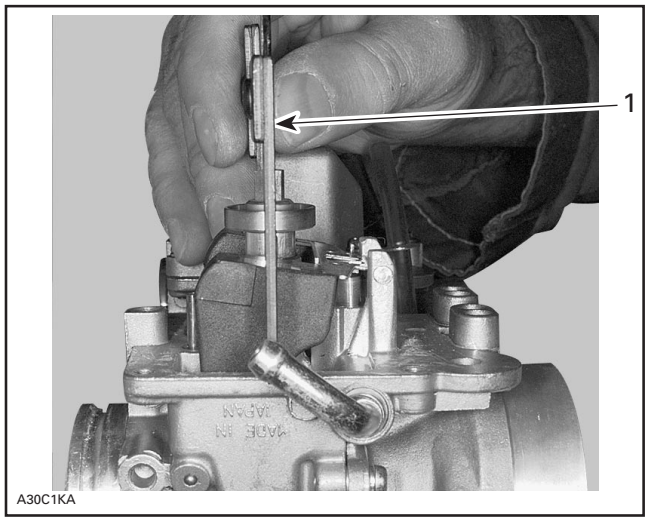
TYPICAL — VM TYPE

1. Measure from top of float arm
H: Float height (including float arm thickness)



TYPICAL — VM TYPE

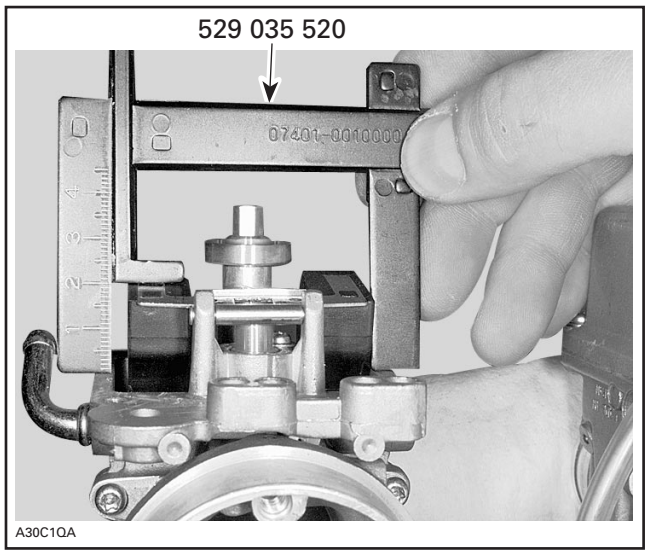
1. Ruler vertical and in line with main jet



TYPICAL — TM TYPE

1. Ruler vertical and in line with main jet

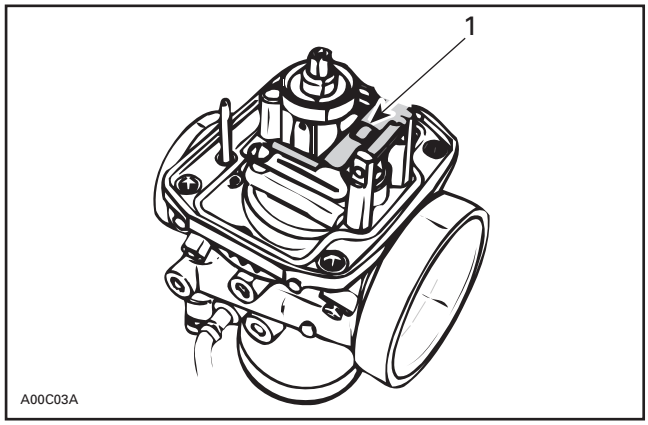
Float level height can be check using tool (P/N 529 035 520). Keep tool in line with main jet as explained above.



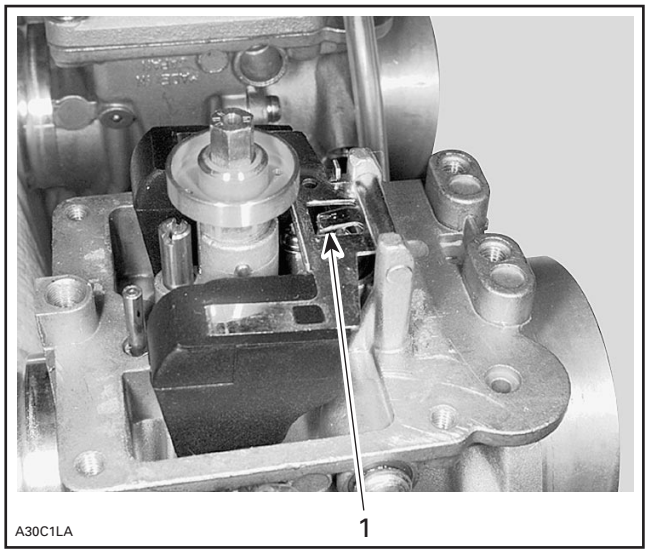
CARBURETOR TYPE	FLOAT HEIGHT H	
	± 1 mm	(± .040 in)
All VM	18.1	(.713)
All TM	20.0	(.787)

To Adjust Height H

– Bend the contact tab of float arm until the specified height is reached.



TYPICAL — VM TYPE
1. Contact tab



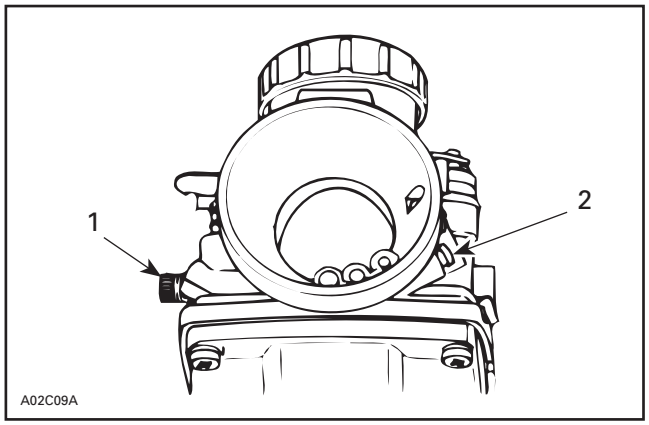
TYPICAL — TM TYPE
1. Contact tab

CARBURETOR ADJUSTMENTS

Adjustments should be performed following this sequence:

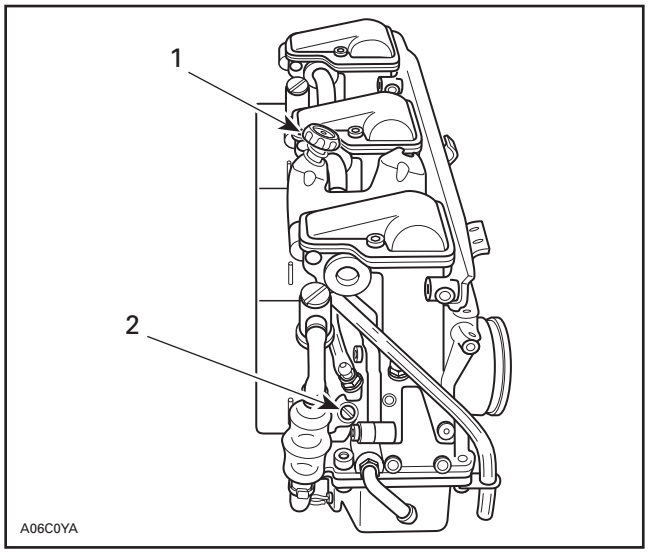
– air screw adjustment
– throttle slide height
(preliminary idle speed adjustment)
– throttle cable adjustment
– carburetor synchronization
(tripledual carburetor models)
– final idle speed adjustment (engine running)
– oil pump and carburetor synchronization

VM Type Carburetor



1. Idle speed screw
2. Air screw

TM Type Carburetor



TYPICAL
1. Idle speed screw
2. Air screw (on each carburetor)

6, Air Screw Adjustment

All Models

Completely close the **air screw** (until a slight seating resistance is felt) then back off as specified.

Turning screw in clockwise enrichners mixture and conversely, turning it out counterclockwise leans mixture.

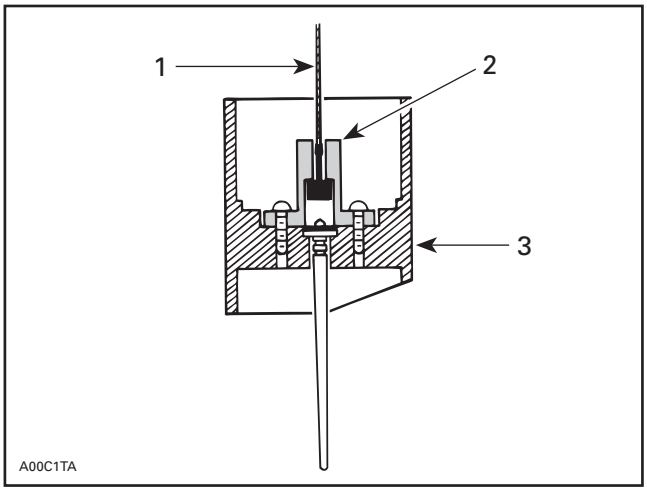
Refer to TECHNICAL DATA 10 for the specifications.

Throttle Slide Height (preliminary idle speed adjustment)

VM Type Carburetor

Hook throttle cable into the needle retainer plate.

NOTE: Do not obstruct hole in throttle slide when installing needle retaining plate. This is important to allow air escaping through and thus allowing a quick response.



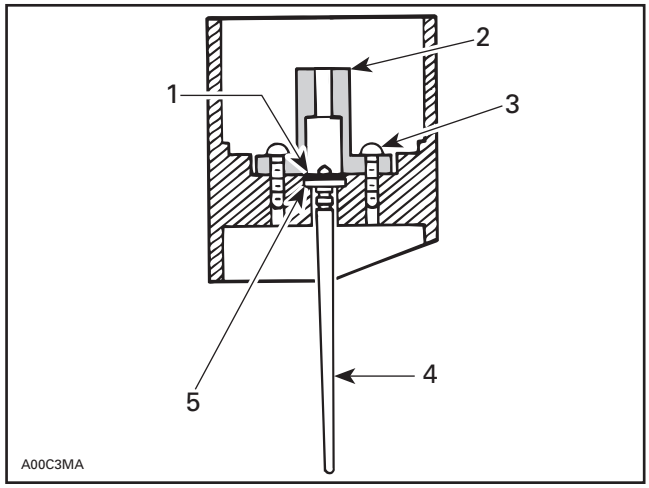
CENTER POST TYPE

1. *Throttle cable*
2. *Needle retaining plate*
3. *Throttle slide*

Make sure the nylon packing **no. 4** is installed on all applicable throttle slides.

▼ CAUTION

Serious engine damage can occur if this notice is disregarded.



CENTER POST TYPE

1. *E-clip*
2. *Needle retaining plate*
3. *Screw*
4. *Needle*
5. *Nylon packing*

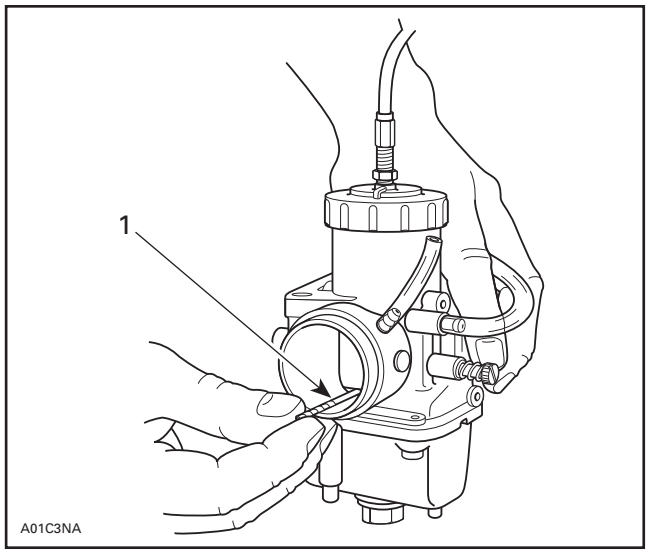
Using a drill bit adjust throttle slide height (see following table) by turning idle speed screw **no. 7**.

Throttle slide height is measured on **outlet** side of carburetor (engine side).

NOTE: Make sure that throttle cable does not hold throttle slide. Loosen cable adjuster accordingly.

Final idle speed adjustment (engine running at idle speed) should be within 1/2 turn of idle speed screw from preliminary adjustment.

MODELS	THROTTLE SLIDE HEIGHT mm (in)
Formula III 600	1.3 (.051)
Formula III 700 and GT 700	1.2 (.047)



TYPICAL
1. Drill bit used as gauge for throttle slide height

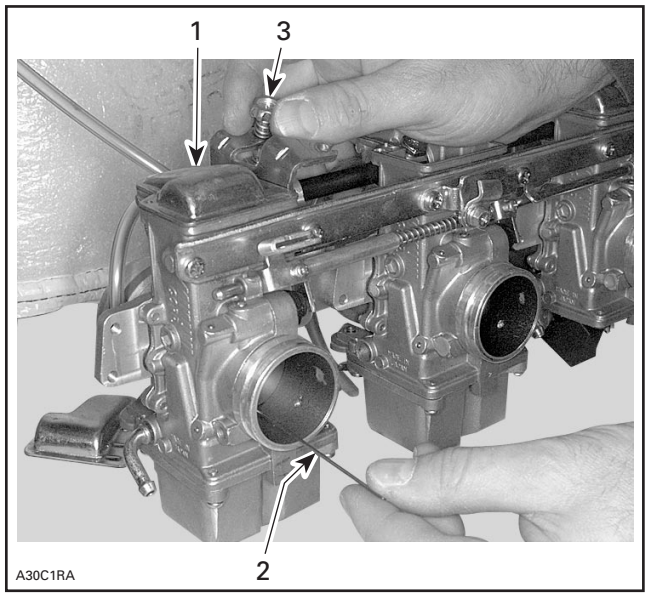
TM Type Carburetor

Remove carburetor covers.

First proceed on MAG carburetor.

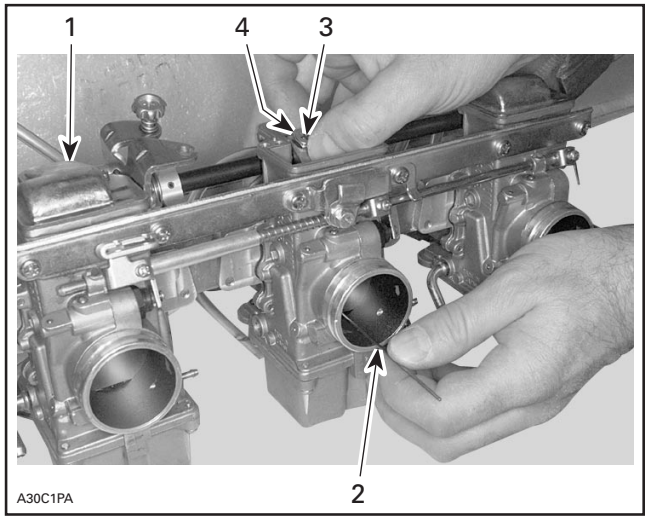
Using a drill bit to measure throttle slide height (see following table) on **outlet** side of carburetor (engine side).

Adjust by turning idle speed screw **no. 7**.



1. Adjust MAG carburetor first
2. Drill used as a gauge to measure throttle height
3. Idle speed screw

For center and PTO carburetors loosen locking screws. Use same drill bit as for MAG carburetor to measure throttle slide height. Turn adjusting nut to adjust.



1. MAG carburetor adjusted first
2. Drill used as a gauge to measure throttle height
3. Locking screw
4. Adjusting nut

Tighten locking screws and recheck throttle height.

NOTE: By adjusting all throttle slides at same height TM carburetors synchronization is done at same time.

Final idle speed adjustment (engine running at idle speed) should be within 1/2 turn of idle speed screw from preliminary adjustment.

MODELS	THROTTLE SLIDE HEIGHT mm (in)
All TM	1.3 (.051)

INSTALLATION

▼ CAUTION

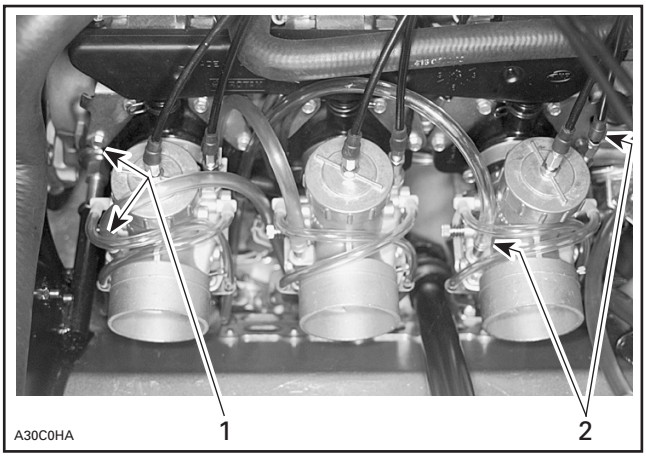
Never allow throttle slide(s) to snap shut.

Prior to install carburetor, adjust air screw and preliminary idle speed as described above.

To install carburetor on engine, inverse removal procedure.

However, pay attention to the following:

Match hose colored dot with the one on coil support.



1. Blue dots
2. Red dots

On applicable models, make sure to align tab of carburetor and air intake silencer (if applicable) with notch of adaptor(s). On applicable models, install adaptor with UP mark facing up.

▼ CAUTION

The rubber flange must be checked for cracks and/or damage. At assembly, the flange must be perfectly matched with the air intake manifold or severe engine damage will occur. Beside do not interchange carburetors, the jetting may be different on each side. A red dot is printed on MAG carburetor (blue on PTO side) and on the high tension coil support. Match the carburetor and the support dots.

Install clamps in a way that their tightening bolts are staggered — not aligned.

Throttle Cable Adjustment

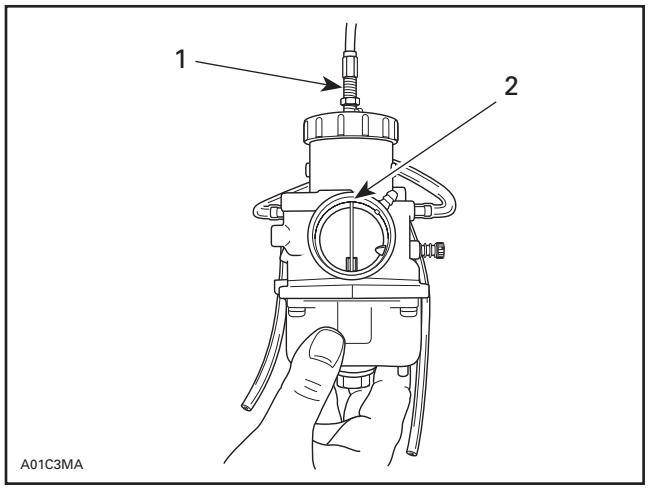
◆ WARNING

Ensure the engine is turned OFF, prior to performing the throttle cable adjustment.

For maximum performance, correct cable adjustment is critical.

At full opening throttle slide must be flush or 1.0 mm (.040 in) lower than the top of carburetor **outlet** bore (engine side).

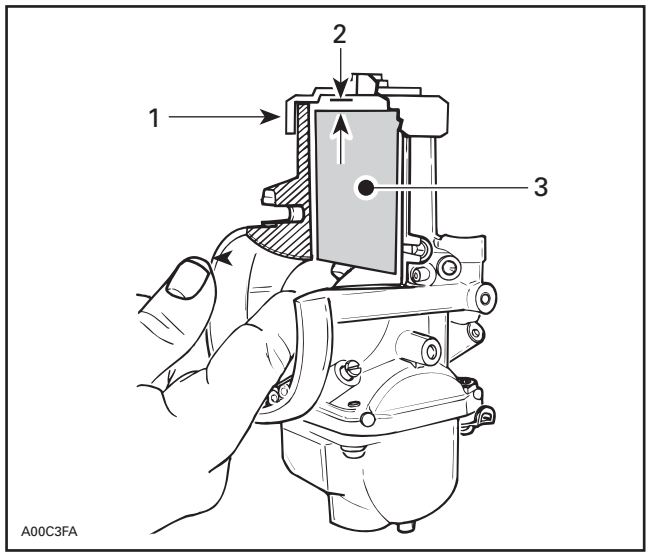
First loosen adjuster nut then turn throttle cable adjuster accordingly.



FULL OPENING (THROTTLE LEVER AGAINST HANDLE GRIP)

1. Throttle cable adjuster
2. Throttle slide flush or 1.0 mm (.040 in) lower than carburetor oulet bore (engine side)

Check that **with the throttle lever fully depressed**, there is a free play between the carburetor cover and top of throttle slide.



FULL OPENING (THROTTLE LEVER AGAINST HANDLE GRIP)

1. Cover
2. Free play
3. Throttle slide

◆ WARNING

This gap is very important. If the throttle slide rests against the carburetor cover at full throttle opening, this will create too much strain and may damage the throttle cable or other components in throttle mechanism.

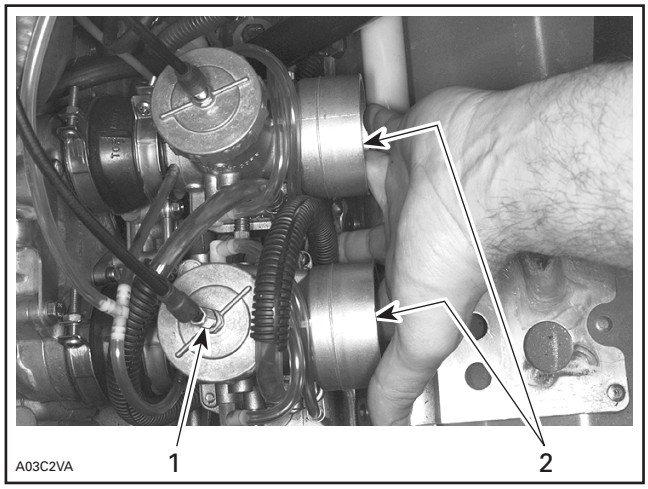
Carburetor Synchronization

VM Type Carburetor

When depressing throttle lever, allboth carburetor slides must start to open at same time.

Unlock cable adjustment lock nut on one carburetor.

Screw or unscrew cable adjuster until all carburetor slides start to open at same time. Cable play will be identical on all carburetors. Retighten jam nut.



TYPICAL

1. *Screw or unscrew adjuster*
2. *Check that all slides start to open at the same time*

Check throttle slide position at wide open throttle. Throttle slide must be flush or 1 mm (.040 in) lower than carburetor **outlet** bore. At that same position, check that throttle slide does not contact carburetor cover. Turn cable adjuster and recheck synchronization.

▼ CAUTION

If the throttle slide rests against the carburetor cover at full throttle opening, this will create too much strain and may damage the throttle cable or other components in throttle mechanism.

▼ CAUTION

Make sure all carburetors start to operate simultaneously.

TM Type Carburetor

All 3 carburetor slides must start to open at the same time.

Carburetor synchronization is done when adjusting throttle slide height. See above.

Idle Speed Final Adjustment

▼ CAUTION

Before starting engine for the final idle adjustment, make sure that oil pump is adjusted. The oil injection pump adjustment must be checked after each time carburetor idle is adjusted. Refer to OIL INJECTION SYSTEM 04-06.

Start engine and allow it to warm then adjust idle speed to specifications by turning **idle speed** screw clockwise to increase engine speed or counterclockwise to decrease it.

Refer to TECHNICAL DATA 10 for the specifications.

NOTE: Turn adjustment screw the same amount to keep carburetors synchronized.

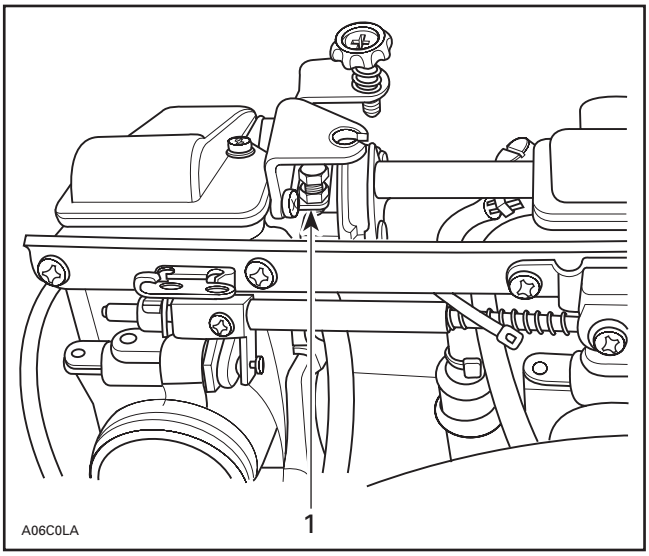
▼ CAUTION

Do not attempt to set the idle speed by using the air screw. Severe engine damage can occur.

Full Throttle Adjustment

TM Type Carburetor

To avoid stress on throttle cable when throttle lever is against handlebar grip, stop screw must not contact stopper. There must be slight free play between stop screw and its stopper.



TYPICAL — FULL THROTTLE POSITION
1. Free play between stop screw and its stopper

CHOKE

Choke Plunger Adjustment

VM Type Carburetor

Set choke lever to fully open position.



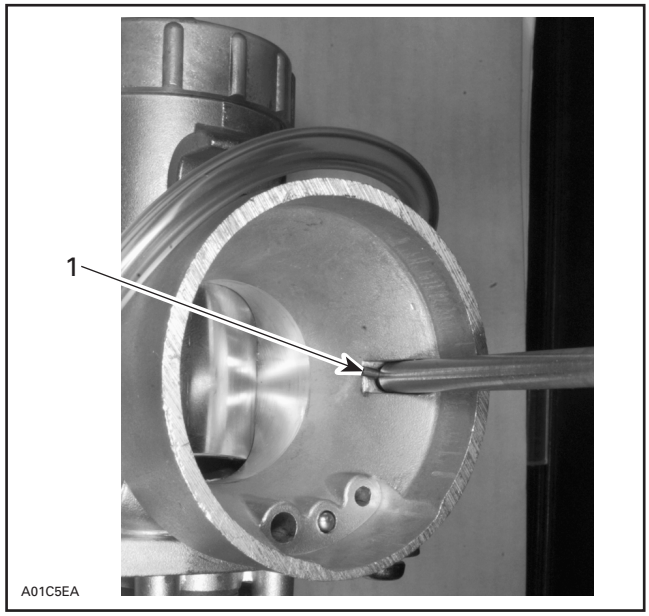
CHOKE LEVER — FULLY OPEN POSITION

Insert choke plunger tool into choke air inlet of each carburetor.

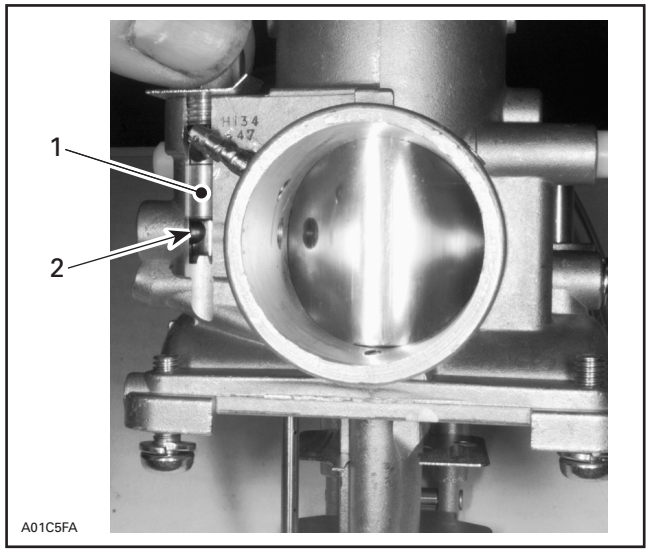
▼ CAUTION

Make sure that tool stopper is properly lean on venturi recess. This will ensure that tool tip is properly seated under choke plunger, as shown on the next photos.

NOTE: Choke plunger tool can be used both sides depending on carburetor type. Use larger diameter for Mikuni 38 mm and smaller diameter for Mikuni 34 mm.



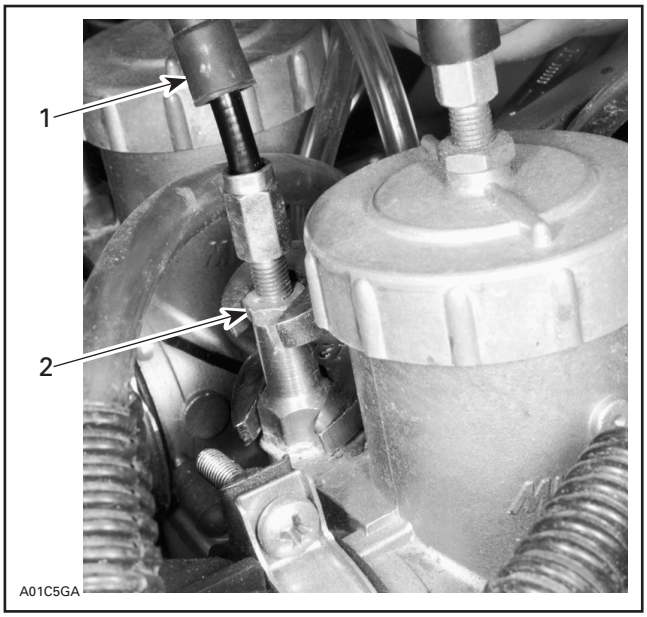
AIR SILENCER SIDE SHOWN
1. Tool stopper properly leaned on venturi recess



ENGINE SIDE SHOWN (CUT-AWAY)
1. Choke plunger
2. Tool properly seated under choke plunger

If tool tip does not seat under choke plunger, adjust as follows:

Lift up protector cap and loosen choke cable lock nut, as shown in the next photo.

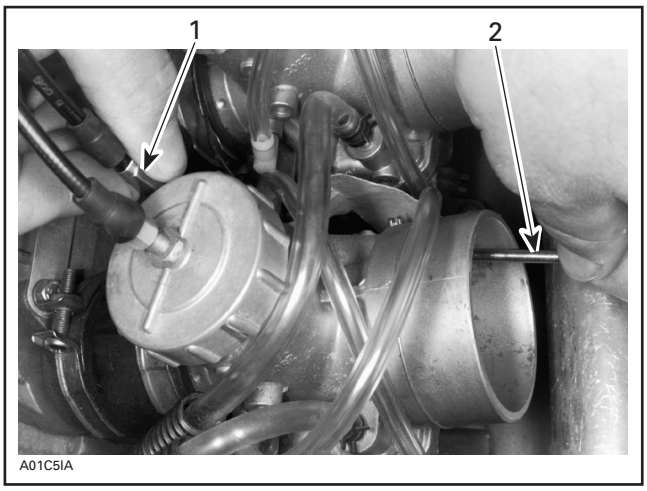


1. *Lift up protector cap*
2. *Loosen lock nut*

Set choke lever to fully open position.

Turn choke cable adjustment nut by hand until tool properly seats under choke plunger.

NOTE: A light pressure should be needed to positioned tool under plunger.



1. *Choke cable adjustment nut*
2. *Choke plunger tool*

Tighten choke cable lock nut and reinstall protector cap.

Set choke lever to close and open positions and ensure that tool properly seats under plunger **only** when lever is set to fully open position.

Set choke lever to close position and, by pulling and pushing choke lever, make sure there is no tension on cable (free play).



CHOKE LEVER — CLOSED POSITION

Choke Rod

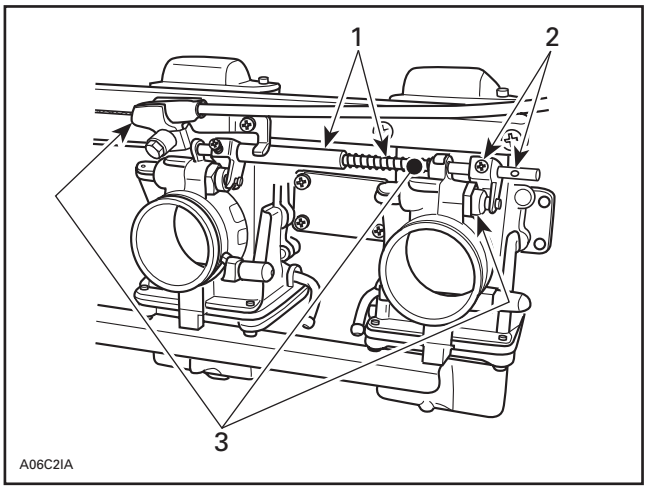
TM Type Carburetor

Check for free movement of choke rod. If hard to slide, remove 3 plunger ferrules then choke rod.

Thoroughly clean choke rod and its mounting hole on each carburetor.

Remove plunger grommet from each carburetor. Fill the grommet interior with dielectric grease (P/N 413 701 700). Reinstall the grommets.

Apply dielectric grease (P/N 413 701 700) on choke rod and reinstall it with its return spring and spacer on PTO side. Make sure that ferrule screws align with each rod hole. Tighten screws to 2 N•m (18 lbf•**in**).



1. Spacer and spring on PTO side
2. Ferrule screw aligned with rod hole
3. Dielectric grease

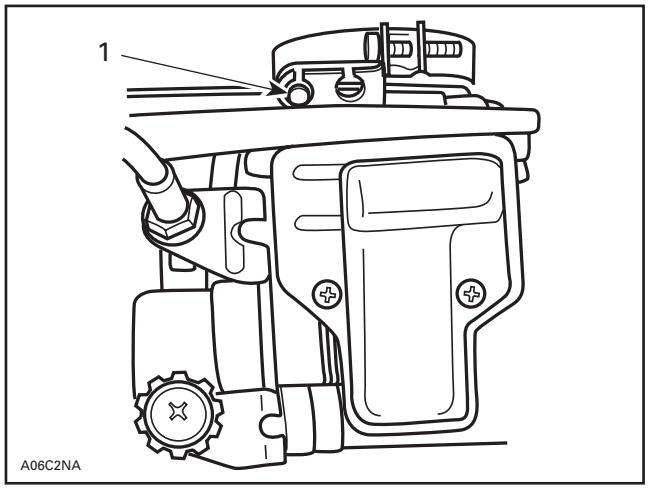
Apply dielectric grease (P/N 413 701 700) on cable housing end.

All 3 plungers must start to open at the same time. Bend ferrule end as required. Do not change position of ferrule on rod. Its screw must remain in line with choke rod hole.

Choke Cable Adjustment

TM Type Carburetor

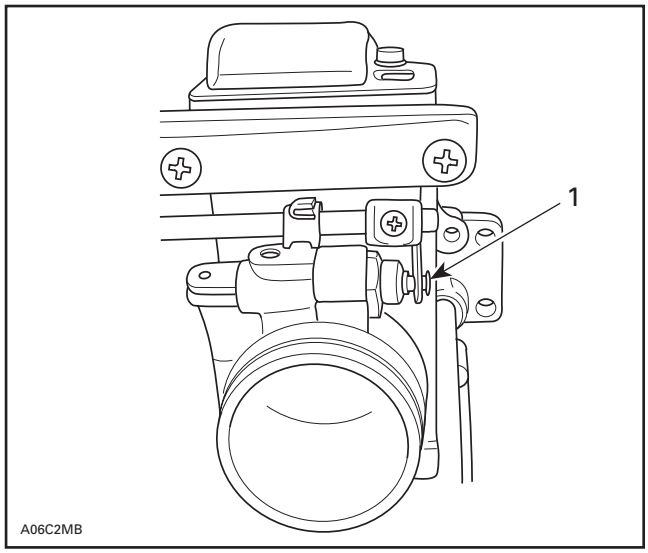
Choke cable barrel must be in left hole of sliding rod lever.



1. Cable barrel in left hole

Air intake silencer must be reinstalled and choke cable properly routed before finalizing adjustment.

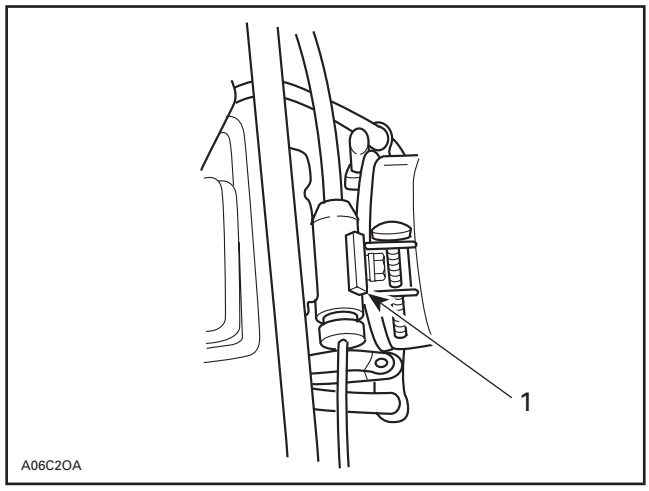
Adjust choke cable to obtain a maximum gap of approximately 0.3 mm (.012 in) between tab and plunger when choke lever is not activated.



1. 0.3 mm (.012 in) gap maximum

NOTE: If there is no gap between tab and plunger, a rich condition will occur and throttle response will be affected; if the gap is too great, the plunger stroke will be reduced causing poor cold engine starting.

If adjustment is required, loosen cable support on middle carburetor to change choke cable position.

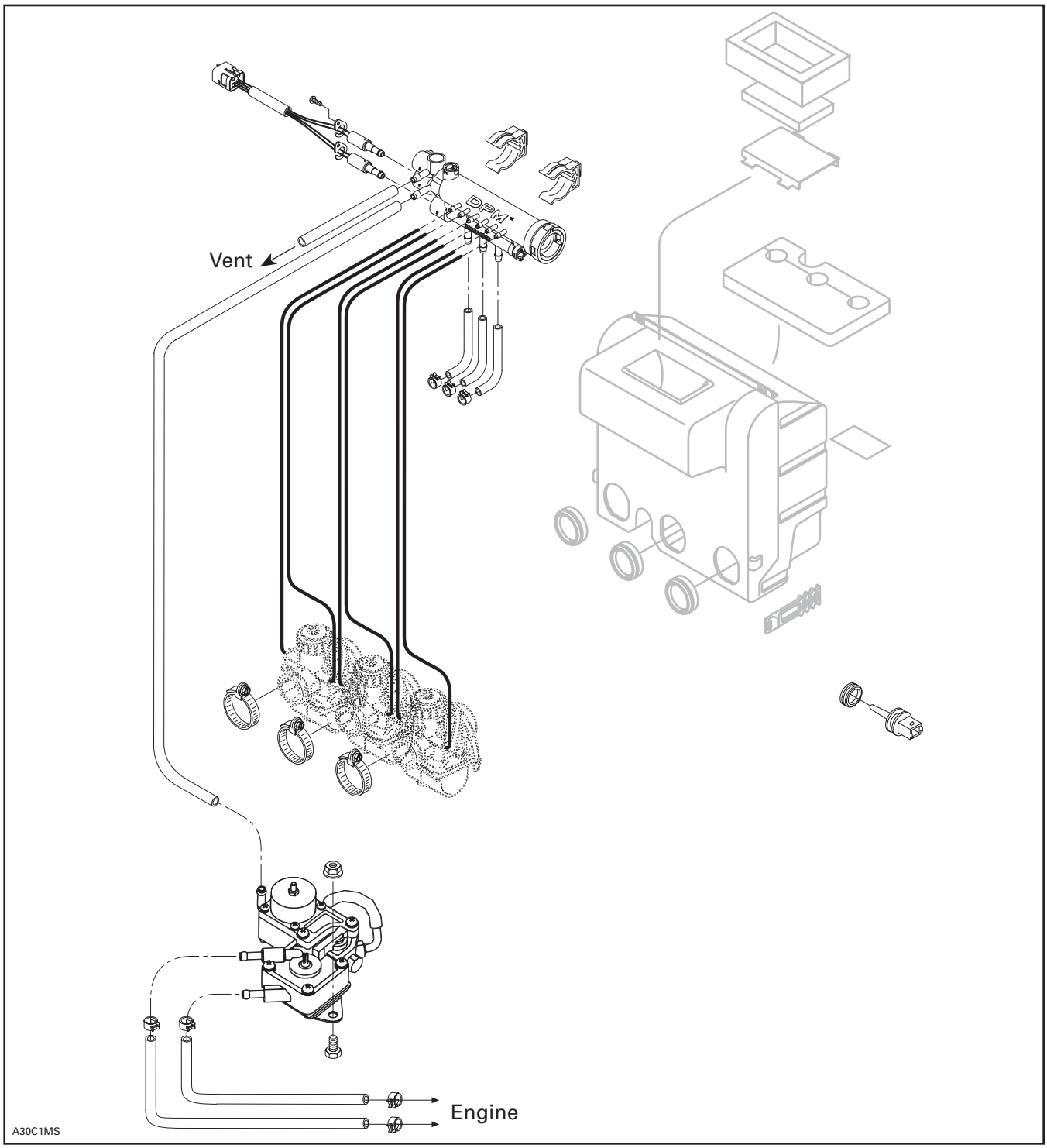


1. Choke cable support

After adjustment, retighten screw.

DPM

Grand Touring 700/SE



PURPOSE

Calibrate the air/fuel mixture in order to optimize the engine output while reducing fuel consumption.

METHOD

The system makes the pressure vary within the carburetor bowl.

OVERALL SYSTEM OPERATION

Introduction

NOTE: The Multi Purpose Electronic Module (MPEM) includes the DPM system.

The Digital Performance Management (DPM) system increases pressure within all 3 carburetor bowls thus the air/fuel mixture is enriched. This is what we call the enrichment mode.

As soon as the spark plug gives off its first spark, the DPM system calculates the enrichment time and rate based on the engine temperature.

Once enrichment mode is completed carburetor bowls return to atmospheric pressure (DPM in standby mode), and the air/fuel mixture is identical to that of carburetors without the DPM system.

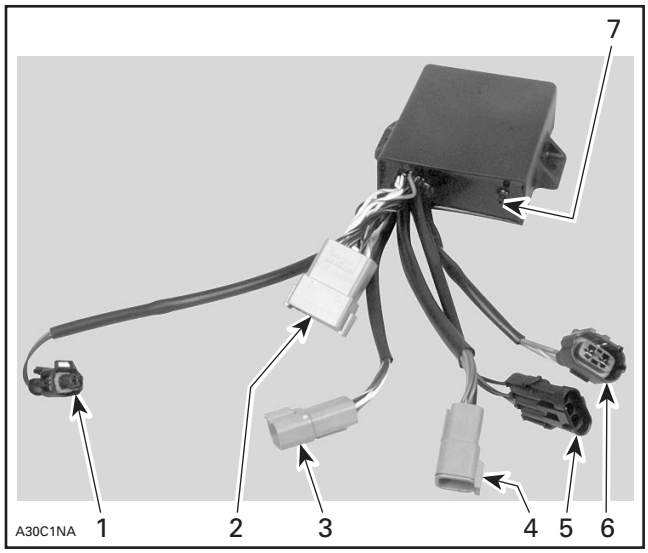
Over 3000 RPM, compensation mode is activated but will compensate only if the air temperature exceeds - 20°C (- 4°F) and the air pressure is lower than 1000 mbar.

Float bowls are now under vacuum (lower than atmospheric pressure) and the air/ fuel mixture is leaner.

NOTE: Both modes can never operate at the same time. The system either makes the mixture richer or leaner. Or, the mixture remains unchanged when module is on standby.

MPEM OPERATION

General



1. *Air temperature sensor, 4-22 housing*
2. *Power supply, ground, DESS switch, reverse switch and alarm, RPM signal for cluster, high tension coils, kill switch, 6-15 housing*
3. *Trigger coils, 6-14 housing*
4. *DPM engine temp. sensor and solenoids, 4-21 housing*
5. *Enrichment switch, 4-20 housing*
6. *Battery/regulator connection, 6-13 housing*
7. *Atmospheric pressure nipple*

Direct current is supplied to the module which is protected with a 1 A fuse.

BLACK/GREEN and WHITE/GRAY wires (4-06 housing) are used for programming by the manufacturer. Nothing must be plugged to this housing.

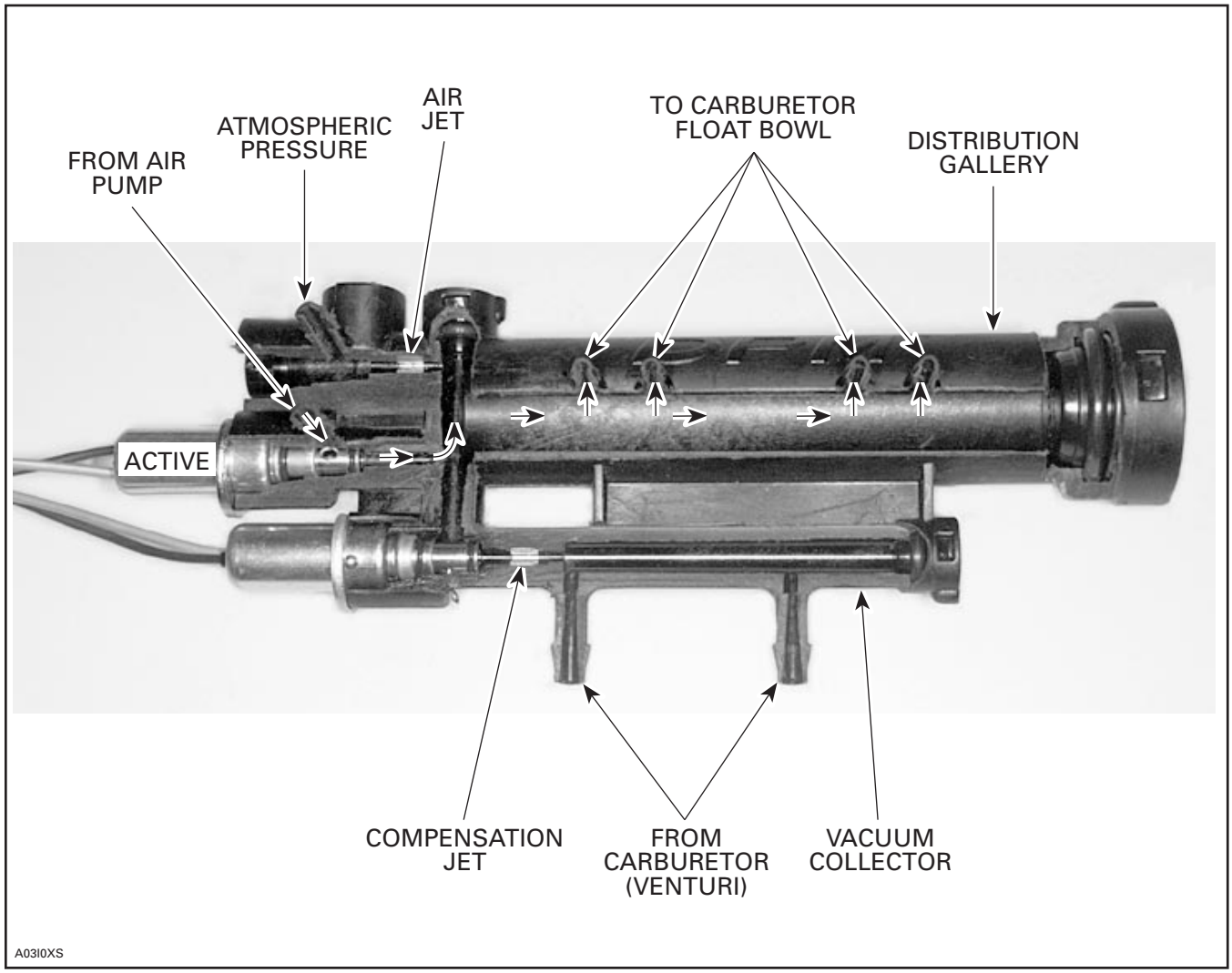
Enrichment Mode (starting)

When turning the ignition key to the ON position, the module is energized and goes on standby. The module uses no electricity when on standby.

Once the engine begins to turn (using either the electrical or rewind starter), the MPEM receives pulses from ignition system.

The MPEM then comes on by reading the engine temperature through the sensor located on the cylinder head. The MPEM calculates the enrichment solenoid opening time and the enrichment rate according to the temperature. The air/fuel mixture is then enriched in order to facilitate starting.

The system pressurizes all 3 carburetor bowls in order to enrich the air/fuel mixture. This is accomplished with the help of an air pump.



TYPICAL — ENRICHMENT MODE

This enrichment process of the air/fuel mixture takes place at start-up and during engine warm-up, and it depends on engine temperature.

The higher the engine temperature upon start-up, the leaner the mixture.

This enrichment progressively decreases (with time) by reducing the solenoid duty cycle. The warmer the engine, the shorter the enrichment mode.

If the throttle opening exceeds one quarter before engine runs, the enrichment mode is interrupted by a switch during the starting process, which allows unflooding the engine.

However, the enrichment mode is restored when releasing the throttle.

Following the enrichment mode, carburetors are operating normally, i.e. without additional pressure within bowls.

NOTE: Calibration is normally the same on engines with a DPM system and those without.

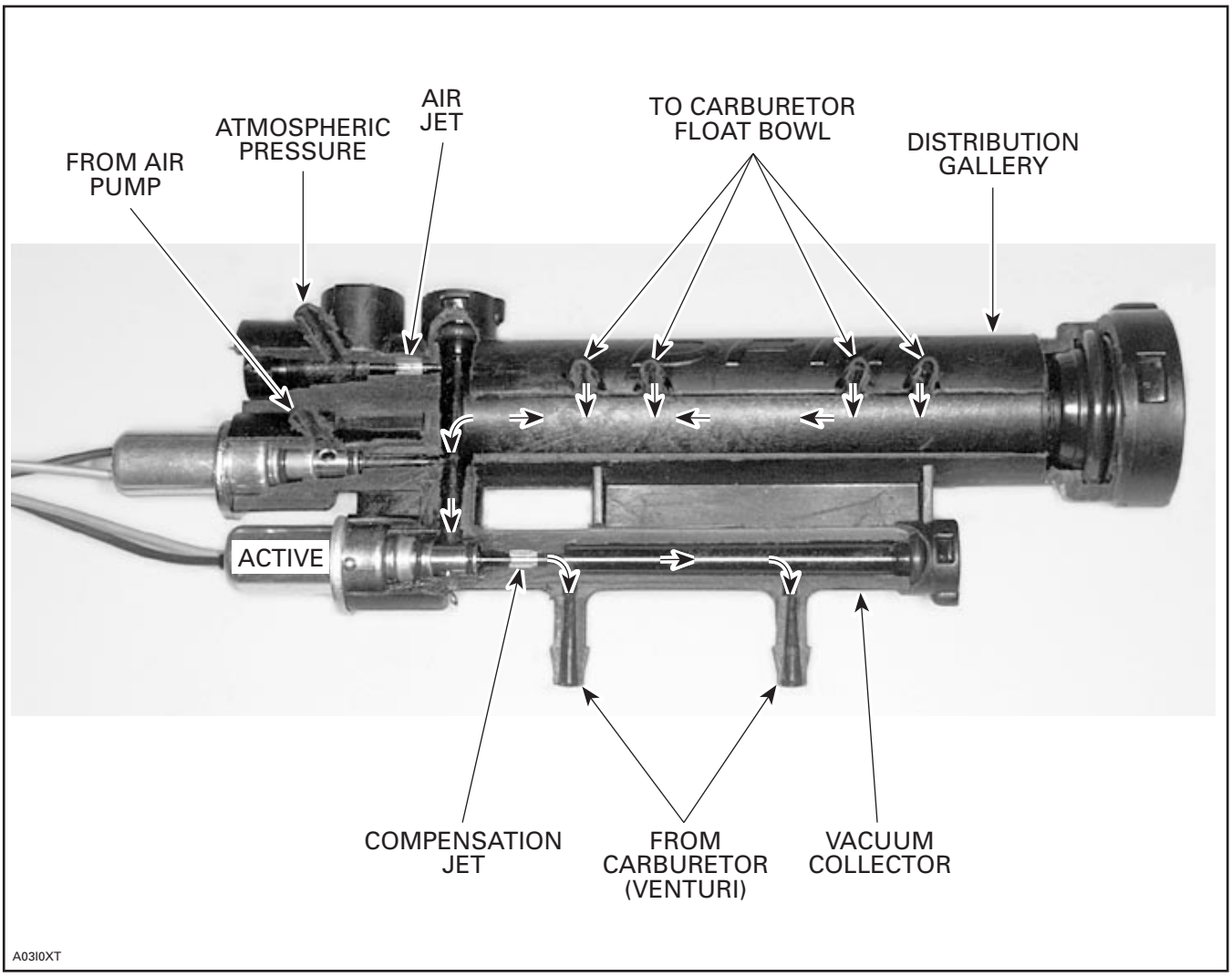
Compensation Mode

Two conditions must be met for the compensation mode to operate:

1. Engine must rev over 3000 RPM.

2. Air temperature must exceed - 20°C (- 4°F)and/or atmospheric pressure must be lower than 1000 mbar.

The compensation mode brings all 3 carburetor bowls under vacuum (lower than the atmospheric pressure) in order to make the air/fuel mixture leaner. The required vacuum is produced within the needle jet air inlet.



TYPICAL

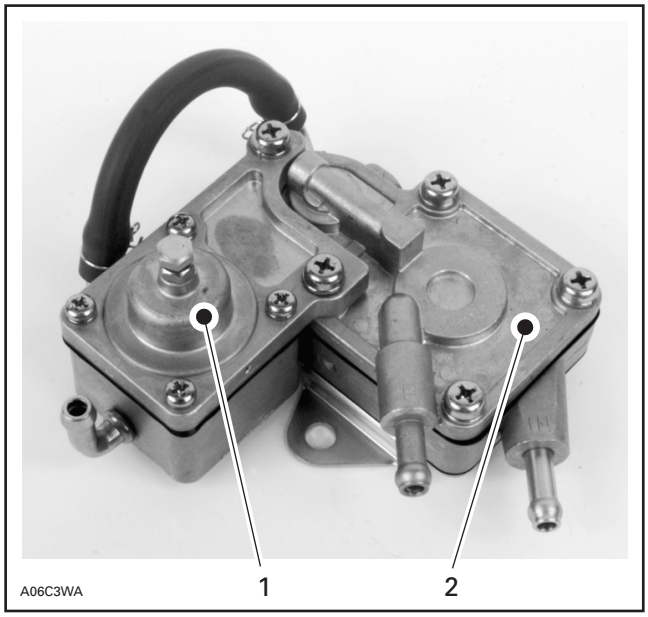
The compensation ratio will depend on the air temperature and the atmospheric pressure.

The higher the air temperature, the leaner the air/fuel mixture.

The lower the atmospheric pressure, the leaner the air/fuel mixture.

NOTE: The atmospheric pressure decreases as the altitude increases.

AIR PUMP OPERATION



1. *Regulator*
2. *Pump*

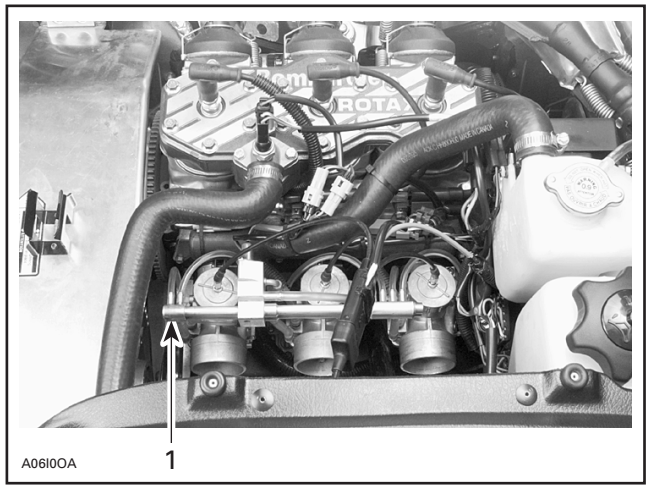
Air pump supplies the distribution gallery through a unique pipe.

Pump diaphragm is activated by the alternating pressure/vacuum within the engine crankcase. Two hoses connect the crankcase (cylinders nos. 2 and 3) to the pump.

A regulator within the pump stabilizes the pump pressure.

Since the pump pressure is insufficient upon starting, the regulator is fed directly by the crankcase pressure.

DPM MANIFOLD OPERATION



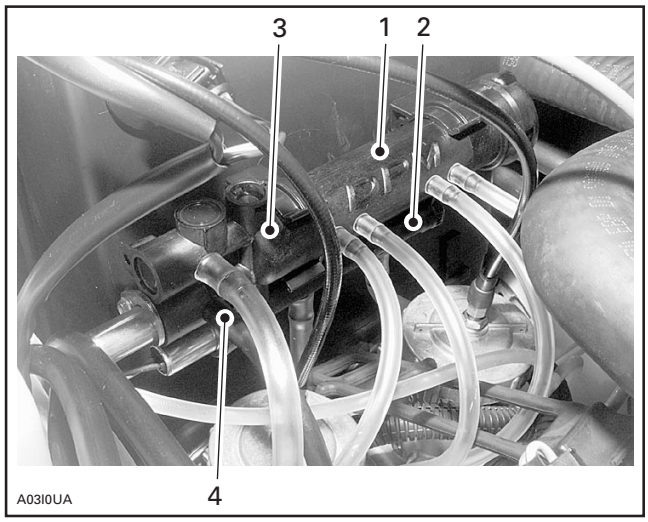
TYPICAL

1. *Manifold*

The DPM manifold consists of 2 tubes. Depending on the mode, the upper tube (distribution gallery) distributes pump pressure or vacuum to each bowl through 2 hoses. The passage is then opened by the enrichment or the compensation solenoid, depending on the mode.

The lower tube (vacuum collector) receives the vacuum created by each carburetor within the needle jet air inlet.

An air jet (manifold air jet) also allows the atmospheric pressure to enter.



TYPICAL — MANIFOLD ASS'Y

1. *Upper tube: distribution gallery*
2. *Lower tube: vacuum collector*
3. *Manifold air jet — Atmospheric pressure*
4. *From air pump*

Enrichment Solenoid

Solenoid Operating Principle

A solenoid is a winding coiled in order to produce a magnetic field. A metal rod crosses the coil and cuts the magnetic field. Each time the coil is activated, the magnetic field attracts the rod. If the supply current is interrupted, a spring pushes the rod.

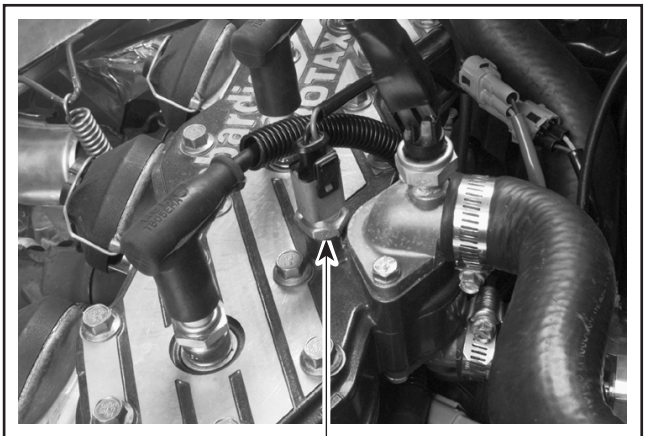
Solenoid Function within the DPM System

The MPEM turns the solenoid on and off 10 times per second, which means that it operates at 10 cycles/second or 10 Hertz (Hz). The solenoid therefore opens and closes 10 times per second, thus allowing the pump pressure to reach the distribution gallery (upper tube).

For the pressure to vary within the bowls, the solenoid is activated in part by the MPEM during each cycle. This is what is called the duty cycle. In other words, the solenoid will not open throughout the whole cycle. The duty cycle depends on the engine temperature.

The colder the engine, the longer the duty cycle. Therefore, the solenoid will stay open longer, thus giving way to pressure.

MPEM reads engine temperature at once (when starting) through a sensor.



TYPICAL
1. Engine temperature DPM sensor

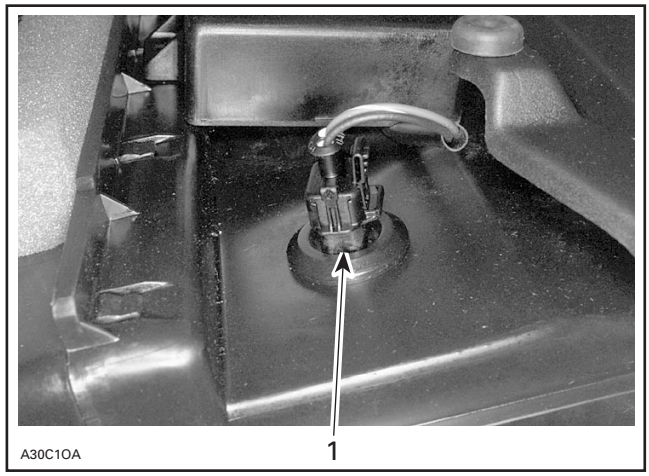
Compensation Solenoid

NOTE: Same principle as enrichment solenoid. Read *Operating Principle of a Solenoid* at the beginning of the chapter concerning the **Enrichment Solenoid**.

The duty cycle of the compensation solenoid depends on the air temperature and the atmospheric pressure.

The warmer the air, the longer the duty cycle. Therefore, the solenoid will stay open longer, thus giving way to vacuum. The same applies when the altitude increases.

MPEM reads air temperature through a sensor.



1. Air temperature sensor

Manifold Air Jet

This jet allows the atmospheric pressure to reach carburetor bowls when the DPM system is on standby (returned to atmospheric pressure).

See manifold ass'y illustration.

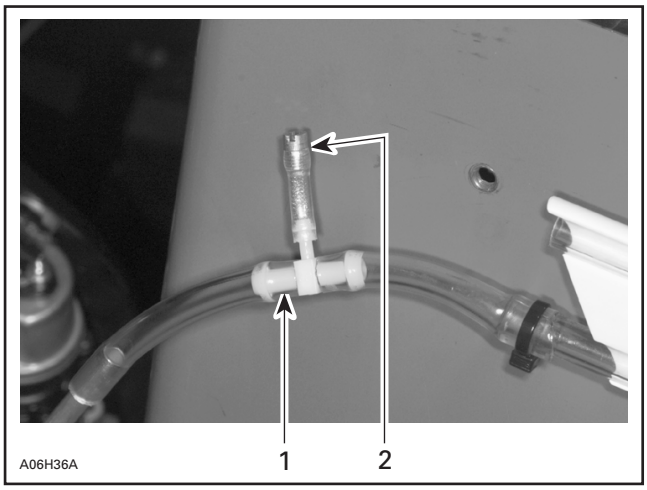
TESTING PROCEDURE

Pump

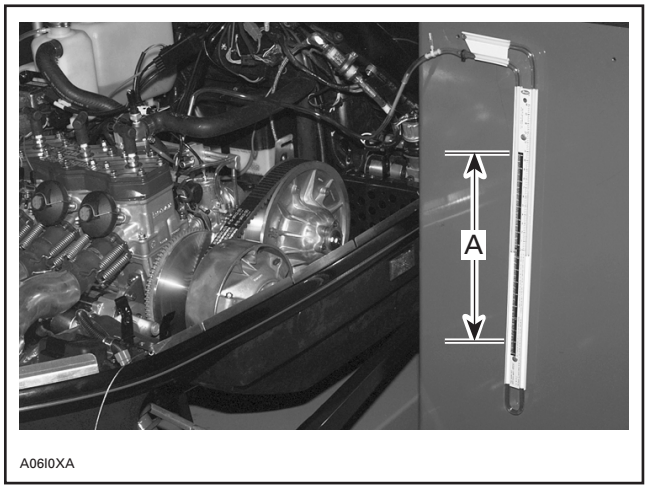
Pressure Test

The pump must create a minimum pressure of 400 ± 50 mm of water.

Connect a jet (P/N 270 500 157) to a hose then connect that little tube to the small nipple of a T-fitting (P/N 414 222 500). Install that T-fitting between a U-tube and air pump outlet.



1. T-fitting (P/N 414 222 500)
2. Jet (P/N 270 500 157)



A. 400 ± 50 mm of water

Start engine and note water height.

MPEM

Solenoids are supplied by the MPEM. If this MPEM does not work, there will be no current on the compensation solenoid RD/BL and BK connectors (3-10 housing); and on the RD/GN and BK connectors (3-11 housing).

Unplug upper solenoid wire (enrichment). Connect a good solenoid to MPEM output connector.

▼ CAUTION

Do not disconnect both DPM connectors. The compensation solenoid must remain plugged.

Disconnect engine temperature sensor connector. The MPEM now operates as though the engine temperature was - 20°C (- 4°F) to allow maximum mixture enrichment.

For the compensation solenoid, the air temperature sensor must be at room temperature. Operate the engine at 3500 RPM. The solenoid must vibrate.

Start the engine and observe the solenoid. A vibrating solenoid indicates that the MPEM is in good working order. If not, replace the MPEM and repeat test.

Solenoid

Static Test

Unplug electric connector of solenoid and connect it to a 12 V battery. The solenoid must sound when it opens. Repeat test several times.

Dynamic Test

When checking the enrichment solenoid, disconnect engine temperature sensor connector. The DPM system now operates as though the engine temperature was - 20°C (- 4°F) to allow maximum mixture enrichment.

Remove the solenoid, hold it in hand and start the engine.

For the enrichment solenoid, check if it vibrates as soon as the engine is started.

For the compensation solenoid, the air temperature sensor must be at room temperature. Operate the engine at 3500 RPM. The solenoid must vibrate.

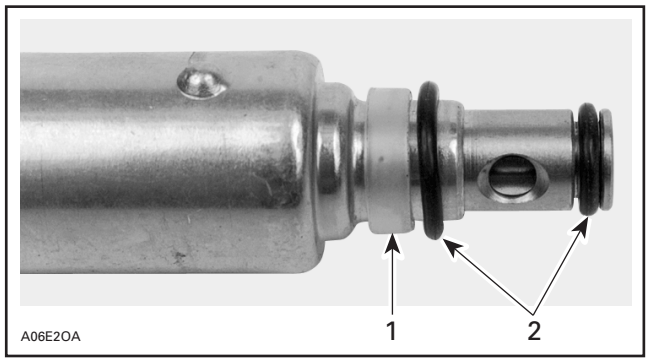
Temperature Sensor (air and engine)

At room temperature 20°C (68°F), the sensor resistance must be 2500 Ω ± 300.

PARTS REMOVAL AND INSTALLATION

Solenoid

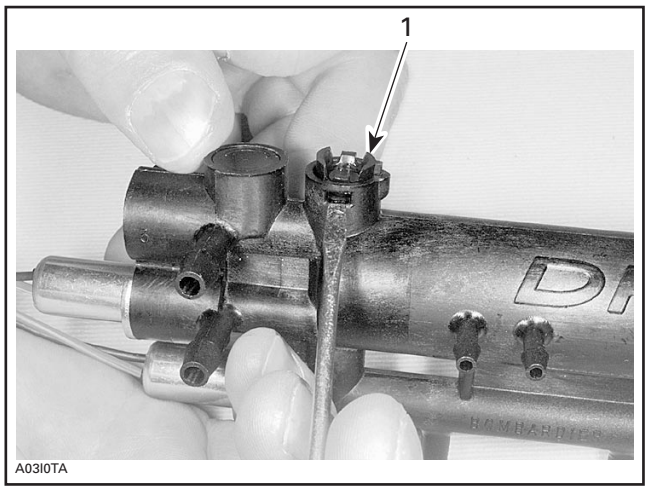
At reassembly, ensure that solenoid seals are in place.



1. Plastic seal
2. O-rings

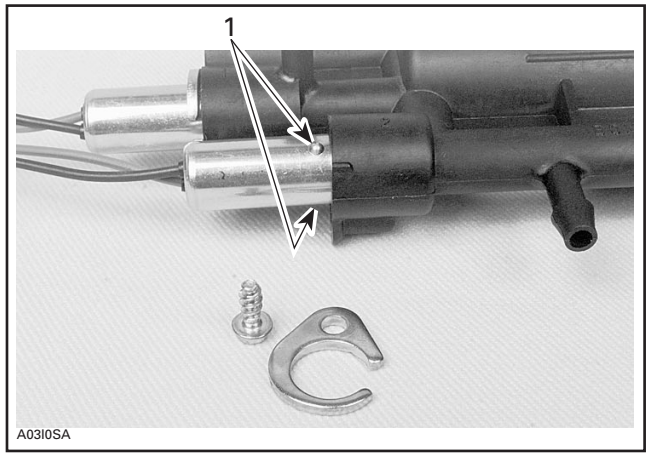
Installation of compensation solenoid must be done as follows:

Remove transfer gallery plug by pushing 2 tabs.



1. Transfer gallery plug

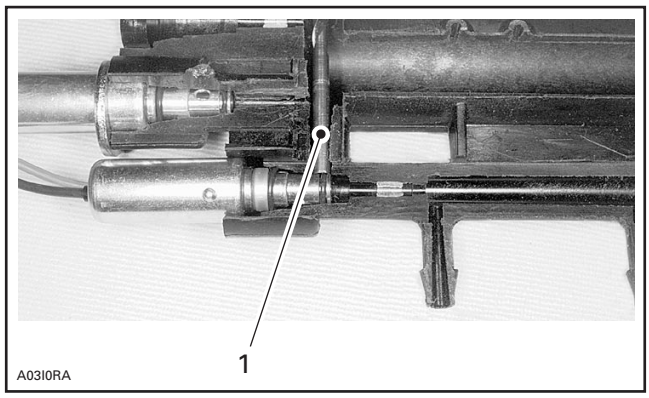
Partially insert compensation solenoid into DPM manifold.



1. Embosses not engaged

Insert a 5/32 in drill bit with its round end first into the transfer gallery.

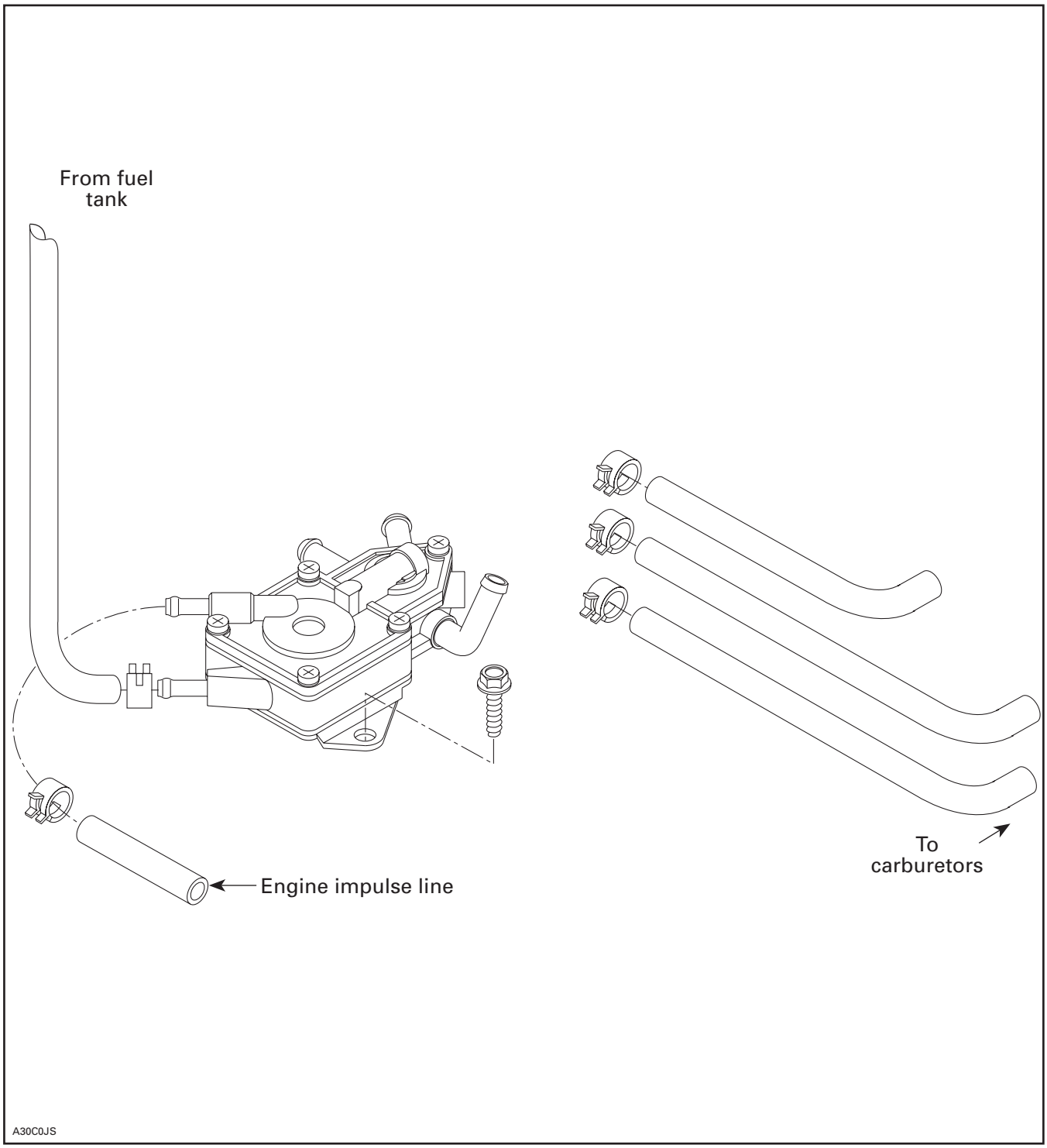
Fully push solenoid into DPM manifold while maintaining a pressure on drill bit. This will guide the solenoid O-ring.



TYPICAL — CUT-AWAY
1. Drill bit round end guiding solenoid O-ring

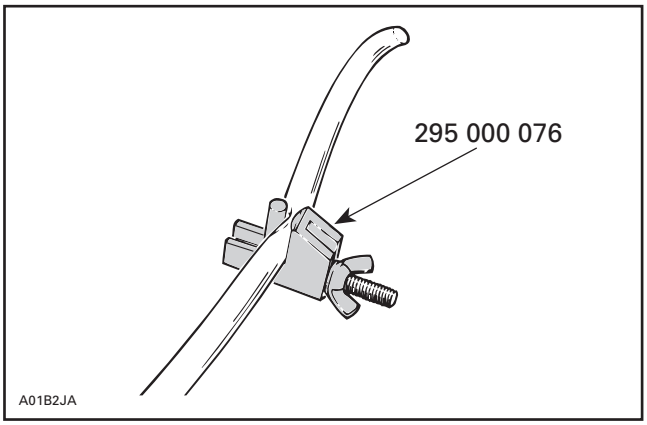
FUEL PUMP

All Models



REMOVAL

Install a hose pincer (P/N 295 000 076) on fuel supply line close to pump inlet.



Disconnect fuel outlet line(s).

Disconnect impulse line.

Remove screws securing fuel pump support to chassis.

PUMP VERIFICATION

Check fuel pump valves operation as follows:

Connect a clean plastic tubing to the inlet nipple and alternately apply pressure and vacuum with pump of leak test kit. The inlet valve should release with pressure and hold under vacuum.

Repeat the same procedure at the outlet nipple. This time the outlet valve should hold with pressure and release under vacuum.

NOTE: Plug 2 outlets with finger while checking outlet valve.

Check impulse diaphragm and gasket on high-supply fuel pump with twin outlets as follows:

Connect a clean plastic tubing to the impulse nipple and plug vent hole on top cover. Either apply pressure or vacuum. The diaphragm/gasket must not leak.

CLEANING AND INSPECTION

The entire pump should be cleaned with general purpose solvent before disassembly.

Fuel pump components should be cleaned in general purpose solvent and dried with compressed air.

◆ WARNING

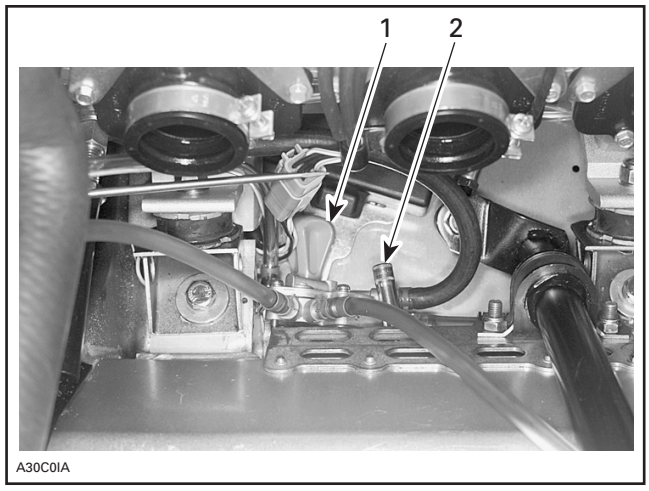
Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as each is flammable and explosive.

Inspect diaphragm. The pumping area should be free of holes, tears or imperfections. Replace as needed.

INSTALLATION

To install, first insert a pick in bottom hole of pump support to hold it in place.

Fasten top screw using a long socket with grease inside to restrain screw.



1. Pick inserted in pump support bottom hole
2. Socket on top screw head to be fastened

◆ WARNING

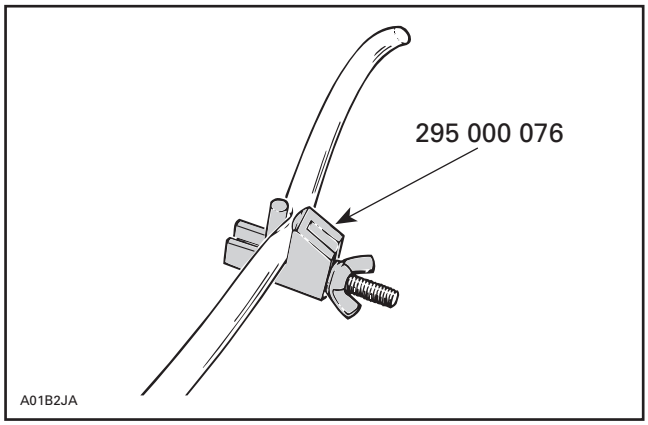
Pressure test to ensure there is no leak in fuel system.

FUEL TANK AND THROTTLE CABLE

Fuel Tank Lines

◆ WARNING

When draining a fuel tank or whenever a fuel line is disconnected, obstruct line with a hose pincher (P/N 295 000 076) or equivalent device. Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.



Impulse/Fuel Lines Spring Clips (all models)

Always reposition spring clips after any repair to prevent possible leaks.

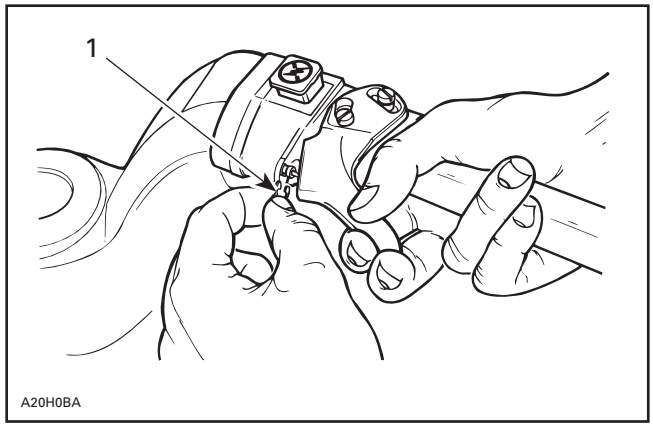
Throttle Cable Circlip at Handlebar (all models)

Put silicone grease (P/N 295 550 004) around cable barrel. Locate circlip as per illustration.

◆ WARNING

If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

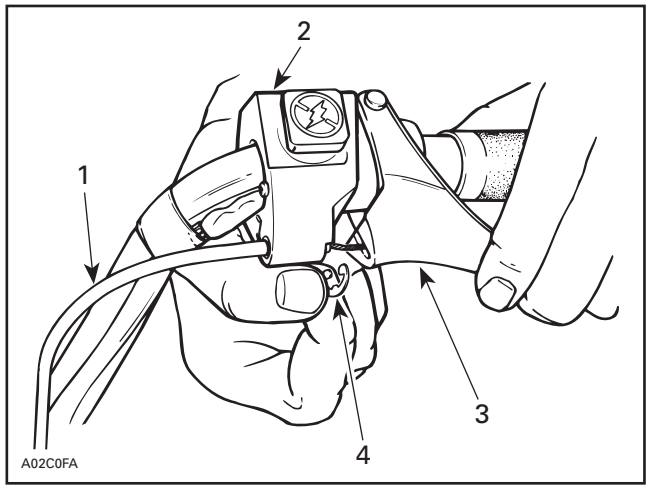
Models with Easy Action Throttle Lever



TYPICAL

1. Circlip

Other Models

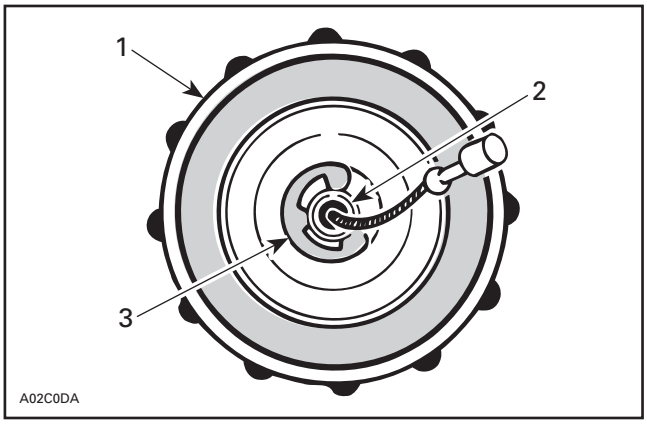


TYPICAL

1. Throttle cable housing
2. Throttle handle housing
3. Throttle handle
4. Circlip

Throttle Cable O-Ring and Retaining Ring at Carburetor (some models)

Locate O-ring outside of carburetor cover and retaining ring inside.



1. Carburetor cover
2. Throttle cable housing
3. Retaining ring

Adjust throttle cable as specified in CARBURETOR AND FUEL PUMP 04-08.

Throttle Cable Routing

▼ CAUTION

Check that throttle cable is routed away from sharp edges, hot or vibrating parts. When turning steering while engine is running, idle speed must not vary.

Fuel Level Sensor

Inspection

Visually inspect the condition of connectors and wiring throughout the circuit. Connections must be clean and tight, and wiring free of damage. Repair as necessary. Use silicone dielectric grease to prevent corrosion at the connectors. Operate the engine to see if the problem has been corrected.

Fuse Replacement

A 0.25 ampere fuse protects fuel level sensor circuitry. Remove seat to gain access.

Fuel Level Sensor Screws

Torque fuel level sensor retaining screws to 1 N•m (8 lbf•**in**) in the sequence shown and then to 2.5 N•m (22 lbf•**in**), using the same sequence.

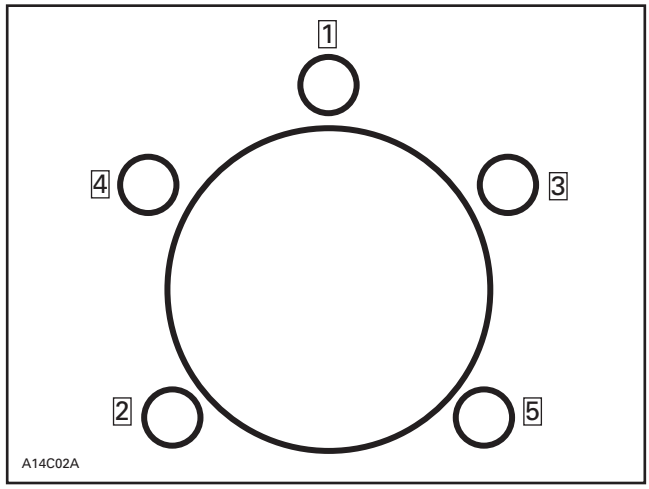


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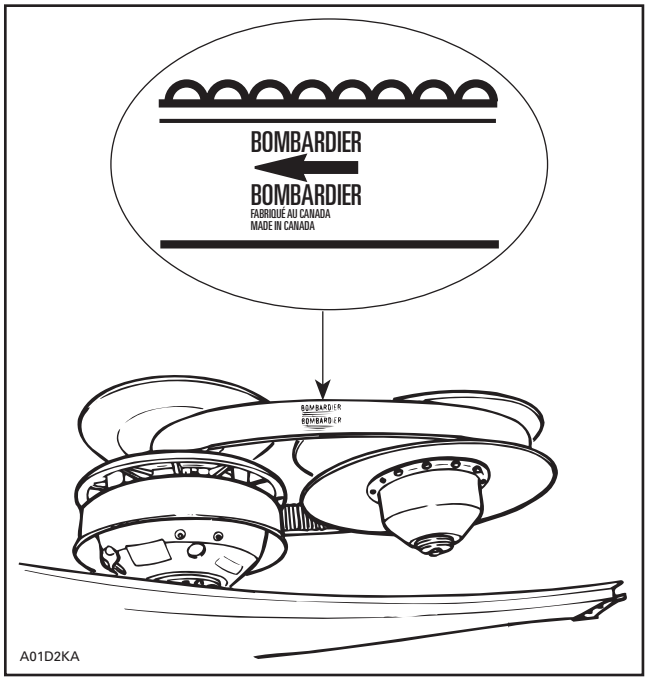
DRIVE BELT

1999 APPLICATION CHART

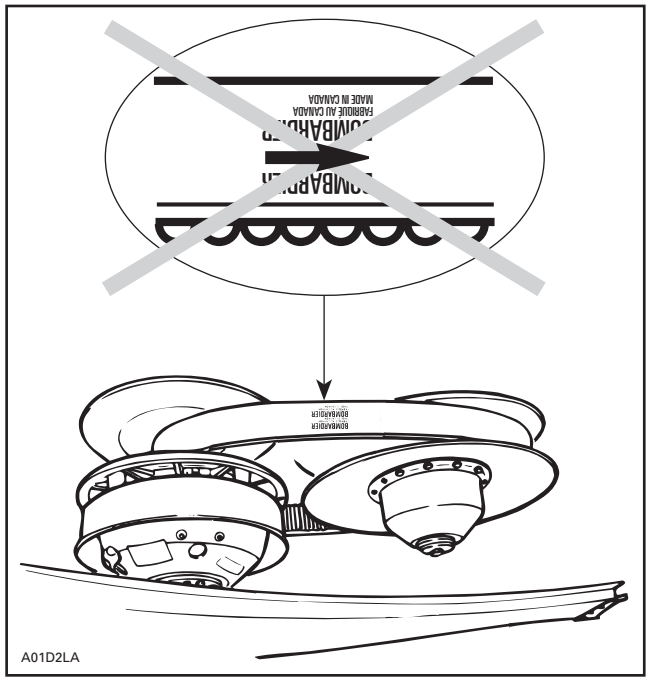
MODEL	PART NUMBER	WIDTH (NEW) ± 0.25 mm (.010 in)	MINIMUM WIDTH (WEAR LIMIT) mm (in)
CK3 Series	417 300 066	35.10 (1.382)	33.00 (1.299)

ROTATION DIRECTION

The maximum drive belt life span is obtained when the drive belt is installed as shown. This will ensure that correct direction of rotation is respected.



CORRECT



INCORRECT

NOTE: For used drive belt, mark and reinstall in the same position.

DRIVE BELT DEFLECTION MEASUREMENT

NOTE: The drive belt deflection measurement must be performed each time a new drive belt is installed.

NOTE: To obtain an accurate drive belt deflection measurement, it is suggested to allow a break-in period of 50 km (30 mi).

Before checking the belt deflection, ensure vehicle has the proper belt (refer to the application chart).

Adjust pulley distance and alignment. Refer to PULLEY DISTANCE AND ALIGNMENT 05-05.

To obtain maximum vehicle performance, the belt tension must be adjusted according to specifications shown in the accompanying chart.

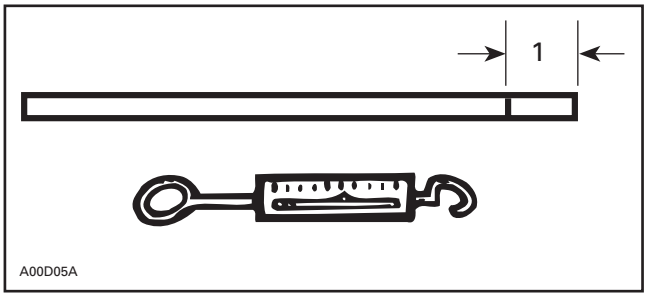
MODEL	DEFLECTION mm (in)	FORCE kg (lb)	HEIGHT† OVER DRIVEN PULLEY
All Models	38 ± 5 (1.496 ± .197)	11.5 (25)	0 - 1.5 mm (0 - 1/16")

† FOR REFERENCE ONLY

To Check Tension

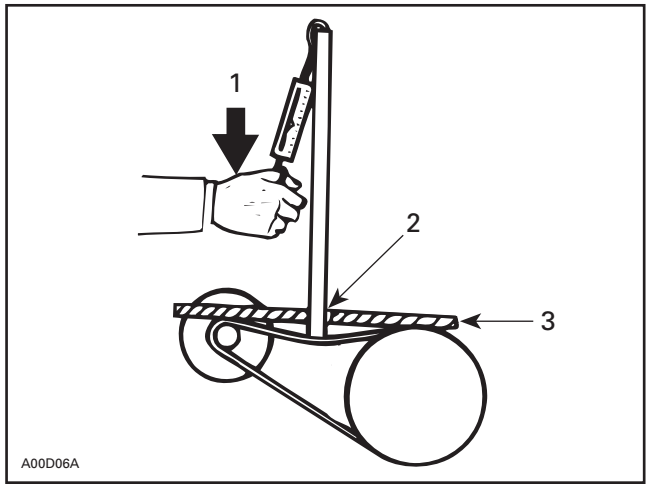
Position a reference rule on drive belt.

Wooden Stick and Spring Scale Method



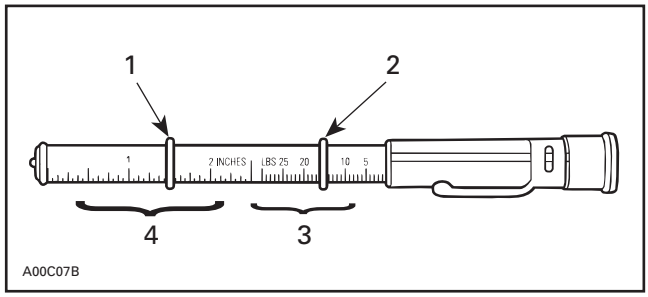
1. Mark specified deflection

Using spring scale and stick, apply specified force on drive belt halfway between pulleys as shown.



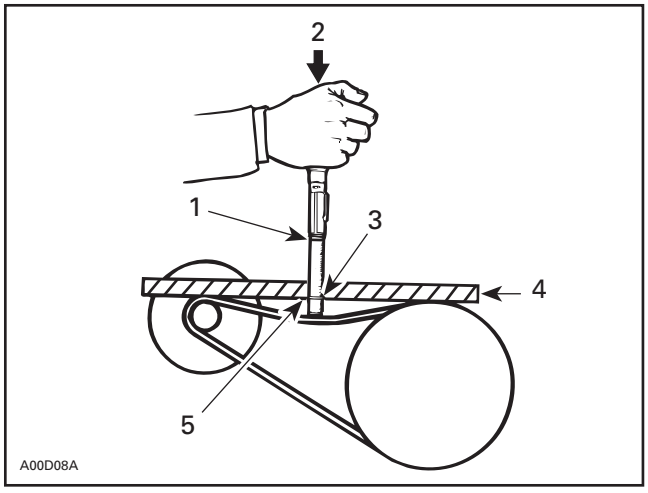
1. Force
2. Read deflection here
3. Reference rule

Or use the belt tension tester (P/N 414 348 200).



1. Lower O-ring
2. Upper O-ring
3. Force (read down)
4. Deflection (read up)

1. Slide lower O-ring of deflection scale to specified measure.
2. Slide upper O-ring to 0 (zero) on the force scale.
3. Apply pressure until lower O-ring is flush with edge of rule and read force on the upper scale at top edge of O-ring.



1. *Upper O-ring — force*
2. *Force*
3. *Lower O-ring — deflection*
4. *Reference rule*
5. *Deflection*

DEFLECTION ADJUSTMENT

Adjust pulley distance according to specification, refer to PULLEY DISTANCE AND ALIGNMENT 05-05.

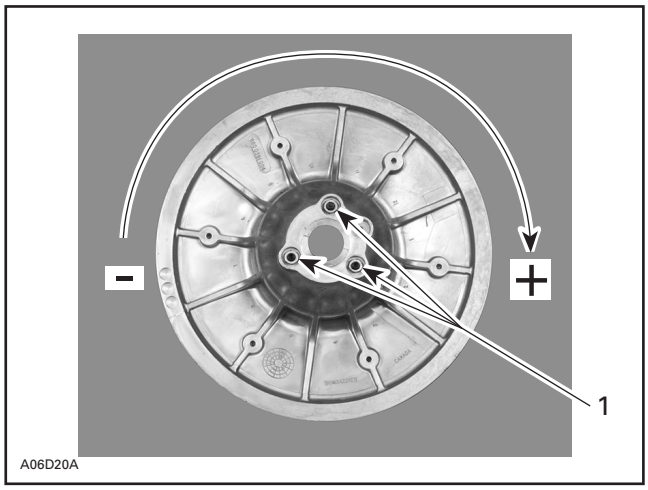
Models Equipped with Formula Type Driven Pulley

Adjust drive belt deflection using Allen screws, as shown.

To increase deflection: turn Allen screws clockwise.

To decrease deflection: turn Allen screws counterclockwise.

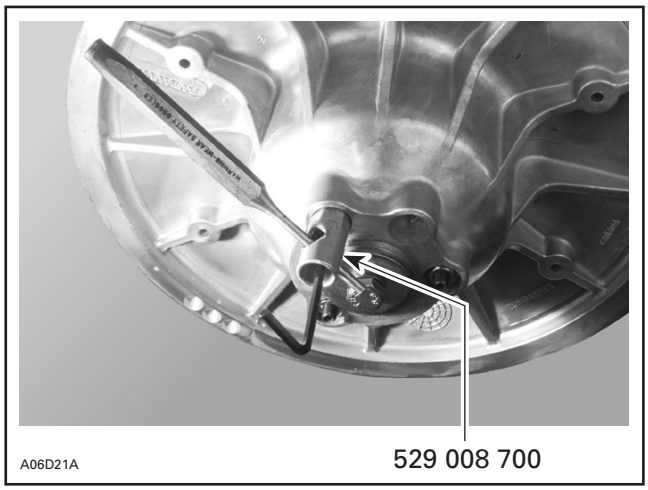
NOTE: Turn Allen screws 1/4 turn at a time, then rotate driven pulley to allow drive belt to settle in pulley. Check deflection, repeat as required.



TYPICAL

1. *Allen screw with jam nut*

Allen screws must be restrained while tightening jam nut to prevent throwing adjustment out. Use drive belt tension adjuster (P/N 529 008 700).



TYPICAL

Models Equipped with HPV27 Type Driven Pulley

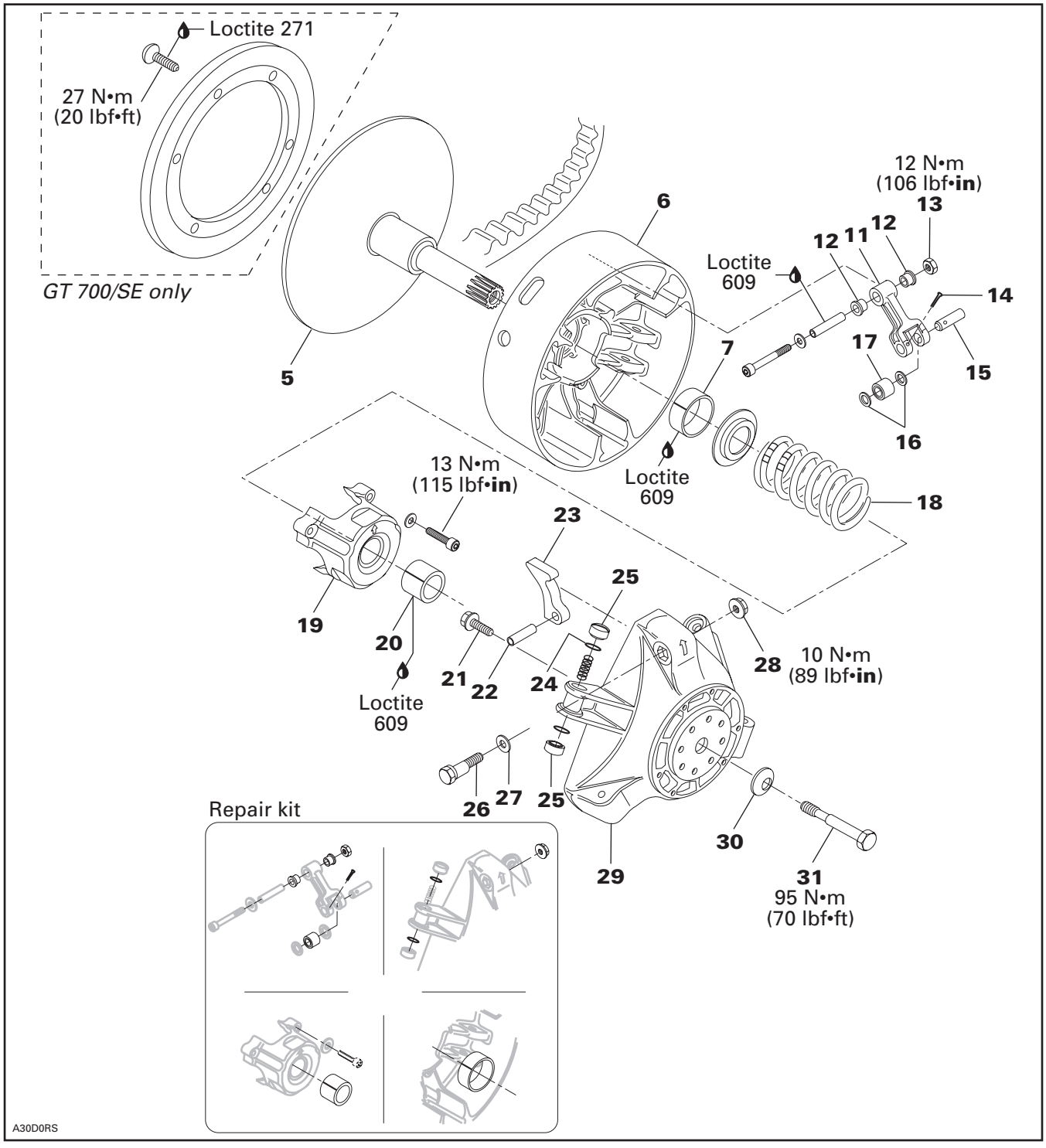
Loosen screws and turn adjustment ring accordingly.

DRIVE PULLEY

TRA

All Models

NOTE: This is a lubrication free drive pulley.



GENERAL

Some drive pulley components (return spring, ramp) can be changed to improve vehicle performance in high altitude regions. The *High Altitude and Sea Level Technical Data Booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude.

▼ CAUTION

Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance. Verify spring specifications before installation. Do not only refer to the spring color code.

NOTE: TRA drive pulley stands for Total Range Adjustable drive pulley.

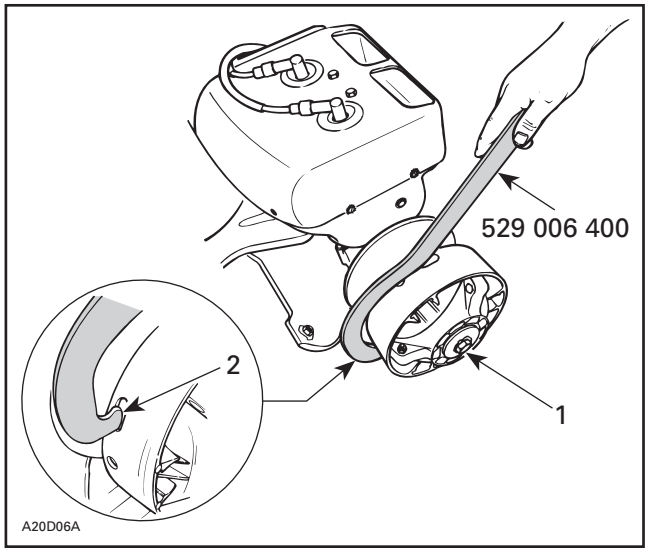
◆ WARNING

Any drive pulley repairs must be performed by an authorized Bombardier snowmobile dealer, or other such qualified person. Subcomponent installation and assembly tolerances require strict adherence to procedures detailed.

REMOVAL

30,31, Conical Spring Washer and Screw

Use holder (P/N 529 006 400).



TYPICAL

1. *Retaining screw*
2. *Insert in any slot*

◆ WARNING

Never use any type of impact wrench at drive pulley removal and installation.

Remove retaining screw.

To remove drive pulley ass'y and/or fixed half from engine, use puller (P/N 529 022 400).

▼ CAUTION

These pulleys have metric threads. Do not use imperial threads puller. Always tighten puller by hand to ensure that the drive pulley has the same type of threads (metric vs imperial) prior to fully tightening.

To Remove Drive Pulley Ass'y:

Retain drive pulley with clutch holder.

Install puller in pulley shaft then tighten.

DISASSEMBLY

1,2, Screw and Ring Gear

▼ CAUTION

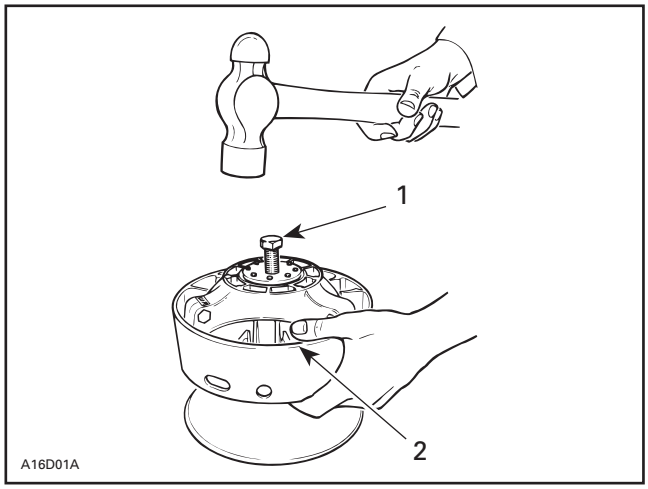
Retaining screws must be heated before disassembly. Do not exceed 150°C (300°F).

5,6, Fixed and Sliding Half

▼ CAUTION

Do not tap on governor cup.

Screw puller into fixed half shaft about 13 mm (1/2 in). Raise drive pulley and hold it by the sliding half while knocking on puller head to disengage fixed half.



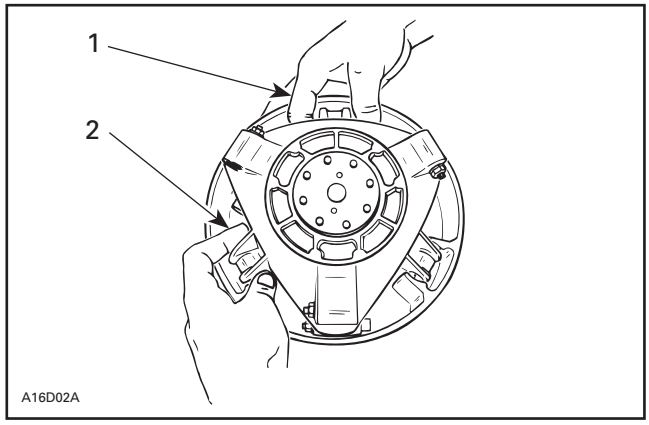
1. Puller
2. Holding sliding half

NOTE: No components marking is required before disassembling this drive pulley since it has factory mark and arrows as indexing reference.

25,29, Slider Shoe and Governor Cup

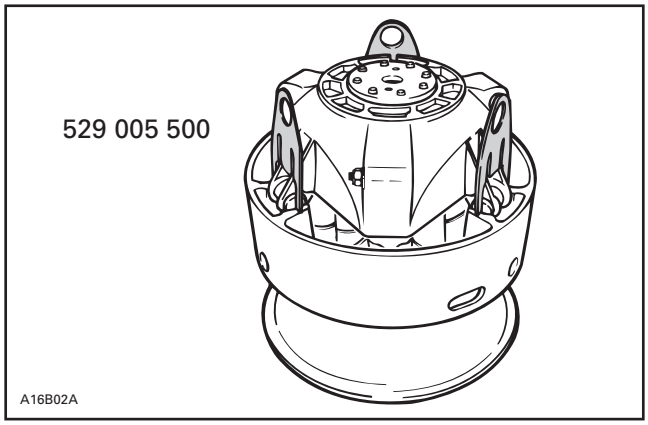
Carefully lift governor cup until slider shoes come at their highest position into guides.

Hold a slider shoe set then carefully lift its housing and remove slider shoes. Proceed the same way for other housings lifting one at a time.



1. Hold slider shoes
2. Lift one housing at a time

NOTE: To ease disassembly, forks (P/N 529 005 500) should be used to hold slider shoes prior to removing governor cup.



19, Spring Cover Ass'y

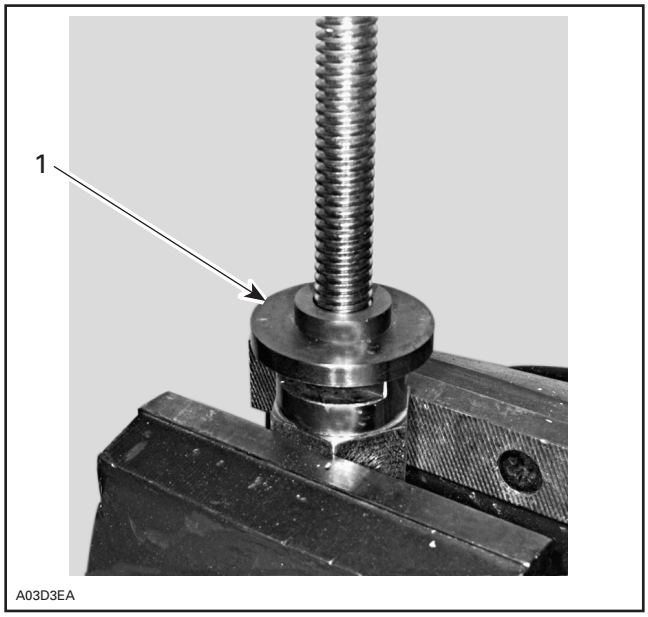
It is pushed by clutch spring pressure.

◆ WARNING

Clutch spring is very strong. Never attempt to remove spring cover without the recommended tools.

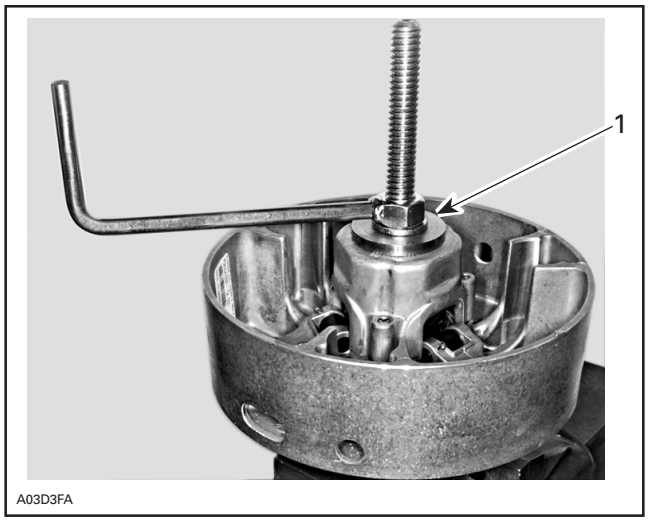
Use spring compressor (P/N 529 035 524).

Install support guide.



1. Support guide

Install sliding half then a second support guide. These support guides will prevent bushing damages.



1. Support guide

Remove 3 Allen screws retaining spring cover then unscrew compressor.

CLEANING

5,6, Fixed and Sliding Half

Clean pulley faces and shaft with fine steel wool and dry cloth.

5, Fixed Half and Crankshaft End

Parts must be at room temperature before cleaning.

Using a paper towel with cleaning solvent, clean crankshaft tapered end and the taper inside the fixed half of the drive pulley, crankshaft threads and retaining screw threads.

◆ WARNING

This procedure must be performed in a well-ventilated area.

▼ CAUTION

Avoid contact between cleaner and crankshaft seal because damage may occur.

Remove all hardened oil deposits that have baked on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper no. 600.

▼ CAUTION

Do not use any other type of abrasive.

Reclean mounting surfaces with paper towel and cleaning solvent.

Wipe off the mounting surfaces with a clean, dry paper towel.

▼ CAUTION

Mounting surfaces must be free of any oil, cleaner or towel residue.

7,20, Bushing

Only use petrol base cleaner when cleaning bushings.

▼ CAUTION

Do not use acetone to clean bushing.

INSPECTION

Drive pulley should be inspected annually.

16,17, Thrust Washer and Roller

Check roller for roundness of external diameter. Check thrust washer for thickness wear. Replace as required.

▼ CAUTION

Ensure rollers are in good condition. Replace as required.

9,12, Fitting Bolt Ass'y and Flanged Bushing

Check for wear, replace as required. When installing old style flanged bushing (made of black plastic), use a size "O" (letter) drill bit to ream inside diameter.

24,25, O-Ring and Slider Shoe

Check if O-rings are cracked, cut or crushed. Replace as required.

Check slider shoes for wear. Replace if groove is not apparent on top.

5,29, Fixed Half and Governor Cup

Inspect splines and free play between both parts. Maximum free play is 0.5 mm (.020 in) measured at calibration screw radius. Replace if required.

7,20, Sliding Half and Spring Cover Bushing

Visually inspect coating. Replace if worn.

Sliding Half Bushing Replacement

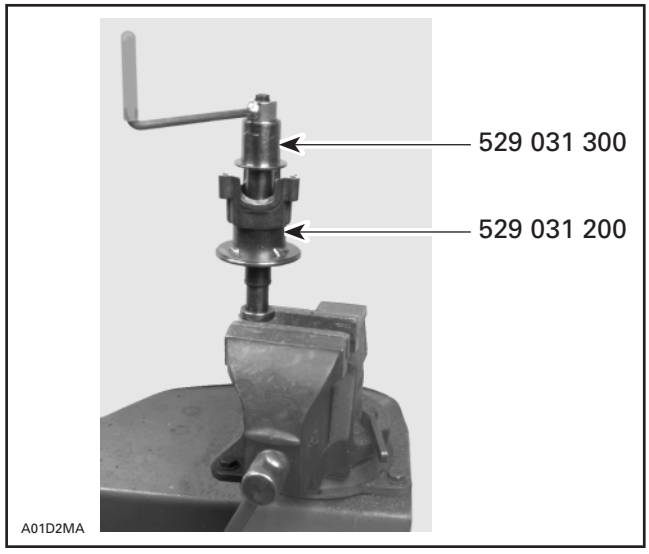
This bushing is not replacable. If worn out, replace sliding half ass'y.

Spring Cover Bushing Replacement

Under normal use there is no need to replace this bushing.

Mount compressor (P/N 529 035 524) in a vise.

Use tools (P/N 529 031 300 and 529 031 200) to remove old bushing.



▼ CAUTION

Bushing must be bonded with retaining compound.

Apply retaining compound Loctite 609 outside of bushing then press it down to counterbore from outside end.

▼ CAUTION

Insert bushing from sliding half side (inner side) of spring cover.

ASSEMBLY

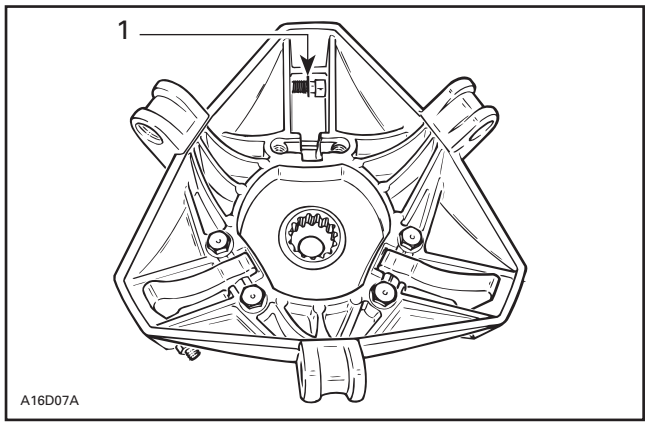
NOTE: This drive pulley is lubrication free. **Do not lubricate** any component.

1,2,3, Screw, Ring Gear and Loctite 271

Apply Loctite 271 (P/N 413 702 900) on threads and then torque to 27 N•m (20 lbf•ft).

26,27,28, Calibration Screw, Washer and Locking Nut

When installing calibration screw, make sure to install washer as shown.



1. Washer

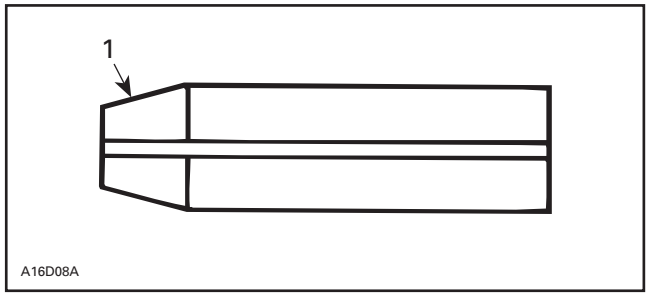
Torque locking nut to 10 N•m (89 lbf•**in**).

15, Pin

Always use the same type of pin as originally installed when servicing. Different types have different weights for calibration purpose. Refer to TECHNICAL DATA 10-03.

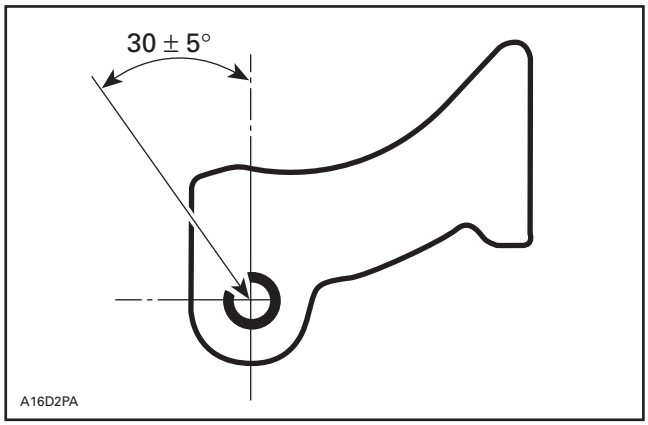
21,22,23, Ramp, Dowel Tube and Screw

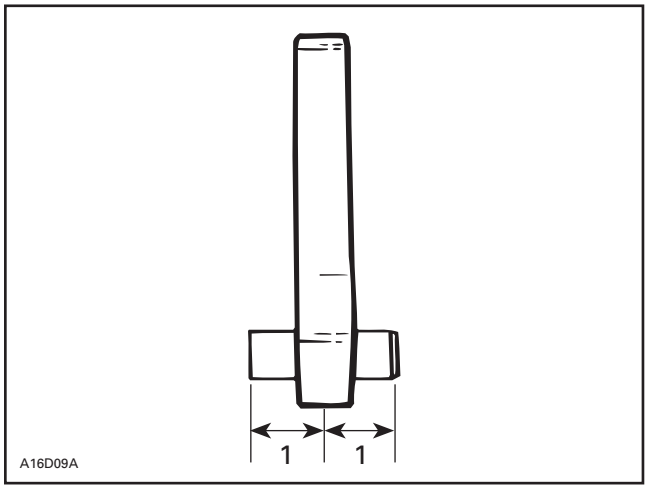
Insert dowel tube from chamfered side. Make sure ramp is centered on dowel tube.



1. Chamfered side

Position dowel tube split at the illustrated angle.





1. Equal distance

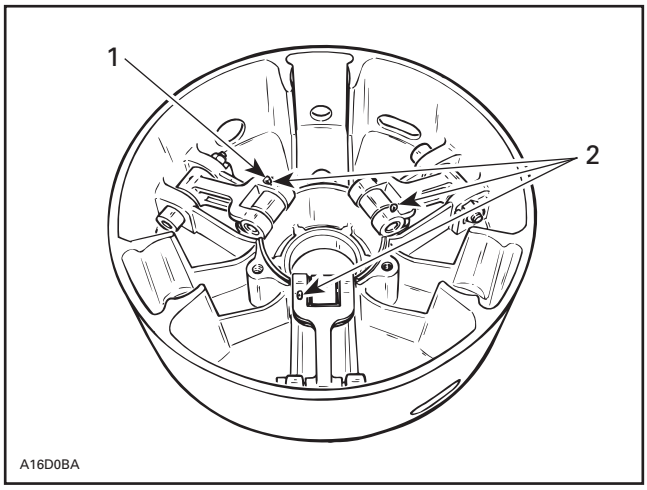
Torque screws to 10 N•m (89 lbf•**in**).

9,11,13,14, Screw, Lever Ass'y, Nut and Cotter Pin

Always install lever assemblies so that cotter pins are on the shown side. Besides install cotter pin head on top when lever is sat at bottom of sliding half. Bend cotter pin ends to sit perfectly against lever.

◆ WARNING

Whenever replacing centrifugal levers, always replace all 3 at the same time. Otherwise, drive pulley misbalancing will occur be-cause of levers difference.



1. Head on top
2. All on the same side

▼ CAUTION

Lever assemblies must be installed so that cotter pins are on the same side.

Torque nuts to 12 N•m (106 lbf•**in**).

▼ CAUTION

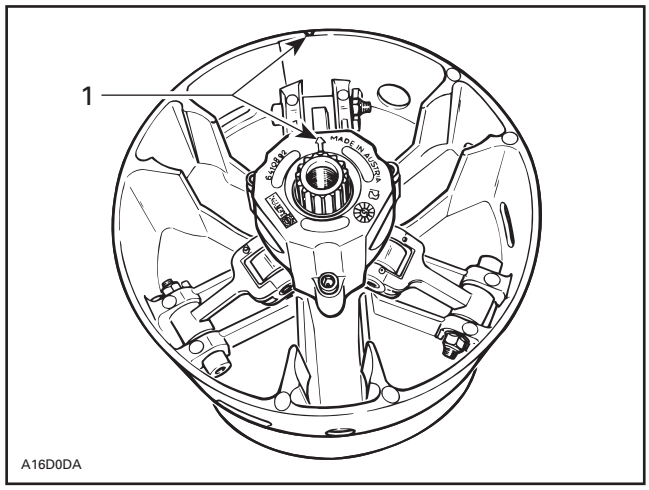
Lever ass'y and rollers must move easily after installation.

5,6,18,19, Fixed Half, Sliding Half, Spring, Spring Cover and Screw

To install spring cover, use spring compressor (P/N 529 035 524).

Assemble fixed and sliding halves. Note that fixed halves have different cone angle. Match cone angle with crankshaft.

Lift sliding half against spring cover and align spring cover arrow with sliding half mark.

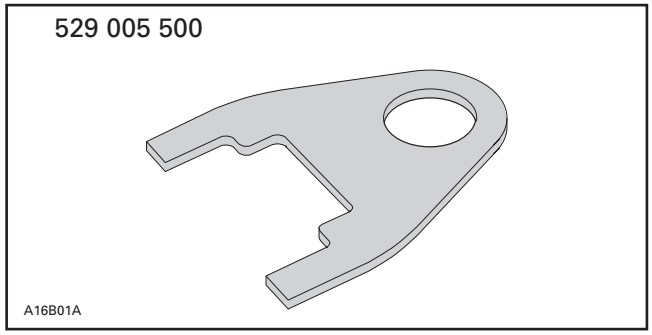


1. Align

Install and torque screws to 13 N•m (115 lbf•**in**).

6,25,29, Sliding Half, Slider Shoe and Governor Cup

To install governor cup, use following tool:

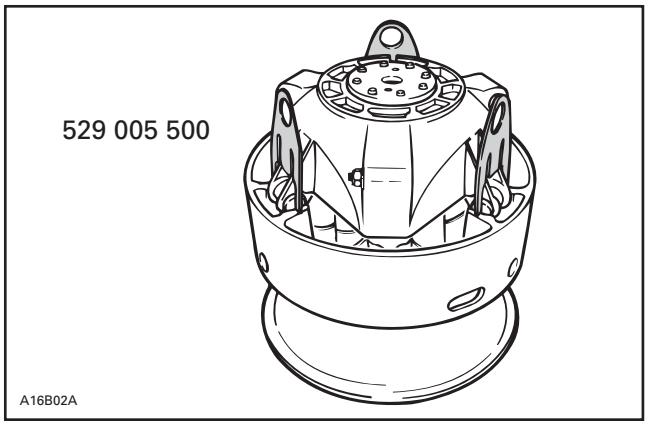


Insert spring and slider shoes into governor cup so that groove in each slider shoe is vertical to properly slide in guides.

▼ CAUTION

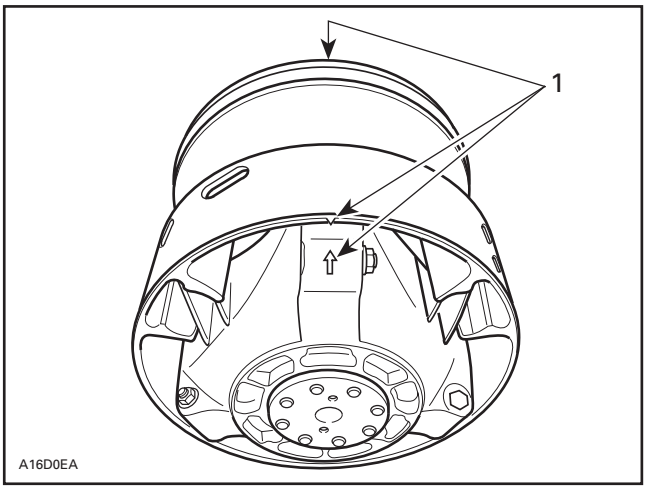
Make sure O-rings are installed on slider shoes and their grooves are positioned vertically.

Install fork (P/N 529 005 500) into slider shoe grooves to maintain them for governor cup installation. Proceed on 3 set of slider shoes.



Make sure to align governor cup arrow with sliding half and fixed half mark.

NOTE: If fixed half has no mark, align governor cup mark with segment no. 1 of inner half. Segments are identified on engine side.



1. Align

Carefully slide governor cup into sliding half. Align mark of governor cup with mark of fixed half.

Remove forks and push governor cup so that its splines engage with fixed half shaft splines.

▼ CAUTION

Make sure splines of both parts are fully engaged.

INSTALLATION

◆ WARNING

Do not apply anti-seize or any lubricant on crankshaft and drive pulley tapers.

◆ WARNING

Never use any type of impact wrench at drive pulley removal and installation.

Clean mounting surfaces as described in CLEANING above.

Drive Pulley Ass'y

The installation procedure must be strictly adhered to as follows.

Install drive pulley on crankshaft extension.

Install conical washer with its concave side towards drive pulley then install screw.

◆ WARNING

Never substitute conical washer and/or screw with jobber ones. Always use Bombardier genuine parts for this particular case.

Use holder. See removal procedure.

Torque screw to 90 to 100 N•m (66 to 74 lbf•ft).

Install drive belt and guard.

Raise and block the rear of the vehicle and support it with a mechanical stand.

◆ WARNING

Ensure that the track is free of particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure nobody is standing near the vehicle.

Accelerate the vehicle at low speed (maximum 30 km/h (20 MPH) and apply the brake, repeat 5 times.

Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

◆ WARNING

After 10 hours of operation the transmission system of the vehicle must be inspected to ensure the retaining screw is properly torqued.

DRIVE PULLEY ADJUSTMENT

The drive pulley is factory calibrated to transmit maximum engine power at a predefined RPM. Factors such as ambient temperature, altitude or surface condition may vary this critical engine RPM thus affecting snowmobile efficiency.

This adjustable drive pulley allows setting maximum engine RPM in the vehicle to maintain maximum power.

Calibration screws should be adjusted so that actual maximum engine RPM in vehicle matches with the maximum horsepower RPM given in TECHNICAL DATA 10.

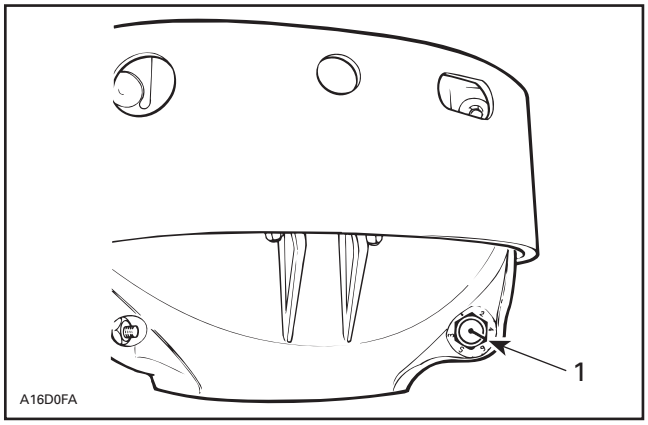
NOTE: Use precision digital tachometer for engine RPM adjustment.

NOTE: The adjustment has an effect on high RPM only.

To adjust, modify ramp end position by turning calibration screws.

26,28,29, Calibration Screw, Locking Nut and Governor Cup

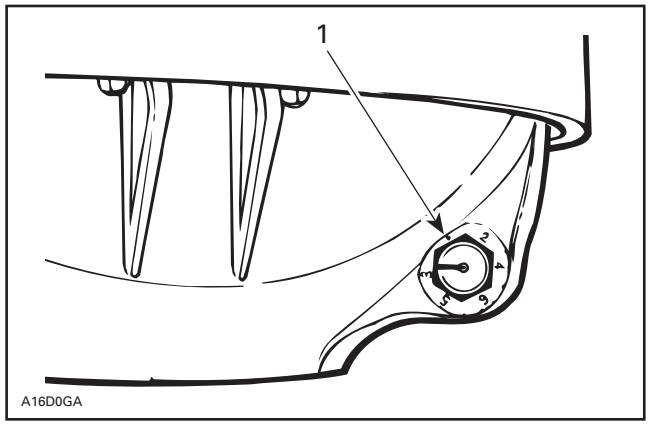
Calibration screw has a notch on top of its head.



1. Notch

Governor cup has 6 positions numbered 2 to 6. Note that in position 1 there is no stamped number (due to its location on casting).

See TECHNICAL DATA 10 for original setting.



1. Position 1 (not numbered)

Each number modifies maximum engine RPM by about 200 RPM.

Lower numbers decrease engine RPM in steps of 200 RPM and higher numbers increase it in steps of 200 RPM.

Example:

Calibration screw is set at position 3 and is changed to position 5. So maximum engine RPM is increased by about 400 RPM.

To Adjust:

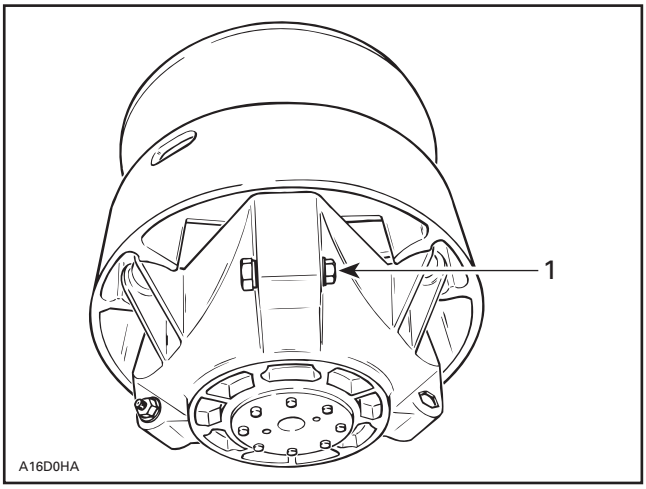
Just loosen locking nut enough to pull calibration screw **partially** out and adjust to desired position. Do not completely remove the locking nut. Torque locking nuts to 10 N•m (89 lbf•**in**).

▼ CAUTION

Do not completely remove calibration screw otherwise its inside washer will fall off.

▼ CAUTION

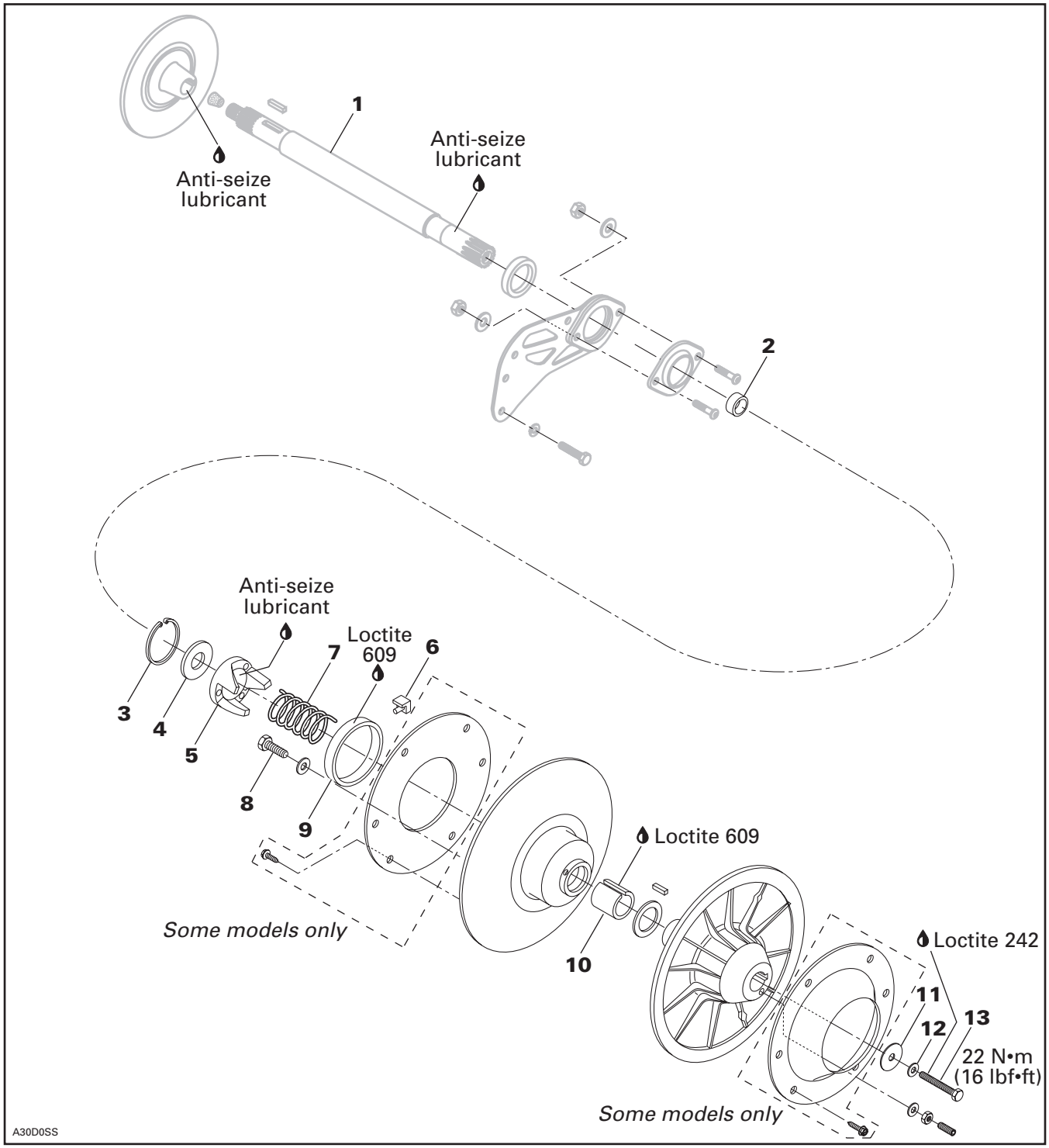
Always adjust all 3 calibration screws and make sure they are all set at the same number.



1. Loosen just enough to permit rotating of calibration screw

DRIVEN PULLEY

Formula Type on Formula III Series, Mach 1/Z/Z LT



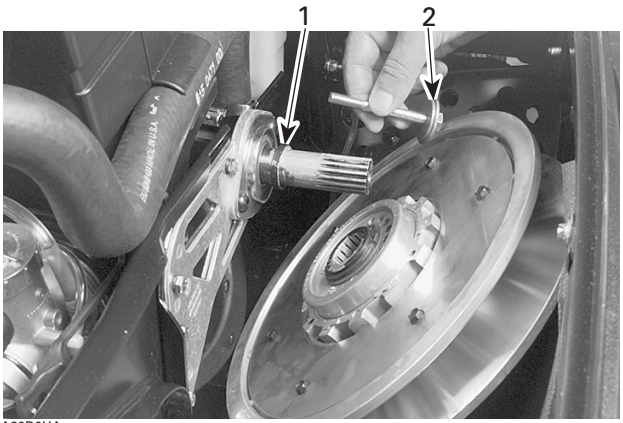
REMOVAL

Remove guard and drive belt from vehicle.

Remove cap screw **no. 13**, washer **no. 12** and shouldered washer **no. 11** then pull the driven pulley from the countershaft.

Note shouldered washer position for reinstallation.

Take care not to loose spacer **no. 2**.



1. Spacer
2. Shoulder on this side

1, Countershaft

Should countershaft **no. 1** removal be required, refer to BRAKE 05-06 then look for **Countershaft and Brake Disc Removal**.

DISASSEMBLY

Use spring compressor (P/N 529 018 600).



Remove snap ring **no. 3** and washer **no. 4** to disassemble the cam and the 2 pulley halves.

◆ WARNING

Driven pulley cam is spring loaded, use above-mentioned tool.

CLEANING

9,10, Large Bushing and Small Bushing

During break-in period (about 10 hours of use), teflon from bushing moves to cam or shaft surface. A teflon over teflon running condition occurs, leading to low friction. So it is normal to see gray teflon deposit on cam or shaft. Do not remove that deposit, it is not dust.

When a dust deposit has to be removed from the cam or the shaft, use dry cloth to avoid removing transferred teflon.

Pulley Half Cleaning

Use Parts Cleaner (P/N 413 711 809).

INSPECTION

9,10, Bushings

Check for cracks, scratch and for free movement when assembled to fixed half.

Using a dial bore gauge measure bushing diameter. Measuring point must be at least 5 mm (1/4 in) from bushing edge.

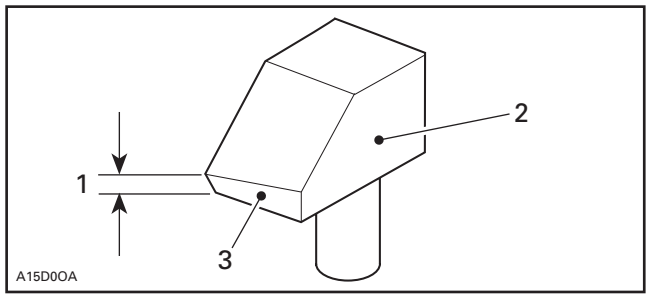


Replace bushing(s) if worn more than specified.

DRIVEN PULLEY BUSHING WEAR LIMIT mm (in)	
Small bushing	38.30 (1.508)
Large bushing	89.15 (3.510)

6, Slider Shoe

Check cam slider shoes for wear. Replace when inside edge of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



1. Measure thickness of slope base here
2. Sliding pulley side
3. Slope base

ASSEMBLY

6, Cam Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

5, Cam

Coat cam interior with anti-seize lubricant.

INSTALLATION

1, Countershaft

▼ CAUTION

Always apply anti-seize lubricant (P/N 413 701 000) on the countershaft before final pulley installation.

Should installation procedure be required, refer to BRAKE 05-06 then look for **Brake Disc and Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

Driven pulley end-play is 0 (zero).

13, Pulley Retaining Screw

Torque to 22 N•m (16 lbf•ft).

ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 to adjust pulley distance. Adjust drive belt height in driven pulley to obtain specified belt deflection. Turn Allen screws **no. 10** equally accordingly.

7, Spring

General

It is usual to experience spring setting during breaking period of a new spring. The factory spring preload is slightly higher (about 1 kg (2 lb)) to compensate for spring setting. Specifications in TECHNICAL DATA 10 are applicable after break-in period (about 10 hours of use).

Spring Torsional Pre-Load

To check spring pre-load adjustment, use spring scale hook (P/N 529 006 500) and a spring scale.

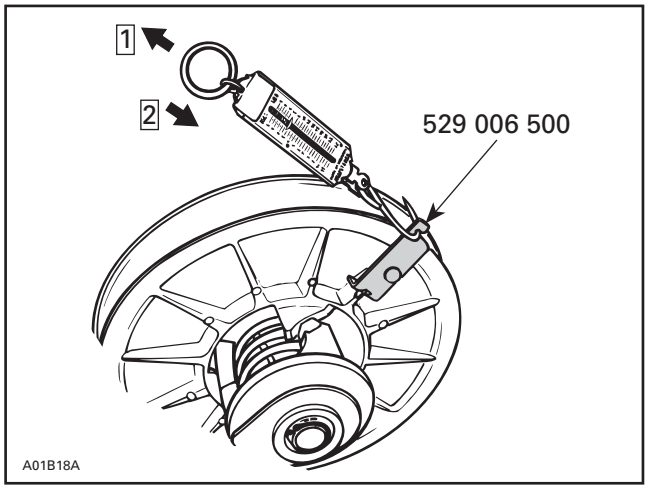
Remove drive belt.

Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicularly with pulley axle.

Take 1st measurement when sliding half begins to turn. Rotate sliding half to 10 mm (3/8 in) of rotation. Hold fish scale at this position. Slowly release tension from fish scale and take 2nd measurement when sliding half begins to return. Spring pre-load is the average measurement between these 2.

$$\frac{\text{1st measurement (when opening)} + \text{2nd measurement (when closing)}}{2} = \text{Spring pre-load}$$

$$\text{Example: } \frac{\text{3.8 kg (8.4 lb) (when opening)} + \text{3.4 kg (7.5 lb) (when closing)}}{2} = \text{3.6 kg (8 lb) Actual spring pre-load}$$

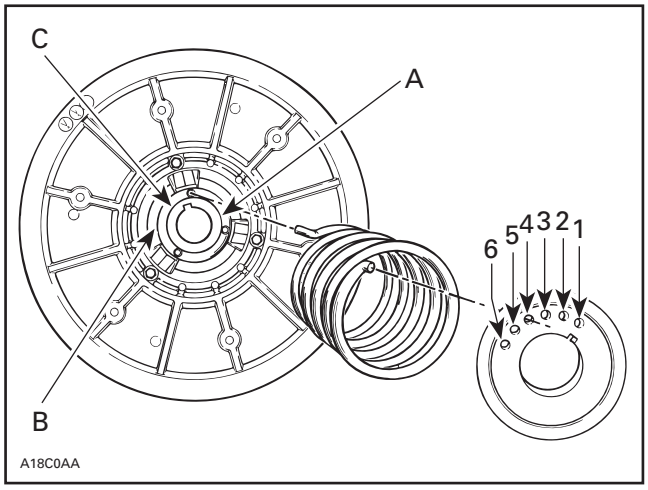


TYPICAL

Step 1: 1st measurement
Step 2: 2nd measurement

To adjust spring pre-load, relocate spring end in cam, moving it clockwise to increase the pre-load and counterclockwise to decrease it. Refer to TECHNICAL DATA 10.

NOTE: If spring pre-load can not be adjusted, try to relocate the other end of spring in sliding pulley (holes A, B and C).



TYPICAL

Letters and numbers shown in illustration are actual letters and numbers embossed on parts

NOTE: Always recheck torsional pre-load after adjusting.

Pulley Alignment and Drive Belt Deflection

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 and DRIVE BELT 05-02 to perform adjustments.

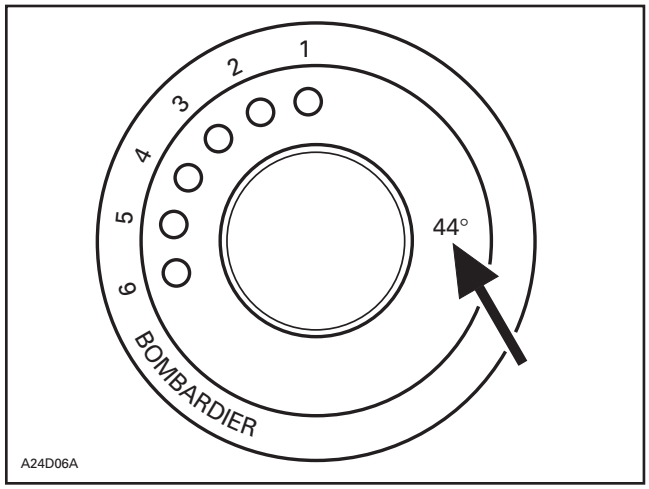
▼ CAUTION

Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

5, Cam

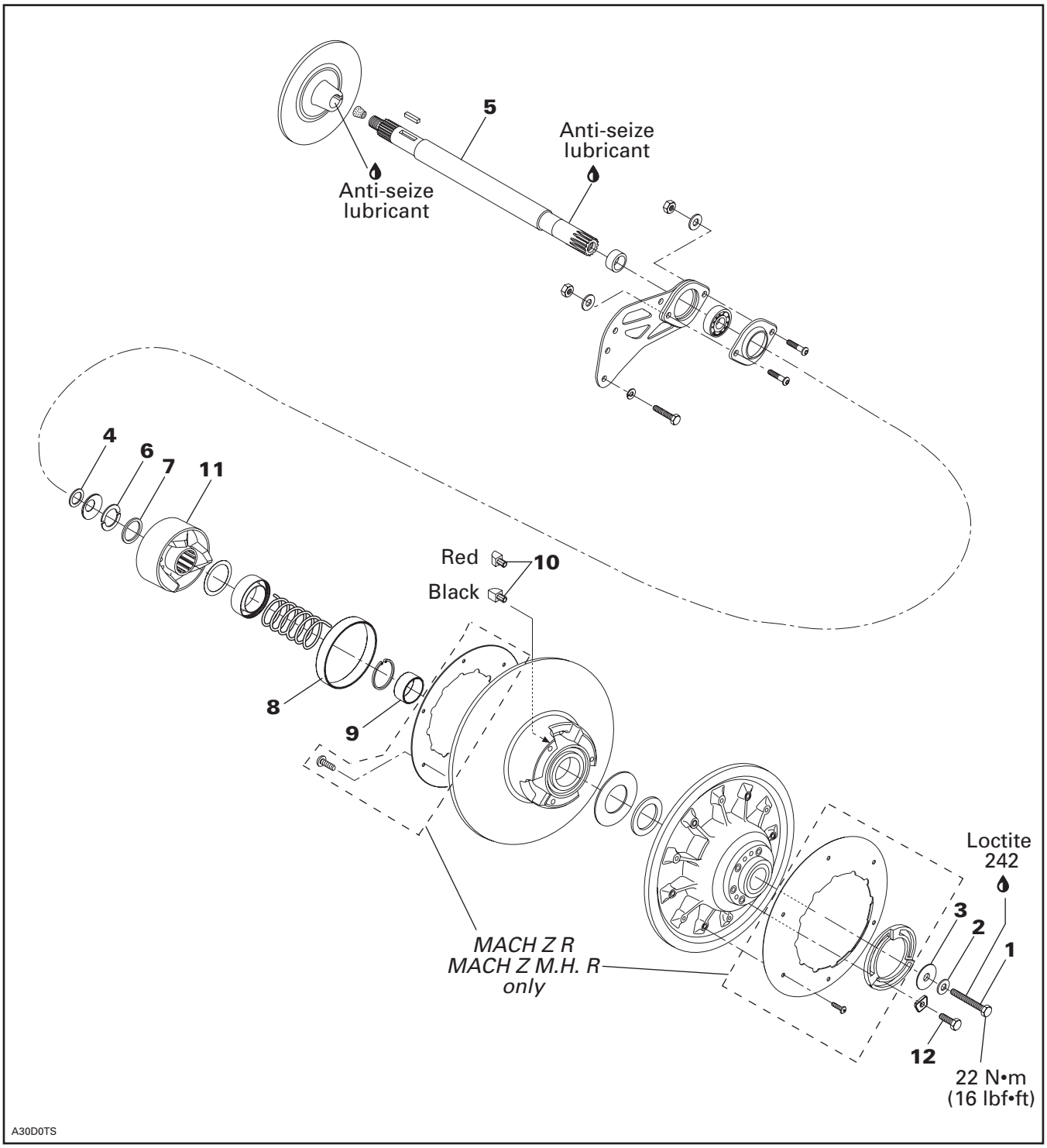
Make sure to install proper cam. Refer to TECHNICAL DATA 10.

Cam angle is identified on cam.



NOTE: For high altitude regions, the *High Altitude and Sea Level Technical Data Booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude.

HPV27 on Mach 1 R, Mach Z R/Z LT R and Grand Touring 700/SE



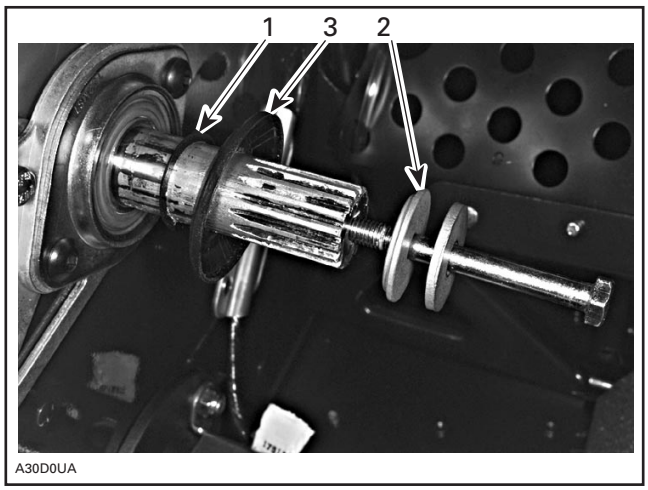
REMOVAL

Remove guard and drive belt from vehicle.

Remove cap screw **no. 1**, washer **no. 2** and shouldered washer **no. 13** then pull the driven pulley from the countershaft.

Note shouldered washer position for reinstallation.

Take care not to loose spacer **no. 4**.



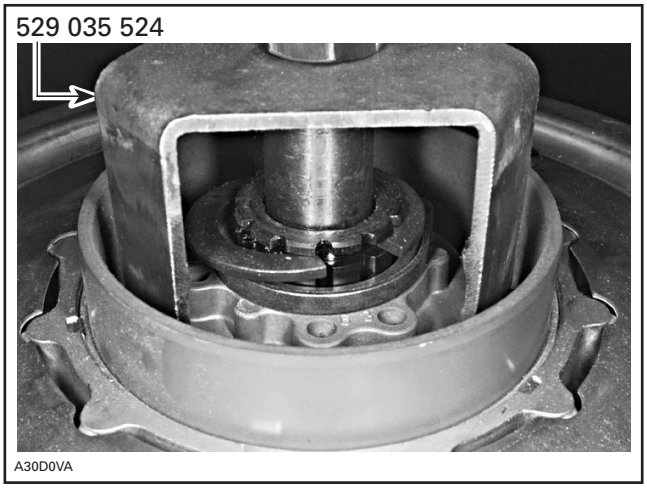
1. Spacer
2. Shoulder on this side
3. Concave side facing driven pulley

5, Countershaft

Should countershaft **no. 5** removal be required, refer to BRAKE 05-06 then look for **Countershaft and Brake Disc Removal**.

DISASSEMBLY

Use spring compressor (P/N 529 035 524).



Remove half keys **no. 6** and washer **no. 7** to disassemble the cam and the 2 pulley halves.

◆ WARNING

Driven pulley cam is spring loaded, use above-mentioned tool.

CLEANING

8,9, Large Bushing and Small Bushing

During break-in period (about 10 hours of use), teflon from bushing moves to cam or shaft surface. A teflon over teflon running condition occurs, leading to low friction. So it is normal to see gray teflon deposit on cam or shaft. Do not remove that deposit, it is not dust.

When a dust deposit has to be removed from the cam or the shaft, use dry cloth to avoid removing transferred teflon.

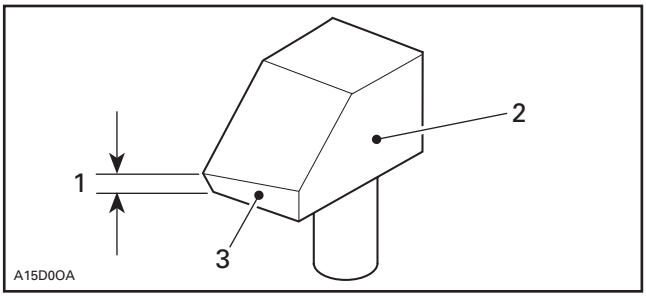
Pulley Half Cleaning

Use Parts Cleaner (P/N 413 711 809).

INSPECTION

10, Slider Shoe

Check cam slider shoes for wear. Replace when inside edge of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



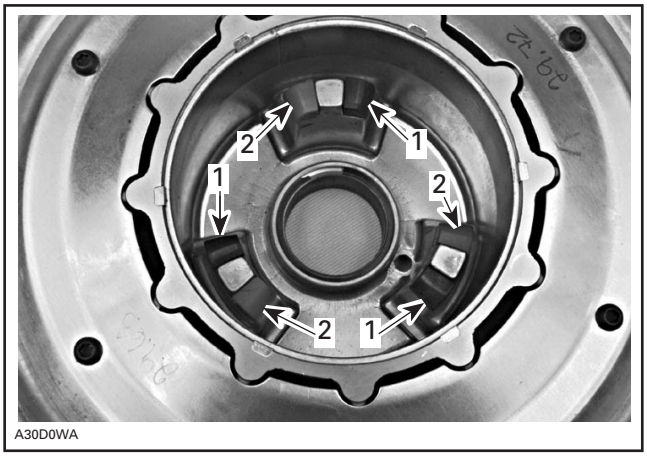
1. Measure thickness of slope base here
2. Sliding pulley side
3. Slope base

ASSEMBLY

10, Cam Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Install slider shoes as per following photo. Red slider shoes are being used for reverse and black ones for forward.



1. BLACK slider shoe
2. RED slider shoe

12, Screws

These screws are machined at there end. With the adjustment ring steel to position 0 (zero), screw ends are flush with inner side of fixed pulley half when tighten.

▼ CAUTION

If any of these screws is not flush with inner side of sliding pulley, bushings will worn unequally.

Assemble driven pulley components by reversing the disassembly procedure.

11, Cam

Coat cam interior with anti-seize lubricant.

INSTALLATION

5, Countershaft

▼ CAUTION

Always apply anti-seize lubricant (P/N 413 701 000) on the countershaft before final pulley installation.

Should installation procedure be required, refer to BRAKE 05-06 then look for **Brake Disc and Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

Driven pulley end-play is 0 (zero).

1, Pulley Retaining Screw

Torque to 22 N•m (16 lbf•ft).

ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 to adjust pulley distance. Adjust drive belt height in driven pulley to obtain specified belt deflection. Loosen screws **no. 12**, turn adjustment ring then retighten screws.

Pulley Alignment and Drive Belt Deflection

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 and DRIVE BELT 05-02 to perform adjustments.

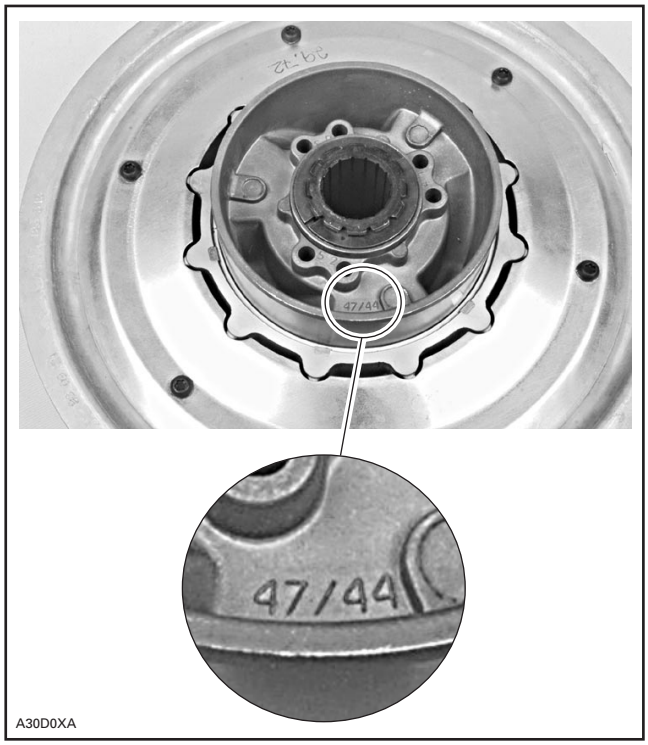
▼ CAUTION

Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

11, Cam

Make sure to install proper cam. Refer to TECHNICAL DATA 10.

Cam angle is identified on cam.



NOTE: For high altitude regions, the *High Altitude and Sea Level Technical Data Booklet* (P/N 484 300 003 and 484 054 500 for binder) gives information about calibration according to altitude.

PULLEY DISTANCE AND ALIGNMENT

GENERAL

The pulley distance we will refer to in this section, is the space separating the drive and driven pulley outside diameters (Z measurement).

This basic distance is provided as an assembly guide and indicates the dimensions between which satisfactory belt deflection will be obtained.

Both pulley distance adjustment and pulley alignment must be carried out to ensure the highest efficiency of the transmission system. Furthermore, optimum drive belt operation and minimal wear will be obtained only with proper pulley alignment.

▼ CAUTION

Before checking pulley adjustment, the rear suspension must be mounted on the vehicle and track tension/alignment must be done. Always check pulley adjustment after suspension is adjusted.

◆ WARNING

Failure to correctly perform pulley alignment may cause the vehicle to creep forward at idle.

All Pulley Alignment Specifications Refer to:

X = Distance between straight bar and drive pulley fixed half edge, **measured between pulleys**.

Y = Distance between straight bar and drive pulley fixed half edge, **measured at the end of straight bar**.

Z = Distance between outside diameter of pulleys.

GENERAL PROCEDURE

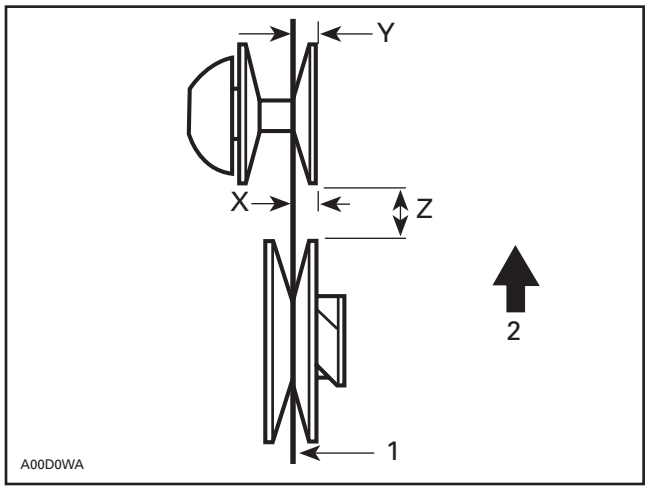
Remove guard and drive belt.

By turning and pushing the sliding half, open the driven pulley. Insert a straight bar 9.5 mm (.375 in) square, 48 cm (19 in) long or the proper alignment template into the opened driven pulley.

Measuring Procedure

Using Straight Bar

Always measure distances X and Y from the farther straight bar side (including its thickness to the fixed half edge).



TYPICAL

1. *Straight bar*
2. *Front of vehicle*

The distance Y **must** exceed distance X to compensate for the twist due to the engine torque.

Drive Belt Deflection

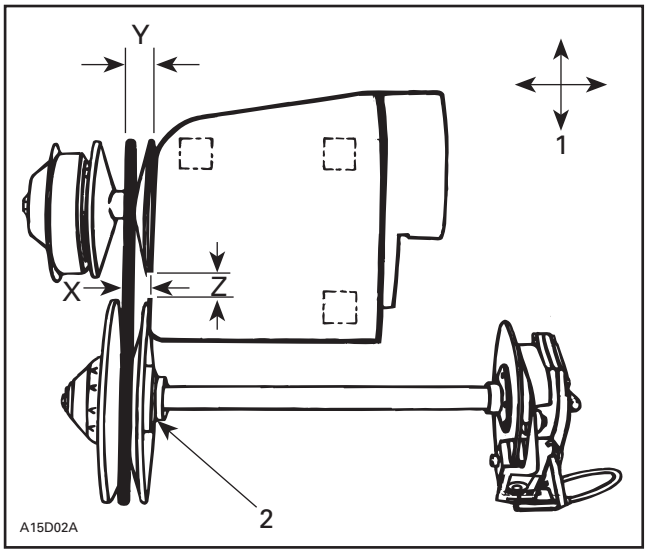
NOTE: When pulley distance and alignment are adjusted to specifications, refer to DRIVE BELT 05-02 to adjust drive belt deflection.

▼ CAUTION

This section deals mainly with adjustment procedures. For complete assembly requirements, refer to the proper ENGINE or TRANSMISSION installation section.

PULLEY ALIGNMENT AND DISTANCE SPECIFICATIONS CHART

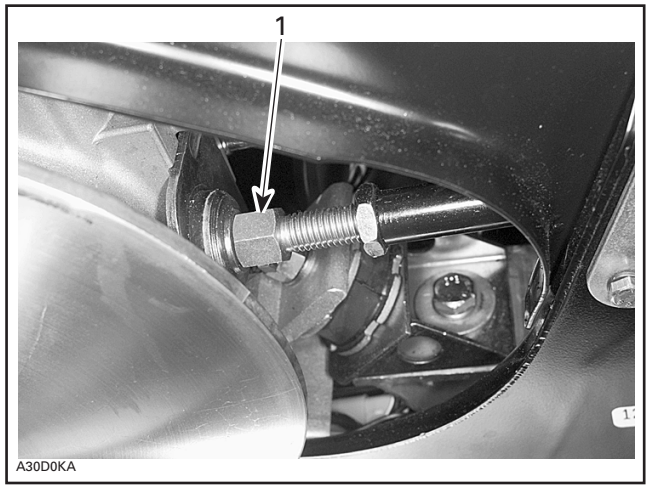
MODELS	PULLEY DISTANCE	OFFSET	
	Z	X	Y-X
	± 0.50 mm (± .020 in)	± 0.50 mm (± .020 in)	± 0.5 mm (± .020 in)
Models with Formula type driven pulley	120.0 (4.724)	35.5 (1.398)	1.5 (0.060)
Models with HPV27 type driven pulley	121.0 (4.764)	35.5 (1.398)	1.5 (0.060)



TYPICAL

1. *Engine movement*
2. *Contact*

NOTE: Prior to performing pulley adjustment, loosen torque rod nut to allow engine movement. Engine supports have tendency to stick to frame, work engine loose prior to aligning.



1. Loosen

Pulley Distance Adjustment Method

Engine Movement

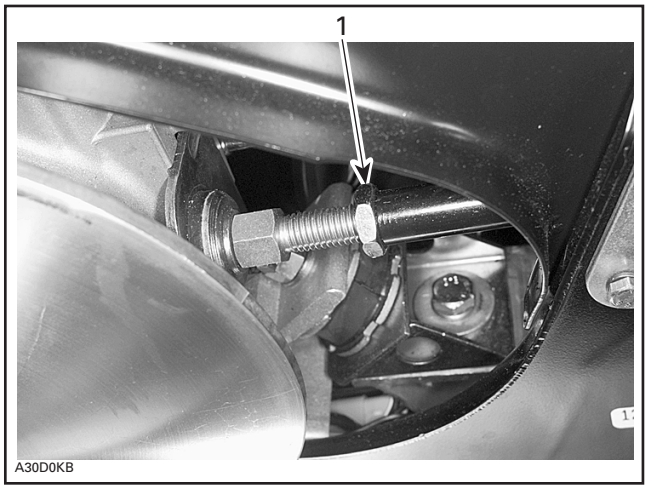
The engine support has slotted mounting holes. Move engine to obtain specified distance between pulleys.

Pulley Alignment Method

Engine Movement

Loosen the 4 bolts retaining engine support to the frame. Position engine to obtain the specified alignment.

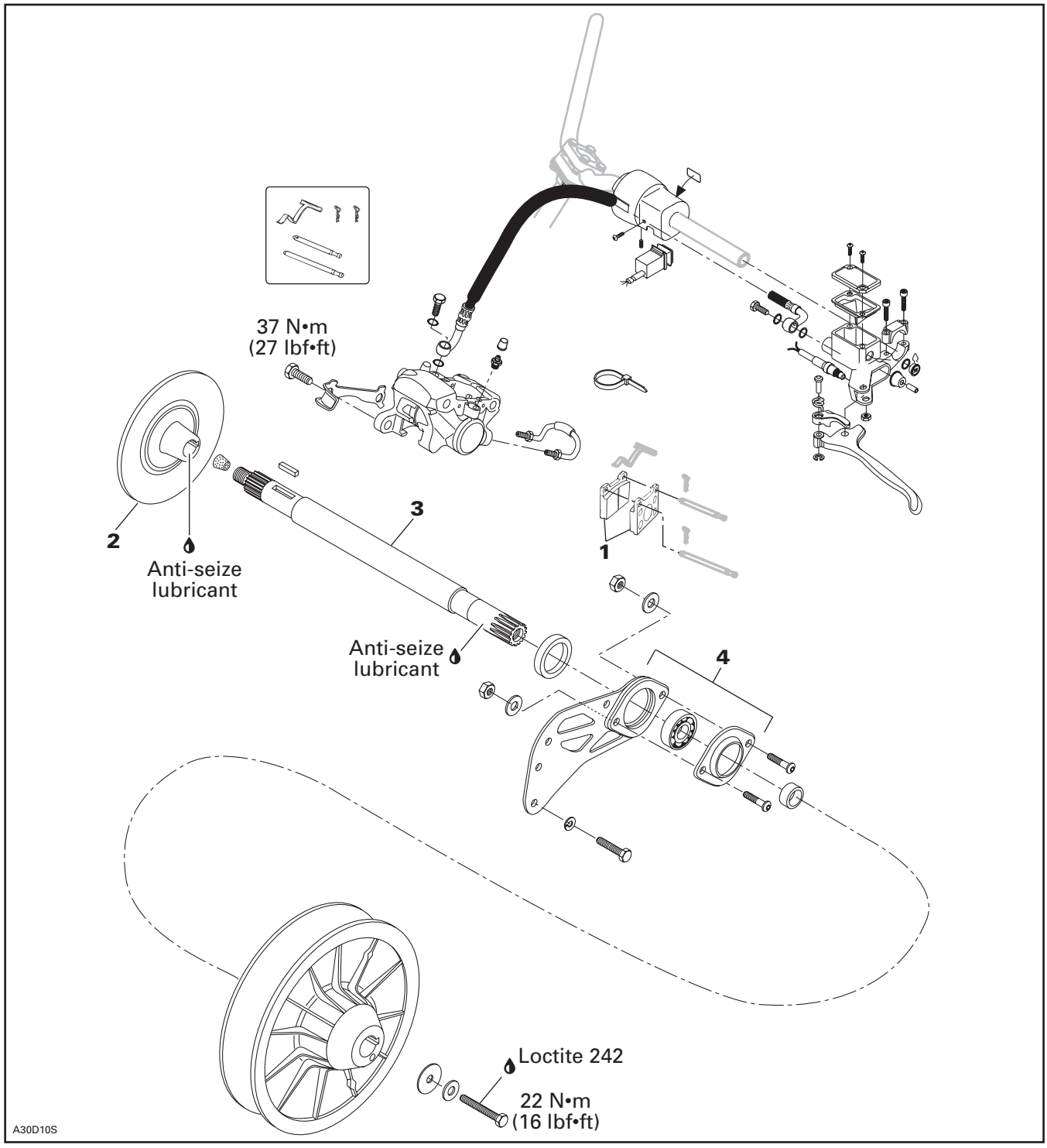
NOTE: After alignment, adjust torque rod so it slightly contacts stopper plate. Do not over tighten, it will disalign pulleys.



1. Retighten

BRAKE

HYDRAULIC DISC BRAKE



REMOVAL

BRAKE DISC REMOVAL

Brake disc can be withdraw without removing caliper. Proceed as follows:

- Remove belt guard, belt and driven pulley.
- Remove air silencer.
- Unbolt bearing support no. 4 from chassis.
- Unbolt caliper from chaincase.
- Open chaincase and remove upper sprocket.
- Pull countershaft no. 3 toward driven pulley side to free from chaincase and disc.
- Remove disc.

COUNTERSHAFT REMOVAL

No tools to remove countershaft bearing were available at time of printing. A service bulletin is to be published to cover this topic.

DISASSEMBLY

Only brake pads are available as spare parts. If caliper or master cylinder are damaged, replace each of them as an assembly.

CLEANING

Clean all metal components in a general purpose solvent. Thoroughly dry all components before assembling.

▼ CAUTION

Do not clean brake pads in solvent. Soiled brake pads must be replaced by new ones.

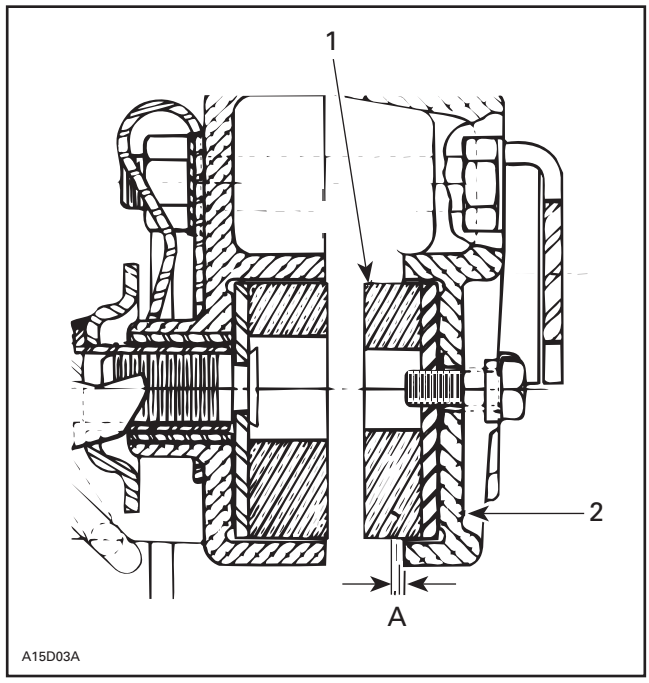
INSPECTION

1, Brake Pad

Brake pads must be replaced when lining is 1 mm (1/32 in) thick or less.

▼ CAUTION

Brake pads must always be replaced in pairs.



TYPICAL
1. Fixed pad
2. Inner caliper
A. 1 mm (1/32 in) minimum

2, Brake Disc

Check for scoring, cracking or bending, replace as required.

▼ CAUTION

Brake disc should never be machined.

◆ WARNING

Always install a new nut when servicing.

INSTALLATION

To install brake, reverse removal procedure paying attention to the following.

◆ WARNING

Avoid getting oil on brake pads.

2, Brake Disc

Apply anti-seize lubricant (P/N 413 701 000) on shaft.

The disc hub exceeds the disc more from one side than from the other. Install disc with the longer exceeding portion toward driven pulley.

ADJUSTMENT

Countershaft Bearing

Insert countershaft (with brake disc) from chaincase side through countershaft support (driven pulley side), then insert into chaincase.

Install countershaft bearing **no. 4** and ensure that countershaft is properly aligned, then tighten 3 retaining screws.

NOTE: A misaligned countershaft will result in difficulty to center the bearing in its support.

Refer to DRIVE AXLE 07-03 then look **Chaincase Perpendicularity Adjustment.**

Torque castellated nut of upper sprocket to 60 N•m (44 lbf•ft).

▼ CAUTION

Upper sprocket castellated nut must be tightened **before** bolting bearing support.

Close chaincase.

BLEEDING

Change brake fluid once a year.

Bleed brake system as follows:

Keep sufficient DOT 4 brake fluid in reservoir at all times.

▼ CAUTION

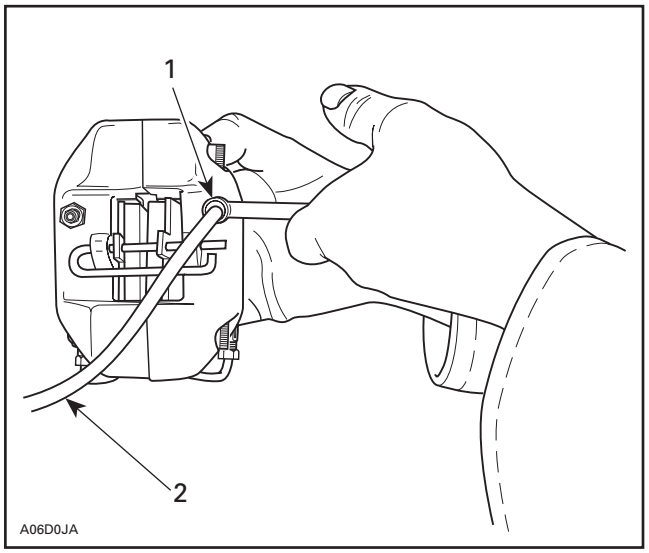
Use only DOT 4 brake fluid.

Install a hose on left side bleeder. Route this hose to a container.

Pump a few times brake lever and while holding brake lever depressed, open bleeder and check for air to escape.

Repeat with the same bleeder until no air appears in hose.

Proceed the same way with the right side bleeder.



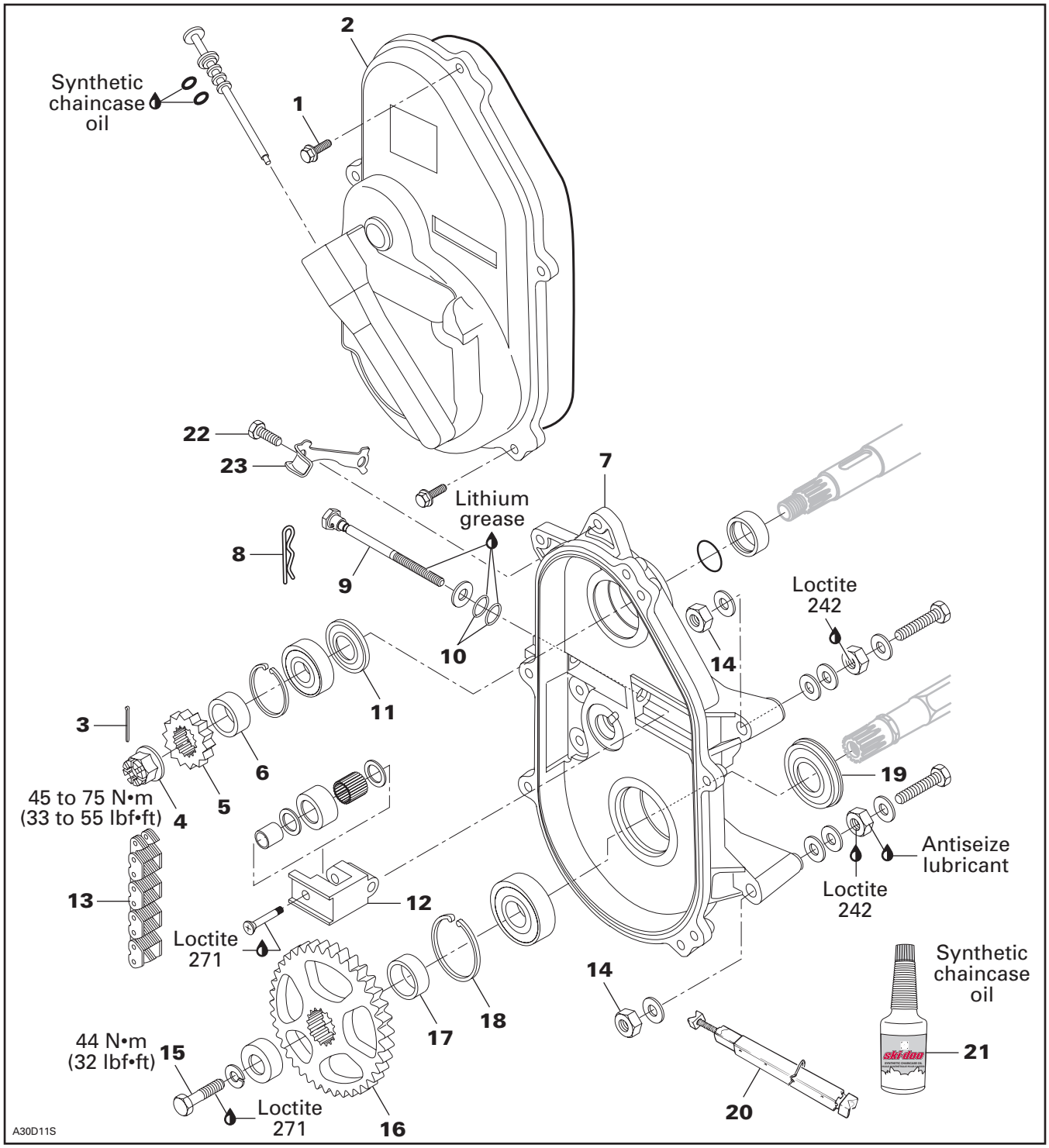
TYPICAL

1. *Open bleeder*
2. *Clear hose to catch used brake fluid*

5, Brake Light

There is no adjustment on these models. Check that switch is securely installed.

CHAINCASE


Synthetic chaincase oil
2
1
22
23
Lithium grease
7
8
9
10
Loctite 242
14
11
3
6
5
45 to 75 N•m (33 to 55 lbf•ft)
4
19
Antiseize lubricant
Loctite 242
13
12
Loctite 271
Synthetic chaincase oil
14
17
18
44 N•m (32 lbf•ft)
15
21
20
Loctite 271
16
A30D11S

REMOVAL

To remove chaincase proceed as follows.

Remove tuned pipes and muffler.

◆ WARNING

Never remove exhaust components when engine is hot.

Remove hair pin no. 8. Release drive chain tension by unscrewing tensioner adjustment screw.

Drain oil by removing chaincase cover no. 2.

3,4,5,6,13,16,17, Cotter Pin, Nut, Sprocket, Shim and Drive Chain

Apply parking brake.

Remove cotter pin no. 3 and nut no. 4 retaining upper sprocket no. 5 and screw no. 15 retaining lower sprocket no. 16. Pull sprockets and drive chain simultaneously. Remove shims nos. 6 and 17.

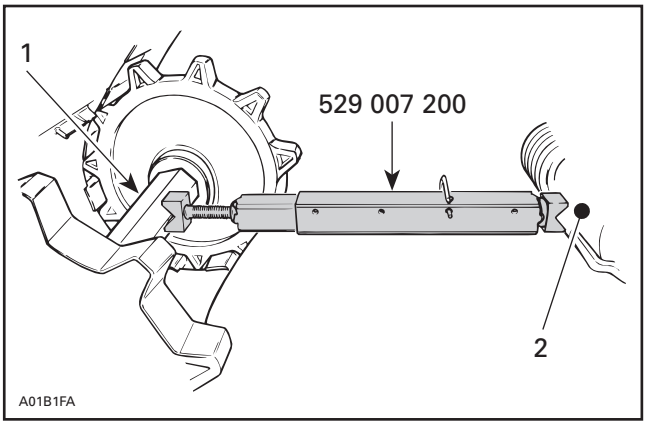
NOTE: Should countershaft removal be required, refer to BRAKE 05-06 then look for **Countershaft Removal**.

Release parking brake.

Remove 3 nuts no. 14.

Unfold locking tab no. 23 then remove caliper retaining screws no. 22.

Release track tension, use drive axle holder no. 20 (P/N 529 007 200).



TYPICAL

1. Drive axle
2. Suspension cross shaft

Pry out drive axle oil seal no. 19 from chaincase.

Pull chaincase from drive axle and countershaft.

Using 2 large screwdrivers inserted between chaincase no. 7 and frame, pry complete assembly from vehicle.

INSPECTION

Visually inspect the chain for cracked, damaged or missing links. Check for worn or defective bearings, sprockets and chain tensioner components.

◆ WARNING

If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

GEAR RATIO MODIFICATION

For particular applications, the number of teeth of the sprockets can be increased or decreased on lower and upper sprockets.

Refer to TECHNICAL DATA 10 for gear ratios.

▼ CAUTION

Gear ratio modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

NOTE: For high altitude regions, the *High Altitude and Sea Level Technical Booklet* (P/N 484 300 003 and P/N 484 054 500 for binder) gives information about calibration according to altitude.

INSTALLATION

Reverse removal procedure and pay attention to the following. Replace oil seals, gaskets and O-rings.

11, Oil Seal

Using an appropriate pusher, press the oil seal into chaincase hub. Oil seal must fit flush with the chaincase edge.

NOTE: Should installation procedure for countershaft be required, refer to BRAKE 05-06.

5,16, Sprockets

Position the sprockets with the writing facing the chaincase cover. Sprocket hub faces toward chaincase.

4, Upper Sprocket Castellated Nut

Torque to 45 to 75 N•m (33 to 55 lbf•ft).

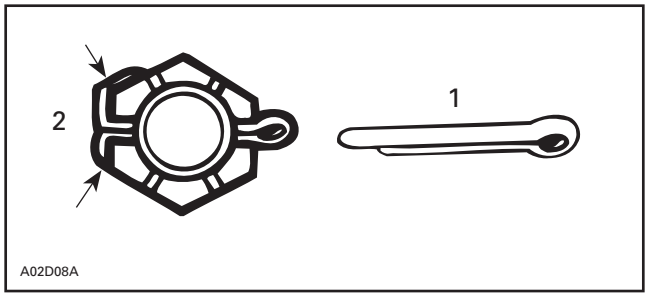
Install new cotter pin in the position shown.

▼ CAUTION

When removing a cotter pin always replace with a new one.

▼ CAUTION

Cotter pin will rub on chaincase cover if installed otherwise.



1. New
2. Fold cotter pin over castellated nut flats only

18, Circlip

▼ CAUTION

It is of the utmost importance to install the circlip otherwise damage to the chaincase components may occur.

DRIVE CHAIN ADJUSTMENT

NOTE: Brake disc key must be in good condition before checking chain free play.

10, O-Ring

Replace O-ring **no. 10** on tensioner adjustment screw. Fully tighten tensioner adjustment screw **by hand**, then back off only far enough for hair pin to engage in locking hole.

This initial adjustment should provide 3-5 mm (1/8-13/64 in) free-play when measured at the outer circumference of the brake disc.

▼ CAUTION

Free-play must not exceed 5 mm (13/64 in), readjust if necessary.

◆ WARNING

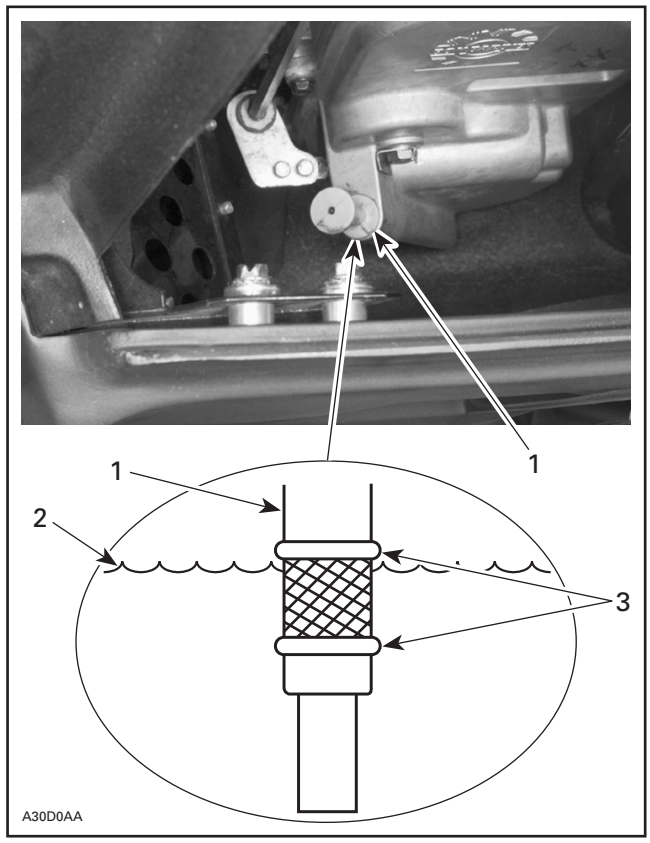
If the specified free-play is not reached with the tensioner screw fully tightened, replace chain and check the condition of sprockets.

21, Chaincase Oil

Pour 250 mL (8.5 U.S. oz) of synthetic chaincase oil (P/N 413 803 300) into chaincase.

NOTE: Chaincase oil capacity is 250 mL (8.5 U.S. oz).

Check oil level with the dipstick then add if required. Remove metal particles from magnet.



TYPICAL

1. Dipstick
2. Oil level
3. Level between marks

NOTE: Chaincase must be in its proper position when checking oil level.

ADJUSTMENT

Pulley Alignment

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05.

Track Tension and Alignment

Refer to TRACK 07-04.

DRIVE CHAIN

SILENT CHAIN

All CK3 models are equipped with a 13-plates wide silent chain. Fit chain on sprockets to make sure that you are using right ones according to width. Refer to TECHNICAL DATA 10.

NOTE: No work (separation, lengthening) can be done on the silent chain type.

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IGNITION TIMING

NIPPONDENSO TRIGGER COIL SYSTEM

Normally ignition timing adjustment should not be required. It has been set at factory and it should remain correctly adjusted since every part is fixed and not adjustable. The only time the ignition timing might have to be changed would be when replacing the crankshaft, the magneto flywheel, the trigger coil or the MPEM. If the ignition timing is found incorrect, first check for proper crankshaft alignment. This might be the indication of a twisted crankshaft.

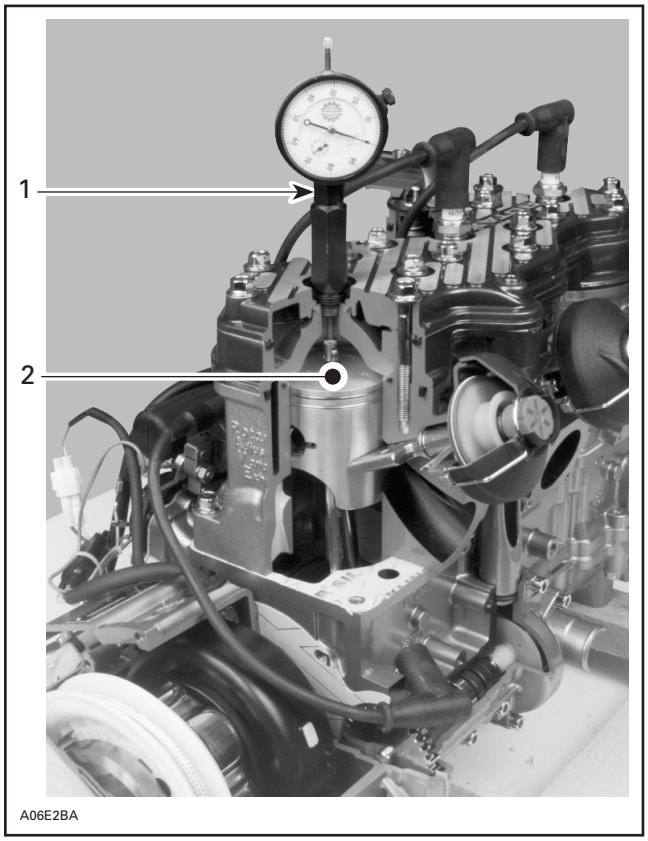
The ignition timing can be checked with either the engine hot or cold. Also, the ignition timing is to be checked at 3500 RPM with a timing light.

NOTE: Between 3000 and 4000 RPM, the spark advance does not change. So when checking ignition timing at 3500 RPM, a change in engine speed within ± 500 RPM will not affect the timing mark when checked with the timing light.

IMPORTANT: During the first 4 hours the timing curve is retarded by 2° between 4500 RPM and maximum RPM. Because checking ignition timing is done at a lower RPM, there will be no further timing adjustment required after the first 4 hours.

Scribing a Timing Mark

1. Clean the area around the MAG spark plug, and remove it.
2. Install the TDC gauge in the spark plug hole, (magneto side) and adjust as follows:
   a. Position the magneto flywheel at approximately TDC.



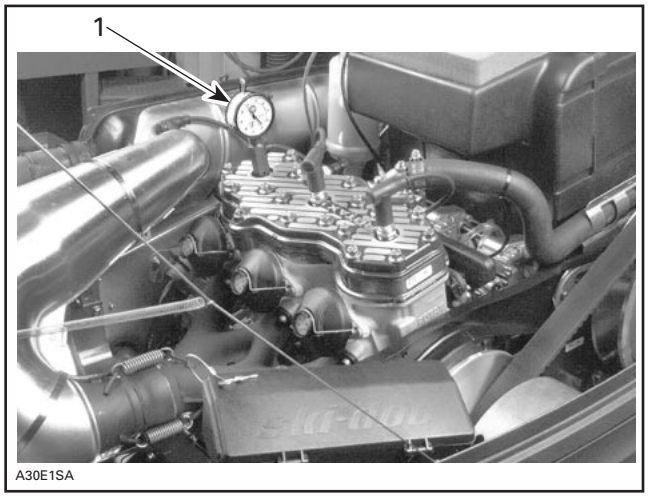
TYPICAL

1. TDC gauge on MAG side
2. MAG side piston at TDC

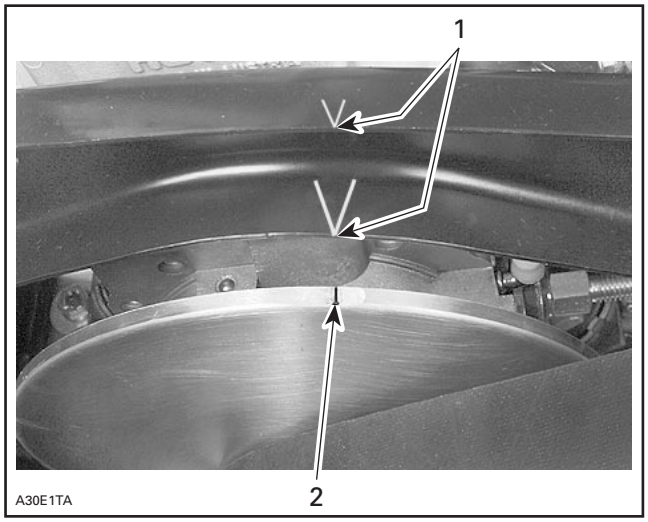
   b. Assemble the gauge to the adaptor and tighten the roller lock nut. Do not tighten the adaptor lock nut.
   c. Screw the adaptor into the spark plug hole and tighten to prevent movement in the plug hole.

d. Position the dial face toward the PTO. Move the gauge down until the needle just begins to move, then move down a further 5 or 6 mm (approximately 1/4 in). Tighten adaptor lock nut by hand.

3. Locate the piston TDC position as follows:
   a. Slowly rotate the drive pulley back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
   b. Rotate the dial face so that "0" is in line with the needle when it stops moving.
   c. Again, slowly rotate the drive pulley back and forth across TDC and adjust the dial face to "0", until the needle always stops exactly at "0" before changing direction.
   d. "0" now indicates exact TDC.
4. Rotate the drive pulley clockwise, one-quarter turn then carefully rotate it counterclockwise until the needle indicates the specified measurement, indicated in TECHNICAL DATA 10.
5. Scribe one mark on removable side member upper ridge and one on lower ridge just above drive pulley center line. These both marks will be used as a reference point.
6. With the TDC gauge indicating specified timing, scribe a mark on drive pulley inner half in line with both marks previously scribed on removable side member.



1. TDC gauge indicating specified timing



1. Marks on side member used as reference point
2. Timing mark in line with both marks on side member

Checking Ignition Timing

Use timing light (P/N 529 031 900).

To check the ignition timing, refer to illustration and proceed as follows:

◆ WARNING

Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground. Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

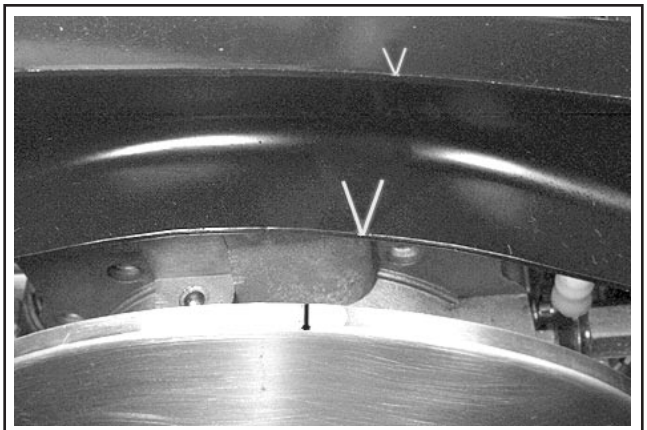
1. Connect the timing light pick-up to a spark plug cable.

NOTE: To avoid an incorrect reading due to parallax, view both marks scribed on removable side member and the timing mark in a straight line.

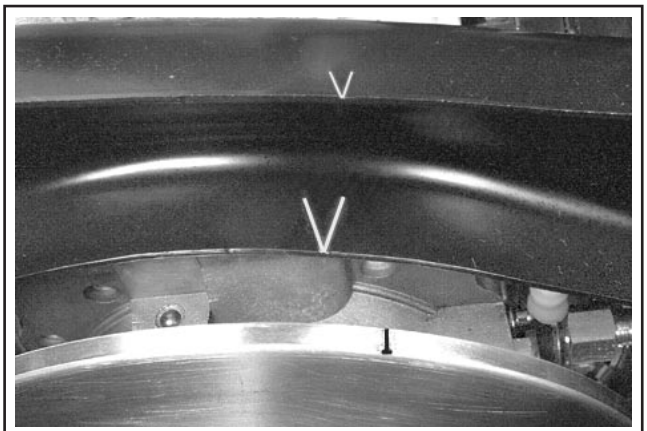
2. Start the engine and point timing light on timing mark. Bring engine to 3500 RPM for a brief instant.


A30E1UA

The timing mark must be aligned with both marks on side member. If not, note if timing is retarded or advanced. Tolerance is ± 1°.


A30E1VA

TIMING RETARDED BY ABOUT 2°


A30E1WA

TIMING ADVANCED BY ABOUT 2°

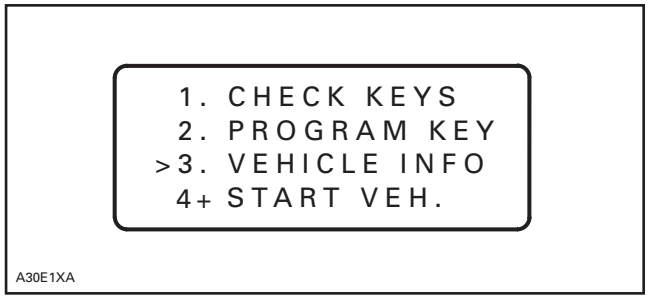
Changing Timing

Timing can only be changed using the programmer (P/N 529 035 589).

Start engine. Turn on programmer then enter password.

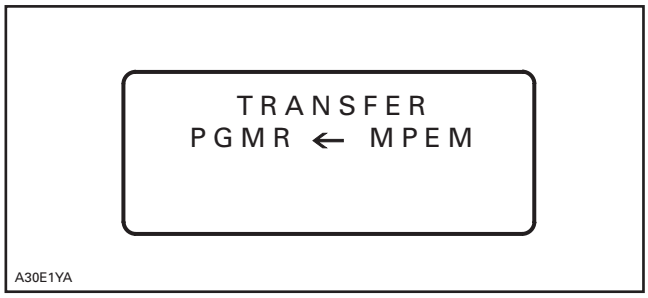
Increase engine speed to 2500 RPM.

From main menu select no. 3. INFO VEHICLE.



A30E1XA

Engine will misfire during vehicle information is transferred from MPEM to programmer. If engine stalls, restart it, keep engine speed at 2500 RPM and select no. 3 VEHICLE INFO again.



A30E1YA

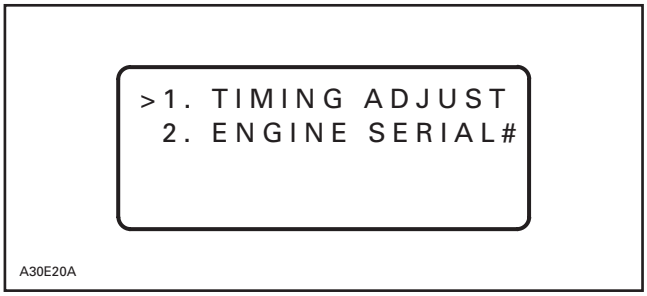
NOTE: In fact the programmer takes a **copy** of all vehicle parameters scribed in MPEM. This copy will be modified within the programmer then transferred to the MPEM.

Select no. 4. ENGINE PARAMETER.



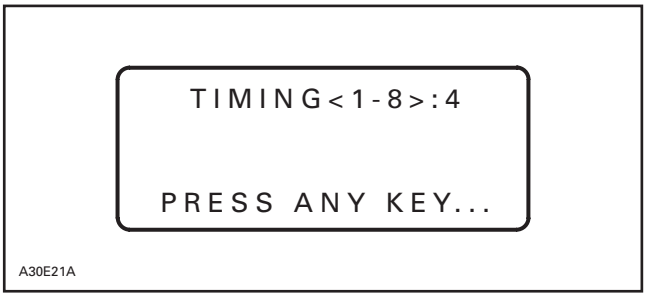
A30E1ZA

Select no. 1 TIMING ADJUSTMENT.



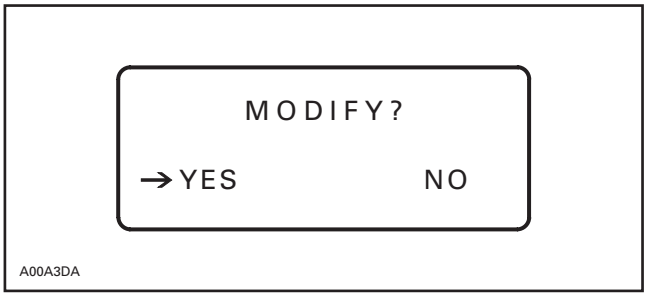
Press ENTER.

Now the display shows the engine timing correction factor that is programmed in the MPEM. In the following example timing correction factor is 4.

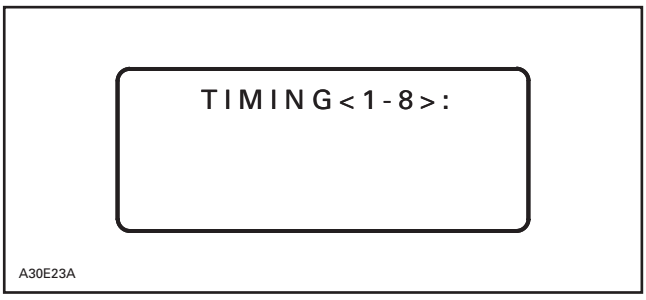


Press any key.

Select YES using the key ↔.



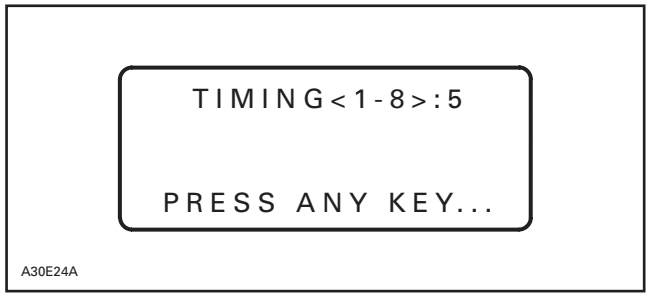
Press ENTER.



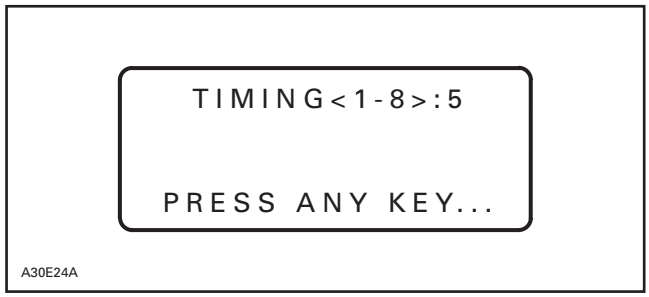
Select a timing correction factor corresponding to correction needed.

Example: Timing mark as verified with a timing light at 3500 RPM was too early by 2°. The correction factor programmed is no. 4.

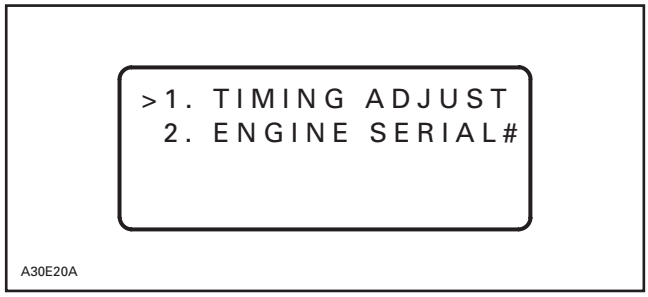
Select correction factor no. 5. This will retard the timing by 2° because the difference between correction factor no. 4 and no. 5 is - 2° (passing from 1° to - 1°).



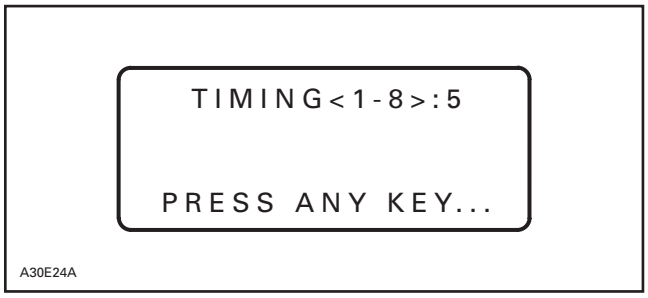
IGNITION CORRECTION FACTOR	
CORRECTION FACTOR PROGRAMMED IN MPEM	IGNITION TIMING CORRECTION
2	3°
3	2°
4	1°
1	0°
5	- 1°
6	- 2°
7	- 3°
8	- 4°



Press ENTER.

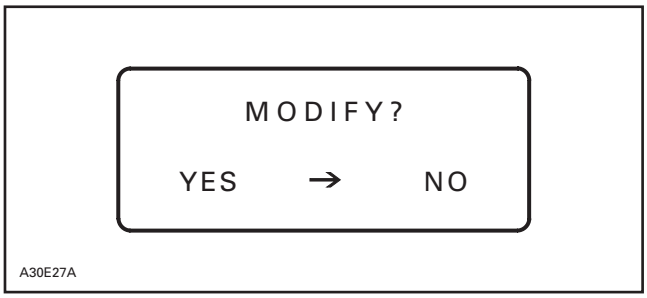


Press ENTER.

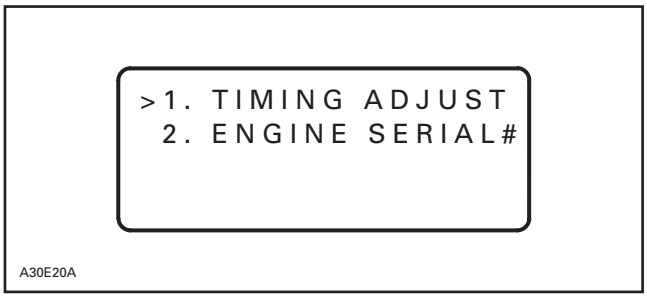


The display confirms that correction factor has been changed to no. 5.

Press any key.

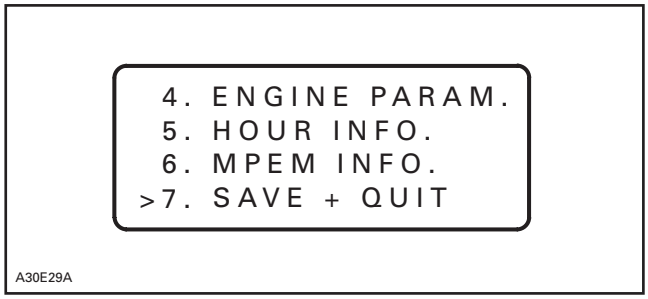


If the new correction factor selected above is the good one select NO. Otherwise select YES to choose an other correction factor.

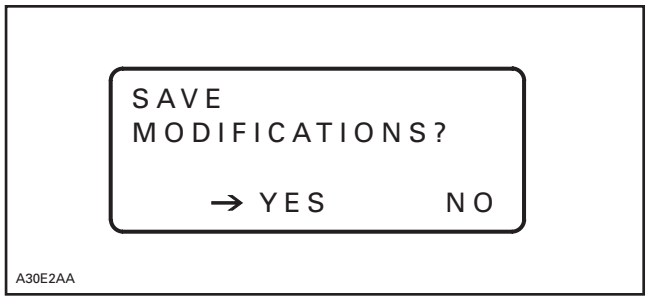


Press MENU.

Scroll to no. 7 SAVE AND QUIT.



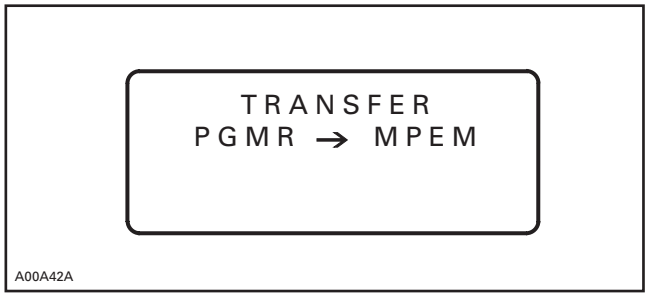
Press ENTER.



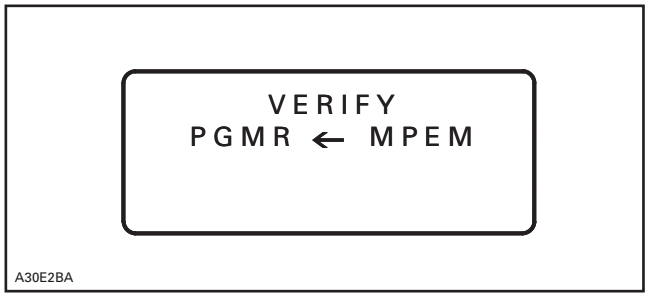
Increase engine speed to 2500 RPM.

Press ENTER.

Engine will misfire during vehicle information is transferred from programmer to MPEM. If engine stalls, restart it, keep engine speed at 2500 RPM and select no. 7 SAVE AND QUIT again.

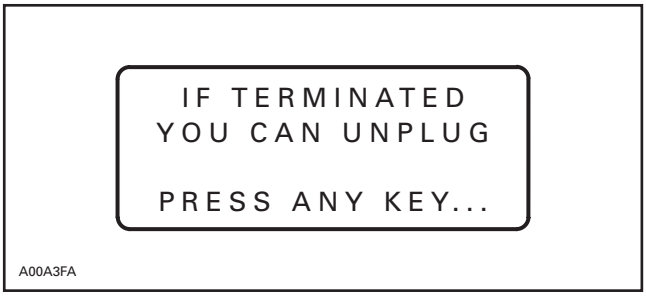


During a very short period of time the following message will appear.

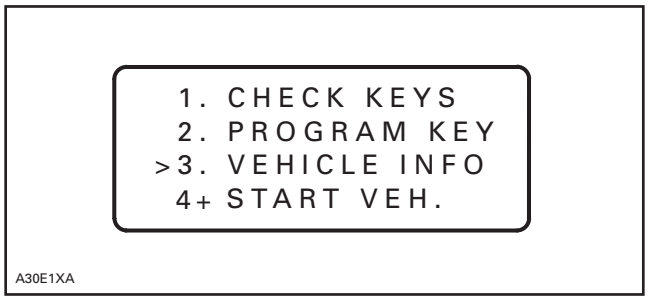




Press any key.



Press any key.



SPARK PLUGS

NGK SPARK PLUG

All Models

NGK SPARK PLUG NUMBERING SYSTEM

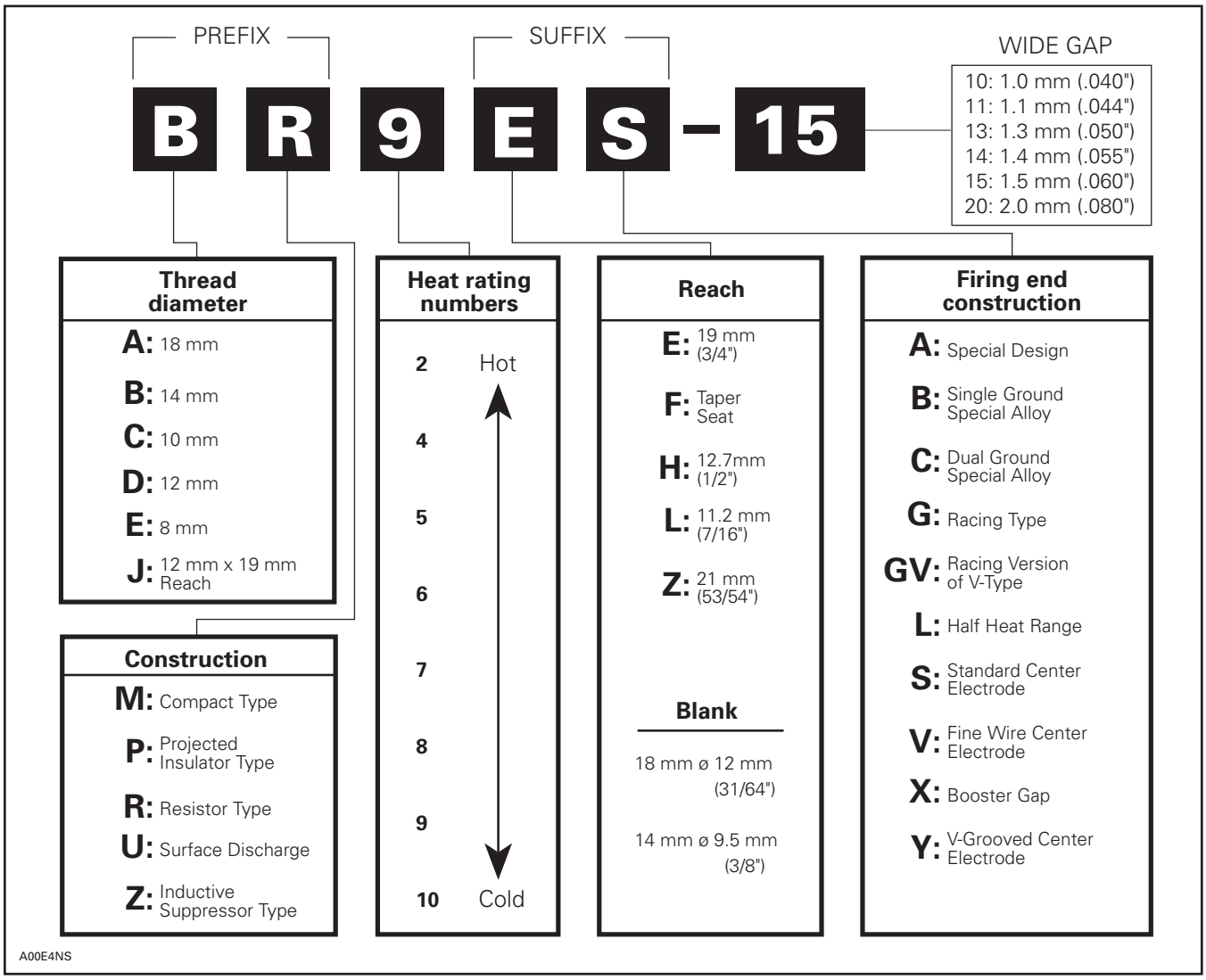
Bombardier uses NGK brand spark plugs on all its snowmobile models.

The heat range identification system is:

Low number ⟶ hot plug

High number ⟶ cold plug

DESIGN SYMBOLS USED IN NGK SPARK PLUGS



CROSSCUTS AND GAP STYLES OF SPARK PLUGS



Standard Type | Projected Insulator Type | Taper Seat Type | V-Type | Surface Discharge Type

A01E1PS

DISASSEMBLY

First unscrew the spark plug 1 turn.

Clean the spark plug and cylinder head with pressurized air, then completely unscrew.

◆ WARNING

Whenever using compressed air, always wear protective eye wear.

HEAT RANGE

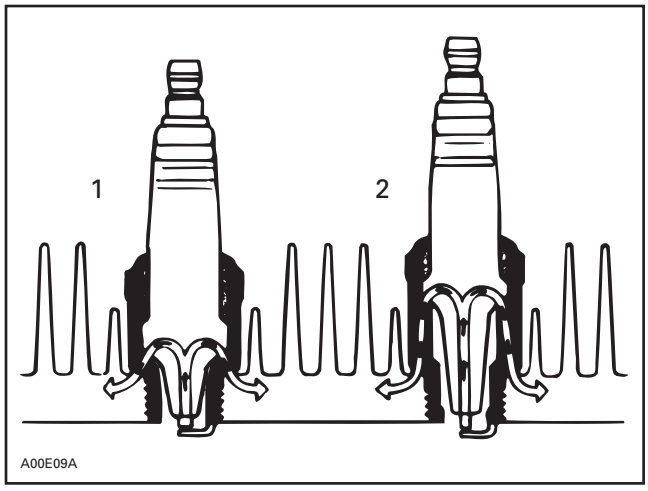
The proper operating temperature or heat range of the spark plugs is determined by the spark plug ability to dissipate the heat generated by combustion.

The longer the heat path between the electrode tip to the plug shell, the hotter the spark plug operating temperature will be — and inversely, the shorter the heat path, the colder the operating temperature will be.

A **cold** type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The **hot** type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.



1. Cold
2. Hot

▼ CAUTION

Severe engine damage might occur if a wrong heat range plug is used.

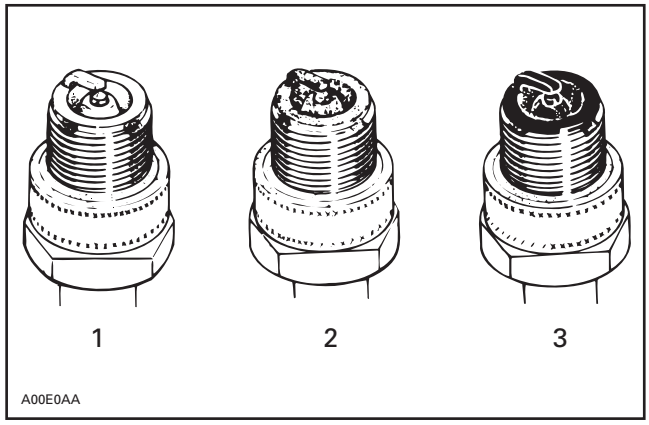
A **too hot** plug will result in overheating and pre-ignition, etc.

A **too cold** plug will result in fouling (shorting the spark plug) or may create carbon build up which can heat up red-hot and cause pre-ignition or detonation.

FOULING

Fouling of the spark plug is indicated by irregular running of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are: prolonged idling, or running on a too rich mixture due to a faulty carburetor adjustment or incorrect fuel and/or fuel mixing. The plug face of a fouled spark plug has either a dry coating of soot or an oily, glossy coating given by an excess either of oil or of oil with soot. Such coatings form a conductive connection between the center electrode and ground.

SPARK PLUG ANALYSIS



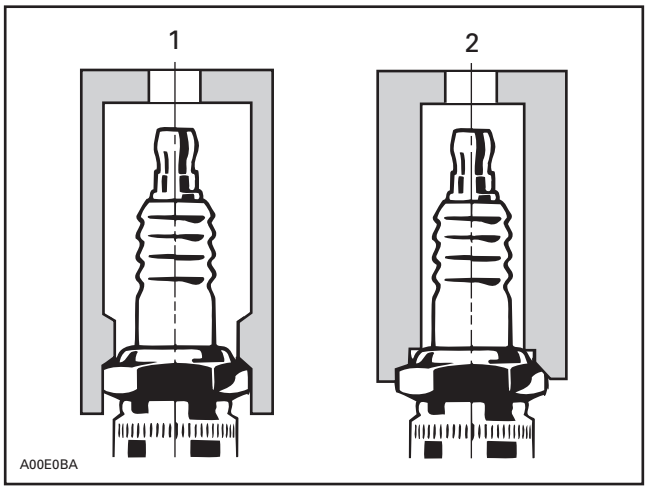
1. Overheated (light grey)
2. Normal (brownish)
3. Fouled (black)

The plug electrode and piston dome reveal the condition of the engine, operating condition, method of driving and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining the plug electrode and the piston dome.

SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

1. Using a wire feeler gauge, set electrode gap according to TECHNICAL DATA 10.
2. Apply anti-seize lubricant (P/N 413 701 000) over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



1. Proper socket
2. Improper socket

SPARK PLUG TIGHTENING TORQUE

MODELS	SPARK PLUGS	TORQUE N•m (lbf•ft)
All models	NGK	27 (20)

BATTERY

REMOVAL

All Models

◆ WARNING

Battery BLACK negative cable must always be disconnected first and connected last.

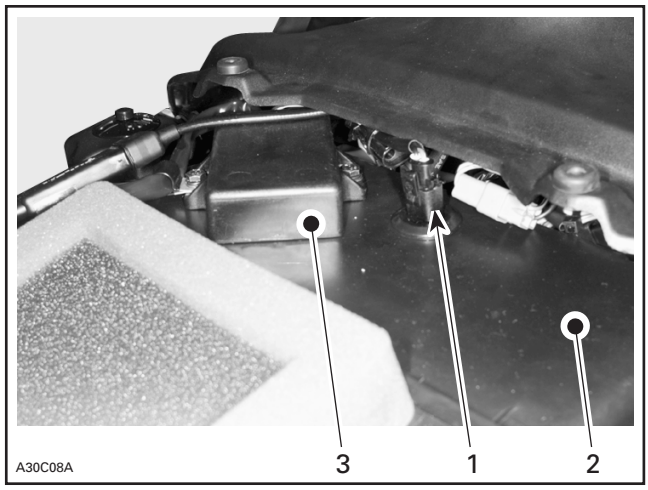
◆ WARNING

Never charge or boost battery while installed on vehicle.

Air Intake Silencer Removal

Grand Touring 700/SE Only

Unplug air temperature sensor connector from air intake silencer and remove MPEM, as shown in the next photo.



TYPICAL

1. *Air temperature sensor*
2. *Air intake silencer*
3. *MPEM*

Then twist DPM manifold and detach from air intake silencer.

All Models

Remove air intake silencer.

Unfasten battery retaining strips.

Open strips.

Remove vent tube.

Withdraw battery from vehicle being careful not lean it so that electrolyte flows out of vent tube.

▼ CAUTION

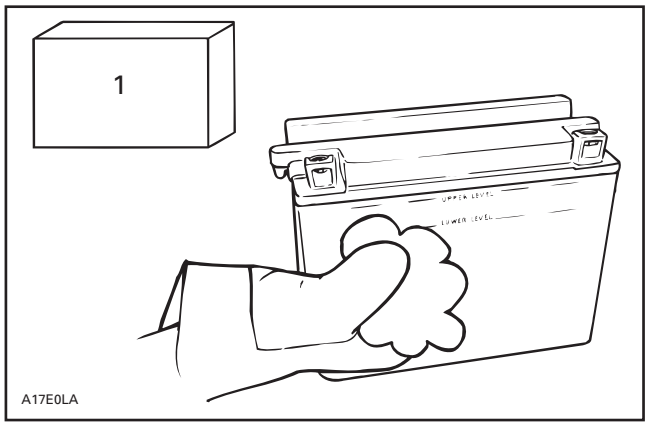
Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water to prevent damage to vehicle components.

CLEANING

Clean the battery, battery casing, vent tube, caps, cables and battery posts using a solution of baking soda and water.

▼ CAUTION

Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.



1. Baking soda

Remove corrosion from battery cable terminals and battery posts using a firm wire brush.

INSPECTION

Visually inspect battery case for cracks or other possible damage. If case is damaged, replace battery and thoroughly clean battery tray and close area with water and baking soda.

◆ WARNING

Should the battery casing be damaged, wear a suitable pair of non-absorbent gloves when removing the battery by hand.

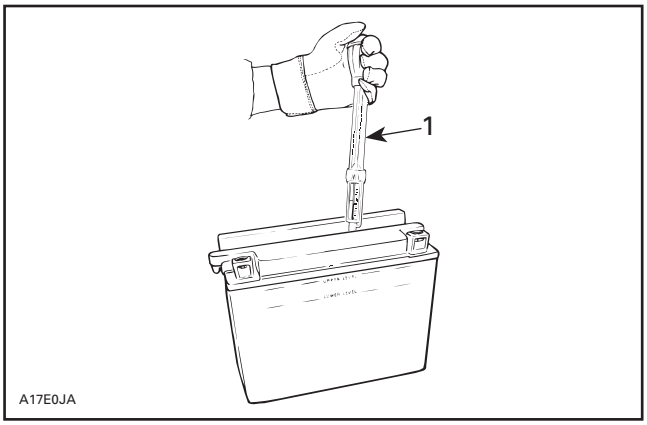
Inspect battery posts for security of mounting.

Inspect for cracked or damaged battery caps, replace defective caps.

◆ WARNING

Battery caps do not have vent holes. Make sure that vent tube is not obstructed.

HYDROMETER TEST



1. Specific gravity 1.260

A hydrometer measures the charge of a battery in terms of specific gravity of the electrolyte. Most hydrometers give a true reading at 27°C (80°F).

In order to obtain correct readings, adjust the initial reading by **adding** .004 points to the hydrometer readings for each 5.5°C (10°F) **above 27°C (80°F)** and by **subtracting** .004 point for every 5.5°C (10°F) **below 27°C (80°F)**.

This chart will be useful to find the correct reading.

ELECTROLYTE TEMPERATURE		OPERATION TO PERFORM		
°C	°F			
38 32	100 90	add	.008 .004	to the reading
27	**80**	**correct reading**		
21 16 10 4 - 1 - 7 - 12 - 18 - 23 - 29 - 34 - 40	70 60 50 40 30 20 10 0 - 10 - 20 - 30 - 40	subtract	.004 .008 .012 .016 .020 .024 .028 .032 .036 .040 .044 .048	from the reading

EXAMPLE NO. 1
Temperature below 27°C (80°F):
Hydrometer reading: 1.250
Electrolyte temperature: - 7°C (20°F)
Subtract .024 Sp. Gr.
Corrected Sp. Gr. is 1.226

EXAMPLE NO. 2
Temperature above 27°C (80°F):
Hydrometer reading: 1.235
Electrolyte temperature: 38°C (100°F)
Add .008 Sp. Gr.
Corrected Sp. Gr. is 1.243

▼ CAUTION

Do not install a partially charged battery on a snowmobile since the casing might crack at freezing temperature. The following chart shows the freezing point of the electrolyte in relation to the charge of the battery.

TEMPERATURE CORRECTED SPECIFIC GRAVITY	BATTERY CHARGE	FREEZING POINT OF ELECTROLYTE
1.260	Fully charged	- 59°C (- 74°F)
1.230	3/4 charged	- 40°C (- 40°F)
1.200	1/2 charged	- 27°C (- 16°F)
1.170	1/4 charged	- 18°C (0°F)
1.110	Discharged	- 7°C (+ 19°F)

BATTERY STORAGE

Disconnect and remove battery from the vehicle.

Check electrolyte level in each cell, add distilled water up to upper level line.

▼ CAUTION

Do not overfill.

The battery must always be stored in fully charged condition. If required, charge until specific gravity of 1.260 is obtained.

▼ CAUTION

Battery electrolyte temperature must not exceed 50°C (122°F). The casing should not feel hot.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P/N 413 701 700) or petroleum jelly on terminals.

Clean battery casing and caps using a solution of baking soda and water. Do not allow cleaning solution to enter battery, otherwise it will destroy the electrolyte. Rinse battery with clear water and dry well using a clean cloth.

Store battery on a wooden shelf in a cool dry place. Such conditions reduce self-discharging and keep fluid evaporation to a minimum.

During the storage period, recheck electrolyte level and specific gravity readings at least every 40 days. As necessary, keep the battery at its upper level line and near full charge as possible (trickle charge).

ACTIVATION OF NEW BATTERY

◆ WARNING

Never charge or boost battery while installed on vehicle.

▼ CAUTION

Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

A new battery is factory fresh dry charged. For storage purposes, it is fitted with a temporary sealing tube.

Do not remove the sealing tube or loosen battery caps unless activation is desired.

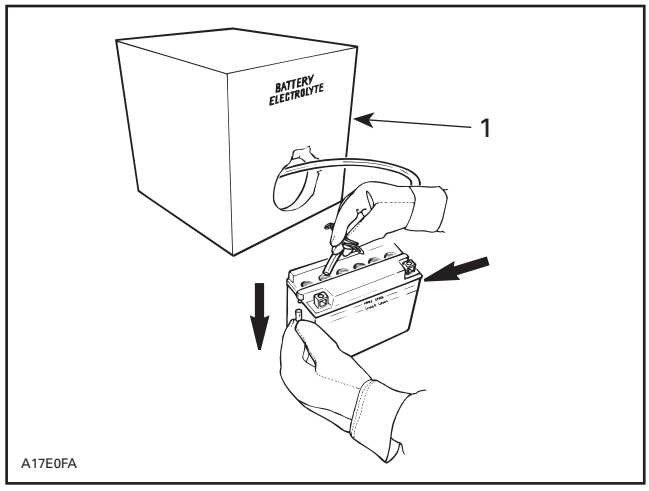
In case of accidental premature removal of caps or sealing tube, battery should be given a full charge.

Perform the following operations anytime a new battery is to be installed.

1. Remove the sealing tube from the vent elbow. Install vent tube, included in the battery kit, to battery elbow.

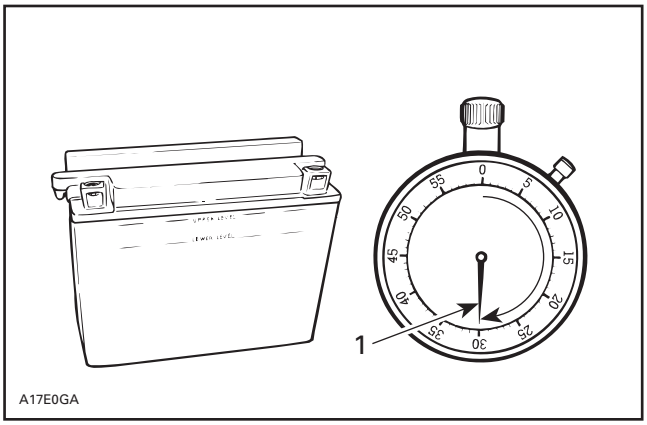
◆ WARNING

Failure to remove the sealing tube could result in an explosion.



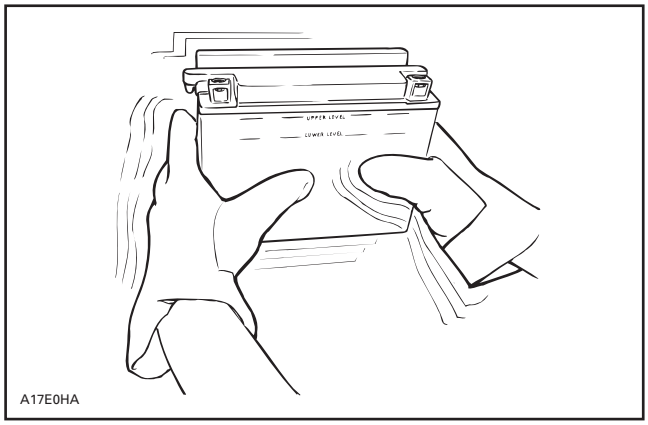
1. Battery electrolyte

2. Remove caps and fill battery to UPPER LEVEL line with electrolyte (specific gravity: 1.260 at 20°C (68°F)).
3. Allow the battery to stand for 30 minutes MINIMUM so that electrolyte soaks through battery cells.

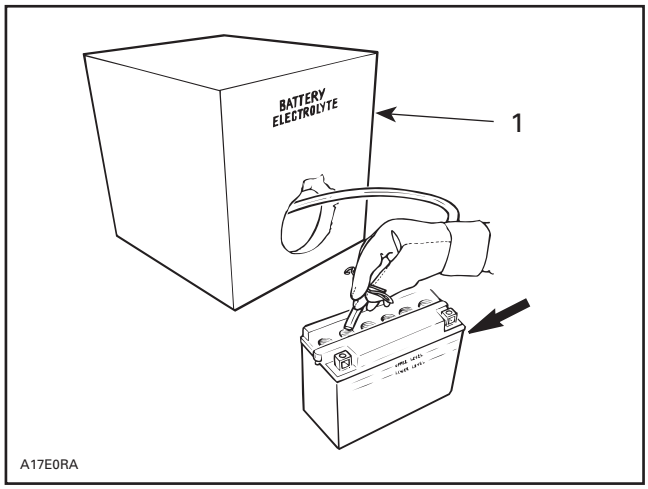


1. 30 minutes

4. Allow gas bubbles to escape by lightly shaking battery by hand.

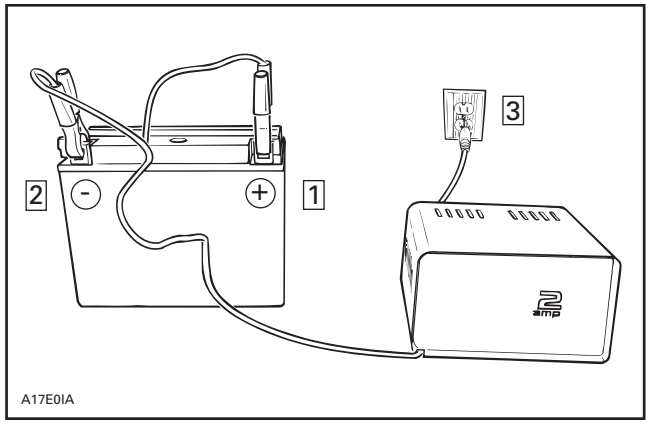


5. Readjust the electrolyte level to the UPPER LEVEL line.



1. Battery electrolyte

6. Connect a 2 A battery charger for 10 to 20 hours.



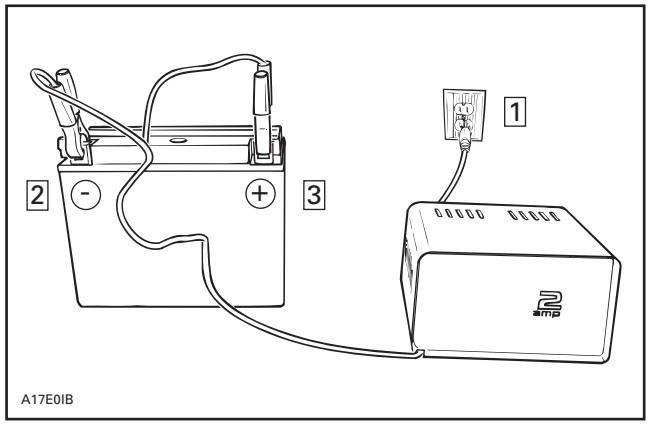
▼ CAUTION

If charging rate raises higher than 2.4 A reduce it immediately. If cell temperature rises higher than 50°C (122°F) (if the casing feels hot) discontinue charging temporarily or reduce the charging rate.

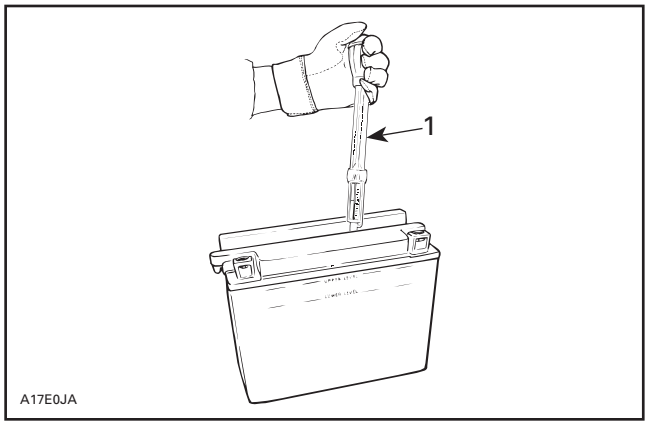
◆ WARNING

Gases given off by a battery being charged are highly explosive. Always charge in a well ventilated area. Keep battery away from cigarettes or open flames. Always turn battery charger off prior to disconnecting cables. Otherwise a spark will occur and battery might explode.

7. Disconnect battery charger.

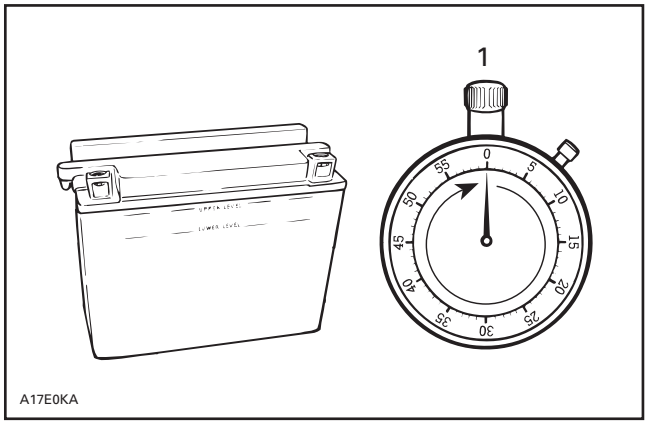


8. Test battery state of charge. Use a hydrometer.



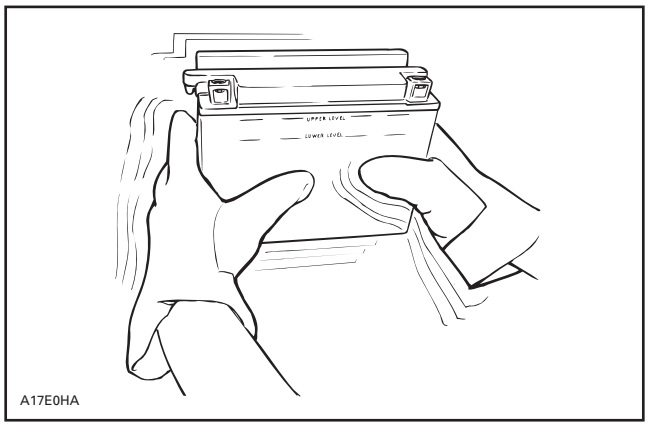
1. Specific gravity 1.260

9. Let battery settle for 1 hour.

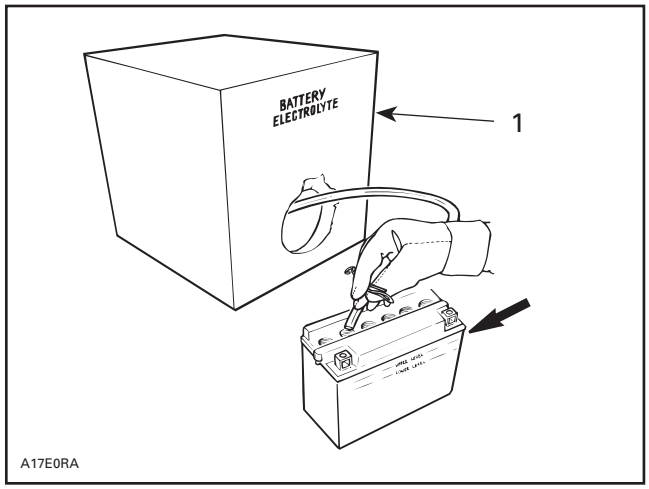


1. 60 minutes

10. Allow gas bubbles to escape by lightly shake battery.

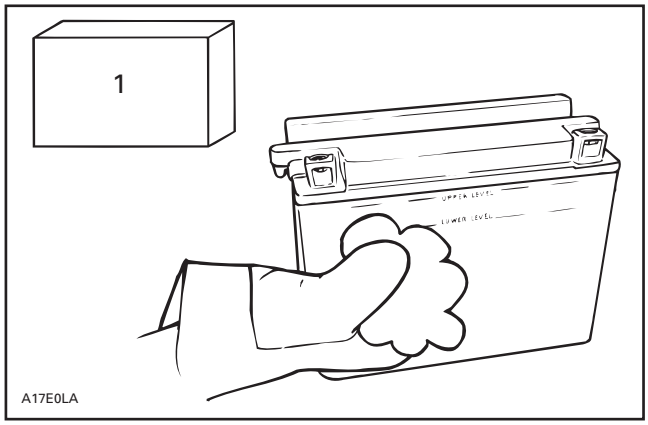


11. Readjust electrolyte level.



1. Battery electrolyte

12. Reinstall caps and clean any electrolyte spillage using a solution of baking soda and water.



1. Baking soda

▼ CAUTION

Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.

NOTE: It is recommended to verify the battery charge once a month. If necessary, fully charge battery.

SERVICING

Electrolyte Level

Since a battery has been activated (see above), add distilled water to top up electrolyte.

TIPS FOR CHARGING A USED BATTERY

▼ CAUTION

Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

For best results, battery should be charged when the electrolyte and the plates are at room temperature. A battery that is cold may not accept current for several hours after charging began.

Do not charge frozen battery. If the battery charge is very low, the battery may freeze. If it is suspected to be frozen, keep it in a heated area for about 2 hours before charging.

◆ WARNING

Do not place battery near open flame.

Time required to charge a battery will vary depending some factors such as:

– Battery temperature: Charging time is increased as the temperature goes down. The current accepted by a cold battery will remain low. As the battery warms up, it will accept a higher rate of charge.

– State of charge: Because the electrolyte is nearly pure water in a completely discharged battery, it cannot accept current as well as electrolyte. This is the reason the battery will not accept current when the charging cycle first begins. As the battery remains on the charger, the current from the charger causes the electrolytic acid content to rise which makes the electrolyte a better conductor and then, the battery will accept a higher charging rate.

– Type of charger: Battery chargers vary in the amount of voltage and current that they can supply. Therefore, time required for the battery to begin accepting measurable current will also vary.

Charging a Very Flat or Completely Discharged Battery

Unless this procedure is properly followed, a good battery may be needlessly replaced.

– Measure the voltage at the battery posts with an accurate voltmeter. If it is below 10 volts, the battery will accept current at very low rate, in term of milliamperes, because electrolyte is nearly pure water as explained above. It could be some time before the charging rate increases. Such low current flow may not be detectable on some charger ammeters and the battery will seem not to accept any charge.

– Only for this particular case, set the charger to a high rate.

NOTE: Some chargers have a polarity protection feature which prevents charging unless the charger leads are connected to the correct battery terminals. A completely discharged battery may not have enough voltage to activate this circuitry, even though the leads are connected properly. This will make it appear that the battery will not accept a charge. Follow the charger manufacturer's instruction telling how to bypass or override this circuitry so that the charger will turn on and charge a low-voltage battery.

– Since the battery chargers vary in the amount of voltage and current they provide, the time required for the battery to accept measurable charger current might be up to approximately 10 hours or more.

– If the charging current is not up to a measurable amount at the end of about 10 hours, the battery should be replaced.

– If the charging current is measurable before the end or at the end of about 10 hours, the battery is good and charging should be completed in the normal manner as specified in Activation of a new battery.

– It is recommended that any battery recharged by this procedure be load tested prior to returning it to service.

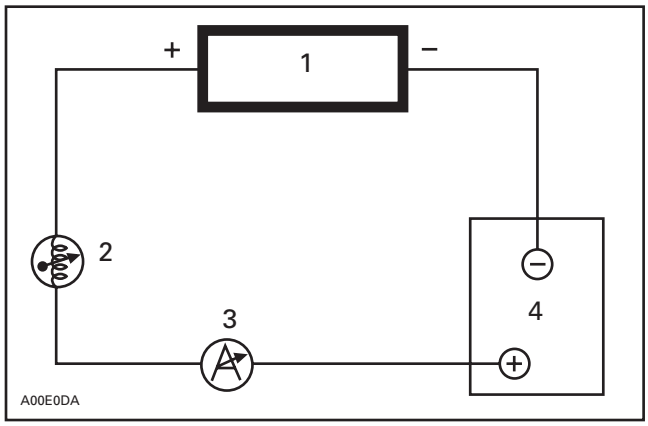
BATTERY CHARGING EQUIPMENT

The battery charger should have an adjustable charging rate. Variable adjustment is preferred, but a unit which can be adjusted in small increments is acceptable.

The battery charger must be equipped with an ammeter capable of accurately measuring current of less than one ampere.

If the present charger is not adjustable to the proper current values, a rheostat can be connected in series with the battery to provide adjustment. 12 ohm, 50 watt rheostat, such as OHMITE — 0314 or MALLORY 50K 12P, are available from electronic parts supply shops and they are suitable for use with most chargers if the peak current is to be held below 2 A.

If you need an accurate ammeter, we recommend the use of: SHURITE — 5202 (0 to 3 A) or — 5203 (0 to 5 A) available from electronic parts supply shops.



1. *Charger*
2. *Rheostat 12 Ω 50 W*
3. *Ammeter*
4. *Battery*

For a service application and a permanent installation, both ammeter and rheostat can be built into a small box adjacent to your charger.

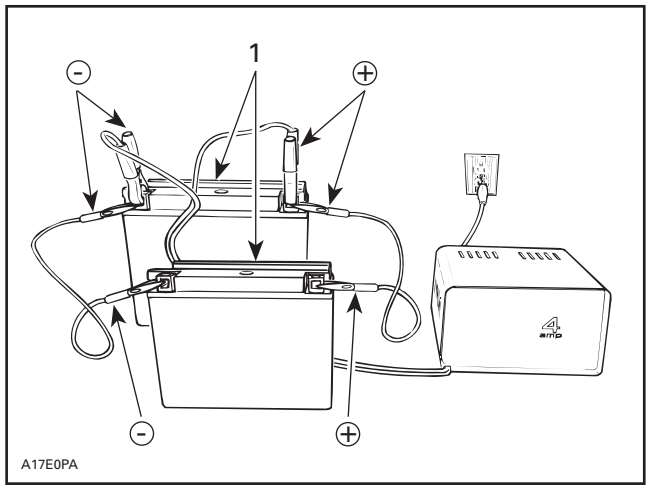
▼ CAUTION

Adequate ventilation MUST be provided to cool the rheostat.

Charging 2 or More Batteries at a Time

Connect all positives together and use a charger with a capacity (rated) equal to: number of batteries to be charged multiply by 2 A.

For example: Charging 5 batteries at a time requires a 10 A rated charger (5 × 2 A = 10 A).

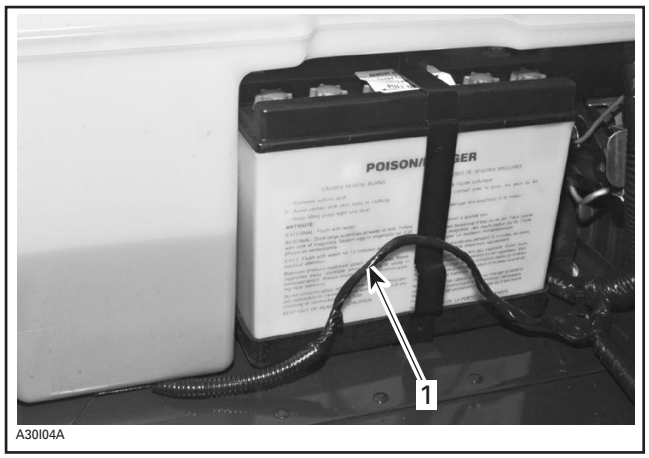


TYPICAL

1. *Two batteries = 4 A*

INSTALLATION OF BATTERY

Make sure that harness of oil reservoir low level sensor is positioned between fuel tank and battery strip.



REAR VIEW — FUEL TANK REMOVED FOR CLARITY

Position battery onto battery support on vehicle.

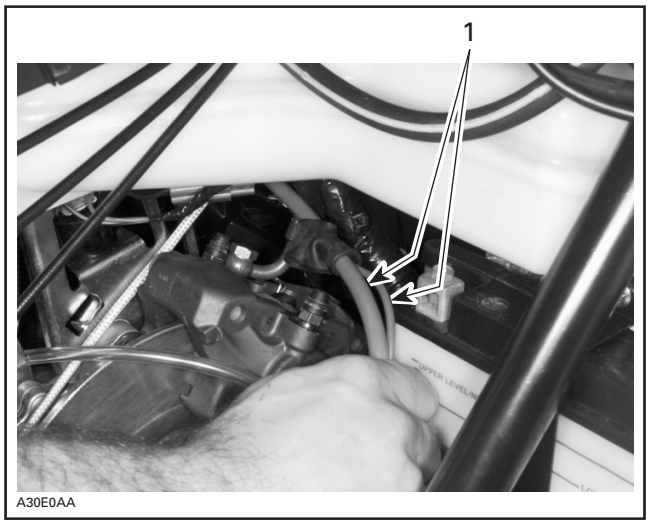
NOTE: To ease battery insertion, use soap with water.

Install vent tube on battery.

NOTE: Ensure that vent tube is not kinked or blocked. Cut vent tube if necessary.

Red Positive Cable and Wire

Move RED positive cable and wire from right side of engine compartment to battery positive post, as shown in the next photo.



1. Move RED positive cable and wire

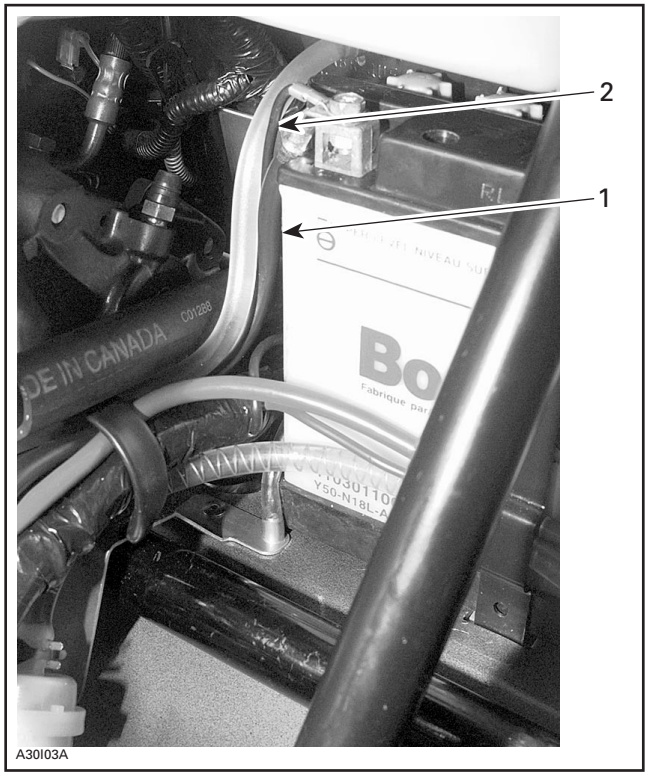
Connect RED positive cable and RED wire to positive battery terminal. Refer to the following photo for proper cable positioning.



RED POSITIVE (+) BATTERY CABLE AND WIRE POSITIONING

Black Negative Cable and Wires

Connect BLACK negative cable and BLACK wire LAST. Refer to the following photo for proper cable positioning.



1. BLACK negative (-) battery cable
2. BLACK wire

◆ WARNING

Always connect the battery cables exactly in the specified order. Connect RED positive cable first, then BLACK negative ground cable.

Apply silicone dielectric grease (P/N 413 701 700) on battery posts and connectors.

Ensure vent tube is properly installed on battery elbow and chassis fitting.

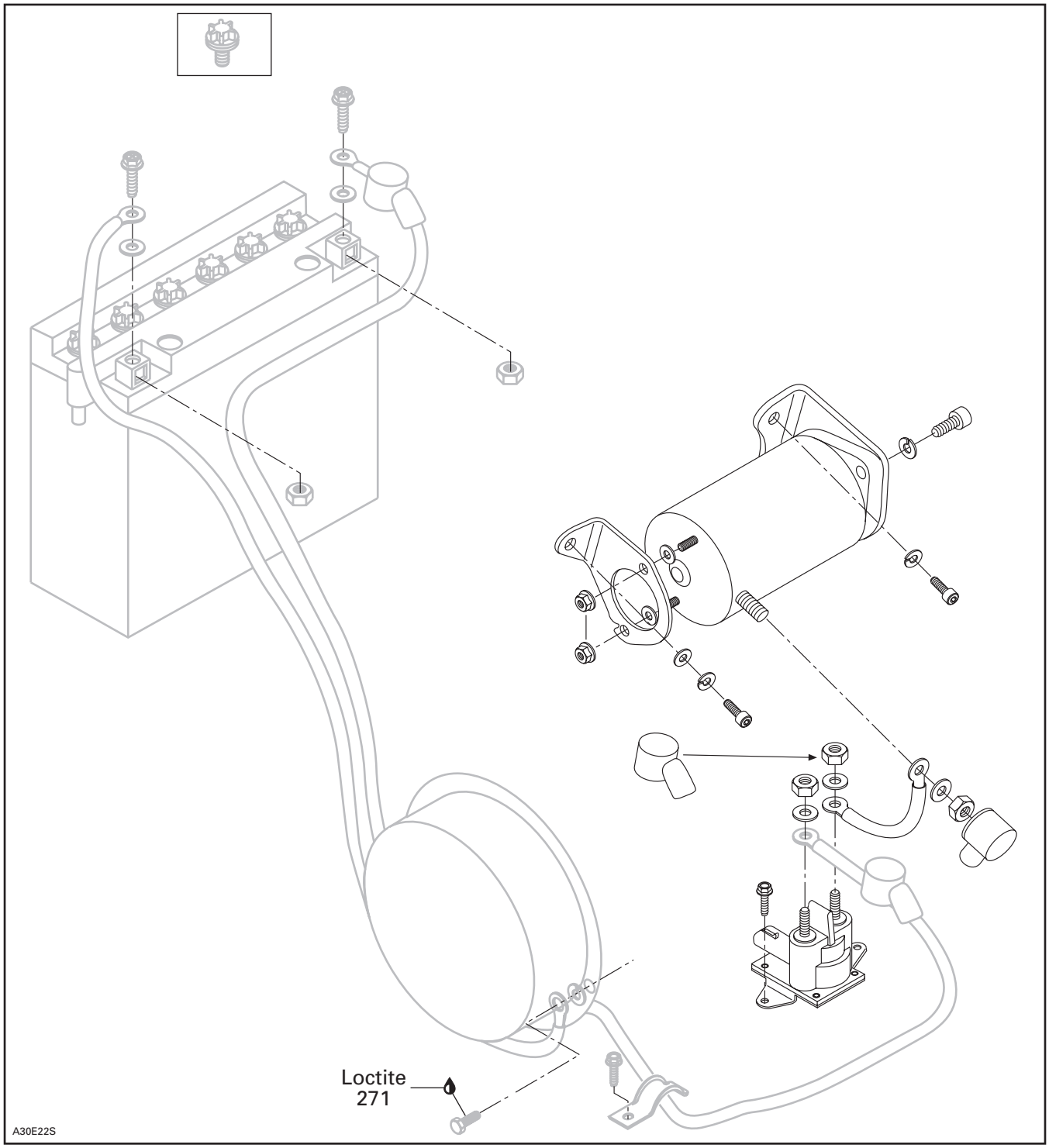
Close and fasten retaining strips and ensure that RED positive battery cable and oil injection supply hose are routed into front retaining strip recess.

Reinstall air intake silencer with hose. On GT 700/SE, install DPM manifold, MPEM and air temperature sensor.

▼ CAUTION

Negative battery terminal should always be disconnected FIRST and reconnected LAST.

ELECTRIC STARTER



PARTS

REMOVAL

– Disconnect BLACK ground cable from battery.
– Disconnect RED positive cable from battery.
– Disconnect RED cable from starter solenoid switch.
– Remove starter from engine.

▼ CAUTION

Support drive housing adequately to prevent damage when pressing bushing.

INSTALLATION

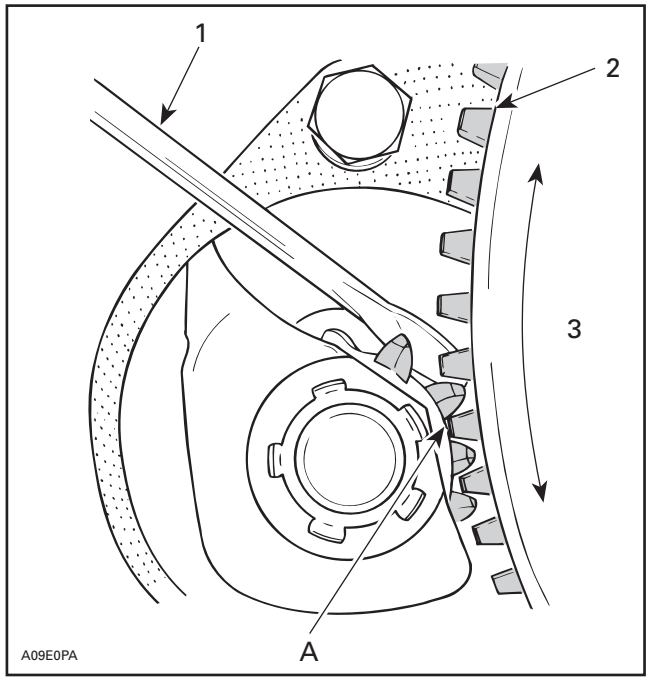
Make sure that starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.

Install starter.

NOTE: Check proper engaging depth of starter pinion teeth to ring gear teeth (see illustration). Install hardened washers (P/N 503 007 900) between engine and starter supports accordingly.

▼ CAUTION

All starter bracket fasteners must be secured with Loctite 271 (P/N 413 707 400).



1. Screwdriver pulling starter pinion
2. Ring gear
3. No excessive backlash
A. 0.5 to 1.5 mm (.020 to .060 in)

Connect RED cable to starter solenoid switch.

Connect the RED positive cable to battery.

Connect BLACK cable to battery.

◆ WARNING

Always disconnect ground cable first and connect last.

SOLENOID SWITCH

Inspect connections and clean as necessary. Solenoid switch condition can be checked with an ohmmeter. Install test probes on **large** connectors of solenoid when it is activated (+ on RED/GREEN wire and - on solenoid body).

IMPORTANT: No current must be present on large cables when using ohmmeter, otherwise meter could be damaged.

TESTING PROCEDURE

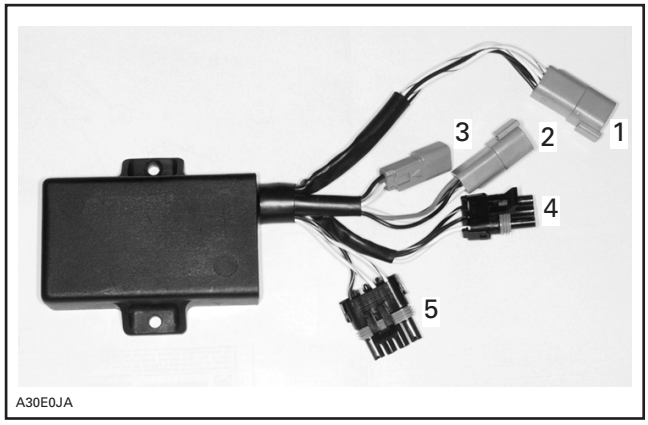
GENERAL

The following chart gives the engine types with their implemented system.

ENGINE TYPE	IGNITION SYSTEM	CHARGING SYSTEM OUTPUT
599, 699 and 809 (except GT 700/SE)	① BOMBARDIER 290 W	290
699 and 809 on GT 700/SE	② BOMBARDIER 360 W	360

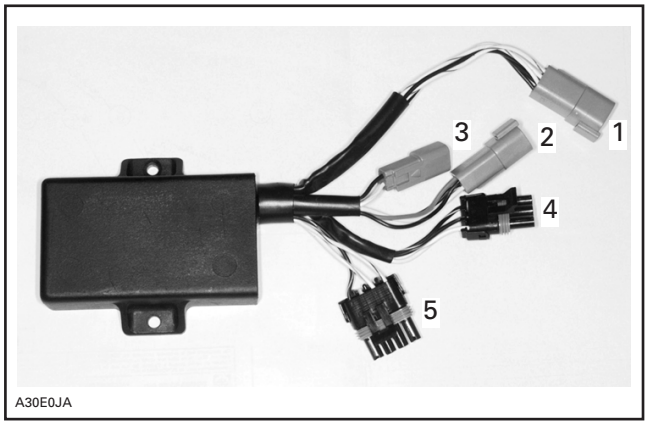
Multi-Purpose Electronic Module (MPEM) Identification

The BOMBARDIER 290 W MPEM receives electricity produced by 2 generating coils (low and high speed). It is smaller than the 360 W MPEM.



TYPICAL — BOMBARDIER 290 W MPEM — NON-RER MODELS

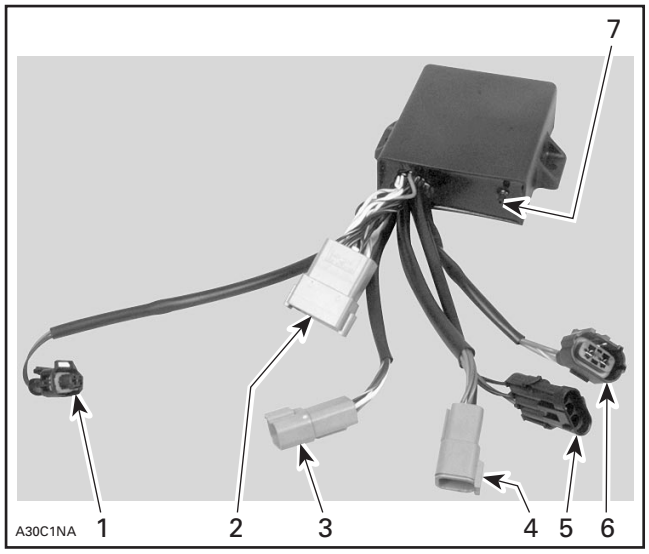
1. *High tension coils, 3-01 housing*
2. *Generating coils (low and high speed), 10-02 housing*
3. *Trigger coil, 10-04 housing*
4. *DESS switch, housing 10-03*
5. *DESS pilot lamp and ignition/kill switches, 10-01 housing*



TYPICAL — BOMBARDIER 290 W MPEM — RER MODELS

1. *High tension coils, 3-01 housing*
2. *Generating coils (low and high speed) and trigger coil, 10-02 housing*
3. *Trigger coil, 10-04 housing*
4. *DESS switch, housing 10-03*
5. *Reverse switch and alarm, DESS pilot lamp and ignition/kill switches, 10-01 housing*

The Bombardier 360 W MPEM receives DC electricity produced by the unique coil.



TYPICAL — BOMBARDIER 360 W MPEM

1. *Air temperature sensor, 4-22 housing*
2. *Power supply, ground, DESS switch, reverse switch and alarm, high tension coils, kill switch, 6-15 housing*
3. *Trigger coils, 6-14 housing*
4. *DPM engine temp. sensor and solenoids, 4-21 housing*
5. *Enrichment switch, 4-20 housing*
6. *Battery/regulator connection, 6-13 housing*
7. *Atmospheric pressure nipple*

▼ CAUTION

Do not interchange MPEM from a model to an other. Even if the P/N stamped on the MPEM is the same, calibration program may be different. When ordering a new MPEM always refer to appropriate model parts catalog. The service P/N published in parts catalogs are the ones with the good calibration program according to model.

At time of printing the programmer does not offer the possibility to see what calibration program is in the MPEM.

SYSTEM TESTING

IGNITION SYSTEM TESTING SEQUENCE

In the case of ignition problems, check the following in the prescribed order until the problem can be solved.

1. Sparking/spark plug condition.
2. Electrical connectors.
3. Ignition switches, DESS switch and emergency switch.
4. Ignition generator coil voltage.
5. Trigger coil.
6. Ignition module voltage.
7. High voltage coil output.
8. MPEM voltage supply.
9. MPEM.

LIGHTING SYSTEM TESTING SEQUENCE

1. Electrical connectors.
2. Magneto output (lighting generator coil).

Testing Conditions

Voltage measurements are always taken upon vehicle starting. Readings when the engine is running will be higher than indicated range. Part temperature must be approximately 20°C (68°F) (room temperature), otherwise readings could be distorted.

Analysis of Readings

Voltage Readings

When testing the different magneto components, it is important to take into consideration that readings vary according to the force applied onto the manual starter. It is therefore important to employ enough force upon each trial.

The reading must be 3 times within or above the range indicated in the corresponding table. If the reading is too low, the part is considered to be defective and must be replaced.

Resistance Readings

Place multimeter selector switch to Ω in order to measure resistance. Readings must be within the indicated range. Otherwise, the part is considered to be defective and must be replaced.

▼ CAUTION

When taking measurements, it is useless to try to start the vehicle since readings would then be distorted.

Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing parts. Most problems cannot be detected when the engine is stopped.

Multiple Problems

As a matter of fact, more that one component can be defective. As a result, if the problem remains although a part was replaced, start over the whole verification from the beginning in order to identify the other defective component.

1. SPARKING

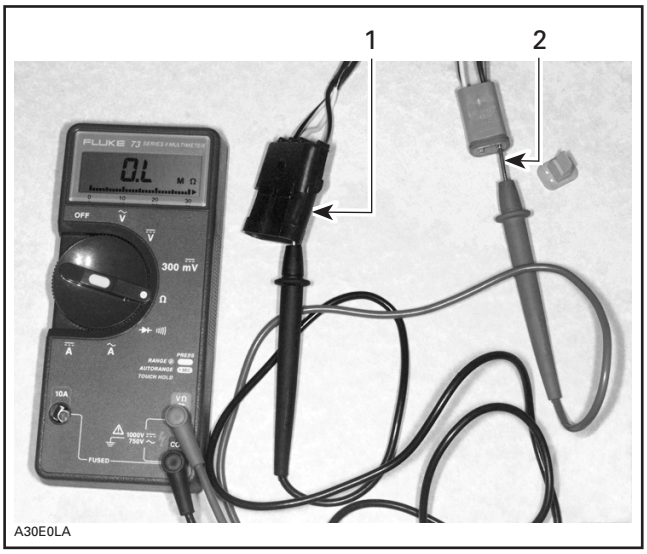
During this operation, it is important to use the snowmobile spark plug and not a new one. Bring the plug in contact with the engine. If no spark is produced, replace the spark plug with a new one and do the test again.

2. ELECTRICAL CONNECTOR TESTING

Make sure that none of the connectors are disconnected.

3. IGNITION SWITCH, TETHER CORD SWITCH AND EMERGENCY SWITCH TESTING

Disconnect connector housing from engine and check resistance as indicated in IGNITION table.



TYPICAL — 290 W

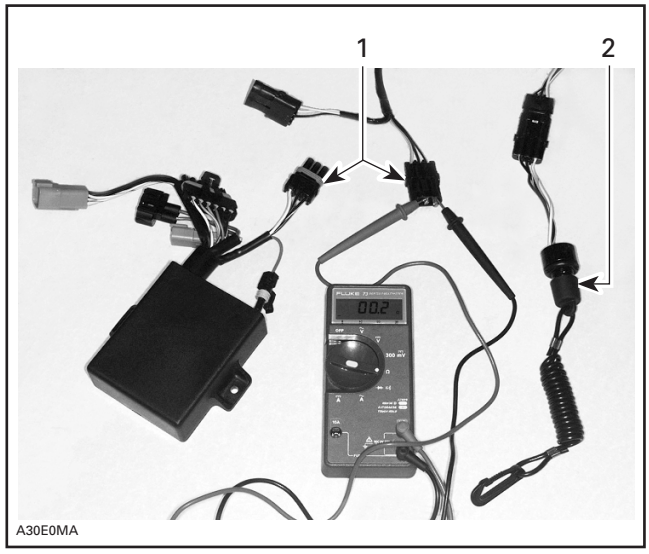
1. *BK/YL wire, 10-01 housing (harness side)*
2. *BK wire, 10-05 housing (harness side)*

If readings are acceptable, go on to next step.

If readings are inadequate, individually check each switch as follows.

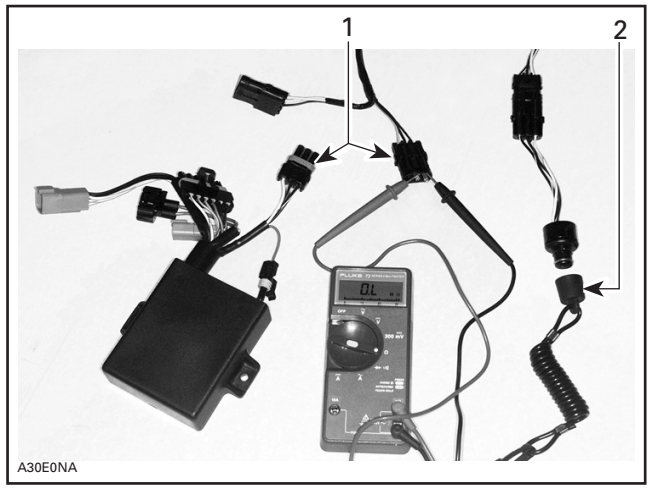
DESS Switch

Unplug 10-03 housing connected to main wiring harness. Check using a multimeter by connecting probes to BLACK/GREEN and BLACK/WHITE wires. The multimeter should indicate a closed circuit (0 $_{\Omega}$) in operating position and a open circuit (0.L $_{M\Omega}$) in off position.



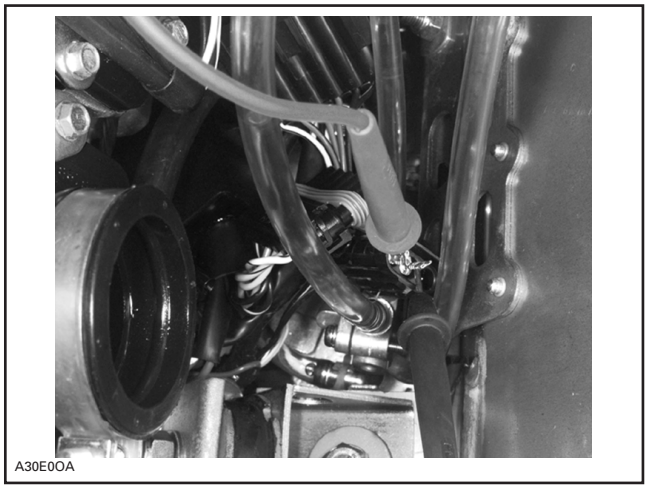
TYPICAL — HARNESS REMOVED FOR CLARITY

1. *10-03 housing disconnected*
2. *DESS cap in place*



TYPICAL — HARNESS REMOVED FOR CLARITY

1. *10-03 housing disconnected*
2. *DESS cap removed*


A30E0OA

TYPICAL — ON-VEHICLE TESTING

If readings do not correspond to the above mentioned indications, replace switch.

If none of these verifications are conclusive, the problem finds its source in the main wiring harness. Proceed as follows:

4. IGNITION GENERATOR COIL VOLTAGE TESTING

290 W Models Only

General

When manually starting the engine while the spark plug is installed, the engine will tend to accelerate beyond the compression point. This will result in higher magneto output power.

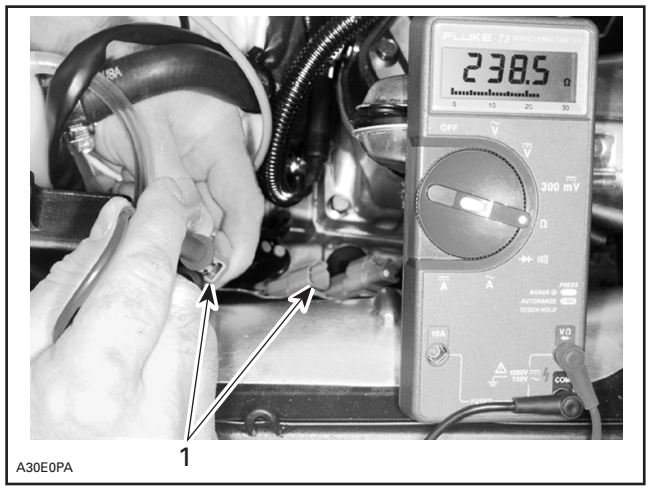
1. Disconnect 10-05 housing between the magneto and the wiring harness.
2. Connect multimeter probes to WHITE and RED wires and bring the selector switch to Ṽ and the scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.
5. Compare readings with those appearing in the IGNITION table.

5. TRIGGER COIL TESTING

All Models

Resistance Testing

1. Connect probes to WHITE/YELLOW and BLUE/YELLOW wires from trigger coil 10-04 housing.
2. Activate the manual starter and check values indicated by the multimeter.
3. Repeat operation 3 times.
4. Compare readings with those appearing in the IGNITION table.



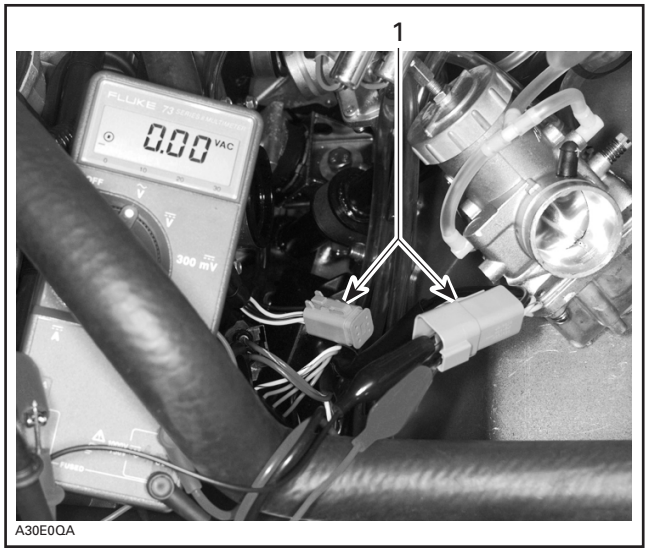
A30E0PA

1. 10-04 housing

6. MPEM VOLTAGE TESTING

All Models

1. Disconnect the 3-01 (2-03 on GT 700/SE) housing between module and high voltage coils.
2. Connect multimeter probes to WHITE/BLUE and BLACK wires coming out from module. Place the selector switch to Ṽ and the scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.

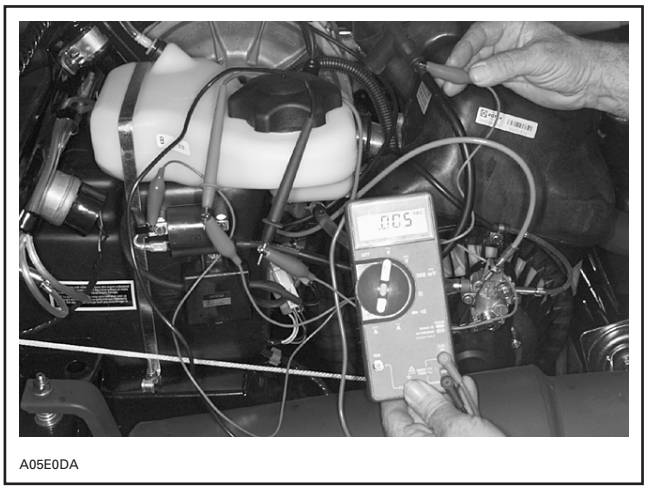


1. 3-01 housing

5. Compare readings with those appearing in the IGNITION table.

7. HIGH VOLTAGE COIL VOLTAGE TESTING

1. Disconnect spark plug cap from spark plug.
2. Fasten alligator clip to spark plug cable, near the spark plug.
3. Connect other multimeter wire to engine (ground), then place selector switch to Ṽ and scale to 0.00^{VAC}.
4. Activate the manual starter and check values indicated by the multimeter.
5. Repeat operation 3 times.



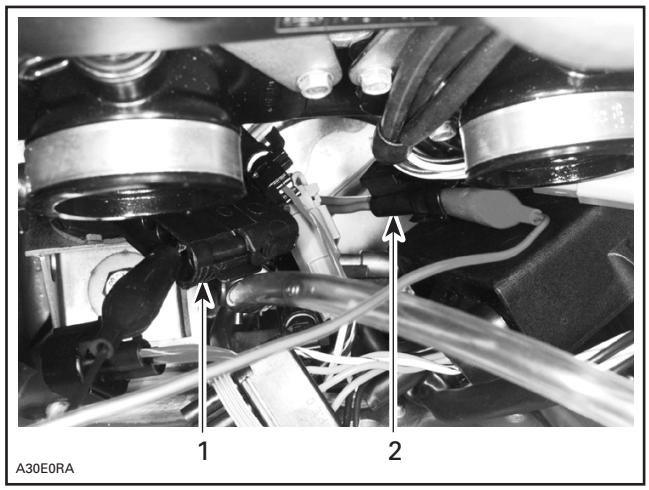
TYPICAL

6. Compare readings with those appearing in the IGNITION table.

8. MPEM SUPPLY VOLTAGE TESTING

Grand Touring 700/SE Only

1. Disconnect the 6-15 and 6-13 housings between module and main harness.
2. Connect multimeter probes to RED/BLUE and BLACK wires coming out from harness. Place the selector switch to Ṽ and the scale to 00.0^{VDC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.



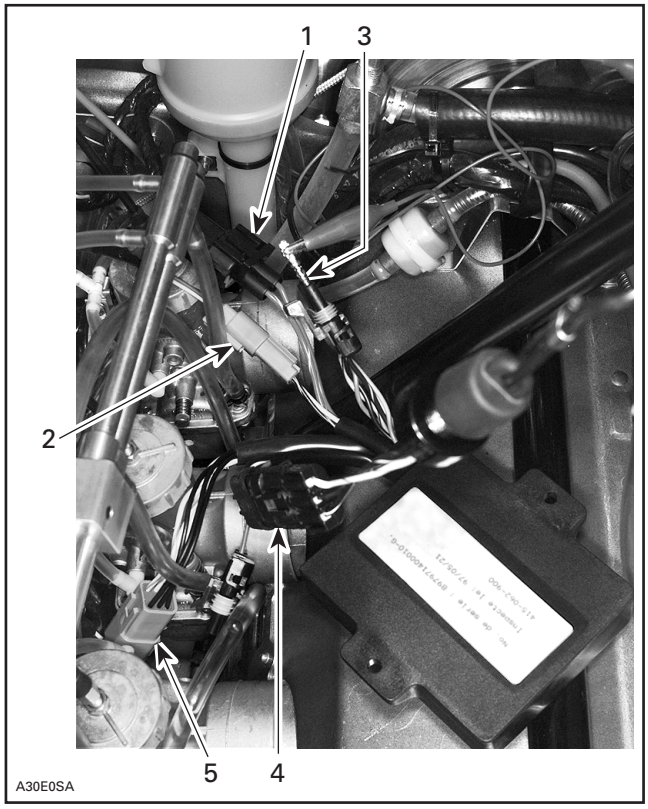
1. 10-01 housing
2. 10-05 housing

5. Compare readings with those appearing in the IGNITION table.

9. MPEM TESTING

Grand Touring 700/SE Only

1. Disconnect the MPEM.
2. Install a known-good MPEM.



1. Diagnostic housing
2. Trigger housing10-05 housing
3. Ground (jumper wire directly on negative post of battery
4. DESS housing
5. High tension coils housing

3. Activate the manual starter and check values indicated by the multimeter.

CONCLUSION

All Models

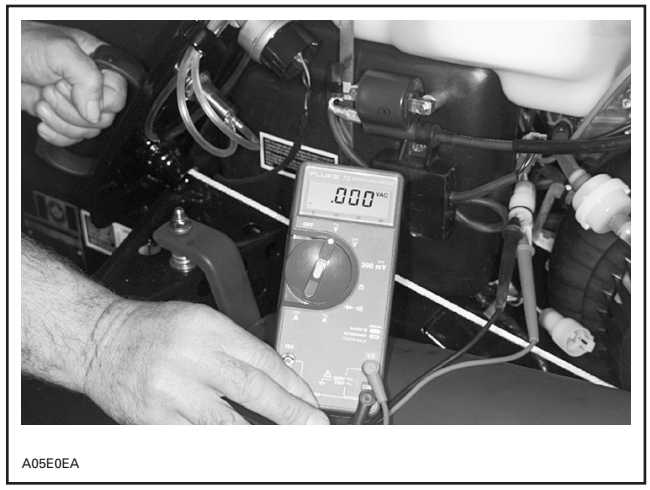
If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the IGNITION table.

Set the multimeter as indicated.

LIGHTING GENERATOR COIL VOLTAGE TESTING

NOTE: For 290 W system, the lighting generator coil is not part of the ignition system. It is a self-contained system used to supply current to the lighting system and to other devices working on alternating current. However, this system can be tested using a multimeter.

1. Disconnect round 2-01 housing from engine (YELLOW, YELLOW wires).
2. Connect multimeter probes to YELLOW wires, then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.



TYPICAL

5. Compare readings with those appearing in the LIGHTING table.

CONCLUSION

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the LIGHTING table.

Set the multimeter as indicated.

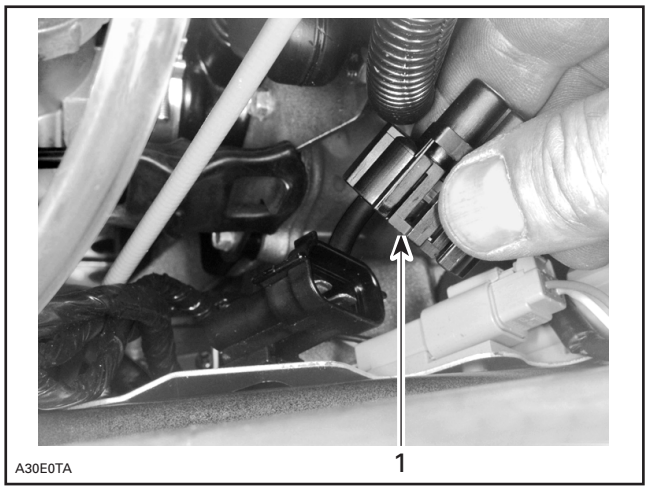
ELECTRIC ACCESSORIES TESTING

Grand Touring 700/SE Only

All accessories are supplied with electricity only when engine is running at 800 RPM or faster.

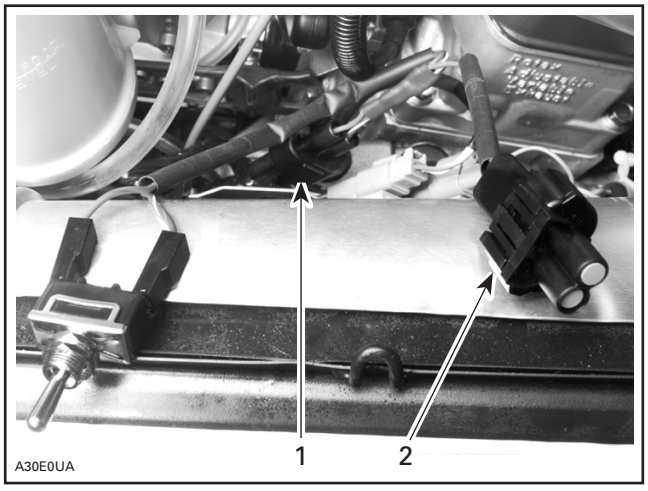
The MPEM controls the electricity supply to accessories. To short-circuit this feature, avoiding to let engine idling during testing, connect the by-pass wires (P/N 529 033 300).

1. Remove protective cap from 2-05 housing.



1. Cap

2. Connect bypass wires (P/N 529 033 300) to the harness housing. Install cap on the other bypass housing.



1. Bypass wires connected
2. Cap in unoccupied housing

3. Turn bypass switch on. All accessories, except the buzzer, receive the battery voltage.

IGNITION SYSTEM TESTING (CK3 Series — 290 W NON-RER)								
Part	Test to be performed	Wire color	Multimeter probe connection	Resistance Ω		Voltage V		Note
				Value (Ohms)	Multimeter scale	Value (Volts)	Multimeter scale	
Ignition and kill switches	Running insulation	BK and BK/YL	10-02-2-F 10-01A-M	0.L	00.0 MΩ	—	—	No stop switch must be operational.
	Continuity in stop position	BK and BK/YL	10-02-2-F 10-01A-M	00.0 - 00.5	00.0 Ω	—	—	Only one stop switch must be operational. Test one at a time.
DESS switch	Insulation in stop position	BK/GN and BK/WH	10-03B-M 10-03C-M	0.L	00.0 MΩ	—	—	Tether cord cap should be off.
	Running continuity	BK/GN and BK/WH	10-03B-M 10-03C-M	00.0 - 00.5	00.0 Ω	—	—	Tether cord cap should be in place.
Ignition generator coil	Output	WH and RD	10-02-5-F 10-02-1-F	25.0 - 56.0	00.0 Ω	30.0 - 50.0	00.0VAC	The test can be done on 2-05 housing, but this would not validate the harness.
		WH and BK/RD	10-02-5-F 10-02-6-F	3.5 - 8.1	00.0 Ω	4.0 - 10.0	00.0VAC	
	Coil insulation	BK and RD	10-02-2-F 10-02-1-F	0.L	00.0 MΩ	—	—	
	Ground continuity	BK and engine	10-02-2-F and engine	00.0 - 00.5	00.0 Ω	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
Trigger coil	Resistance and output	WH/YL and BL/YL	10-04-2-F 10-04-1-F	190 - 300	00.0 Ω	.200 - .350	.000VAC	The test can be done on 2-02 housing, but this would not validate the harness.
MPEM	Output voltage	WH/BL and BK	3-01-(1,2,3)-M 3-01-(6,5,4)-M	—	—	10.0 - 20.0 3 times	00.0VAC	No switch must be operational and tether cord cap must be in place.
High voltage coil	Primary winding resistance	WH/BL and BK	3-01-(1,2,3)-F 3-01-(6,5.4)-F	00.2 - 00.5 3 times	00.0 Ω	—	—	—
	Secondary winding resistance (spark plug cap included)	Spark plug cap and engine	In spark plug cap and on engine	10.5 K - 19 K 3 times	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding resistance (without spark plug cap)	BK and engine	In spark plug wire and on engine	6 K - 13 K 3 times	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding voltage	BK and engine	On spark plug wire and on engine	—	—	1.5 - 2.5 3 times	0.00VAC	The measurement must be taken on the spark plug wire (without the spark plug).
Spark plug cap	Cap resistance	—	Spark plug side and wire side	4.0 K - 6.0 K 3 times	00.0 KΩ	—	—	—

M: Male F: Female

IGNITION SYSTEM TESTING (CK3 Series — 290 W RER)								
Part	Test to be performed	Wire color	Multimeter probe connection	Resistance Ω		Voltage V		Note
				Value (Ohms)	Multimeter scale	Value (Volts)	Multimeter scale	
Ignition and kill switches	Running insulation	BK and BK/YL	10-02-2-F 10-01A-M	0.L	00.0 MΩ	—	—	No stop switch must be operational.
	Continuity in stop position	BK and BK/YL	10-02-2-F 10-01A-M	00.0 - 00.5	00.0 Ω	—	—	Only one stop switch must be operational. Test one at a time.
DESS switch	Insulation in stop position	BK/GN and BK/WH	10-03B-M 10-03C-M	0.L	00.0 MΩ	—	—	Tether cord cap should be off.
	Running continuity	BK/GN and BK/WH	10-03B-M 10-03C-M	00.0 - 00.5	00.0 Ω	—	—	Tether cord cap should be in place.
Ignition generator coil	Output	WH and RD	10-02-5-F 10-02-1-F	25.0 - 56.0	00.0 Ω	30.0 - 50.0	00.0VAC	The test can be done on 2-05 housing, but this would not validate the harness.
		WH and BK/RD	10-02-5-F 10-02-6-F	3.5 - 8.1	00.0 Ω	4.0 - 10.0	00.0VAC	
	Coil insulation	BK and RD	10-02-2-F 10-02-1-F	0.L	00.0 MΩ	—	—	
	Ground continuity	BK and engine	10-02-2-F and engine	00.0 - 00.5	00.0 Ω	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
Trigger coil no. 1	Resistance and output	WH/YL and BL/YL	10-02-3-F 10-02-4-F	190 - 300	00.0 Ω	.200 - .350	.000VAC	The test can be done on 2-05 housing, but this would not validate the harness.
Trigger coil no. 2	Resistance and output	GY/YL and GN/YL	10-04-2-F 10-04-1-F	190 - 300	00.0 Ω	.200 - .350	.000VAC	The test can be done on 2-02 housing, but this would not validate the harness.
MPEM	Output voltage	WH/BL and BK	3-01-(1,2,3)-M 3-01-(6,5,4)-M	—	—	10.0 - 20.0 3 times	00.0VAC	No switch must be operational and tether cord cap must be in place.
High voltage coil	Primary winding resistance	WH/BL and BK	3-01-(1,2,3)-F 3-01-(6,5.4)-F	00.2 - 00.5 3 times	00.0 Ω	—	—	—
	Secondary winding resistance (spark plug cap included)	Spark plug cap and engine	In spark plug cap and on engine	10.5 K - 19 K 3 times	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding resistance (without spark plug cap)	BK and engine	In spark plug wire and on engine	6 K - 13 K 3 times	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding voltage	BK and engine	On spark plug wire and on engine	—	—	1.5 - 2.5 3 times	0.00VAC	The measurement must be taken on the spark plug wire (without the spark plug).
Spark plug cap	Cap resistance	—	Spark plug side and wire side	4.0 K - 6.0 K 3 times	00.0 KΩ	—	—	—

M: Male F: Female

NOTE: Stop switches include the ignition switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

LIGHTING SYSTEM TESTING (CK3 Series — 290 W)								
Part	Test to be performed	Wire color	Multimeter probe connection	Resistance Ω		Voltage V		Note
				Value (Ohms)	Multimeter scale	Value (Volts)	Multimeter scale	
Lighting generator coil	Output	YL and YL	2-01B-F and 2-01C-F	00.15 - 00.35	00.0 Ω	3.0 - 7.0	00.0 VAC	—
	Coil insulation	YL and engine	2-01(B,C)-F and engine	0.L	00.0 MΩ	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
	Ground continuity	BK and engine	2-01A-F and engine	00.0 - 00.5	00.0 Ω	—	—	

M: Male F: Female

NOTE:

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

IGNITION SYSTEM TESTING (CK3 Series — 360 W)								
Part	Test to be performed	Wire color	Multimeter probe connection	Resistance Ω		Voltage V		Note
				Value (Ohms)	Multimeter scale	Value (Volts)	Multimeter scale	
Ignition and kill switches	Running insulation	BK and BK/YL	6-15-9-F 6-15-3-F	0.L	00.0 MΩ	—	—	No stop switch must be operational.
	Continuity in stop position	BK and BK/YL	6-15-9-F 6-15-3-F	00.0 - 00.5	00.0 Ω	—	—	Only one stop switch must be operational. Test one at a time.
DESS switch	Insulation in stop position	BK/GN and BK/WH	6-15-2-F 6-15-1-F	0.L	00.0 MΩ	—	—	Tether cord cap must be off.
	Running continuity	BK/GN and BK/WH	6-15-2-F 6-15-1-F	00.0 - 00.5	00.0 Ω	—	—	Tether cord cap must be in place.
MPEM	Supply from GY wire	RD/GY and BK	6-15-10-F 6-15-9-F	—	—	Battery voltage within 0.5	00.0 VDC	—
	Supply from RD/BL wire	RD/BL and BK	6-13-A-M 6-15-9-F	—	—	2.00 - 3.50	00.0 VDC	The test can be done on 2-05B-M housing of diagnostic post and engine, but this would not completely validate the harness.
	Supply from RD/WH wire	RD/WH and BK	6-13-B-M 6-15-9-F	—	—	Battery voltage within 0.5	00.0 VDC	The test can be done on 2-05A-M housing of diagnostic post and engine, but this would not completely validate the harness.
	Ground continuity	BK and engine	6-15-9-F and engine	00.0 - 00.5	00.0 Ω	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
Trigger coil no. 1	Resistance and output	WH/YL and BL/YL	6-14-1-F 6-14-4-F	190 - 300	00.0 Ω	.200 - .350	.000 VAC	The test can be done on 2-02 housing, but this would not validate the harness.
Trigger coil no. 2	Resistance and output	GY/YL and GN/YL	6-14-3-F 6-14-2-F	190 - 300	00.0 Ω	.200 - .350	.000 VAC	The test can be done on 2-02 housing, but this would not validate the harness.
Ignition module	Output voltage	WH/BL and BK	2-03-(1,2,3)-M 2-03-(6,5,4)-M	—	—	10.0 - 20.0 3 times	00.0 VAC	No switch must be operational and tether cord cap must be in place.
High voltage coil	Primary winding resistance	WH/BL and BK	3-01-(1,2,3)-F 3-01-(6,5.4)-F	00.2 - 00.5 3 times	00.0 Ω	—	—	—
	Secondary winding resistance (spark plug cap included)	Spark plug cap and engine	In spark plug cap and on engine	10.5 K - 19 K 3 times	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding resistance (without spark plug cap)	BK and engine	In spark plug wire and on engine	6 K - 13 K 3 times	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding voltage	BK and engine	On spark plug wire and on engine	—	—	1.5 - 2.5 3 times	0.00 VAC	The measurement must be taken on the spark plug wire (without the spark plug).
Spark plug cap	Cap resistance	—	Spark plug side and wire side	4.0 K - 6.0 K 3 times	00.0 KΩ	—	—	—

M: Male F: Female

NOTE: Stop switches include the ignition switch, and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

LIGHTING SYSTEM TESTING (CK3 Series — 360 W)								
Part	Test to be performed	Wire color	Multimeter probe connection	Resistance Ω		Voltage V		Note
				Value (Ohms)	Multimeter scale	Value (Volts)	Multimeter scale	
Lighting generator coil	Output	YL and YL	2-06(A,B,C)-F and 2-06(A,B,C)-F	00.0 - 00.5 3 times	00.0 Ω	3.5 - 5.5 3 times	00.0 VAC	Do the test between A and B, A and C and B and C.
	Coil insulation	YL and engine	2-06(A,B,C)-F and engine	0.L	00.0 MΩ	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.

M: Male F: Female

NOTE:

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

INSPECTION OF AC CIRCUIT ISOLATION

290 W Models

If AC circuit is not isolated from frame, headlamp beam will weaken.

INSPECTION

Disconnect regulator/rectifier.

Connect one digital ohmmeter probe (needle ohmmeter will not offer enough precision) to frame and other probe to YELLOW wire (2-04A).

Measured resistance must be infinite. If such is not the case, it means there is a connection between AC circuit and frame.

Disconnect one accessory at the time to identify the faulty circuit.

INSPECTION OF HEATING ELEMENTS

All measurements must be performed at 21°C (70°F).

Throttle Lever Heating Element

Resistance Measurement

Formula III and Mach 1/Z Series

HIGH INTENSITY	YELLOW/BLACK wire BROWN wire	1.96 to 3.64 ohms
LOW INTENSITY	YELLOW/BLACK wire BROWN/YELLOW wire	8.05 to 14.95 ohms

Grand Touring 700/SE

YELLOW/BLACK wire BROWN wire	65 to 80 ohms

Current Measurement

Formula III and Mach 1/Z Series

HIGH INTENSITY	BROWN wire	0.23 A minimum
LOW INTENSITY	BROWN/YELLOW wire	0.13 A minimum

Handlebar Grip Heating Element

Resistance Measurement

Formula III and Mach 1 Series

LOW INTENSITY	YELLOW/BLACK wire ORANGE/VIOLET wire	17.7 to ① 20.7 ohms
HIGH INTENSITY	YELLOW/BLACK wire ORANGE wire	8.73 to ① 10.67 ohms

Grand Touring 700/SE

RED/YELLOW wire ORANGE wire	6.5 to 8 ohms ①

① When measuring resistance at terminals the actual value will be half the measurement in table. The reason for that is the elements are connected in parallel. Therefore the total resistance is half the resistance of one element.

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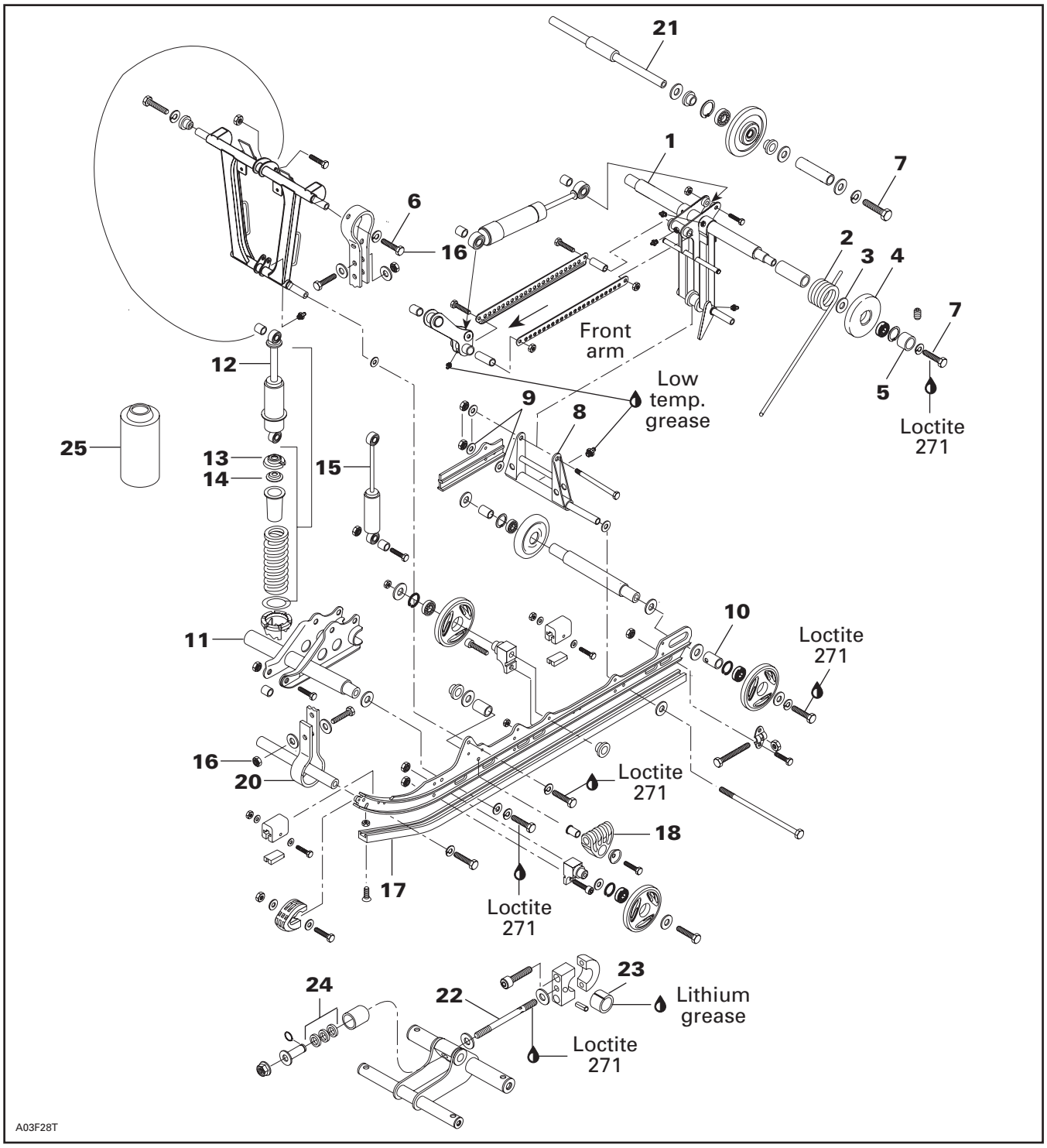
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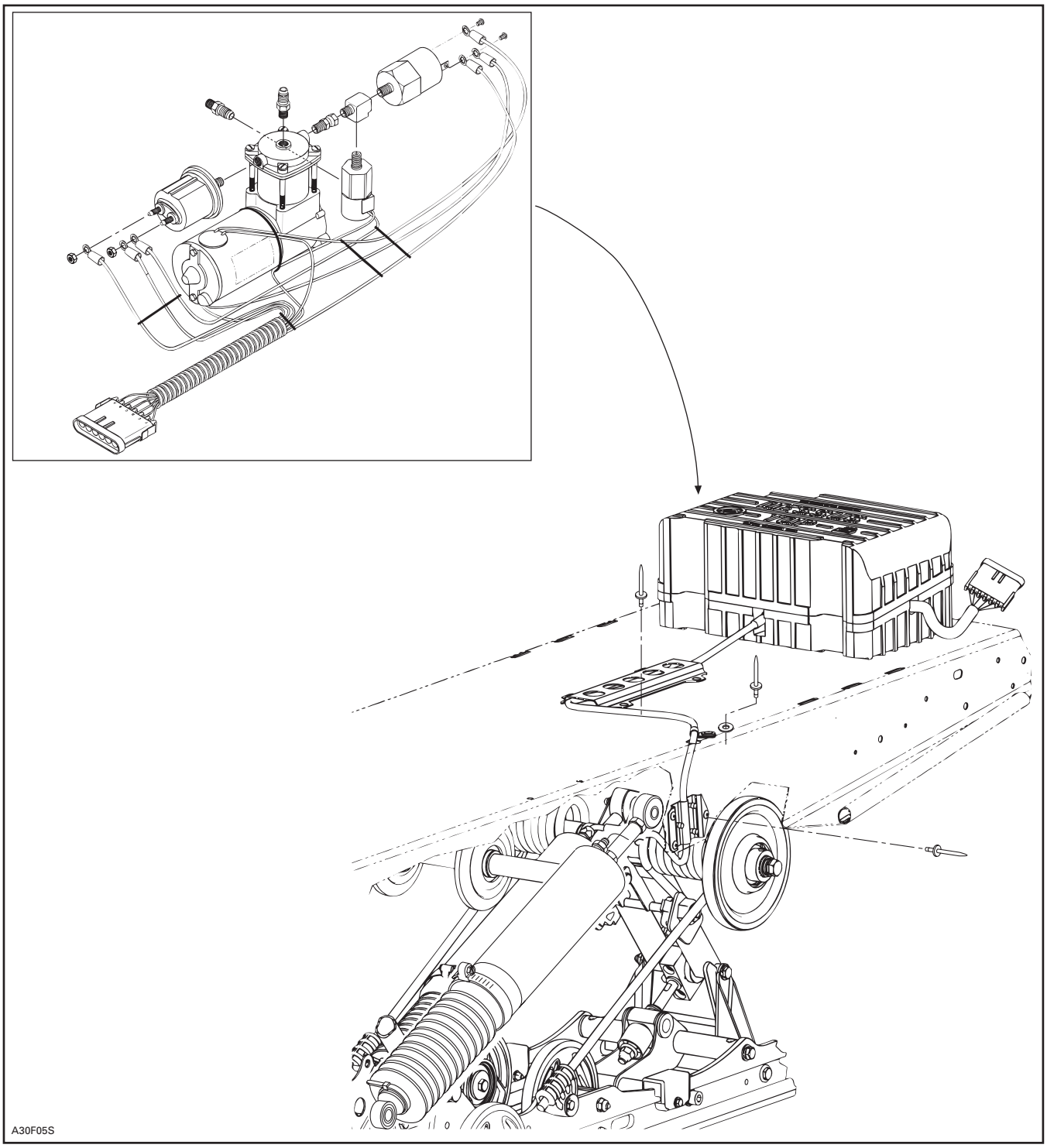
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SC-10 SUSPENSION

SC-10 High-Performance on All CK3 Models



Air Suspension Components on GT SE Only



COMPONENT REMOVAL AND INSTALLATION

Lift rear of vehicle and support it off the ground.

21, Rear Axle

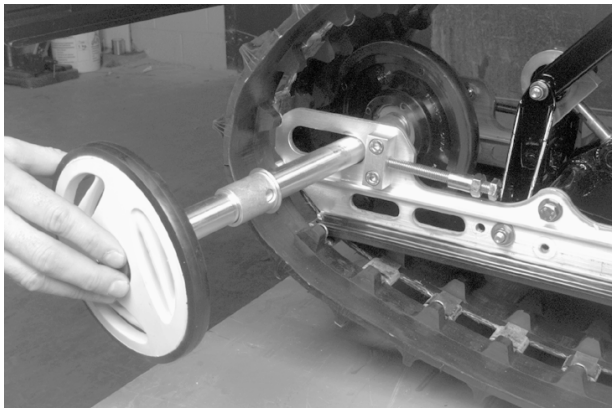
Completely loosen track tension.

Unscrew one rear idler wheel screw.

Pull out rear axle from opposite side of offset inner wheel. Proceed on either sides for models with 4 wheels on rear axle.

At assembly, temporary loosen rear shackle lower pivot nut and ACM (Acceleration and Control Modulator) support rear bolt.

Align spacer hole with adjusting bolt.



A03F1LA

TYPICAL

SC-10 HP and XC

22, Threaded Rod

NOTE: Do not disassemble threaded rod ass'y needlessly.

Lift rear of vehicle.

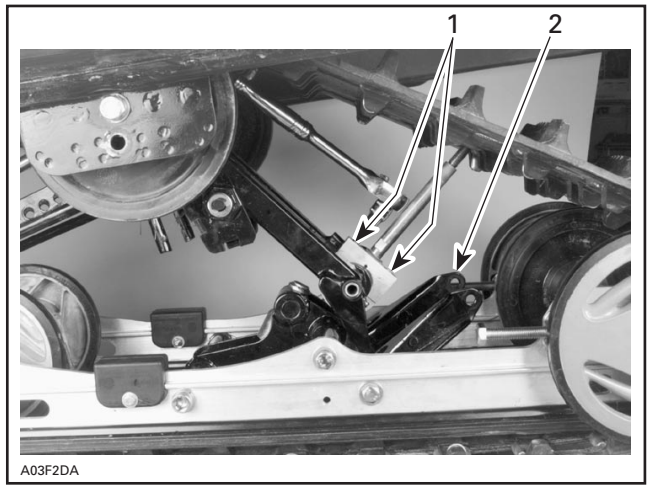
Unhook rear springs.

Unscrew threaded rod nut.

Remove through bolt from shackle.

Swing shackle rearward.

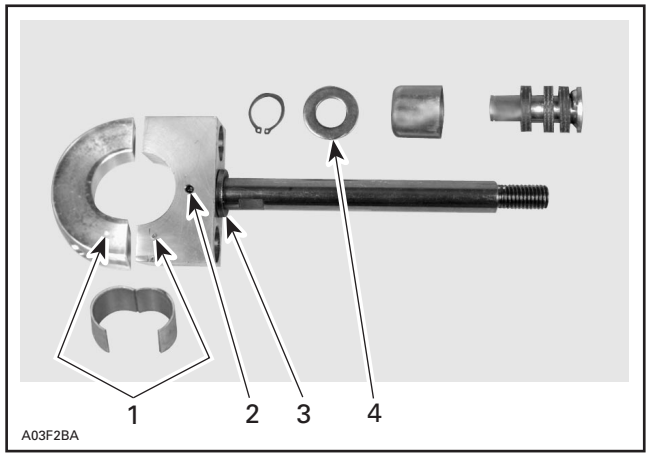
Collapse suspension in order to disengage threaded rod from its support.



A03F2DA

1. *Block ass'y Allen screw*
2. *Schackle*

Unscrew block ass'y Allen screws.



A03F2BA

1. *Marks*
2. *Roll pin*
3. *Smaller washer*
4. *Larger washer*

23, Cushion

Separate pivot block.

Remove cushion.

Apply lithium grease on cushion at reassembly.

At assembly, match marked side of both pivot blocks.

When cup is disassembled, it may be too difficult to install circlip before reinstalling this assembly. Install all parts and the circlip loosely around threaded rod. Compress rear of vehicle or lift the front to easily install circlip in its groove.

25, ACM Support

Remove threaded rod ass'y. Loosen rear axle screw on one side and rear shackle screws.

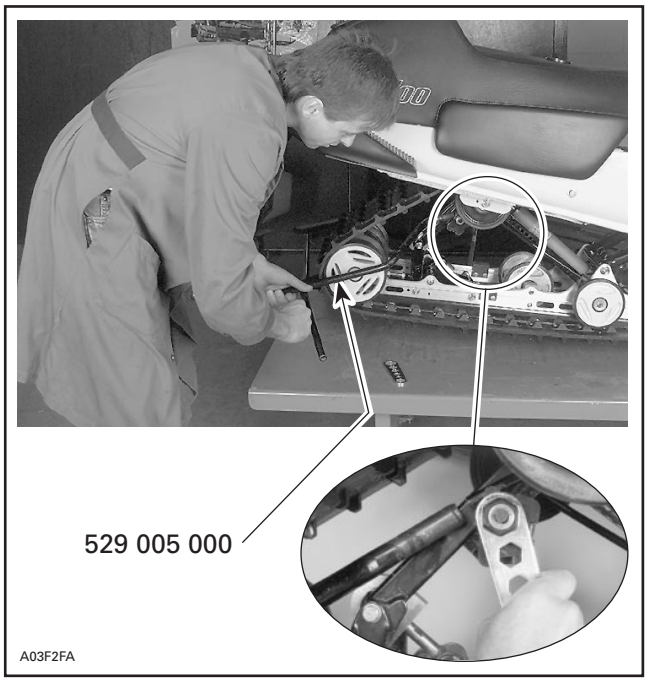
Unbolt ACM support and remove it.

Remove cup.

15, Rear Shock

Lift rear of vehicle.

Slightly turn adjusting cam to expose spring end. Using spring installer (P/N 529 005 000), remove left spring from adjusting cam.



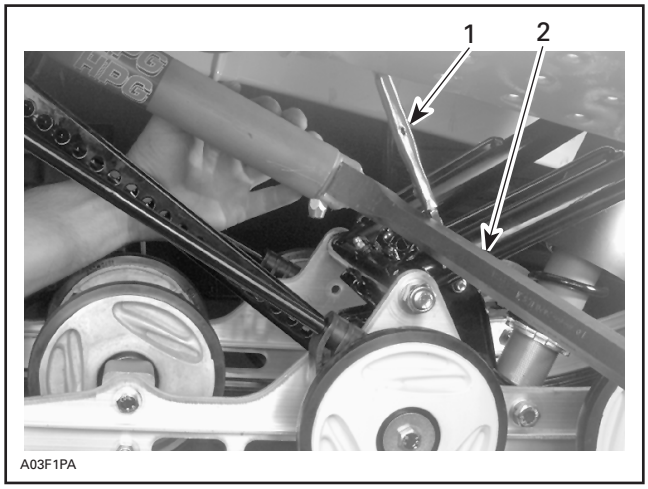
Remove nut on top end of shock.

Remove nut on bottom end of shock. Pry up shock bottom end to ease removing bolt (gas shock only). See installation illustration below.

Installation is reverse of removal procedure. To easily compress gas shock absorber, use a pry bar and locking pliers as a stopper.

▼ CAUTION

Take care not to damage grease fitting.



1. Locking pliers
2. Pry bar

12, Front Shock

Unfasten one end of stopper strap.

Unbolt shock and remove it.

2, Rear Spring

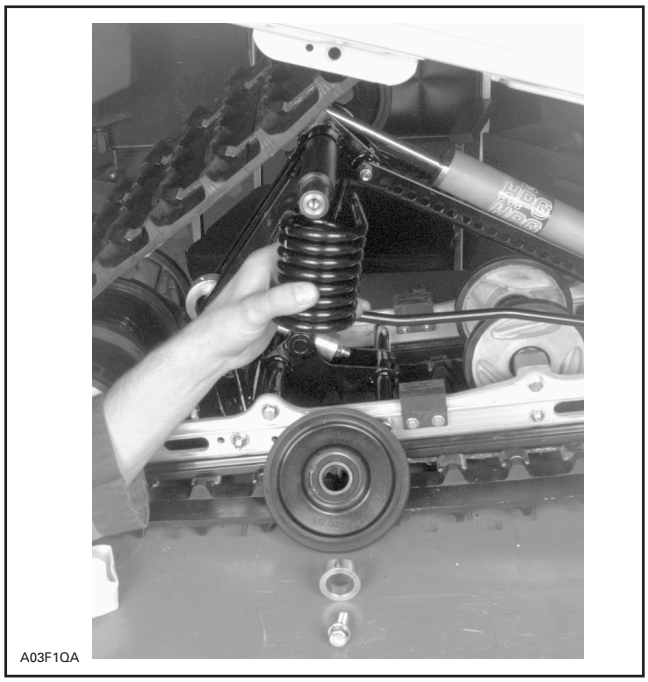
Remove spring ends from adjusting cams.

Unbolt rear arm top axle from chassis.

Unscrew set screws from locking ring at each end of top axle.

Remove locking rings (spacers on fan cooled models) and top idler wheels.

Remove springs.



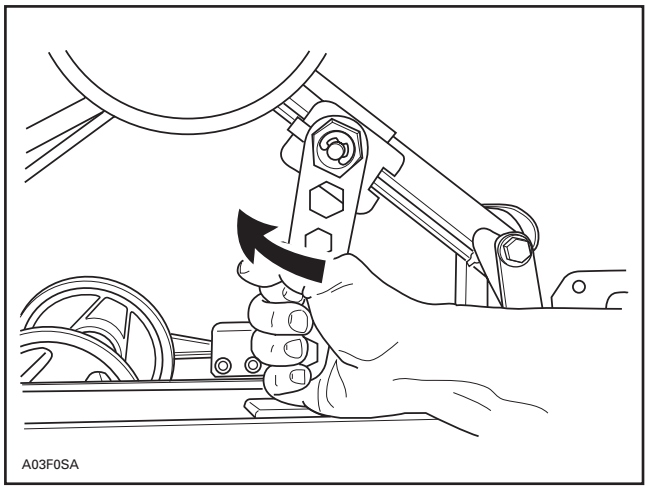
TYPICAL

At reassembly, wheel circlip must face outward.

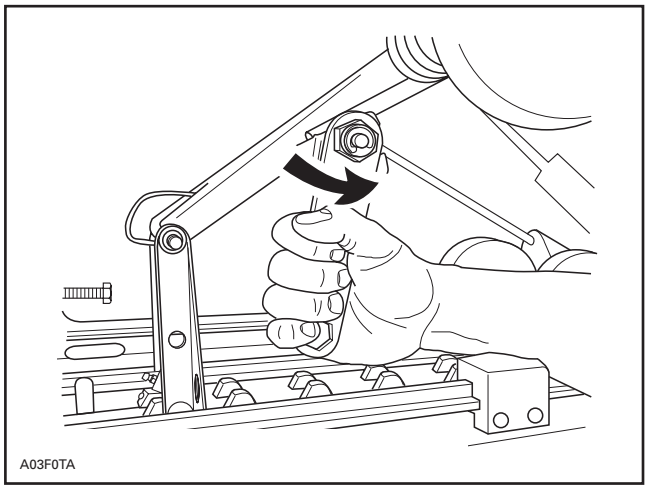
REMOVAL

19, Cam

Decrease spring preload by turning LH cam clockwise and RH cam counterclockwise.



LH SIDE SHOWN



RH SIDE SHOWN

Lift rear of vehicle and support it off the ground.

Loosen track tension.

7, Screw

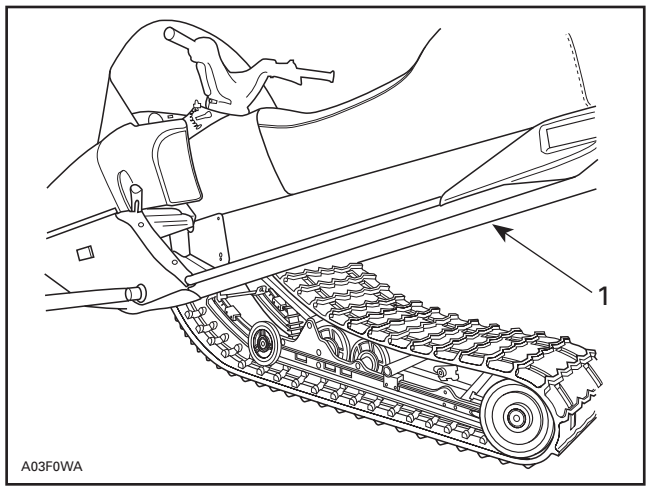
Unscrew rear arm top axle from chassis.

NOTE: To prevent axle from turning when unscrewing screws assembled with threadlocker, proceed as follows:

– Knock on screw head and/or heat to break threadlocker bond.
– Loosen one screw then retighten.
– Remove the opposite screw.
– Remove the first one.

Unscrew center idler wheel axle from tunnel then remove.

Lift rear of vehicle at least 1 m (3 ft).



1. At least 1 m (3 ft)

6, Screw

Remove both screws retaining front arm to tunnel.

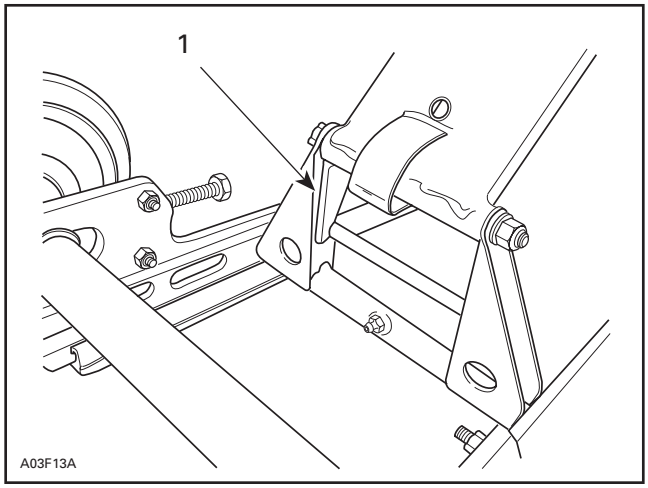
Remove suspension.

DISASSEMBLY AND ASSEMBLY

Inspect track thoroughly before reinstalling suspension. Refer to TRACK 07-04.

1, Rear Arm

At installation, rear arm stroke limiter must be on rear side.



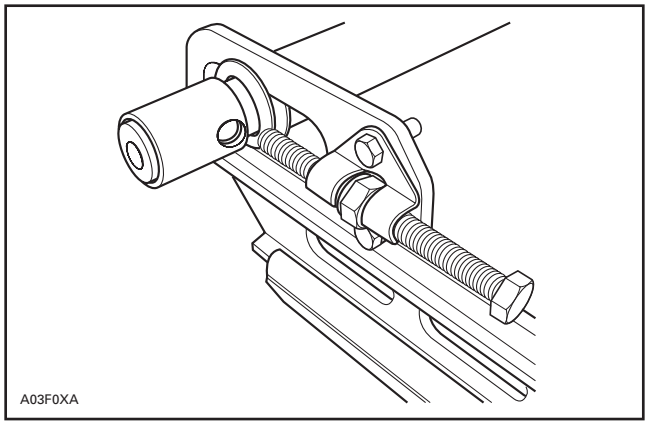
1. Stroke limiter on rear side

8,9, Pivot Arm and Flat Washer

At installation pivot arm grease fitting must face rearward.

10, Outer Bushing

At installation, hole must face adjustment screw.



11, Axle

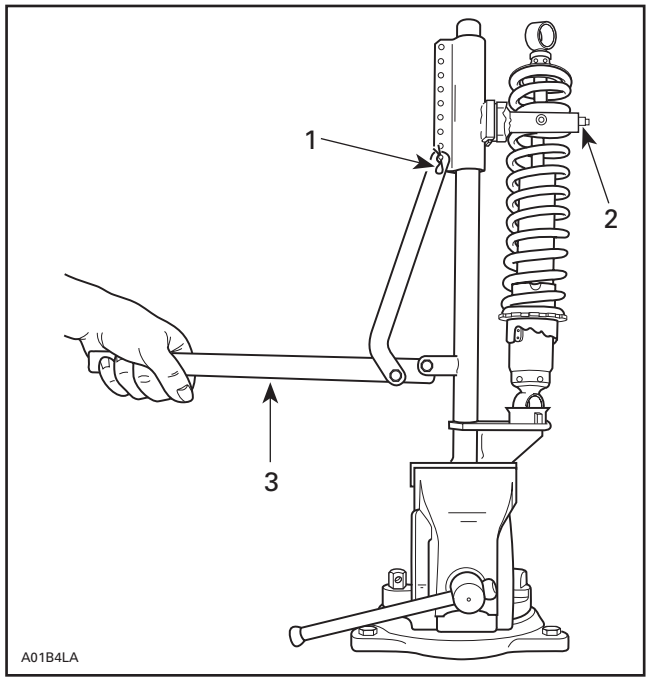
Note position of axles at disassembly. Axles with a paint stripe serve as idler wheel axles. These are more precise than those used as pivot axles. Idler wheel axles can be used as pivot axles but the opposite is not true.

12,13,14, Front Shock, Spring Stopper and Cap

Use shock spring remover (P/N 529 027 100) and put it in a vise. Mount shock in it and turn shock so that spring coils match spring compressor.

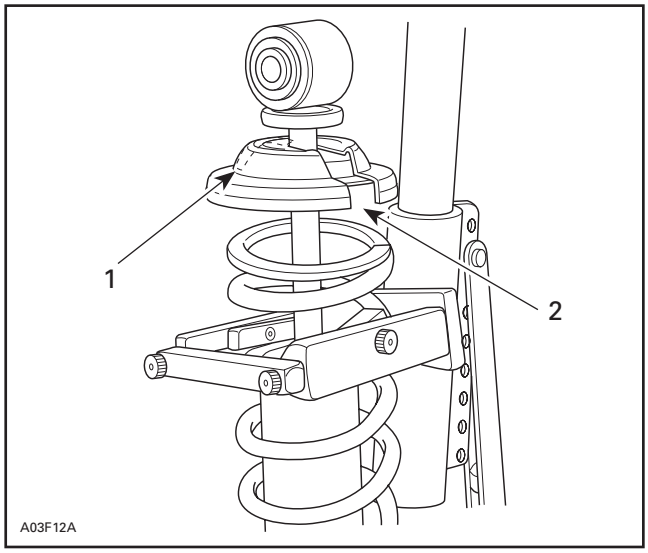
Close and lock bar. Adjust handle horizontal by changing position of clevis pin.

Push down on handle until it locks. Remove spring stopper and cap then release handle.



1. Clevis pin
2. Bar
3. Handle horizontal

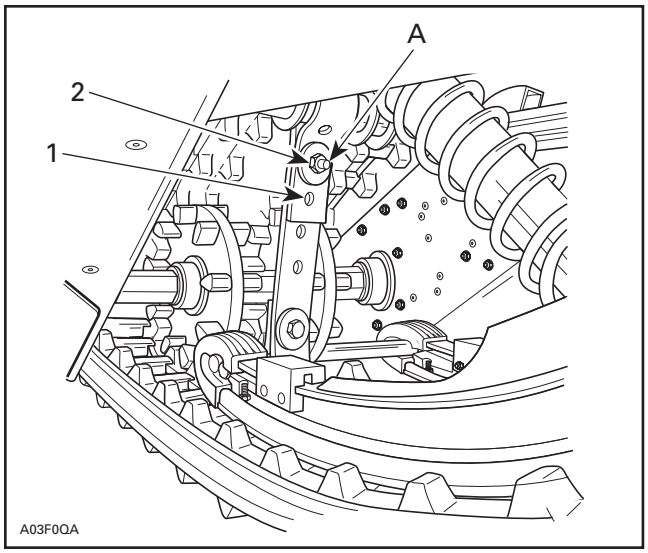
At installation, cap opening must be 180° from spring stopper opening.



1. Cap opening
2. Spring stopper opening

20, Stopper Strap

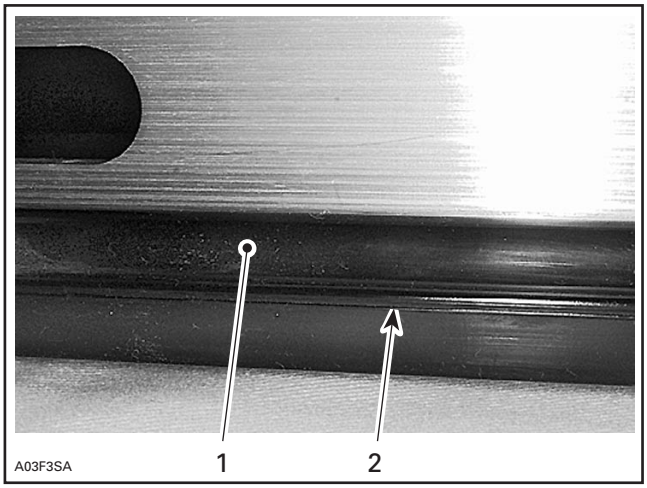
Inspect strap for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required. Make sure it is attached through proper hole from the end. Refer to TECHNICAL DATA 10-03. Torque nut to 11 N•m (97 lbf•**in**).



1. 1st hole
2. 2nd hole
*A. 11 N•m (97 lbf•**in**)*

17, Slider Shoe

Molding line is the wear limit indicator.



TYPICAL

1. Slider shoe
2. Molding line (wear limit indicator)

Replace slider shoes when wear limit is reached.

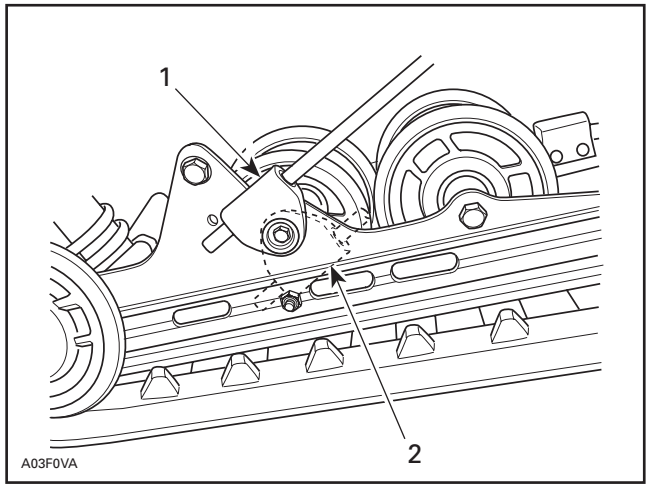
▼ CAUTION

Slider shoes must always be replaced in pairs.

18, Spring Support

▼ CAUTION

To avoid track damage, spring supports must be mounted upward.



RIGHT SIDE SHOWN

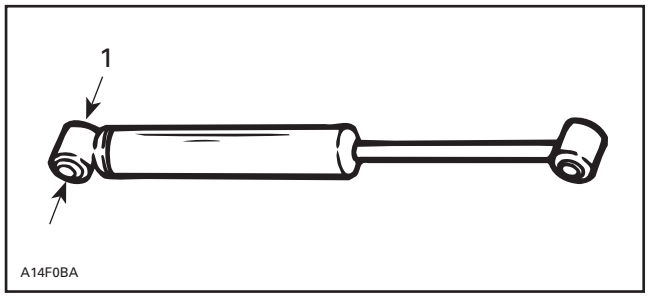
1. Right position: upward
2. Wrong position

SHOCK ABSORBER INSPECTION

All Models Equipped with Hydraulic Shock

NOTE: Hydraulic shocks are painted black or dark gray.

Secure the shock body end in a vise with its rod upward.



1. Clamp

▼ CAUTION

Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with its rod upward.

Pay attention to the following conditions that will denote a defective shock:

– A skip or a hang back when reversing stroke at mid travel.
– Seizing or binding condition except at extreme end of either stroke.
– Oil leakage.
– A gurgling noise, after completing one full compression and extension stroke.

Renew if any faults are present.

All Models Equipped with Gas Pressurized Shock

NOTE: Gas pressurized shocks are light gray painted.

Gas shock can be inspected as follows:

Because of gas pressure, strong resistance is felt when compressing shock. When released, the shock will extend unassisted. Renew as required.

If suspecting an internal gas leak between oil chamber and gas chamber, check shock as follows:

Install shock in a vise clamping on its bottom eyelet with its rod upward.

Let it stand for 5 minutes.

Completely push down the shock rod then release.

Rod must comes out at a steady speed. If speed suddenly increases particularly at end of extension, replace shock.

If suspecting a frozen gas shock proceed as follows:

Place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance, compare to a new shock. If shock is frozen it will be much more difficult to compress than for the new one.

INSTALLATION

Install assembled suspension into track with front portion first.

Insert rear portion of suspension into track.

Bolt front arm, rear arm then center top idler wheel axle.

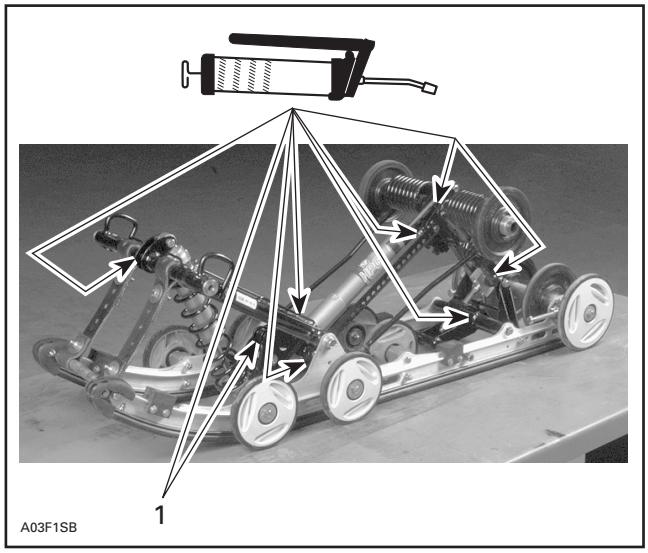
Adjust track tension.

RIDE ADJUSTMENT

Refer to *Operator's Guide*.

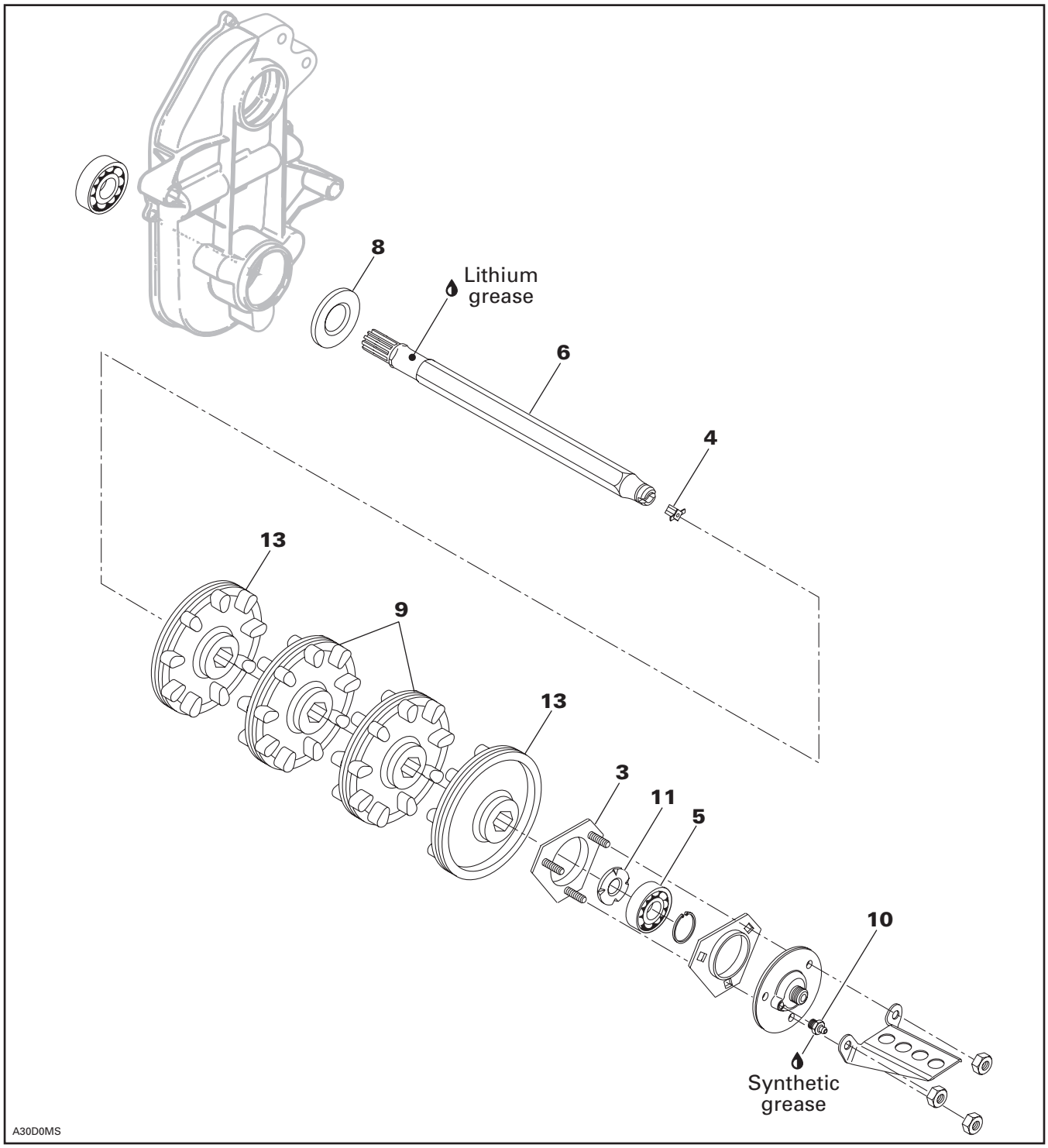
LUBRICATION

Lubricate front and rear arms at grease fittings using synthetic grease (P/N 413 711 500).



SC-10 HP: 7 GREASE FITTINGS
1. Only the GT 700/SE and all LT versions have this 8th grease fitting

DRIVE AXLE



REMOVAL

Drain oil from chaincase. Release drive chain tension. Remove chaincase cover.

Raise and block rear of vehicle off the ground.

Remove suspension. Refer to SC-10 SUSPENSION 07-02.

2,8, End Bearing Housing and Seal

Remove outer flange cover of bearing housing.

Remove chain and sprocket then circlip and bearing from drive axle.

Pry oil seal from chaincase.

6,9,13, Drive Axle and Sprocket

Release drive axle sprocket from track and at the same time, pull the drive axle toward the end bearing housing side.

Remove drive axle from vehicle.

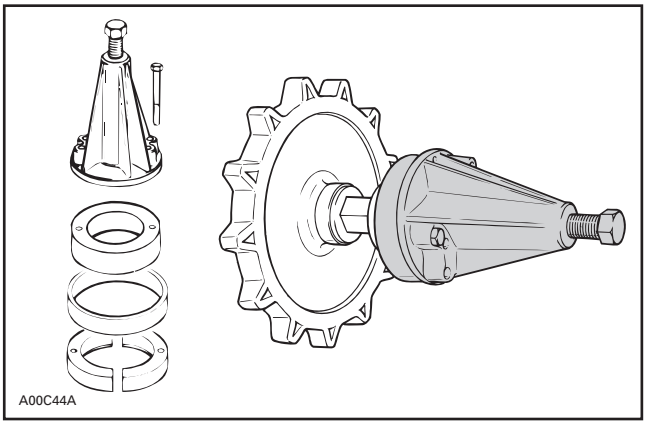
DISASSEMBLY

4, Speedometer Drive Insert

Remove speedometer drive insert.

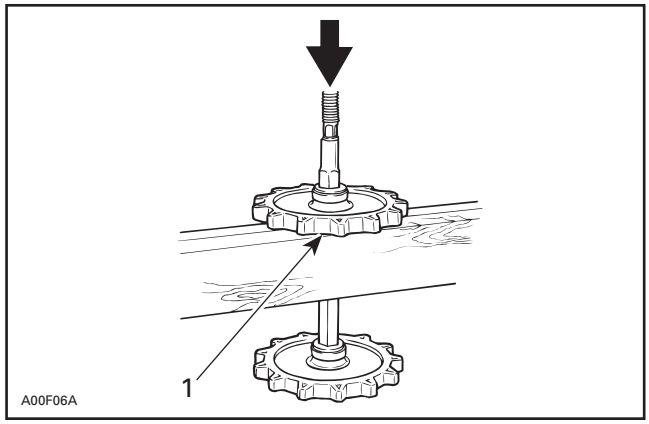
5,12, Bearing

To remove bearings, use puller assembly, ring and half rings as illustrated.



9,13, Sprocket and Half-Sprocket

To remove press fit sprockets, use a press and a suitable support as illustrated.



TYPICAL

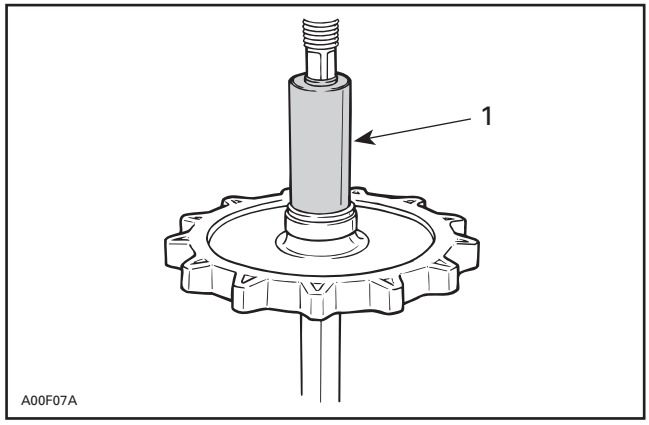
1. Support sprocket near hub

NOTE: Two different types of sprocket press fit can be found. Ensure to replace ring reinforced sprockets with the same type.

ASSEMBLY

8,9,13, Drive Axle and Sprocket

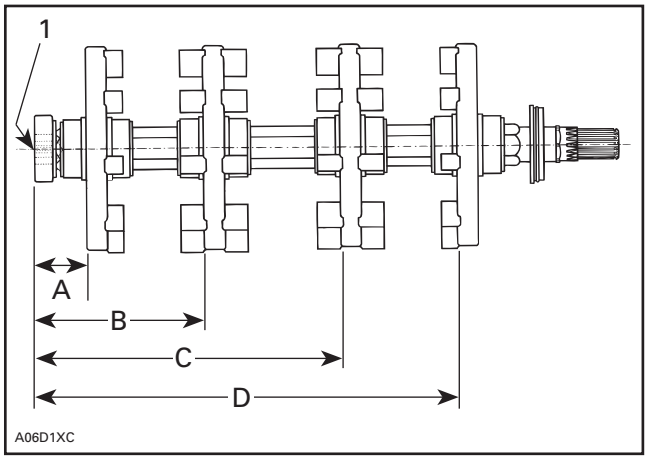
To assemble press fit sprockets, use a press and a suitable pipe as illustrated. Sprockets must be assembled according to the following dimensions.



TYPICAL

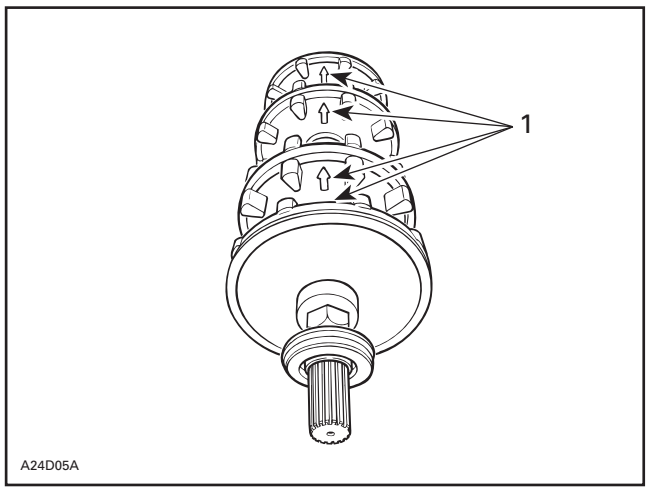
1. Pipe

CK3 Series



1. Measure from end of drive axle
A. 49 mm (1.929 in)
B. 151.2 mm (4.724 in)
C. 274.2 mm (10.795 in)
D. 376.3 mm (14.815 in)

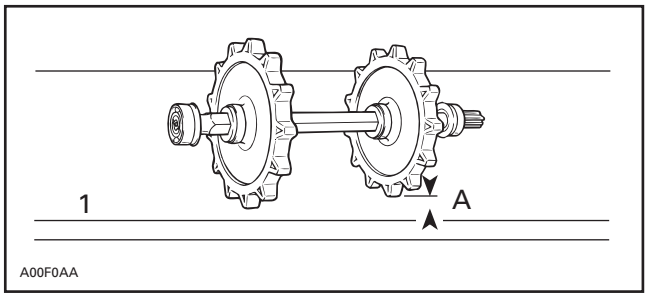
Ensure to align indexing marks of each sprocket when assembling.



TYPICAL
1. Indexing marks aligned

The maximum desynchronization for the sprockets is 1.5 mm (1/16 in).

To check this tolerance, place axle assembly on a plane surface and measure the gap between sprocket tooth and surface.



1. Plane surface
A. 1.5 mm (1/16 in) MAXIMUM

CAUTION

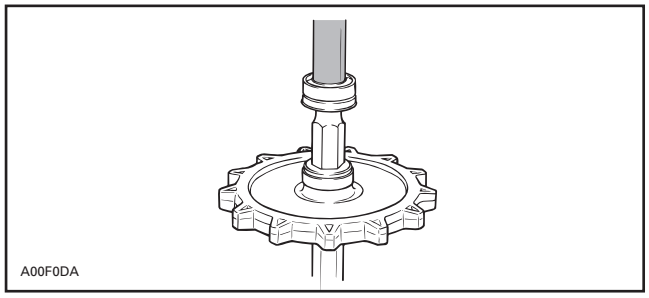
The same sprocket must not be pressed twice on the axle. If synchronization is found to be defective, use a new sprocket.

11, Bearing Protector

At assembly, flat side of bearing protector must be against bearing.

5,12, Bearing

Always push bearing by inner race.



The bearing on the splined side of axle must be pushed until it is seated on shaft shoulder. Each bearing must have its shield facing the sprocket.

LUBRICATION

15, Grease Fitting

Lubricate end housing bearing with synthetic grease (P/N 413 711 500).

ADJUSTMENT

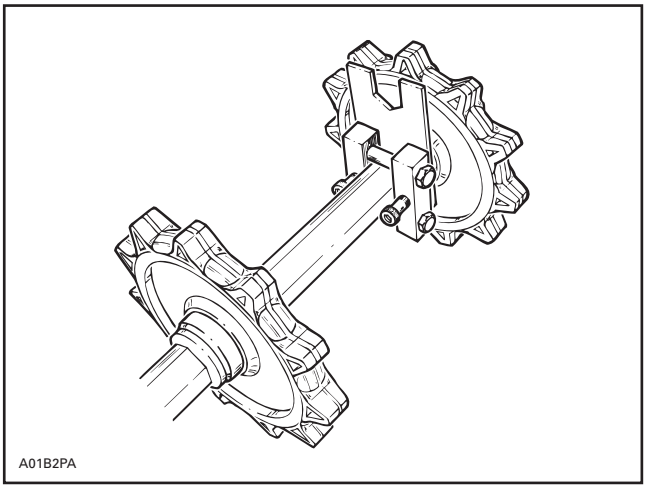
Sprocket/Track Alignment

▼ CAUTION

Do not temper with sprocket/track alignment if frame or suspension is damaged.

Sprockets might be repositioned to fit lugs without removing drive axle.

Use drive axle sprocket adjuster kit (P/N 861 725 700).



TYPICAL

TRACK

TRACK TYPE APPLICATION

Refer to TECHNICAL DATA section 10.

GENERAL

This section gives guidelines for track removal. Some components require more detailed disassembly procedures. In these particular cases, refer to the pertaining section in this manual.

INSPECTION

Visually inspect track for:

– cuts and abnormal wear
– broken rods
– broken or missing track cleats

If track is damaged or rods are broken, replace track. For damaged or missing cleats, replace by new ones, using cleat remover (P/N 529 028 700). Use small-cleat installer (P/N 529 008 500).

◆ WARNING

Do not operate a snowmobile with a cut, torn or damaged track.

REMOVAL

Remove the following parts:

– speedometer cable
– muffler
– chaincase cover
– suspension
– drive axle seal
– end bearing housing
– sprockets and chain
– drive axle (toward end bearing housing)
– track

INSTALLATION

Reverse the removal procedure.

NOTE: When installing the track, respect rotation direction indicated by an arrow on track thread.

Check sprocket/track alignment as described in DRIVE AXLE 07-03.

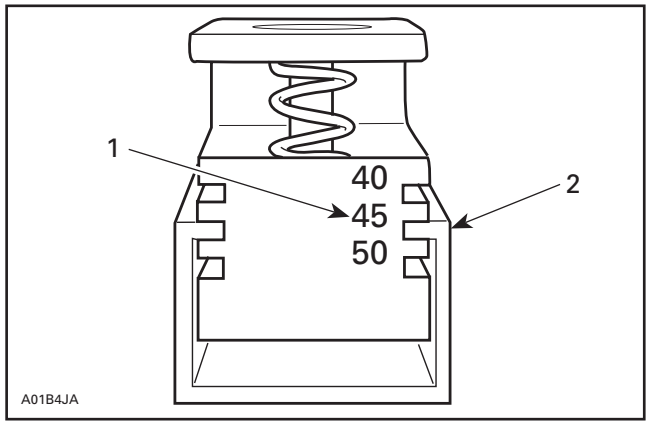
Track Tension and Alignment

Track tension and alignment are inter-related. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

Tension

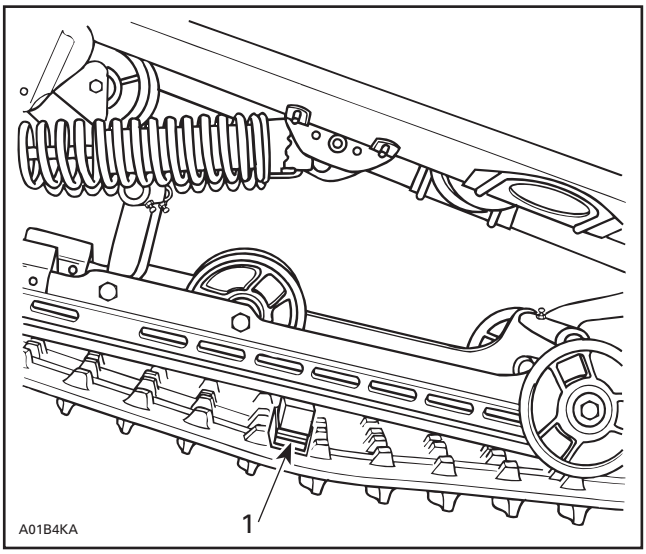
Lift the rear of vehicle and support with a mechanical stand. Allow the slide to extend normally. Check the gap half-way between front and rear idler wheels. Measure between slider shoe and bottom inside of track.

When using the track tension gauge (P/N 529 021 500), slide U shape extrusion to proper deflection.



1. Example: 45 mm
2. Extrusion

Insert pre-setted gauge between slider shoe and track. Allow gauge to settle by forcing track up and down. Track tension is as specified when edge of gauge reaches line.



TYPICAL
1. Line

NOTE: Lightly oil track tension gauge center pin to avoid sticking.

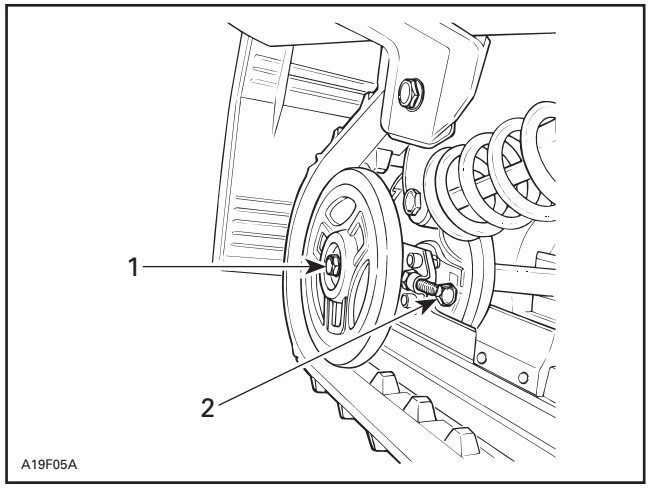
All Models

Refer to TECHNICAL DATA 10 for proper tension values.

▼ CAUTION

Too much tension will result in power loss and excessive stress on suspension components. If too loose, the track will have a tendency to thump.

To adjust, loosen the rear idler wheel retaining screws then loosen or tighten the adjuster bolts located on the inner side of the rear idler wheels.



TYPICAL
1. Retaining screw
2. Adjuster bolt

Alignment

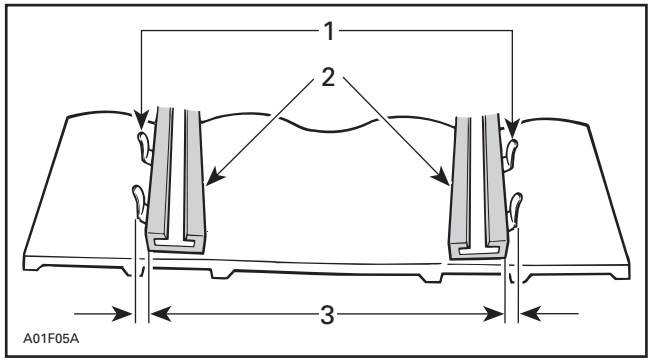
◆ WARNING

Before checking track tension, ensure that the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

All Models

With rear of vehicle supported off the ground, start engine and allow the track to rotate **slowly**.

Check that the track is well centered; equal distance on both sides between edges of track guides and slider shoes.

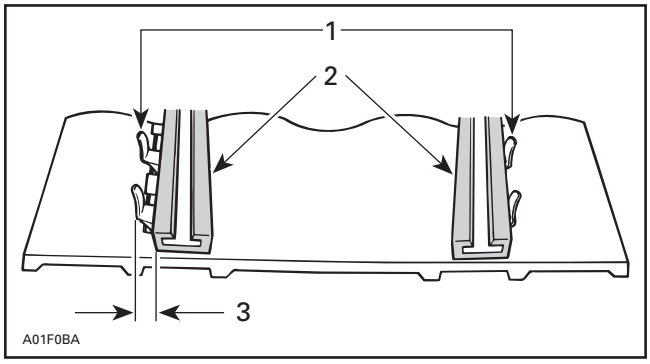


1. Guides
2. Slider shoes
3. Equal distance

◆ WARNING

Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track.

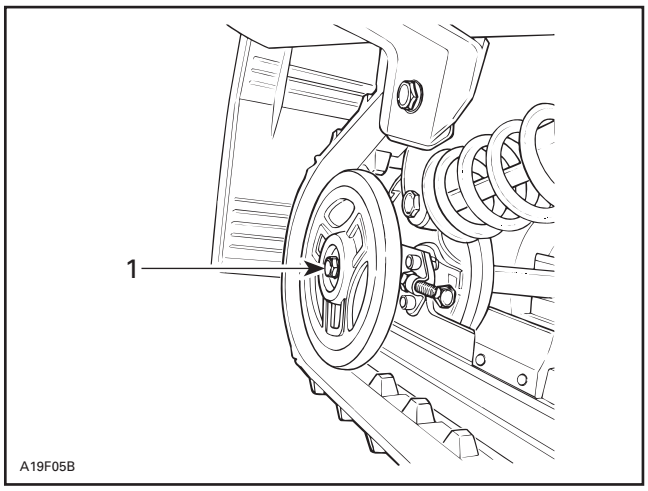
To correct, stop engine then tighten the adjuster bolt on side where guides are farthest to slide. Recheck alignment.



1. Guides
2. Slider shoes
3. Tighten on this side

NOTE: Torque retaining screw to 48 N•m (35 lbf•ft) after adjustment.

Tighten the idler wheel retaining screws.



TYPICAL

1. Retighten

Restart engine, rotate track **slowly** and recheck alignment.

Track Cleat

Removal

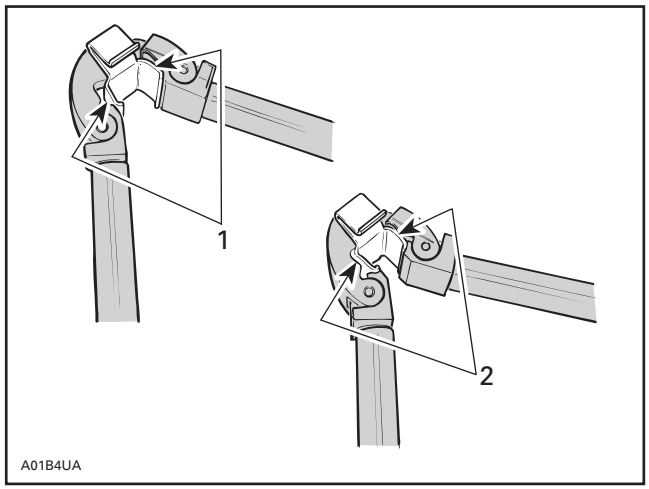
– Raise rear of vehicle off the ground and lift snowguard then rotate track to expose a cleat to be replaced.

– Using track cleat remover (P/N 529 008 700) for all models.

Installation

NOTE: Keep the same pitch between guide cleats.

– Place new cleat in position and using small track cleat installer (P/N 529 008 500) bend cleat then push tabs into rubber.



TYPICAL

1. First step
2. Second step (to push tabs into rubber)

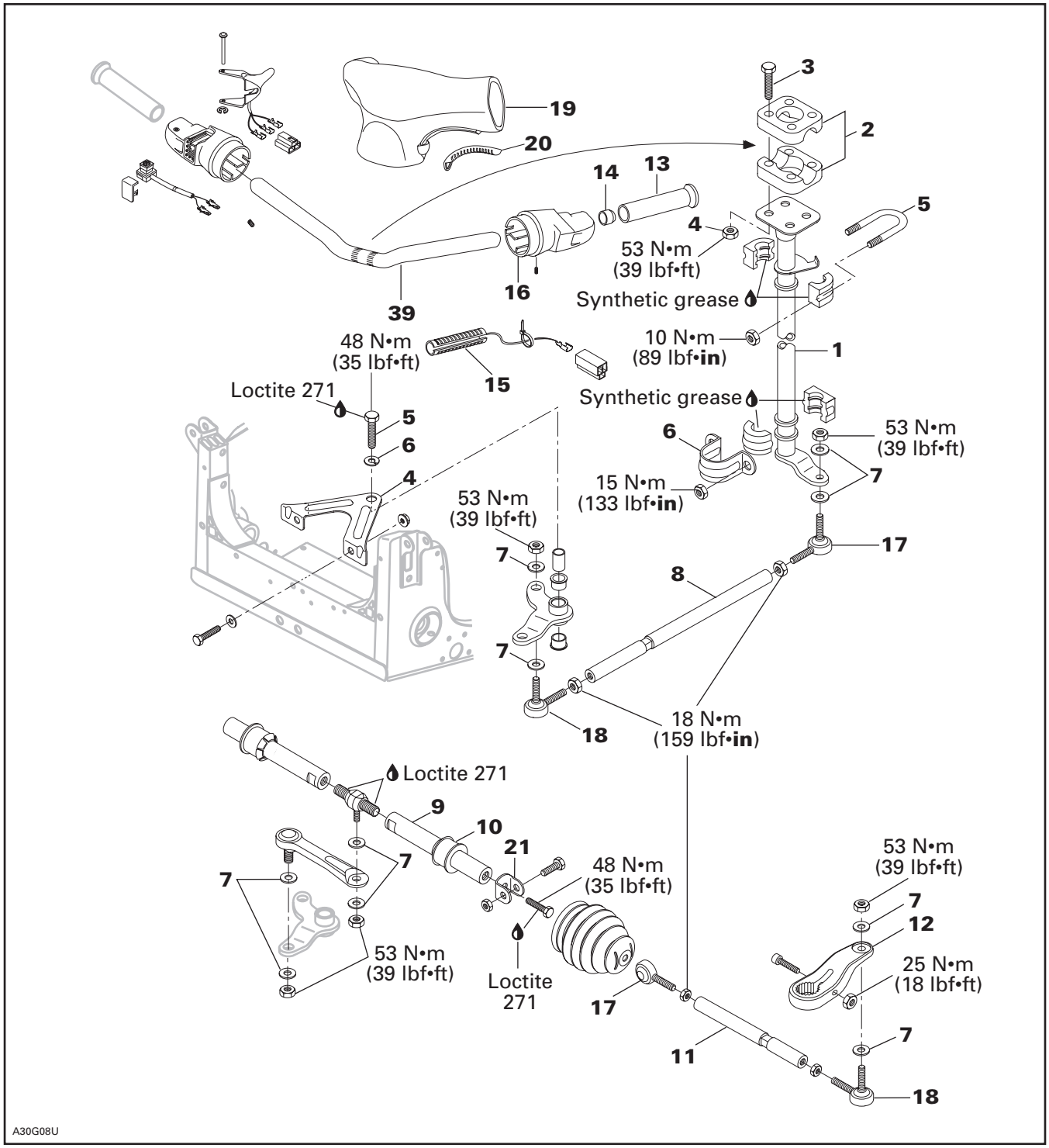
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STEERING SYSTEM

CK3 Series



DISASSEMBLY AND ASSEMBLY

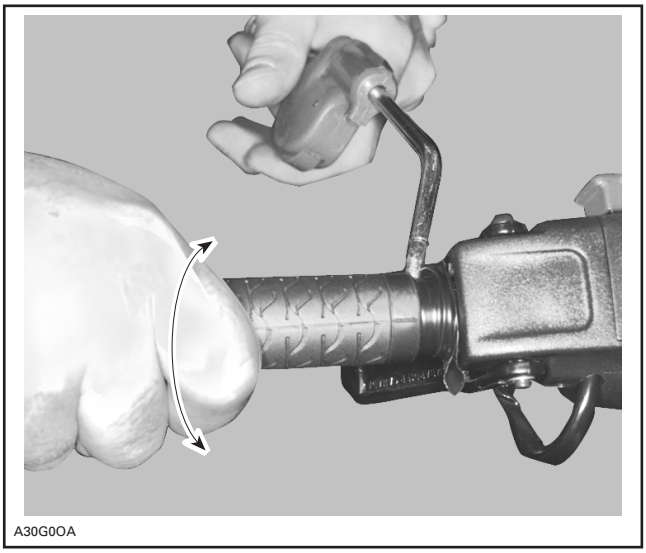
13, Grip

Grips must be carefully removed to prevent damaging the heating elements.

Heat grip with a heat gun.

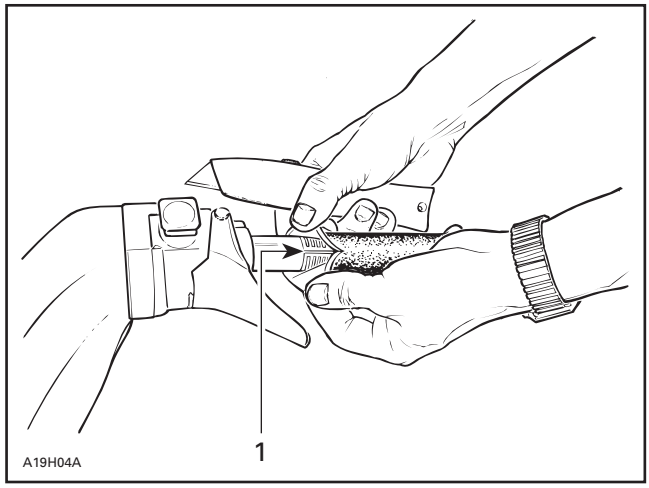
Apply tape to handlebar near the grip to protect paint.

Inject compressed air into the handlebar and twist grip as pulling it out.



The grips might be unremovable as explained above, in this case, carefully proceed as follows to prevent damaging the heating elements.

Locate the element wires inside the handlebar; look through end of grip. Start cutting the grip exactly opposite the element wires and immediately peel it open to locate the gap in the heating element, as shown.



TYPICAL

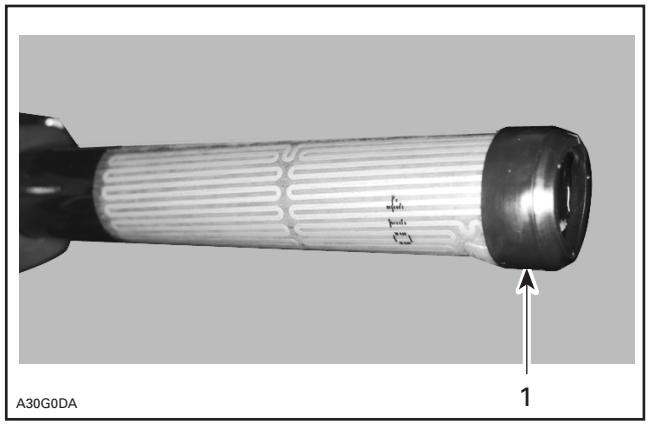
1. Gap in the heating element opposite the wires

Continue cutting along the gap and remove the grip.

If required, slowly peel heating element **no. 15** from handlebar and remove it.

To install, stick the heating element to the handlebar making sure the wires do not interfere with operation of the accelerator or brake handle

Prior to install grips, position heating element protector **no. 14**.



1. Heating element protector

◆ WARNING

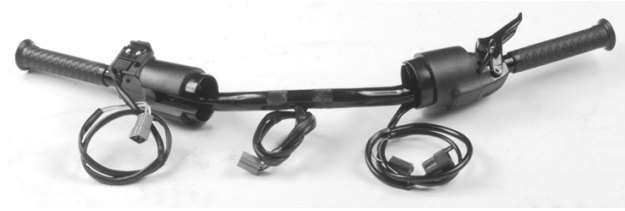
Never use lubricants (e.g. soap, only grease, etc.) to install the handlebar grip, use a mix of soap and water. Mix 40 parts of water with one part of dish washing soap (recommended: Ultra Joy, Sunlight or Palmolive).

Heat the grip with a heater gun or a spot light to ease installation. Insert new grip with compressed air.


A30G0NA

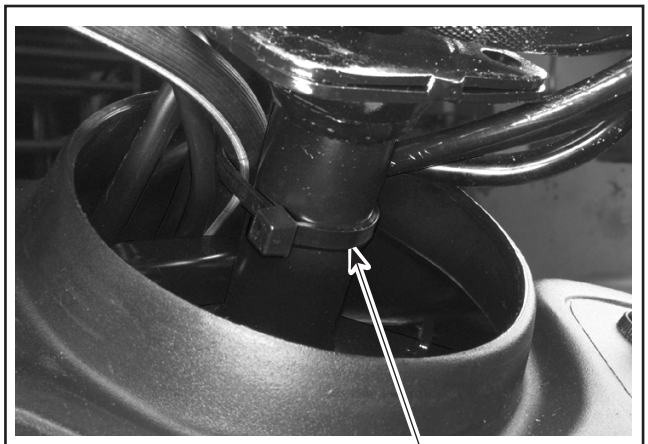
1, Steering Column

Remove steering pad, remove master cylinder from handlebar and put it aside. Remove circlip retaining throttle cable to throttle housing. Unplug all connector housings of handlebar switches. Remove handlebar ass'y.


A30G0JA

HANDLEBAR ASS'Y

Cut locking tie retaining brake line and throttle cable to steering column.

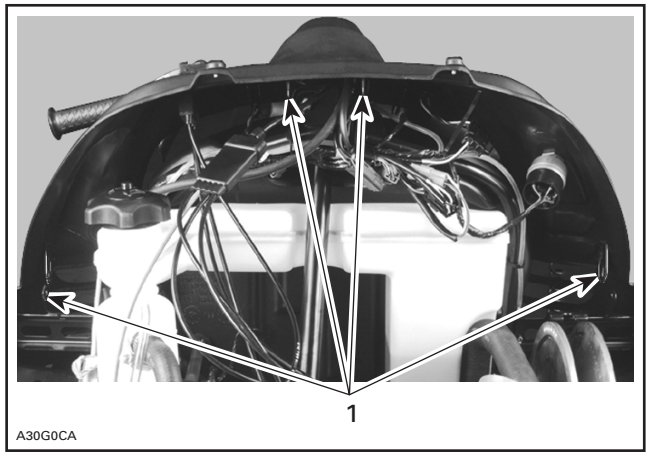


A30G0EA

1. Cut this locking tie

Remove the air intake silencer then center and magneto side carburetors.

Unbolt console at center and sides.

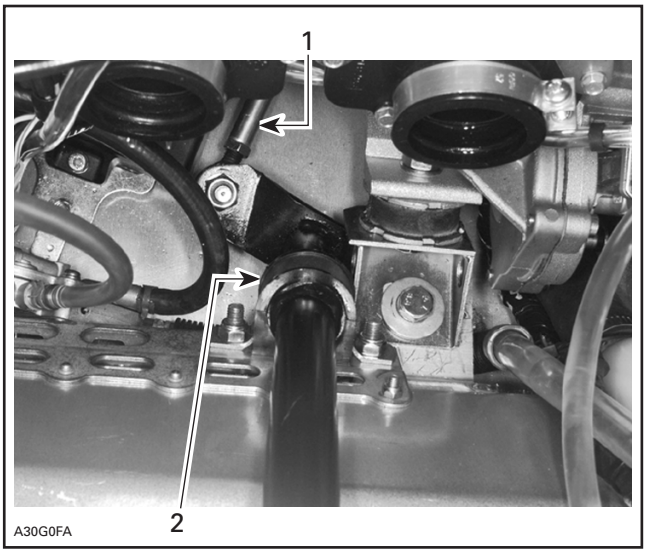


A30G0CA

1. Unbolt console

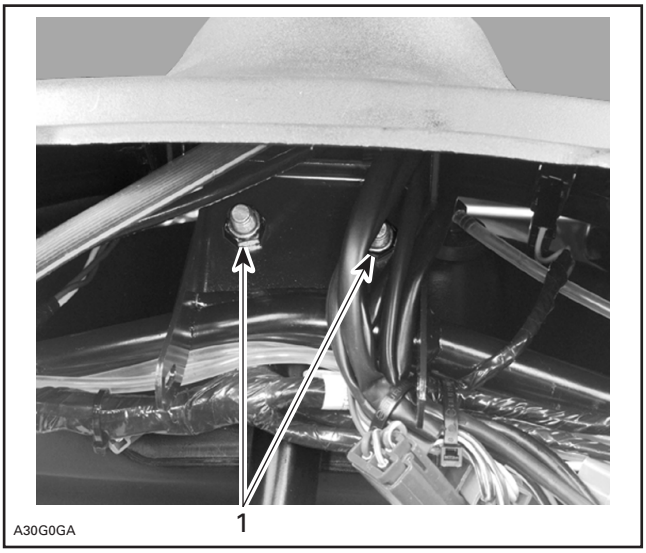
Detach the short tie rod (under the engine) from the steering column. Note that a hardened flat washer no. 7 goes on each side of steering column lever.

Remove U-clamp **no. 6**.



1. Short tie rod
2. U-clamp

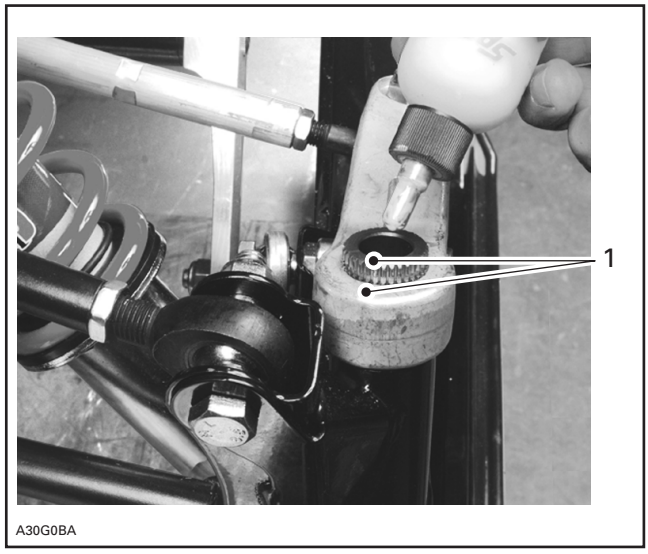
Remove U-bolt **no. 5** from steering support then, pull steering column from top.



1. U-bolt nuts

17, Steering Arm

To maintain correct steering geometry for reassembling, scribe mark the steering arm and ski leg before disassembly.



1. Marks

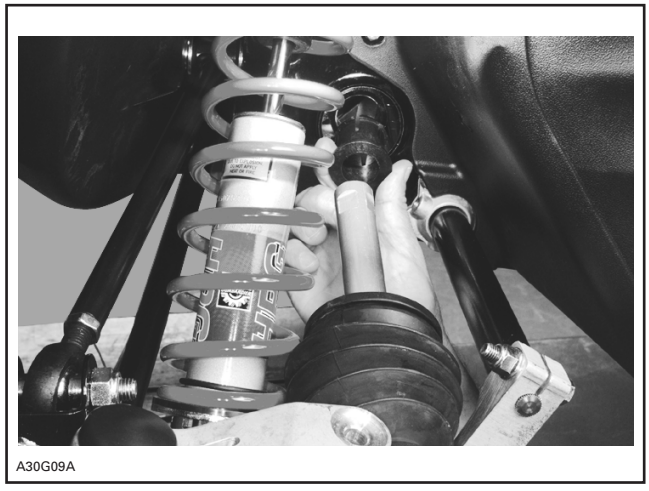
10, Bushing

Unscrew sliding rod **no. 9**.

Detach rubber boot from frame. Pull out sliding rod.

Working from engine compartment, drive out bushing **no. 10**.

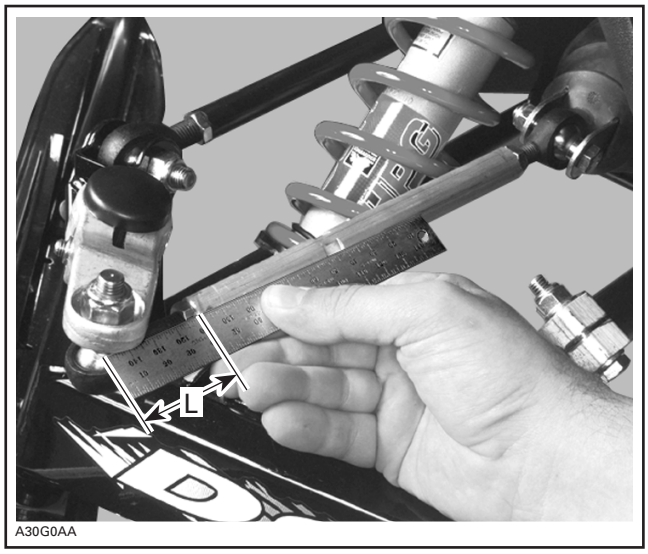
Install a new bushing proceeding from front suspension pit.



BUSHING INSTALLATION

17,18, Ball Joint (left hand and right hand threads)

The maximum external threaded length not engaged in the tie rod must not exceed the value L in the following thread length chart:



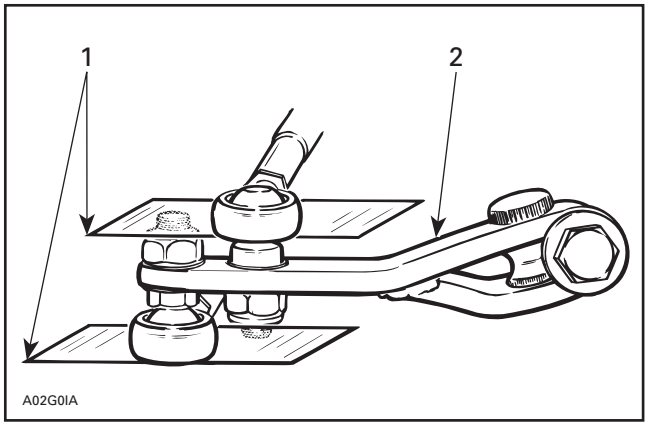
TYPICAL

L: Threaded length not engaged

BALL JOINT	L	
	mm	(in)
Outer ball joint of tie rods	46	(1-13/16)
Both ball joints of short tie rod (linking steering column to pivot arm) and inner ball joint of tie rods	34	(1-11/32)

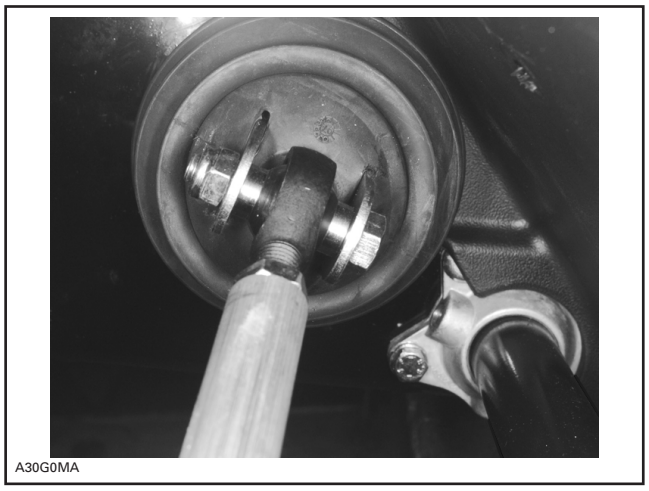
The ball joint should be restrained when tightening the tie rod end lock nut. Align it so the tie rod end is parallel to the steering arm when assembled on the vehicle, refer to the following illustration.

For proper torque specifications refer to the specific exploded view for the vehicle being serviced.



TYPICAL

1. Parallel with steering arm
2. Steering arm



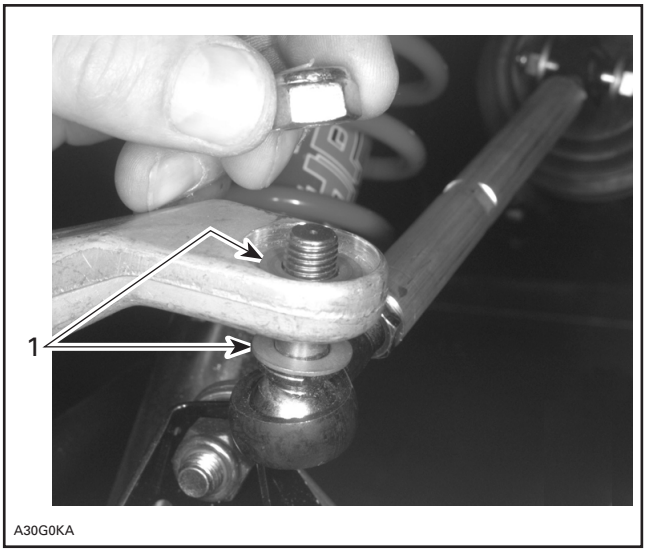
TIE ROD BALL JOINT PARALLEL TO BRACKET BEFORE TIGHTENING

◆ WARNING

The cut off section of the ball joint must run parallel with the steering arm. When tightening lock nuts, restrain ball joint with appropriate size wrench. Ensure not too many threads are kept outside of the tie rod according to the thread length chart.

7, Hardened Washer

Install a hardened washer on each side of the arm.

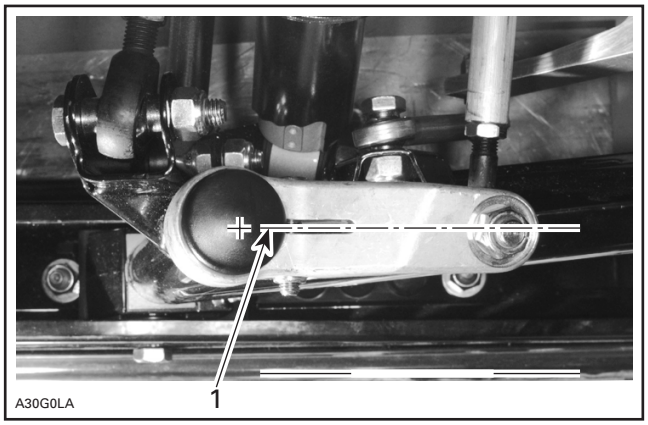


1. Hardened washers

12, Steering Arm

The steering arm angles should be equal on both sides when skis are parallel with vehicle.

Steering arm axis must run parallel to ski.



1. Parallel

Tighten the steering arm pinch bolt and nut to the torque specified in the exploded view.

INSPECTION

Check skis and runner shoes for wear, replace as necessary. Refer to FRONT SUSPENSION 08-03.

12, Steering Arm

Make sure steering arm and ski leg splines interlock.

◆ WARNING

Any parts having worn splines have to be replaces with new ones.

Check the general condition of the steering system components for wear. Replace if necessary.

15, Heating Grip Element

Refer to TESTING PROCEDURE 06-06.

17,18, Ball Joint (left hand and right hand threads)

Inspect ball joint ends for wear or looseness, if excessive, replace them.

ADJUSTABLE HANDLEBAR

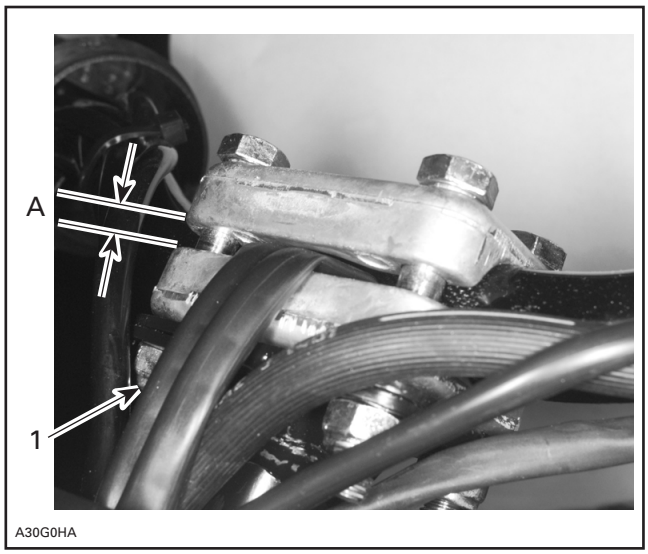
Loosen all 4 nuts **no. 4** retaining steering clamps **no. 2**.

Adjust the steering handlebar to the desired position.

Lock the handlebar in place by tightening the 4 nuts as specified in the illustrations.

▼ CAUTION

Tighten the nuts equally in a criss-cross sequence and ensure there is an equal gap on each side of the clamps.



TYPICAL

1. Torque to 23 N•m (17 lbf•ft)
A. Equal gap all around

◆ WARNING

Avoid contact between the brake handle and the windshield by NOT adjusting the handlebar too high.

◆ WARNING

Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.

19,20, Steering Pad and Rubber Attachment

▼ CAUTION

Prior to installation, perform handlebar adjustment.

Properly fit the steering pad to the handlebar. Assemble using the 2 rubber attachments.

◆ WARNING

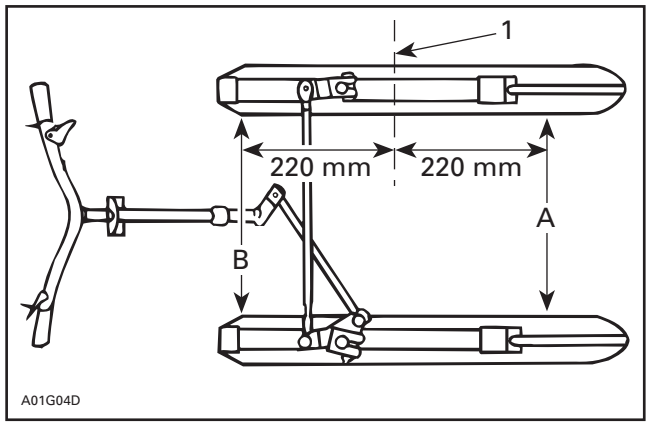
Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.

STEERING ADJUSTMENT (SKIS)

Definitions

TOE-OUT:

A difference measured between the front edge of the skis "A" and rear edge "B" as viewed from the top. It is adjustable. For all CK3 models, toe-out is measured at 220 mm (8-21/32 in) from ski pivot bolt axis.



TYPICAL

1. Ski pivot bolt axis

CAMBER:

A specific inward or outward tilt angle of ski leg compared to a vertical line when viewing the vehicle from front.

Adjustments

Adjustments should be performed following this sequence:

– Pivot arm centering.
– Set camber angle.
– Check for a horizontal handlebar.
– Set toe-out.

PIVOT ARM CENTERING

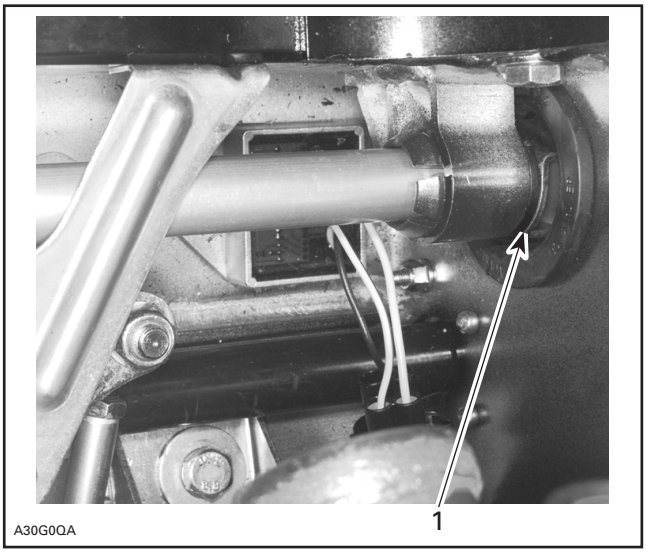
◆ WARNING

Do not attempt to adjust straight ahead ski position by turning the ball joint on tie rod **no. 8**.

8,17,18,21, Tie Rod, Ball Joint and Bracket

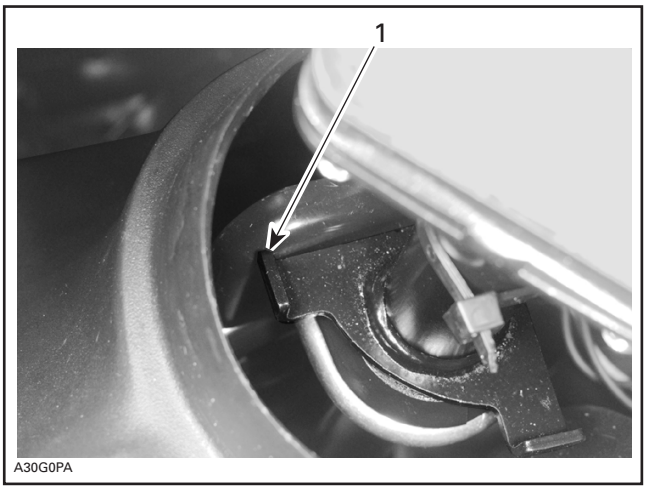
Remove steering pad.

Turn handlebar all the way to the right. Check that the right side bracket **no. 21** is against the bushing **no. 10**.



1. Bracket against the bushing

Keeping the handlebar in that position, check that the stopper on the steering column is almost touching the plate.

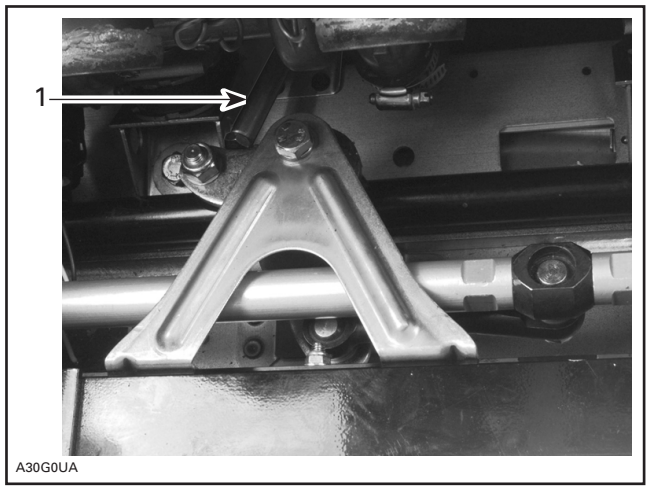


1. Stopper almost touching the plate

Loosen the jam nuts on tie rod **no. 8** (LH threads on steering column end) and turn tie rod accordingly. Align and retighten the jam nuts to 18 N•m (159 lbf•**in**).

◆ WARNING

Never lengthen this tie rod so that threaded portion of ball joint exceeds 34 mm (1-11/32 in).

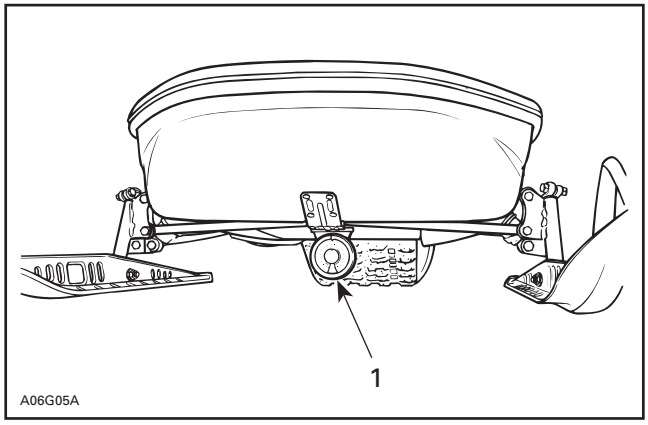


*1. Tie rod **no. 8***

CAMBER

NOTE: Identical adjustments are required on both sides of the vehicle.

– Make sure the vehicle is leveled by placing an angle finder under the main frame member as shown on the following illustration.
– Vehicle skis must be off the ground.

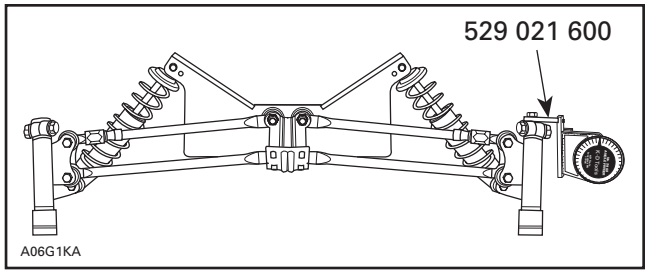


TYPICAL
1. Angle finder

Using special tool (P/N 529 021 600) mounted to the ski leg, position the angle finder on the tool as shown in the following illustration. An alternate location for the angle finder if the special tool is not available is the outside of the ski leg housing.

▼ CAUTION

Angle finder must sit square against swing arm. Positioning angle finder against weld bead or decal may result in false reading.



TYPICAL — CAMBER ADJUSTMENT SET-UP

Adjusting

– Loosen lock nut on both upper control arms.

– Unbolt both upper control arms at ski leg housing. Turn tie rod half turn at a time to obtain the specified value when skis are not touching ground. Bolt upper control arms.

MODEL	CAMBER ± 0.5°
GT 700/SE Mach Z LT/Z LT R	- 4.5
Formula III 600/700/800 Mach 1/1 R/Z/Z R	- 2.5

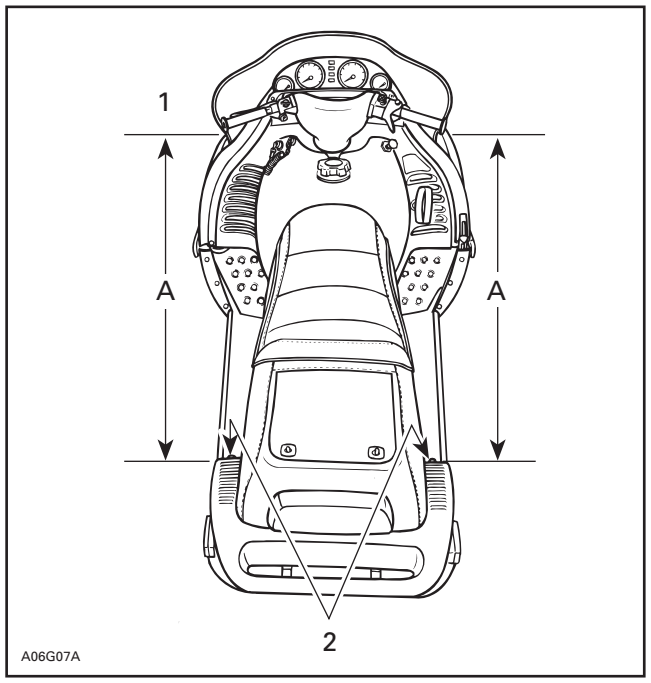
NOTE: Because of a negative camber, skis will lean toward center of vehicle.

Tighten lock nut on both upper control arms.

HANDLEBAR AND SKI TOE-OUT

Check that handlebar is horizontal when skis are in straight ahead position by measuring from the extremities of the grips to the rearmost edge of the tunnel, as shown.

NOTE: The reference point must be the same relative to each side.



TYPICAL

1. Equal distance A on each side
2. Same reference point

Adjustment is performed by adjusting length of left and right tie rods **no. 11**.

◆ WARNING

Do not attempt to adjust skis straight ahead position by turning ball joint on tie rod no. 8.

Procedure:

– Loosen jam nuts of both tie rods **no. 11**.

– Turn the tie rod on one side to shorten its length.

– Lengthen the other one by turning it exactly the same amount, so that toe-out is not changed.

◆ WARNING

Never lengthen tie rod so that threaded portion of inner ball joint exceeds 34 mm (1-11/32 in) and 46 mm (1-13/16 in) for outer ball joint.

– Close front of skis manually to take all slack from steering mechanism.

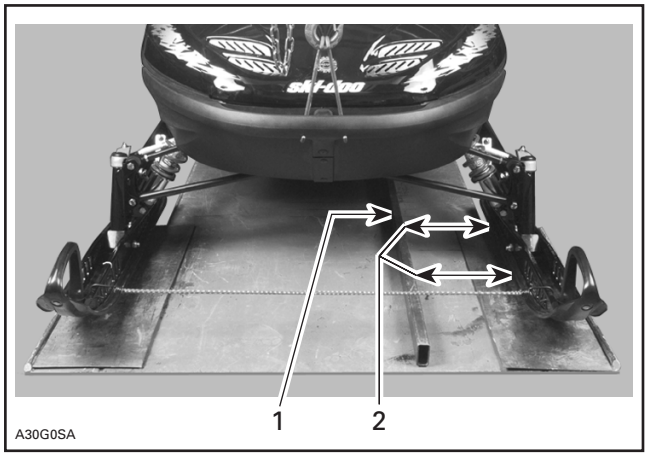
NOTE: A rubber cord must be hooked in front of skis to keep them closed.

Toe-out must be as specified when skis are in a straight-ahead position and the front of vehicle is lifted off the ground.

MODEL	TOTAL TOE-OUT + 3 mm (+ 1/8 in) - 0 mm (- 0 in)
GT 700/SE Mach Z LT/Z LT R	12 (1/2)
Formula III 600/700/800 Mach 1/1 R/Z/Z R	16 (5/8)

NOTE: To make sure skis are in a straight-ahead position, place a straight edge against pre-adjusted track and measure the distance between front and rear of skis and straight edge.

To reduce tolerance when measuring, set one ski to proper toe-out (half the total toe-out) then measure from that ski to the opposite ski.



1. Straight edge
2. Measure at 220 mm (8-21/32 in) from ski pivot axis

LUBRICATION

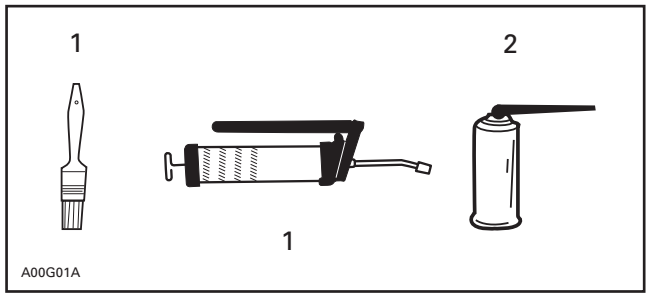
◆ WARNING

Do not lubricate throttle cable or housing.

26, Grease Fittings

Only use synthetic grease (P/N 413 711 500).

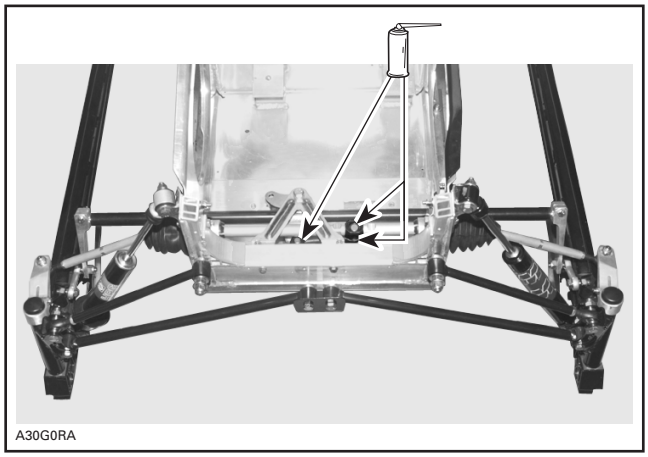
The following symbols will be used to show what type of lubricant should be used at the suitable locations.

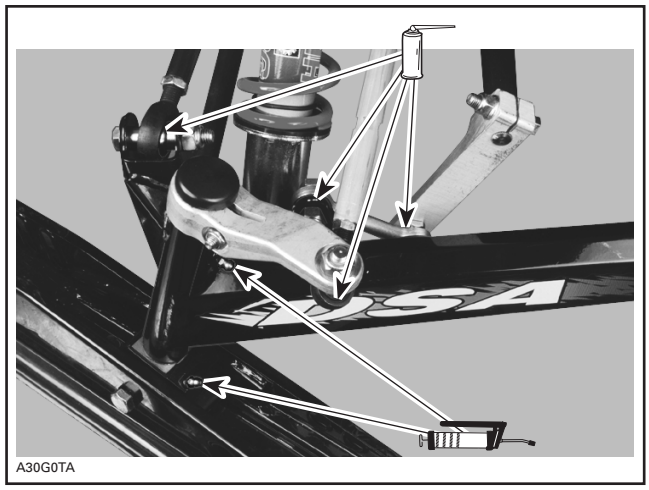


1. Synthetic grease (P/N 413 711 500)
2. BOMBARDIER LUBE (P/N 293 600 016)

Lubricate:

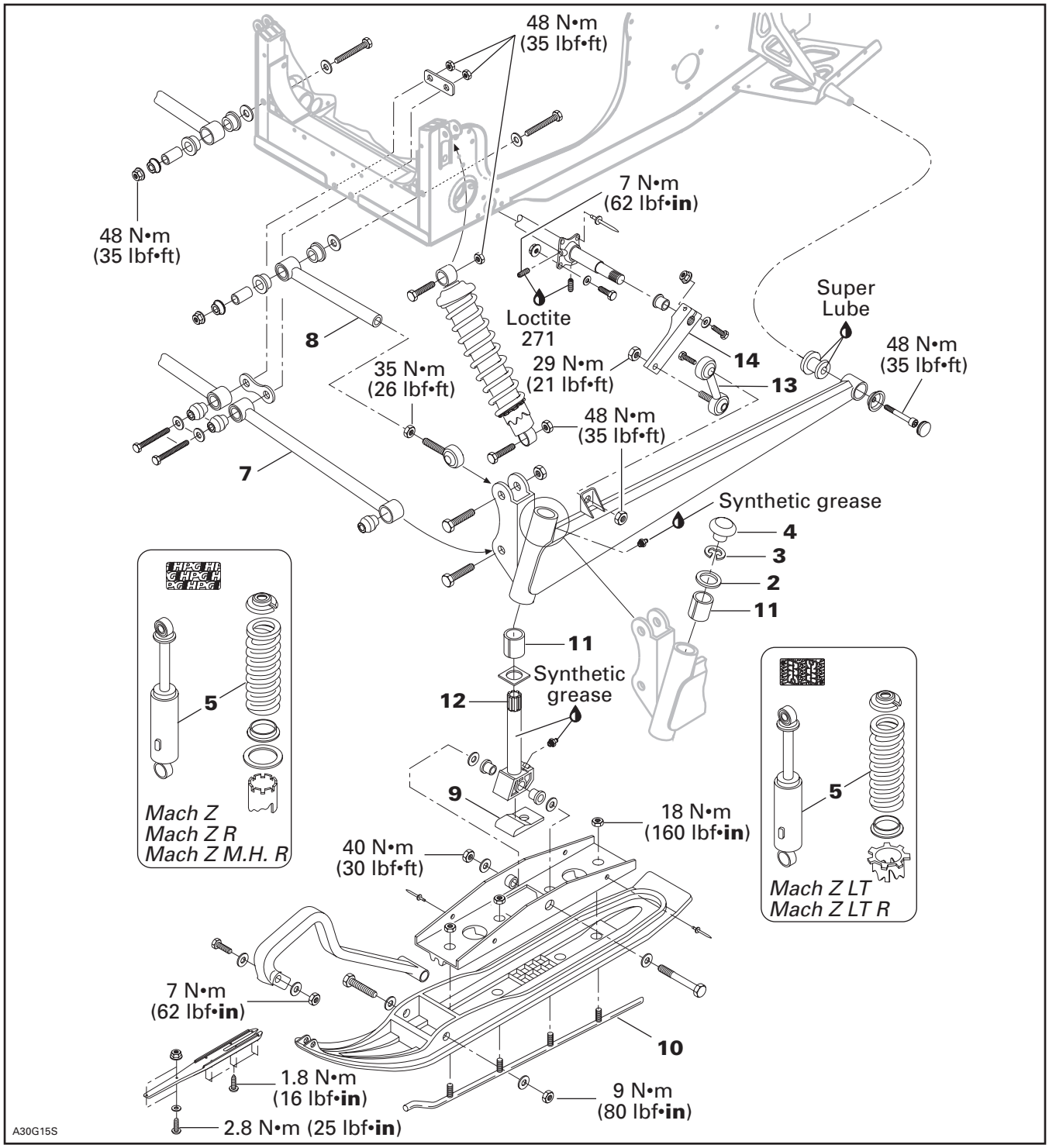
- Steering column bushings.
- Short tie rod ends.
- Ball stud lever.
- Upper arm ball joint.
- Grease ski legs and ski pivots.
- Stabilizer ball joints.





SUSPENSION AND SKI SYSTEM

CK3 Series

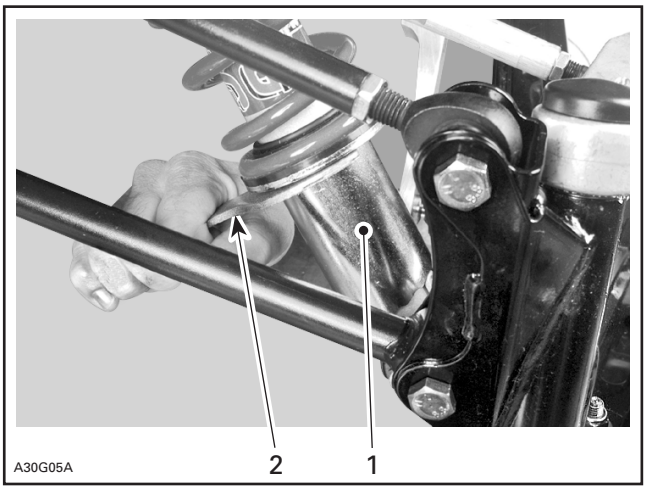


DISASSEMBLY

5, Shock

Lift front of vehicle and support it off the ground.

Reduce spring preload by turning adjusting ring accordingly with the adjustment wrench in vehicle tool box.



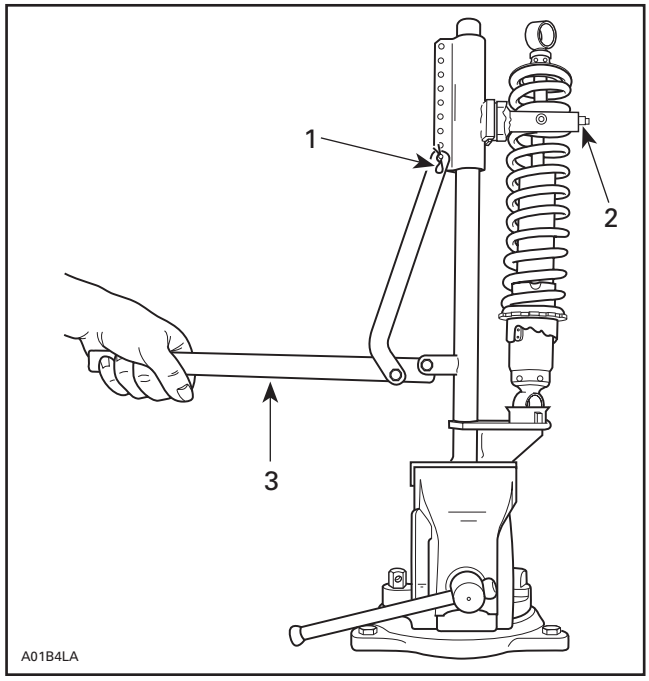
TYPICAL

1. *Shock cam*
2. *Adjustment wrench*

Remove lower bolt then upper bolt of shock.

For shock spring disassembly use shock spring remover (P/N 529 027 100) in a vise. Mount shock in it and turn shock so that spring coils matched spring compressor.

Close and lock the bar. Adjust the handle horizontal position by changing the position of the clevis pin.



1. *Clevis pin*
2. *Bar*
3. *Handle horizontal*

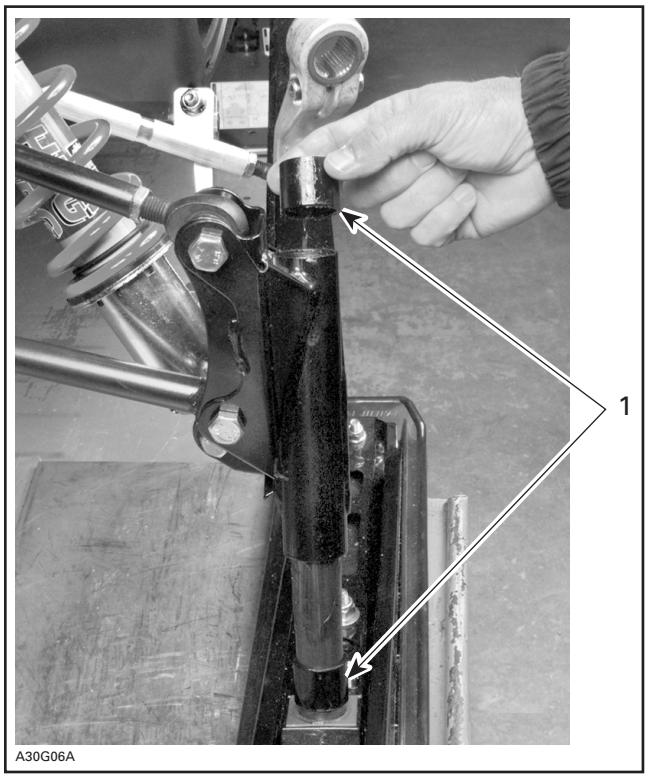
Push down on the handle until it locks. Remove spring stopper then release handle.

1, Swing Arm

Lift front of vehicle and support it off the ground.

Remove cap **no. 4**, circlip **no. 3** then loosen steering arm bolt and pull up steering arm. Note shim **no. 2** positions. Ski leg may fall off from swing arm.

Remove bushings **no. 11**.



*1. Bushings **no. 11***

Unbolt lower end of shock from swing arm.

Unbolt radius rod.

14, Lever

Unbolt tie rod **no. 13** ball joint from swing arm.

Unbolt rear of swing arm from frame.

Pull swing arm off the vehicle.

INSPECTION

Check all rubber cushions for crack and wear. Replace as required.

Check straightness of ski leg **no. 12** and make sure that splines are properly interlocking with steering arm. Replace as required.

Check for straightness of swing arm. Replace as required.

Check for clogged grease fittings. Clean or replace as required.

Check skis and runners **no. 10** for wear, replace as necessary.

Check condition of ski stopper **no. 9**. Replace it when deteriorated.

To check condition of shock, refer to SC-10 SUSPENSION 07-02 then look for **Shock Absorber Inspection**.

INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Apply synthetic grease (P/N 413 711 500) to ski leg components.

Tighten nuts and screws to proper torque as mentioned in exploded view.

7,8, Upper and Lower Half Arms

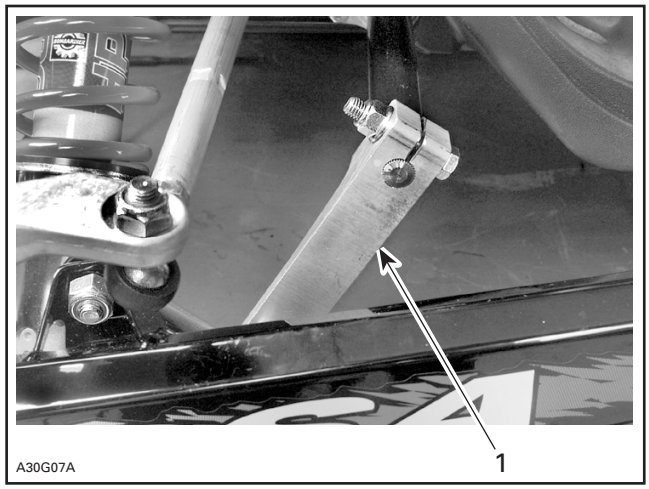
Position half arms and tie rods horizontally before tightening nuts.

8, Adjustable Half Arm

Refer to STEERING SYSTEM 08-02 for proper camber adjustment using these half arms.

13,14, Tie Rod and Lever

Install levers pointing downward on both sides at same angle, see following photo.



1. Lever pointing downward

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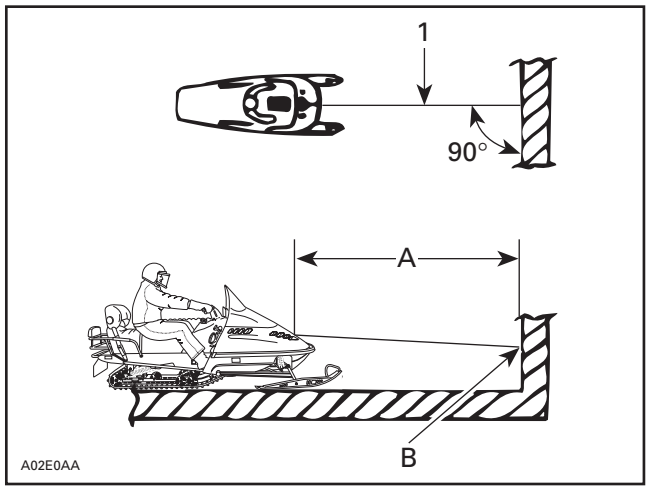
BODY

INSTALLATION AND ADJUSTMENT

HEADLAMP BEAM AIMING

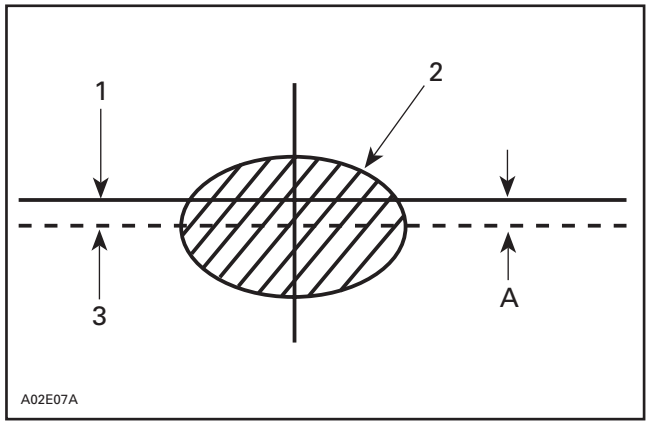
Beam aiming is correct when center of high beam is 25 mm (1 in) below the headlamp horizontal center line, scribed on a test surface, 381 cm (12 ft 6 in) away.

Measure headlamp center distance from ground. Scribe a line at this height on test surface (wall or screen). Light beam center should be 25 mm (1 in) below scribed line.



TYPICAL

1. Headlamp center line
A. 381 cm (12 ft 6 in)
B. 25 mm (1 in) below center line



1. Headlamp horizontal
2. Light beam (high beam) (projected on the wall)
3. Light beam center
A. 25 mm (1 in)

Required Conditions

Place the vehicle on a flat surface perpendicular to test surface (wall or screen) and 381 cm (12 ft 6 in) away from it.

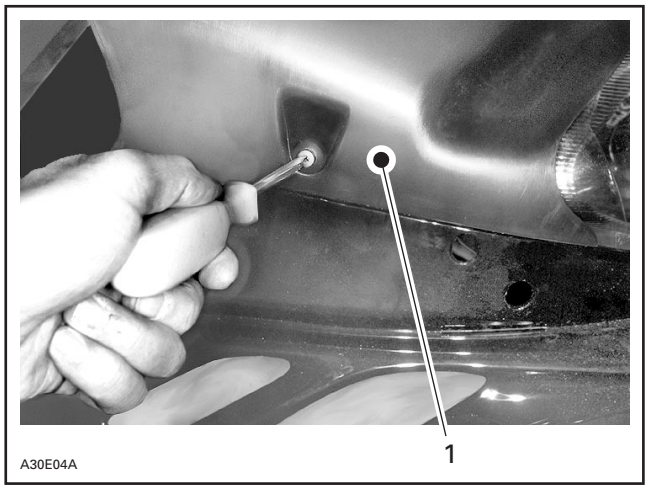
Rider or equivalent weight must be on the vehicle.

Select **high** beam.

BULB REPLACEMENT

Headlamp

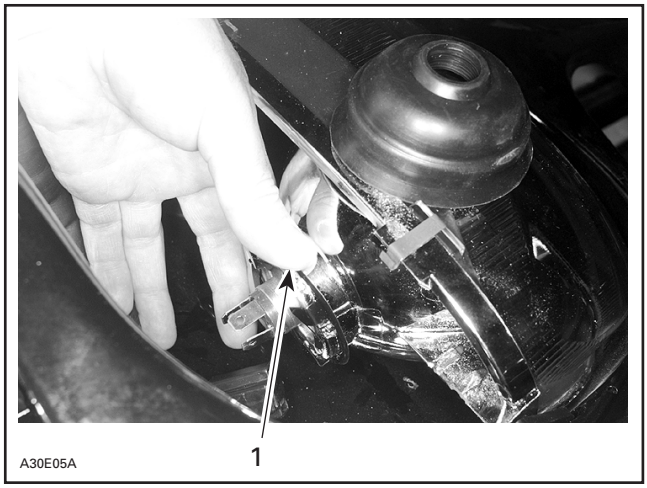
If any headlight bulb is burnt, remove windshield, air filter then, air deflector.



1. Air deflector

Unplug burnt bulb connector. Remove the rubber boot.

Unfasten bulb retainer ring. Detach the bulb and replace. Properly reinstall parts including air filter.



1. Locking ring

▼ CAUTION

Never touch glass portion of an halogen bulb with bare fingers, as it shortens its operating life. If by mistake glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

Taillight

If the taillight bulb is burnt, expose the bulb by removing red plastic lens. To remove, unscrew the 2 retaining screws. Verify all lights after replacement.

DECAL

To remove a decal; heat old decal with a heat gun and peel off slowly.

Using isopropyl alcohol, clean the surface and dry thoroughly.

Apply liquid soap to new decal and carefully position the decal. Using a sponge or a squeegee, remove the air bubbles and surplus water working from the center toward the edges. Allow to air dry.

▼ CAUTION

Do not apply isopropyl alcohol or solvent directly on decals. Use only in a well ventilated area.

WINDSHIELD INSTALLATION

Remove protective film.

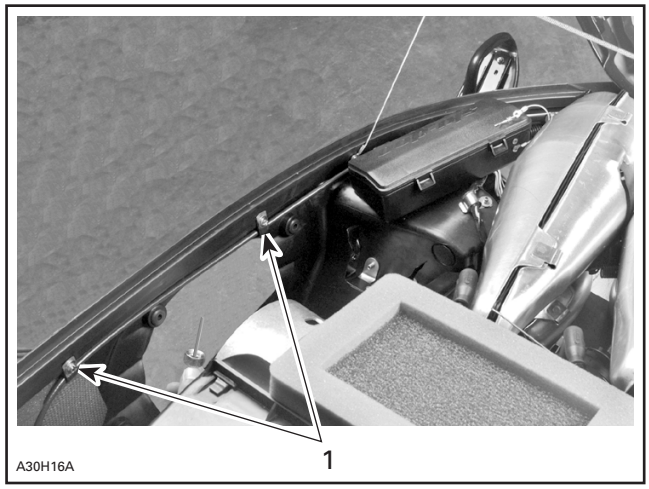
Position the windshield on the hood then push it down until the tabs are fully inserted into the hood slots. Lock the windshield tabs in position.

HOOD

All Models Except Grand Touring 700/SE

Unfasten speedometer cable from angle drive.

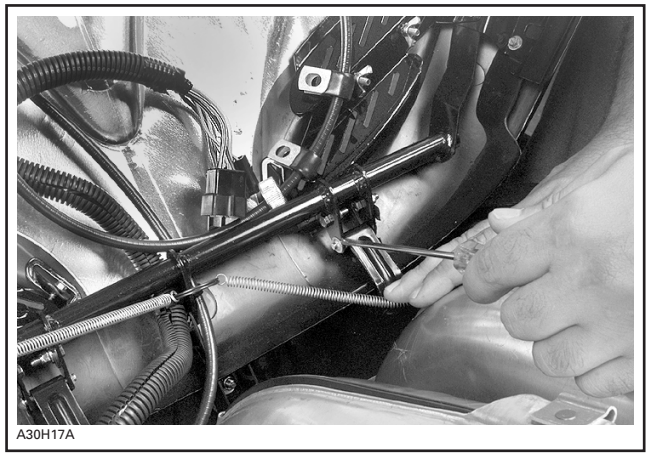
Remove clips holding speedometer cable to bottom pan.



1. Clips

All Models

Remove hinge pin push nuts.



Unplug wiring harnesses then retaining cables.

Remove hinge pins, cables, spring and hood.

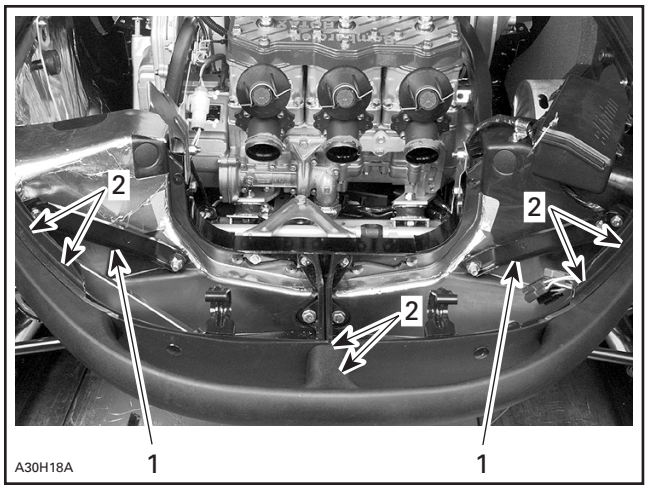
HALF BOTTOM PAN

Remove hood.

Remove tuned pipes and tail pipes. Remove muffler when RH side half bottom pan has to be removed.

Unbolt suspension tower bracket on appropriate side.

Remove 4 screws, 1 nut and 1 rivet retaining front bumper.

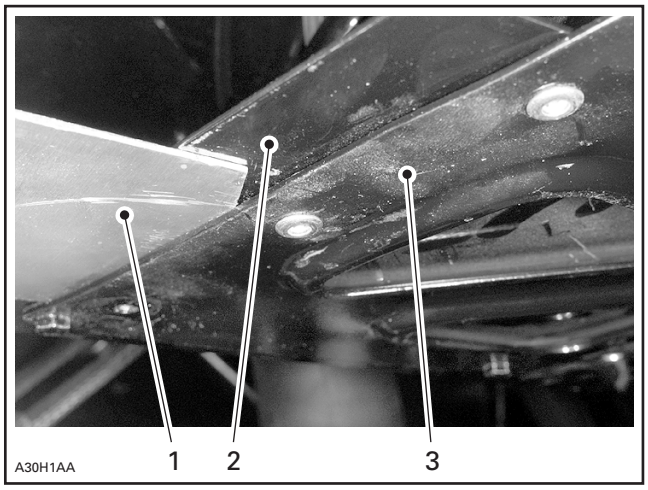


1. *Suspension tower bracket*
2. *Bottom pan screws, nut and rivet*

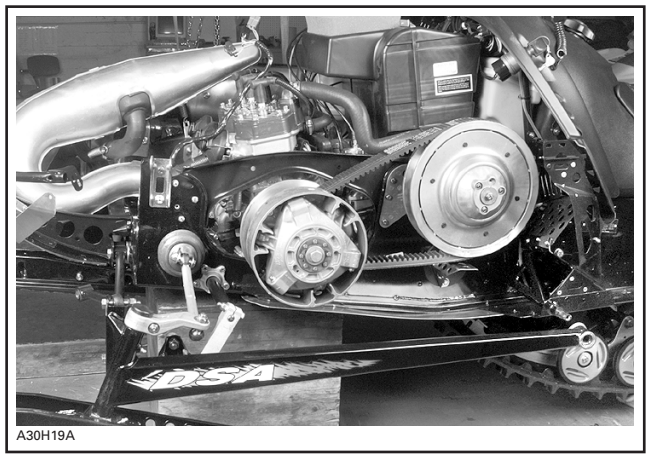
Unfasten swing arm at rear pivot.

Drill all rivets retaining half bottom pan to be removed.

At installation, insert bottom pan protector between tunnel and footrest.

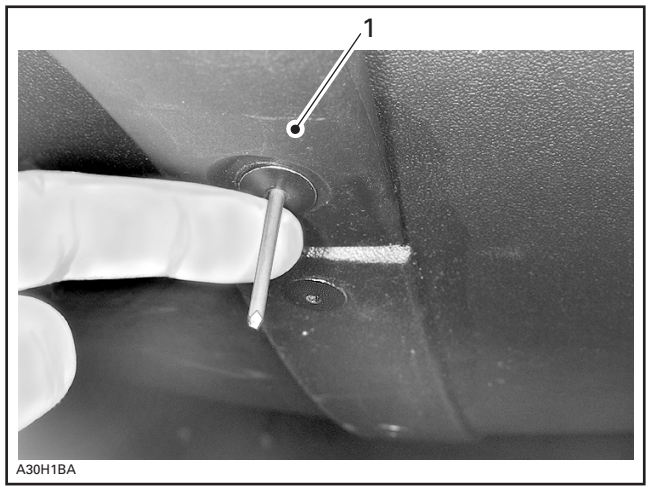


1. *Bottom pan protector*
2. *Footrest*
3. *Tunnel*



VEHICLE READY TO RECEIVE LH SIDE HALF BOTTOM PAN

When riveting bottom pan, do not install front rivet. That rivet is installed with the bumper.



FRONT — SEEN FROM UNDERNEATH

1. *Bumper*

GUARD

Disassembly and Assembly

NOTE: For additional information (ex.: exploded view) refer to the correspondent parts catalog.

◆ WARNING

Engine should be running only with belt guard and/or pulley guard well secured in place.

Inspection

Check guard and/or pulley guard mounting bosses, clips and retainers for wear.

WIRING HARNESS

◆ WARNING

Ensure all terminals are properly crimped on the wires and that all connector housings are properly fastened. Keep wires away from any rotating, moving, heating and vibrating parts. Use proper fastening devices as required.

CABLES

◆ WARNING

Before installation, ensure that all cables are in perfect condition. Properly install the cable ends and secure them in place. Pay attention to route them properly, away from any rotating, moving, heating, or vibrating parts.

PIPING

◆ WARNING

Always ensure that the fuel, vent, primer, impulse, injection oil and rotary valve oil lines are properly fixed to their connectors, that they are not perforated or kinked and that they are properly routed away from any rotating, moving, heating or vibrating parts. Also check for leaks. Replace if required.

NOTE: Refer to proper *Parts Catalog* to find suitable clip part numbers.

PLASTIC MAINTENANCE

MAINTENANCE

Clean the vehicle thoroughly, removing all dirt and grease accumulation.

To clean use a soft clean cloth and either soapy water or isopropyl alcohol.

To remove grease, oil or glue use isopropyl alcohol.

▼ CAUTION

Do not apply isopropyl alcohol or acetone directly on decals.

▼ CAUTION

The following products must not be used to clean or wax any of the plastic components used on the vehicles:

- gasoline
- brake fluid
- kerosene
- diesel fuel
- lighter fluid
- varsol
- naphtha
- acetone
- strong detergents
- abrasive cleaners
- waxes containing an abrasive or a cleaning agent in their formula

Apply wax on glossy finish only. Protect the vehicle with a cover to prevent dust accumulation during storage.

▼ CAUTION

If for some reason the snowmobile has to be stored outside it is preferable to cover it with an opaque tarpaulin. This will prevent the sun rays from affecting the plastic components and the vehicle finish.

FRAME

FRAME CLEANING

NOTE: For aluminum frames use only aluminum cleaner and follow instructions on container. (Dursol cleaner or equivalent).

Clean frame and tunnel with appropriate cleaners and rinse with high pressure hose.

Touch up all metal spots where paint has been scratched off. Spray all bare metal parts of vehicle with metal protector.

Seat Cleaning

For all models, it is recommend to clean the seat with a solution of **warm soapy water**, using a soft clean cloth.

▼ CAUTION

Avoid use of harsh detergents such as strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc. that may cause damage to the seat cover.

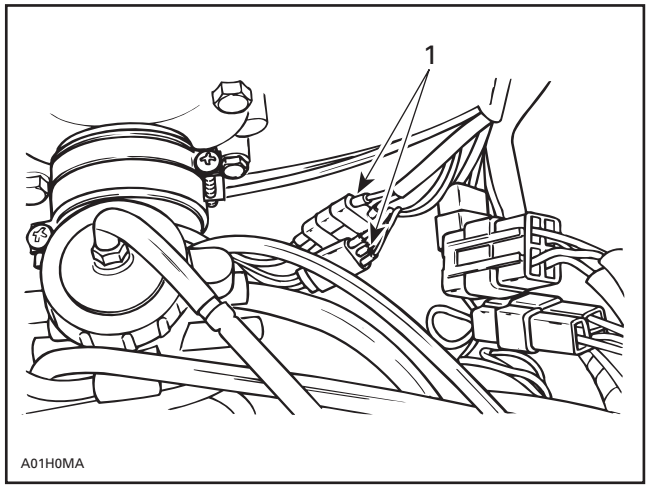
FRAME WELDING

Aluminum Frame
(refer to specialized welding shop)

– argon-oxygen/acetylene welding
– rod: ER-4043 (3/32 in)

▼ CAUTION

Before performing electrical welding anywhere on the vehicle, unplug MPEM. On models equipped with a battery, also unplug the negative cable. This will protect the electronic box and battery against damage caused by flowing current when welding.



TYPICAL
1. Unplug before electrical welding

▼ CAUTION

If welding is to be done near plastic material, it is recommended to either remove the part from the area or to protect it with aluminum foil to prevent damage.

FRAME COMPONENT REPLACEMENT

Drilling Procedure

When drilling self-piercing rivets, use Supertanium™ drill bit (P/N 529 031 800), available in a 5 mm (3/16 in) size and shipped in packs of 2.

For proper drilling instructions and to prevent premature wear, follow the procedure below.

Always use a variable speed electric drill.

Partially drill rivet end — not the rivet head.


A03H2FA

Ground rivet end to the part retained by the rivet.

Remove part riveted.

Ground rivet to the chassis.

Drive out remaining rivet head using a punch.

Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant chip is ejected.

NOTE: To increase bit life, use Bombardier synthetic chaincase oil (P/N 413 803 300) as a cutting oil.

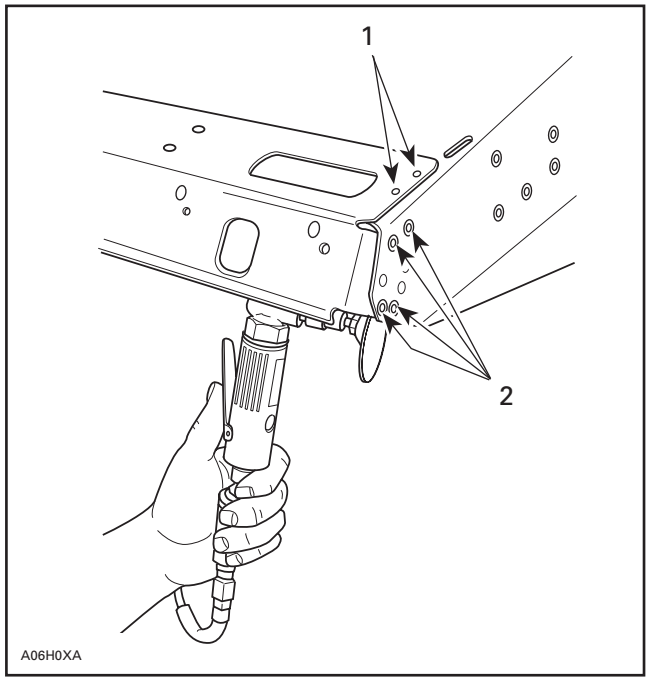
▼ CAUTION

High speed drilling will cause excessive heat which may destroy the cutting edge of the bit, therefore avoid using pneumatic drills.

Grinding Procedure

Rear Cap

Grind rivet heads from top of rear cap and underneath for side retaining rivets.



1. Rivets heads ground
2. Rivets to be ground from underneath

To remove rivet, strike with a punch from rivet head side.

Make a chamfer from underneath on all 4 corner holes.

TECHNICAL DATA

SI* METRIC INFORMATION GUIDE

BASE UNITS

DESCRIPTION	UNIT	SYMBOL
length	meter	m
mass	kilogram	kg
force	newton	N
liquid	liter	L
temperature	Celsius	°C
pressure	kilopascal	kPa
torque	newton•meter	N•m
speed	kilometer per hour	km/h

PREFIXES

PREFIX	SYMBOL	MEANING	VALUE
kilo	k	one thousand	1 000
centi	c	one hundredth	0.01
milli	m	one thousandth	0.001
micro	µ	one millionth	0.000001

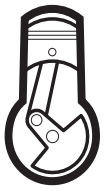
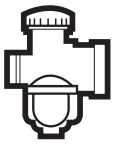
CONVERSION FACTORS

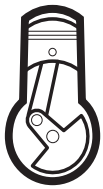
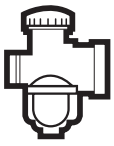
TO CONVERT	TO †	MULTIPLY BY
in	mm	25.4
in	cm	2.54
in^2	cm^2	6.45
in^3	cm^3	16.39
ft	m	0.3
oz	g	28.35
lb	kg	0.45
lbf	N	4.4
lbf•**in**	N•m	0.11
lbf•ft	N•m	1.36
lbf•ft	lbf•**in**	12
PSI (lbf/in^2)	kPa	6.89
imp. oz	U.S. oz	0.96
imp. oz	mL	28.41
imp. gal	U.S. gal	1.2
imp. gal	L	4.55
U.S. oz	mL	29.57
U.S. gal	L	3.79
MPH	km/h	1.61
Fahrenheit	Celsius	(°F - 32) ÷ 1.8
Celsius	Fahrenheit	(°C × 1.8) + 32

* The international system of units abbreviates SI in all languages.

† To obtain the inverse sequence, divide by the given factor. To convert **mm** to **in**, divide by 25.4.

NOTE: Conversion factors are rounded off to 2 decimals for easier use.

	VEHICLE MODEL			GRAND TOURING 700	GRAND TOURING SE	FORMULA III 600	FORMULA III 700
	ENGINE TYPE			**699**	**809**	**599**	**699**
	Number of Cylinders			3	3	3	3
	Bore		mm (in)	69.75 (2.746)	70.5 (2.776)	64.5 (2.5394)	69.75 (2.746)
	Stroke		mm (in)	61.0 (2.402)	68.0 (2.677)	61.0 (2.402)	61.0 (2.402)
	Displacement		cm^3 (in^3)	699.25 (42.67)	796.3 (48.59)	597.94 (36.49)	699.20 (42.67)
	Compression Ratio (corrected)			6.8	6.8	6.8	6.8
	Maximum Power Engine Speed ①		± 100 RPM	8000	8000	8400	8000
	Piston Ring Type		$1^{st}/2^{nd}$	ST/R	ST/R	ST/R	ST/R
	Ring End Gap	New Wear Limit	mm (in) mm (in)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)
	Ring/Piston Groove Clearance	New Wear Limit	mm (in) mm (in)	0.03 (.0012) 0.2 (.0079)	0.03 (.0012) 0.2 (.0079)	0.03 (.0012) 0.2 (.0079)	0.03 (.0012) 0.2 (.0079)
	Piston/Cylinder Wall Clearance	New Wear Limit	mm (in) mm (in)	0.10 (.0039) 0.15 (.0059)	0.095 (.0037) 0.15 (.0059)	0.07 (.0028) 0.15 (.0059)	0.10 (.0039) 0.15 (.0059)
	Connecting Rod Big End Axial Play	New Wear Limit	mm (in) mm (in)	0.31 (.0122) 1.2 (.0472)	0.39 (.0154) 1.2 (.0472)	0.39 (.0154) 1.2 (.0472)	0.39 (.0154) 1.2 (.0472)
	Maximum Crankshaft End-play ②		mm (in)	0.3 (.012)	0.3 (.012)	0.3 (.012)	0.3 (.012)
	Maximum Crankshaft Deflection at Center		mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)
	Rotary Valve Timing and P/N 420 924 XXX		Opening Closing	N.A.	N.A.	N.A.	N.A.
	Magneto Generator Output		W	360	360	290	290
	Ignition Type			CDI	CDI	CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES	NGK BR9ES
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ③		mm (in)	2.77 (.109)	2.59 (.102)	2.77 (.109)	2.77 (.109)
	Trigger Coil ④		Ω	190 – 300	190 – 300	190 – 300	190 – 300
	Generating Coil ④	Low Speed	Ω	N.A.	N.A.	25 – 56	25 – 56
		High Speed	Ω	N.A.	N.A.	3.5 – 8.1	3.5 – 8.1
	Lighting Coil ④		Ω	0.0 – 0.05	0.0 – 0.5	0.15 – 0.35	0.15 – 0.35
	High Tension Coil ④	Primary	Ω	0.2 – 0.5	0.2 – 0.5	0.2 – 0.5	0.2 – 0.5
		Secondary	kΩ	6 – 13	6 – 13	6 – 13	6 – 13
	Carburetor Type		PTO/CTR/MAG	3 x VM 38 422	TM 38 C232	3 x VM 36 190	3 x VM 38 420
	Main Jet		PTO/CTR/MAG	290	270/290/280	270	290
	Needle Jet			480-P-1	327 O-2	286 P-0	480 P-1
	Pilot Jet			50	50	50	50
	Needle Identification — clip position			6DEH5-3	8ADY1-41-3	6DEY2-2	6DEH5-3
	Slide Cut-Away			2.5	2.5	2.5	2.5
	Float Adjustment		± 1 mm (± .040 in)	18.1 (.71)	21.0 (.83)	18.1 (.71)	18.1 (.71)
	Air Screw Adjustment		± 1/16 Turn	2-1/2	4-1/2	2	2.5
	Idle Speed		± 200 RPM	1800	1800	1800	1800
	Gas Type/Pump Octane Number			Super Unleaded/91	Super Unleaded/91	Super Unleaded/91	Super Unleaded/91
	Gas/Oil Ratio			Injection	Injection	Injection	Injection
	Type			Liquid	Liquid	Liquid	Liquid
	Axial Fan Belt Adjustment	Deflection	mm (in)	N.A.	N.A.	N.A.	N.A.
		Force	kg (lbf)	N.A.	N.A.	N.A.	N.A.
	Thermostat Opening Temperature		°C (°F)	N.A.	N.A.	N.A.	N.A.
	Radiator Cap Opening Pressure		kPa (PSI)	90 (13)	90 (13)	90 (13)	90 (13)
	**ENGINE COLD N•m (lb•ft)**	Drive Pulley Retaining Screw		⑤	⑤	⑤	⑤
		Exhaust Manifold Nuts or Bolts		10 (7)	10 (7)	10 (7)	10 (7)
		Magneto Ring Nut		125 (92)	125 (92)	125 (92)	125 (92)
		Crankcase Nuts or Screws	M6 M8	13 (9.5) 29 (21)	13 (9.5) 29 (21)	13 (9.5) 29 (21)	13 (9.5) 29 (21)
		Crankcase/Engine Support Nuts or Screws		35 (26)	35 (26)	35 (26)	35 (26)
		Cylinder Head Nuts		29 (21)	29 (21)	29 (21)	29 (21)
		Crankcase/Cylinder Nuts or Screws		29 (21)	29 (21)	29 (21)	29 (21)
		Axial Fan Shaft Nut		N.A.	N.A.	N.A.	N.A.

	VEHICLE MODEL			FORMULA III 800	MACH 1/1 R	MACH Z/Z R/Z M.H. R/Z LT/Z LT R
	ENGINE TYPE			**809**	**699**	**809**
	Number of Cylinders			3	3	3
	Bore		mm (in)	70.50 (2.776)	69.75 (2.746)	70.50 (2.776)
	Stroke		mm (in)	68.0 (2.677)	61.0 (2.402)	68.0 (2.677)
	Displacement		cm^3 (in^3)	796.3 (48.59)	699.20 (42.67)	796.3 (48.59)
	Compression Ratio (corrected)			6.8	6.8	6.8
	Maximum Power Engine Speed ①		± 100 RPM	8000	8300	8300
	Piston Ring Type		$1^{st}/2^{nd}$	ST/R	ST/R	ST/R
	Ring End Gap	New Wear Limit	mm (in) mm (in)	0.2 (.010) 1.0 (.039)	0.2 (.008) 1.0 (.039)	0.2 (.010) 1.0 (.039)
	Ring/Piston Groove Clearance	New Wear Limit	mm (in) mm (in)	0.03 (.0012) 0.2 (.0079)	0.03 (.0012) 0.2 (.0079)	0.03 (.0012) 0.2 (.0079)
	Piston/Cylinder Wall Clearance	New Wear Limit	mm (in) mm (in)	0.11 (.0043) 0.15 (.0059)	0.10 (.0039) 0.15 (.0059)	0.11 (.0043) 0.15 (.0059)
	Connecting Rod Big End Axial Play	New Wear limit	mm (in) mm (in)	0.31 (.0122) 1.2 (.0472)	0.39 (.0154) 1.2 (.0472)	0.31 (.0122) 1.2 (.0472)
	Maximum Crankshaft End-play ②		mm (in)	0.3 (.012)	0.3 (.012)	0.3 (.012)
	Maximum Crankshaft Deflection at Center		mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)
	Rotary Valve Timing and P/N 420 924 XXX		Opening Closing	N.A.	N.A.	N.A.
	Magneto Generator Output		W	290	290	290
	Ignition Type			CDI	CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ③		mm (in)	2.59 (.102)	2.77 (.107)	2.59 (.102)
	Trigger Coil ④		Ω	190 – 300	190 – 300	190 – 300
	Generating Coil ④	Low Speed	Ω	25 – 56	25 – 56	25 – 56
		High Speed	Ω	3.5 – 8.1	3.5 – 8.1	3.5 – 8.1
	Lighting Coil ④		Ω	0.15 – 0.35	0.15 – 0.35	0.15 – 0.35
	High Tension Coil ④	Primary	Ω	0.2 – 0.5	0.2 – 0.5	0.2 – 0.5
		Secondary	kΩ	6 – 13	6 – 13	6 – 13
	Carburetor Type		PTO/CTR/MAG	TM 38 C228	TM 38 C224	TM 38 C236
	Main Jet		PTO/CTR/MAG	270/290/280	300	310
	Needle Jet			327 O-2	327 N-7	327 O-2
	Pilot Jet			50	50	50
	Needle Identification — clip position			8ADY1-41-3	8AGY1-41-4	8ADY1-41-3
	Slide Cut-away			2.0	2.0	2.0
	Float Adjustment		± 1 mm (± .040 in)	21.0 (.83)	21.0 (.83)	21.0 (.83)
	Air Screw Adjustment		± 1/16 Turn	4-1/2	4	4-1/2
	Idle Speed		± 200 RPM	1800	1800	1800
	Gas Type/Pump Octane Number			Super Unleaded/91	Super Unleaded/91	Super Unleaded/91
	Gas/Oil Ratio			Injection	Injection	Injection
	Type			Liquid	Liquid	Liquid
	Axial Fan Belt Adjustment	Deflection	mm (in)	N.A.	N.A.	N.A.
		Force	kg (lbf)	N.A.	N.A.	N.A.
	Thermostat Opening Temperature		°C (°F)	N.A.	N.A.	N.A.
	Radiator Cap Opening Pressure		kPa (PSI)	90 (13)	90 (13)	90 (13)
	**ENGINE COLD N•m (lb•ft)**	Drive Pulley Retaining Screw		⑤	⑤	⑤
		Exhaust Manifold Nuts or Bolts		10 (7)	10 (7)	10 (7)
		Magneto Ring Nut		125 (92)	125 (92)	125 (92)
		Crankcase Nuts or Screws	M6 M8	13 (9.5) 29 (21)	13 (9.5) 29 (21)	13 (9.5) 29 (21)
		Crankcase/Engine Support Nuts or Screws		35 (26)	35 (26)	35 (26)
		Cylinder Head Nuts		29 (21)	29 (21)	29 (21)
		Crankcase/Cylinder Nuts or Screws		29 (21)	29 (21)	29 (21)
		Axial Fan Shaft Nut		N.A.	N.A.	N.A.

	VEHICLE MODEL				GRAND TOURING 700	GRAND TOURING SE	FORMULA III 600	FORMULA III 700
	ENGINE TYPE				**699**	**809**	**599**	**699**
	Chain Drive Ratio				24/43	24/43	24/43	25/43
	Chain	Pitch		in	3/8	3/8	3/8	3/8
		Type/Links Qty/Plates Qty			Silent 72/13	Silent 72/13	Silent 72/13	Silent 72/13
	Drive Pulley	Type of Drive Pulley			TRA	TRA	TRA	TRA
		Ramp Identification and Roller Pin Type			285 ⑤	297 ⑤	297 ⑤	297 ⑤
		Calibration Screw Position or Calibration Disc Quantity			4	3	3	3
		Spring Color			Yellow/Red	Yellow/Orange	Green/Blue	Violet/Blue
		Spring Length		± 1.5 mm (± .060 in)	121.1 (4.77)	105.7 (4.16)	147.4 (5.80)	114.6 (4.51)
		Clutch Engagement		± 200 RPM	3300	3300	4200	3800
	Driven Pulley	Type			HPV27	HPV27	Formula	Formula
		Spring Preload		± 0.7 kg (± 1.5 lb)	N.A.	N.A.	7.0 (15.4)	7.0 (15.4)
		Cam Angle		Degree	47 – 44	47 – 44	50 – 47	50 – 47
	Pulley Distance	Z		(+ 0, - 1) mm ((+ 0, - .040) in)	121.0 (4.764)	121.0 (4.764)	120.0 (4.724)	120.0 (4.724)
	Offset	X		± 0.5 mm (± .020 in)	35.5 (1.398)	35.5 (1.398)	35.5 (1.398)	35.5 (1.398)
		Y – X	MIN. – MAX.	mm (in)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)
	Drive Belt Part Number (P/N)				417 300 066	417 300 066	417 300 066	417 300 066
	Drive Belt Width (new) ①			mm (in)	35.1 (1.382)	35.1 (1.382)	35.1 (1.382)	35.1 (1.382)
	Drive Belt Adjustment		Deflection	± 5 mm (± .197 in)	38 (1.496)	38 (1.496)	38 (1.496)	38 (1.496)
			Force ②	kg (lbf)	11.5 (25)	11.5 (25)	11.5 (25)	11.5 (25)
	Track	Width		cm (in)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)
		Length		cm (in)	345.5 (136)	345.5 (136)	307.4 (121)	307.4 (121)
		Profile Height		mm (in)	22.3 (.878)	22.3 (.878)	22.3 (.878)	22.3 (.878)
		Adjustment	Deflection	mm (in)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)
			Force ③	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type		Track		SC-10 HP	SC-10 HP	SC-10 HP	SC-10 HP
			Ski		ADSA	ADSA	ADSA	ADSA
	Length			cm (in)	303.5 (119.5)	303.5 (119.5)	277.5 (109.3)	277.5 (109.3)
	Width			cm (in)	117.4 (46.2)	117.4 (46.2)	117.4 (46.2)	117.4 (46.2)
	Height			cm (in)	130.0 (51.2)	130.0 (51.2)	114.3 (45.0)	114.3 (45.0)
	Ski Stance			cm (in)	104.1 (41)	104.1 (41)	104.1 (41)	104.1 (41)
	Mass (dry)			kg (lb)	278 (612)	282 (620)	253 (556)	244 (537)
	Ground Contact Area			cm^2 (in^2)	7423.2 (1150.6)	7423.2 (1150.6)	6670.9 (1034)	6670.9 (1034)
	Ground Contact Pressure			kPa (PSI)	3.67 (.532)	3.73 (.541)	3.72 (.539)	3.59 (.521)
	Frame Material				Aluminum	Aluminum	Aluminum	Aluminum
	Bottom Pan Material				Impact Copolymer	Impact Copolymer	Impact Copolymer	Impact Copolymer
	Hood Material				TPO	TPO	TPO	TPO
	Battery			V (A•h)	12/22	12/22	N.A.	N.A.
	Headlight			W	H4 60/55	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27	8/27	8/27
	Tachometer and Speedometer Bulbs			W	3	3	3	3
	Fuel and Temperature Gauge Bulbs			W	3	3	3	3
	Fuse	Starter Solenoid		A	30	30	N.A.	N.A.
		Fuel Level Sensor		A	0.25	0.25	0.25	0.25
	Fuel Tank			L (U.S. gal)	42 (11.1)	42 (11.1)	42 (11.1)	42 (11.1)
	Chaincase/Gearbox			mL (U.S. oz)	250 (8.5)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System ④			L (U.S. oz)	5.1 (172.5)	5.1 (172.5)	5.0 (169)	5.0 (169)
	Injection Oil Reservoir			L (U.S. oz)	4.1 (138.7)	4.1 (138.7)	4.1 (138.7)	4.1 (138.7)

	VEHICLE MODEL				FORMULA III 800	MACH 1	MACH 1 R	MACH Z
	ENGINE TYPE				809	699	699	809
	Chain Drive Ratio				26/43	25/43	25/43	26/43
	Chain	Pitch		in	3/8	3/8	3/8	3/8
		Type/Links Qty/Plates Qty			Silent 72/13	Silent 72/13	Silent 72/13	Silent 72/13
	Drive Pulley	Type of Drive Pulley			TRA	TRA	TRA	TRA
		Ramp Identification and Roller Pin Type			295 ⑤	286 ⑤	286 ⑤	295 ⑤
		Calibration Screw Position or Calibration Disc Quantity			3	3	3	3
		Spring Color			Violet/Blue	Green/Violet	Green/Violet	Green/Blue
		Spring Length		± 1.5 mm (± .060 in)	114.6 (4.51)	126.7 (4.99)	126.7 (4.99)	147.4 (5.80)
		Clutch Engagement		± 200 RPM	3800	4200	4200	4200
	Driven Pulley	Type			Formula	Formula	HPV27	Formula
		Driven Pulley Spring Preload		± 0.7 kg (± 1.5 lb)	7.0 (15.4)	7.0 (15.4)	N.A.	7.0 (15.4)
		Cam Angle		Degree	50 – 47	53 – 44	47 – 44	53 – 44
	Pulley Distance	Z		(+ 0, - 1) mm (+ 0, - 1/32) in	120.0 (4.724)	120.0 (4.724)	121.0 (4.764)	120.0 (4.724)
	Offset	X		± 0.4 mm (± 1/64 in)	35.5 (1.398)	35.5 (1.398)	35.5 (1.398)	35.5 (1.398)
		Y – X	MIN. – MAX.	mm (in)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)
	Drive Belt Part Number (P/N)				417 300 066	417 300 066	417 300 066	417 300 066
	Drive Belt Width (new) ①			mm (in)	35.1 (1.382)	35.1 (1.382)	35.1 (1.382)	35.1 (1.382)
	Drive Belt Adjustment		Deflection	± 5 mm (± 13/64 in)	38 (1.496)	38 (1.496)	38 (1.496)	38 (1.496)
			Force ②	kg (lbf)	11.5 (25)	11.5 (25)	11.5 (25)	11.5 (25)
	Track	Width		cm (in)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)
		Length		cm (in)	307.4 (121)	307.4 (121)	307.4 (121)	307.4 (121)
		Profile Height		mm (in)	22.3 (.878)	22.3 (.878)	22.3 (.878)	22.3 (.878)
		Adjustment	Deflection	mm (in)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)
			Force ③	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type		Track		SC-10 HP	SC-10 HP	SC-10 HP	SC-10 HP
			Ski		ADSA	ADSA	ADSA	ADSA
	Length			cm (in)	277.5 (109.3)	277.5 (109.3)	277.5 (109.3)	277.5 (109.3)
	Width			cm (in)	117.4 (46.2)	117.4 (46.2)	117.4 (46.2)	117.4 (46.2)
	Height			cm (in)	114.3 (45.0)	114.3 (45.0)	114.3 (45.0)	114.3 (45.0)
	Ski Stance			cm (in)	104.1 (41)	104.1 (41)	104.1 (41)	104.1 (41)
	Mass (dry)			kg (lb)	251 (552)	253 (557)	254 (559)	260 (572)
	Ground Contact Area			cm^2 (in^2)	6670.9 (1034)	6670.9 (1034)	6670.9 (1034)	6670.9 (1034)
	Ground Contact Pressure			kPa (PSI)	3.69 (.535)	3.72 (.539)	3.74 (.542)	3.82 (.554)
	Frame Material				Aluminum	Aluminum	Aluminum	Aluminum
	Bottom Pan Material				Impact Copolymer	Impact Copolymer	Impact Copolymer	Impact Copolymer
	Hood Material				TPO	TPO	TPO	TPO
	Battery			V (A•h)	N.A.	N.A.	N.A.	N.A.
	Headlight			W	H4 60/55	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27	8/27	8/27
	Tachometer and Speedometer Bulbs			W	3	3	3	3
	Fuel and Temperature Gauge Bulbs			W	3	3	3	3
	Fuse	Starter Solenoid		A	N.A.	N.A.	N.A.	N.A.
		Fuel Level Sensor		A	0.25	0.25	0.25	0.25
	Fuel Tank			L (U.S. gal)	42 (11.1)	42 (11.1)	42 (11.1)	42 (11.1)
	Chaincase/Gearbox			mL (U.S. oz)	250 (8.5)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System ④			L (U.S. oz)	5.0 (169)	5.0 (169)	5.0 (169)	5.0 (169)
	Injection Oil Reservoir			L (U.S. oz)	4.1 (138.7)	4.1 (138.7)	4.1 (138.7)	4.1 (138.7)

	VEHICLE MODEL				MACH Z R MACH Z M.H. R	MACH Z LT	MACH Z LT R
	ENGINE TYPE				**809**	**809**	**809**
	Chain Drive Ratio				26/43	25/43	25/43
	Chain	Pitch		in	3/8	3/8	3/8
		Type/Links Qty/Plates Qty			Silent 72/13	Silent 72/13	Silent 72/13
	Drive Pulley	Type of Drive Pulley			TRA	TRA	TRA
		Ramp Identification and Roller Pin Type			295 ⑤	295 ⑤	295 ⑤
		Calibration Screw Position or Calibration Disc Quantity			3	3	3
		Spring Color			Green/Blue	Green/Blue	Green/Blue
		Spring Length		± 1.5 mm (± .060 in)	147.4 (5.80)	147.4 (5.80)	147.4 (5.80)
		Clutch Engagement		± 200 RPM	4200	4200	4200
	Driven Pulley	Type			HPV27	Formula	HPV27
		Driven Pulley Spring Preload		± 0.7 kg (± 1.5 lb)	N.A.	7.0 (15.4)	N.A.
		Cam Angle		degree	47 – 44	53 – 44	47 – 44
	Pulley Distance	Z		(+ 0, - 1) mm ((+ 0, - 1/32) in)	121.0 (4.764)	120.0 (4.724)	121.0 (4.764)
	Offset	X		± 0.4 mm (± 1/64 in)	35.5 (1.398)	35.5 (1.398)	35.5 (1.398)
		Y – X	MIN. – MAX.	mm (in)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)	1.0 – 2.0 (.039 – .079)
	Drive Belt Part Number (P/N)				417 300 066	417 300 066	417 300 066
	Drive Belt Width (new) ①			mm (in)	35.1 (1.382)	35.1 (1.382)	35.1 (1.382)
	Drive Belt Adjustment		Deflection	± 5 mm (± 13/64 in)	38 (1.496)	38 (1.496)	38 (1.496)
			Force ②	kg (lbf)	11.5 (25)	11.5 (25)	11.5 (25)
	Track	Width		cm (in)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)
		Length		cm (in)	307.4 (121)	345.5 (136)	345.5 (136)
		Profile Height		mm (in)	22.3 (.878)	22.3 (.878)	22.3 (.878)
		Adjustment	Deflection	mm (in)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)
			Force ③	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type		Track		SC-10 HP	SC-10 HP	SC-10 HP
			Ski		ADSA	ADSA	ADSA
	Length			cm (in)	277.5 (109.3)	297.2 (117.0)	297.2 (117.0)
	Width			cm (in)	117.4 (46.2)	118.1 (46.5)	118.1 (46.5)
	Height			cm (in)	114.3 (45.0)	114.3 (45.0)	114.3 (45.0)
	Ski Stance			cm (in)	104.1 (41)	104.1 (41)	104.1 (41)
	Mass (dry)			kg (lb)	261 (574)	265 (582)	265 (584)
	Ground Contact Area			cm^2 (in^2)	6670.9 (1034)	7549.2 (1170.1)	7549.2 (1170.1)
	Ground Contact Pressure			kPa (PSI)	3.84 (.557)	3.44 (.499)	3.44 (.499)
	Frame Material				Aluminum	Aluminum	Aluminum
	Bottom Pan Material				Impact Copolymer	Impact Copolymer	Impact Copolymer
	Hood Material				TPO	TPO	TPO
	Battery			V (A•h)	N.A.	N.A.	N.A.
	Headlight			W	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight			W	8/27	8/27	8/27
	Tachometer and Speedometer Bulbs			W	3	3	3
	Fuel and Temperature Gauge Bulbs			W	3	3	3
	Fuse	Starter Solenoid		A	N.A.	N.A.	N.A.
		Fuel Level Sensor		A	0.25	0.25	0.25
	Fuel Tank			L (U.S. gal)	42 (11.1)	42 (11.1)	42 (11.1)
	Chaincase/Gearbox			mL (U.S. oz)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System ④			L (U.S. oz)	5.0 (169)	5.1 (173)	5.1 (173)
	Injection Oil Reservoir			L (U.S. oz)	4.1 (138.7)	4.1 (138.7)	4.1 (138.7)

ENGINE LEGEND

BTDC: Before Top Dead Center
CDI: Capacitor Discharge Ignition
CTR: Center
K: Kilo (× 1000)
MAG: Magneto Side
N.A.: Not Applicable
PTO: Power Take Off Side
R: Rectangular
ST: Semi-trapez

① The maximum horsepower RPM applicable on the vehicle. It may be different under certain circumstances and BOMBARDIER INC. reserves the right to modify it without obligation.

② Crankshaft end-play is not adjustable on these models. Specification is given for verification purposes only.

③ At 3500 RPM with headlamp turned on.

④ All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.

⑤ Drive pulley retaining screw: torque to 90 to 100 N•m (66 to 74 lbf•ft), install drive belt, accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake; repeat 5 times. Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

VEHICLE LEGEND

ADSA: Advanced Direct Shock Action
TPO: Thermo Plastic Olefin
TRA: Total Range Adjustable
N.A.: Not Applicable

① Minimum allowable width may not be less than 3.0 mm (1/8 in) of new drive belt.

② Force applied midway between pulleys to obtain specified tension deflection.

③ Force or downward pull applied to track to obtain specified tension deflection.

④ Coolant mixture: 60% antifreeze/40% water.

⑤ Lever with roller pin (P/N 417 004 308) (solid).

WIRING DIAGRAMS

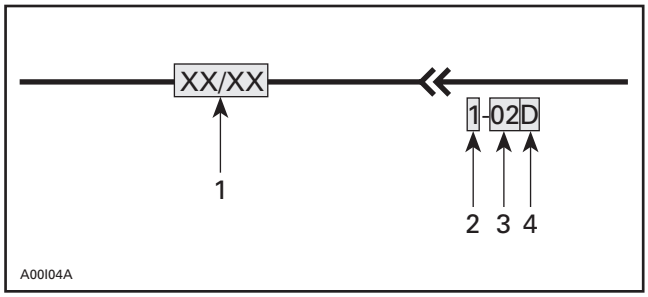
MODELS	WIRING DIAGRAM PAGE	HEADLIGHT (watt)	TAILLIGHT (watt)	ELECTRICAL SYSTEM OUTPUT (watt)
Formula III 600/700/800 Mach 1/Z /Z LT	Annex 1	60/55 hal.	8/27	290
Mach 1R/Z R/Z M.H. R/Z LT R	Annex 2	60/55 hal.	8/27	290
GT 700	Annex 3	60/55 hal.	8/27	360
GT SE	Annex 4	60/55 hal.	8/27	360

hal. = halogen

WIRING DIAGRAM LEGEND

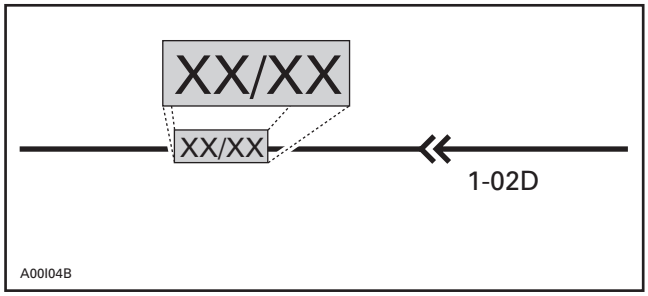
◆ WARNING

Ensure all terminals are properly crimped on the wires and all connector housings are properly fastened.



1. *Wire colors*
2. *Connector housing area*
3. *Housing number per area*
4. *Wire connector location in housing*

WIRE COLORS

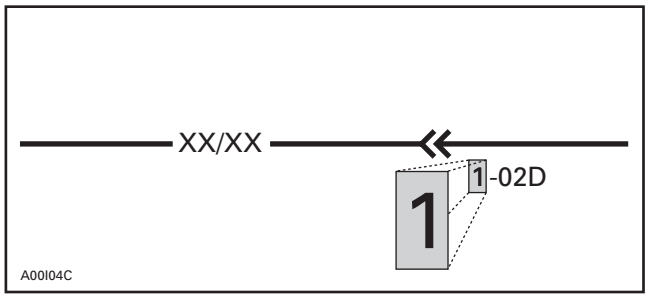


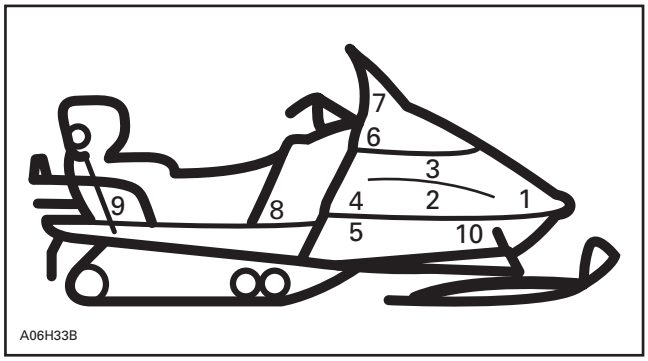
The first color of a wire is the main color, second color is the stripe.

Example: YL/BK is a YELLOW wire with a BLACK stripe.

COLOR CODE					
BK	—	BLACK	GN	—	GREEN
WH	—	WHITE	GY	—	GREY
RD	—	RED	VI	—	VIOLET
BL	—	BLUE	OR	—	ORANGE
YL	—	YELLOW	BR	—	BROWN
BE	—	BEIGE			

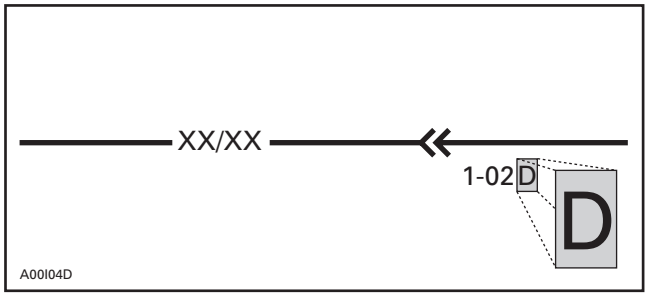
CONNECTOR HOUSING AREA

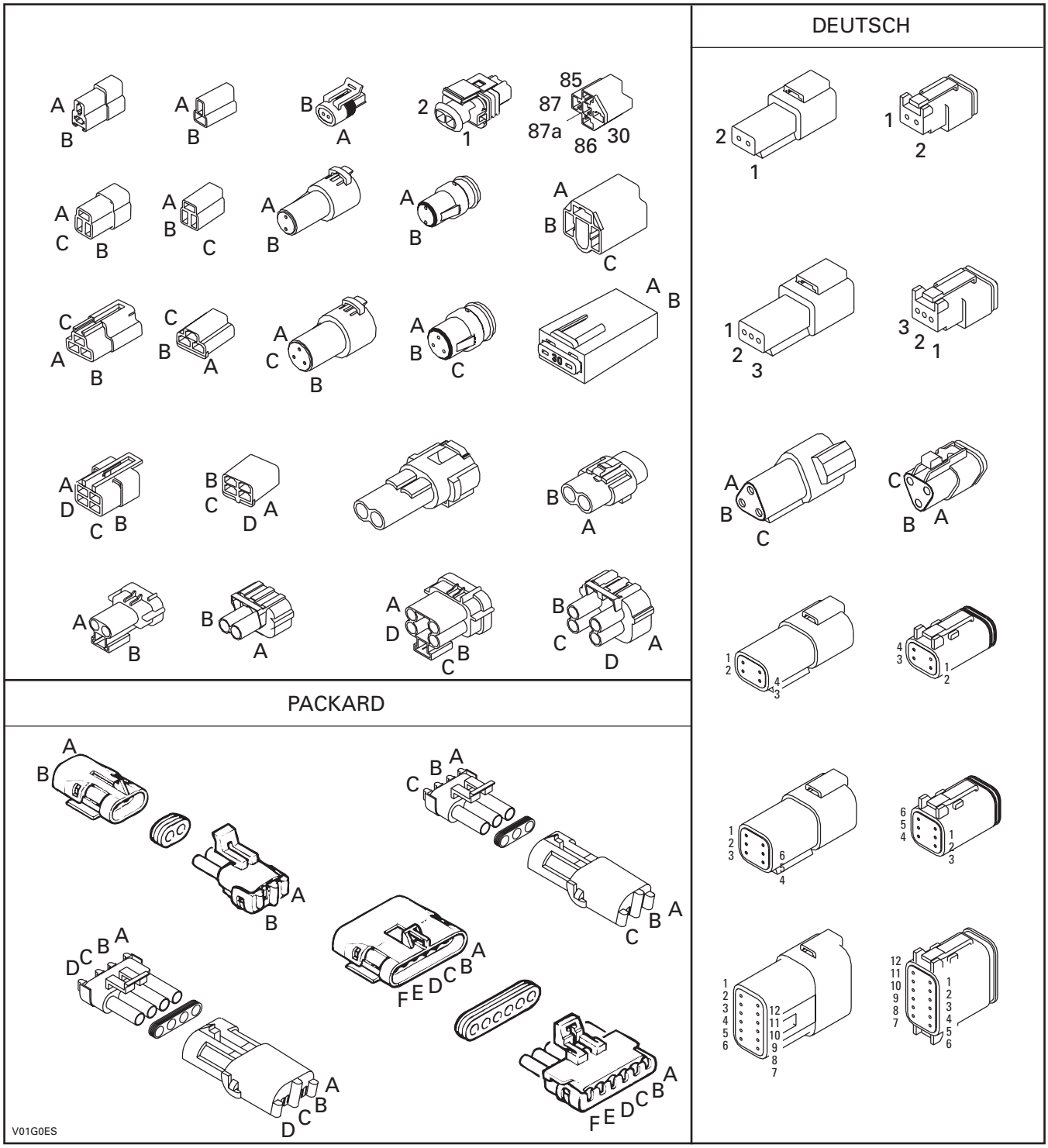




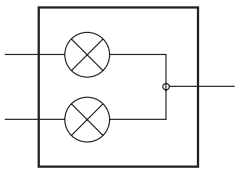
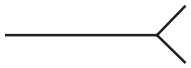
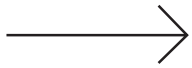
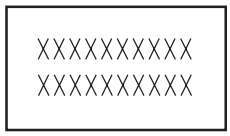
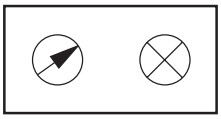
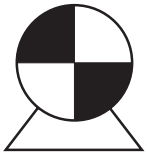
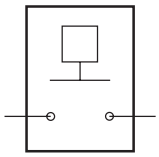
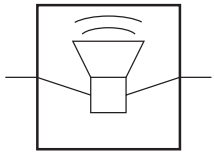
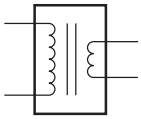
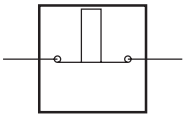
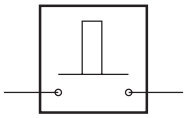
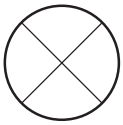
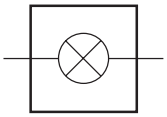
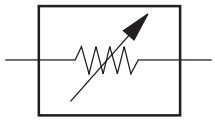
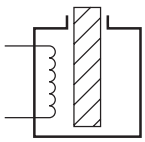
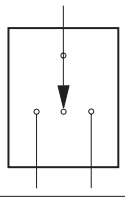
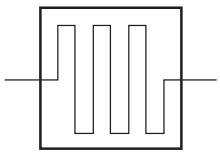
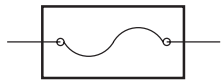
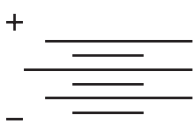
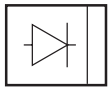
AREA	LOCATION
1	Front of engine compartment
2	Magneto
3	Carburetors
4	Near of intake silencer
5	Near driven pulley
6	Under console
7	Under hood
8	Near fuel tank
9	Rear of seat
10	Under engine

CONNECTOR LOCATION IN HOUSING




DEUTSCH
PACKARD
V01G0ES

SYMBOLS DESCRIPTION

Beam and tail light 	Female terminal 	Male terminal 	Electronic module 
Meter 	Electric motor 	Low level sensor 	Buzzer 
Ignition coil 	Normally close switch 	Normally open switch 	Male terminal on instrument 
Engine ground 	Frame ground  Frame	Spark plug 	Meter movement 
Bulb 	Pilot lamp 	Analog sensor 	Solenoid valve 
Magneto (Delta) 	3 position switch 	Heating element 	Fuse 
Trigger coil 	Battery 	Diode 	Partially illustrated component 

A00E55S

UNPLUGING CONNECTORS

Always unplug connectors by pulling on housing not on wire.



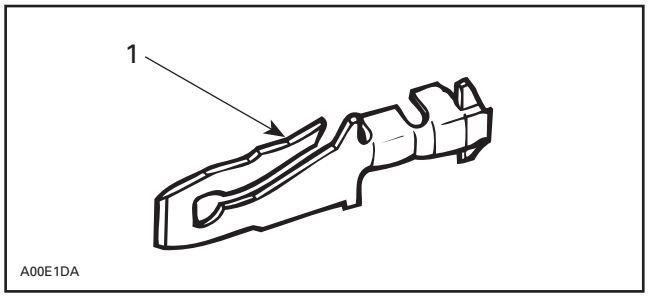
A06E1PA

TYPICAL

TAB AND RECEPTACLE CONNECTORS REMOVAL

Tab Connector

It is locked in its housing by a spring tab on its side. Removal is done by squeezing this tab.

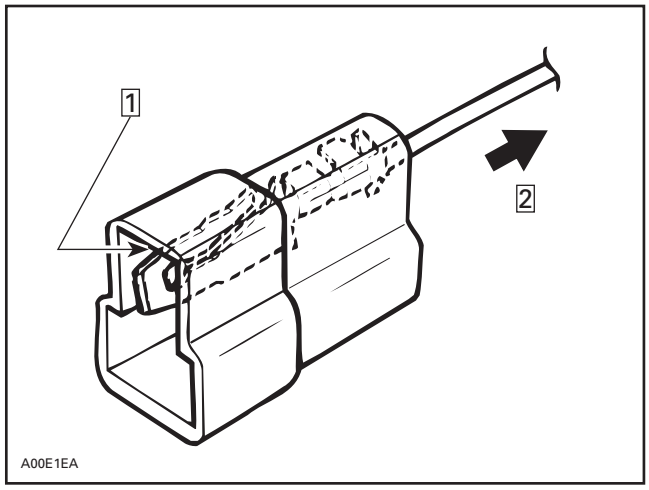


A00E1DA

TAB CONNECTOR
1. Locking tab

To remove:

– Insert a screwdriver or Snap-on TT 600-5 from opposite side of wire and pry locking tab.
– While holding locking tab pried, pull connector toward wire side.



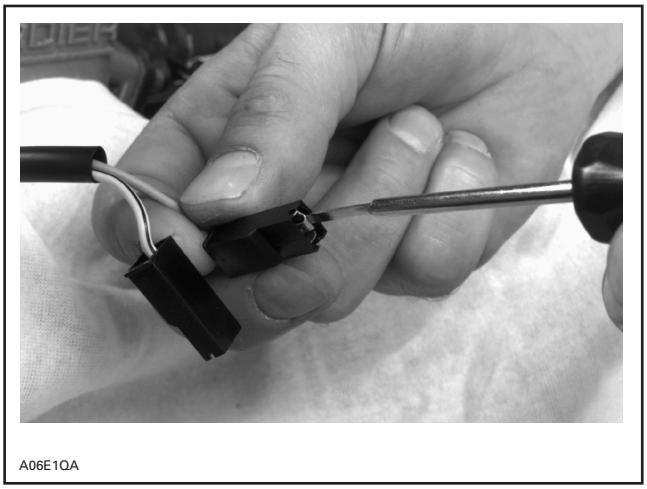
A00E1EA

Step 1 : Insert screwdriver here
Step 2 : Pull this side

Locking Receptacle Connector

To remove:

– Insert tool Snap-on TT 600-5 in access opening then pull housing toward wire side.



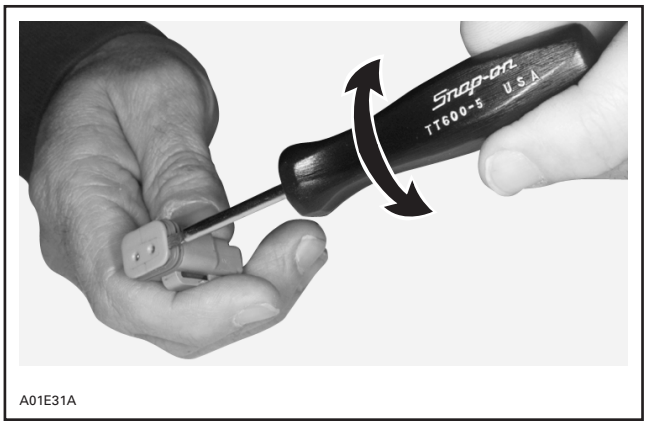
A06E1QA

Waterproof Connector Housing

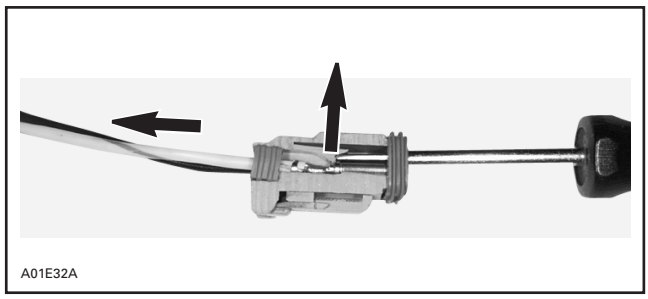
Female Connector Housing

To remove:

– Insert tool Snap-on TT 600-5 under lock and twist to lift it.



– Pry tab to free connector then pull wire out of housing.

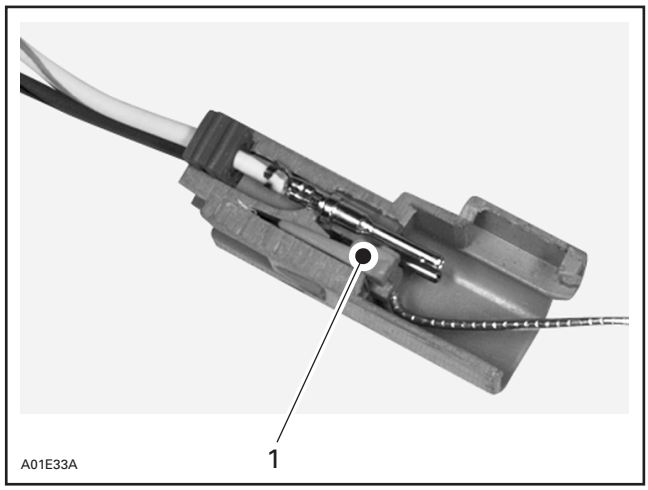


FEMALE CONNECTOR HOUSING — CUT-AWAY

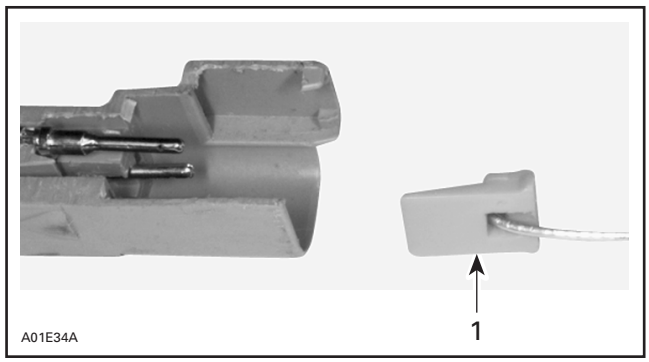
Male Connector Housing

To remove:

– Using a small hook, pull out the lock.

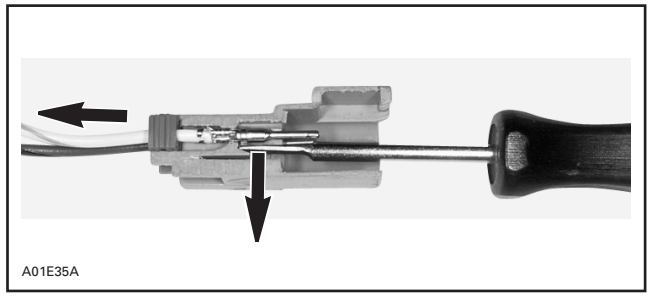


1. Lock



1. Lock

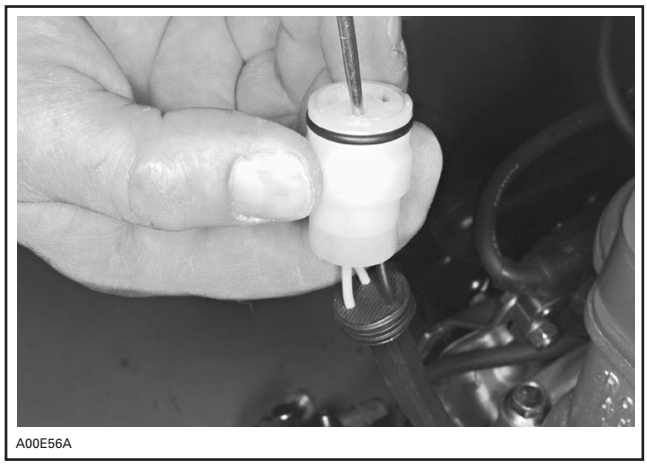
– Pry tab to free connector then pull wire out of housing.



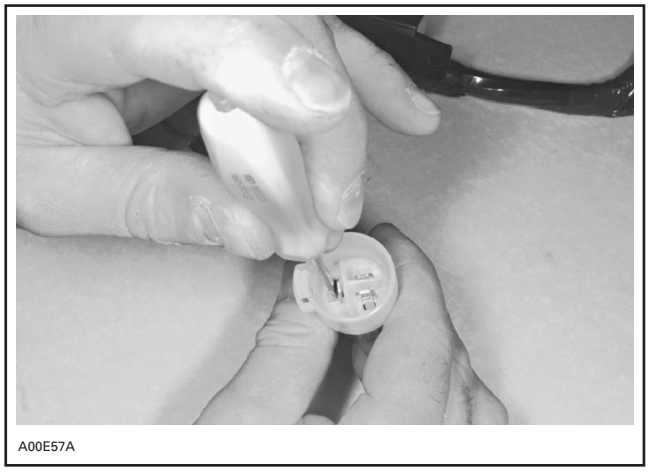
MALE CONNECTOR HOUSING — CUT-AWAY

Round Connector Housing

Female Connector Housing



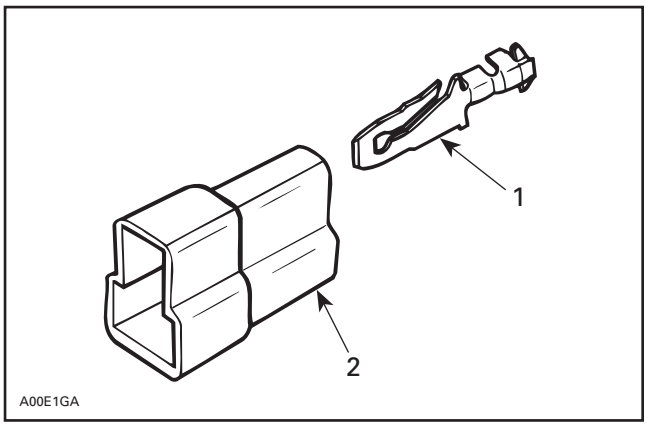
Male Connector Housing



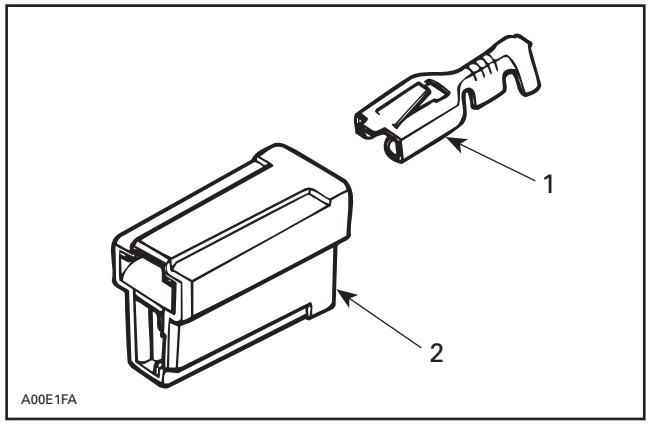
TAB AND RECEPTACLE CONNECTORS INSTALLATION

Prior to installing, make sure locking tab is sufficiently lifted to properly lock.

Insert tab and receptacle connectors in their respective housings as shown in following illustrations. Push sufficiently so that they snap. Try pulling wire to ensure they are properly locked.



1. Tab
2. Housing



TYPICAL

1. Receptacle
2. Housing

ACCESSORIES INSTALLATION

On all **electric start models:** The direct current (DC) utilizes the snowmobile frame as ground "wire" while all alternating current (AC) consumers (lights, heated grips, fuel gauge, etc.) utilize a separate ground wire.

Never interconnect AC and DC grounds as an AC voltage drop will result. When installing accessories on **any** snowmobile, connect their wires directly to the YELLOW and YELLOW/BLACK lighting coil wires.

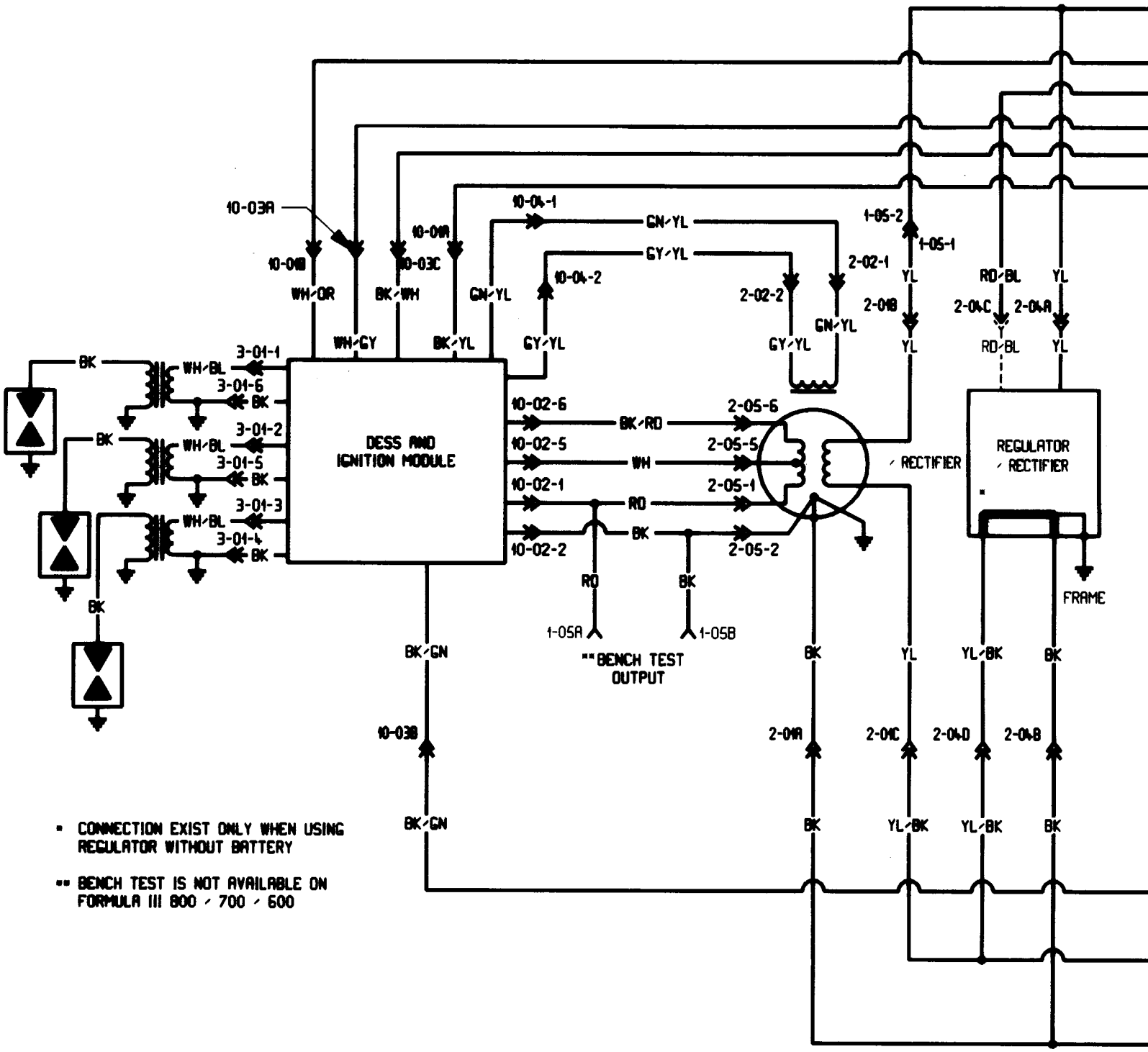
Even if **manual start models** have an AC ground to the chassis (on voltage regulator), all accessories utilize a ground wire isolated from chassis. When an electric starter kit is installed, the voltage regulator and its ground wire are replaced by a voltage rectifier/regulator unit permitting a completely isolated AC circuit.

◆ WARNING

Keep wires away from any rotating, moving, heating, vibrating or sharp edge. Use proper fastening devices as required.

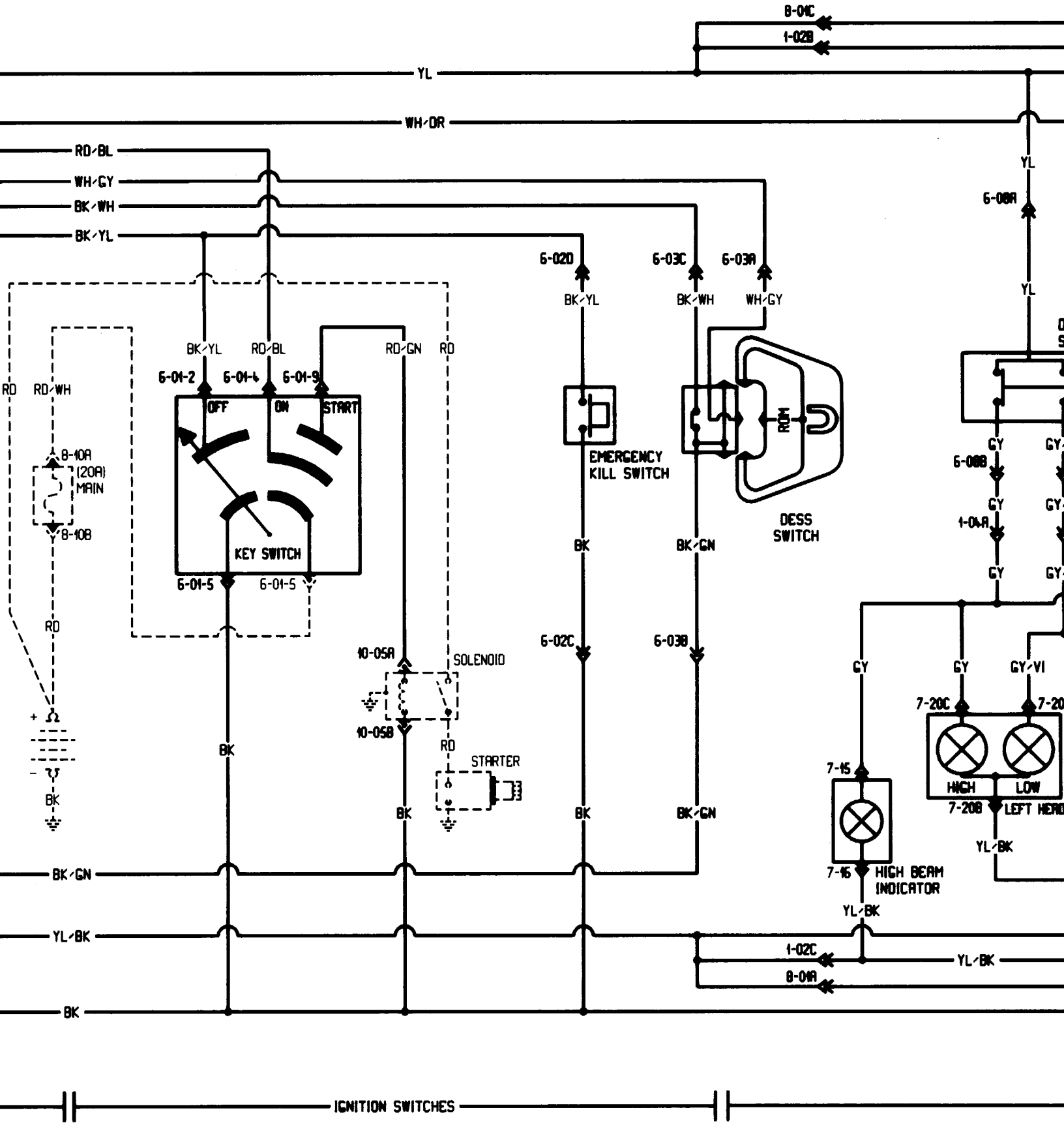
FORMULA III 600/700/800
ANNEX 1 MACH 1/Z/Z LT

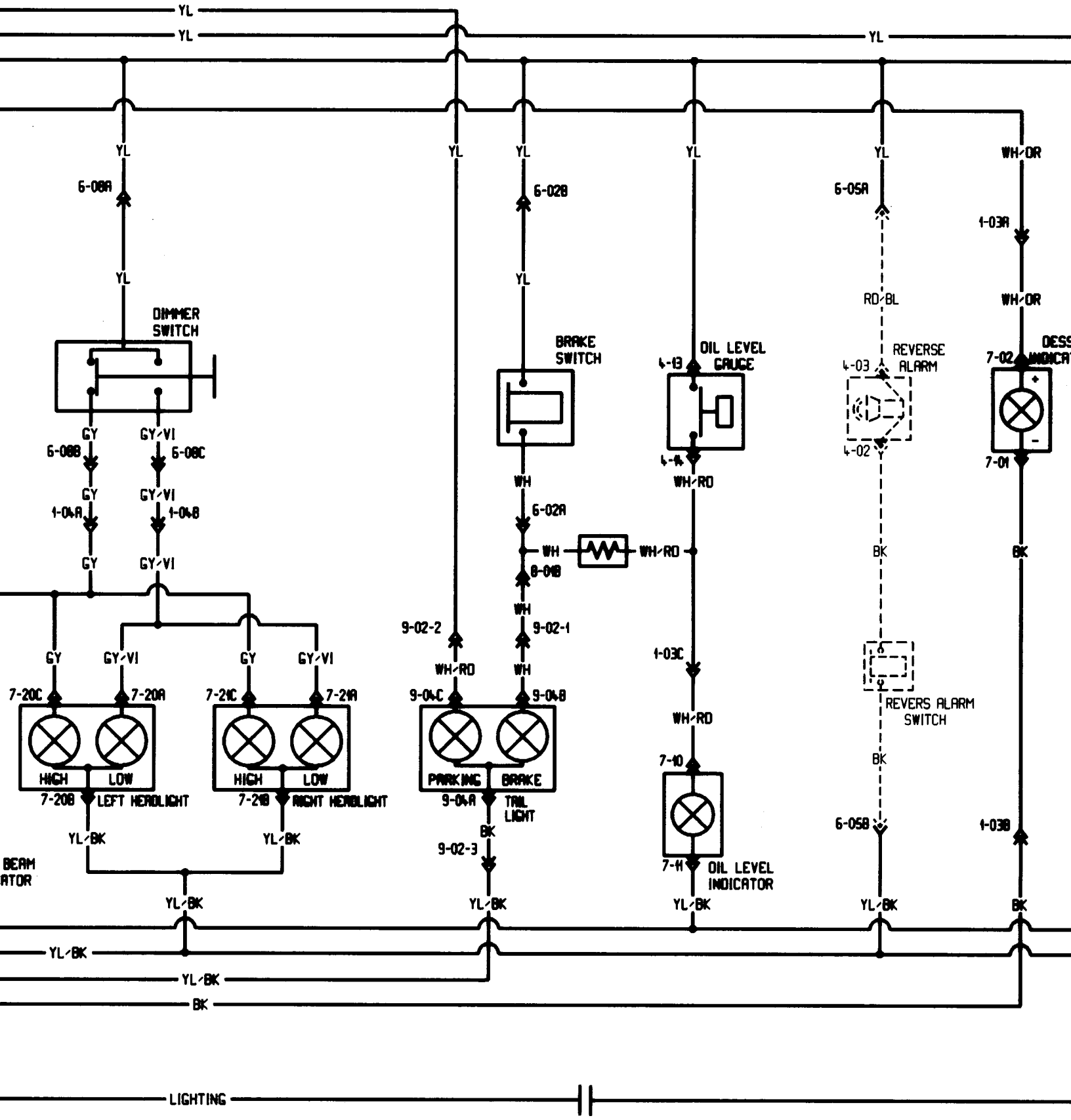
'99 MACH Z (LT), MACH 1, FORMULA III 800 / 700 / 600

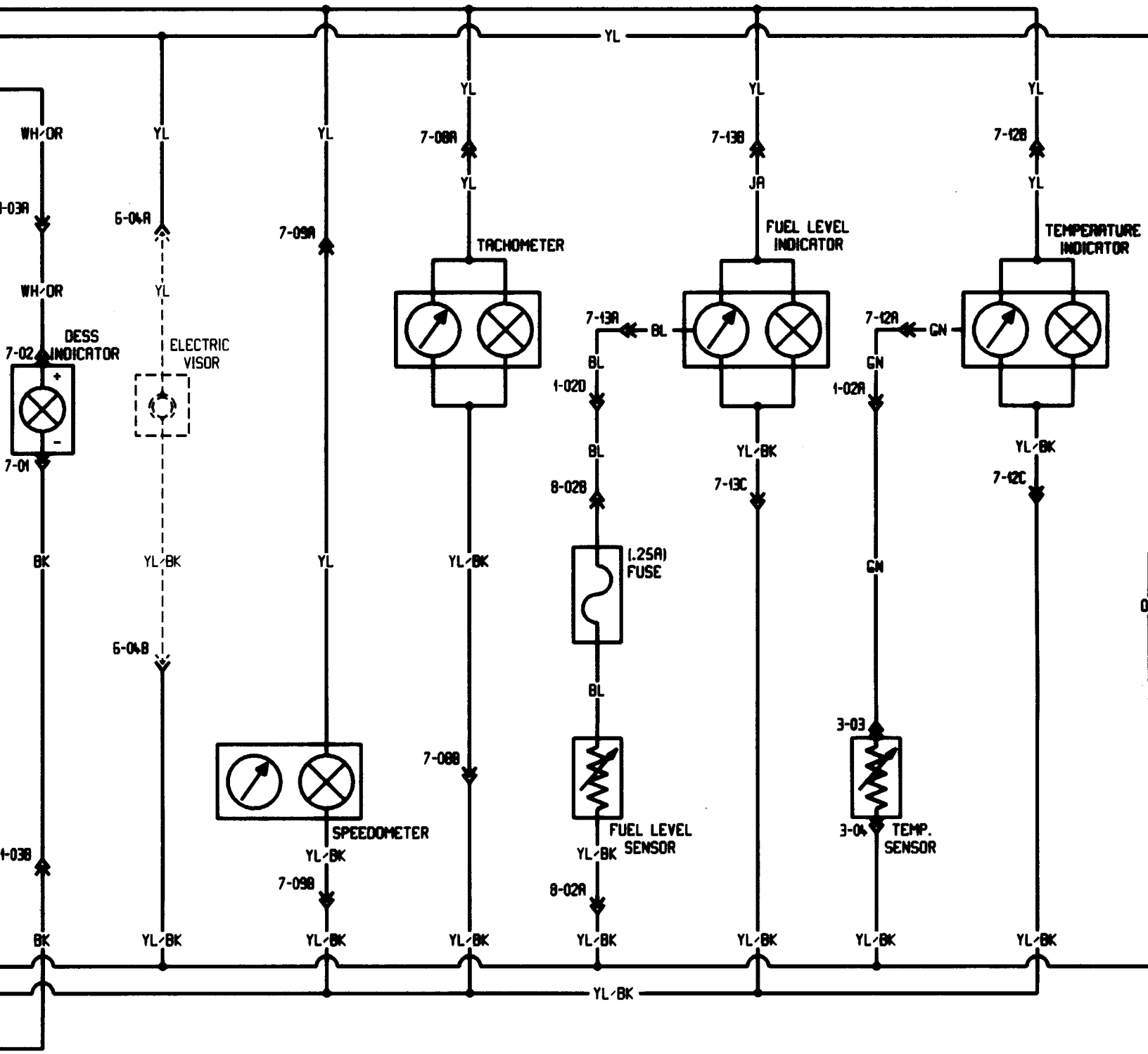


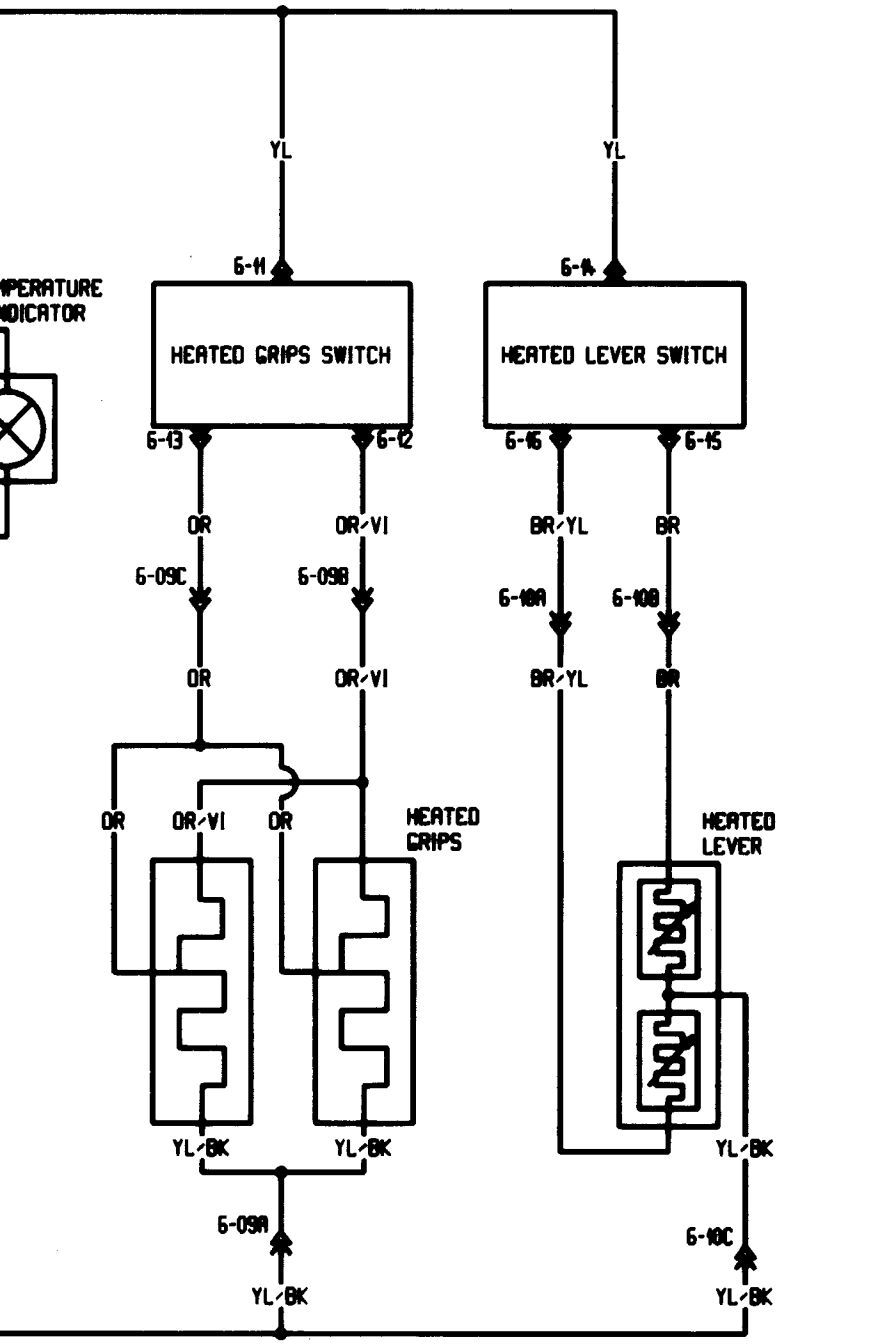
* CONNECTION EXIST ONLY WHEN USING REGULATOR WITHOUT BATTERY

** BENCH TEST IS NOT AVAILABLE ON FORMULA III 800 / 700 / 600


8-01C
1-02B
YL
WH/OR
RD/BL
WH/GY
BK/WH
BK/YL
6-02D
6-03C
6-03A
BK/YL
BK/WH
WH/GY
YL
6-08A
YL
BK/YL
RD/BL
RD/GN
RD
RD
RD/WH
6-01-2
6-01-4
6-01-9
OFF
ON
START
8-10A
(20A)
MAIN
8-10B
KEY SWITCH
6-01-5
6-01-5
EMERGENCY
KILL SWITCH
RUN
DESS
SWITCH
GY
6-08B
GY
1-04A
GY
RD
10-05A
SOLENOID
10-05B
RD
STARTER
BK
BK
BK
BK
6-02C
6-03B
BK
BK/GN
BK/GN
GY
GY
GY/VI
7-20C
7-20
HIGH
LOW
7-20B
LEFT HEAD
7-15
7-15
HIGH BEAM
INDICATOR
YL/BK
YL/BK
1-02C
YL/BK
8-01A
BK
IGNITION SWITCHES


YL
YL
YL
YL
YL
YL
YL
YL
WH/OR
6-08A
6-02B
6-05A
1-03A
YL
YL
RD/BL
WH/OR
DIMMER SWITCH
BRAKE SWITCH
4-13
OIL LEVEL GAUGE
4-03
REVERSE ALARM
7-02
GY
GY/VI
6-08B
6-08C
4-14
WH/RD
4-02
7-01
GY
GY/VI
1-04A
1-04B
WH
6-02A
BK
BK
GY
GY/VI
WH
WH/RD
8-04B
WH
9-02-2
9-02-1
1-03C
GY
GY/VI
GY
GY/VI
WH/RD
WH
REVERS ALARM SWITCH
7-20C
7-20A
7-21C
7-21A
9-04C
9-04B
WH/RD
7-10
BK
HIGH
LOW
HIGH
LOW
PARKING
BRAKE
7-20B
LEFT HEADLIGHT
7-21B
RIGHT HEADLIGHT
9-04A
TAIL LIGHT
6-05B
1-03B
YL/BK
YL/BK
BK
9-02-3
7-11
OIL LEVEL INDICATOR
BEAM ATOR
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
BK
LIGHTING

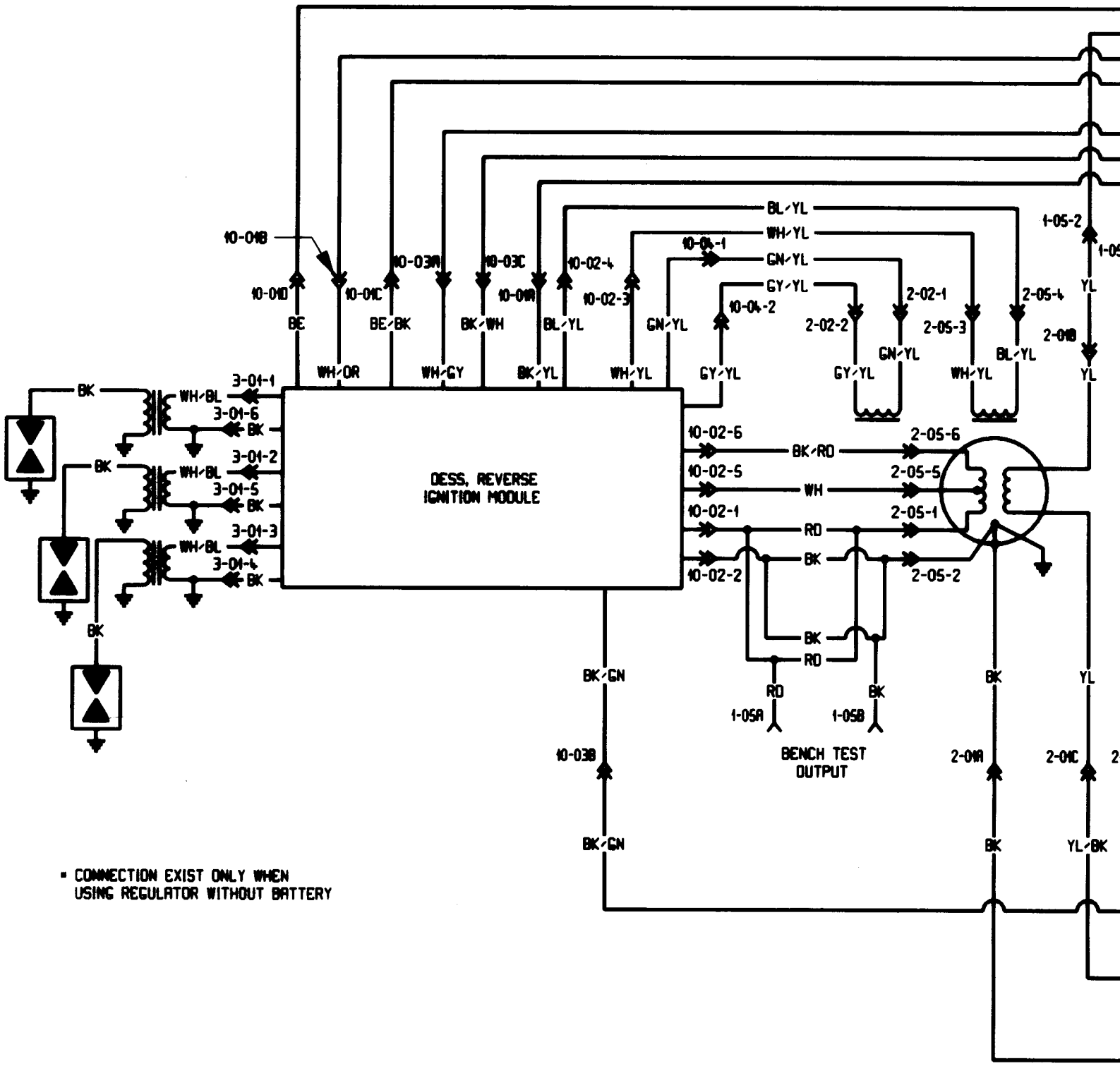

YL
WH/OR
YL
YL
7-08A
YL
7-13B
JA
YL
7-12B
YL
1-03A
6-04A
7-09A
TACHOMETER
FUEL LEVEL INDICATOR
TEMPERATURE INDICATOR
WH/OR
YL
7-13A
BL
7-12A
GN
7-02
DESS INDICATOR
ELECTRIC VISOR
1-02D
BL
1-02A
GN
7-01
YL/BK
YL/BK
7-12C
BK
YL/BK
YL
YL/BK
8-02B
7-13C
(.25A) FUSE
BL
GN
6-04B
3-03
7-08B
SPEEDOMETER
FUEL LEVEL SENSOR
TEMP. SENSOR
1-03B
YL/BK
YL/BK
7-09B
8-02A
BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK



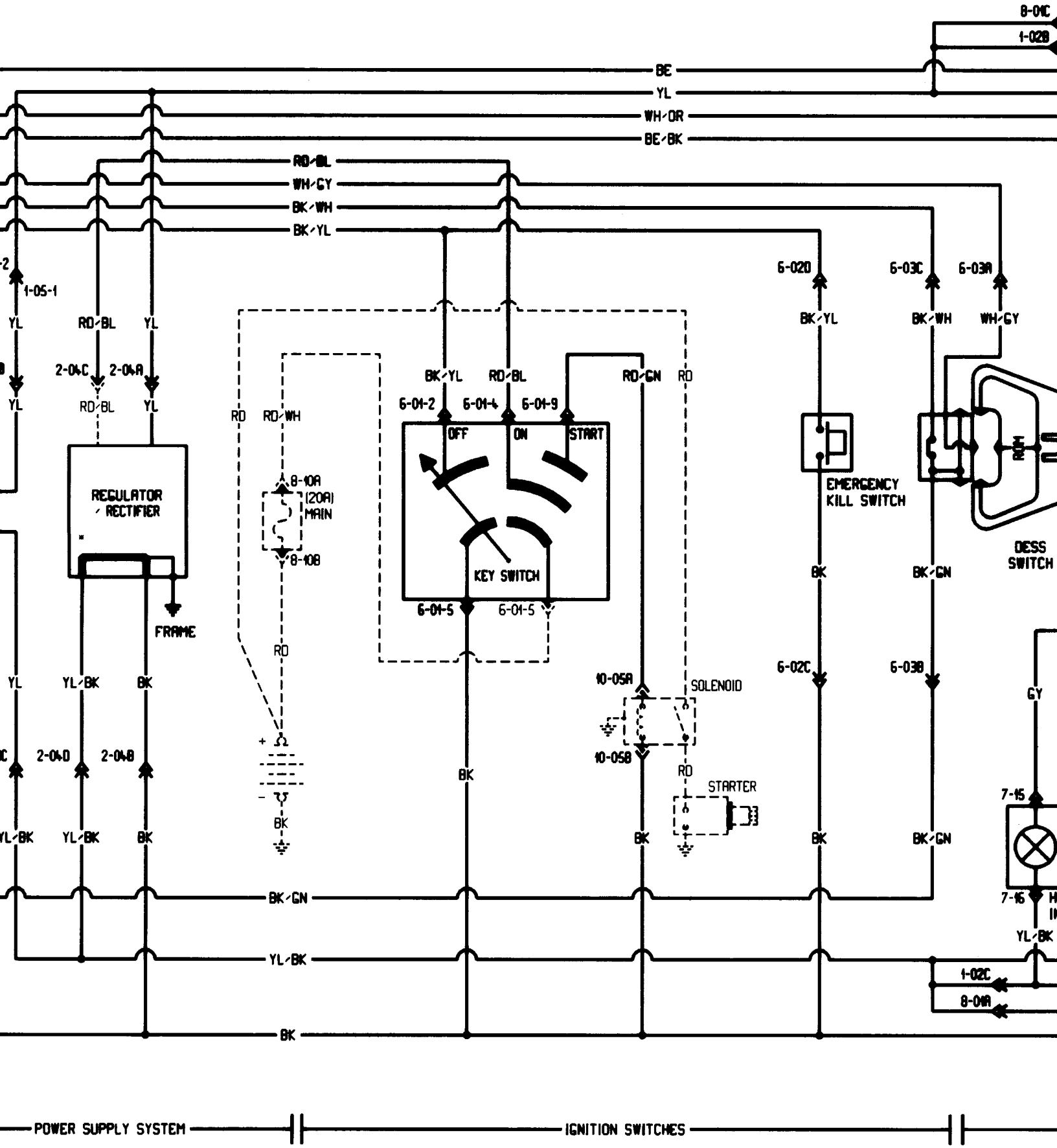
HEATING ELEMENTS

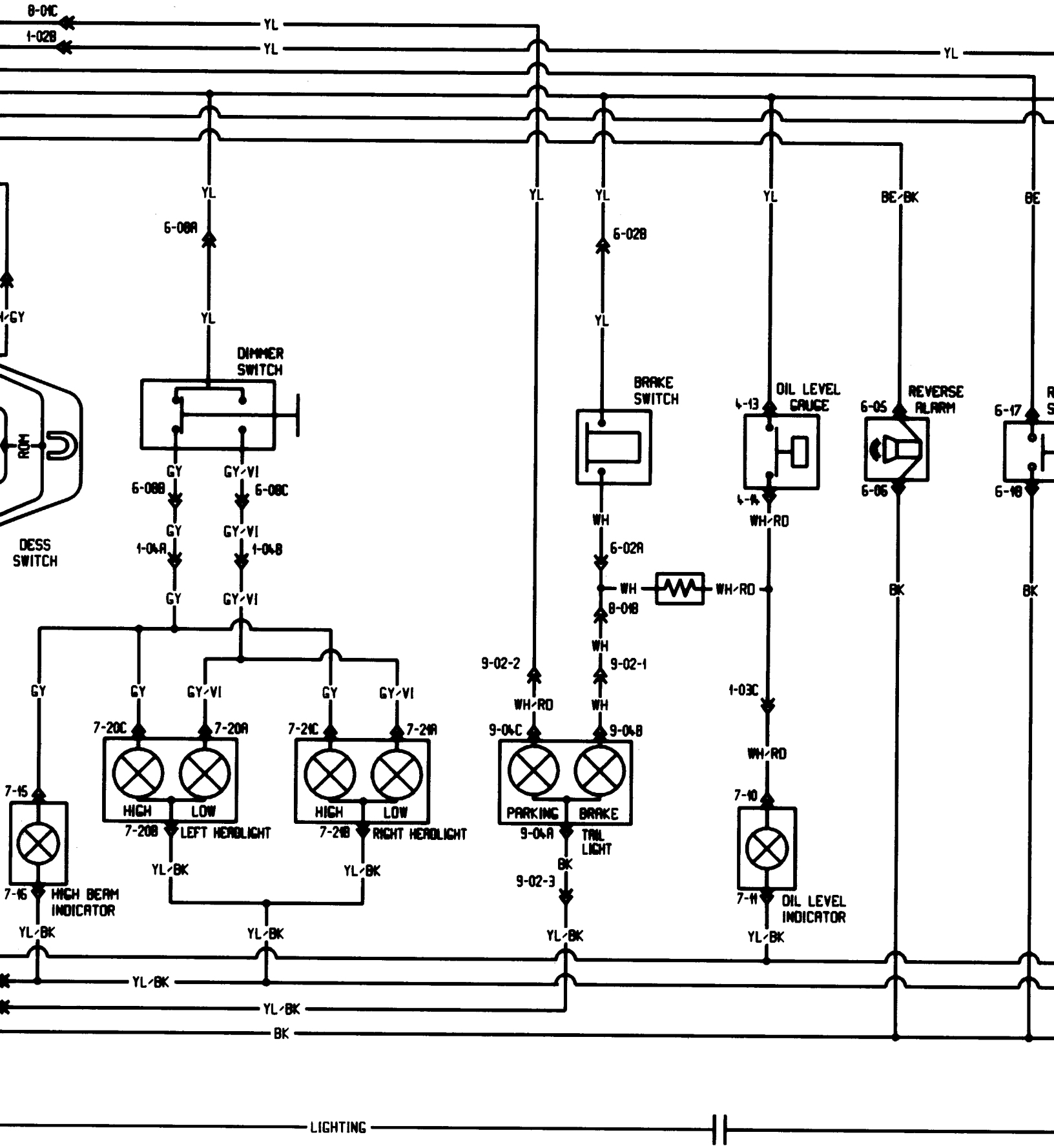
ANNEX 2 MACH 1R/Z R/Z M.H. R/Z LT R

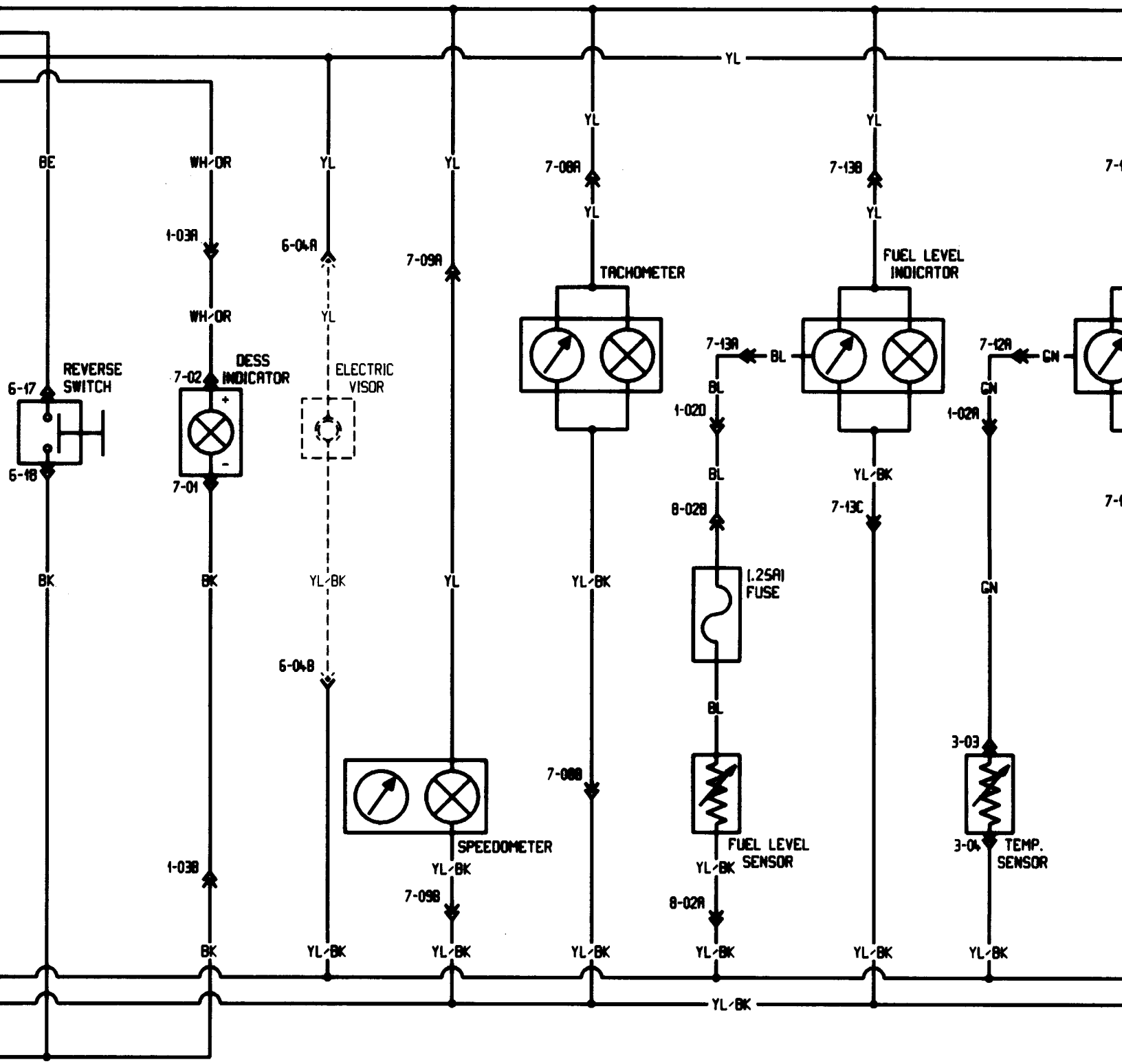
'99 MACH 1 R, MACH Z R, MACH Z LT R, MACH Z M.H. R

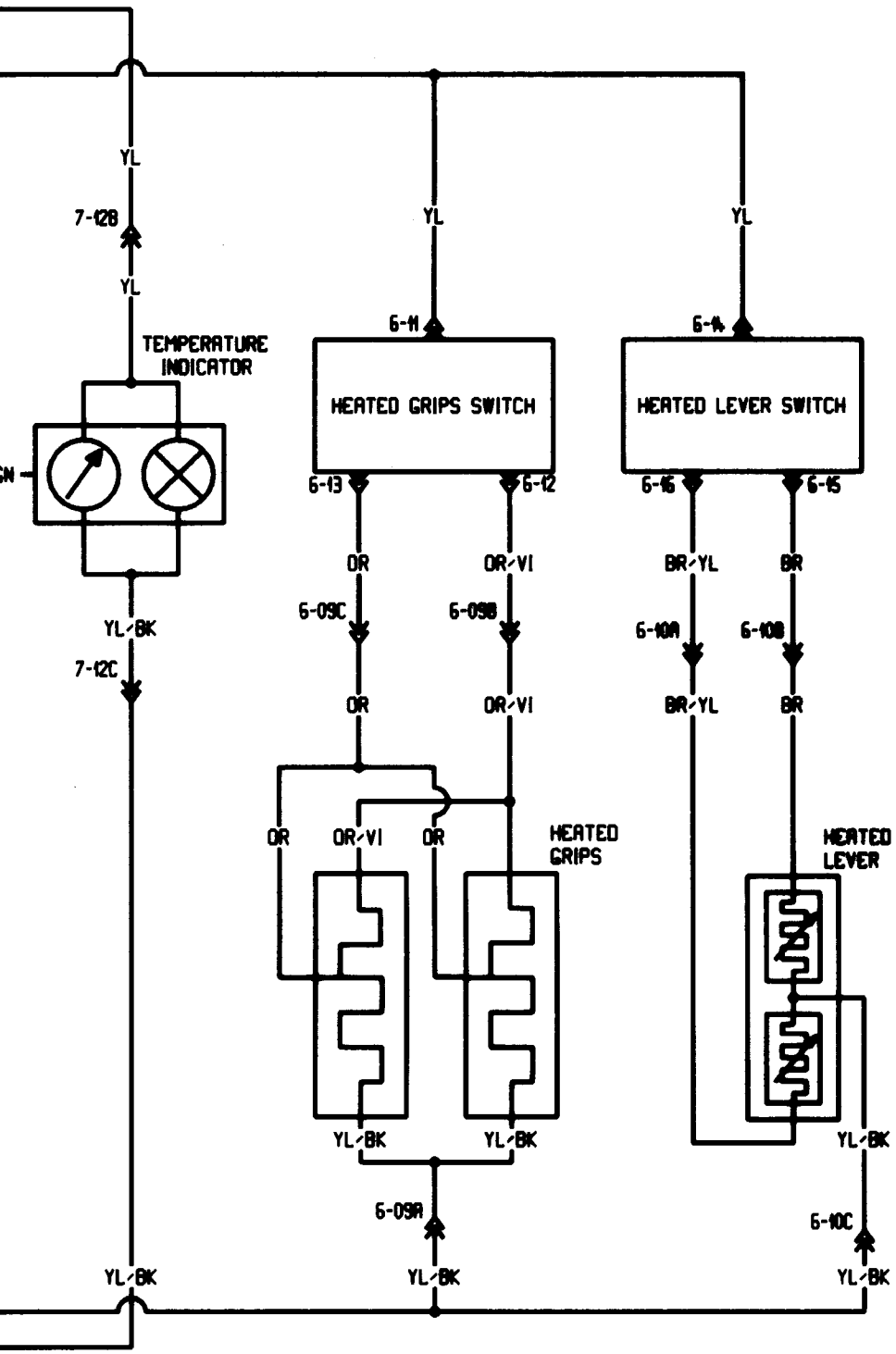


* CONNECTION EXIST ONLY WHEN USING REGULATOR WITHOUT BATTERY


8-01C
1-02B
BE
YL
WH/OR
BE/BK
RD/BL
WH/GY
BK/WH
BK/YL
1-05-1
YL
RD/BL
YL
2-04C
2-04A
RD/BL
YL
REGULATOR / RECTIFIER
FRAME
RD
RD/WH
8-10A
(20A)
MAIN
8-10B
RD
BK/YL
RD/BL
RD/GN
RD
6-01-2
6-01-4
6-01-9
OFF
ON
START
KEY SWITCH
6-01-5
6-01-5
6-02D
6-03C
6-03A
BK/YL
BK/WH
WH/GY
EMERGENCY KILL SWITCH
DESS SWITCH
BK
BK/GN
6-02C
6-03B
10-05A
SOLENOID
10-05B
RD
STARTER
BK
BK
BK
GY
7-15
7-16
YL
YL/BK
BK
2-04D
2-04B
YL/BK
YL/BK
BK
BK/GN
YL/BK
1-02C
8-01A
BK
POWER SUPPLY SYSTEM
IGNITION SWITCHES

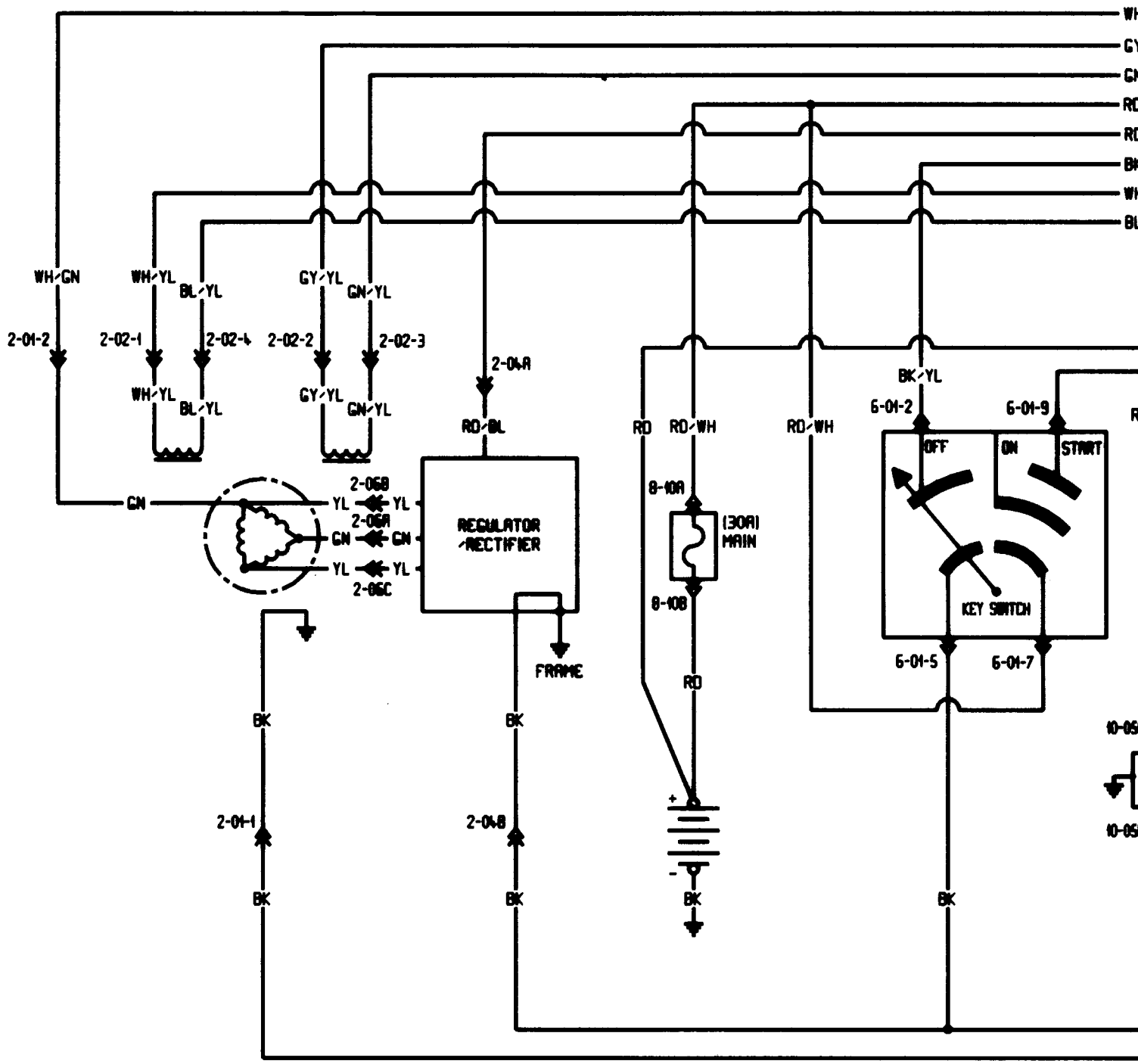

8-01C
1-02B
YL
YL
YL
YL
6-08A
YL
DIMMER SWITCH
GY
GY/VI
6-08B
6-08C
GY
GY/VI
1-04A
1-04B
GY
GY/VI
DESS SWITCH
GY
GY
GY/VI
GY
GY/VI
7-20C
7-20A
7-21C
7-21A
HIGH
LOW
HIGH
LOW
7-20B LEFT HEADLIGHT
7-21B RIGHT HEADLIGHT
7-15
7-16 HIGH BEAM INDICATOR
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL
YL
6-02B
YL
BRAKE SWITCH
WH
6-02A
WH
8-01B
WH
9-02-2
9-02-1
WH/RD
WH
9-04C
9-04B
PARKING
BRAKE
9-04A TAIL LIGHT
BK
9-02-3
YL/BK
YL
4-13
OIL LEVEL GAUGE
4-14
WH/RD
WH/RD
1-03C
WH/RD
7-10
7-11 OIL LEVEL INDICATOR
YL/BK
BE/BK
6-05
REVERSE ALARM
6-06
BK
BE
6-17
6-18
BK
BK
LIGHTING

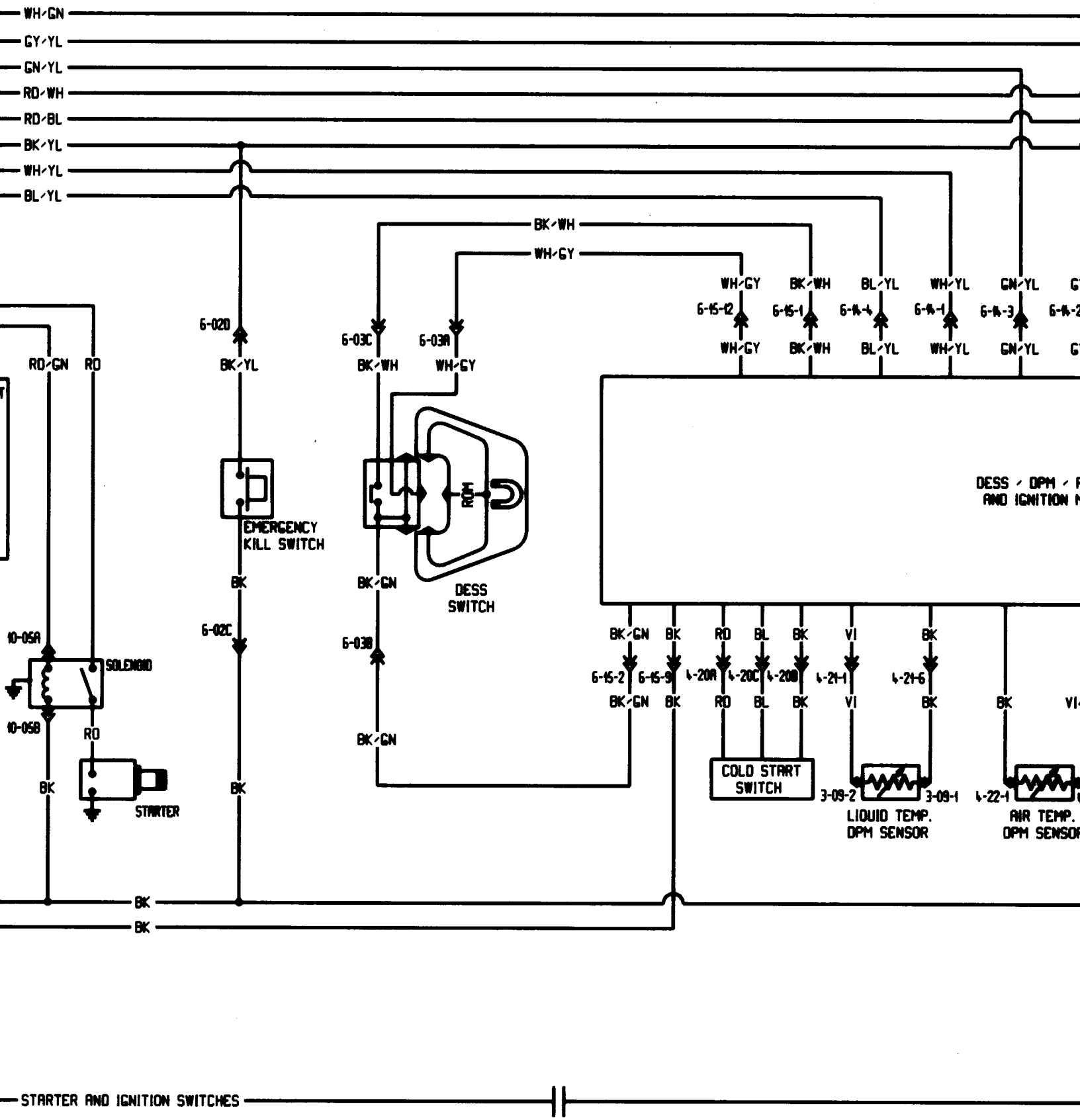

YL
BE
WH/OR
YL
YL
YL
YL
1-03A
6-04A
7-09A
7-08A
7-13B
YL
YL
YL
WH/OR
YL
TACHOMETER
FUEL LEVEL
INDICATOR
7-13A
BL
7-12A
GN
REVERSE
SWITCH
6-17
DESS
INDICATOR
7-02
ELECTRIC
VISOR
BL
GN
1-02D
1-02A
6-18
7-01
BL
YL/BK
7-13C
8-02B
BK
BK
YL/BK
YL
YL/BK
1.25AI
FUSE
GN
6-04B
BL
3-03
7-08B
SPEEDOMETER
FUEL LEVEL
SENSOR
3-04
TEMP.
SENSOR
1-03B
YL/BK
YL/BK
7-09B
8-02A
BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK
YL/BK

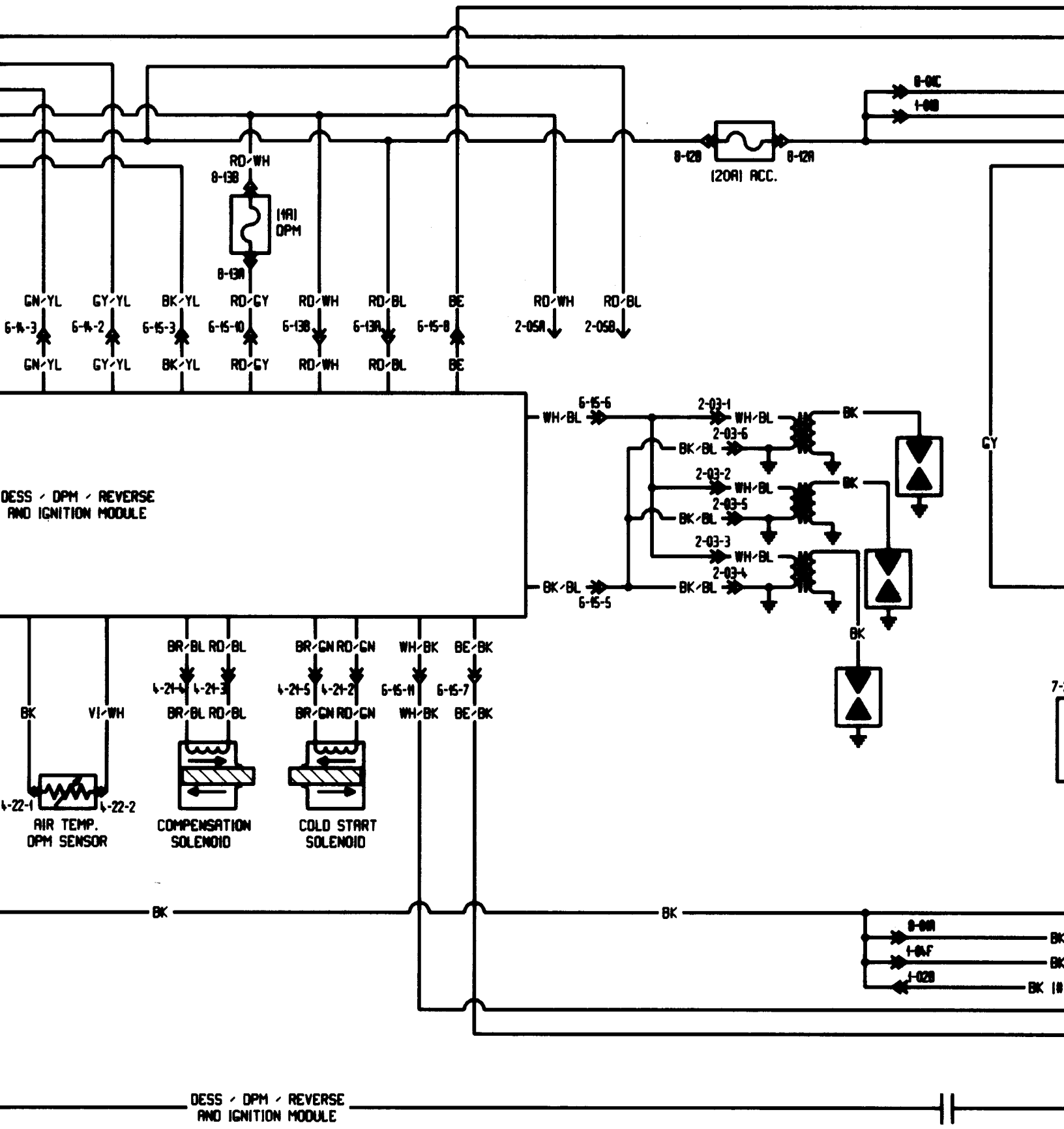

YL
7-12B
YL
TEMPERATURE INDICATOR
YL/BK
7-12C
YL
6-11
HEATED GRIPS SWITCH
6-13
6-12
OR
OR/VI
6-09C
6-09B
OR
OR/VI
OR
OR/VI
OR
HEATED GRIPS
YL/BK
YL/BK
6-09A
YL/BK
YL
6-14
HEATED LEVER SWITCH
6-16
6-15
BR/YL
BR
6-10A
6-10B
BR/YL
BR
HEATED LEVER
YL/BK
6-10C
YL/BK

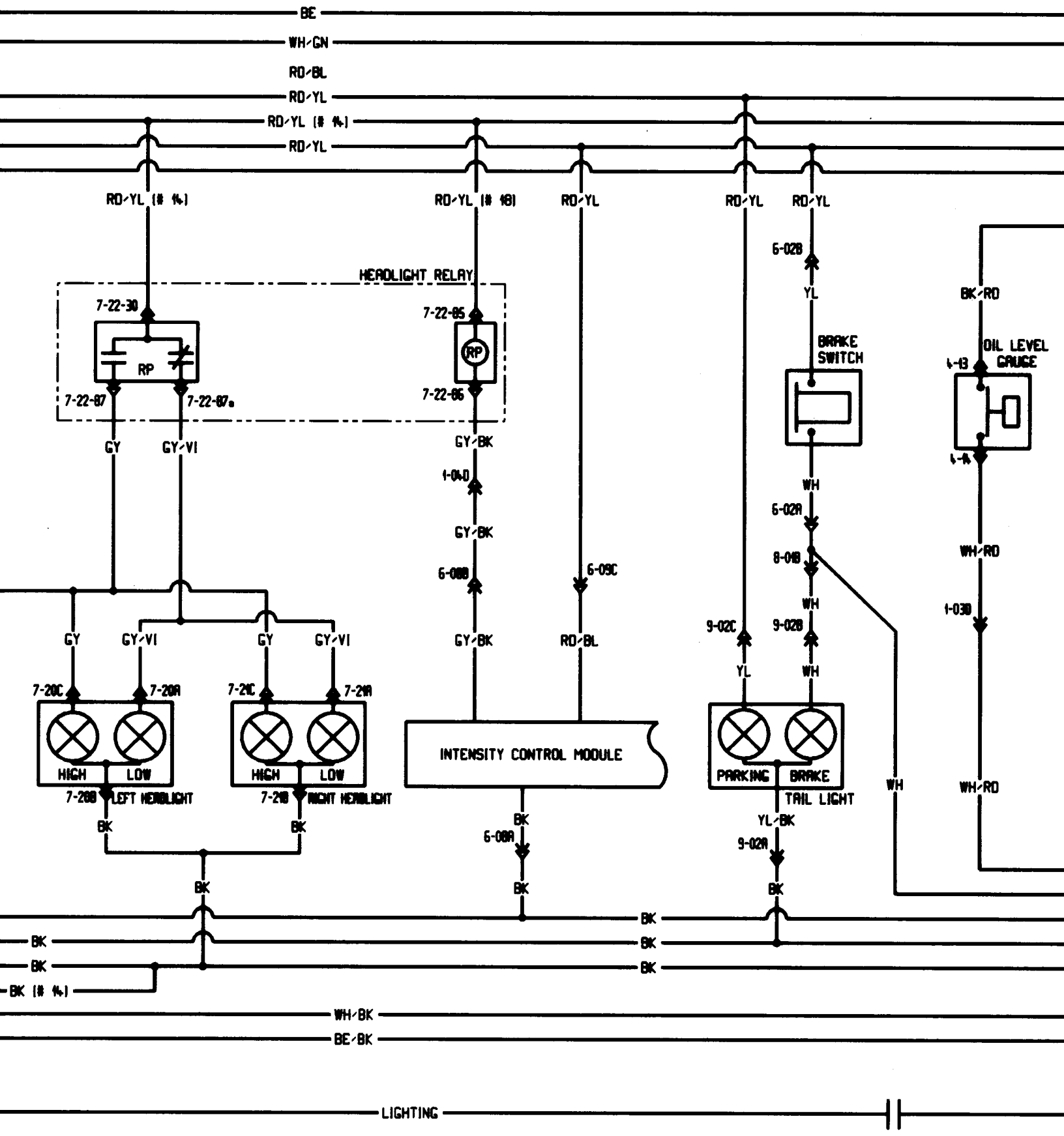
ANNEX 3 GT 700

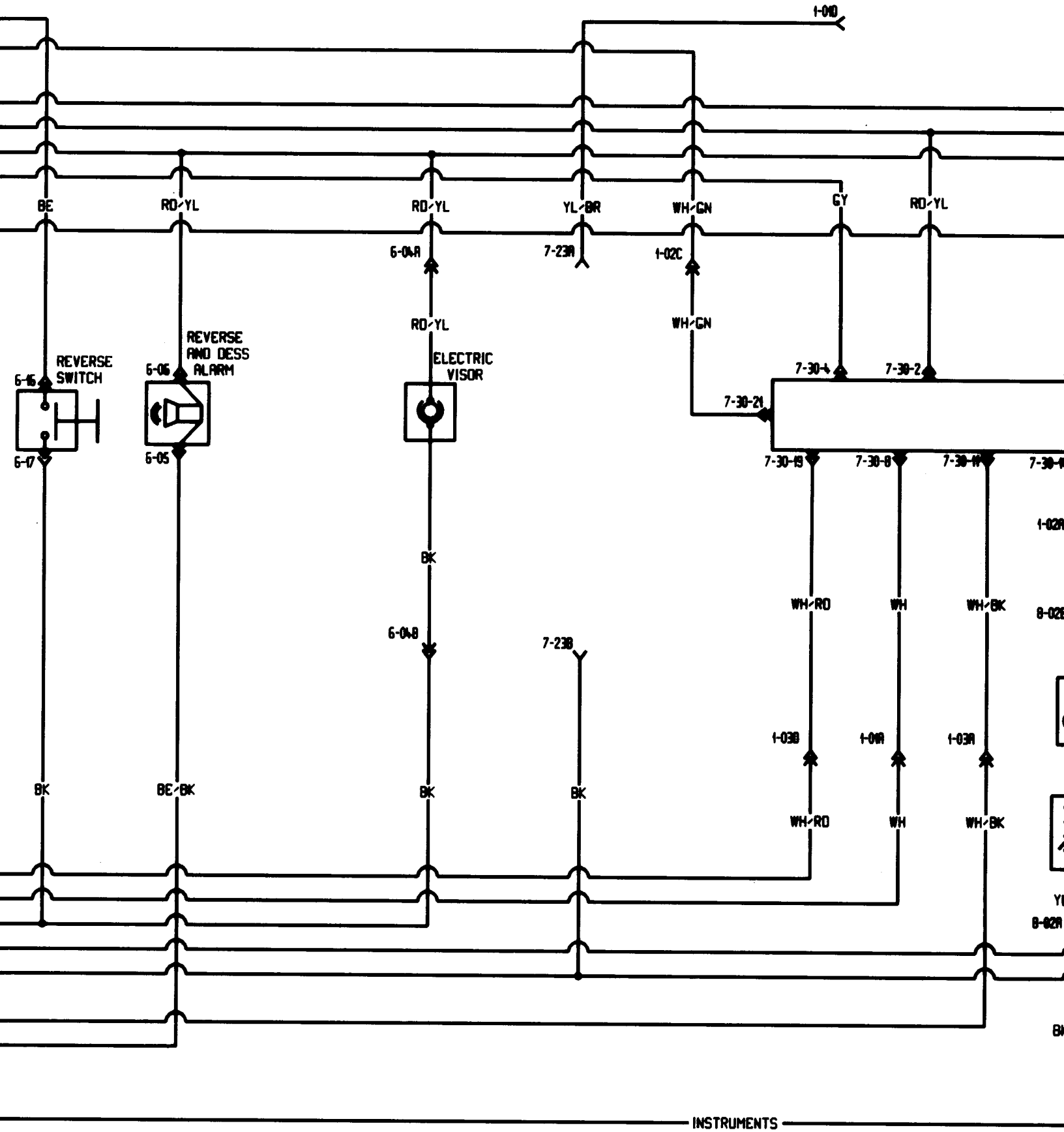
'99 GRAND TOURING 700

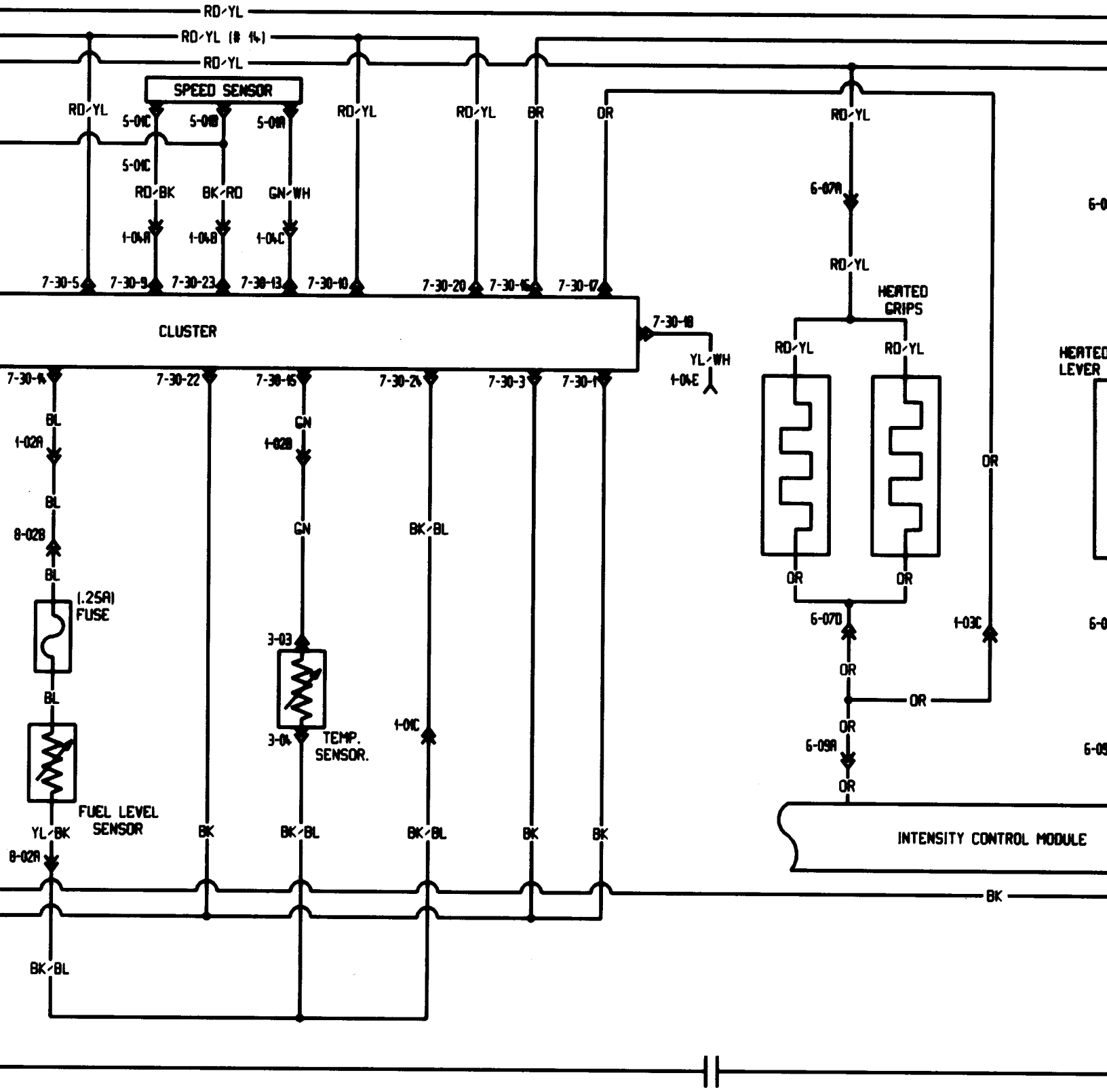


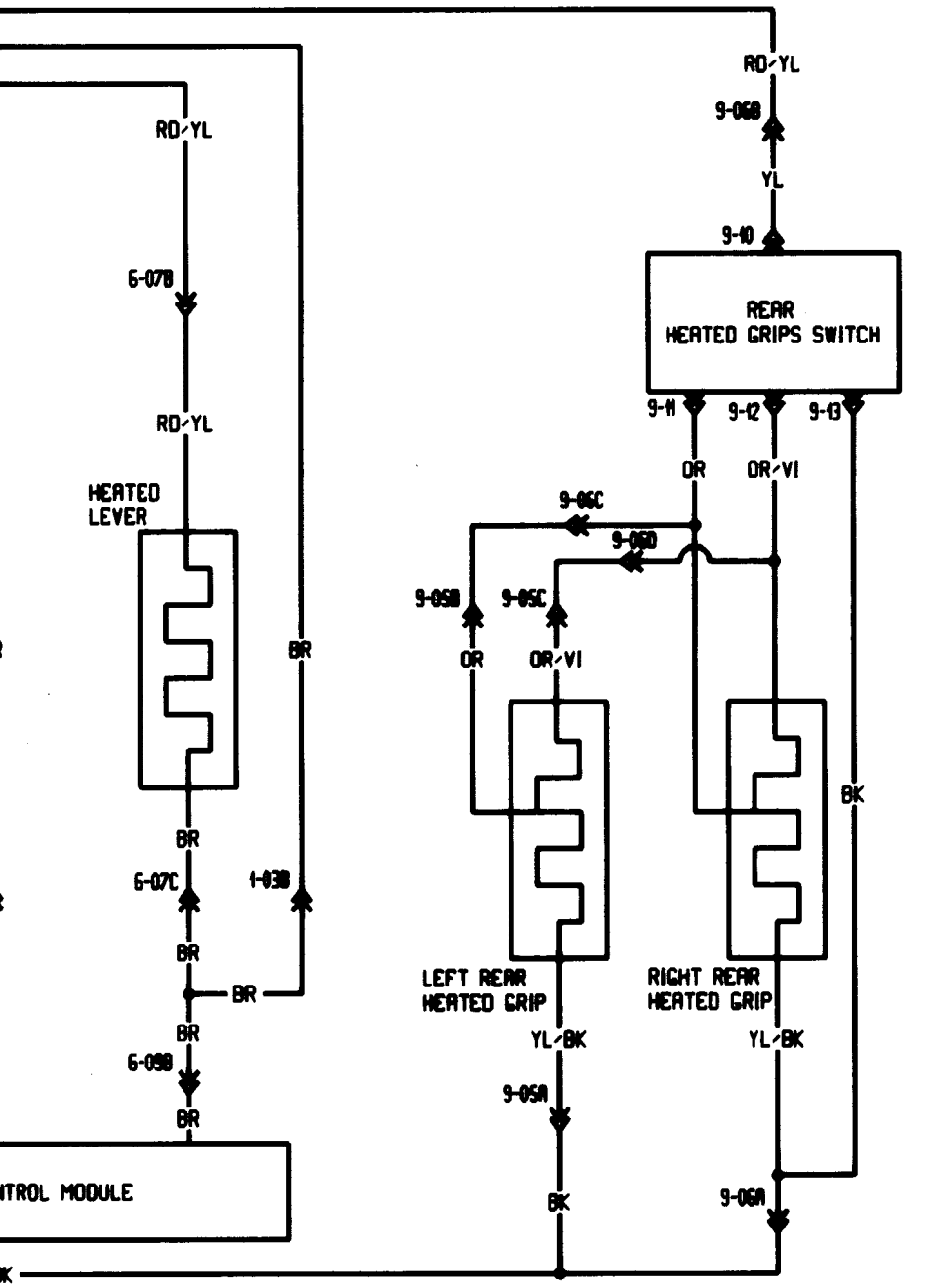

WH/GN
GY/YL
GN/YL
RD/WH
RD/BL
BK/YL
WH/YL
BL/YL
BK/WH
WH/GY
RD/GN
RD
6-02D
BK/YL
6-03C
BK/WH
6-03A
WH/GY
EMERGENCY
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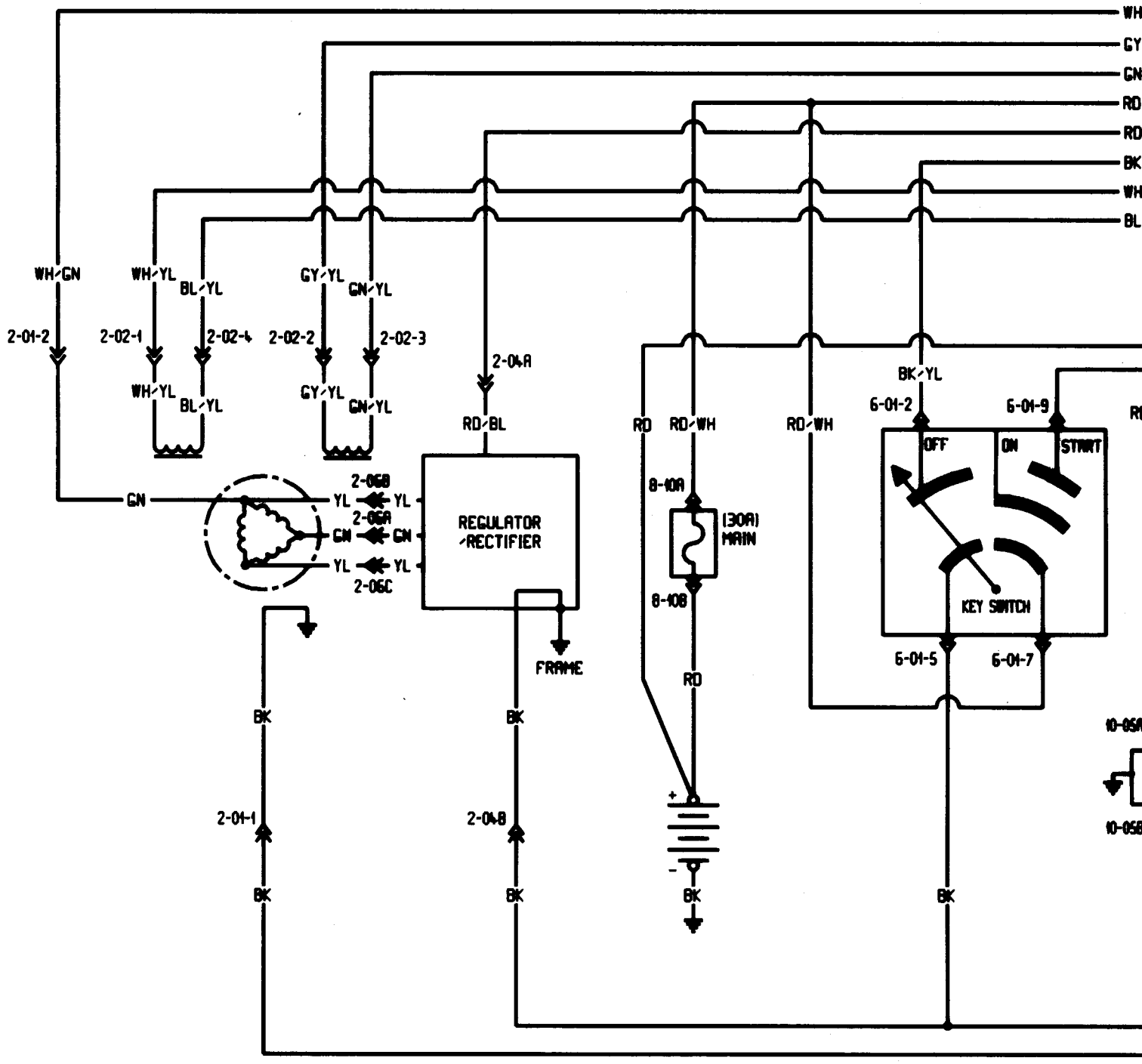

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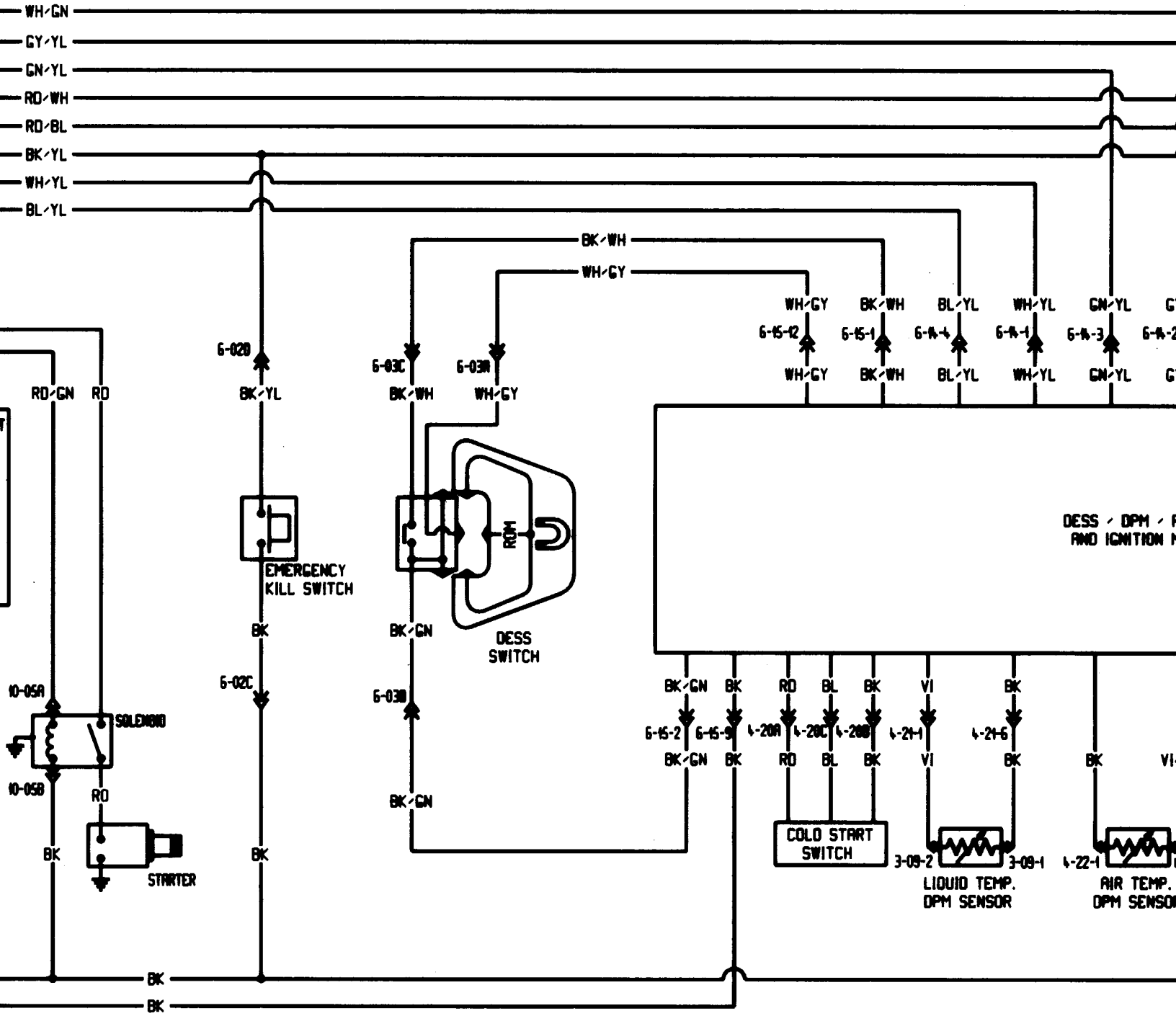

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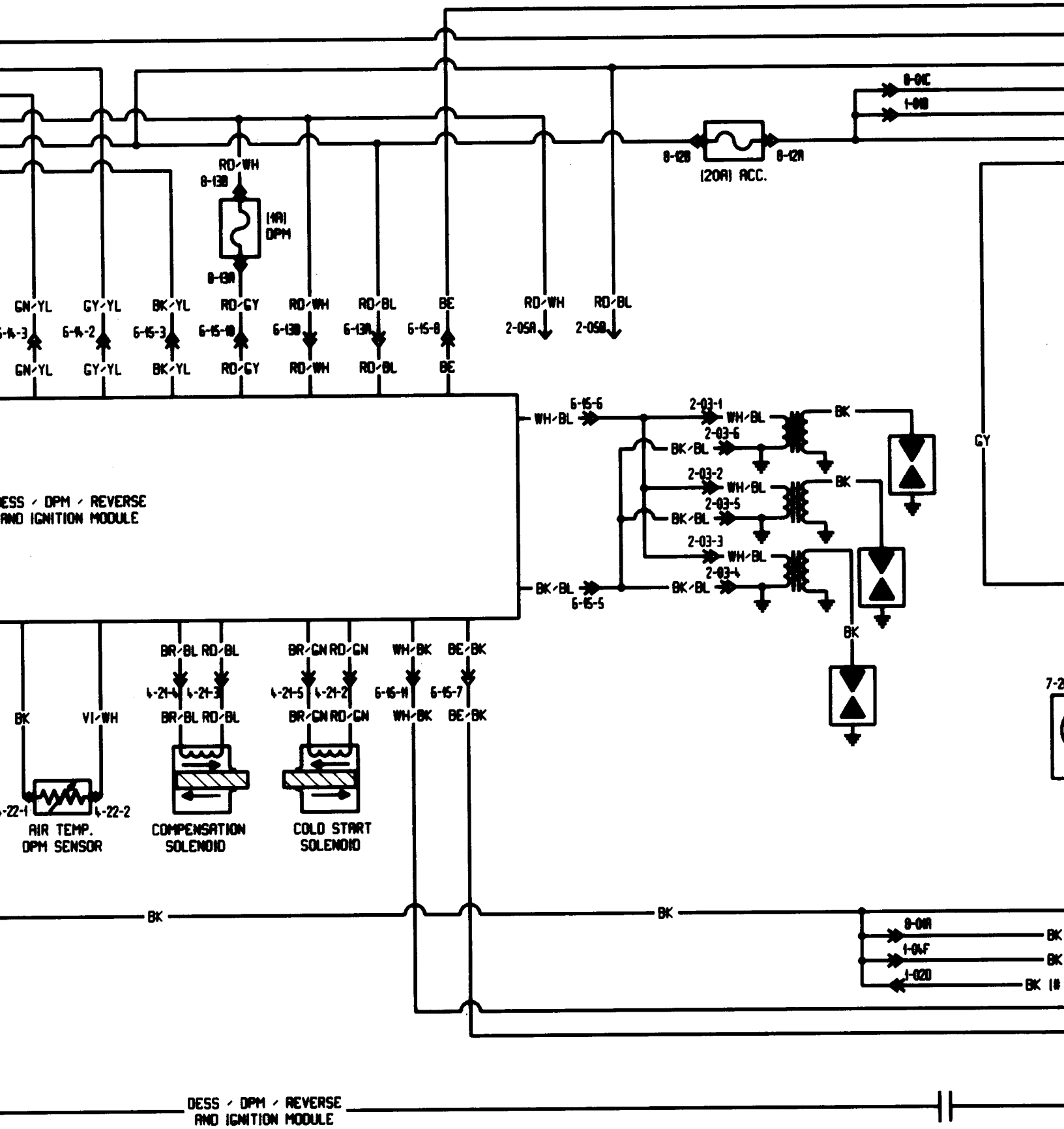

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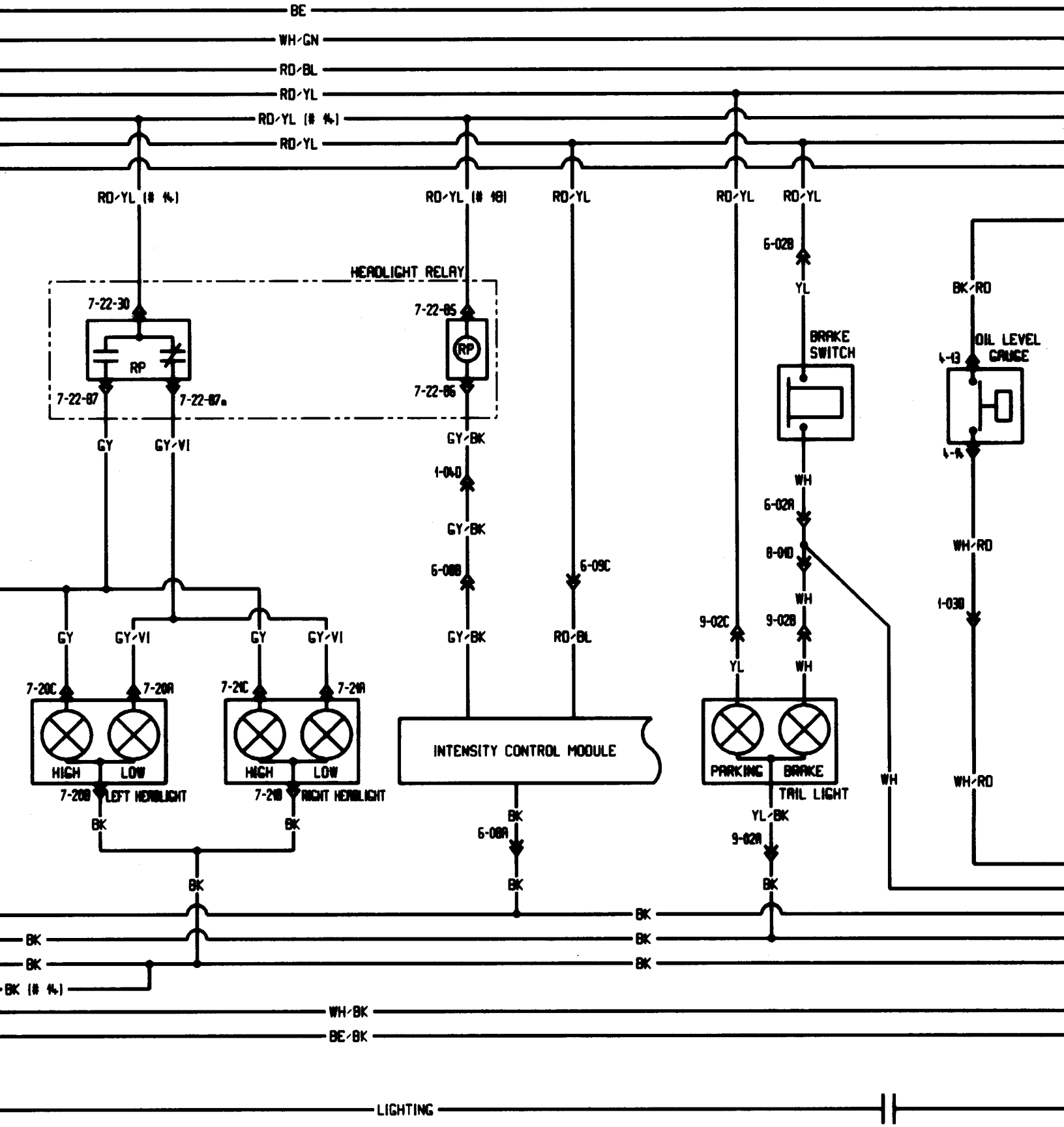
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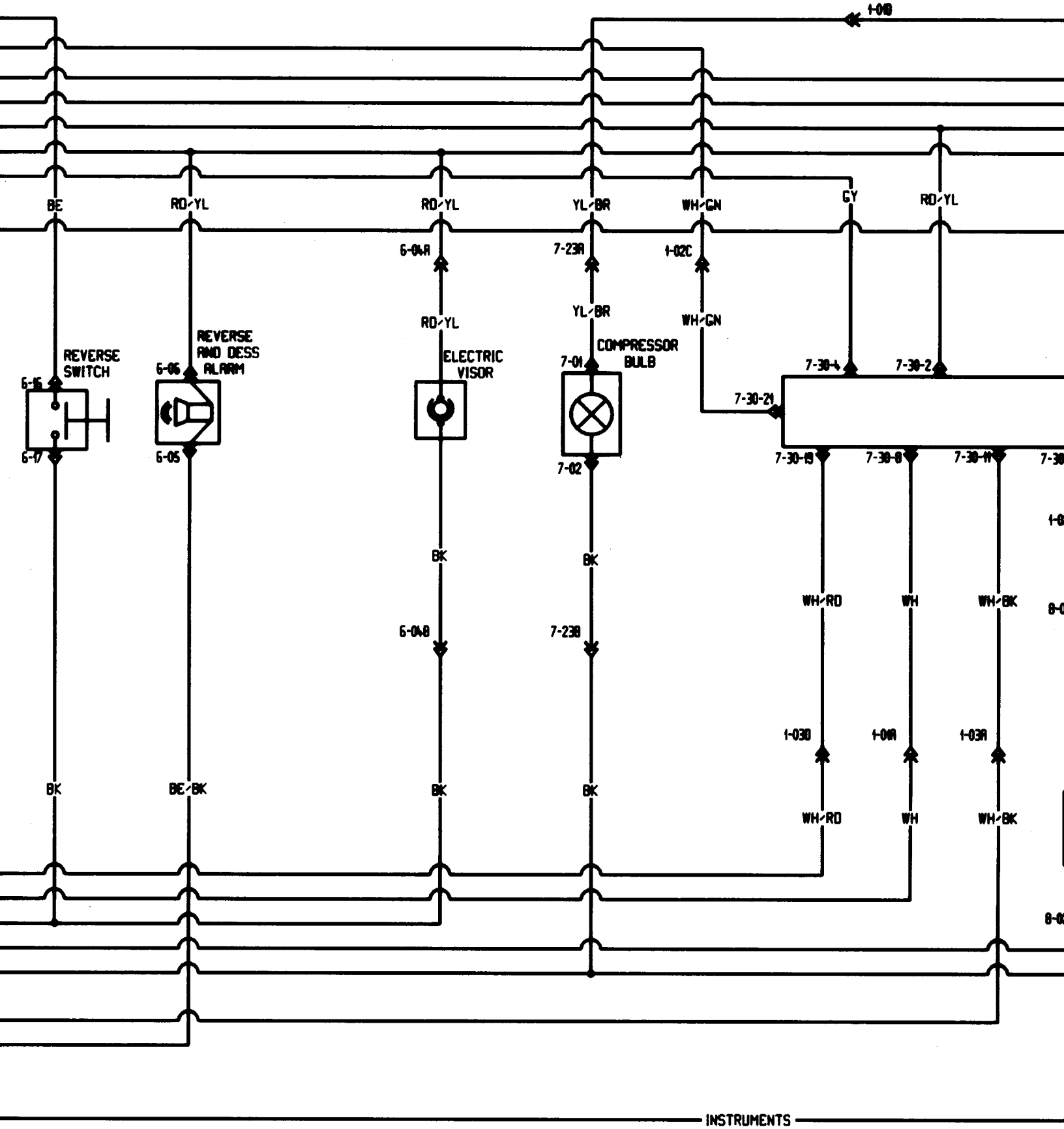
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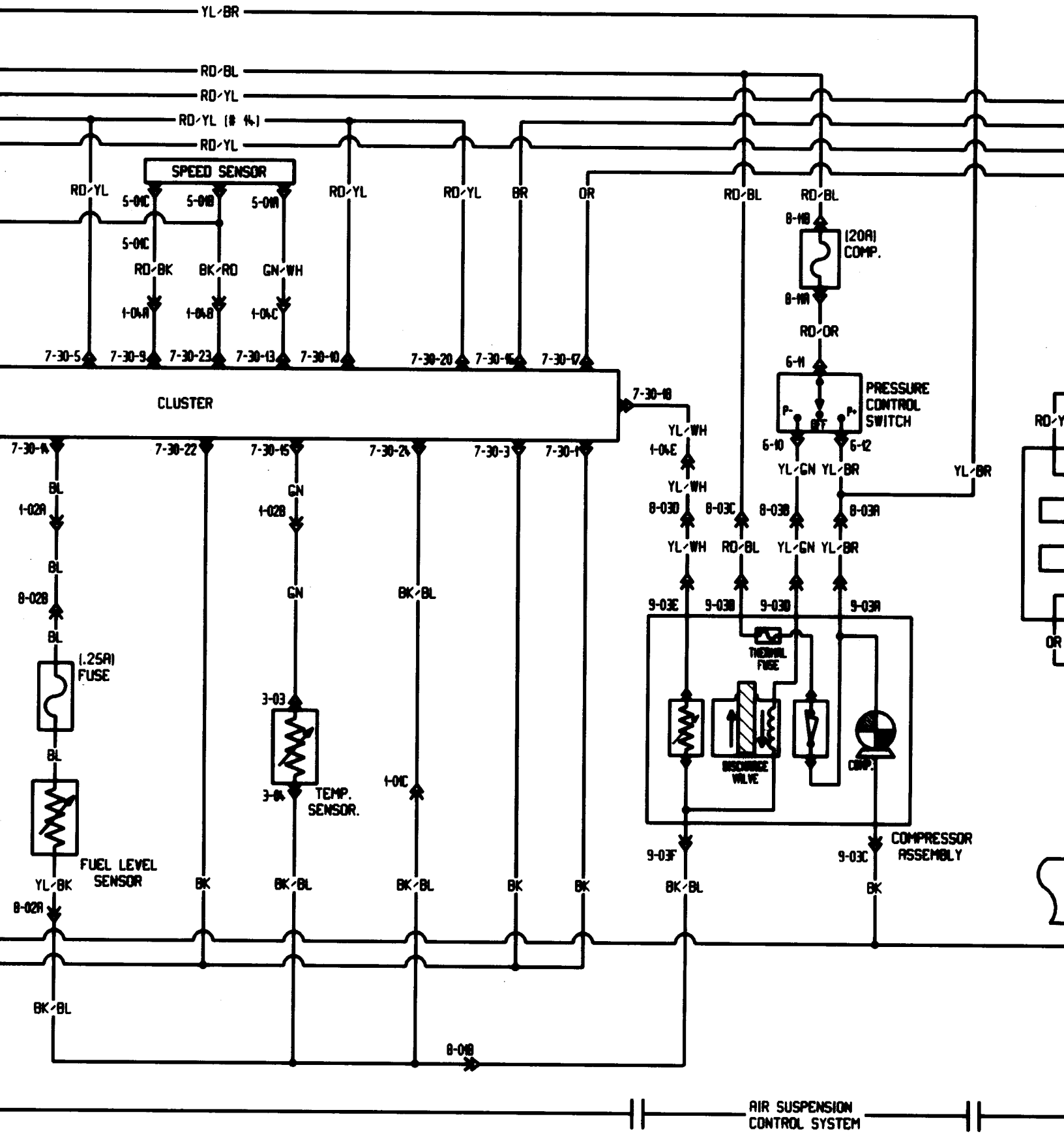


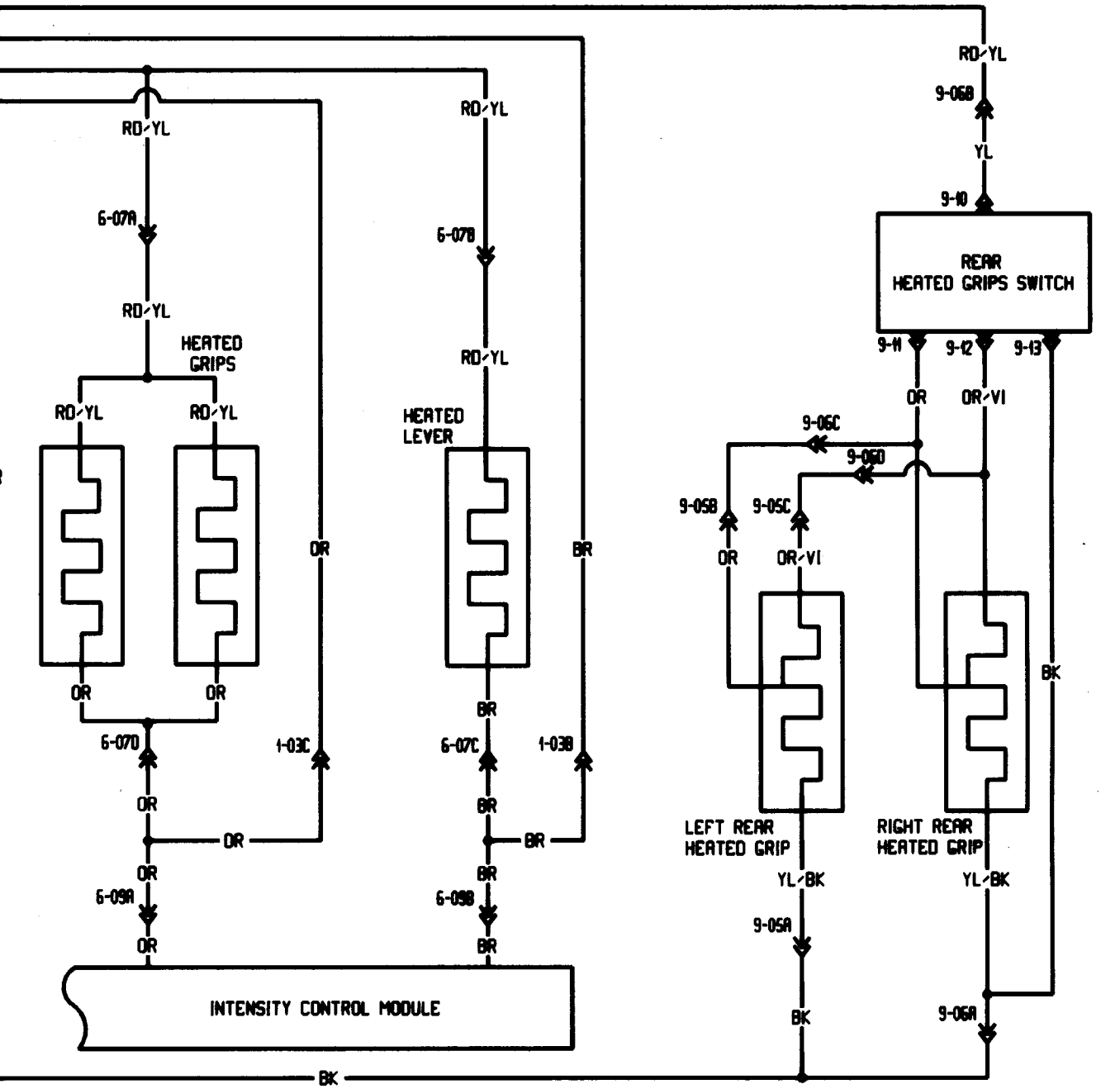

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VERSION FRANÇAISE ÉGALEMENT DISPONIBLE

ski-doo®



SHOP MANUAL 1999

MINI Z

484 200 007

Shop Manual

MINI Z

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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair Ski-Doo Mini Z snowmobile.

This edition was primarily published to be used by snowmobile mechanics who are already familiar with all service procedures relating to Bombardier made snowmobiles.

Please note that the instructions will apply only if proper hand tools and special service tools are used.

This *Shop Manual* uses technical terms which may be slightly different from the ones used in *Parts Catalog*.

It is understood that this manual may be translated into another language. In the event of any discrepancy, the english version shall prevail.

The content depicts parts and/or procedures applicable to the particular product at its time of manufacture. It does not include dealer modifications, whether authorized or not by Bombardier, after manufacturing the product.

In addition, the sole purpose of the illustrations throughout the manual, is to assist identification of the general configuration of the parts. They are not to be interpreted as technical drawings or exact replicas of the parts.

The use of Bombardier parts is most strongly recommended when considering replacement of any component. Dealer and/or distributor assistance should be sought in case of doubt.

The engine and the corresponding components identified in this document should not be utilized on product(s) other than those mentioned in this document.

Torque wrench tightening specifications must be strictly adhered to. Locking devices (ex.: locking tab, elastic stop nut, etc.) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be renewed.

This manual emphasizes particular information denoted by the wording and symbols:

◆ WARNING

Identifies an instruction which, if not followed, could cause serious personal injury including possibility of death.

▼ CAUTION

Denotes an instruction which, if not followed, could severely damage vehicle components.

NOTE: Indicates supplementary information needed to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use. Always use common shop safety practice.

This information relates to the preparation and use of Bombardier snowmobiles and has been utilized safely and effectively by Bombardier Inc. However, Bombardier Inc. disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic. It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

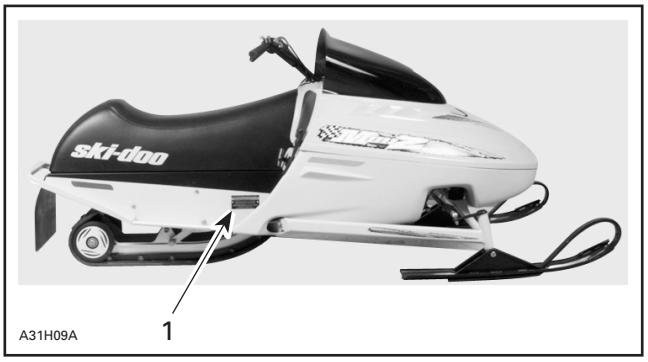
INTRODUCTION

This *Shop Manual* covers the Ski-Doo Mini Z* snowmobile.

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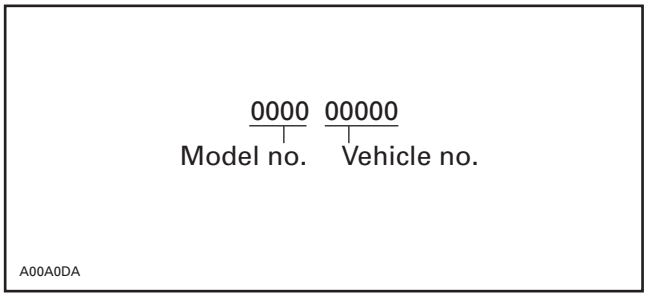
VEHICLE SERIAL NUMBER

Vehicle Serial Number Location



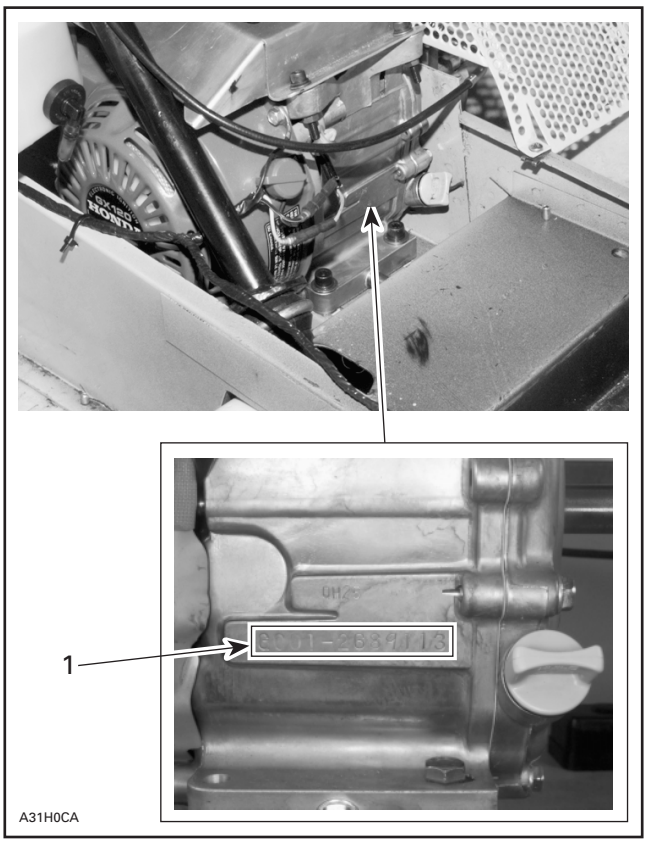
1. Vehicle serial number

Serial Number Meaning



ENGINE SERIAL NUMBER

Engine Serial Number Location



1. Engine serial number

ARRANGEMENT OF THE MANUAL

The manual is divided into 11 major sections:

01 SERVICE TOOLS AND SERVICE PRODUCTS
02 LUBRICATION AND MAINTENANCE
03 TROUBLESHOOTING
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05 TRANSMISSION
06 ELECTRICAL
07 REAR SUSPENSION
08 STEERING/FRONT SUSPENSION
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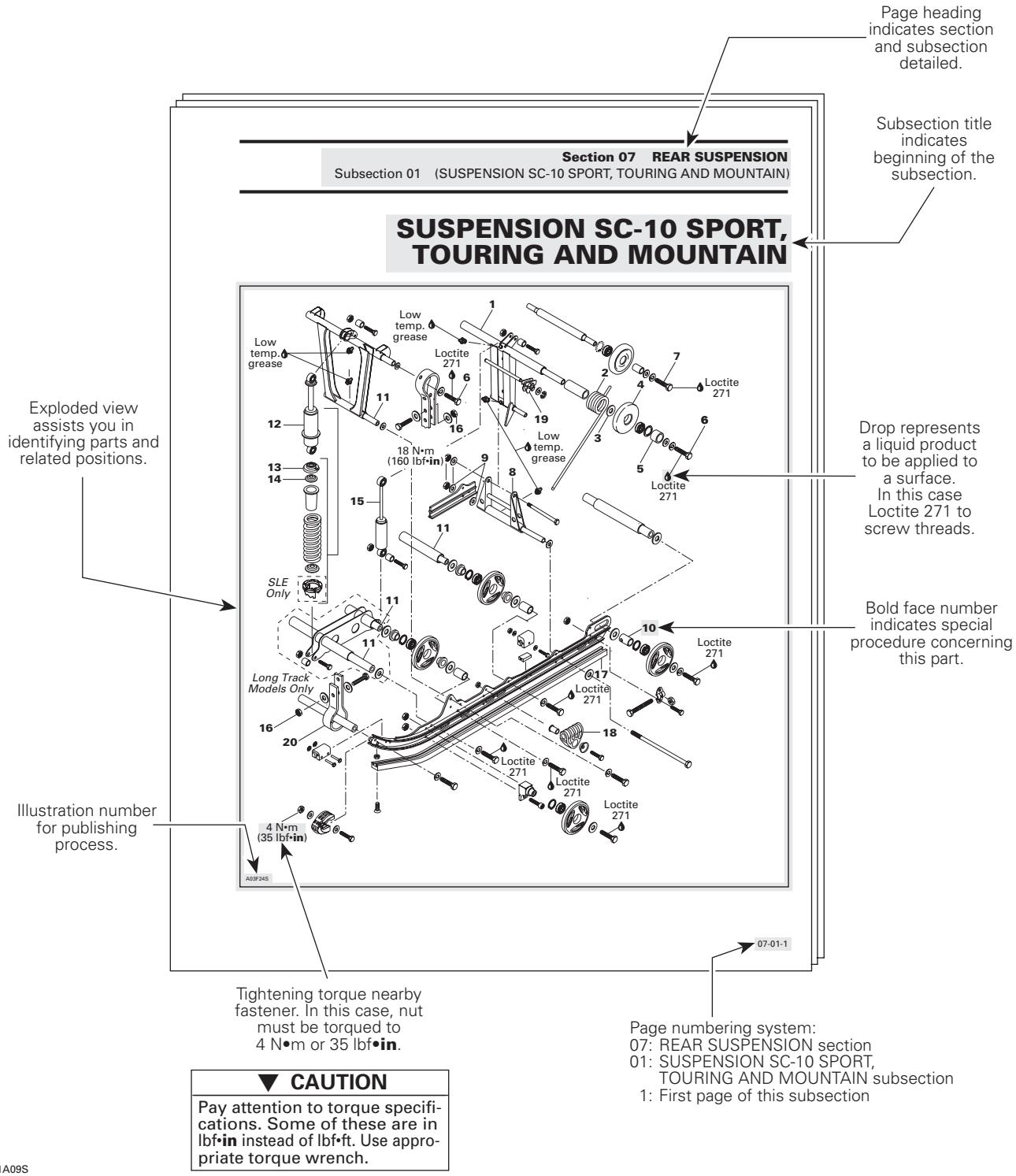
Each section is divided in various subsections, and again, each subsection has one or more division.

LIST OF ABBREVIATIONS USED IN THIS MANUAL

A	ampere
amp	ampere
A•h	ampere-hour
AC	alternate current
°C	degree Celsius
cm	centimeter
cm^2	square centimeter
cm^3	cubic centimeter
DC	direct current
°F	degree Fahrenheit
FC	fan cooled
fl. oz	fluid ounce
ft	foot
GRD	ground
imp. oz	imperial ounce
in	inch
in^2	square inch
in^3	cubic inch
k	kilo (thousand)
kg	kilogram
km/h	kilometer per hour
kPa	kilopascal
L	liter
lb	pound
lbf	pound (force)
lbf/in^2	pound per square inch
LH	left hand
m	meter
MAG	magneto
Max.	maximum
Min.	minimum
mL	milliliter
mm	millimeter
MPH	mile per hour
N	newton
N.A.	not applicable
no.	number
00.0	continuity
0.L	overload (open circuit)
O.D.	outside diameter
OPT	optional
oz	ounce
P/N	part number
PSI	pound per square inch
PTO	power take off
R	rectangular
RPM	revolution per minute
TDC	top dead center
U.S. oz	ounce (United States)
V	volt
Vac	volt (alternative current)

This *Shop Manual* uses technical terms wich may be slightly different from the ones in the parts catalog.

TYPICAL PAGE



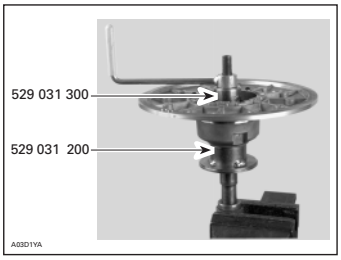
▼ CAUTION

Pay attention to torque specifications. Some of these are in lbf•**in** instead of lbf•ft. Use appropriate torque wrench.

A31A09S

TYPICAL PAGE

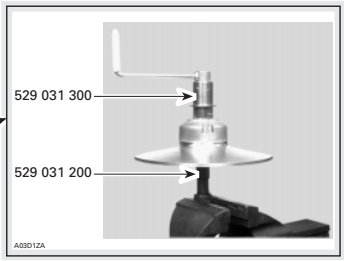
Turn puller handle and sliding half at once to extract the bushing.



IMPORTANT: Large bushing retaining screws and washers must be removed before small bushing installation.

Coat bushing outside diameter with Loctite 609 (P/N 413 703 100).

Install bushing as following photo.



ASSEMBLY

Came Slider Shoe

When replacing slider shoes **no. 4**, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

Cam

Coat cam **no. 18** interior with anti-seize lubricant.

INSTALLATION

Countershaft

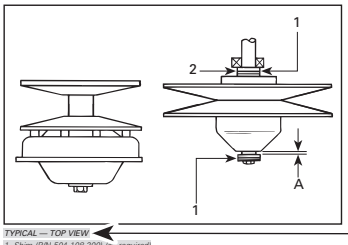
▼ CAUTION

Always apply anti-seize lubricant (P/N 413 701 000) on the countershaft before final pulley installation.

Should installation procedure be required, refer to BRAKE 05-05 then look for **Brake Disc and Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

Check end play of driven pulley on countershaft by pushing pulley towards outer housing so that the inner shims (P/N 504 108 200) contact it. Measure end play at the mounting screw end between shim(s) and puley. See illustration.



TYPICAL — TOP VIEW
1. Shim (P/N 504 108 200) (as required)
2. Contact
A. 0 to 1 mm (0 to 3/64 in)

Torque retaining screw **no. 13** to 25 N•m (18 lbf•ft).

ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT 05-04 to adjust pulley distance. Adjust drive belt height between pulley halves to obtain specified belt deflection.

Title indicates main procedure to be carried-out.

"TYPICAL" caption indicates a general view which does not represent full detail. "TOP VIEW" caption helps you in understanding illustration.

Call-outs for above illustration.

Illustration always follows text to which it pertains.

Reference to look up a certain section and subsection. In this case it concerns pulleys adjustment.

Subtitle indicates a particular procedure for the named part.

Number following part name refers to exploded view at beginning of subsection.

A31A0AS

INTRODUCTION

GENERAL INFORMATION

The information and component/system descriptions contained in this manual are correct at time of publication. Bombardier Inc. however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

Due to late changes, it may have some differences between the manufactured product and the description and/or specifications in this document.

Bombardier Inc. reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligation.

USEFUL PUBLICATIONS

Refer to *Parts Catalogs* to order the right parts.

Use *Specification Booklet* to find rapidly the right specs.

ILLUSTRATIONS AND PROCEDURES

Illustrations and photos show the typical construction of the different assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts shown, however, they represent parts which have the same or a similar function.

▼ CAUTION

Most components of those vehicles are built with parts dimensioned in the metric system. Most fasteners are metric and must not be replaced by customary fasteners or vice-versa. Mismatched or incorrect fasteners could cause damage to the vehicle or possible personal injury.

As many of the procedures in this manual are interrelated, we suggest, that before undertaking any task, you read and thoroughly understand the entire section or subsection in which the procedure is contained.

A number of procedures throughout the book require the use of special tools. Before commencing any procedure, be sure that you have on hand all the tools required, or approved equivalents.

The use of RIGHT and LEFT indications in the text, always refers to driving position (when sitting on vehicle).



TYPICAL

1. *Left*
2. *Right*

TIGHTENING TORQUES

Tighten fasteners to torque mentioned in exploded views and text. When they are not specified refer to following table.

N•m	FASTENER SIZE (8.8)	Lbf•**in**
1		9
2	**M4**	18
3	M4	27
4	**M5**	35
5		44
6		53
7		62
8	M6	71
9	M6	80
10	**M6**	89
11	M6	97
12	M6	106
13		115
14		124
15		133
16		142
17		150
18		159
19		168

N•m	FASTENER SIZE (8.8)	Lbf•ft
20		15
21	M8	15
22	M8	16
23	**M8**	17
24	M8	18
25	M8	18
26		19
27		20
28		21
29		21
30		22
31		23
32		24
33		24
34		25
35		26
36		27
37		27
38		28

N•m	FASTENER SIZE (8.8)	Lbf•ft
39		29
40		30
41		30
42		31
43	M10	32
44	M10	32
45	M10	33
46	M10	34
47	M10	35
48	**M10**	35
49	M10	36
50	M10	37
51	M10	38
52	M10	38
53	M10	39
54		40
55		41
56		41
57		42
58		43
59		44
60		44
61		45
62		46
63		46
64		47
65		48
66		49
67		49
68		50
69		51
70		52
71		52
72		53
73		54
74		55
75		55
76	M12	56
77	M12	57
78	M12	58
79	M12	58
80	**M12**	59
81	M12	60
82	M12	60
83	M12	61

N•m	FASTENER SIZE (8.8)	Lbf•ft
84	M12	62
85		63
86		63
87		64
88		65
89		66
90		66
91		67
92		68
93		69
94		69
95		70
96		71
97		72
98		72
99		73
100		74
101		74
102		75
103		76
104		77
105		77
106		78
107		79
108		80
109		80
110		81
111		82
112		83
113		83
114		84
115		85
116		86
117		86
118		87
119		88
120		89
121	M14	89
122	M14	90
123	M14	91
124	M14	91
125	M14	92
126	M14	93
127	M14	94
128	M14	94

N•m	FASTENER SIZE (8.8)	Lbf•ft
129	M14	95
130	M14	96
131	M14	97
132	M14	97
133	M14	98
134	M14	99
135	**M14**	100
136	M14	100
137	M14	101
138	M14	102
139	M14	103
140	M14	103
141	M14	104
142	M14	105
143	M14	105
144	M14	106
145	M14	107
146	M14	108
147	M14	108
148	M14	109
149	M14	110
150	M14	111

TIGHTENING TORQUES FOR 8.8 GRADE BOLTS AND NUTS

We would be pleased if you could communicate to Bombardier any suggestions you may have concerning our publications.

Bombardier SERVICE PUBLICATIONS REPORT

Publication title and year _____ Page_____

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AFFIX
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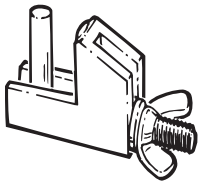
Technical Publications
After Sales Service
565 de la Montagne Street
Valcourt, Québec, Canada J0E 2L0

SERVICE TOOLS

This is a list of tools to properly service Ski-Doo snowmobile models specified on cover page. The list includes both the mandatory tools and the optional tools that are ordered separately. The list of Service Products, both mandatory and optional, are not part of any kit and must all be ordered separately. If you need to replace or add to your tool inventory these items can be ordered through the regular parts channel.

ENGINE — MANDATORY SERVICE TOOLS

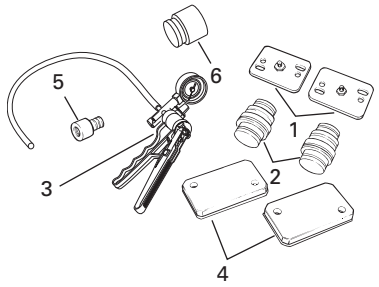
Hose pincher (2)
(P/N 295 000 076)



A01B2I4

APPLICATION
All vehicles.

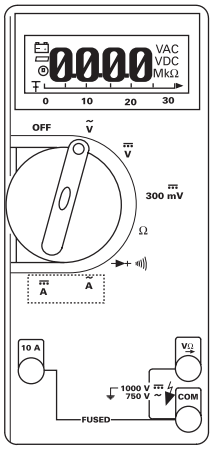
Engine leak tester kit
(P/N 861 749 100)



A01B2D4

APPLICATION
All engines.

Fluke multimeter
(P/N 529 022 000)



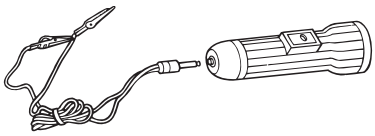
F01B1O4

APPLICATION
All models.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

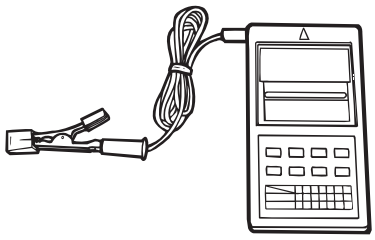
Circuit tester
(continuity light)
(P/N 414 012 200)



A00C214

APPLICATION
All models.

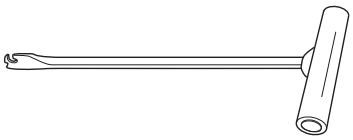
Digital/induction type
tachometer
(P/N 529 014 500)



F01B1G4

APPLICATION
All engines.

Exhaust spring installer/remover
(P/N 529 028 100)



A00C3S4

APPLICATION
All models.

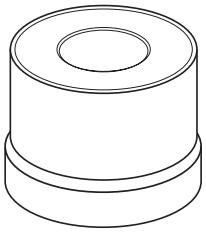
Driver tool
(P/N 529 035 521)



A00B4O4

APPLICATION
Crankcase bearings.

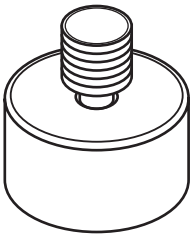
Attachment
(P/N 529 035 522)



A00B4P4

APPLICATION
Crankcase bearings.

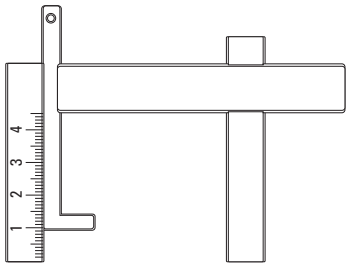
Pilot 22 mm
(P/N 529 035 523)



A00B4Q4

APPLICATION
Crankcase bearings.

Float level gauge
(P/N 529 035 520)



A00B4N4

APPLICATION
All models.

TRANSMISSION — MANDATORY SERVICE TOOLS

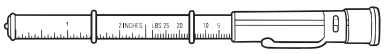
Clutch holder
(P/N 529 006 400)



A01B154

APPLICATION
All TRA drive pulleys and Mini Z flywheel.

Tension tester
(P/N 414 348 200)



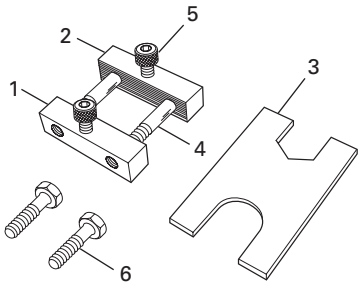
A03D1T4

APPLICATION
All models.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

Drive axle sprocket adjuster
(P/N 861 725 700)



A01B2O4

APPLICATION
All vehicles.

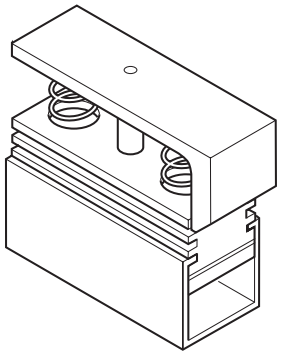
Parts included in the kit:

1) Block with threads
   (P/N 529 010 700)
2) Block without threads
   (P/N 529 010 800)
3) Plate
   (P/N 529 010 600)
4) Bolt M10 (2)
   (P/N 222 007 565)
5) Allen screw M8 (2)
   (P/N 222 983 065)
6) Screw M8 (2)
   (P/N 222 082 565)

NOTE: When the tool is to be use between tunnel and sprocket use screw M8.

SUSPENSION — RECOMMENDED SERVICE TOOLS

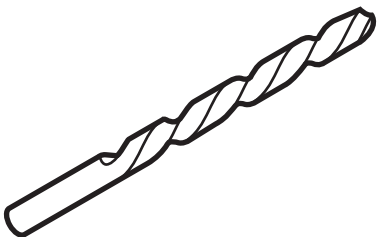
Track tension gauge
(P/N 529 021 500)



A00B3X4

APPLICATION
All models.

Drill bit
(P/N 529 031 800)



A01B564

APPLICATION
All 3/16 in rivets.

VEHICLES — RECOMMENDED SERVICE TOOLS

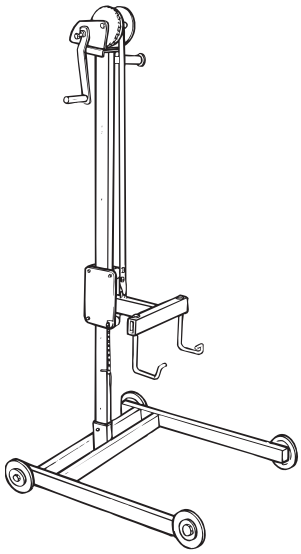
Protective mat
(P/N 529 030 600)



A01B45W

APPLICATION
All models.

Snowmobile jack
(P/N 529 020 000)



A01A1JJ

APPLICATION
All models.

SERVICE PRODUCTS

MANDATORY SERVICE PRODUCTS

Medium-strength threadlocker
(P/N 413 703 000)
Loctite® 242
Threadlocker (10 mL)
(blue, medium strength)



A00B324

APPLICATION
Flywheel nut, crankcase studs, etc.

Silicone compound
(P/N 420 897 061)
Dow Corning® MS4



A00B3R4

APPLICATION
Lubricate pawl and pawl lock of rewind starter.

Gasket/paint remover
(P/N 413 708 500)
Loctite® 79040 Chisel
510 g (18 oz)

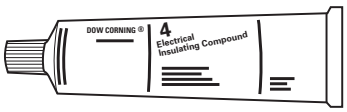


A00B3L4

APPLICATION
Clean mating surfaces of cylinders and crankcase. Remove carbon in combustion chambers.

RECOMMENDED SERVICE PRODUCTS

Silicone dielectric grease
(3 oz)
(P/N 413 701 700)



A00B1X4

APPLICATION

On all electric connections. High tension coil and spark plug connections. Connector housings, etc.

Anti-seize lubricant
(P/N 413 701 000)
Loctite anti-seize
lubricant 454 g (16 oz)



F01B174

APPLICATION

Unpainted surfaces of countershaft.

Bearing grease (400 g)
(P/N 413 706 100)



A01B574

APPLICATION

For idler bearings, ski legs, seal interior lips drive axle bearings, suspension and steering, etc.

Storage oil
(350 g spray can)
(12 x 350 g)
(P/N 496 014 100)



A00B384

APPLICATION

All models.

Degreaser
(P/N 413 708 400)
Permatex® 48 TA
433 g (15 oz)



A00B3K4

APPLICATION

Engine, chaincase, pulleys and any greasy surfaces.

Gel instant adhesive
(P/N 413 708 300)
Loctite 454-40
20 g (.70 oz)



A00B3O4

APPLICATION

Isolating foam and rubber strip.

Tough adhesive
(P/N 413 408 300)
Loctite Black Max 38004
3 mL (.10 oz)

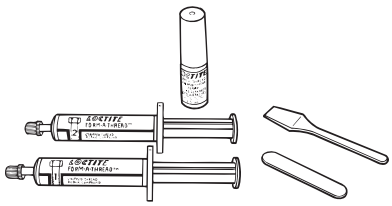


A00B3P4

APPLICATION

Shifter boot or grip.

Stripped threads repair kit
(P/N 413 708 600)
Loctite 81668
Form-A-thread 81668

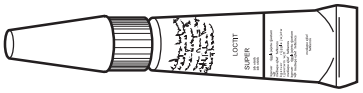


A00A1J4

APPLICATION

Repair damaged threads of grade 5 (SAE) or 8.8 (metric) maximum. Do not use in applications where temperatures will exceed 149°C (300°F) or on critical assemblies.

General purpose instant adhesive Loctite 495 (3 g)
(P/N 413 703 200)



A00B2V4

APPLICATION
Rubber to metal bonding and most hard plastic.

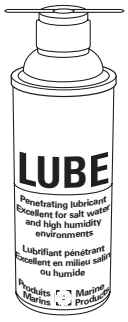
Fuel stabilizer
(12 x 8 oz)
(P/N 413 408 600)



A00B3V4

APPLICATION
All models.

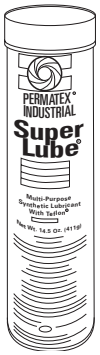
BOMBARDIER LUBE
(12 x 14 oz)
(P/N 293 600 016)



A01B4P4

APPLICATION
Steering ball joints on all models.

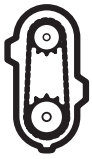
Super Lube (grease)
(P/N 293 550 014)



A00B474

APPLICATION
Tie rod bushings.

LUBRICATION AND MAINTENANCE CHART

SYSTEM	PART/TASK	10-HOUR INSPECTION (to be performed by dealer)	WEEKLY	MONTHLY	ONCE A YEAR	STORAGE (to be performed by dealer)	PRE-SEASON PREPARATION (to be performed by dealer)	REFER TO
	Rewind Starter Lubrication and Rope Condition						✔	Subsection 04-07
	Engine Head Nuts	✔			✔			Appropriate section: See TOP END
	Engine Mount Nuts	✔			✔			Appropriate section: See ENGINE REMOVAL
	Exhaust System	✔		✔			✔	Appropriate section: See ENGINE REMOVAL
	Engine Lubrication					✔		This section no. 3
	Cooling System Condition	✔			✔		✔	Subsection 04-06
	Valve Clearance				✔			Subsection 04-03
	Condition of Seals						✔	Subsection 04-04
	Oil Level	EACH USE						This section no. 1
	Oil Change	✔	6 MONTHS					This section no. 2
	Fuel Filter Replacement						✔	This section no. 5
	Fuel Strainer Cleaning						✔	This section no. 6
	Fuel Lines and Connections	✔					✔	Subsection 04-09
	Carburetor Adjustment	✔			✔		✔	Subsection 04-08
	Throttle Cable Inspection	✔			✔		✔	Subsection 04-09
	Condition of Drive and Driven Sprockets	✔		✔		✔	✔	Subsections 05-03 and 05-04
	Lubrication of Drive and Driven Sprockets	✔		✔		✔	✔	Subsections 05-03 and 05-04
	Retorquing of Clutch Screw	✔		✔		✔	✔	Subsection 05-02
	Brake Condition	✔	✔				✔	Subsection 05-03
	Brake Adjustment			✔			✔	Subsection 05-03
	Drive Chain Tension and Lubrication	✔		✔		✔	✔	Subsection 05-04
	Lubrication of Drive Axle Bearing	✔		✔		✔		Subsection 07-03

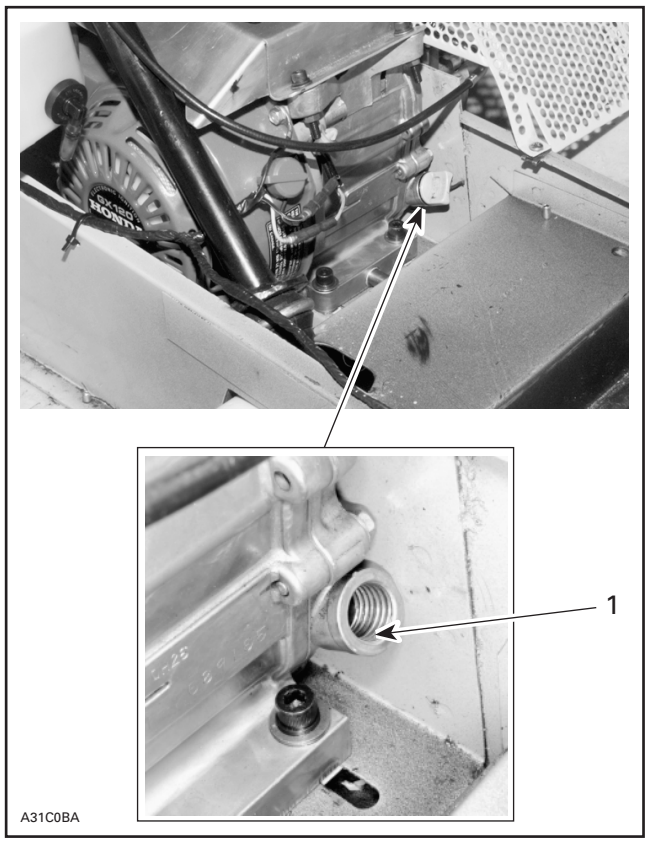
SYSTEM	PART/TASK	10-HOUR INSPECTION (to be performed by dealer)	WEEKLY	MONTHLY	ONCE A YEAR	STORAGE (to be performed by dealer)	PRE-SEASON PREPARATION (to be performed by dealer)	REFER TO
	Steering and Front Suspension Mechanism	✔		✔		✔	✔	Subsections 08-02 and 08-03
	Wear and Condition of Skis and Runners	✔	✔					Subsection 08-03
	Suspension Lubrication			✔		✔		Section 07: See appropriate subsection
	Suspension Condition	✔			✔		✔	Section 07: See appropriate subsection
	Suspension Stopper Straps Condition				✔		✔	Section 07: See appropriate subsection
	Track Condition	✔		✔			✔	Subsection 07-04
	Track Tension and Alignment	✔	AS REQUIRED					Subsection 07-04
	Spark Plug *	✔		✔			✔	Subsection 06-03
	Headlight Beam Aiming				✔			Subsection 09-03
	Wiring Harnesses, Cables and Lines	✔		✔				Subsection 09-03
	Operation of Lighting System (Headlight and Taillight) Test Operation of Emergency Cut-out Switch and Tether Cut-out Switch	✔	✔			✔		*Operator's Guide*
	Rags in Air Intake and Exhaust System					✔	✔	This section no. 8
	Engine Compartment	✔		✔			✔	This section no. 9
	Vehicle Cleaning and Protection	✔		✔		✔		This section no. 10

* Before installing new spark plug at pre-season preparation, it is suggested to burn excess storage oil by starting the engine with the old spark plug. Only perform this operation in a well ventilated area.

NO. 1 ENGINE OIL LEVEL

With snowmobile on a level surface, check the oil level by removing dipstick at engine base.

Oil level must be to the top of the oil filler neck. If not, refill up to oil filler neck using SAE 5W/30 recommended oil. Refer to TECHNICAL DATA.



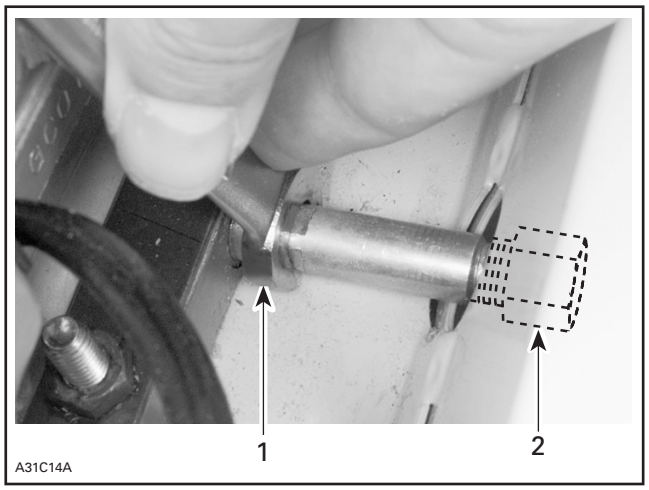
ADD OIL UNTIL IT REACHES THE TOP OF THE OIL FILLER NECK
1. Top of the oil filler neck

NO. 2 ENGINE OIL CHANGE

Refer to LUBRICATION AND MAINTENANCE CHART 02-01.

To drain oil from engine, **hold pipe** using a key then unscrew cap from underneath front of snowmobile. See next photo.

NOTE: To completely drain oil from engine, keep snowmobile leveled.



1. Hold pipe
2. Remove oil drain cap

NO. 3 ENGINE LUBRICATION

Engine internal parts must be lubricated to protect them from possible rust formation during the storage period.

Proceed as follows:

Start the engine and allow it to run at idle speed until the engine reaches its operating temperature.

◆ WARNING

Ensure the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

Stop the engine.

Remove carburetor cap to spray storage oil into carburetor bore.

Restart engine and run at idle speed.

Inject storage oil until the engine stalls or until a sufficient quantity of oil has entered the engine (approximately half a can).

With the engine stopped, remove the spark plug and spray storage oil (P/N 496 014 100) into cylinder.

Crank slowly 2 or 3 revolutions to lubricate cylinder.

Reinstall the spark plug.

◆ WARNING

This procedure must only be performed in a well ventilated area. Do not run engine during storage period.

NO. 4 FUEL STABILIZER

A fuel stabilizer (P/N 413 408 600) can be added in fuel tank to prevent fuel deterioration and avoid draining fuel system for storage. Follow manufacturer's instructions for proper use.

If above fuel stabilizer is not used, drain fuel system including fuel tank and carburetor.

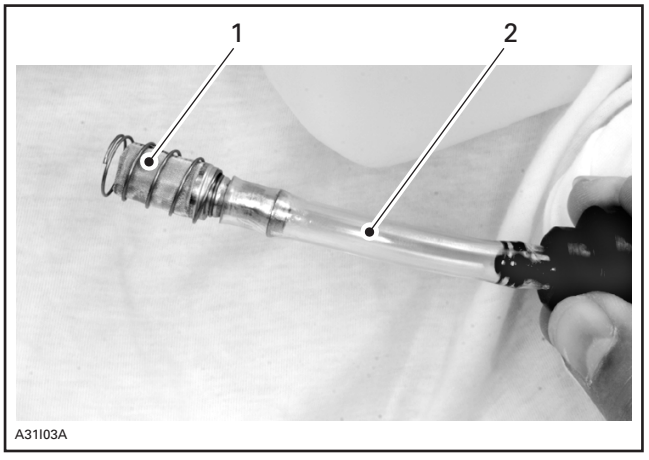
▼ CAUTION

Fuel stabilizer should be added prior the engine lubrication to ensure carburetor(s) protection against varnish deposit.

NO. 5 FUEL FILTER REPLACEMENT

Drain fuel tank.

Remove fuel line grommet from fuel tank and pull out inlet fuel line from tank.



1. Fuel filter
2. Fuel hose

Replace fuel filter.

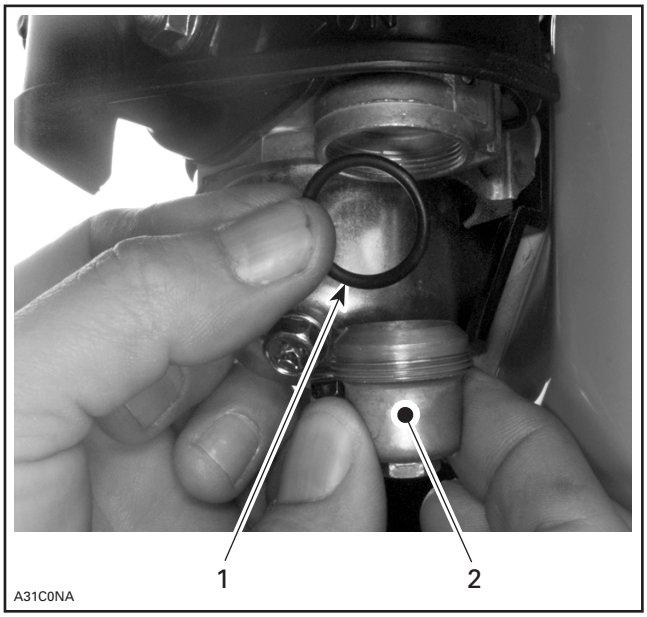
NO. 6 FUEL STRAINER

Turn off fuel valve.



FUEL VALVE TO "OFF" POSITION

Remove the strainer cup, as shown in the next photo.



REMOVE STRAINER CUP
1. O-ring
2. Strainer cup

Clean the strainer cup with cleaning solvent (P/N 413 708 200).

Reinstall strainer cup with O-ring and tighten to 4 N•m (36 lbf•**in**).

NO. 7 DRIVE CHAIN CONDITION

Visually inspect the chain for cracked, damaged or missing link rollers.

Check for defective bearings, sprockets and worn chain tensioner components.

Lubricate drive chain as per lubrication chart.

Use BOMBARDIER LUBE (P/N 293 600 000).

▼ CAUTION

Always lubricate drive chain slightly. Oil must not contact brake pad.

NO. 8 RAGS IN AIR INTAKE AND EXHAUST SYSTEM

At storage preparation, block air intake hole and exhaust system hole using clean rags.

Remove those rags at pre-season preparation.

NO. 9 ENGINE COMPARTMENT

Keep clean of grass, twigs, cloth, etc. These are combustible under certain conditions.

NO. 10 VEHICLE CLEANING AND PROTECTION

Remove any dirt or rust.

To clean the entire vehicle, use only flannel clothes or Kimtowels® wipers no. 58-380 from Kimberly-Clark.

▼ CAUTION

It is necessary to use flannel cloths or Kimtowels wipers on windshield and hood to avoid damaging further surfaces to clean.

To clean the entire vehicle, including metallic parts with a **thick** coat of grease, use Endust® imported by Bristol Myers, available at hardware stores or supermarkets.

For bottom pan cleaning, use Bombardier Cleaner (P/N 293 110 001 (spray can 400 g) and 293 110 002 (4 L)).

▼ CAUTION

Do not use Bombardier Cleaner on decals or vinyl.

To clean the entire vehicle, including metallic parts with a **thin** coat of grease, use Simple Green® from Sunshine Makers Inc., available at hardware stores or at automotive parts retailer.

For vinyl and plastic parts, use Vinyl & Plastic Cleaner (P/N 413 711 200 (6 x 1 L)).

To remove scratches on windshield or hood: Start with "Slip Streamer Motorcycle Windshield Heavy Duty Scratch, Remover". Finish with "Slip Streamer Motorcycle Cleaner and Polish".

NOTE: The latest product may be use alone if only light scratches are noticeable.

▼ CAUTION

Never clean plastic parts or hood with strong detergent, degreasing agent, paint thinner, acetone, products containing chlorine, etc.

Inspect the hood and repair any damage. Touch up all metal spots where paint has been scratched off. Spray all metal parts with BOMBARDIER LUBE (P/N 293 600 016). Wax the hood and the painted portion of the frame for better protection.

NOTE: Apply wax on glossy finish only. Protect the vehicle with a cover to prevent dust accumulation during storage.

▼ CAUTION

The snowmobile has to be stored in a cool and dry place and covered with an opaque tarpaulin. This will prevent sun rays and grime from affecting plastic components and vehicle finish.

Lift rear of vehicle until track is clear of the ground. Install on a snowmobile mechanical stand.

NOTE: Do not release track tension.

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ENGINE

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline.

SYMPTOM	**ENGINE BACKFIRES.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check spark plug.** a. Carbon accumulation caused by defective spark plug. *Clean carbon accumulation and replace spark plug.*
	2. Check ignition timing. a. Timing is fixed but ensure that woodruff key holding flywheel is in place.

SYMPTOM	**ENGINE DOES NOT OFFER MAXIMUM POWER AND/OR DOES NOT REACH MAXIMUM OPERATING RPM.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check spark plug condition.** a. Fouled spark plug(s). *Replace.*
	2. Check if there is water in fuel. a. There is water in fuel. *Drain fuel system, then fill it with appropriate fuel.*
	3. Check governor adjustment. a. Governor out of adjustment. *Readjust.*
	4. Check carburetor adjustments and cleanliness. a. Inadequate carburetor adjustments or dirt accumulation. *Adjust according to specifications (refer to TECHNICAL DATA 10) or clean.*
	5. Check valve clearance. a. Valve clearance incorrect. *Readjust.*
	6. Check valve condition. a. Valve or valve seat worn or damaged. *Inspect and correct.*
	7. Check track adjustment. a. Too much tension and/or improper alignment. *Align track and adjust its tension to specifications (refer to TECHNICAL DATA 10).*

	8. Check exhaust system. a. Restriction. *Replace.*
	9. Check ignition system. a. Decrease in power due to incorrect ignition. *Check spark plug and ignition coil operation.*
	10. Check engine compression. a. Worn piston(s) and ring(s). *Replace (refer to TECHNICAL DATA 10 for specification).*

SYMPTOM	**ENGINE DETONATION AT MAXIMUM RPM.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check which type of fuel is used.** a. Octane number is too low and/or alcohol level is too high. *Use recommended fuel type.*
	2. Check spark plug type. a. Improper spark plug heat range. *Install recommended spark plug(s) (refer to TECHNICAL DATA 10).*
	3. Check exhaust system. a. Too much restriction. *Replace.*
	4. Check ignition system. a. Incorrect ignition. *Check spark plug and ignition coil operation.*
	5. Check carburetion. a. Fouled and/or improper carburetor components. *Clean or replace according to specification (refer to TECHNICAL DATA 10).*

SYMPTOM	ENGINE TURNS OVER BUT FAILS TO START.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check switches.** a. Ignition switch, emergency cut-out switch or tether switch is in the OFF position. *Place all switches in the RUN or ON position.*
	2. Check fuel level. a. Mixture not rich enough to start cold engine. *Check fuel tank level and use choke.*
	3. Check spark plug. a. Defective spark plug (no spark). *Replace spark plug.*
	4. Check amount of fuel on spark plug. a. Spark plug wet (flooded engine). *Clean and dry spark plug. Reinstall spark plug and start engine taking care not to use choke. If flooding is severe, check carburetor float valve, then change engine oil.* b. Spark plug dry (no fuel to the engine). *Check fuel tank level; check if fuel valve is opened: check fuel strainer, clean if clogged; check condition of fuel lines and their connections.* *Check carburetor main jet and nozzle.*
	5. Check the ignition system. a. No spark or weak spark. *Replace parts as indicated in section electrical system.*
	6. Check engine compression. a. Insufficient engine compression. *Check valve clearance; carbon accumulation; defective cylinder head gasket, valves or valve seats; Check for worn piston rings, piston or cylinder. Replace defective part(s) (ex. : piston(s), ring(s), etc.).*

SYMPTOM	IRREGULAR ENGINE IDLE.
CONDITION	NORMAL USE AFTER ENGINE WARM UP.
Test/Inspection	**1. Check choke.** a. Choke plate may be partially closed. *Readjust.*
	2. Check pilot screw position. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	3. Check ignition system coil air gap. a. Air gap is too large. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	4. Check dimension of main jet. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check engine compression. a. Insufficient engine compression. *Check valve clearance; carbon accumulation; defective cylinder head gasket, valves or valve seats.* *Check for worn piston rings, piston or cylinder. Replace defective part(s) (ex.: piston(s), ring(s), etc.).*

SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check cooling fins of engine.** a. Dirt accumulation between engine fins. *Clean thoroughly.*
	2. Check carburetion. a. Improperly adjusted or inadequate carburetor components. *Adjust according to specifications (refer to TECHNICAL DATA 10) or replace inadequate component(s).*
	3. Check cylinder head gasket. a. Worn gasket. *Replace.*
	4. Check condition and heat range of spark plug. a. Melted spark plug tip or inadequate heat range. *Replace.*
	5. Check exhaust condition. a. Carbon deposit. *Clean.*

SYMPTOM	REWIND STARTER ROPE DOES NOT REWIND.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check rewind spring.** a. Broken spring. *Replace spring.*

SYMPTOM	REWIND STARTER RATCHET DOES NOT ENGAGE.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ratchet and ratchet guide.** a. Ratchet and ratchet guide have stuck together because of dirt or heat. *Clean or replace.*
	2. Check ratchet and rope sheave. a. Ratchet and rope sheave have stuck together because of heat. *Replace.*

SYMPTOM	ENGINE PINGING.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel lines.** a. Bent fuel lines (preventing fuel from flowing through). *Relocate or replace fuel lines.*
	2. Check if carburetor is clean. a. Dirt prevents fuel from flowing through. *Clean.*

FUEL AND OIL SYSTEMS

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline.

SYMPTOM	**HIGH FUEL CONSUMPTION OR RICH MIXTURE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel tank.** a. Perforated fuel tank. *Replace fuel tank.*
	2. Check carburetor fittings. a. Leaking fittings. *Replace defective part.*
	3. Check float height in carburetor(s). a. Fuel level is too high in float bowl. *Adjust according to specifications (refer to TECHNICAL DATA 10).*

SYMPTOM	**ENGINE LACKS POWER OR STALLS AT HIGH RPM.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel filter or strainer.** a. Clogged filter or strainer. *Clean.*
	2. Check fuel lines. a. Kinked or clogged lines. *Relocate or replace.*
	3. Check if carburetor is clean. a. Varnish. *Clean.*

SYMPTOM	**ENGINE RUNS OUT OF FUEL (OR LEAN MIXTURE).**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel filter or strainer.** a. Clogged filter or strainer. *Clean.*
	2. Check if lines are perforated or kinked and make sure they do not leak at fittings. a. Lines are too big for their fittings or are improperly rooted. *Replace or properly relocate lines.*
	3. Check main jet. a. Dirt (varnish, foreign particle) accumulation at main jet. *Clean.*
	4. Check float height in carburetor bowl. a. Running out of fuel at high speed because float height is too low. *Adjust float lever height according to specification.*

TRANSMISSION AND BRAKE SYSTEMS

The following charts are provided to help in diagnosing the probable source of troubles. It should be used as a guideline.

TRANSMISSION

SYMPTOM	**LOOSENESS IS FELT IN DRIVE SYSTEM WHEN ACCELERATING/DECELERATING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive chain tension.** a. Drive chain automatic tensioner is too loose. *Replace tensioner.* b. Drive chain is worn out. *Replace drive chain with new one.*

SYMPTOM	**VIBRATIONS ORIGINATING FROM DRIVEN SPROCKET.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check driven sprocket hub fit with drive axle.** a. Driven sprocket is loosened on drive axle. *Replace driven sprocket or drive axle.*

SYMPTOM	**VIBRATIONS ORIGINATING FROM DRIVE SPROCKET.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check tightening torque of drive sprocket screw.** a. Moving drive sprocket. *Retighten screw.* b. Worn key way. *Replace parts.*

SYMPTOM	**CLUTCH DO NOT OPERATE PROPERLY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Replace clutch with new one.**

SYMPTOM	EXCESSIVE NOISE WITH DRIVE CHAIN.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive chain lubrication.** a. Drive chain is dry. *Lubricate drive chain.* **2. Check drive chain condition.** a. Chain is cracked, damaged or some link rollers are missing. *Replace drive chain.* **3. Check sprockets.** a. Excessive wear at sprocket teeth. *Replace sprockets.*

BRAKE SYSTEM

MECHANICAL BRAKE

SYMPTOM	BRAKE HANDLE DOES NOT RETURN COMPLETELY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check brake return spring.** a. Broken return spring. *Replace.*
	2. Check if brake cable moves freely in its housing. a. Brake cable movement is limited due to oxidation or dirt accumulation. *Replace.*
	3. Check distance between brake lever and caliper. a. Distance is too wide. *Adjust according to specifications (refer to TRANSMISSION 05).*

SYMPTOM	BRAKE SYSTEM IS NOISY.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check brake pad thickness.** a. Pad is worn up to wear limit. *Replace.*
	2. Check brake attachment. a. Attachment is loose or cracked. *Tighten or replace.*
	3. Check brake pad alignment. a. Brake pad is not properly aligned with clutch. *Rotate brake pad 180° or replace with new one.*

ELECTRICAL SYSTEM

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline.

SYMPTOM	**HEADLAMP NOT LIGHTING.**
CONDITION	WHITE BULB.
Test/Inspection	**1. Check bulb.** a. Burnt bulb. *Replace bulb.*
CONDITION	BROKEN ELEMENT.
Test/Inspection	**1. Check for loose headlamp housing and bulb socket.** a. Vibration problem. *Tighten headlamp mounting screws. Lock bulb in socket. Replace bulb.*
CONDITION	MELTED FILAMENT (ENDS OF ELEMENT HOLDER) AND BLACK BULB.
Test/Inspection	**1. Check voltage at headlamp at different speeds. It must not be above 15 Vac.** a. Excessive voltage in lighting circuit. *Ensure proper wire connections and grounding. Retest.*

SYMPTOM	**HEADLAMP DIMING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check voltage at headlamp at different speeds. It must not be below 11 Vac.** a. Insufficient voltage in lighting circuit. *Replace voltage regulator and retest.* b. Wires are worn or loose. *Ensure proper wire connections and grounding. Retest.*
	2. Visually inspect wiring harness for damaged and/or melted wires and/or bad wire terminal crimping and/or connections. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. *Repair/replace damaged wires and/or terminals. Reroute harness where necessary.*

SYMPTOM	**ENGINES DOES NOT START — NO SPARK AT SPARK PLUG.**
CONDITION	AT ENGINE CRANKING.
Test/Inspection	**1. Verify spark plug condition.** a. Defective, improperly set, worn-out, fouled. *Identify source of problem and correct. Replace spark plug.*
	2. Verify spark plug cap resistance with an ohmmeter. a. Defective part. *Replace cap.*
	3. Verify if problem originated from electrical system wiring harness and/or accessories and/or ignition cut-out switches. Check condition of connectors. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. Defective switch(es). Corroded connector terminals. *Replace or repair damaged wires. Reroute where necessary. Replace defective switch(es). Clean terminals and apply silicone dielectric grease.*
	4. Verify ignition coil resistance with an ohmmeter and connector condition. a. Defective coil. Corroded connector terminals. *Replace defective coil. Clean terminals and apply silicone dielectric grease.*
	5. Verify condition of ignition coil. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace ignition coil.*
	6. Verify condition of ignition generator coils. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace coils.*

SYMPTOM	**ENGINE STALLS.**
CONDITION	AT LOW SPEED.
Test/Inspection	**1. Verify items 4, 5 and 6 above.**

SYMPTOM	**IRREGULAR ENGINE SPEED.**
CONDITION	AT HIGH SPEED.
Test/Inspection	**1. Verify items 3, 4, 5 and 6 above.**
CONDITION	AT LOW SPEED.
Test/Inspection	**1. Verify items 3, 4 and 5 above and ignition coil/flywheel protrusion air-gap.** a. Air-gap too large. *Readjust air-gap.*

SYMPTOM	**ENGINE IS MISFIRING — ERRATIC SPARK AT SPARK PLUG.**
CONDITION	RIDING ON WET SNOW.
Test/Inspection	**1. Verify if spark plug wires and/or spark plug cap seals are sealing-out moisture.** a. Defective wires and/or seals. *Replace defective part.*
	2. Verify if ignition system wiring harness connectors are in good condition and/or are sealing-out moisture. a. Loose connectors, corroded terminals or defective parts. *Clean terminals and apply silicone dielectric grease. Replace defective parts.*
CONDITION	RIDING IN DEEP AND THICK SNOW.
Test/Inspection	**1. Perform all verifications outlined under "Engine does not start — no spark at spark plug".**
	2. Verify spark plug. Proceed with spark plug analysis in order to identify source of problem. a. Defective and/or worn spark plug(s) and/or cable(s) and/or cap(s). *Replace defective part(s). Proceed with ignition system testing procedures. Perform engine analysis.*

SYMPTOM	**FOULED (BLACK) SPARK PLUG TIP.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check carburetor.** a. Carburation is too rich. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Check engine compression. a. Leaking piston ring(s). *Replace.*

SYMPTOM	**SPARK PLUG TIP IS LIGHT GREY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Refer to "Engine slows down or stops at high RPM" and check items listed.**
	2. Check spark plug heat range. a. Spark plug heat range is too high. *Replace by Bombardier's recommended spark plug (refer to ELECTRICAL 06).*
	3. Check carburetor gasket. a. Cracked or deformed gasket. *Replace.*

SYMPTOM	**REAR LIGHT BULB FLASHES.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if rear light is properly connected.** a. Connector housing is partially connected. *Install connector housing properly.*
	2. Check continuity of wires. a. Corroded terminals and/or broken wires. *Replace terminal(s) or crimp defective wires.*

SUSPENSION AND TRACK

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline.

SYMPTOM	**REAR SUSPENSION BOTTOMS OUT.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check rear spring preload.** a. Spring tension is too low. *Replace spring.*

SYMPTOM	**SLIDER SHOES WEAR OUT PREMATURELY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Pressure is too great on slider shoes. *Adjust according to specifications (refer to TECHNICAL DATA 10). Replace defective parts.*

SYMPTOM	**PREMATURE WEAR ON TRACK GUIDES.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Pressure is too great on guides. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Check slider shoes and/or suspension retaining screws. a. Worn slider shoes or lost retaining screws. *Replace defective parts and/or tighten loose screws.*

SYMPTOM	**NOISE OR VIBRATIONS ORIGINATING FROM THE TRACK.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check slide suspension retaining bolts.** a. Missing bolt(s) allowing movement of certain components which in turn interfere with track rotation. *Replace missing bolt(s).*
	2. Check condition of idler wheel(s). a. Idler wheel rubber is damaged. *Replace.*
	3. Check sprockets. a. One or various teeth of drive shaft sprockets are broken. *Replace sprocket(s).*
	4. Check track internal traction teeth. a. One or various track teeth are broken. *Replace track.*

SYMPTOM	DERAILING TRACK.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Track is too loose. *Adjust.*
	2. Check if track and slider shoes are properly aligned. a. Improper alignment. *Adjust.*
	3. Check slide suspension retaining bolts. a. Missing bolt(s) allowing movement of certain components which in turn interfere with track rotation. *Replace missing bolt(s).*

SYMPTOM	REAR SUSPENSION IS LOW OR TOO STIFF.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Track is too tight. *Adjust.*
	2. Check if axles are properly lubricated. a. Improper lubrication and/or contaminated grease (sticky oil sludge). *Clean and/or lubricate.*
	3. Check rear spring preload. a. Insufficient preload. *Replace rear spring.*

SYMPTOM	WHEN HANDLEBAR IS TURNED, SNOWMOBILE UNDERSTEERS.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ski runner condition.** a. Worn ski runners. *Replace.*
	2. Check if front arm stopper strap is too long. a. Insufficient ski pressure on the ground. *Replace front arm stopper strap.*

SYMPTOM	**HANDLE BAR IS DIFFICULT TO TURN.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check condition of ball joints.** a. Corrosion restrains movement. *Lubricate or replace.*
	2. Check U-clamp and retaining support a. Torque on screws are too high. *Refer to STEERING/FRONT SUSPENSION 08.* b. Grease missing. *Apply lithium grease on steering column bushings.*

SYMPTOM	**THE SNOWMOBILE IS UNSTABLE (IT MOVES FROM LEFT TO RIGHT AND VICE VERSA).**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ski runner condition.** a. Worn or bent ski runners. *Replace ski runners.*
	2. Check ski alignment. a. Improper ski alignment. *Align skis in order to obtain proper toe-out (opening) (to adjust, refer to STEERING/FRONT SUSPENSION 08).*
	3. Check if bushings are too loose in steering system. a. Bushings are too loose. *Replace.*

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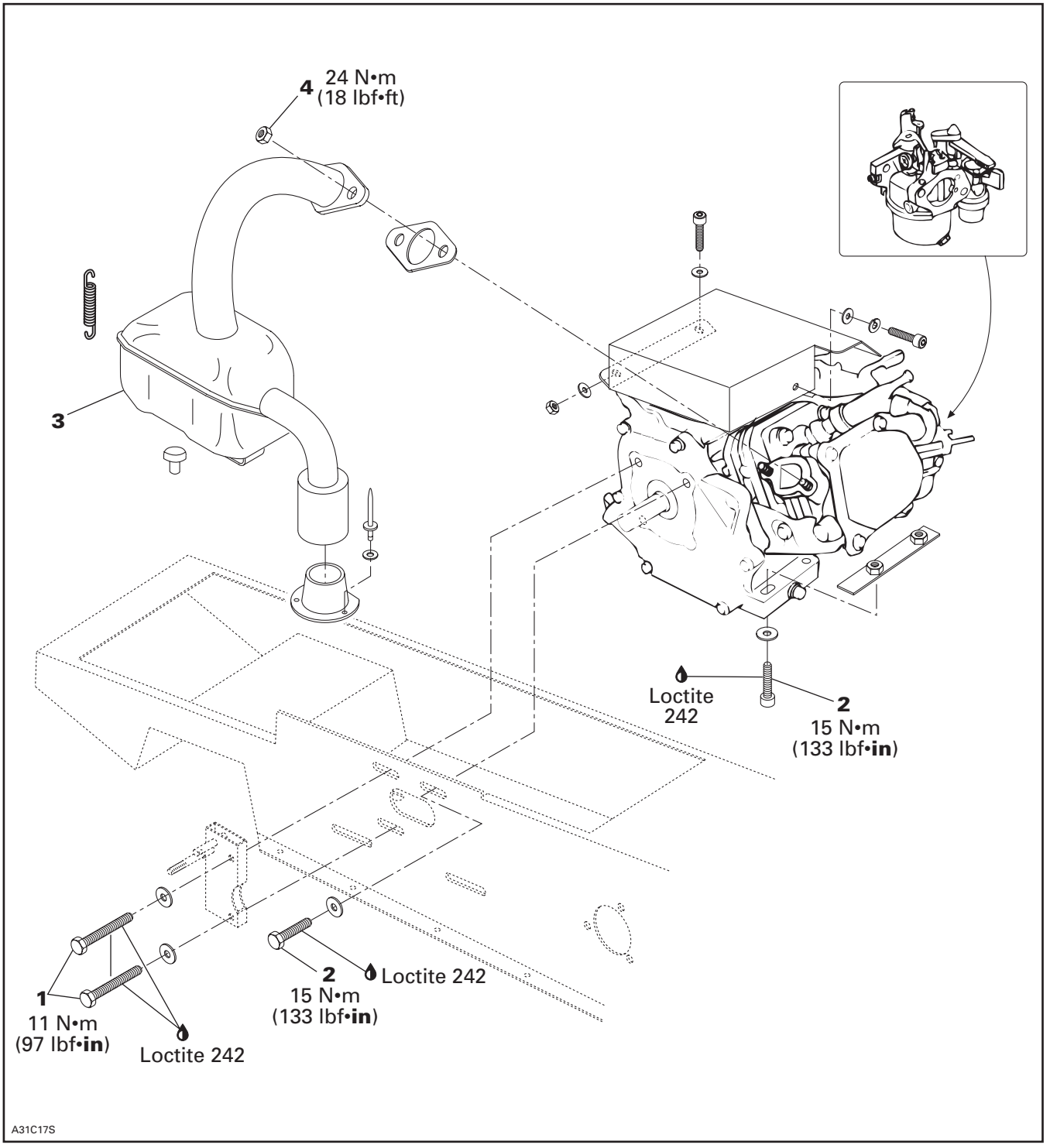
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ENGINE REMOVAL AND INSTALLATION



REMOVAL FROM VEHICLE

Remove or disconnect the following then lift engine from vehicle:

– chain guard
– drive chain
– drive sprocket (clutch)
– muffler no. 3
– throttle cable
– choke cable
– fuel line
– electrical connectors
– engine mount screws no. 2
– brake support screws no. 1

ENGINE AND MUFFLER DISASSEMBLY AND ASSEMBLY

Torque the muffler nuts no. 4 to 24 N•m (18 lbf•ft).

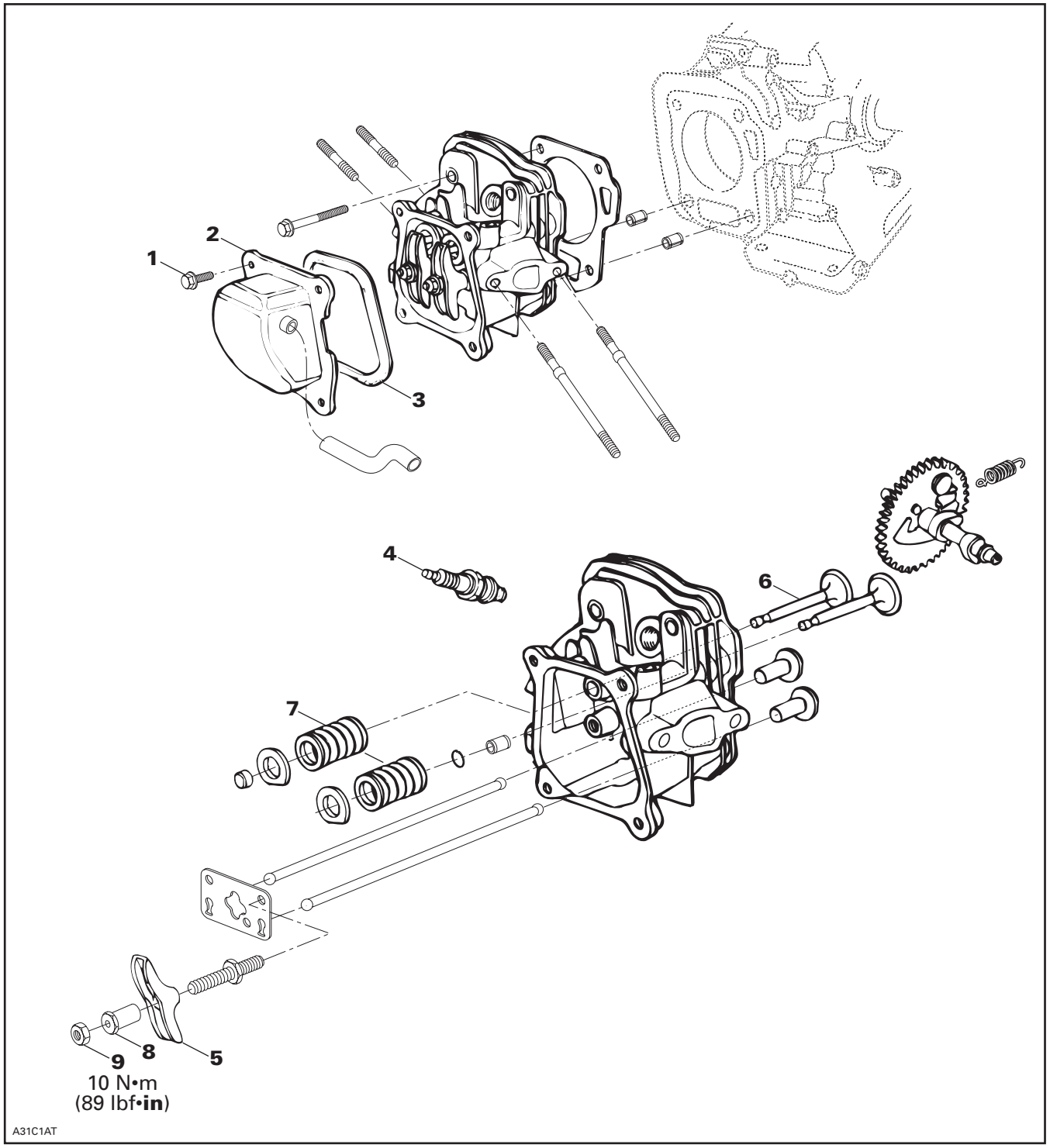
Torque both brake support screws no. 1 to 11 N•m (97 lbf•**in**) and 5 engine mount screws no. 2 to 15 N•m (133 lbf•**in**).

INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention to the following:

– Check tightness of engine mount screws, and clutch screw.
– After throttle cable and choke installation, check for proper operation.
– Check drive chain automatic tensioner for proper operation.

VALVE ADJUSTMENT



VALVE ADJUSTMENT

NOTE: Valve clearance inspection and adjustment must be performed with the engine cold.

Preparation

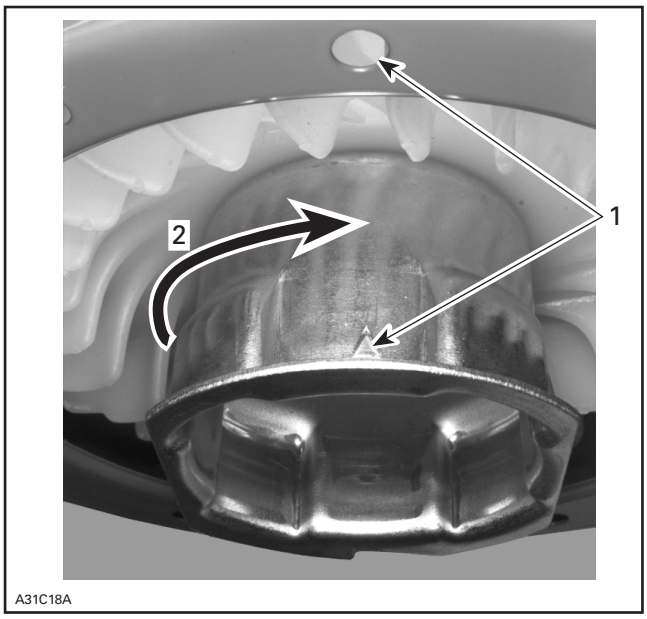
Remove cylinder head cover bolts **no. 1**, cylinder head cover **no. 2** and gasket **no. 3**.

Set the piston at TDC (Top Dead Center) of the **compression** stroke, as shown in the following procedure.

COMPRESSION STROKE TDC POSITIONING

Remove spark plug **no. 4**.

Turn engine clockwise (PTO side) by hand so that triangular mark on starter pulley align with the top hole on the fan cover.



REWIND STARTER HAS BEEN REMOVED

1. *Triangular mark aligned with fan cover top hole*
2. *Rotate clockwise to position engine at TDC of compression stroke*

▼ CAUTION

The triangular mark on the starter pulley will align with the top hole on the fan cover when the piston is at top dead center of the compression or exhaust stroke. Ensure that piston is at TDC of the compression stroke. At compression stroke both valves are fully closed.

Valve Clearance Inspection

Insert a feeler gauge between rocker arm **no. 5** and valve **no. 6**. Refer to the following table for valve clearance.

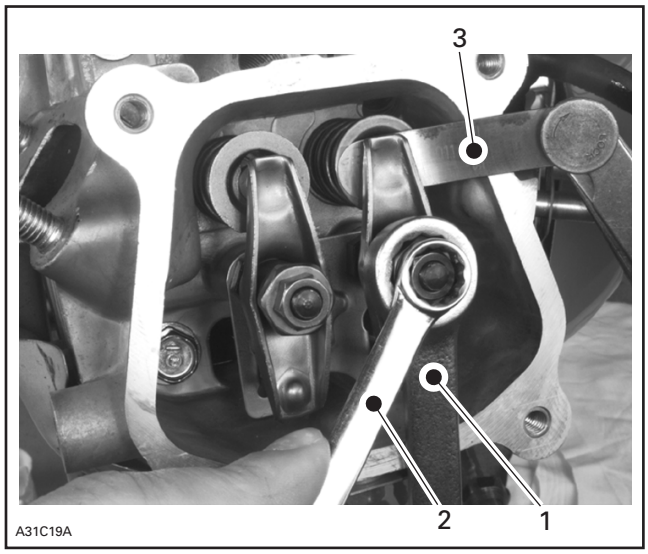
STANDARD VALVE CLEARANCE	
Intake valve	0.15 ± 0.02 mm (0.006 ± 0.001 in)
Exhaust valve	0.20 ± 0.02 mm (0.008 ± 0.001 in)

NOTE: When inspecting clearance, ensure that feeler gauge does not compress valve springs **no. 7**. Valve springs have low compression rates.

If valve clearance is not according to the above table, perform valve clearance adjustment as described in the following procedure.

Valve Clearance Adjustment

Hold rocker arm pivot **no. 8** and loosen rocker arm pivot lock nut **no. 9**, as shown in the next photo.



1. *Tool retaining rocker arm pivot*
2. *Tool loosening lock nut of rocker arm pivot*
3. *Feeler gauge*

Turn rocker arm pivot to obtain the specified clearance.

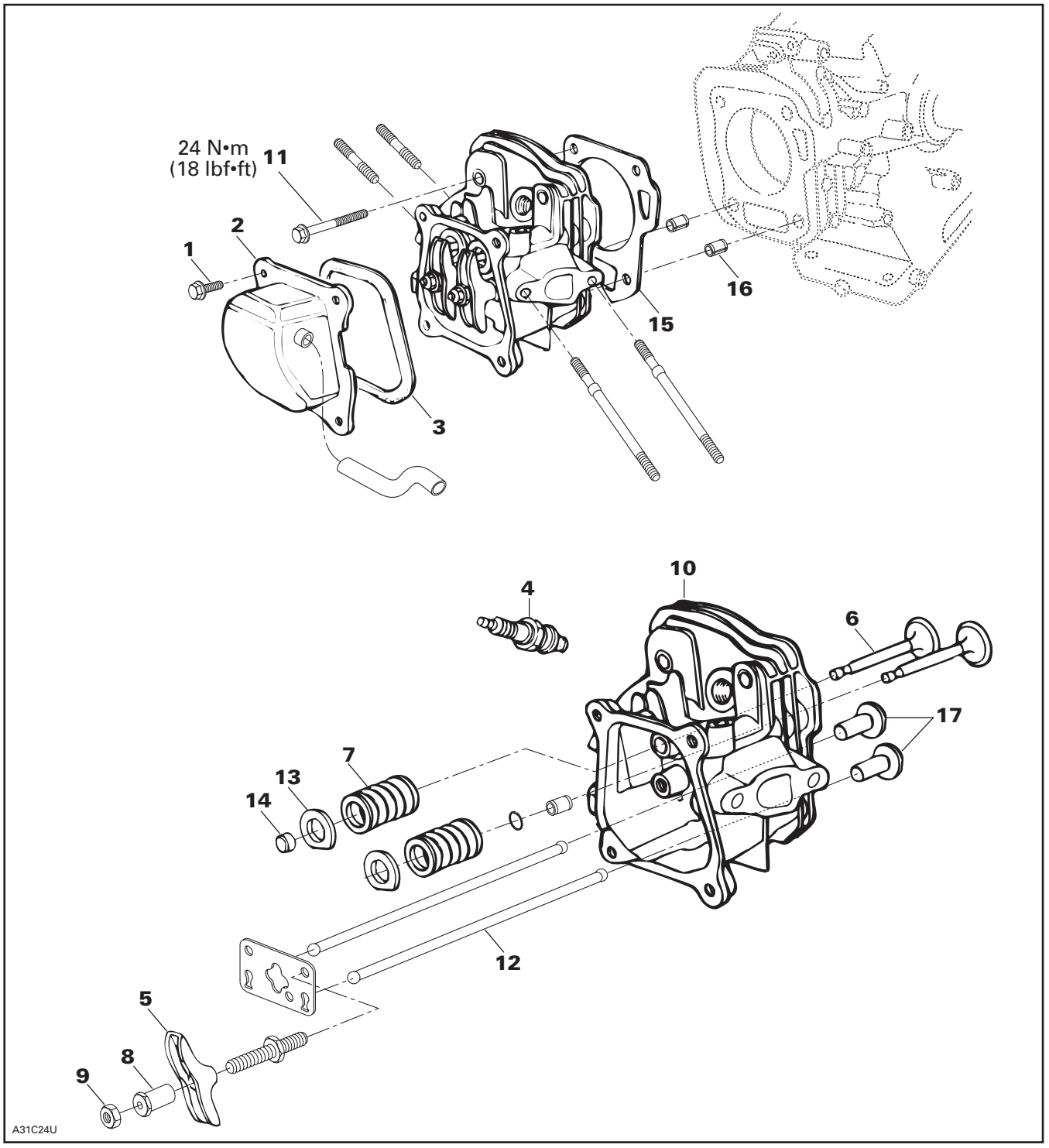
Retighten the rocker arm pivot lock nut while holding the rocker arm pivot.

Recheck valve clearance after tightening the rocker arm pivot lock nut.

Reinstall cylinder head cover with gasket then secure with cylinder head cover bolts in a crisscross sequence.

DISASSEMBLY/ASSEMBLY

TOP END

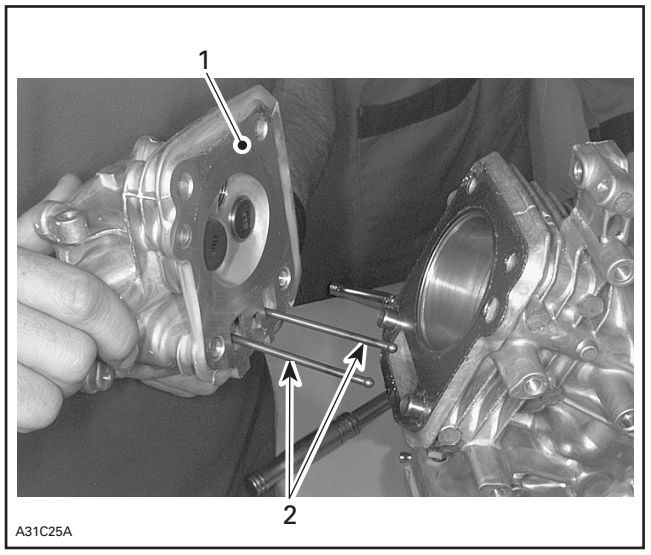


TOP END REMOVAL

Remove the following then lift cylinder head **no. 10**:

– carburetor
– exhaust system
– spark plug **no. 4**
– cylinder head cover **no. 2**
– cylinder head nuts **no. 11**

NOTE: When removing cylinder head, mark both push rods **no. 12** for reassembly.



TYPICAL — MECHANIC REMOVING CYLINDER HEAD

1. *Cylinder head*
2. *Mark both push rods for reassembly*

Pull out push rods.

CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head, valves **no. 6** and piston dome using a wooden spatula.

NOTE: The triangular mark on the piston dome must be visible after cleaning.

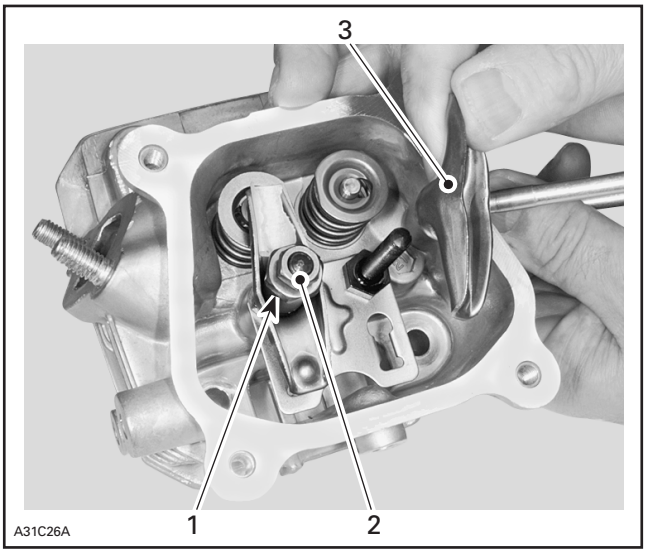
Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

DISASSEMBLY

NOTE: Before disassembling, mark valve springs **no. 7**, valves **no. 6** and rocker arms **no. 5**. This will ensure that parts will not be inverse at reassembly.

Unscrew rocker arm pivot lock nuts **no. 9** and rocker arm pivots **no. 8**. Remove them.

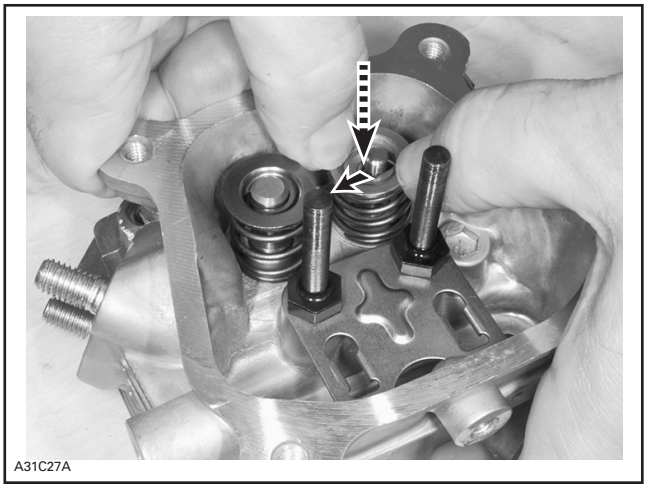
Remove both rocker arms **no. 5**.



TYPICAL — MECHANIC REMOVING ROCKER ARM OF INTAKE VALVE

1. *Rocker arm pivot*
2. *Rocker arm pivot lock nut*
3. *Rocker arm*

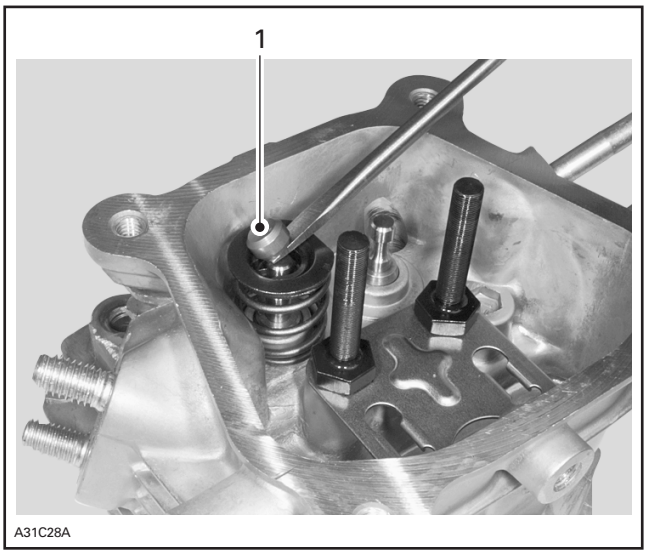
Push down and slide the spring retainer **no. 13** to the side, so the valve stem slips through the hole, as shown in the next photo.



TYPICAL — PUSH DOWN AND SLIDE RETAINER TO THE SIDE

Put apart valve spring retainer and spring.

Repeat procedure for exhaust valve but ensure that valve rotator **no. 14** is removed first. Refer to the following photo.



1. On exhaust valve only, remove valve rotator then remove valve spring retainer

Pull out both valves from cylinder head.

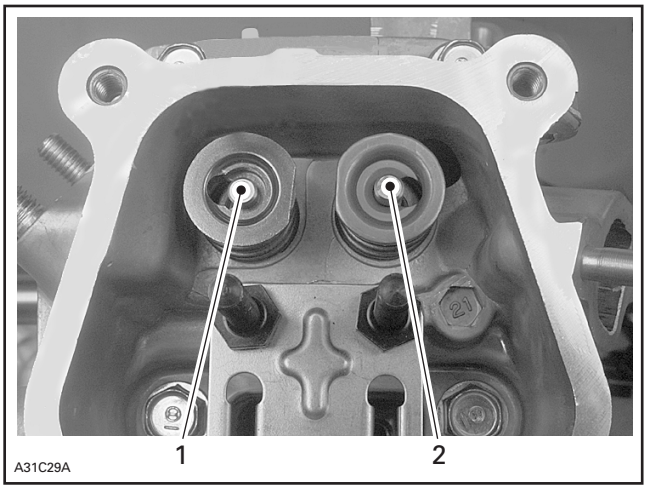
INSPECTION

Refer to COMPRESSION TEST AND ENGINE DIMENSIONS MEASUREMENT 04-05.

ASSEMBLY

Slide exhaust valve (small diameter) into exhaust valve guide, then slide intake valve (large diameter) into intake guide. See next photo.

Install springs and secure with valve spring retainers.



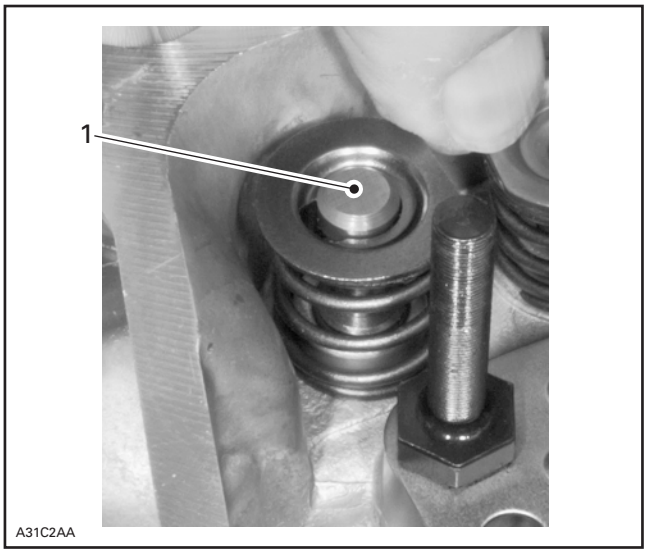
EXHAUST AND INTAKE VALVES SECURED IN PLACE

1. Exhaust valve (small dia.) location
2. Intake valve (large dia.) location

Install valve rotator on exhaust valve.

▼ CAUTION

To avoid engine damage, ensure that exhaust valve rotator is properly installed on exhaust valve, as shown in the next photo.

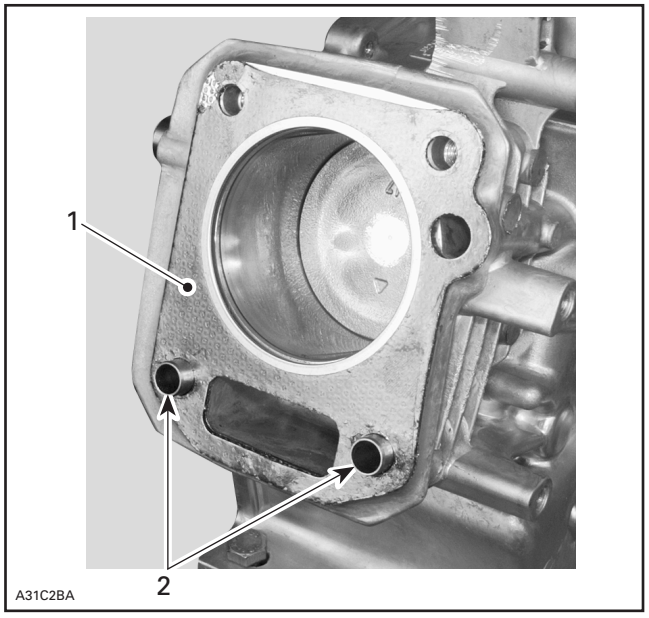


EXHAUST VALVE SHOWN

1. Exhaust valve rotator in place

TOP END INSTALLATION

Install cylinder head gasket no. 15 and check that both locating pins no. 16 are in place, as shown in the next photo.



1. Cylinder head gasket
2. Locating pin

Check push rods no. 12 on both ends for wear. Check also push rods for straightness.

Install push rod ends into lifters no. 17.

Reinstall cylinder head.

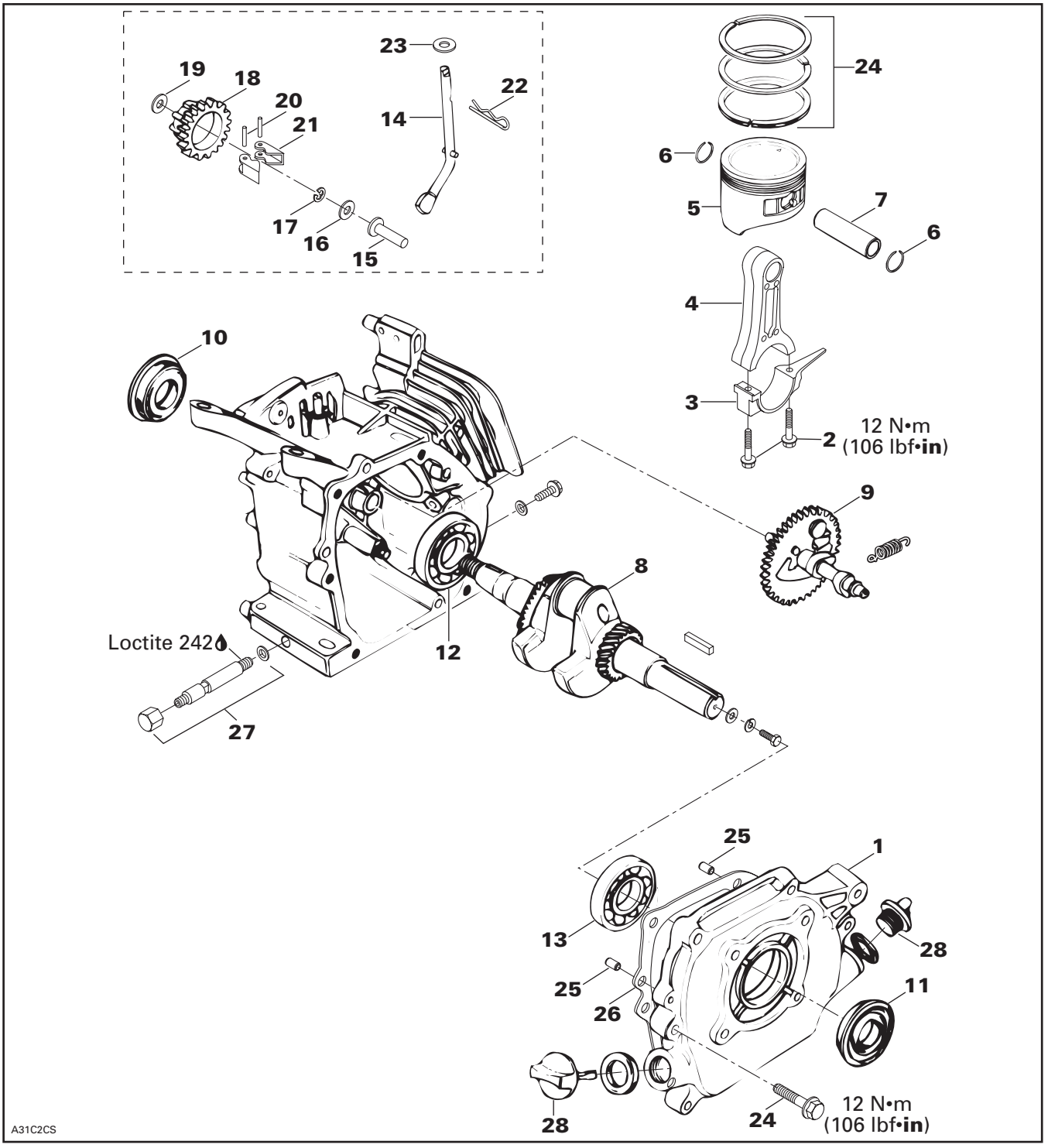
▼ CAUTION

Ensure that push rods are properly inserted into push rod guides and firmly seated in the lifters.

Secure cylinder head with screws.

Reinstall cylinder head cover.

BOTTOM END


23
19
18
20
21
22
14
17
16
15
24
6
5
7
6
4
3
2
12 N•m
(106 lbf•in)
10
9
8
Loctite 242
12
27
25
1
13
28
25
26
11
28
24
12 N•m
(106 lbf•in)
A31C2CS

NOTE: Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all oil seals and gaskets.

Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

General

To remove clutch, refer to CLUTCH 05-02.

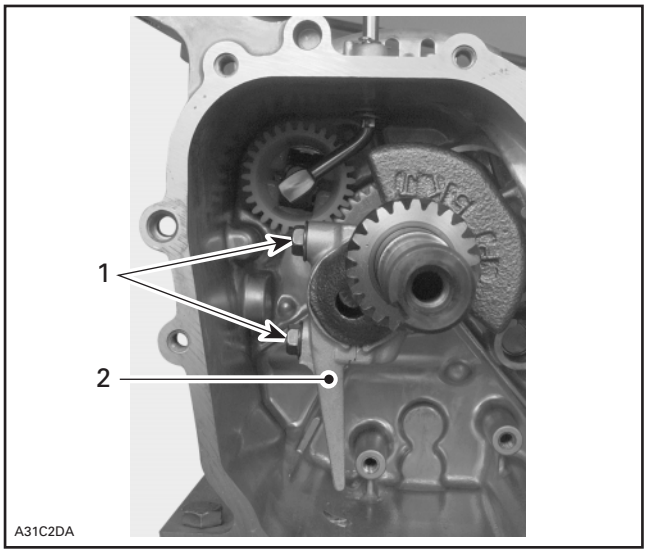
To remove magneto, refer to TRANSISTORIZED MAGNETO IGNITION 04-06.

Crankcase

Drain all oil from engine base.

Remove crankcase cover **no. 1** on PTO side.

From inside crankcase, loosen both connecting rod screws **no. 2** then remove connecting rod cap **no. 3**.



1. Connecting rod screws
2. Connecting rod cap

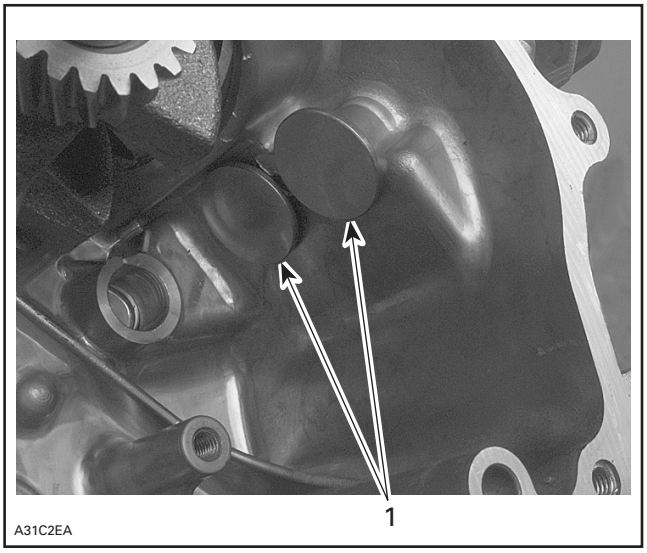
Push on connecting rod **no. 4** and pull out piston **no. 5**.

Remove both piston pin circlips **no. 6** and push out piston pin **no. 7**.

Detach piston from connecting rod.

Remove crankshaft **no. 8** and camshaft ass'y **no. 9**.

Mark both valve lifters and remove them. This will ensure that lifters will not be inverse at reassembly.



MARK BOTH VALVE LIFTERS FOR REASSEMBLY
1. Valve lifters

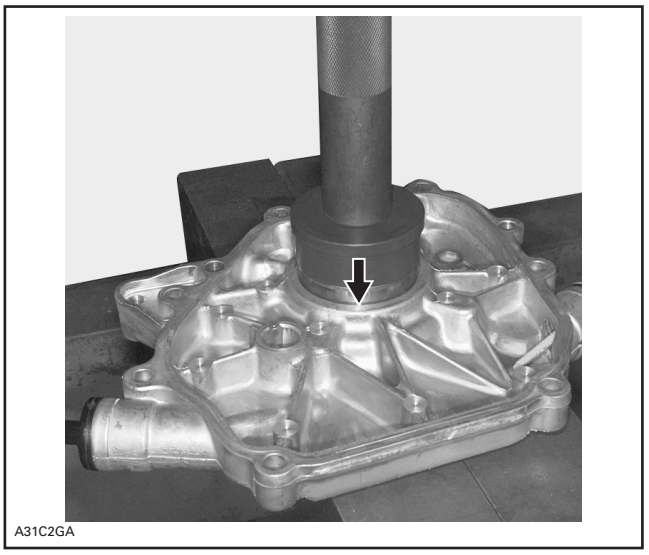
Seals and Bearings

To remove seals **nos. 10** and **11**, push from inside crankcase towards the outside.

To remove bearings **nos. 12** and **13**, use a press with all 3 following tools:

– driver (P/N 529 035 521)
– attachment (P/N 529 035 522)
– pilot (P/N 529 035 522)

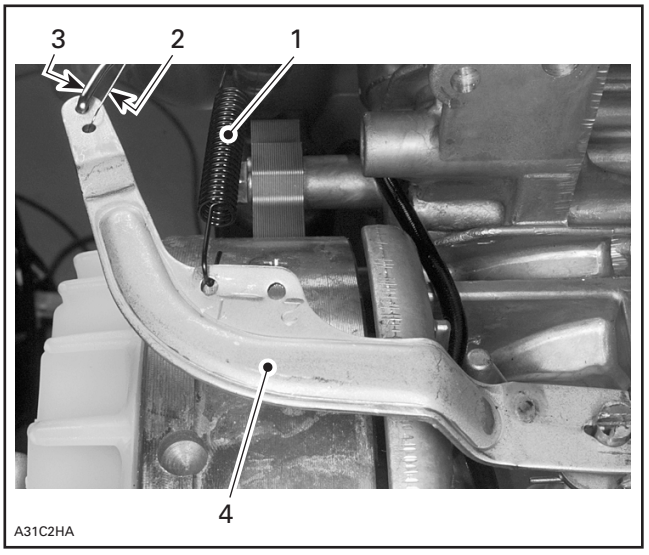
To reinstall bearings, reverse housing and use same tools as for bearings removal, as shown in the next photo.


A31C2GA

TO INSTALL BEARING

Governor System

Detach governor spring (black), throttle return spring and governor rod from governor arm. See next photo.

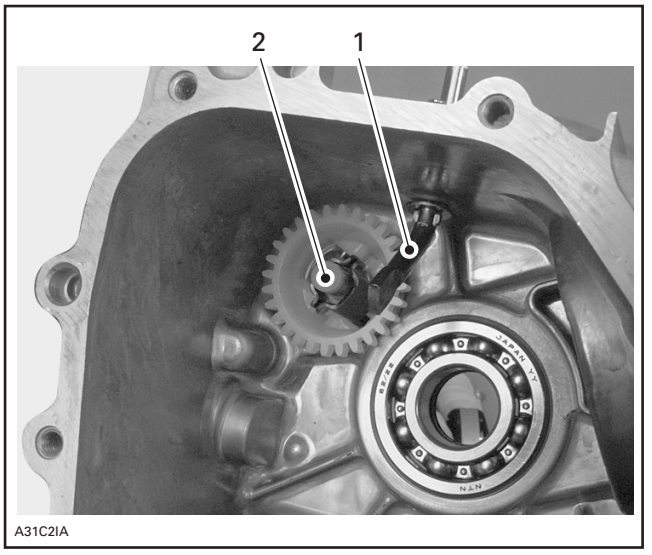


A31C2HA

1. *Governor spring (black)*
2. *Throttle return spring*
3. *Governor rod*
4. *Governor arm*

Loosen governor arm screw then remove governor arm.

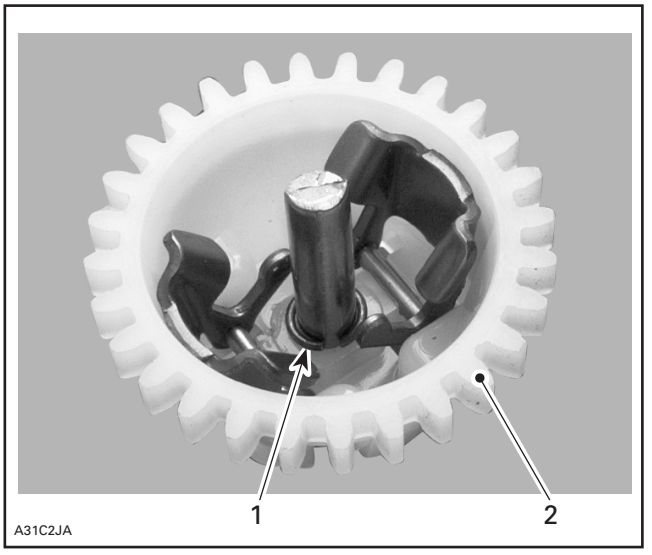
From inside crankcase, rotate governor arm shaft **no. 14** then pull out governor slider **no. 15** and washer **no. 16**.



A31C2IA

1. *Rotate governor arm shaft*
2. *Remove governor slider with washer (not shown)*

Using a small flat screwdriver, remove clip **no. 17** from governor weight holder **no. 18**.



A31C2JA

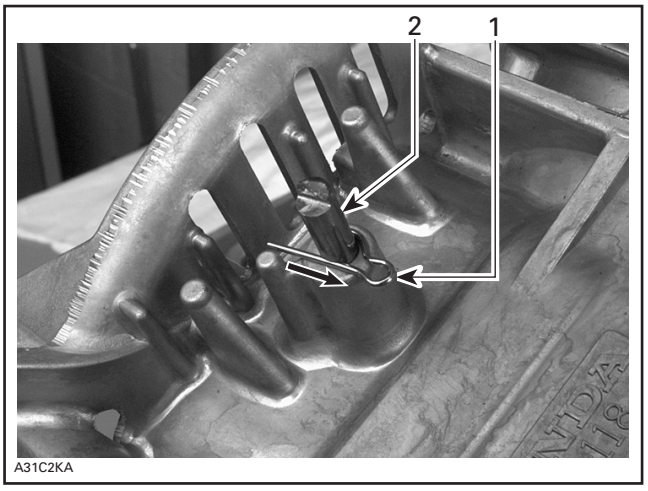
GOVERNOR ASS'Y HAS BEEN REMOVED TO SHOW CLIP

1. *Clip*
2. *Governor weight holder*

Pull out governor weight holder and washer **no. 19**.

Remove pins **no. 20** from governor weights **no. 21** then remove governor weights.

From outside crankcase, remove lock pin **no. 22** from governor arm shaft, as shown in the next photo. Remove governor arm shaft **no. 14** with washer **no. 23**.



REMOVE LOCK PIN
1. *Lock pin*
2. *Governor arm shaft*

INSPECTION

Piston, Crankshaft and Camshaft

Inspect camshaft decompressor. If there is any problems, replace camshaft assembly with new one.

Refer to COMPRESSION TEST AND ENGINE DIMENSION MEASUREMENT 04-05.

Governor System

Check for wear or damage on governor weight holder.

Check that governor weights move freely inside governor weight holder.

ASSEMBLY

Seals and Bearings

Using a press, install bearings **nos. 12** and **13** so that they lean on crankcase flange.

Governor System

Reinstall governor weights **no. 21** with pins **no. 20.**

Install governor weight holder washer **no. 19** then install governor weight holder **no. 18** on shaft.

Secure governor weight holder with clip **no. 17**.

▼ CAUTION

Ensure that clip is properly inserted into shaft groove.

Spread governor weights **no. 21** then install governor slider washer **no. 16** and governor slider **no. 15**.

Check that governor slider moves smoothly.

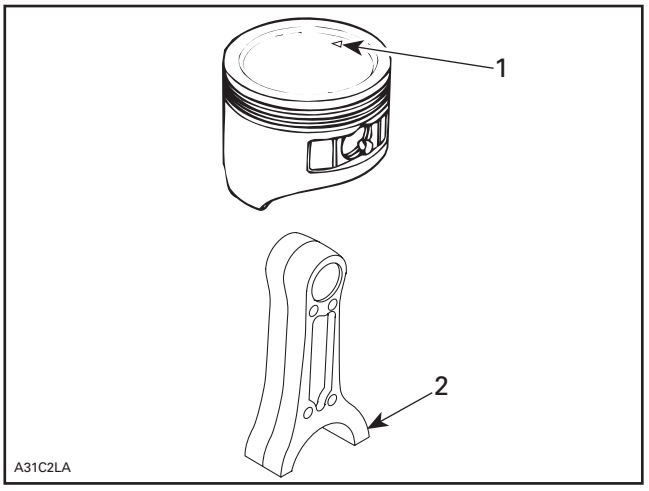
Reinstall governor arm shaft **no. 14** with washer **no. 23** inside crankcase. Secure with lock pin **no. 22**.

▼ CAUTION

The lock pin must be installed on the governor arm shaft with the straight side of the pin against the groove in the shaft.

Piston and Rings

Align piston mark with connecting rod long end and install piston on connecting rod. See the next illustration.

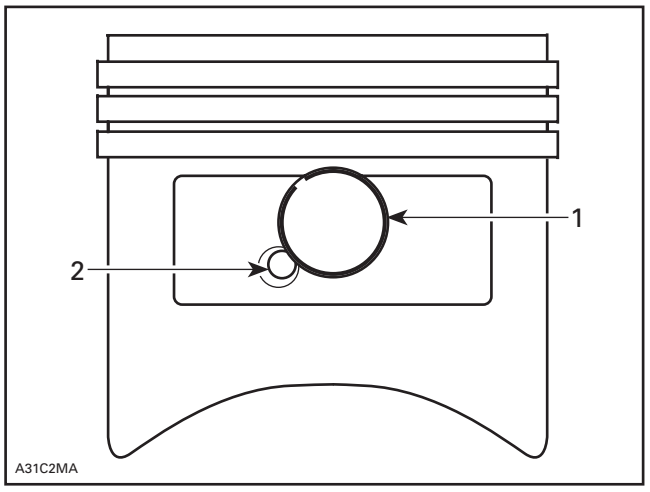


1. *Piston mark*
2. *Connecting rod long end*

Insert piston pin **no. 7** into piston **no. 5** and connecting rod **no. 4**.

Secure piston pin with both piston pin circlips **no. 6**.

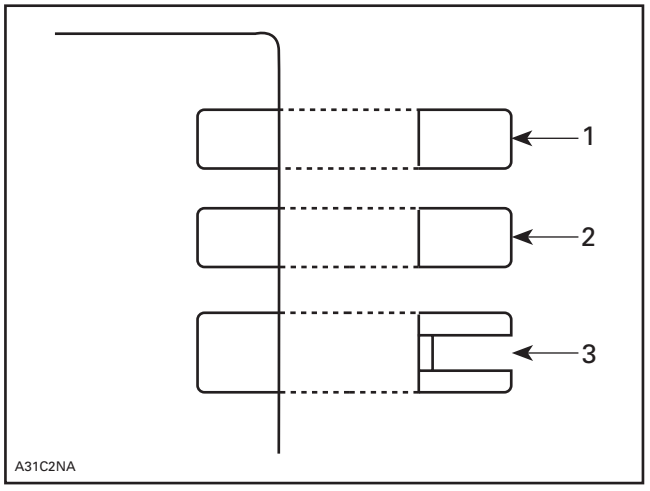
NOTE: Do not align the end gap of the piston pin circlips with the cutout in the piston bore.



1. Piston pin circlip
2. Cutout

Install all rings no. 24 with the markings facing upward.

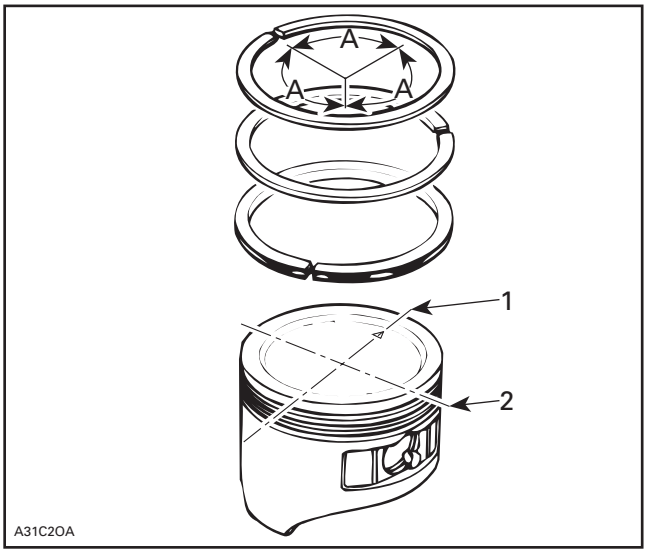
Ensure that top and second rings are not interchanged.



1. Top ring (chrome plated)
2. Second ring
3. Oil ring

Check that rings rotate smoothly after installation.

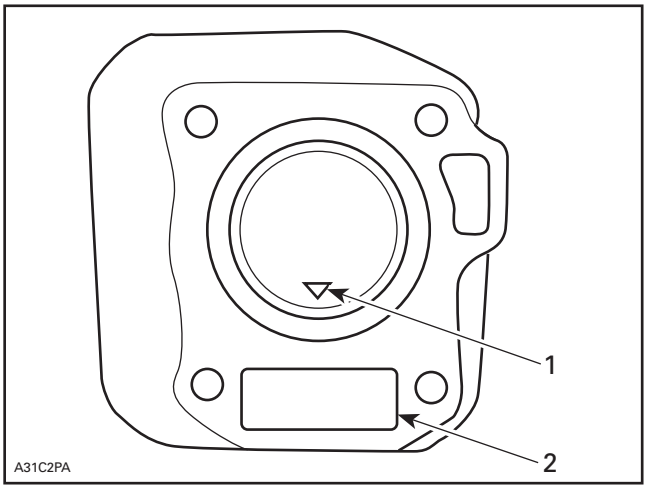
Space the piston ring end gaps 120° apart and do not align the gaps with the piston pin bore or the thrust side axis.



RING POSITIONING

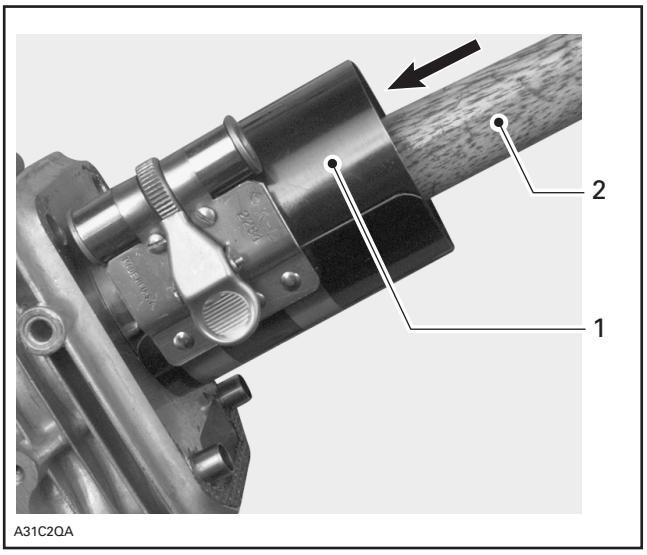
1. DO NOT align ring gap with piston trust side axis
2. DO NOT align ring gap with piston pin bore axis
A. 120°

Position piston ass'y with piston mark toward push rod hole, as shown in the following illustration.



1. Piston mark
2. Push rod hole

Using a ring compressor, slide piston into cylinder with a hammer handle, as shown in the next photo.



SLIDE PISTON INTO CYLINDER

1. *Ring compressor*
2. *Hammer handle*

Crankshaft

Apply oil on crankshaft connecting rod location, connecting rod cap and connecting rod before starting assembly.

Install crankshaft into crankcase.

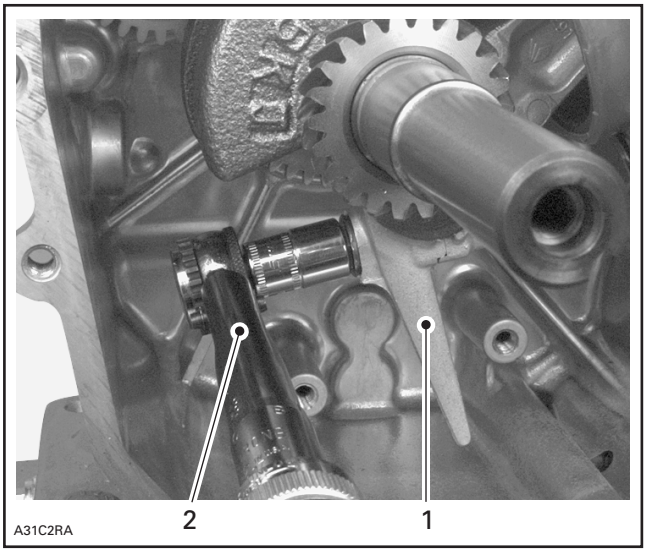
NOTE: To protect seal and ease crankcase cover installation, apply grease on crankcase cover seal.

Slide down piston so that connecting rod properly seats on crankshaft.

Secure connecting rod with connecting rod cap. Torque screws to 12 N•m (106 lbf•**in**).

▼ CAUTION

Ensure that connecting rod cap is properly positioned, as shown in the next photo.

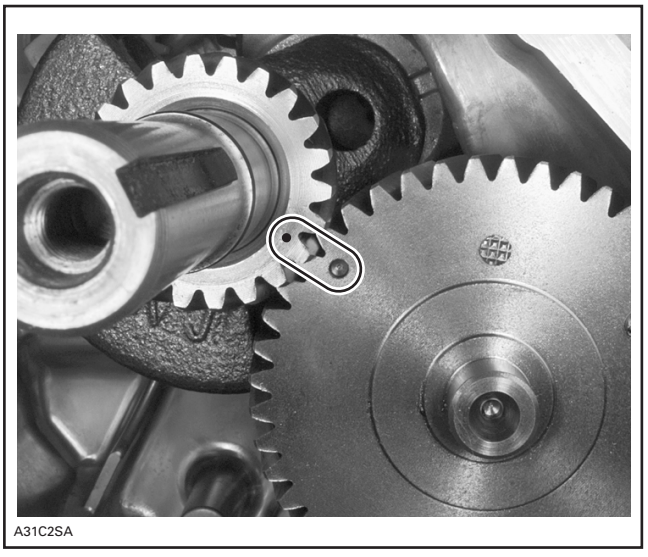


1. *Connecting rod cap*
2. *Torque wrench*

Camshaft

Install exhaust and intake valve lifters inside crankcase.

With the crankshaft in place, align the timing punch mark of the cam gear with the punch mark of the crankshaft drive gear. Refer to the following photo.



ALIGN BOTH MARKS

Crankcase

Verify that locating sleeves no. 25 are in place.

Install gasket no. 26 on crankcase.

Finalize crankcase assembling with crankcase cover no. 1. Torque screws in a crisscross sequence to 12 N•m (106 lbf•**in**).

NOTE: To protect seal and ease crankcase cover installation, apply grease on crankcase cover seal.

Verify that oil drain bolt no. 27 and both oil filler caps no. 28 are in place.

COMPRESSION TEST AND ENGINE DIMENSION MEASUREMENT

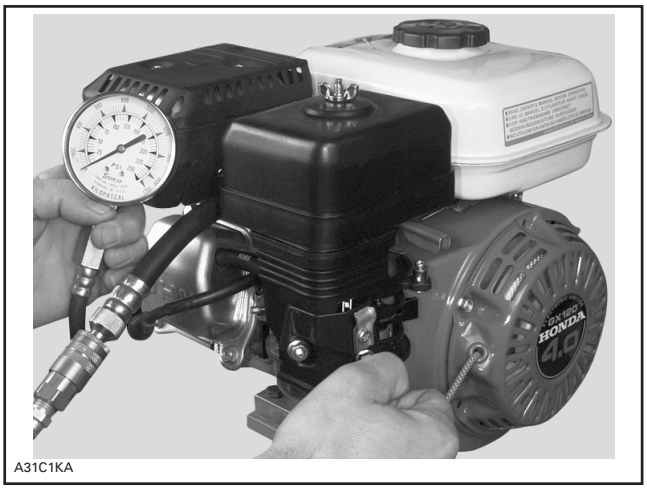
COMPRESSION TEST

Set ignition and emergency cut-out switches to the OFF position.

Disconnect spark plug cap, then remove.

Plug compression testing gauge into spark plug hole.

Hold compression testing gauge in one hand then pull starter handle 3 or 4 times with the other hand, as shown in the next photo.



A31C1KA

PULL STARTER HANDLE 3 OR 4 TIMES

Engine compression must be as described in the following table. If not, see subsection 04-03 VALVE ADJUSTMENT or subsection 04-04 DISASSEMBLY/ASSEMBLY.

STANDARD	SERVICE LIMIT
110 - 120 PSI	85 PSI

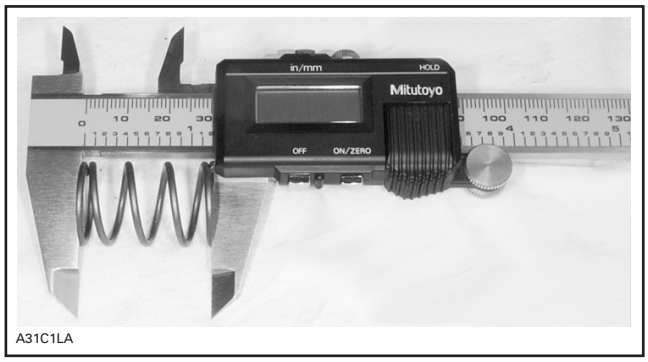
ENGINE DIMENSION MEASUREMENT

VALVE SPRING FREE LENGTH

STANDARD	SERVICE LIMIT
30.5 mm (1.20 in)	29.5 mm (1.16 in)

Measure valve springs free length with a galiper, as shown in the next photo.

NOTE: When measuring free length, ensure not to apply pressure onto spring.



A31C1LA

VALVE SPRING FREE LENGTH

If the springs are shorter than service limit value, replace with new one.

VALVE SEAT WIDTH

STANDARD	SERVICE LIMIT
0.8 mm (0.03 in)	2.0 mm (0.08 in)

Measure valve seat width using a galiper, as shown in the next photo.



A31C1MA

VALVE SEAT WIDTH

If valve seat width is under the standard or over the service limit value, replace cylinder head with new one.

VALVE STEM (outside diameter)

	STANDARD	SERVICE LIMIT
INTAKE	5.48 mm (0.216 in)	5.318 mm (0.2094 in)
EXHAUST	5.44 mm (0.214 in)	5.275 mm (0.2077 in)

Measure valve stem with a micrometer, as shown in the next photo.



A31C1NA

TYPICAL

Inspect valve surface, check for abnormal stem wear and bending. If so, replace valve with new one.

VALVE GUIDE (inside diameter)

STANDARD	SERVICE LIMIT
5.50 mm (0.217 in)	5.572 mm (0.2194 in)

Clean valve guides to remove carbon deposits before measuring.

Measure valve guide inside diameter using a small hole telescoping gauge and a micrometer.

Replace cylinder head if valve guides are over service limit value.

GUIDE-TO-STEM CLEARANCE

Subtract each valve stem outside diameter from the corresponding valve guide inside diameter to obtain the stem-to-guide clearance.

	STANDARD	SERVICE LIMIT
INTAKE	0.02 - 0.044 mm (0.0008 - 0.0017 in)	0.10 mm (0.004 in)
EXHAUST	0.006 - 0.087 mm (0.0024 - 0.0034 in)	0.12 mm (0.005 in)

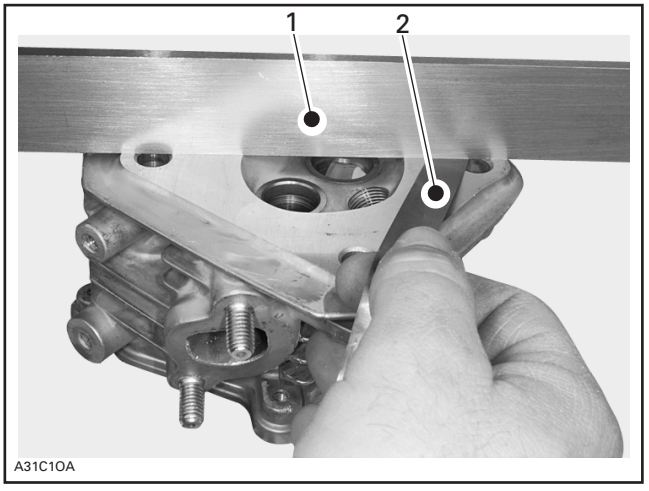
If the stem-to-guide clearance exceeds the service limit value, replace valve or cylinder head as needed.

CYLINDER HEAD SURFACE

SERVICE LIMIT	0.10 mm (0.004 in)

Clean cylinder head surface.

Check cylinder head flatness with a straight edge and a feeler gauge, as shown in the next photo.



1. Straight edge
2. Feeler gauge

If cylinder head flatness is over service limit value, replace cylinder head.

Cylinder Head Inspection

Remove carbon deposits from combustion chamber.

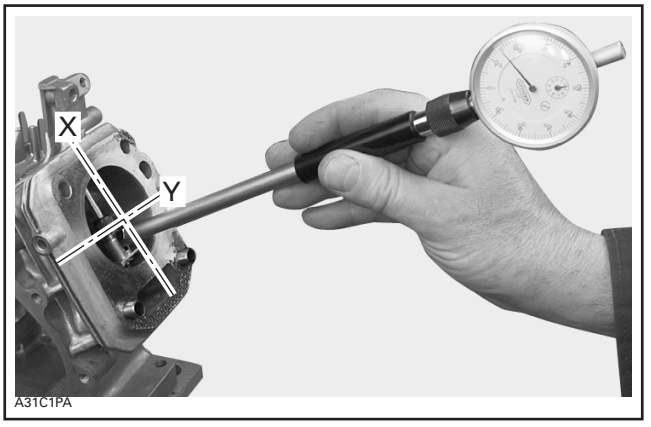
Check the spark plug hole and valve areas for cracks.

CYLINDER INSIDE DIAMETER

STANDARD	SERVICE LIMIT
60.0 mm (2.36 in)	60.165 mm (2.3687 in)

Compare cylinder inside diameter 16 mm (5/8 in) from top of cylinder, halfway and 12.7 mm (1/2 in) from bottom of cylinder.

Measure cylinder inside diameter in both X (perpendicular to crankshaft) and Y (parallel to crankshaft) axis. Take the maximum reading to determine cylinder wear.



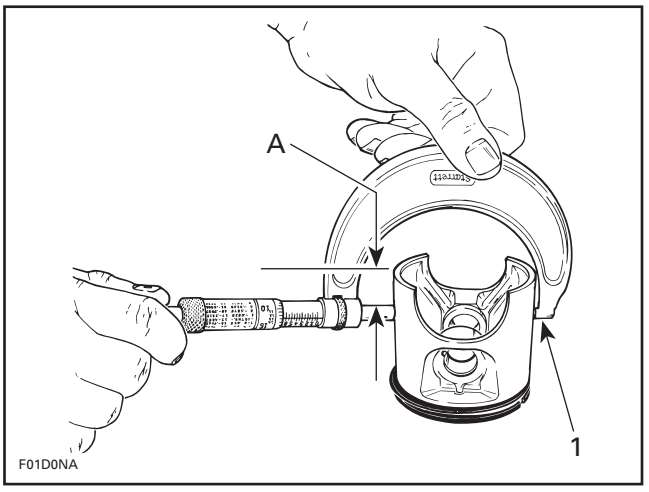
X. Axis (perpendicular to crankshaft axis)
Y. Axis (parallel to crankshaft axis)

If the difference exceeds the specified dimension the cylinder should be rebored and honed or should be replaced.

USED PISTON MEASUREMENT

STANDARD	SERVICE LIMIT
59.985 mm (2.3616 in)	59.845 mm (2.3561 in)

Using a micrometer, measure piston at 10 mm (25/64 in) perpendicularly (90°) to piston pin.



TYPICAL

1. Measuring perpendicularly (90°) to piston pin axis
A. 10 mm (25/64 in)

The measured dimension should be as described in the previous table. If not, install a new piston.

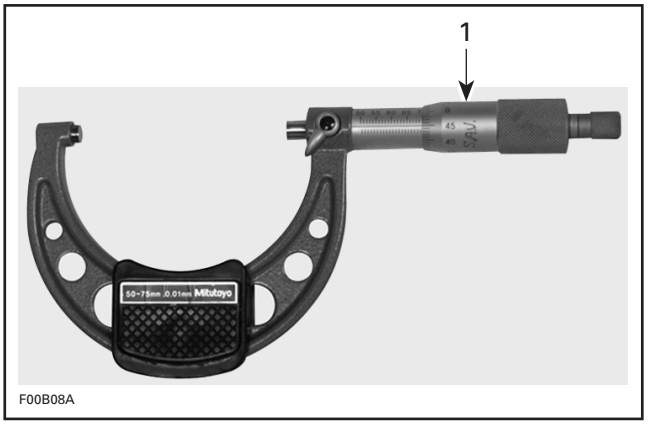
CYLINDER/PISTON CLEARANCE

STANDARD	SERVICE LIMIT
0.015 - 0.050 mm (0.0006 - 0.0020 in)	0.12 mm (0.005 in)

Used and New Pistons

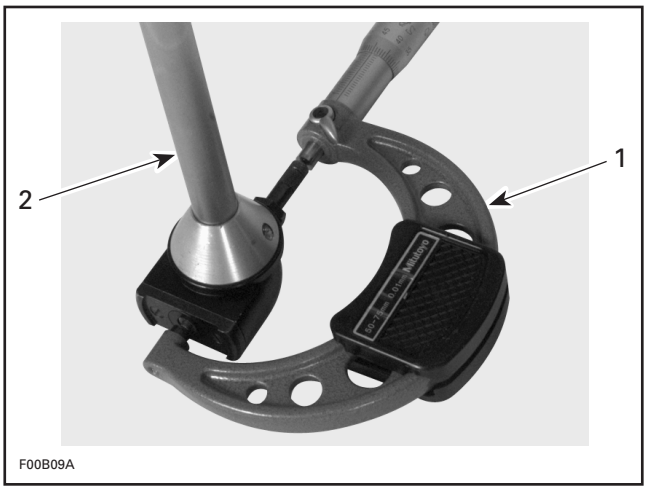
NOTE: Make sure used piston is not worn. See USED PISTON MEASUREMENT above.

Adjust and lock a micrometer to the piston dimension.

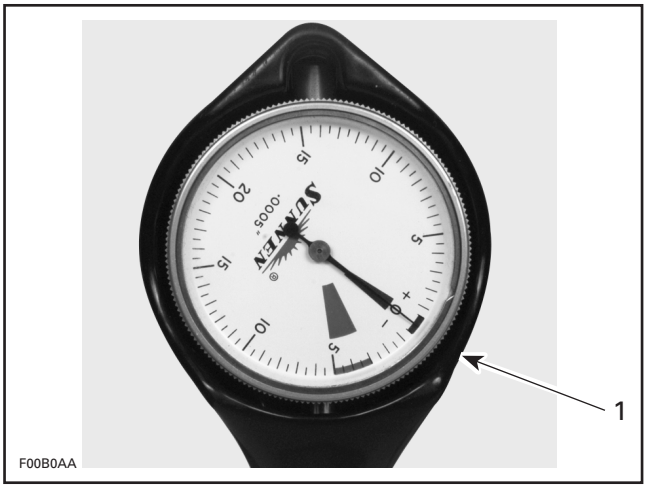


1. Micrometer set to the piston dimension

With the micrometer set to the piston dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0 (zero).



1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



TYPICAL

1. Indicator set to 0 (zero)

Position the dial bore gauge at 16 mm (5/8 in) below cylinder top edge, measuring perpendicularly (90°) to piston pin axis. See CYLINDER INSIDE DIAMETER above.

Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance. If clearance exceeds specified tolerance, replace cylinder or rebore. See previous table.

NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.

RING/PISTON GROOVE CLEARANCE

STANDARD	SERVICE LIMIT
0.015 - 0.045 mm (0.0006 - 0.0018 in)	0.15 mm (0.006 in)

NOTE: These clearances are applicable for 3 rings; top, second and oil ring.

Using a feeler gauge check clearance between ring and groove. Replace piston if clearance exceeds specified tolerance. See above table.



RING/PISTON GROOVE CLEARANCE

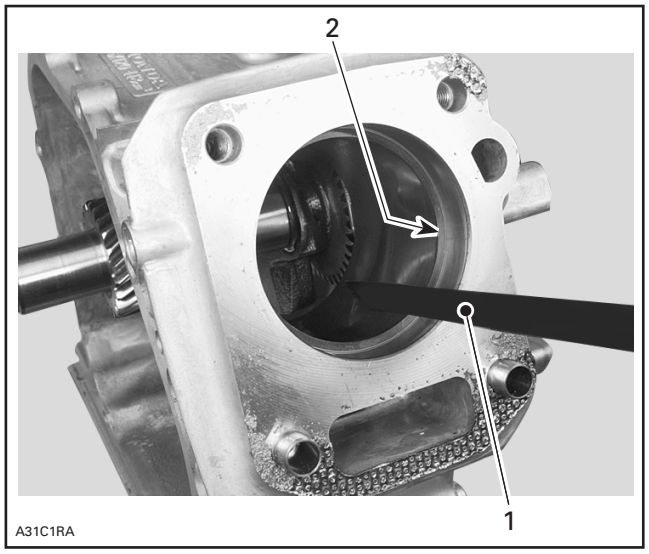
RING END GAP

	STANDARD	SERVICE LIMIT
TOP AND SECOND	0.2 - 0.4 mm (0.008 - 0.016 in)	1.0 mm (0.04 in)
OIL	0.15 - 0.35 mm (0.006 - 0.014 in)	1.0 mm (0.04 in)

Position ring 16 mm (5/8 in) from top of cylinder.

NOTE: In order to correctly position the ring in the cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. Replace ring, if gap exceeds specified tolerance. See above table.

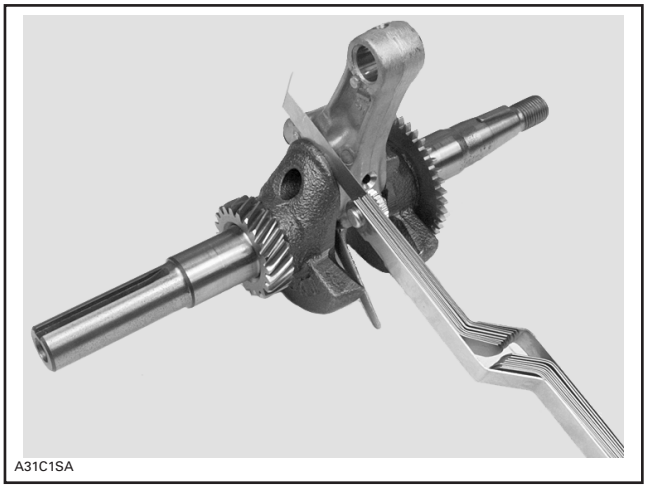


1. Feeler gauge
2. Ring properly positioned in cylinder

CONNECTING ROD BIG END SIDE CLEARANCE

STANDARD	SERVICE LIMIT
0.1 - 0.7 mm (0.004 - 0.028 in)	1.1 mm (0.043 in)

Using a feeler gauge, measure distance between connecting rod and crankshaft counterweight. If the distance exceeds specified tolerance, replace the crankshaft.



MEASURE SIDE CLEARANCE

PISTON PIN (outside diameter)

STANDARD	SERVICE LIMIT
13.0 mm (0.51 in)	12.954 mm (0.5100 in)

Mesure piston pin with a micrometer, as shown in the next photo.

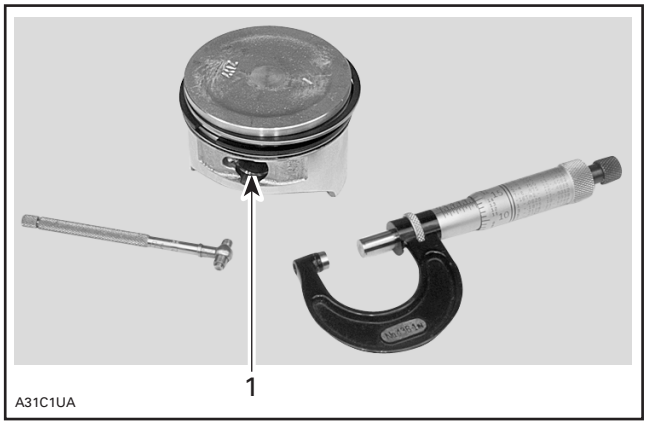


MEASURE PISTON PIN

PISTON PIN BORE (inside diameter)

STANDARD	SERVICE LIMIT
13.002 mm (0.5119 in)	13.048 mm (0.5137 in)

Measure piston pin bore with a telescoping gauge and a micrometer, as shown in the next photo.



1. Piston pin bore

PISTON-TO-PISTON PIN BORE CLEARANCE

STANDARD	SERVICE LIMIT
0.002 - 0.014 mm (0.0001 - 0.0006 in)	0.08 mm (0.003 in)

Compare both previously measured piston pin (outside diameter) and piston pin bore (inside diameter).

If clearance is out of service limit value, replace piston pin or piston as needed.

CONNECTING ROD SMALL END (inside diameter)

STANDARD	SERVICE LIMIT
13.005 mm (0.5120 in)	13.07 mm (0.515 in)

Measure connecting rod small end (inside diameter) with a telescoping gauge and a micrometer, as shown in the next photo.



MEASURE CONNECTING ROD SMALL END

CONNECTING ROD BIG END (inside diameter)

STANDARD	SERVICE LIMIT
26.02 mm (1.024 in)	26.066 mm (1.0262 in)

Measure connecting rod big end (inside diameter) with a telescoping gauge and a micrometer, as shown in the next photo.



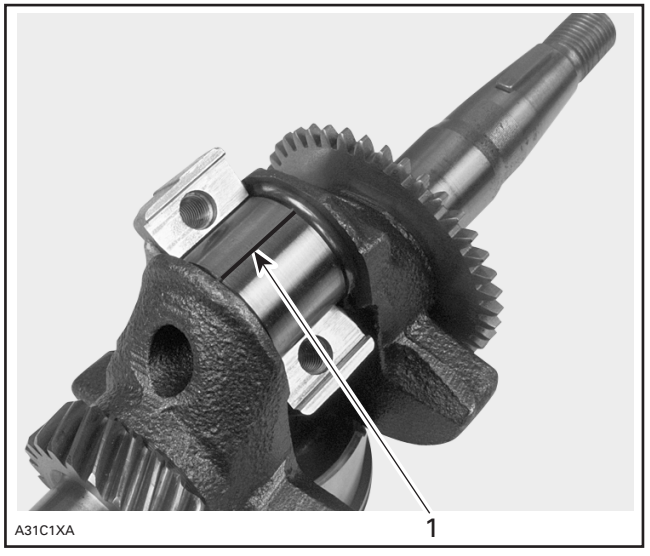
MEASURE CONNECTING ROD BIG END

CONNECTING ROD BIG END OIL CLEARANCE

STANDARD	SERVICE LIMIT
0.040 - 0.063 mm (0.0016 - 0.0025 in)	0.12 mm (0.005 in)

Clean all oil from crankpin and connecting rod big end surfaces.

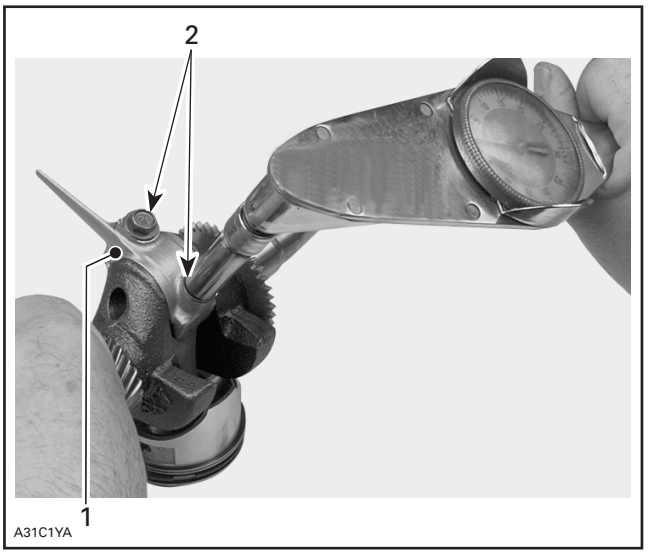
Position a piece of plastigauge on the crankpin, as shown on the next photo.



1. Plastigauge properly positioned

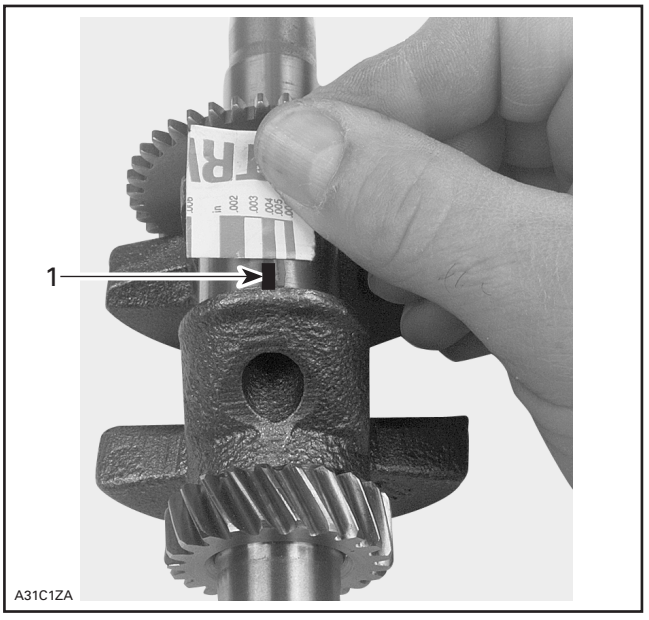
Reinstall connecting rod cap and torque screws to 12 N•m (109 lbf•**in**). See next photo.

NOTE: Do not rotate crankshaft while plastigauge is in place.



1. Connecting rod cap in place
2. Torque both screws

Remove connecting rod cap and measure the plastigauge, as shown in the next photo.



1. Plastigauge

If clearance exceeds the service limit, replace connecting rod and recheck clearance.

NOTE: Replacement connecting rods are available with standard and 0.25 mm (0.010 in) undersize bearing surfaces.

CRANKPIN (outside diameter)

STANDARD	SERVICE LIMIT
25.98 mm (1.023 in)	25.92 mm (1.020 in)

Measure crankpin outside diameter with a micrometer, as shown in the next photo.

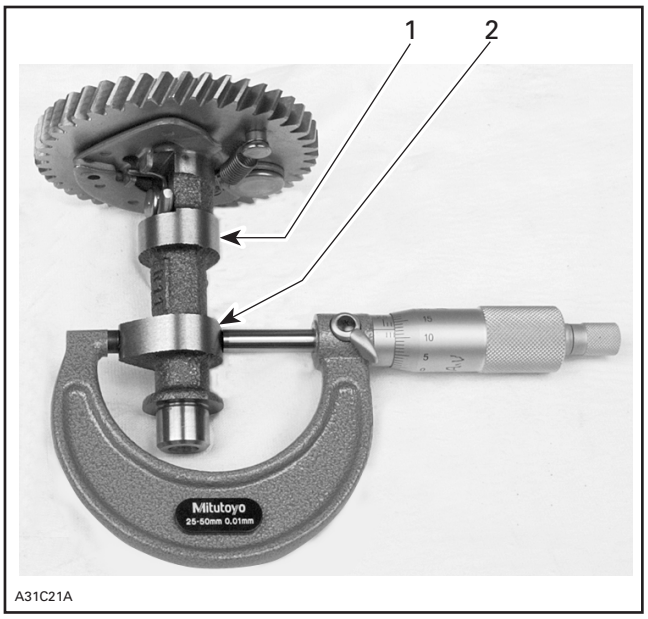


MEASURE CRANKPIN

CAMSHAFT CAM HEIGHT

	STANDARD	SERVICE LIMIT
INTAKE	27.7 mm (1.09 in)	27.45 mm (1.081 in)
EXHAUST	27.75 mm (1.093 in)	27.50 mm (1.083 in)

Measure both camshaft cams with a micrometer, as shown in the next photo.



1. Exhaust valve cam
2. Intake valve cam

CAMSHAFT (outside diameter)

STANDARD	SERVICE LIMIT
13.984 mm (0.5506 in)	13.916 mm (0.5479 in)

Measure camshaft outside diameter with a micrometer, as shown in the following photo.

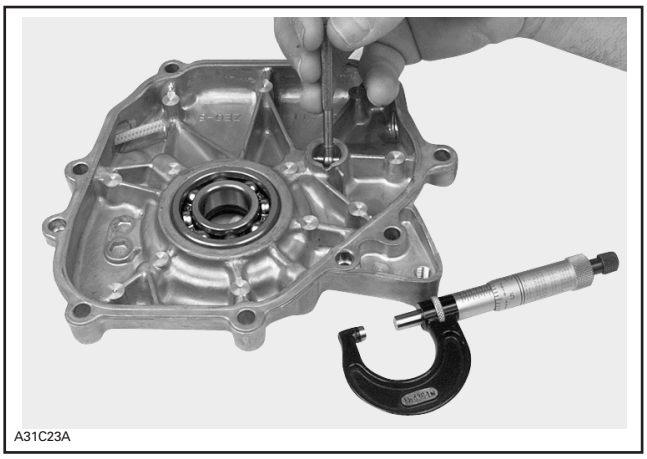


MEASURE CAMSHAFT OUTSIDE DIAMETER

CAMSHAFT HOLDER (inside diameter)

STANDARD	SERVICE LIMIT
14.0 mm (0.55 in)	14.048 mm (0.5531 in)

Measure camshaft holder inside diameter with a telescoping gauge and a micrometer, as shown in the next photo.



MEASURE CAMSHAFT HOLDER INSIDE DIAMETER

CHECKING SURFACE FLATNESS

Crankcase cover can be checked for perfectly mating surfaces.

Lay part on a surface plate (marble, mirror or thick glass plate).

Holding down one end of part, try pushing down the other end.

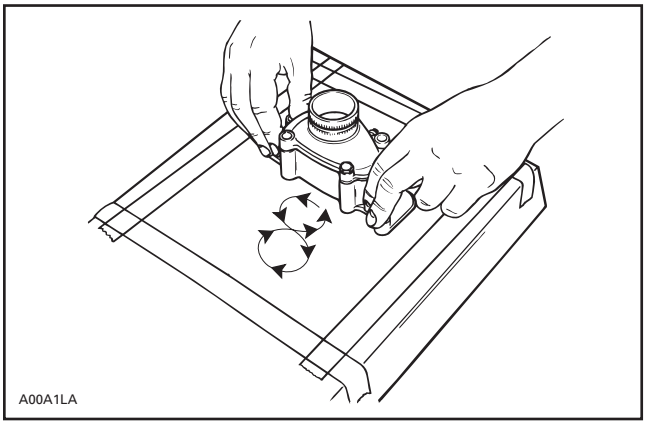
If any play is felt, part must be rectified.

RECTIFYING SURFACES

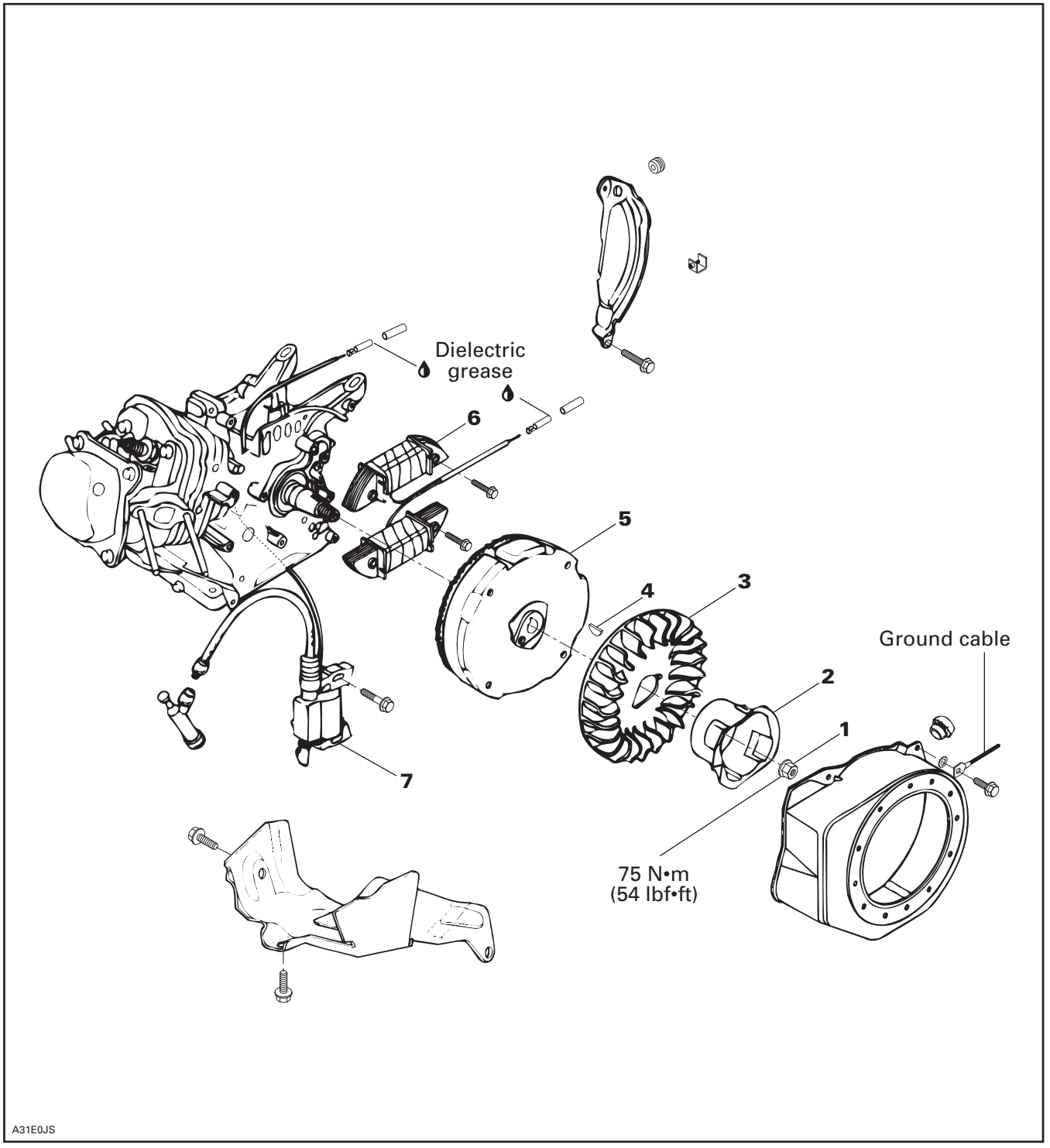
Stick a fine sand paper sheet on the surface plate then lightly oil the sand paper.

Rub manifold mating surface on sand paper using 8-figure movements.

Sand until mating surface is perfectly straight.



TRANSISTORIZED MAGNETO IGNITION



NOTE: Engine must be removed to perform the following procedures.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ CAUTION

Clean armature and magneto using only with a clean cloth.

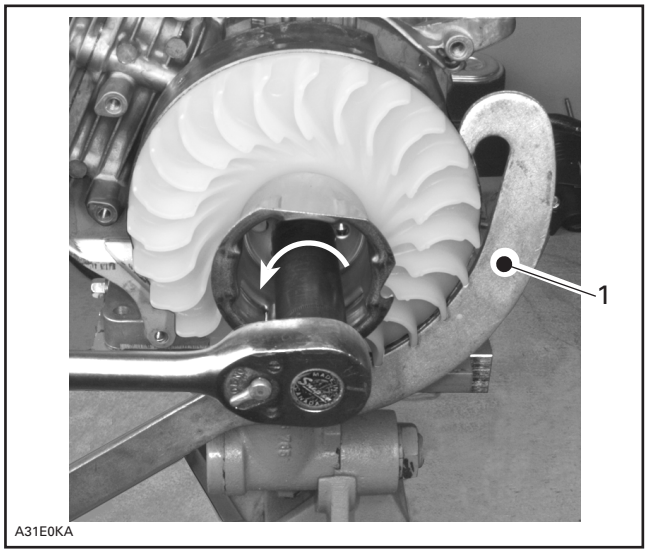
DISASSEMBLY

To gain access to magneto assembly, remove the following parts:

– chain guard
– drive chain
– clutch
– muffler
– disconnect fuel line
– engine
– rewind starter

Remove ignition coil **no. 7**.

To remove magneto flywheel retaining nut **no. 1**, use clutch holder tool (P/N 529 006 400), as shown in the next photo.



LOOSEN FLYWHEEL NUT

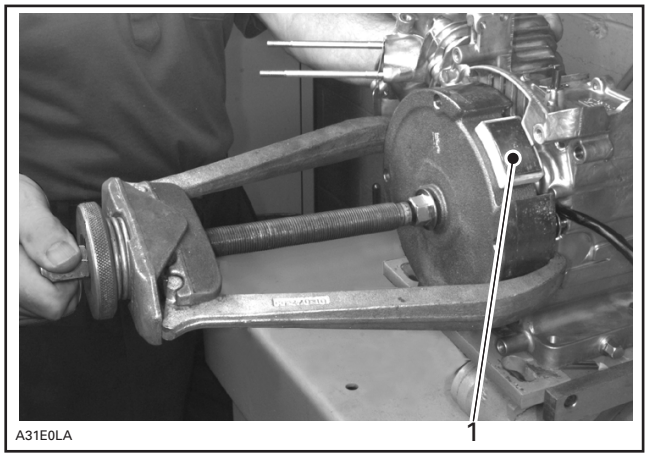
1. *Hold flywheel using clutch holder tool (P/N 529 006 400)*

Remove starter pulley **no. 2** and fan **no. 3**.

Reinstall magneto flywheel nut then using puller, detach flywheel **no. 5**, as shown in the next photo.

▼ CAUTION

Never hold flywheel using magnet section. Flywheel may be damaged.

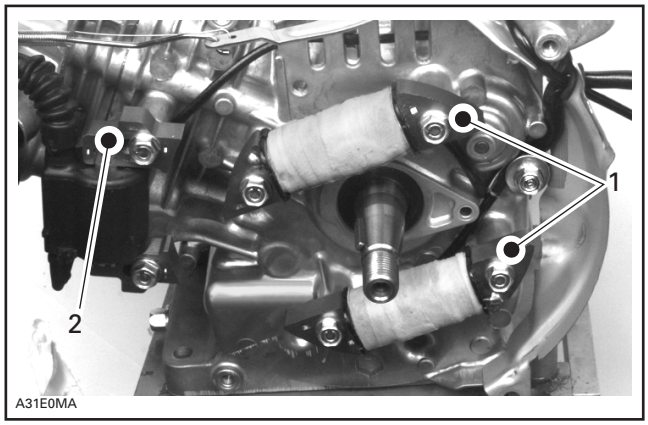


1. *Magnet section*

NOTE: Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto flywheel from its taper.

INSPECTION

Test ignition **no. 7** and lamp **no. 6** coils as described in TESTING PROCEDURE 06-03.



1. *Lamp coils*
2. *Ignition coil*

ASSEMBLY

Clean crankshaft extension (taper).

Position Woodruff key **no. 4** then reinstall flywheel with fan.

Install starter pulley, as shown in the next photo.

▼ CAUTION

When installing starter pulley, ensure that locating pin is properly aligned with flywheel alignment hole.



1. Starter pulley locating pin must be aligned with flywheel hole

Torque flywheel nut to 75 N•m (54 lbf•ft).

At reassembly coat all electric connections with silicone dielectric grease (P/N 413 701 700) to prevent corrosion or moisture penetration.

▼ CAUTION

Do not use silicone "sealant", this product will corrode contacts.

Ignition Coil Air Gap Adjustment

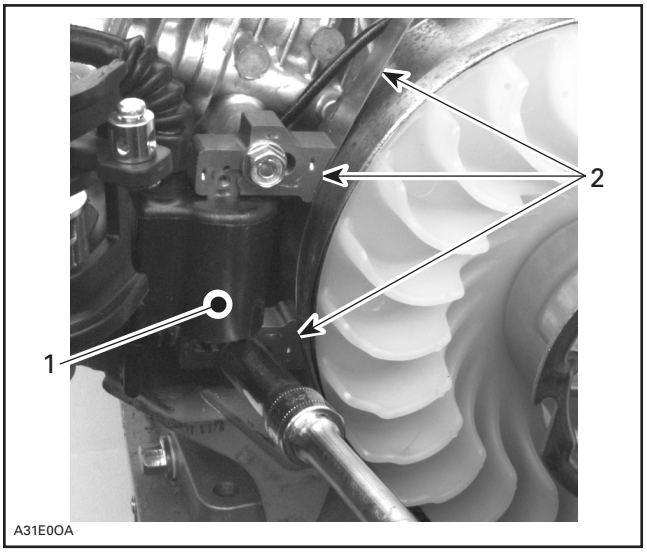
NOTE: To perform ignition coil air gap adjustment, flywheel must be tightened.

Loosen ignition coil screws.

Insert filler gauge between flywheel and ignition coil. Adjust both gaps at the same time as shown in the next photo and according to the following table.

Specified clearance	0.4 ± 0.2 mm (0.016 ± 0.008 in)

Push the ignition coil firmly toward flywheel and tighten screws.

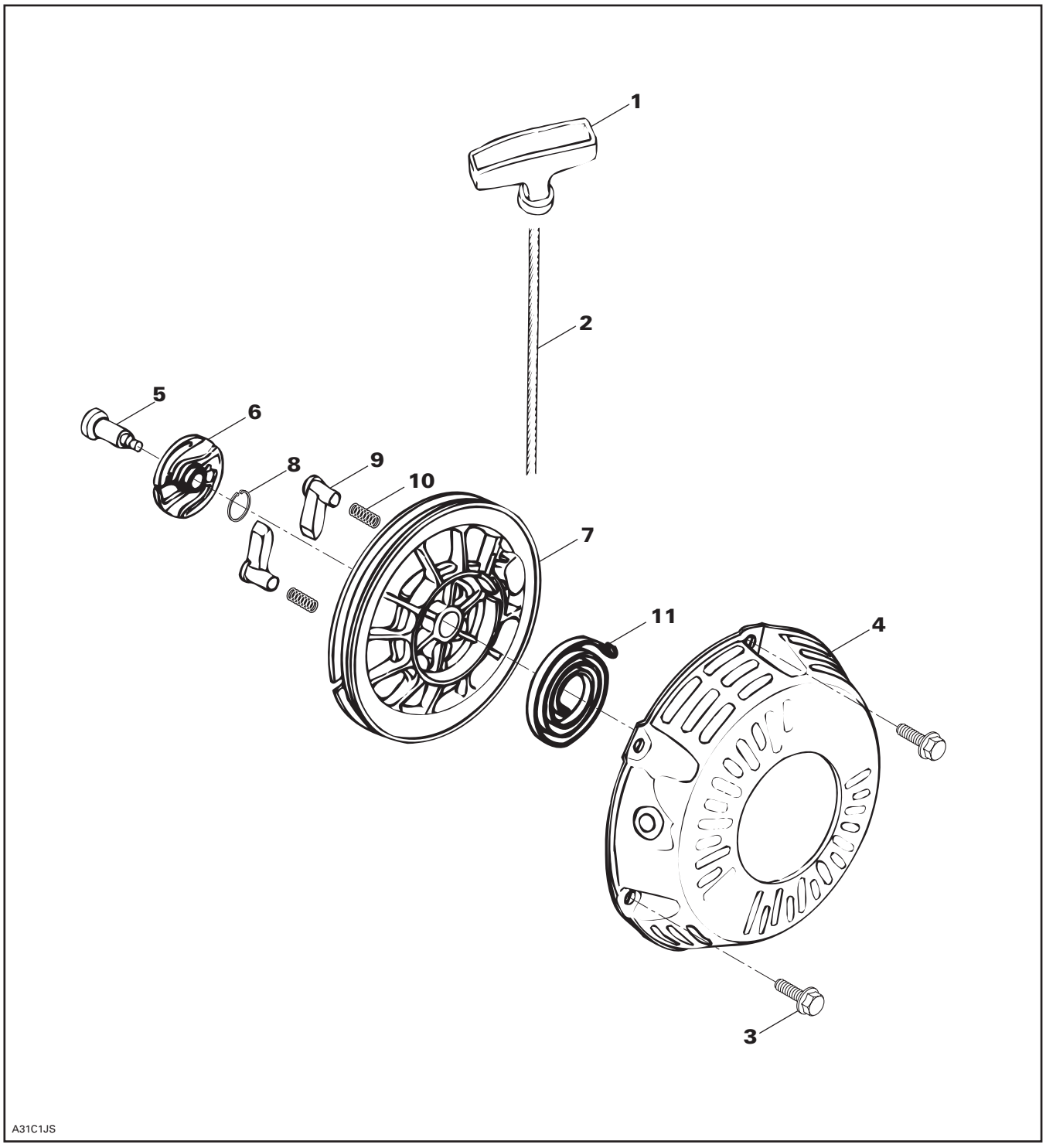


1. Ignition coil
2. Filler gauge filling both gaps

▼ CAUTION

Do not adjust ignition coil air gap at magnet section on flywheel.

REWIND STARTER



REMOVAL

The following must be removed before rewind starter removal:

– chain guard
– drive chain
– clutch
– disconnect fuel hose
– engine

Using a small screwdriver, extract rope knot from starter grip **no. 1**. Cut rope **no. 2** close to knot. Tie a knot near starter.

Mark rewind starter housing **no. 4** position for re-assembly.

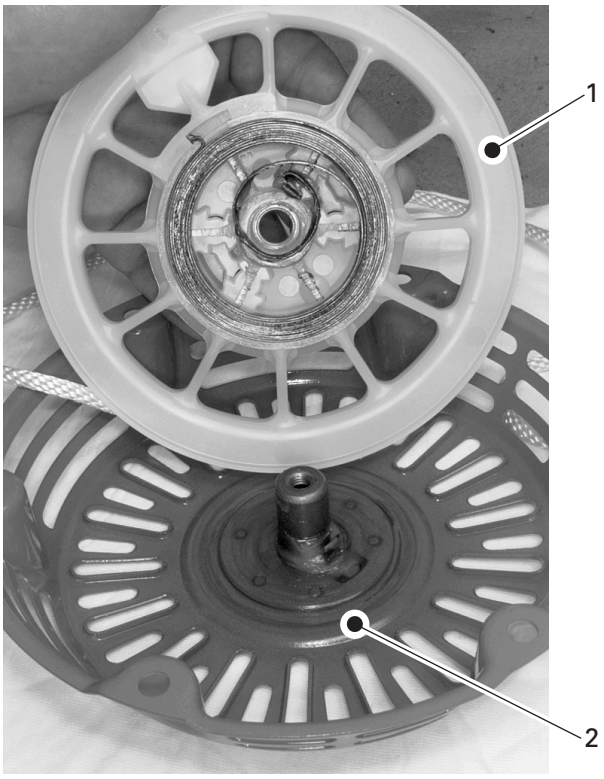
Remove screws **no. 3** securing rewind starter housing **no. 4** to engine then remove rewind starter ass'y.

DISASSEMBLY

To remove rope from rewind starter mechanism:

Place rewind starter ass'y on a bench.

– First remove screw **no. 5**, then ratchet guide **no. 6.**
– Remove friction spring **no. 8** and both ratchets **no. 9** with springs **no. 10.**
– Remove sheave **no. 7** from starter housing, as shown in the next illustration.



1. Sheave
2. Rewind starter housing

◆ WARNING

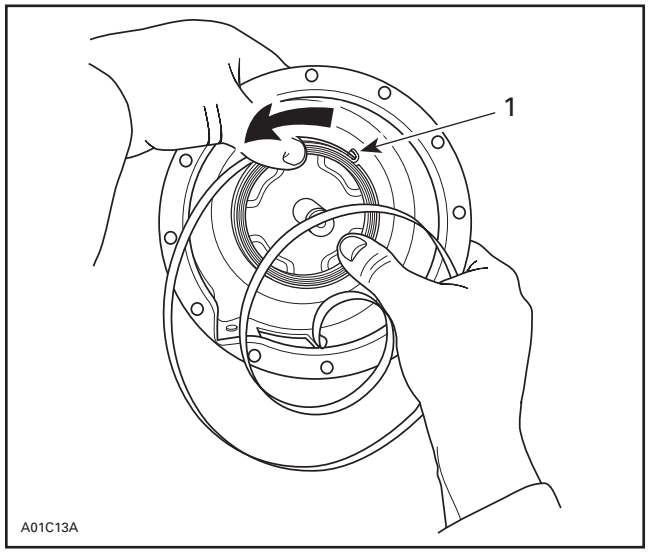
Since the spring is tightly wound inside the guide it may fly out when rewind is handled. Always handle with care.

INSPECTION

Check rope **no. 2** for fraying. Replace if so.

ASSEMBLY

At assembly, position spring **no. 11** outer end into spring guide notch then wind the spring counterclockwise into guide.



TYPICAL

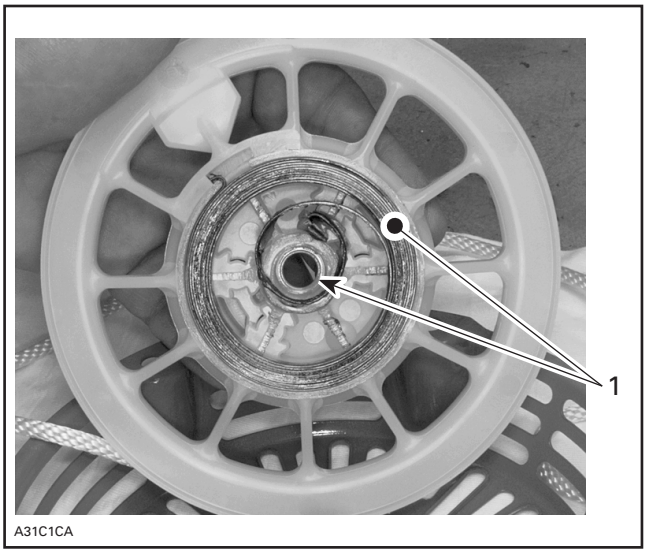
1. Outer end into guide notch

NOTE: Due to dust accumulation, rewind starter must be periodically cleaned, inspected and relubricated.

▼ CAUTION

It is of the utmost importance that the rewind starter spring be lubricated periodically using specific lubricants. Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Lubricate spring assembly with silicone compound grease (P/N 420 897 061) and position into starter housing as in the next photo.



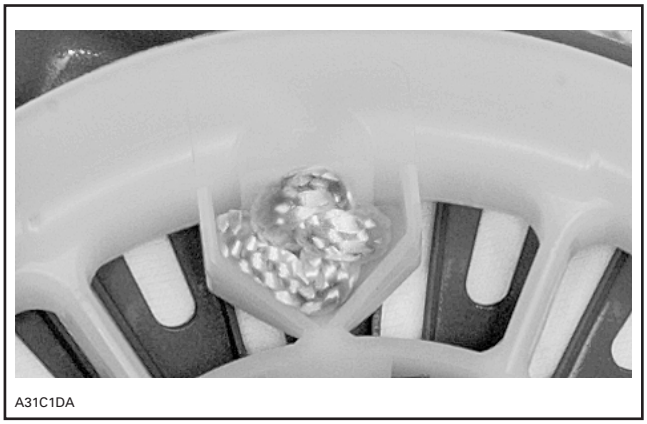
1. Grease inside spring guide and sheave hub

▼ CAUTION

The use of standard multi-purpose grease could result in rewind starter malfunction.

To install a new rope:

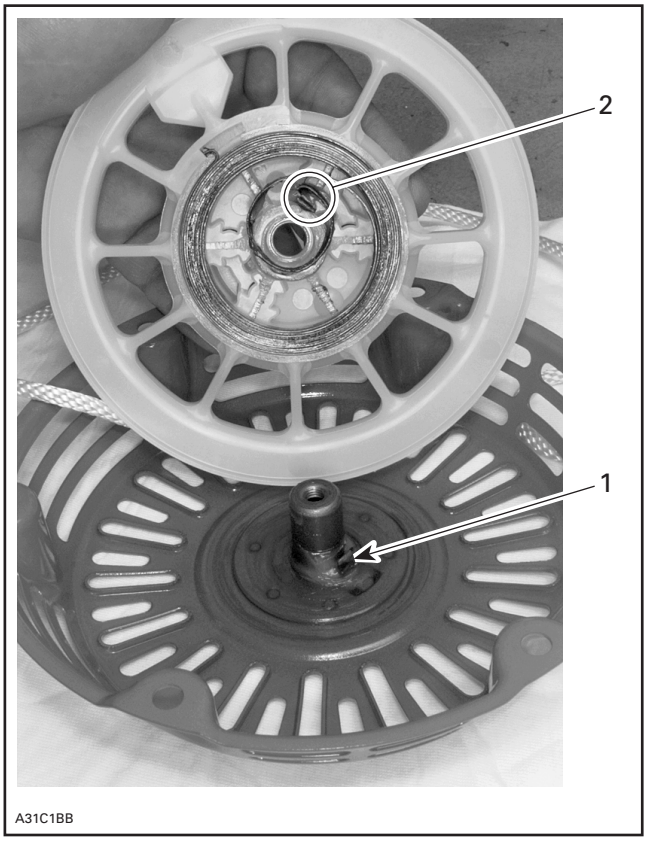
Insert rope into sheave orifice and lock it with a knot as illustrated.



ROPE KNOT INTO SHEAVE ORIFICE

To adjust rope tension:

Wind rope on sheave and place sheave into starter housing making sure that the sheave hub notch engages in the rewind spring hook. See the next photo.

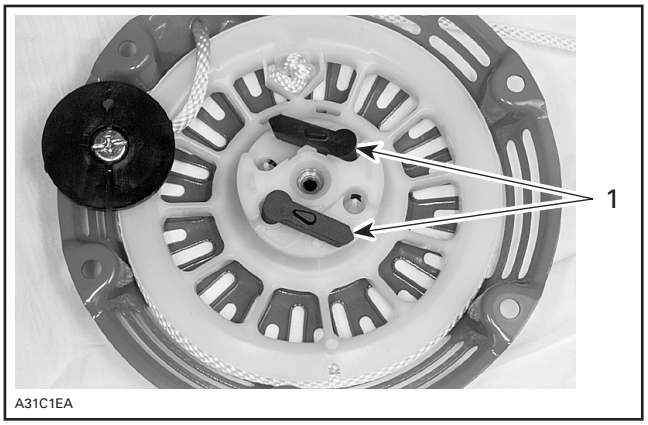


1. *Sheave hub notch*
2. *Rewind spring hook*

Rotate the sheave counterclockwise until rope end is accessible through starter housing orifice.

Pull the rope out of the starter housing and temporarily make a knot to hold it.

Position both ratchets (with springs), as shown in the next photo.



1. *Ratchet*

Finalize rewind starter assembly with friction spring **no. 8**, ratchet guide **no. 6** and screw **no. 5**.

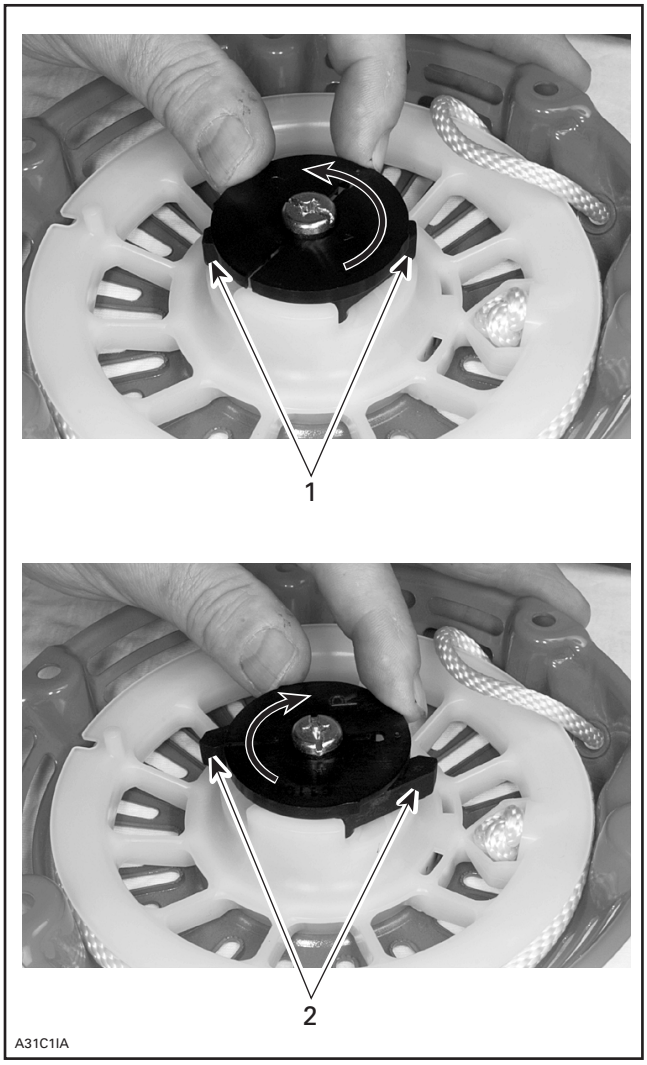
Attach rope to sheave notch then turn (2 turns) sheave counterclockwise, as shown in the next photo. One turn preload will give 7 turns of tension when fully extended.



2 TURNS COUNTERCLOCKWISE

1. *Sheave notch*

Check ratchet operation: when turning ratchet guide counterclockwise, ratchets must move in. When turning ratchet guide clockwise, ratchets must move out as shown in the next photo.



1. *Turn counterclockwise (CCW) — ratchets in*
2. *Turn clockwise (CW) — ratchets out*

INSTALLATION

Reinstall rewind starter ass'y on engine.

Reinstall engine in snowmobile.

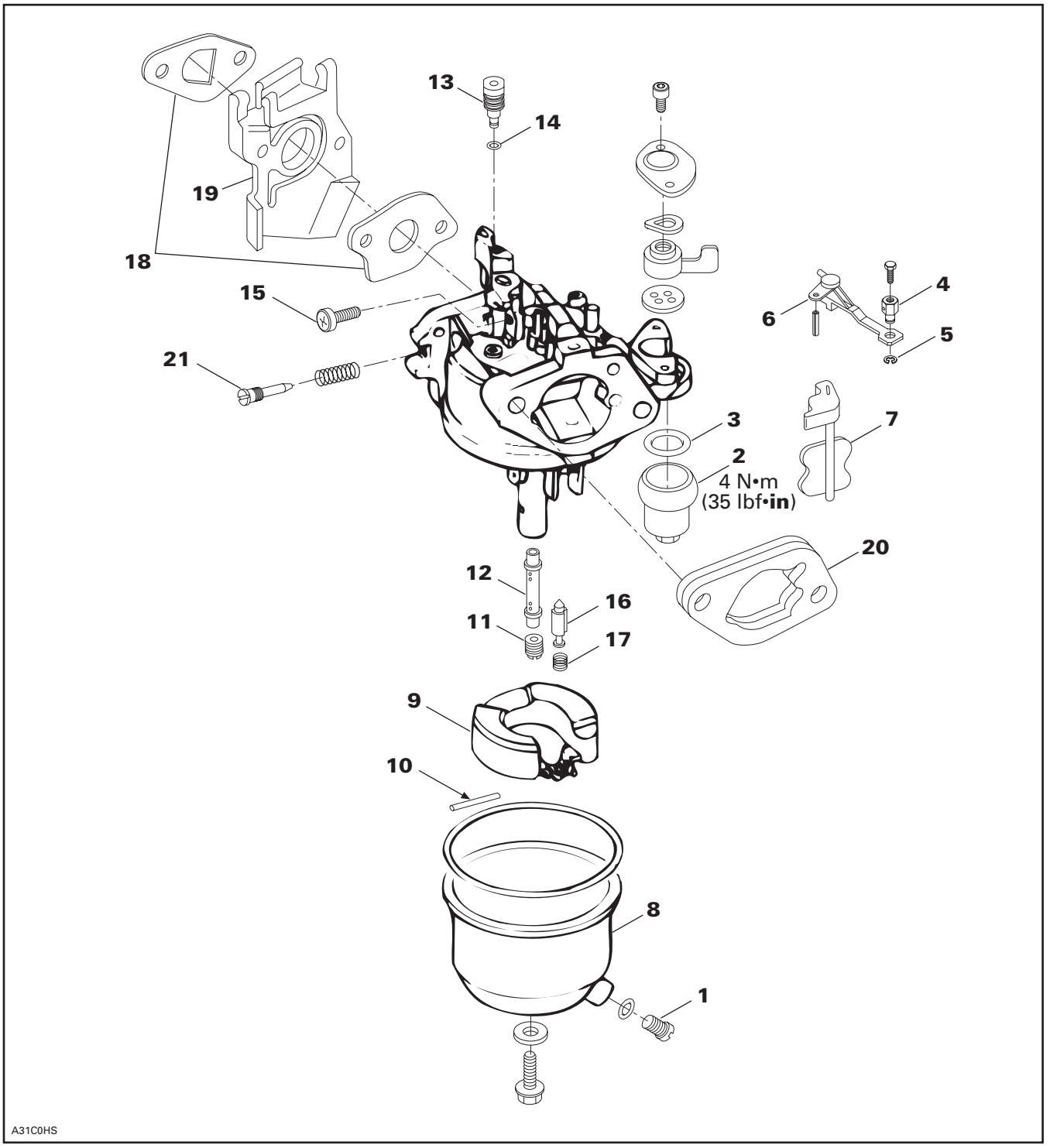
Prior to installing starter grip **no. 1** on new rope, it is first necessary to fuse the rope end with a lit match.

Pass rope through snowmobile fitting and starter grip and tie a knot in the rope end. Fuse the knot with a lit match then insert rope end down and pull the starter grip over the knot.

Reconnect fuel hose.

Reinstall clutch, drive chain, then chain guard.

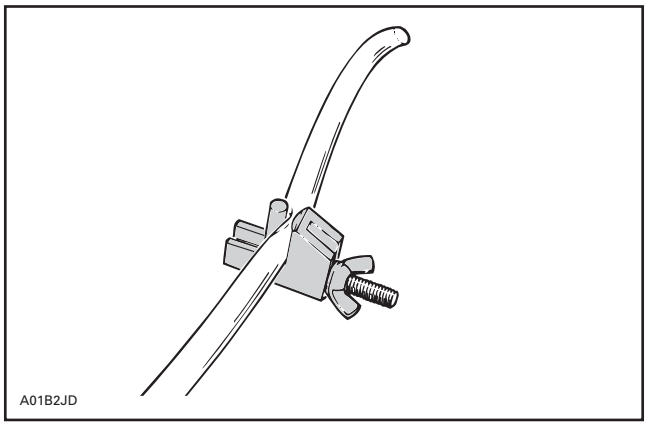
CARBURETOR


13
14
19
18
15
21
6
4
5
3
7
2
4 N•m
(35 lbf•in)
20
12
16
11
17
9
10
8
1
A31C0HS

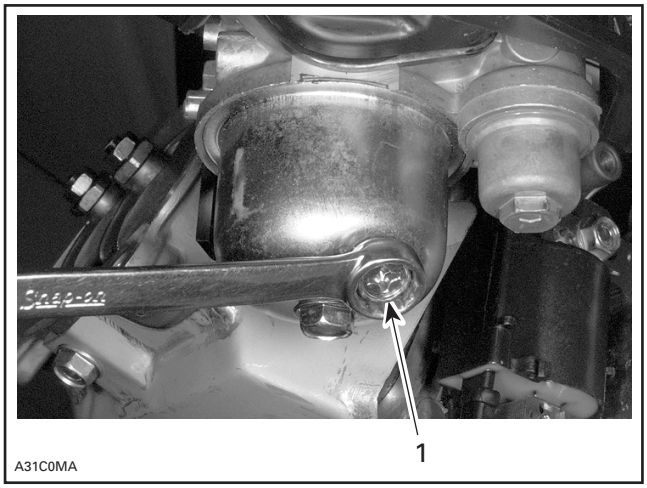
REMOVAL

Remove engine protective plate.

Obstruct fuel line with a hose pincher (P/N 295 000 076), as shown in the next photo.



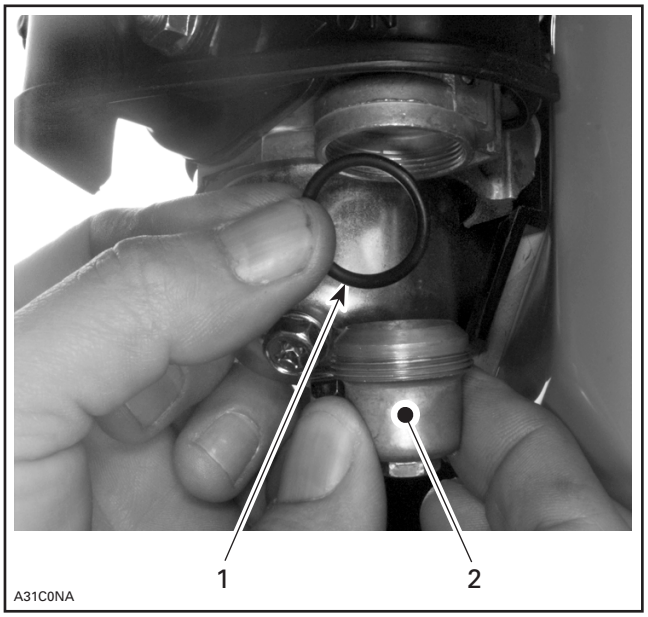
Drain fuel from carburetor by loosening screw **no. 1**, as shown in the next photo.



TO DRAIN CARBURETOR

1. Loosen this screw

Loosen fuel strainer cup **no. 2** and remove from carburetor. Keep O-ring **no. 3**, as shown in the next photo.



REMOVE FUEL STRAINER CUP

1. O-ring
2. Fuel strainer cup

Disconnect fuel inlet line from carburetor and drain fuel from tank.

◆ WARNING

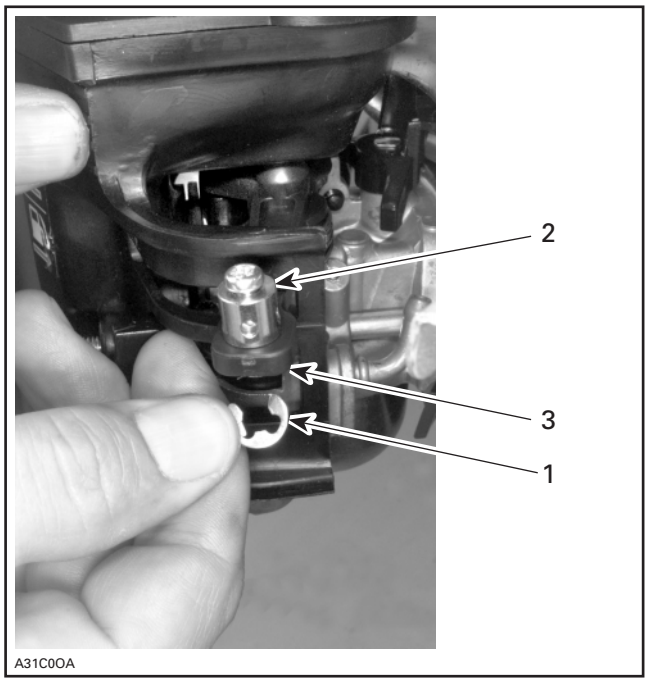
When draining a fuel tank or whenever a fuel line is disconnected, obstruct line with a hose pincher (P/N 295 000 076) or equivalent device. Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.

Remove fuel tank.

Remove carburetor cap.

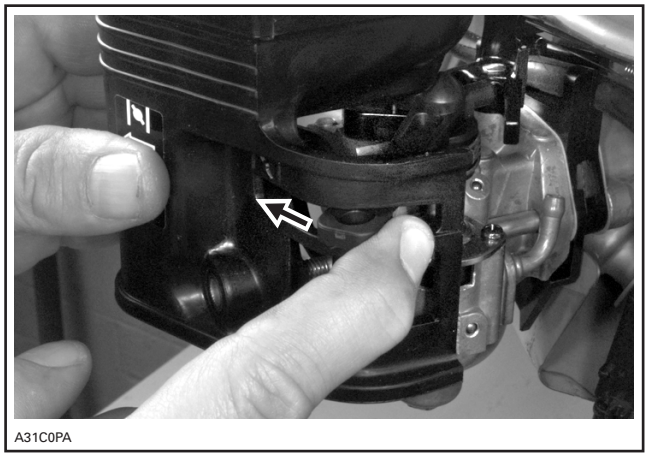
Detach choke cable from choke cable attachment **no. 4**, located on carburetor choke lever **no. 6**.

Remove circlip **no. 5** then remove choke cable attachment from carburetor choke lever, as shown in the next photo.



1. *Circlip*
2. *Choke cable attachment*
3. *Carburetor choke lever*

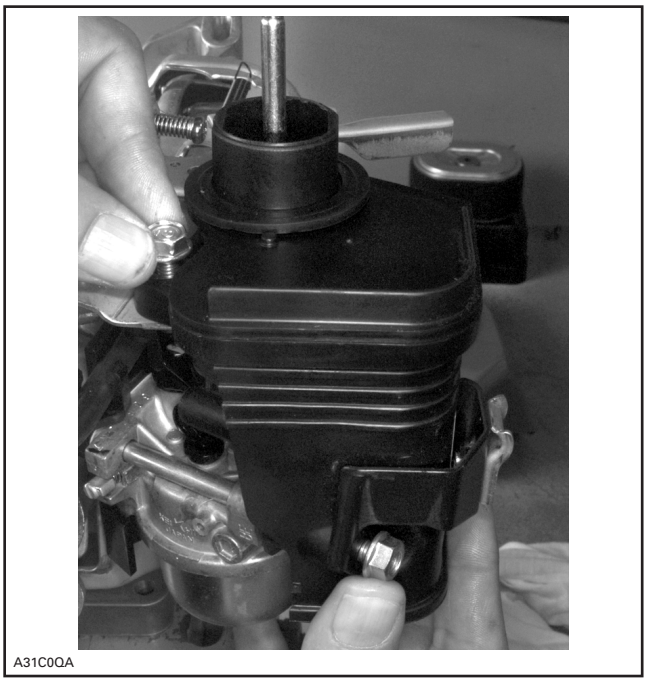
Move carburetor choke lever to the left, as shown in the next photo.



MOVE CARBURETOR CHOKE LEVER

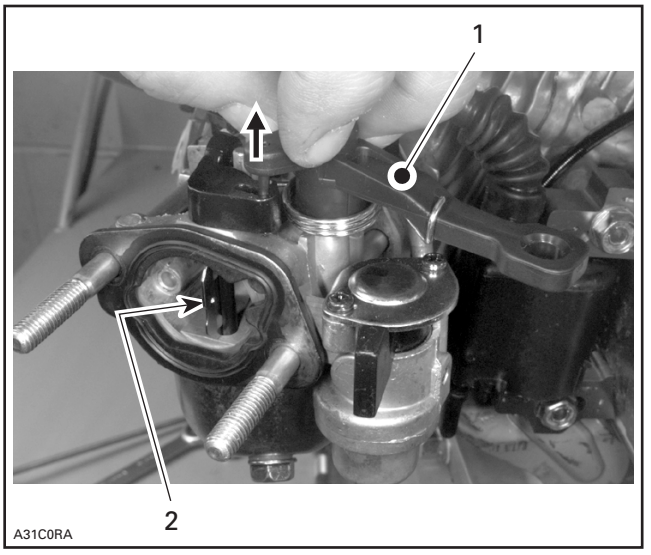
Unscrew carburetor protector screws then remove carburetor nuts.

Remove carburetor protector, as shown in the next photo.



REMOVE CARBURETOR PROTECTOR

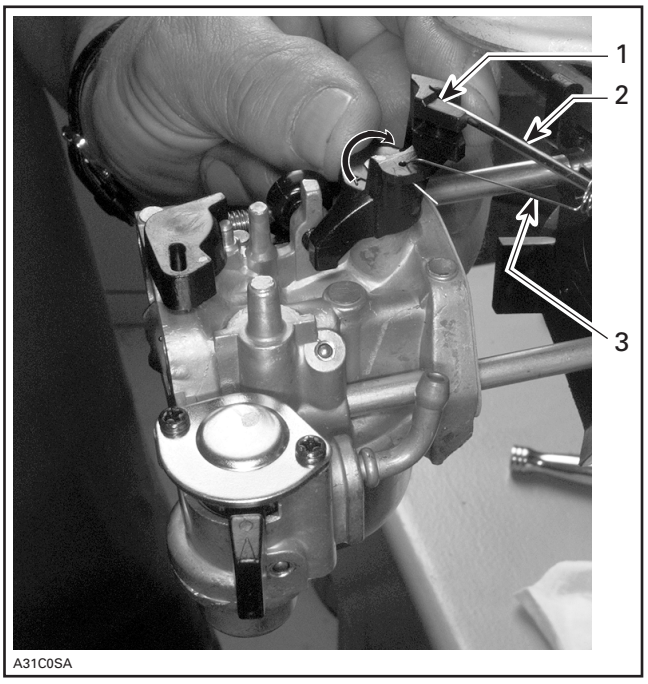
Lift up choke lever **no. 6** and detach from choke **no. 7**, as shown in the next photo.



LIFT UP CHOKE LEVER

1. *Choke lever*
2. *Choke*

Slide out carburetor and activate carburetor throttle lever so that groove align with governor rod, as shown in the next photo.



SLIDE OUT CARBURETOR AND ALIGN GROOVE

1. *Carburetor throttle lever groove aligned with governor rod*
2. *Governor rod*
3. *Throttle return spring*

Detach governor rod with throttle return spring.

Detach governor spring.

Remove carburetor.

NOTE: Carburetor can be removed without removing engine from vehicle, in that case remove left side stud.

CLEANING AND INSPECTION

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

▼ CAUTION

Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O-rings, etc. Therefore, it is recommended to remove those parts prior to cleaning.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions.

◆ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

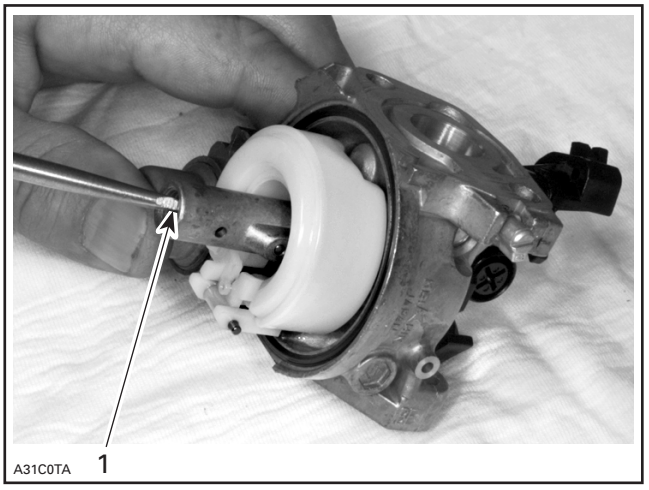
Check for fuel soaked into float no. 8. Replace as necessary.

Check float no. 9 and float pin no. 10 for cracks or other damages affecting free movement. Replace as necessary.

DISASSEMBLY AND ASSEMBLY

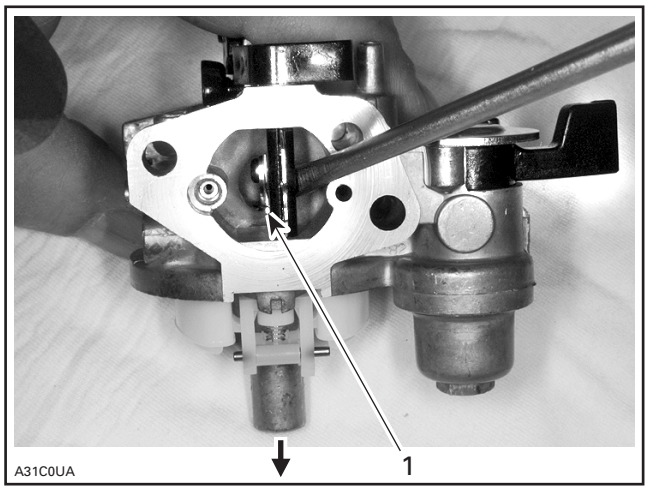
11,12, Main Jet and Nozzle

Place carburetor on a clean surface, then unscrew main jet no. 11 using a flat screwdriver, as shown in the next photo.



1. Unscrew main jet using a flat screwdriver

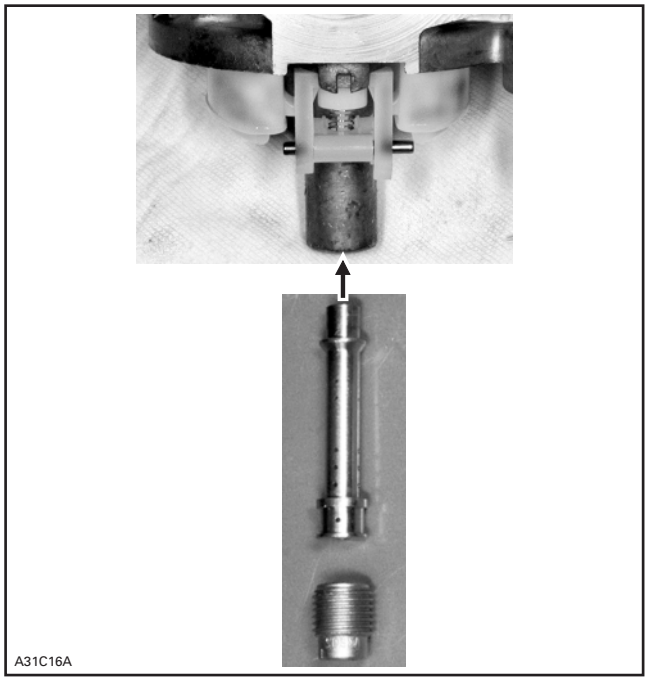
To remove nozzle **no. 12** use a flat screwdriver and push from inside carburetor, as shown in the following photo.



1. Push on nozzle to remove it

Clean main jet and nozzle thoroughly with compressed air.

Reinstall nozzle and main jet as shown in the next photo.

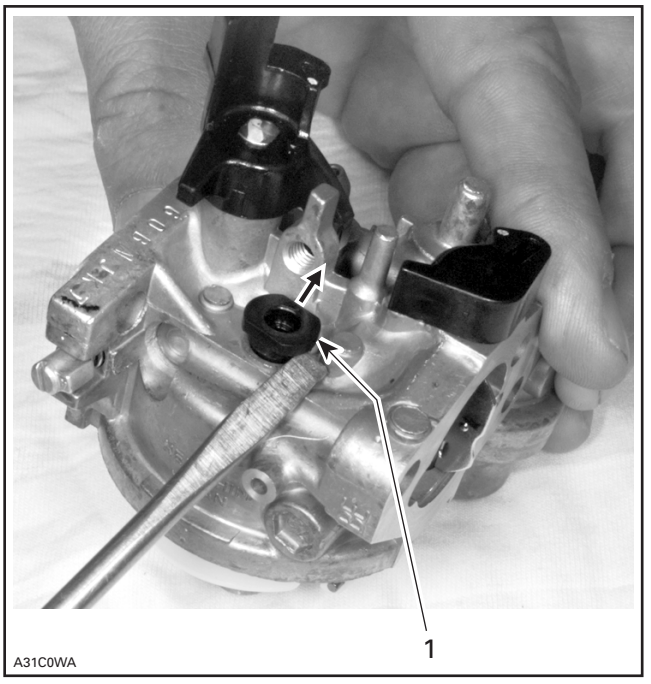


PROPER POSITION TO INSTALL NOZZLE AND MAIN JET

13,14, Pilot Jet

Remove stop screw **no. 15**.

Using a flat screwdriver remove pilot jet **no. 13**, as shown in the next photo.

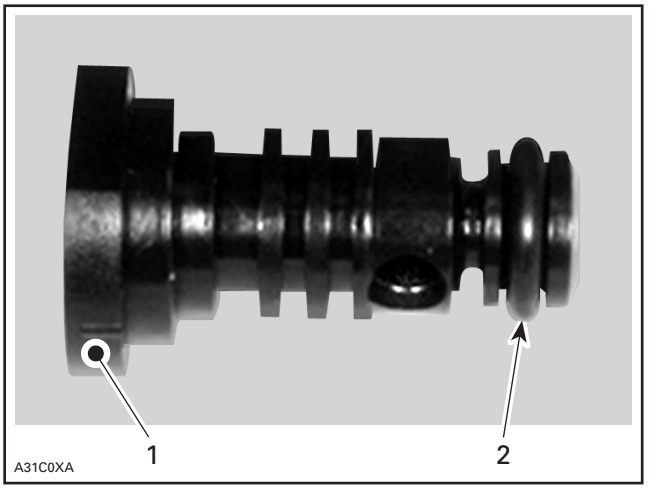


TO REMOVE, LIFT PILOT JET

1. Pilot jet

Clean pilot jet using compressed air.

Ensure that O-ring **no. 14** is not damaged. If so, replace with new one. See next photo.



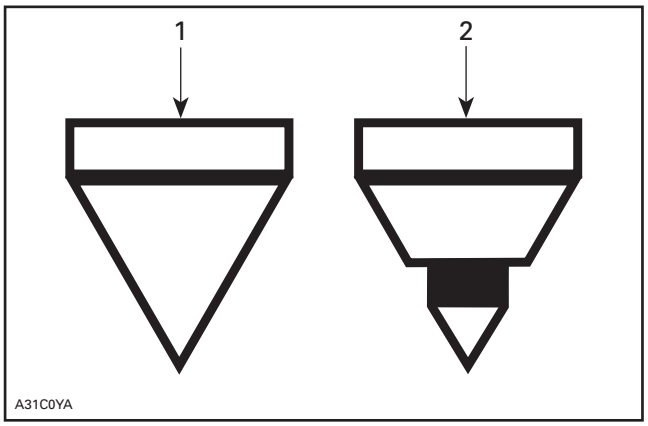
1. Pilot jet
2. O-ring

16,17, Float Valve

Remove float pin **no. 10** then remove float **no. 9** from carburetor.

Check for worn valve seat on float. Replace if so.

Check for weak float valve spring **no. 17** or worn float valve, as shown in the next photo.

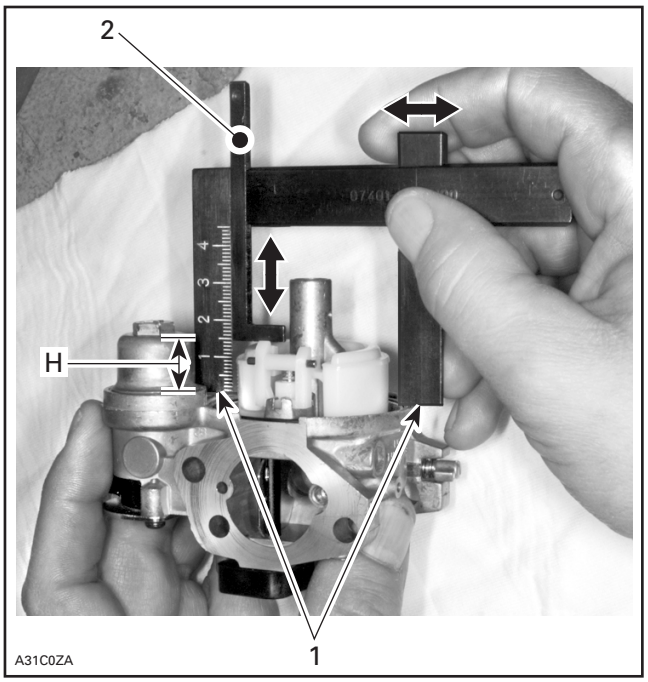


1. Float valve tip OK
2. Replace float valve

CARBURETOR FLOAT LEVEL

Correct fuel level in float chamber is vital toward maximum engine efficiency. To check for correct float level proceed as follows:

– Remove float bowl **no. 8** and gasket from carburetor.
– With carburetor leaned on a clean surface, measure float level height H using float level gauge (P/N 529 035 520), as shown in the next photo.
– Keep float level gauge perfectly vertical and in line with main jet hole.
– Ensure that both float level gauge tips are properly positioned on carburetor body and that "L" arm is leaning on float without compressing valve spring.



1. Float level gauge tips properly leaned on carburetor body
2. Lean "L" arm to carburetor to measure float level height
H. Float level height

STANDARD FLOAT HEIGHT	13.7 mm (0.54 in)

If float height is not according to specifications on above table, replace float and/or float valve.

Recheck float level height.

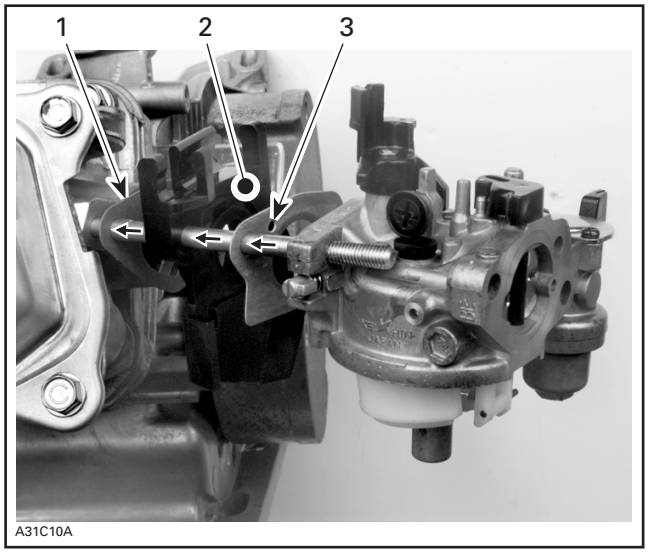
INSTALLATION

To install carburetor on engine, inverse removal procedure.

However, pay attention to the following:

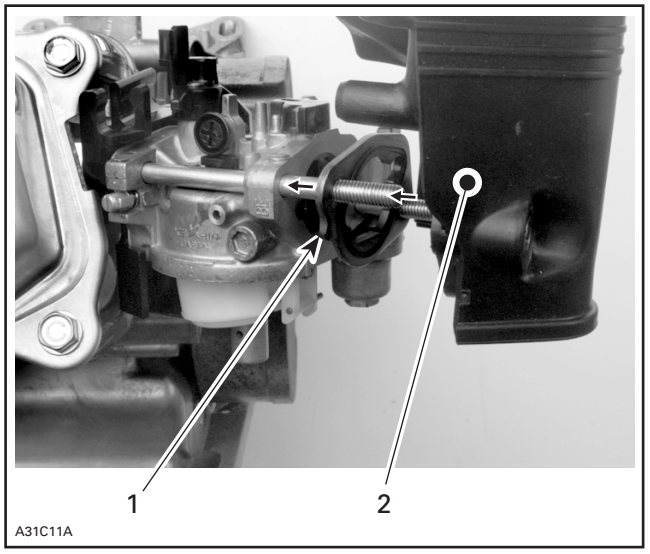
– Inspect throttle cable and housing prior to installation.

– Ensure that both packings **no. 18** and insulator **no. 19** are properly positioned between cylinder head and carburetor, as shown in the next photo.



1. Packing
2. Insulator
3. Note packing hole position

– Ensure that spacer **no. 20** is properly positioned between carburetor and air cleaner elbow ass'y, as shown in the following photo.



1. Spacer
2. Air cleaner elbow ass'y

CARBURETOR ADJUSTMENTS

Preliminary Idle Speed Adjustment

21, Pilot Screw

Start engine and allow it to warm.

Adjust idle speed by turning pilot screw **no. 21** clockwise or counterclockwise until highest idle RPM is attained.

Idle Speed Final Adjustment

15, Throttle Stop Screw

After the pilot screw is correctly adjusted, turn throttle stop screw **no. 15** to obtain the standard idle speed.

STANDARD IDLE SPEED	1400 ± 200 RPM

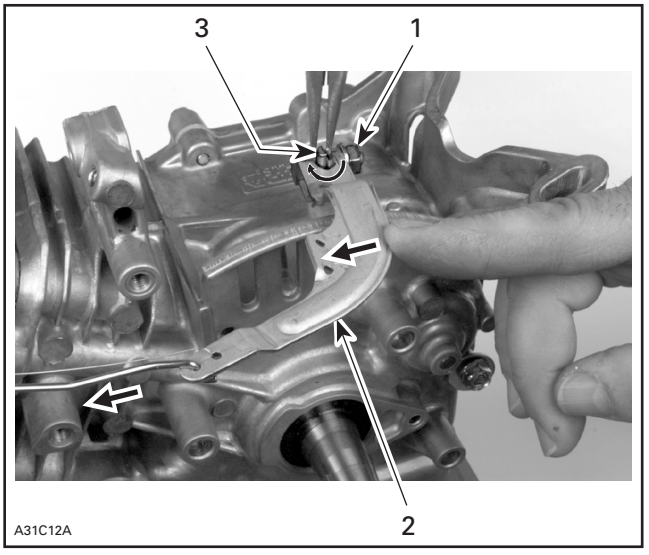
GOVERNOR ADJUSTMENT

Loosen governor arm nut.

Turn governor arm clockwise until carburetor throttle is fully opened. Hold governor arm in this position.

Using pliers, turn governor arm shaft clockwise until it stops.

At this point tighten governor arm nut. See the next photo.



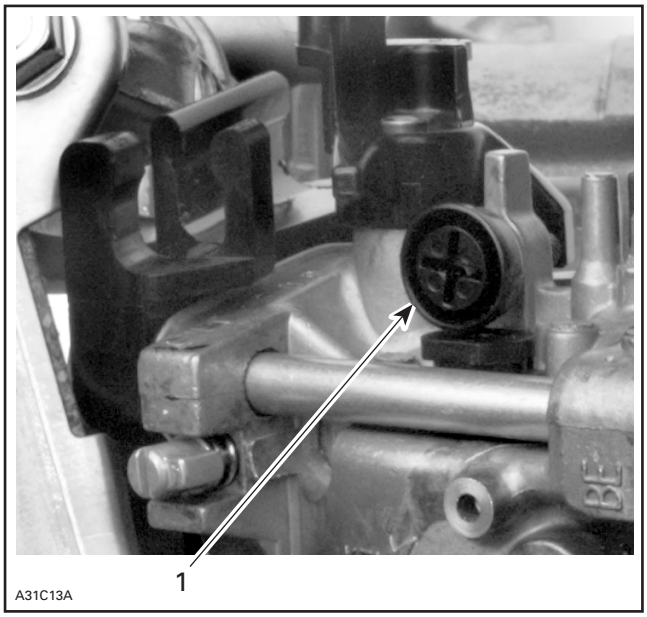
1. Governor arm nut
2. Turn governor arm to fully open throttle
3. Turn governor arm shaft

Lift rear of snowmobile.

Start engine and allow to warm up to normal temperature.

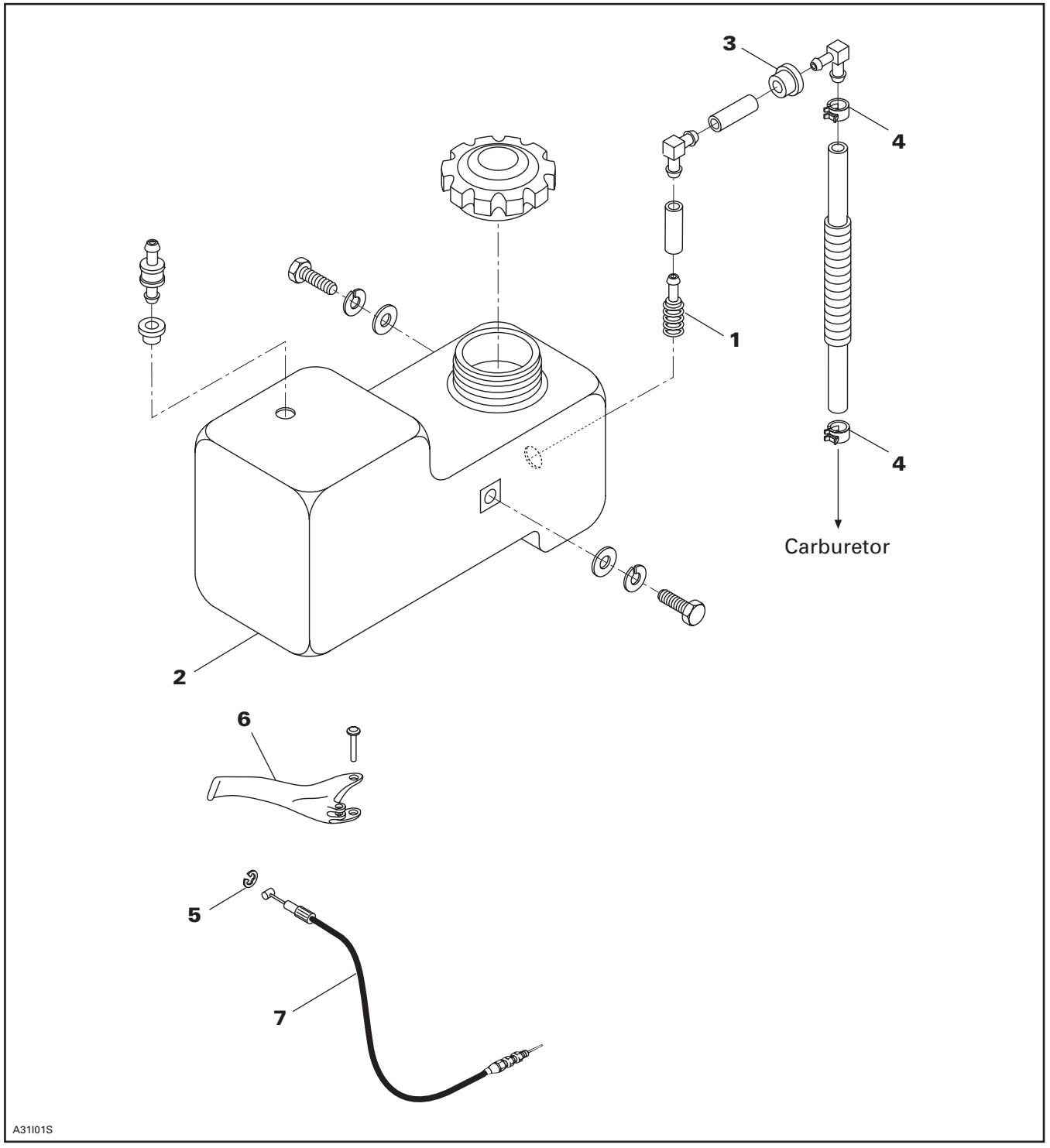
Activate throttle lever so that engine revs to maximum standard speed.

Adjust throttle lever stop screw so that engine will not rev over maximum standard speed. Refer to TECHNICAL DATA 10-02.



1. Adjust throttle lever stop screw

FUEL TANK AND THROTTLE CABLE

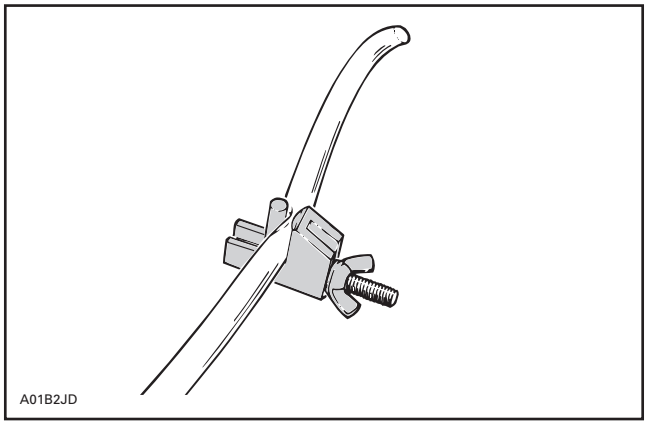


PARTS

Fuel Tank Lines

WARNING

When draining a fuel tank or whenever a fuel line is disconnected, obstruct line with a hose pincher (P/N 295 000 076) or equivalent device. Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.



Fuel Filter

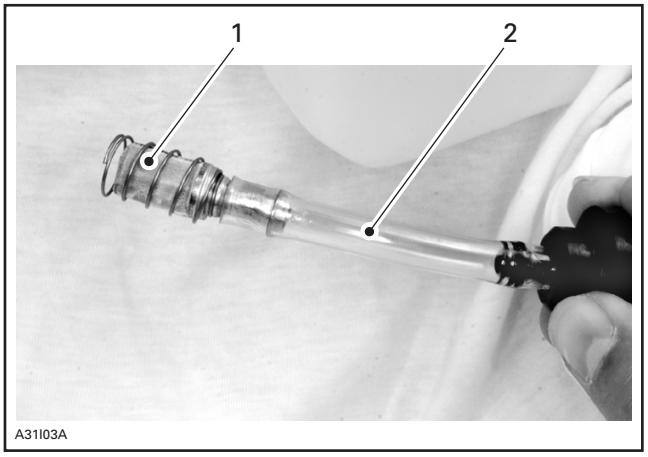
To remove fuel filter **no. 1** from fuel tank **no. 2**, first drain fuel tank.

Using a flat screwdriver, carefully pull out fuel filter by removing grommet **no. 3**, as shown in the next photo.



REMOVE GROMMET

Ensure that fuel filter and fuel line are clean and not damaged, as per following photo.



1. Fuel filter
2. Fuel line

Reinstall fuel filter with grommet.

Refuel tank and ensure there are no leaks.

Fuel Line Spring Clips

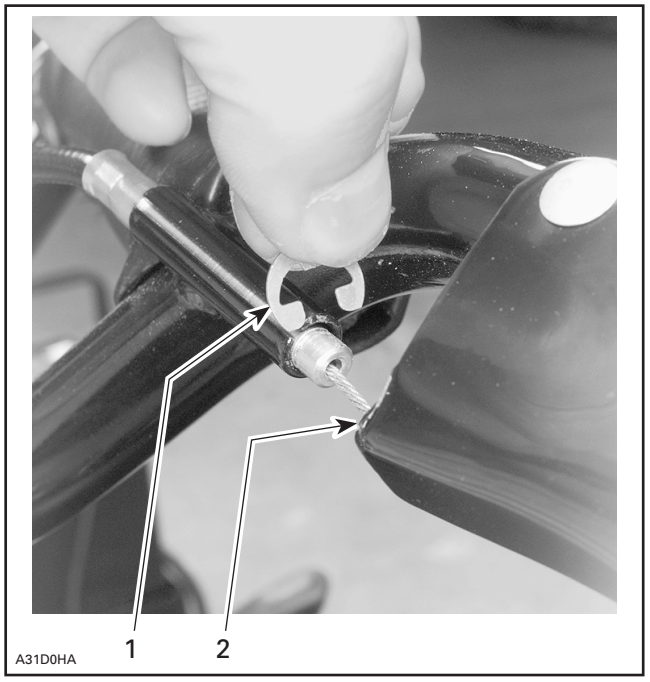
Always reposition spring clips **no. 4** after any repair to prevent possible leaks.

Throttle Cable Circlip at Handlebar

Put silicone grease (P/N 413 701 700) around cable barrel of throttle cable **no. 7**. Locate circlip **no. 5** as per following photo.

WARNING

If this procedure is disregarded, throttle lever **no. 6** might be half-open at normally closed position and the engine will speed up when starting.



TYPICAL — BRAKE SIDE SHOWN, IDENTICAL FOR THROTTLE SIDE

1. *Circlip*
2. *Detach throttle cable from throttle lever*

Throttle Cable Routing

▼ CAUTION

Check that throttle cable is routed away from sharp edges, hot or vibrating parts. When turning steering while engine is running, idle speed must not vary.

Throttle Cable Adjustment

Loosen throttle cable at carburetor.

While holding handlebar throttle lever and carburetor lever at full throttle, tighten throttle cable to this position.

◆ WARNING

Ensure that engine is not running when adjusting throttle cable.

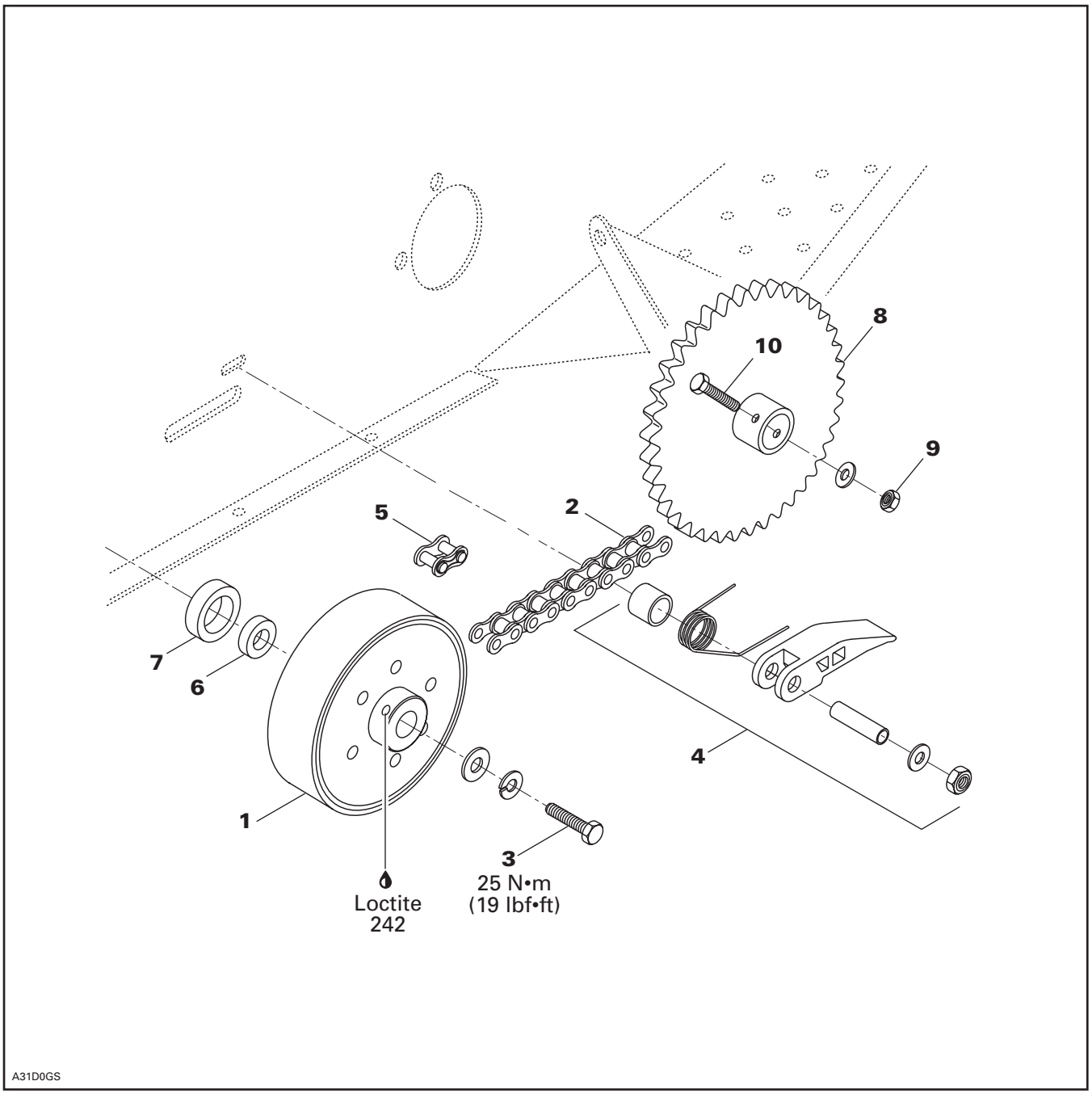
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CLUTCH



NOTE: Parts are not available separately. If clutch **no. 1** is damaged, replace clutch assembly.

REMOVAL

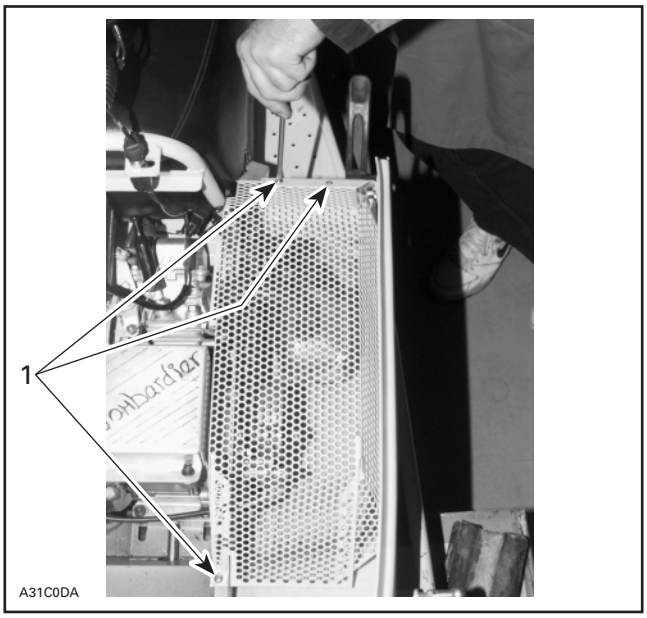
NOTE: Clutch can be removed without removing brake. In that case drive chain **no. 2** must be separated and removed first.

Lift hood.

Remove chain guard retaining screws as shown in the following photo and lift off guard.

◆ WARNING

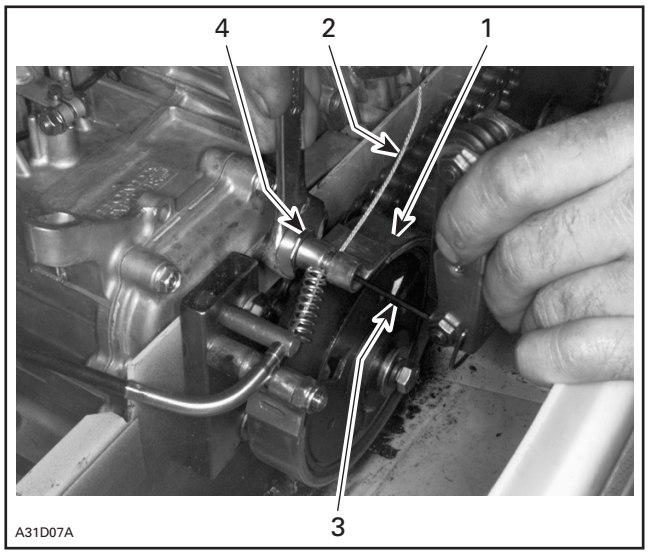
When removing chain guard, ensure that engine is not running. Serious injuries may occur.



1. Using a screwdriver, remove 3 screws

Brake Pad Removal

Using Allen key, unlock brake cable from brake pad, as shown in the next photo.

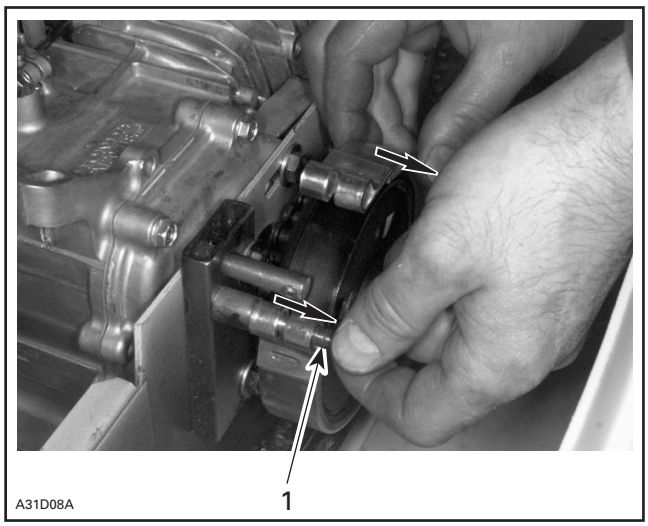


UNLOCK BRAKE CABLE FROM BRAKE PAD

1. Brake pad
2. Brake cable
3. Unlock brake cable using Allen key
4. Hold screw head

Pull out brake cable from brake pad.

Remove elastic nut from pivot screw, then pull out brake pad.

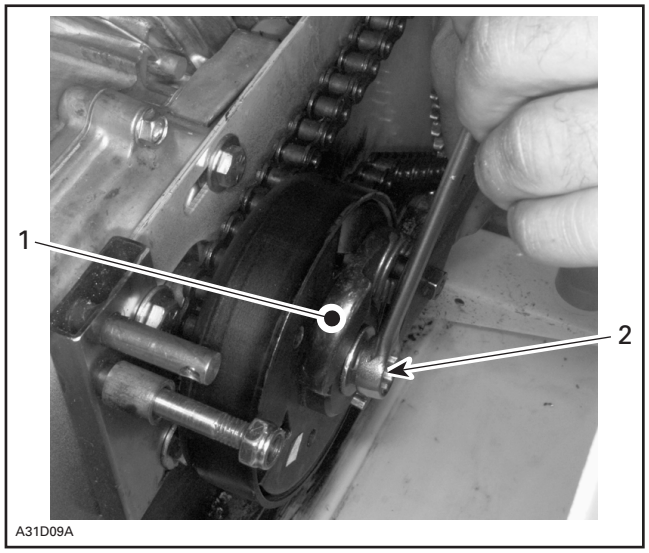


REMOVE BRAKE PAD

1. Pivot screw

1, Clutch Removal

Holding clutch with a wrench, loosen clutch retaining screw **no. 3**.



LOOSEN CLUTCH SCREW

1. *Wrench*
2. *Clutch retaining screw*

Remove drive chain automatic tensioner ass'y **no. 4**.

Remove drive chain from drive sprocket.

NOTE: To ease drive chain removal, chain can be separated by removing connecting link **no. 5**, as described in subsection 04 DRIVE CHAIN.

Remove clutch with extension **no. 6** and spacer **no. 7**.

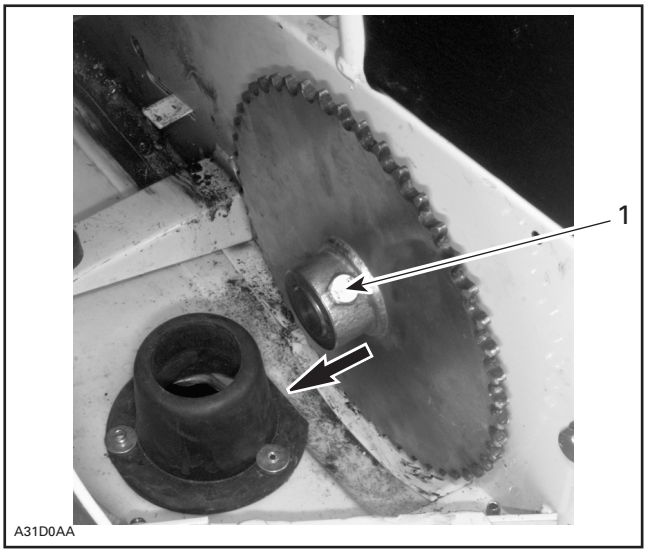
8, Driven Sprocket Removal

NOTE: To ease drive chain and driven sprocket **no. 8** removal and installation, it may be useful to remove footrest.

Remove drive chain from driven sprocket.

Loosen driven sprocket locking nut **no. 9**, then remove driven sprocket screw **no. 10.**

Pull out driven sprocket from drive axle.



REMOVE DRIVEN SPROCKET

1. *Loosen driven sprocket locking screw*

DISASSEMBLY

Parts are not available separately. If clutch is damaged, replace clutch assembly.

CLEANING

Clean all metal components in a general purpose solvent. Thoroughly dry all components before assembling.

INSPECTION

Inspect drive sprocket for wear. If sprocket is worn, replace clutch ass'y with new one.

If so check if clutch components are loose. If so, replace clutch ass'y with new one.

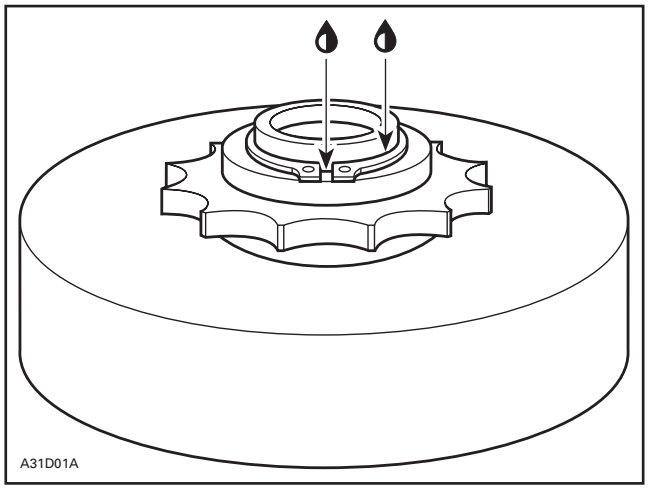
INSTALLATION

To install clutch, reverse removal procedure paying attention to the following.

Pour a few drops of oil into clutch sleeves, as shown in the next illustration.

▼ CAUTION

Pour a few drops of oil on clutch axle only. Do not spill oil into clutch mechanism or on clutch cover (braking surface).

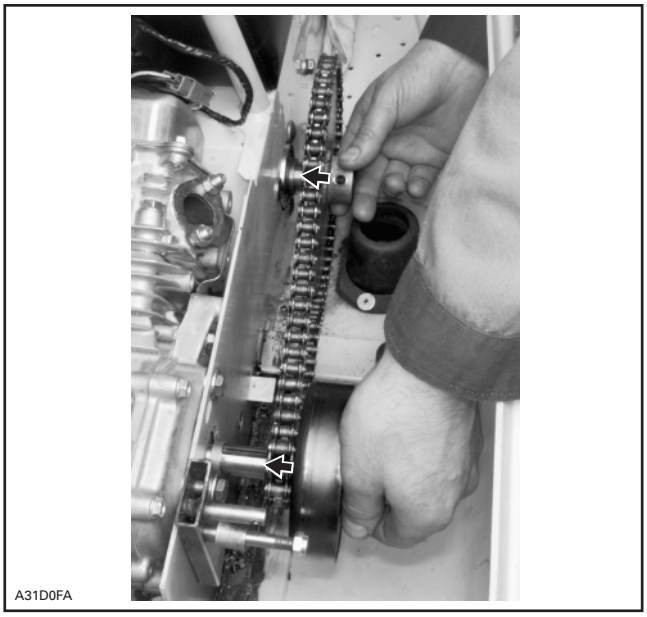


DRIP A FEW DROPS OF OIL ON CLUTCH AXLE

To ease sprocket and clutch installation, first install drive chain on both sprockets. Slide clutch and driven sprocket on shafts, as per following photo.

▼ CAUTION

Ensure that keyway is properly positioned when sliding clutch on shaft.

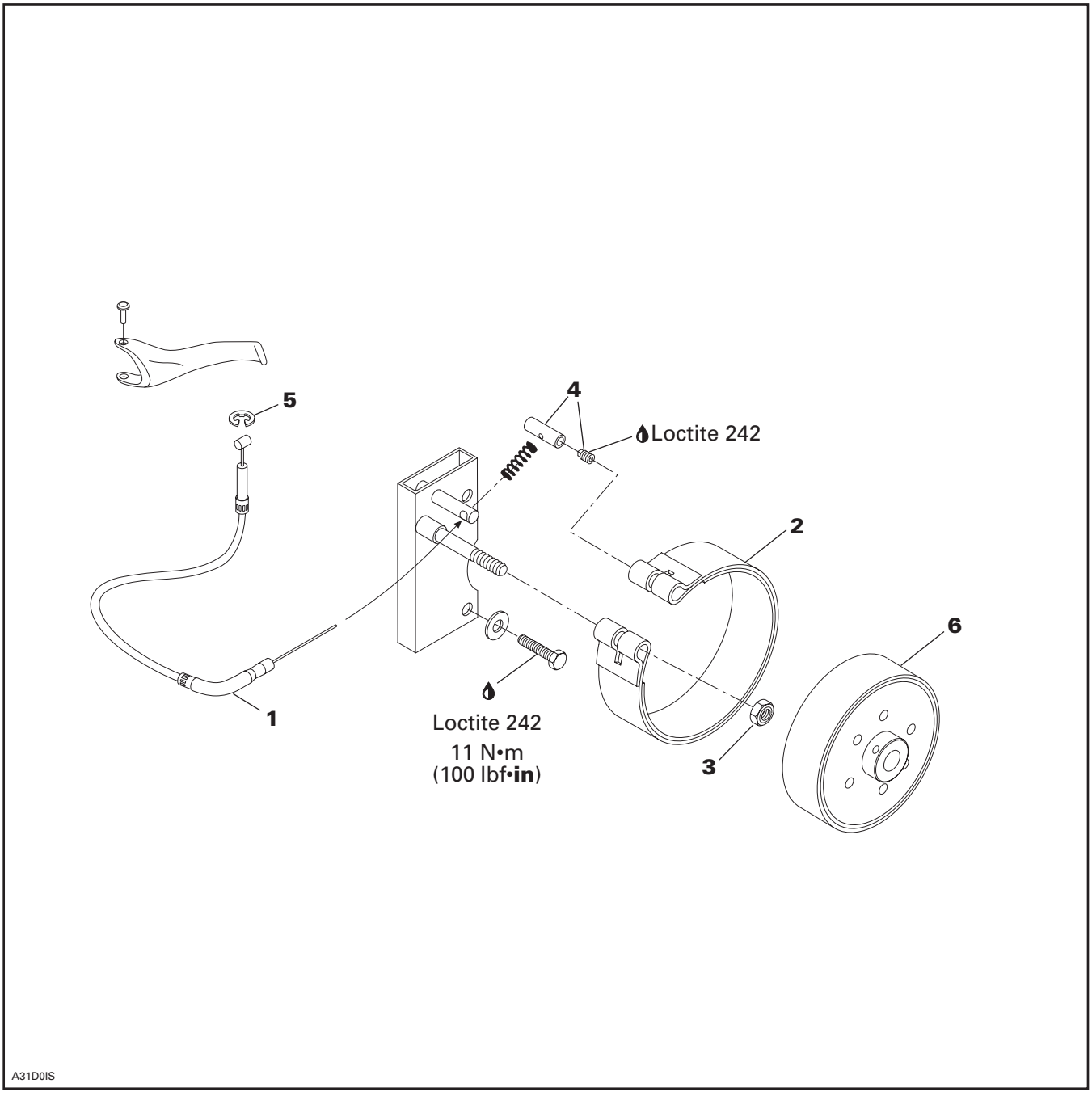


SLIDE CLUTCH AND DRIVEN SPROCKET

Secure clutch and driven sprocket.

Reinstall automatic drive chain tensioner.

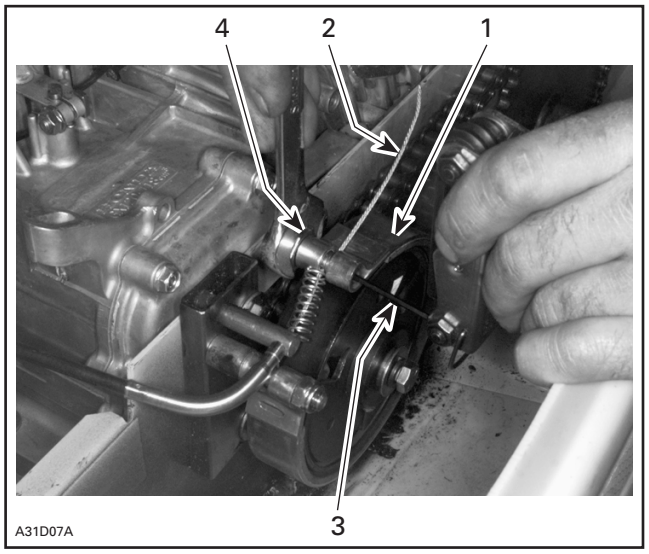
BRAKE



REMOVAL

2, Brake Pad Removal

Using Allen key, unlock brake cable **no. 1** from cable lock **no. 4**, as shown in the next photo.

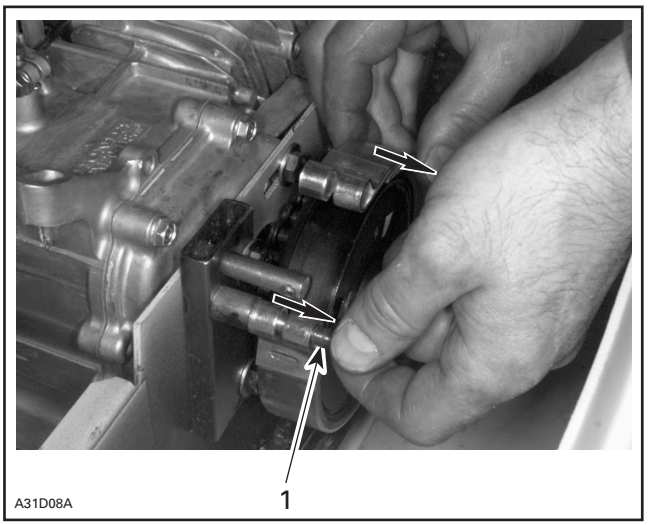


UNLOCK BRAKE CABLE FROM BRAKE PAD

1. *Brake pad*
2. *Brake cable*
3. *Unlock brake cable using Allen key*
4. *Hold screw head*

Pull out brake cable from cable lock.

Remove elastic nut **no. 3** from pivot screw, then pull out brake pad **no. 2**.

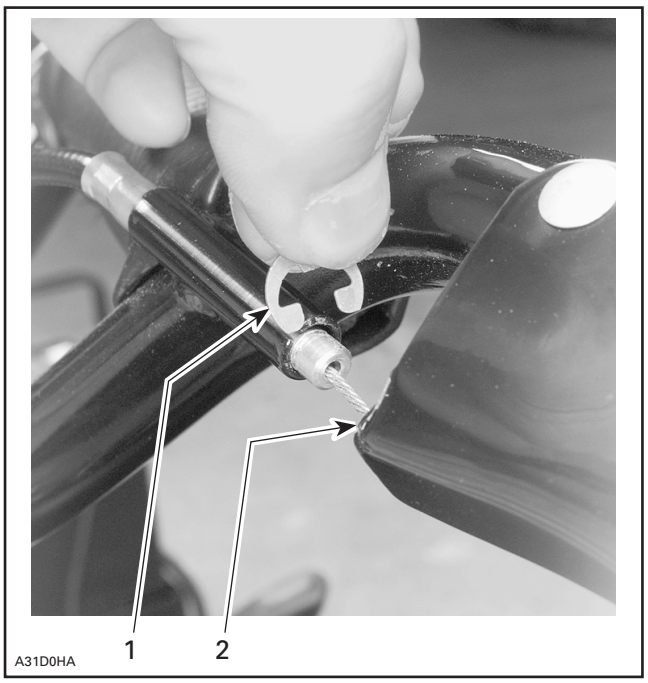


REMOVE BRAKE PAD

1. *Pivot screw*

Brake Cable Replacement

Remove circlip **no. 5** from brake cable at brake lever location, as shown in the next photo.



1. *Circlip*
2. *Detach brake cable from brake lever*

Detach brake cable from brake lever.

Remove cable and replace with new one.

DISASSEMBLY

Only brake pad **no. 2** is available as spare part. If clutch cover braking surface is damaged or used, replace clutch ass'y **no. 6**.

CLEANING

Clean all metal components in a general purpose solvent. Thoroughly dry all components before assembling.

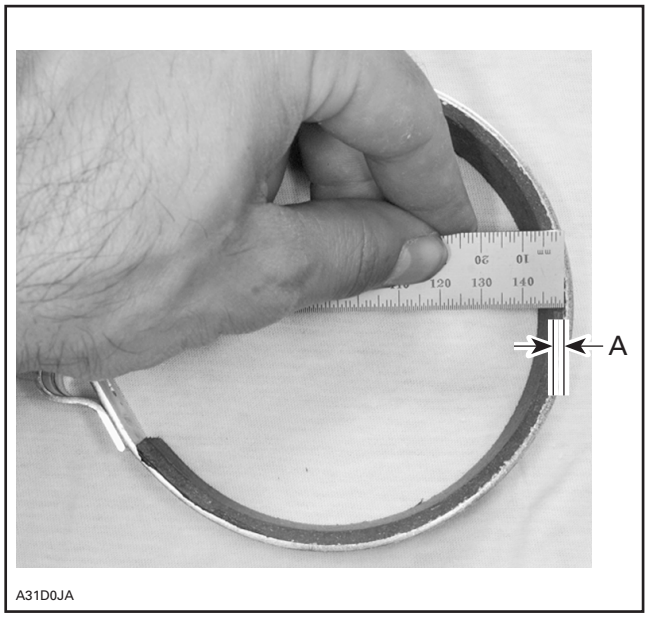
▼ CAUTION

Do not clean brake pad in solvent. Soiled brake pad must be replaced by new one.

INSPECTION

2, Brake Pad

Brake pad must be replaced when lining is 1 mm (1/32 in) thick or less.



A. 1 mm (1/32 in) minimum

6, Brake Drum (clutch cover)

Inspect brake drum surface in clutch cover for scoring, wear or cracking.

If brake drum needs to be replaced, replace clutch assembly with new one.

INSTALLATION

To install brake pad, reverse removal procedure paying attention to the following.

When securing brake pad with elastic nut **no. 3**. Stop tightening when nut leans against brake pad. This will avoid brake pad damage.

◆ WARNING

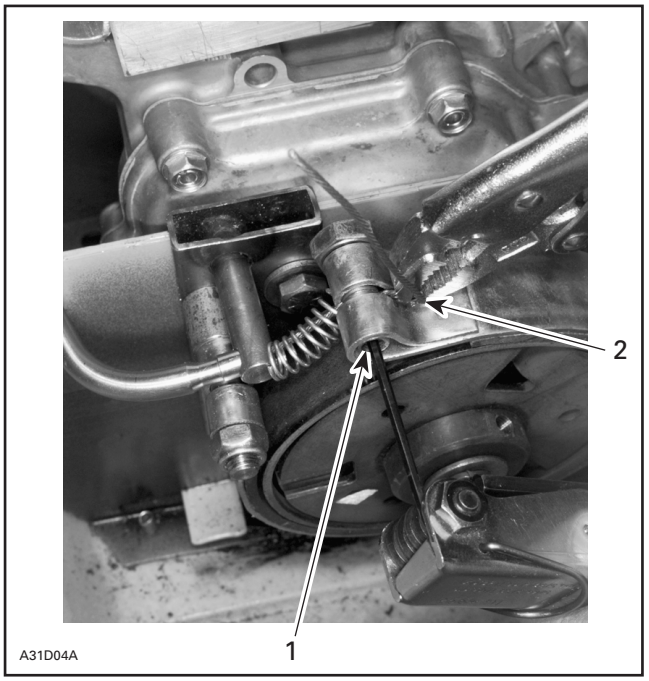
Avoid getting oil on brake pad.

Check that brake lever is set to normal position (no play), as shown in the next photo.



1. No play here

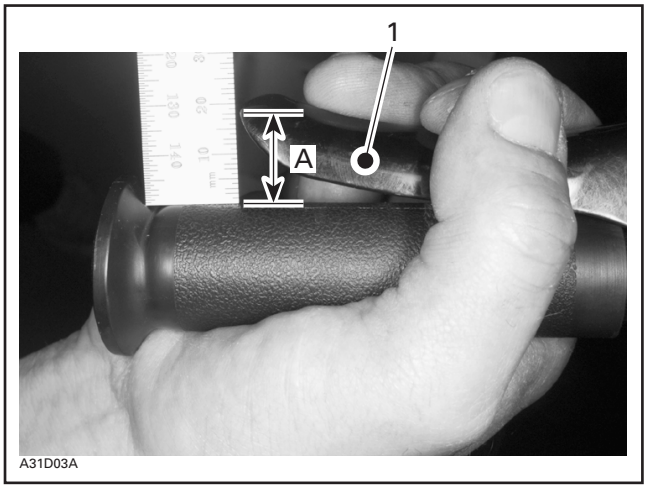
Using pliers, secure brake cable so that brake pad slightly rests on clutch cover.



1. Tighten Allen screw
2. Pull brake cable with pliers

ADJUSTMENT

Fully apply brake with brake lever. If brake lever is not within 15 mm (19/32 in) to 20 mm (25/32 in) of the handlebar, readjust brake. Refer to the following photo.



1. Brake lever
A. If measure is not within 15 mm (19/32 in) to 20 mm (25/32 in), readjust brake

To adjust brake, loosen Allen screw then pull or push on brake cable.

Retighten cable lock Allen screw.

Finally check brake adjustment.

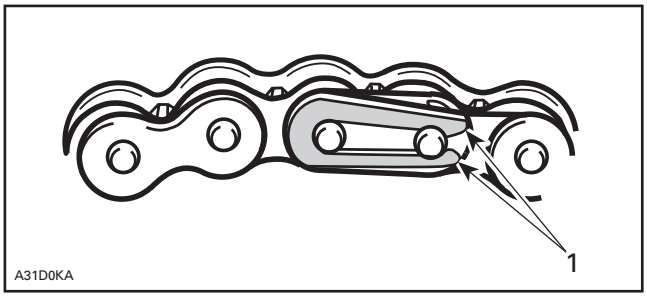
DRIVE CHAIN

REMOVAL

NOTE: To ease drive chain removal, remove drive chain automatic tensioner first.

Rotate drive chain to locate connecting link circlip.

Using a flat screwdriver push on both ends of circlip to remove it.

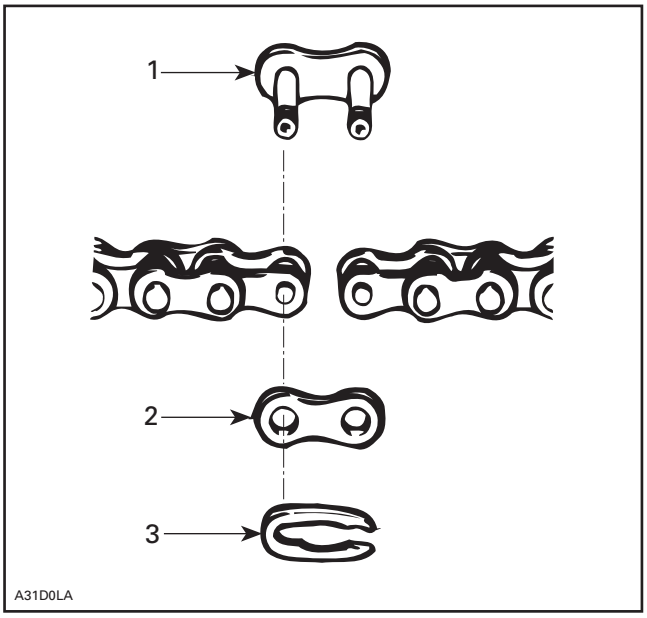


REMOVE CIRCLIP

1. Using a screwdriver, push circlip here

Remove outer link.

Detach drive chain by removing connecting link.



1. Connecting link
2. Outer link
3. Circlip

Keep circlip, outer link and connecting link.

INSPECTION

Check that chain is not stretched.

▼ CAUTION

On a stretched chain, pitch has changed (increased) and will not properly match the sprockets pitch, causing premature wear. For that reason, a stretched chain must never be shortened.

Visually inspect chain for cracked, damaged or missing links.

Check for worn or defective bearings, sprockets and chain tensioner components.

INSTALLATION

Reinstall drive chain on both sprockets.

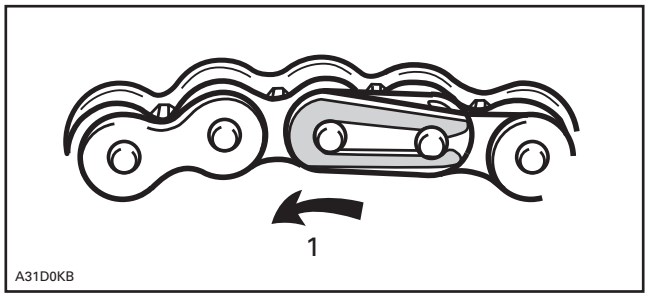
Join both drive chain ends using connecting link.

Secure connecting link using outer link and circlip.

Install circlip so that open end is positioned opposite side of drive chain rotation. See the following illustration.

◆ WARNING

Always ensure that connecting link, outer link and circlip are in good condition. Ensure that circlip is properly secured.



TYPICAL

1. Rotation

Reinstall drive chain automatic tensioner.

LUBRICATION

Lubricate drive chain as per lubrication chart.

Use BOMBARDIER LUBE (P/N 293 600 000).

▼ CAUTION

Always lubricate drive chain slightly. Oil must not contact brake pad.

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SPARK PLUGS

NGK SPARK PLUG

NGK SPARK PLUG NUMBERING SYSTEM

Bombardier uses the NGK spark plug brand on all its snowmobile models.

The heat range identification system is:

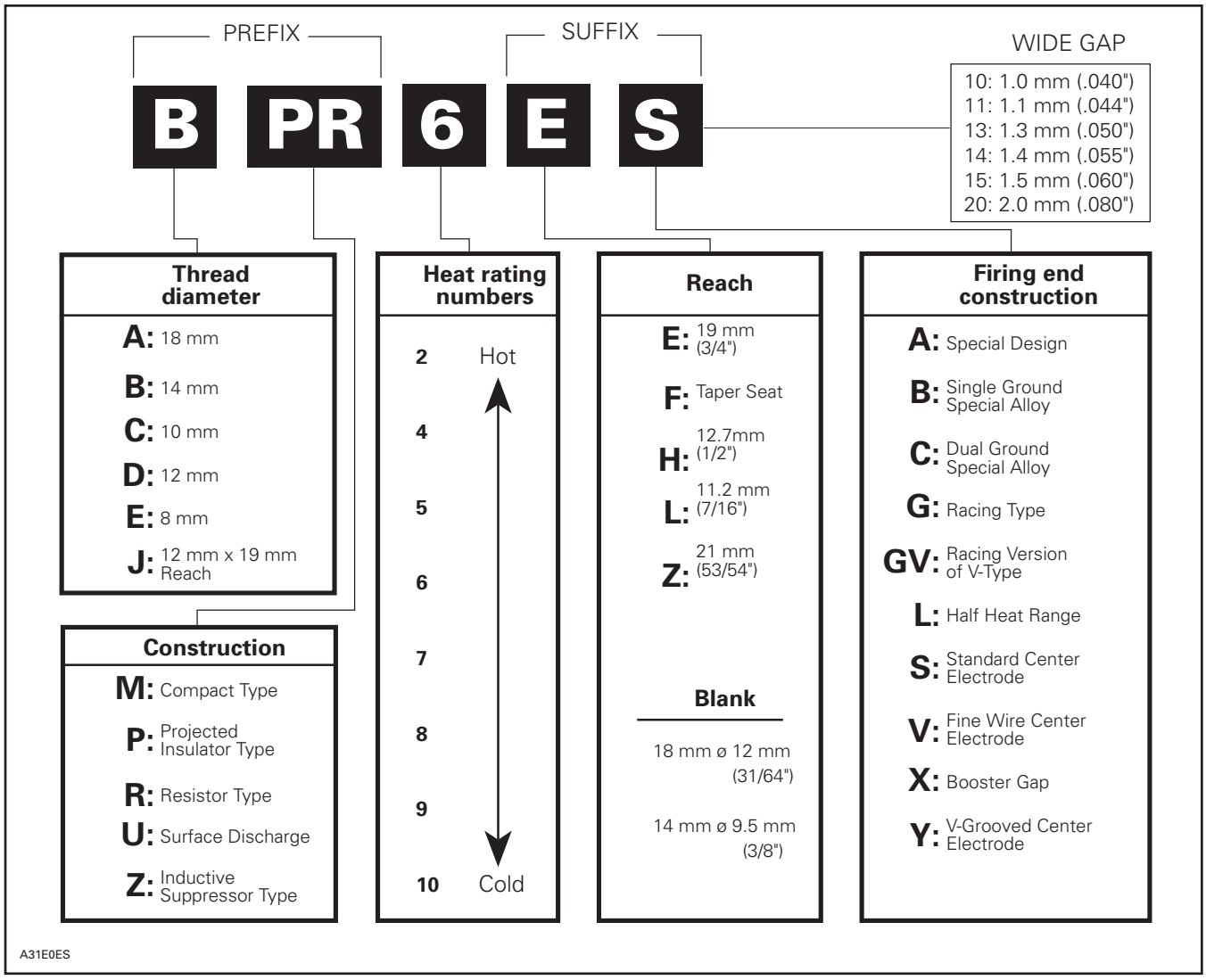
Low number ⟶ hot plug
High number ⟶ cold plug

REFERENCE CHART

NGK spark plug used on Bombardier Mini Z snowmobile is covered in this manual:

– BPR6 ES

DESIGN SYMBOLS USED IN NGK SPARK PLUGS



CROSSCUTS AND GAP STYLES OF SPARK PLUGS



Standard Type | Projected Insulator Type | Taper Seat Type | V-Type | Surface Discharge Type

A01E1PS

DISASSEMBLY

First unscrew the spark plug 1 turn.

Clean the spark plug and cylinder head with pressurized air, then completely unscrew.

◆ WARNING

Whenever using compressed air, always wear protective eye wear.

HEAT RANGE

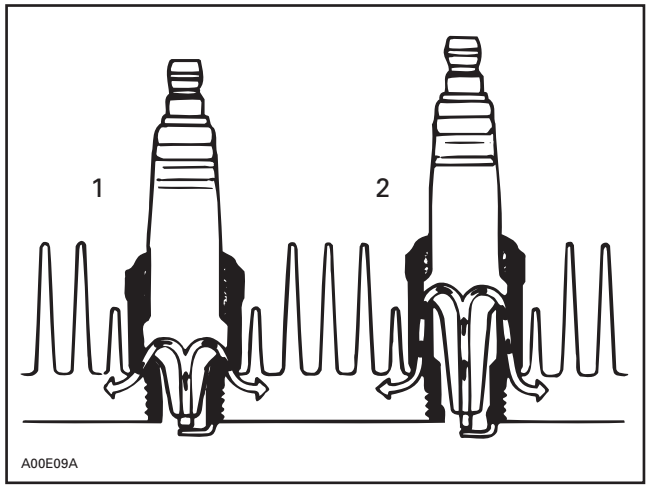
The proper operating temperature or heat range of the spark plugs is determined by the spark plug ability to dissipate the heat generated by combustion.

The longer the heat path between the electrode tip to the plug shell, the hotter the spark plug operating temperature will be — and inversely, the shorter the heat path, the colder the operating temperature will be.

A "cold" type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The "hot" type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.



1. Cold
2. Hot

▼ CAUTION

Severe engine damage might occur if a wrong heat range plug is used.

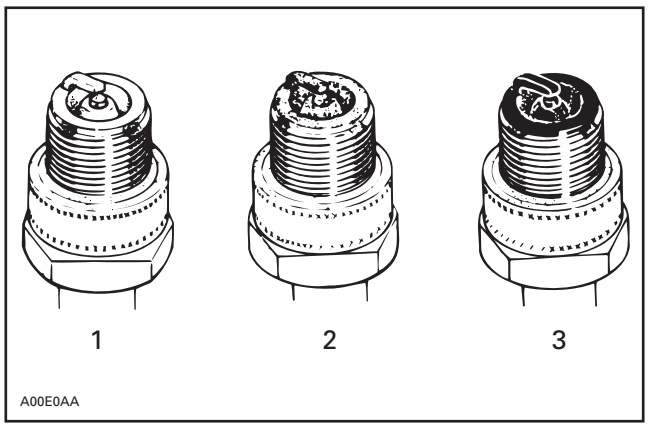
A too "hot" plug will result in overheating and pre-ignition, etc.

A too "cold" plug will result in fouling (shorting the spark plug) or may create carbon build up which can heat up red-hot and cause pre-ignition or detonation.

FOULING

Fouling of the spark plug is indicated by irregular running of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are: prolonged idling, or running on a too rich mixture due to a faulty carburetor adjustment or incorrect fuel and/or fuel mixing. The plug face of a fouled spark plug has either a dry coating of soot or an oily, glossy coating given by an excess either of oil or of oil with soot. Such coatings form a conductive connection between the center electrode and ground.

SPARK PLUG ANALYSIS



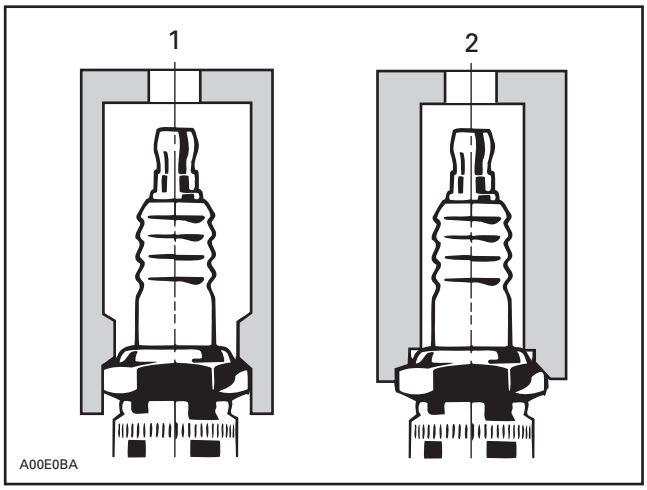
1. Overheated (light grey)
2. Normal (brownish)
3. Fouled (black)

The plug electrode and piston dome reveal the condition of the engine, operating condition, method of driving and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining the plug electrode and the piston dome.

SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

1. Using a wire feeler gauge, set electrode gap according to TECHNICAL DATA 10.
2. Apply anti-seize lubricant (P/N 413 701 000) over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



1. Proper socket
2. Improper socket

SPARK PLUG TIGHTENING TORQUE

MODELS	SPARK PLUGS	TORQUE N•m (lbf•ft)
All models	NGK	27 (20)

TESTING PROCEDURE

IGNITION SYSTEM TESTING SEQUENCE

In the case of ignition problems, check the following in the prescribed order until the problem can be solved.

1. Sparking/spark plug condition
2. Electrical connectors
3. Ignition switches, tether cord cap switch and emergency switch
4. Ignition coil resistance

LIGHTING SYSTEM TESTING SEQUENCE

1. Electrical connectors
2. Lamp coil resistance

Analysis of Readings

Resistance Readings

Place multimeter selector switch to Ω in order to measure resistance. Readings must be within the indicated range. Otherwise, the part is considered to be defective and must be replaced.

▼ CAUTION

When taking measurements, it is useless to try to start the vehicle since readings would then be distorted.

Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing parts. Most problems cannot be detected when the engine is stopped.

Multiple Problems

As a matter of fact, more than one component can be defective. As a result, if the problem remains although a part was replaced, start over the whole verification from the beginning in order to identify the other defective component.

1. SPARKING

During this operation, it is important to use the snowmobile spark plug and not a new one. Bring the plug in contact with the engine. If no spark is produced, replace the spark plug with a new one and do the test again.

2. ELECTRICAL CONNECTOR TESTING

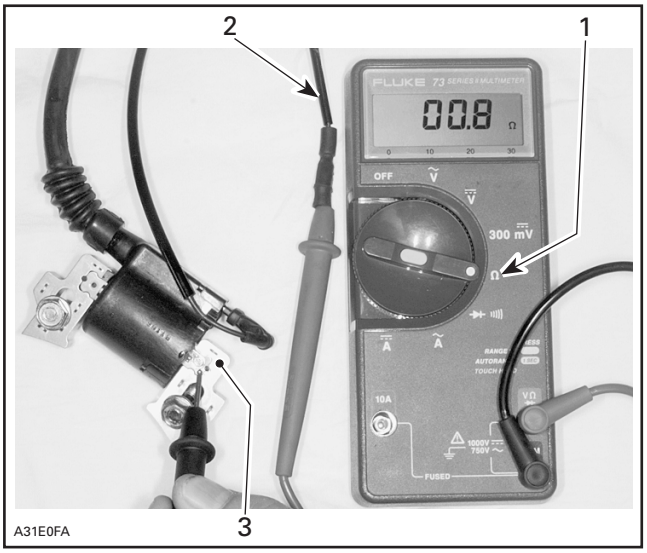
Make sure that none of the connectors are disconnected.

3. IGNITION COIL TESTING

Primary Side

Bring multimeter selector switch to Ω position.

Connect first multimeter probe to ignition coil primary black wire then second probe to ignition coil iron core, as shown in the next photo.



PRIMARY SIDE TESTING

1. *Multimeter to Ω position*
2. *Ignition coil primary black wire*
3. *Ignition coil iron core*

The measured resistance should be according to the following table. If not, replace ignition coil.

PRIMARY SIDE RESISTANCE VALUE	0.8 - 1.0 Ω

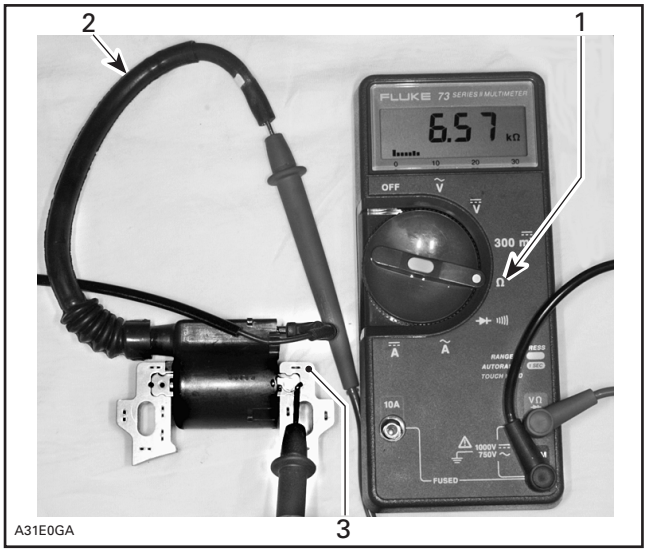
Secondary Side

Bring multimeter selector switch to Ω position.

Remove spark plug cap by unscrewing cap from cable.

NOTE: A false resistance reading will result if spark plug cap is not removed.

Connect first multimeter probe to spark plug lead wire then second probe to ignition coil iron core, as shown in the next photo.



SECONDARY SIDE TESTING

1. *Multimeter to Ω position*
2. *Spark plug lead wire*
3. *Ignition coil iron core*

The measured resistance should be according to the following table. If not, replace ignition coil.

SECONDARY SIDE RESISTANCE VALUE	5.9 - 7.1 kΩ

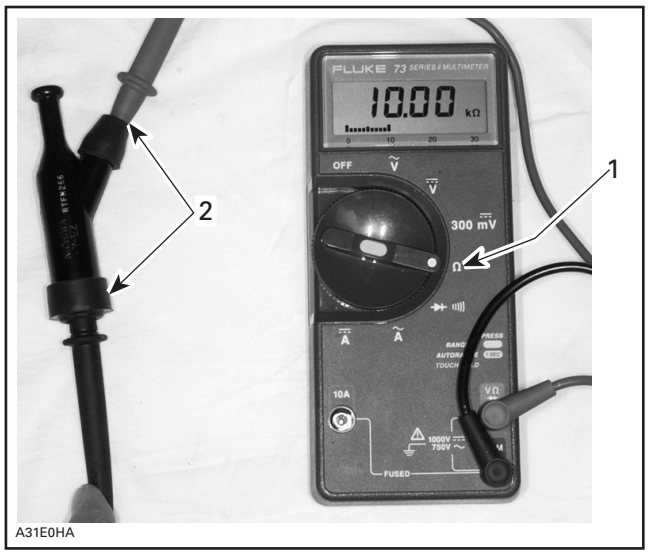
4. SPARK PLUG CAP TESTING

Remove spark plug cap by unscrewing cap from cable.

NOTE: A false resistance reading will result if spark plug cap is not removed.

Bring multimeter selector switch to Ω position.

Connect first multimeter probe to one end of the spark plug cap then second probe to the other end as shown in the next photo.



SPARK PLUG CAP TESTING

1. *Multimeter to Ω position*
2. *Spark plug cap end*

The measured resistance should be according to the following table. If not, replace spark plug cap.

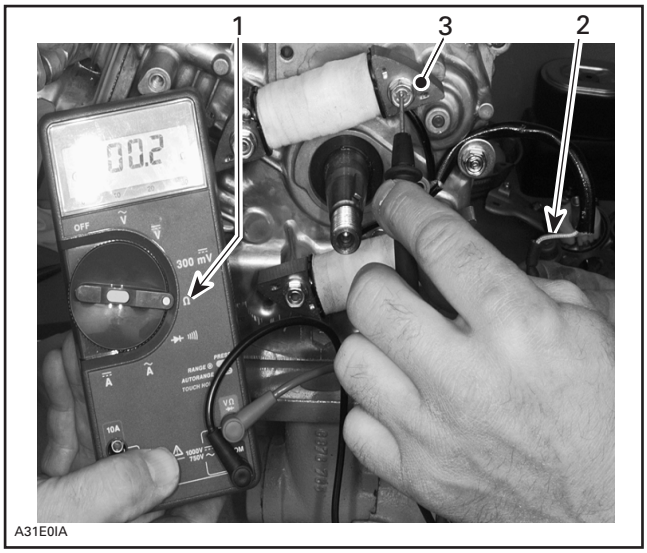
RESISTANCE	7.5 - 12.5 kΩ

5. LAMP COIL TESTING

NOTE: Lamp coil is parallel 2 coils type.

Bring multimeter selector switch to Ω position.

Connect first multimeter probe to pink wire then second probe to lamp coil iron core, as shown in the next photo.



LAMP COIL TESTING

1. *Multimeter to Ω position*
2. *Pink wire*
3. *Lamp coil iron core*

The measured resistance should be according to the following table. If not, replace lamp coil.

RESISTANCE	0.18 - 0.23 Ω

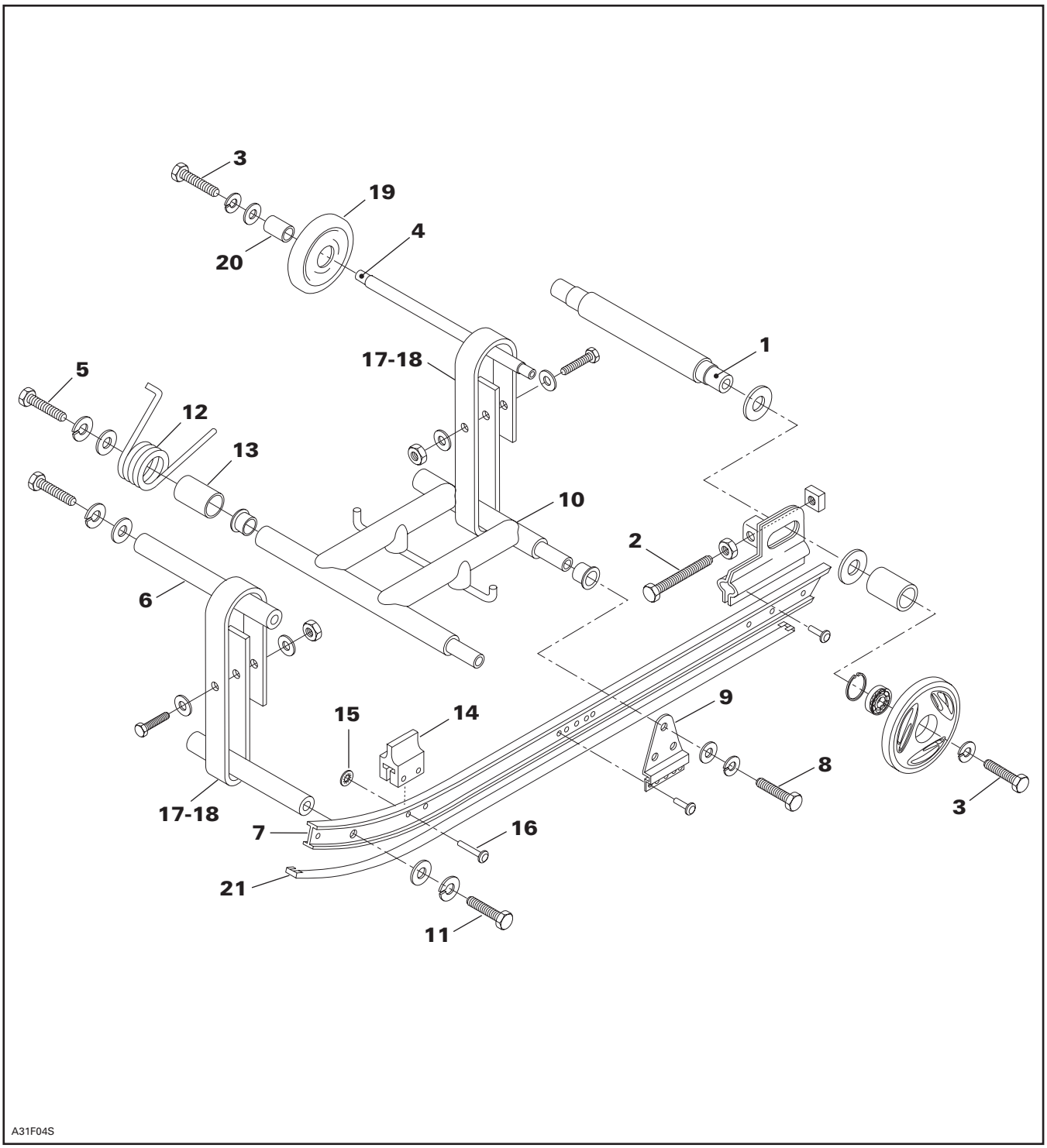
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REAR SUSPENSION



NOTE: The following is the complete procedure to remove rear suspension ass'y. However some suspension components can be removed without removing suspension ass'y. See DISASSEMBLY AND ASSEMBLY procedure.

REMOVAL

Lift rear of snowmobile and support it off the ground.

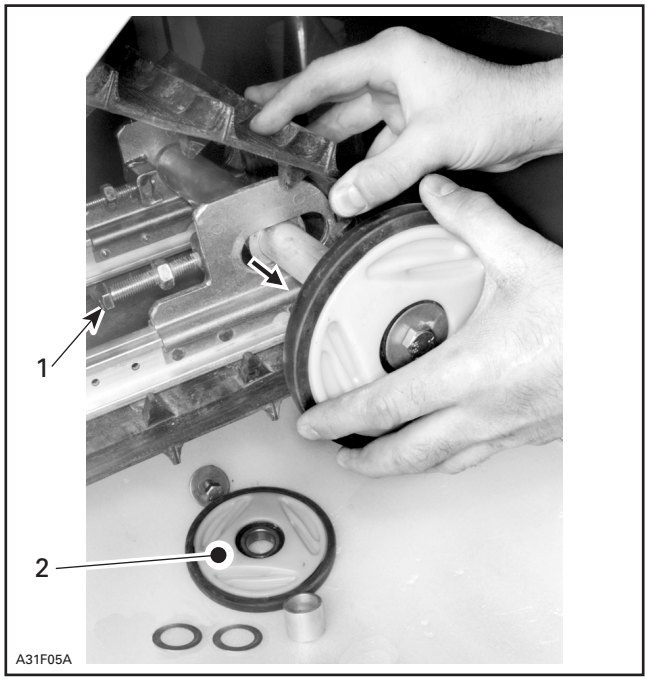
1, Rear Axle

NOTE: Removing rear axle first will ease rear suspension ass'y removal.

Completely release track tension by loosening adjustment screws **no. 2**.

Unscrew one rear idler wheel screw **no. 3**.

Pull out rear axle **no. 1** from opposite side of offset inner wheel.



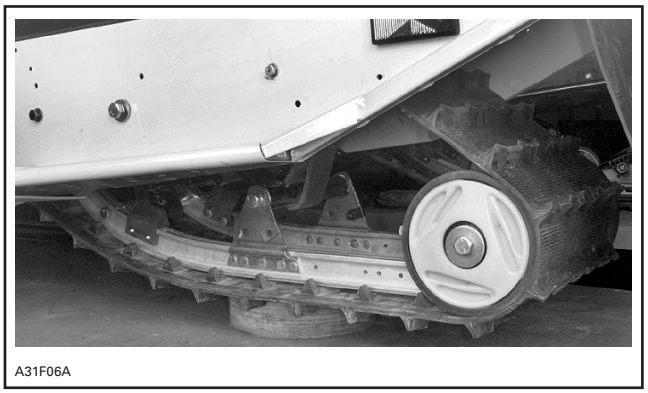
PULL OUT REAR AXLE

1. *Loose this adjustment screw on both sides to release track tension*
2. *Idler wheel previously removed*

Rear Suspension

Position a small block below track.

Lower snowmobile so that track sits on block.



POSITION A SMALL BLOCK BELOW TRACK

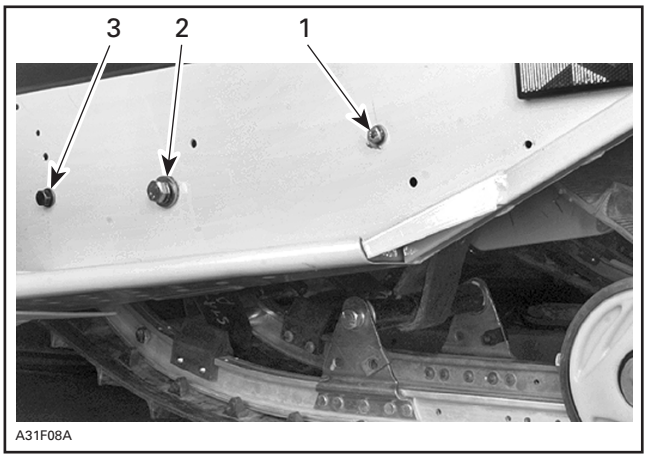
Lean on snowmobile seat then unscrew upper idler wheel axle **no. 4** from tunnel.



1. *Unscrew upper idler wheel axle*

Remove both screws **no. 5** retaining front arm to tunnel.

Unscrew front retainer axle **no. 6** (retaining front strap) from tunnel. See the following photo.



A31F08A

1. Upper idler wheel screw
2. Front arm screw
3. Front retainer axle screw

Lift rear of snowmobile.

Pull out suspension ass'y.

DISASSEMBLY AND ASSEMBLY

Inspect track thoroughly before reinstalling suspension. Refer to TRACK 07-04.

7, Runner

NOTE: Runner **no. 7** can be removed without removing suspension assembly, as described in the following procedure.

Lift rear of snowmobile.

Completely released track tension.

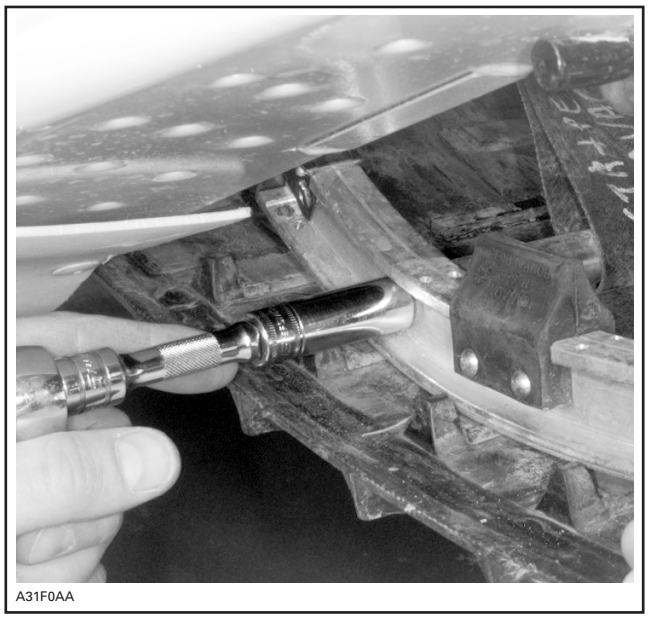
Remove rear axle **no. 1** with idler wheels.

Remove screws **no. 8** retaining runner support **no. 9** to front arm **no. 10**, as shown in the following photo.


A31F09A

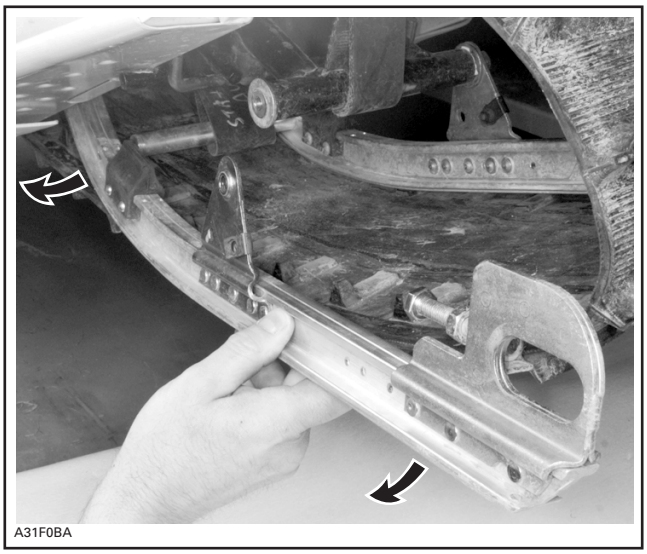
REMOVE SCREW

Remove front axle screw **no. 11**, as shown in the following photo.


A31F0AA

REMOVE SCREW

Pull out runner from track, as shown in the next photo.



PULL OUT RUNNER

To reinstall runner, reverse removal procedure.

12, Torsion Spring

NOTE: Torsion springs can be replaced without completely removing rear suspension ass'y, as described in the following procedure.

Lift rear of snowmobile.

Completely released track tension.

Remove rear axle **no. 1** with idler wheels.

Lower snowmobile.

Lean on snowmobile seat then unscrew upper idler wheel axle **no. 4** from tunnel.



1. Unscrew upper idler wheel axle

Remove both screws **no. 5** retaining front arm to tunnel.

Lift rear of snowmobile so that rear suspension ass'y comes out of tunnel.

Remove torsion spring **no. 12**, as shown in the next photo.



REMOVE TORSION SPRING

Remove bushing **no. 13**, as shown in the next photo. Clean all surfaces and check for excessive wear.



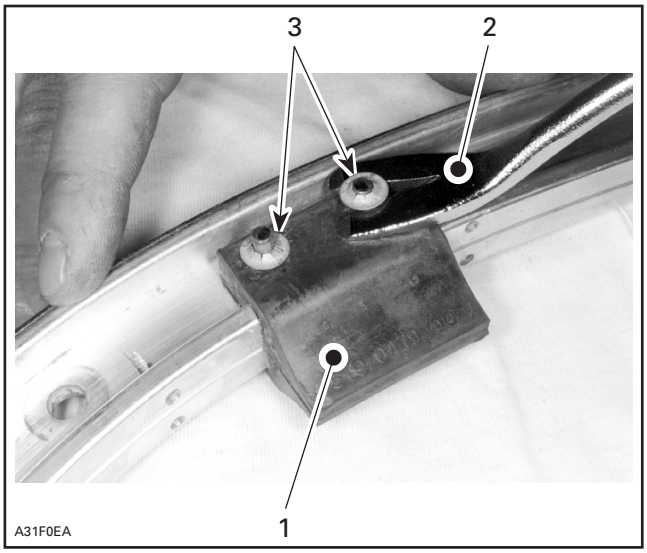
REMOVE AND CLEAN BUSHING

To reinstall, reverse removal procedure.

14,15,16, Stopper Rubber

NOTE: Stopper rubber **no. 14** can be replaced with runner and suspension ass'y in place.

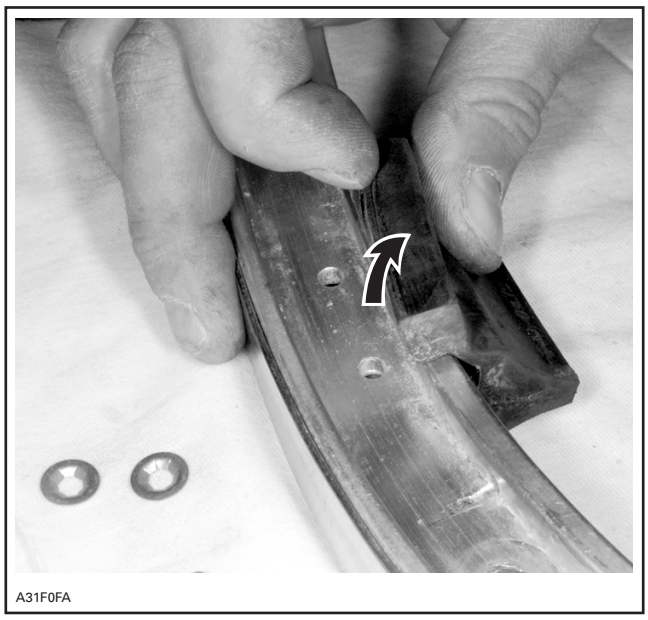
Using special tool Snap-on A161B, remove push nuts **no. 15** as shown in the next photo.



1. *Stopper rubber*
2. *Special tool Snap-on A161B*
3. *Push nuts*

Remove retaining pins **no. 16**.

Lift stopper rubber tab and remove it.



REMOVE STOPPER RUBBER

Reinstall stopper rubber **no. 14** with retaining pins **no. 16** and push nuts **no. 15**.

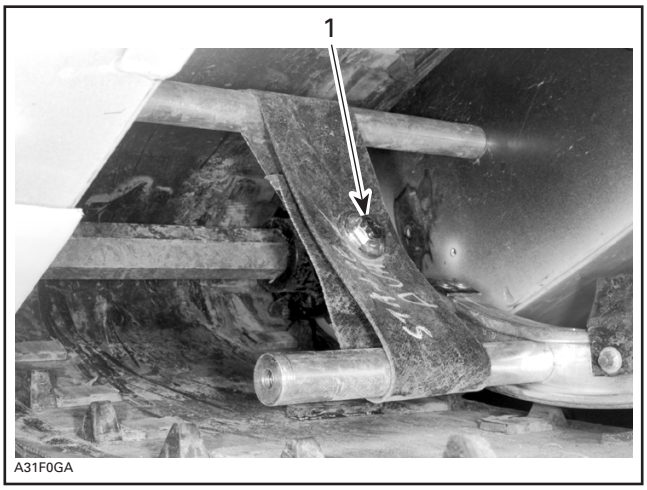
▼ CAUTION

When reusing original push nuts, ensure that they are in good condition. If not, replace with new push nuts.

INSPECTION

17,18, Stopper Straps

Inspect straps for wear or cracks, bolts and nuts for tightness. If nuts are loose, inspect hole for deformation. Replace as required.



TYPICAL — FRONT STRAP SHOWN
1. Inspect bolts and nuts for tightness

19,20, Upper Idler Wheels

Remove bushing **no. 20** and idler wheel **no. 19** from shaft **no. 4**, as shown in the next photo.

Clean parts and check for wear and bearing condition.



CHECK BUSHING, WHEEL AND SHAFT CONDITION

21, Slider Shoe

Inspect slider shoes **no. 21** for wear.

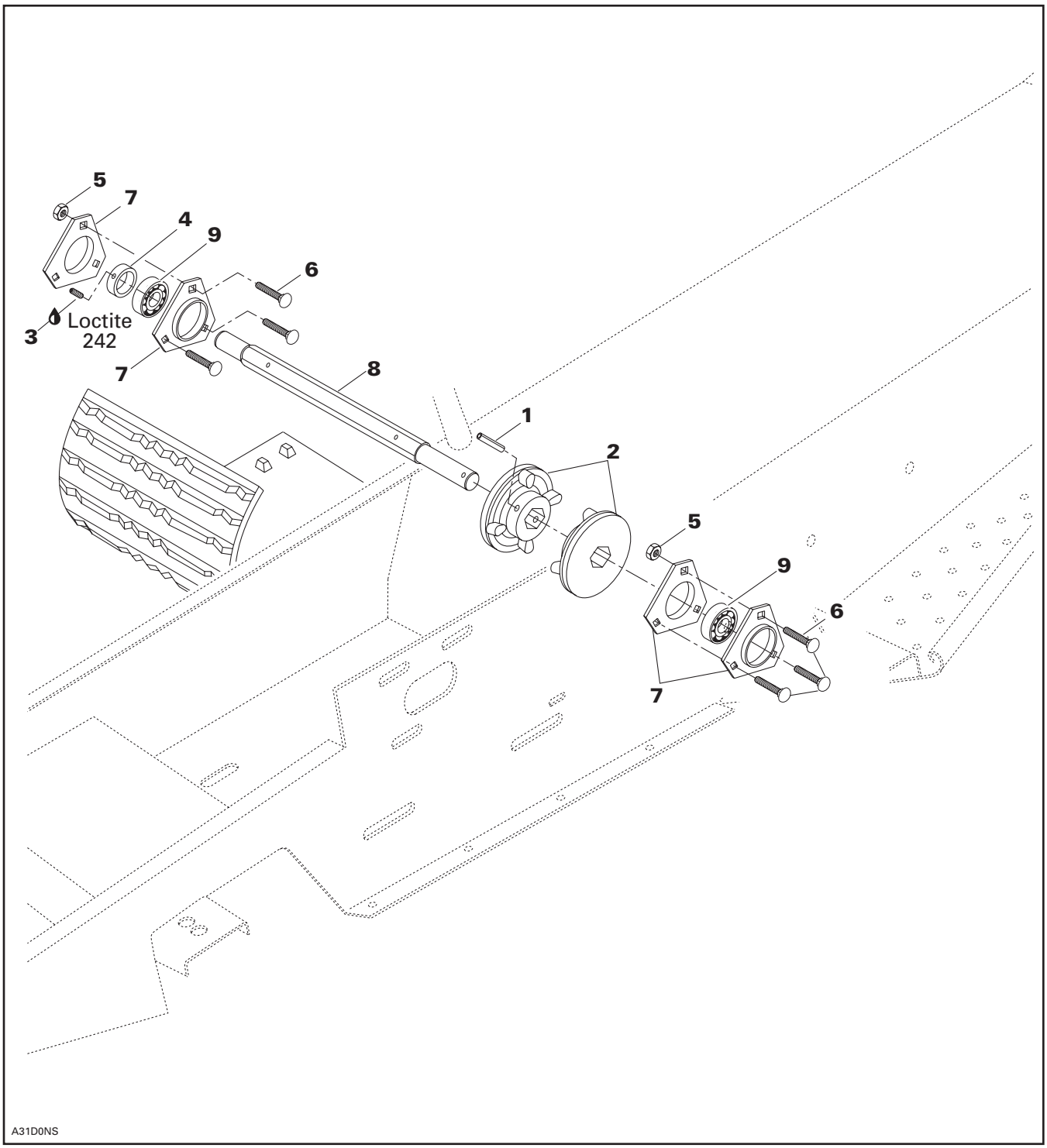
▼ CAUTION

If only one slider shoe needs to be replaced, always replace both one. Slider shoes must always be replace in pairs.

To replace slider shoes:

– Remove left side runner.
– Bend tabs from used slider shoe then remove it.
– Install new slider shoe on one end of the runner, then clip second end.
– Secure slider shoe by bending tabs onto runner.
– Repeat procedure on right side.

DRIVE AXLE



REMOVAL

Remove chain guard.

Remove drive chain then remove driven sprocket.

NOTE: To ease driven sprocket and drive axle removal, it may be useful to remove left side footrest.

Remove rear suspension. Refer to REAR SUSPENSION 07-02 of this manual.

Sprocket

From inside tunnel, remove spring pin **no. 1** from right side sprocket using a hammer and a punch, as shown.



REMOVE SPRING PIN

Using a prybar and a piece of wood (to protect tunnel), slide right side sprocket **no. 2** (38 mm (1-1/2 in)). See the next photo.

NOTE: Apply BOMBARDIER LUBE (P/N 293 600 016 — 12 x 14 oz) on drive axle to ease sliding sprocket.

▼ CAUTION

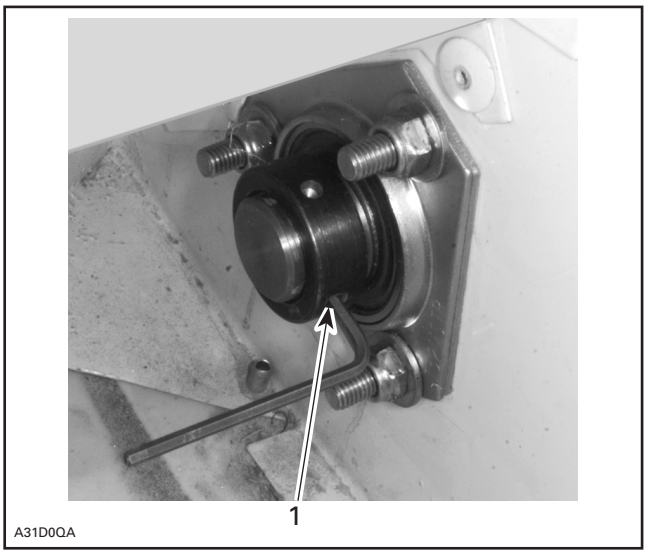
When using prybar, ensure not to apply too much pressure on tunnel wall in order to avoid damaging tunnel.



SLIDE RIGHT SIDE SPROCKET INSIDE

Bearing Holder

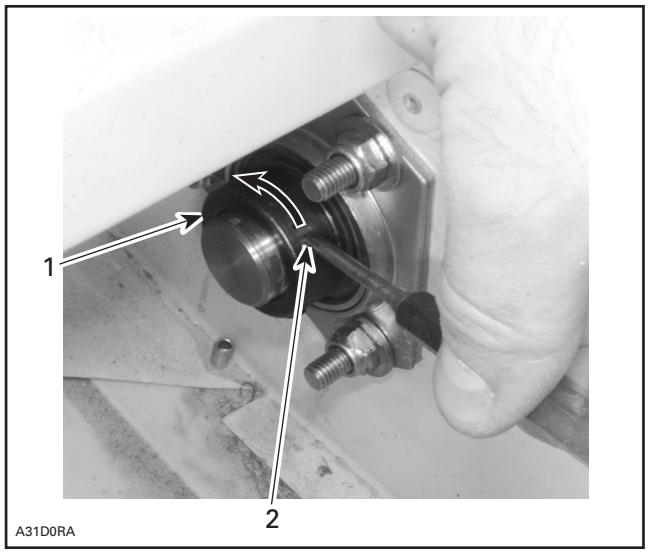
Using Allen key loosen set screw **no. 3** from bearing lock sleeve **no. 4**, as shown in the next photo.



RIGHT SIDE SHOWN

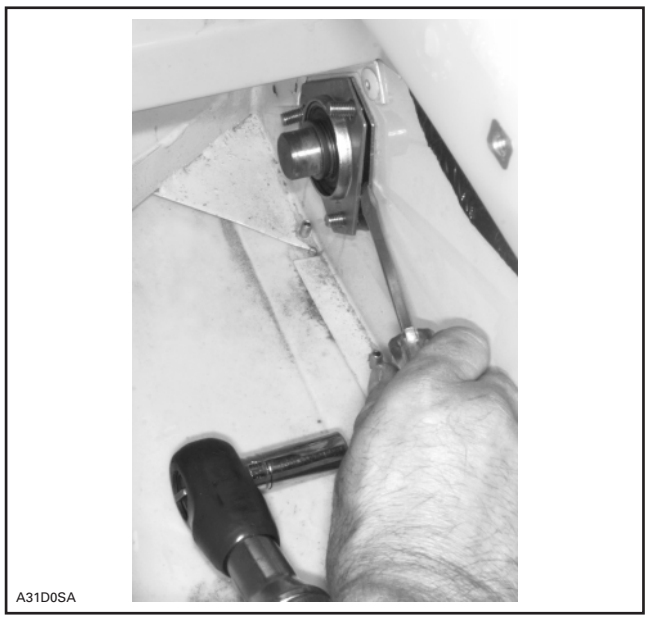
1. Loosen set screw

Using a hammer and a punch, turn CCW to unlock bearing lock sleeve as shown.



1. Lock sleeve
2. Position punch in this hole

Remove 3 bearing holder nuts **no. 5** and screws **no. 6** then detach both halves **no. 7** using a flat screwdriver. See the following photo.

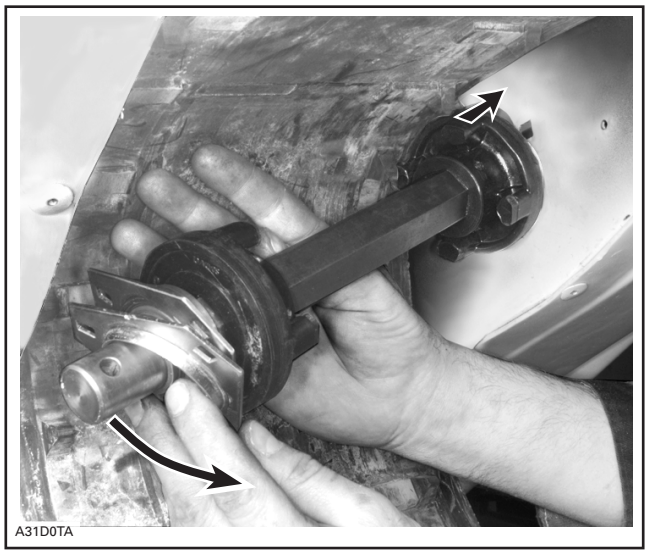


DETACH BEARING HOLDER HALVES

Repeat procedure for left side bearing, except for lock sleeve.

Drive Axle Ass'y

Pull out drive axle ass'y **no. 8**, as shown in the next photo.



PULL OUT DRIVE AXLE ASS'Y

DISASSEMBLY AND ASSEMBLY

Bearing and Sprocket

To remove or to install bearings **no. 9** and sprockets **no. 2**, use a press.

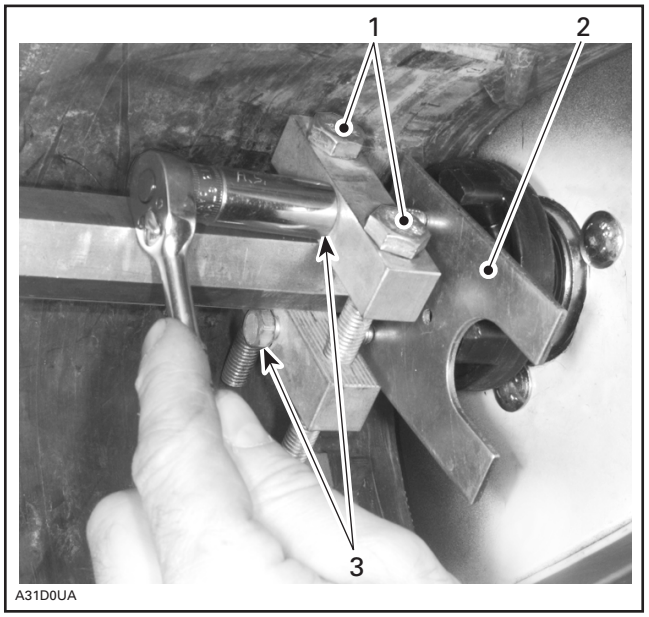
▼ CAUTION

Ensure that bearings and sprockets are properly supported near hub and that spring pins have been removed from sprockets, before removal.

INSTALLATION

Reverse the removal procedure and pay a special attention to the following points.

Sprockets can be positioned with drive axle in place. In that case use drive axle sprocket adjuster (P/N 861 725 700), as shown in the following photo.



1. Tighten tool on drive axle with these screws
2. Install plate to protect sprocket
3. Use these screws to move sprocket

Reinstall spring pins as shown in the next photo.

▼ CAUTION

Ensure that drive axle spring pin hole is properly aligned with sprocket hole.

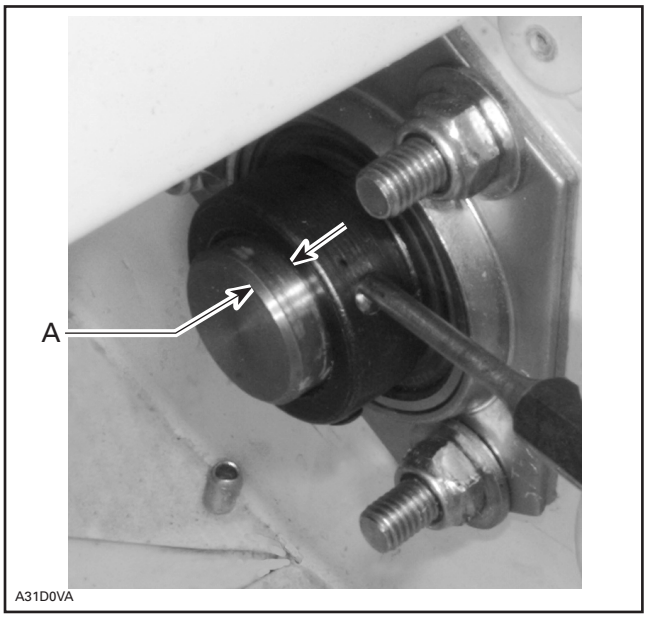


REINSTALL SPRING PIN

Drive Axle Alignment

To ensure that drive axle sprockets are properly aligned with track guides, measure right side drive axle end.

Measure must be 12 mm (15/32 in) with bearing lock sleeve flange, as shown in the next photo. If not, realign drive axle.



A. 12 mm (15/32 in)

Tighten bearing lock sleeve and secure with set screw. Apply Loctite 242 on set screw thread.

TRACK

GENERAL

This section gives guidelines for track removal. Some components require more detailed disassembly procedures. In these particular cases, refer to the pertaining section in this manual.

INSPECTION

Visually inspect track for:

– cuts and abnormal wear

– missing or defective inserts or guides

If track is damaged, replace track.

◆ WARNING

Do not operate a snowmobile with a cut, torn or damaged track.

REMOVAL

Remove the following items:

– chainguard

– drive chain and driven sprocket

– rear suspension

– end bearing housing

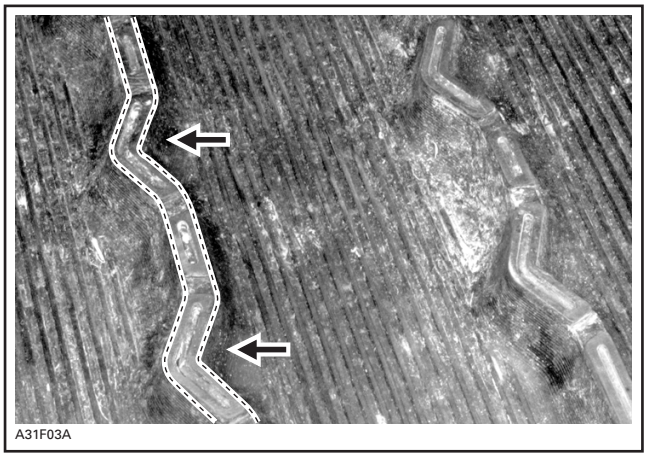
– drive axle

– track

INSTALLATION

Reverse the removal procedure.

NOTE: When installing the track, respect rotation direction indicated by shaped arrows on track thread.



TRACK ROTATION

Track Tension and Alignment

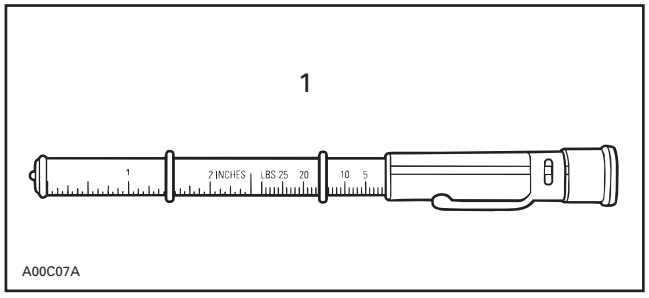
Track tension and alignment are interrelated. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

Tension

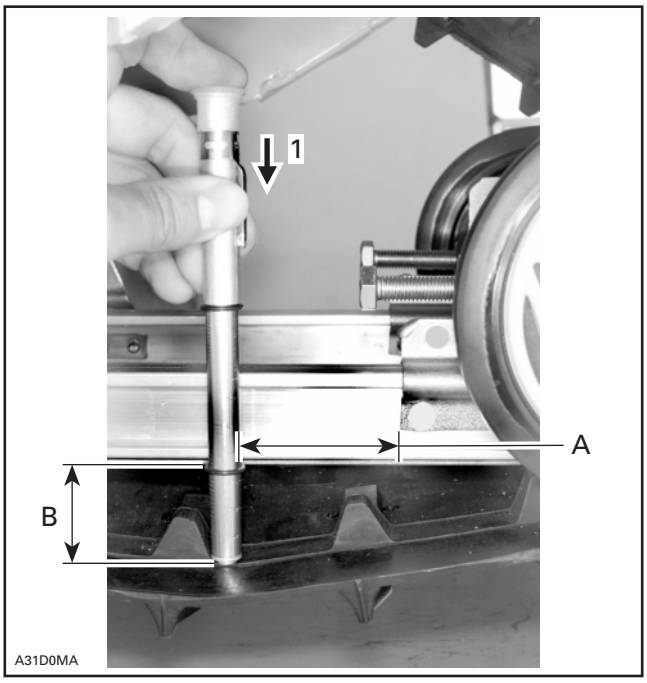
Lift the rear of vehicle and support with a mechanical stand. Allow the suspension to extend normally. Check the gap 60 mm (2-3/8 in) from rear idler wheel bracket.

Deflection should be 35 mm (1-3/8 in) between slider shoe and bottom inside of track, when exerting a downward pull of 7.3 kg (16 lb).

Both track tension gauge (P/N 529 021 500) or tension tester (P/N 414 348 200) can be used to measure deflection as well as force applied.



1. Belt tension tester

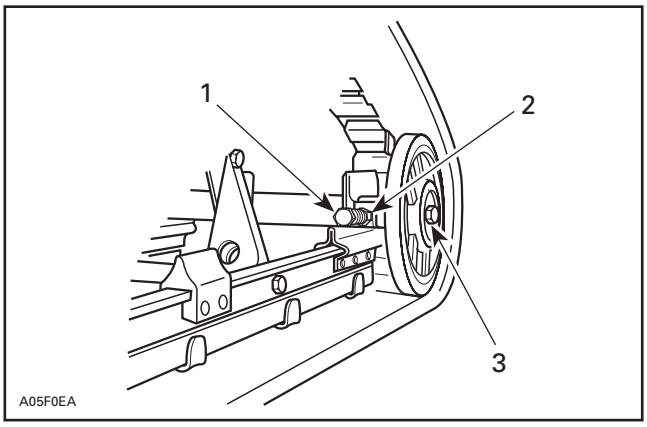


1. 7.3 kg (16 lb)
A. 60 mm (2-3/8 in)
B. 35 mm (1-3/8 in)

▼ CAUTION

Too much tension will result in power loss and excessive stress on suspension components. If too loose, the track will have a tendency to thump.

To adjust, loosen the rear idler wheel retaining screws and the adjustment screw lock nuts; then loosen or tighten the adjustment screws located on the inner side of the rear idler wheels.



TYPICAL

1. Adjustment screw
2. Lock nut
3. Retaining screw

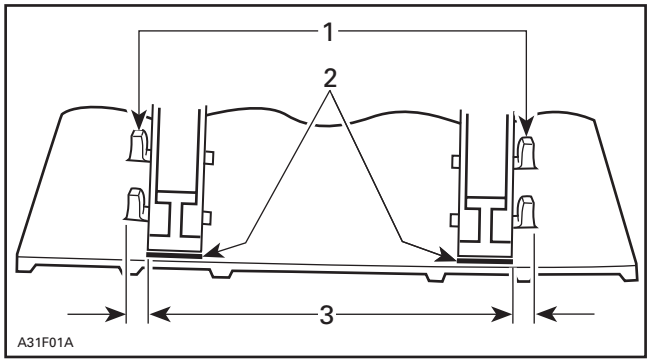
Alignment

◆ WARNING

Before checking track tension, ensure that the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

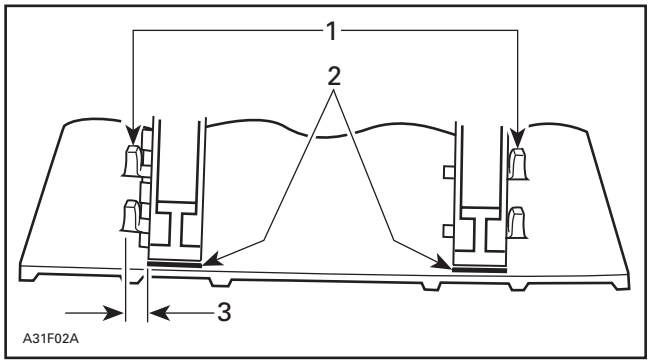
With rear of vehicle supported off the ground, start engine and allow the track to rotate **slowly**.

Check that the track is well centered; equal distance on both sides between edges of track guides and slider shoes.



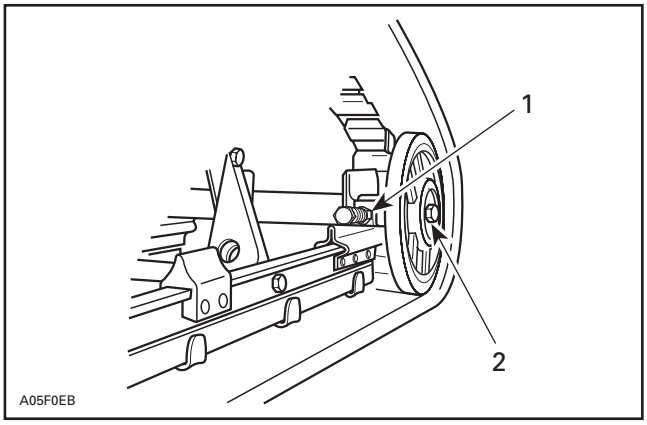
1. Guides
2. Slider shoes
3. Equal distance

To correct, stop engine then loosen the lock nuts and tighten the adjustment screw on side where guides are farthest to runner. Tighten lock nuts and recheck alignment.



1. Guides
2. Slider shoes
3. Tighten on this side

Tighten lock nuts and the idler wheel retaining screws.



TYPICAL

1. *Retighten lock nuts*
2. *Retighten rear idler wheel retaining screws*

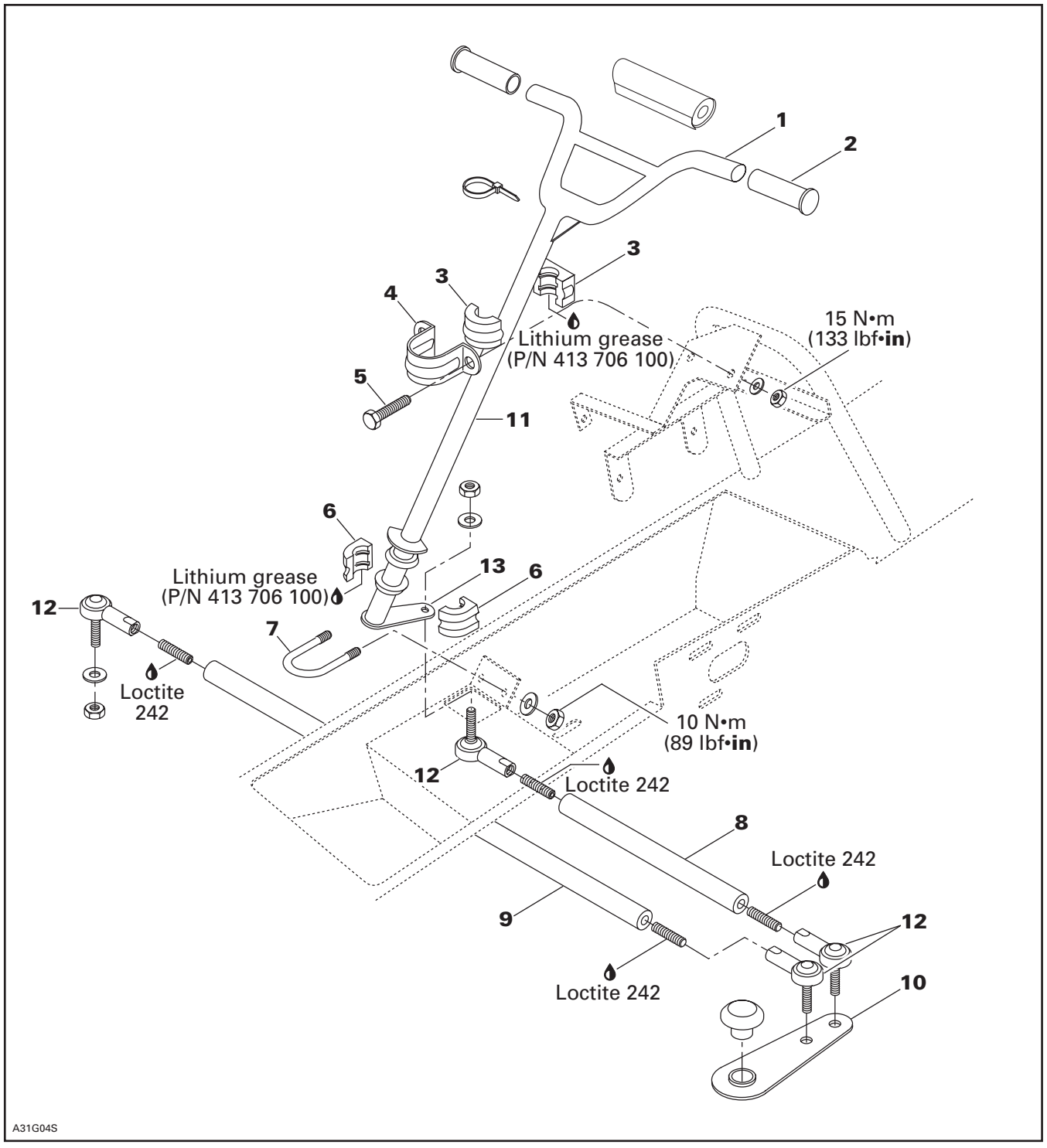
Restart engine, rotate track **slowly** and recheck alignment.

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SUSPENSION AND SKI SYSTEM 08-03-1
DISASSEMBLY 08-03-2
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INSTALLATION 08-03-2

STEERING SYSTEM



INSPECTION

Check skis and runner shoes for wear, replace as necessary. Refer to SUSPENSION AND SKI SYSTEM 08-03.

Steering System

Check general condition of steering system.

Check general condition of steering system components for wear and replace if necessary.

DISASSEMBLY AND ASSEMBLY

2, Grip

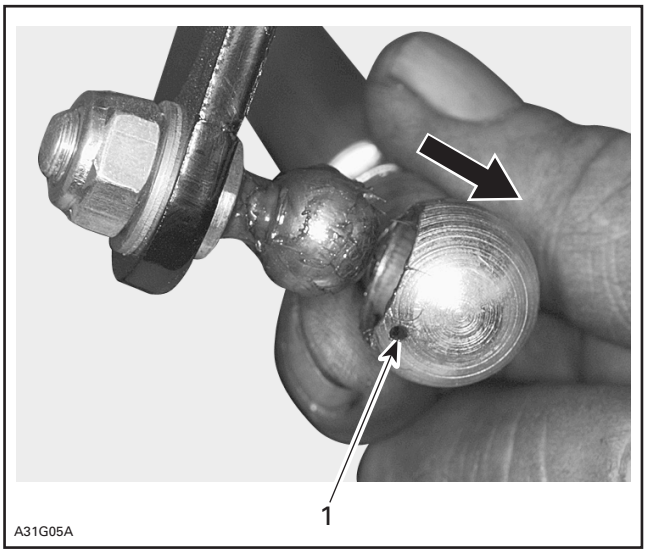
Grips can be removed and installed without any damage by injecting compressed air into the handlebar or by heating them with a heat gun.

11, Steering Column

From underneath bottom pan, remove tie rod clip.

Refer to STEERING ADJUSTMENT (SKIS) for clip removal.

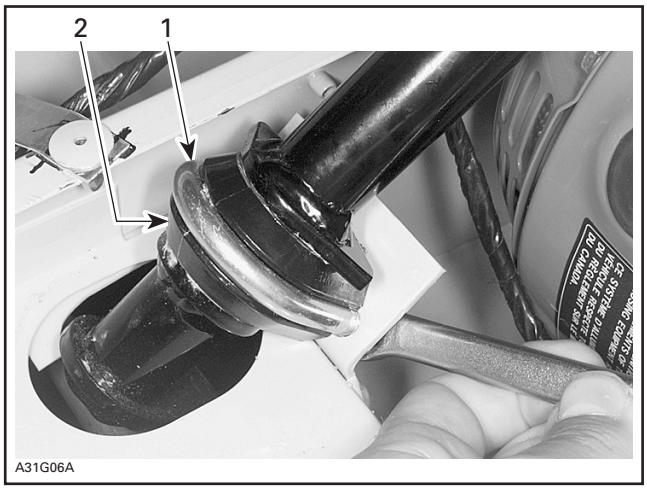
Detach short tie rod **no. 8** from steering column **no. 11**, as shown in the next photo.



DETACH TIE ROD

1. Clip removed

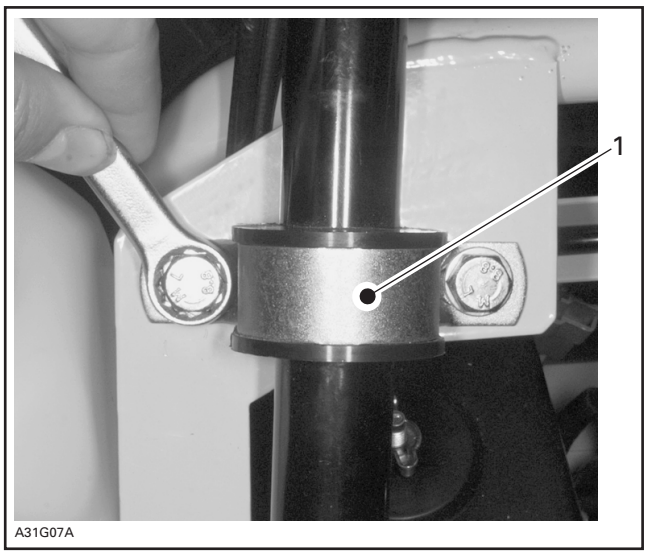
Remove U-clamp **no. 7** with both half bushings, **no. 6** as shown in the following photo.



REMOVE U-CLAMP

1. U-clamp
2. Bushing

Remove retaining support **no. 4** with both half bushings **no. 3**, as shown in the following photo.



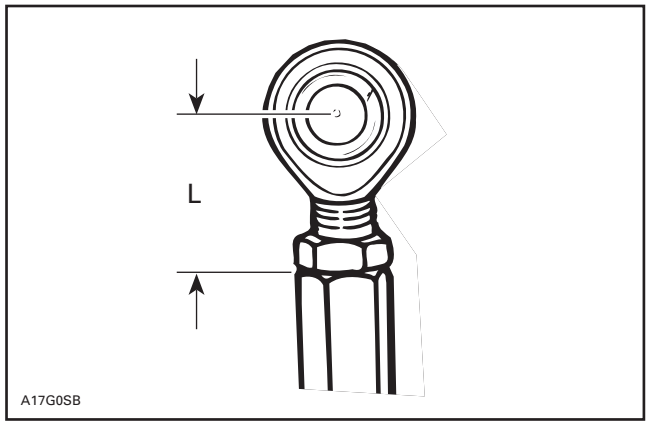
1. Retaining support

INSPECTION

12, Ball Joint

Inspect ball joint ends for wear or looseness, if excessive, replace.

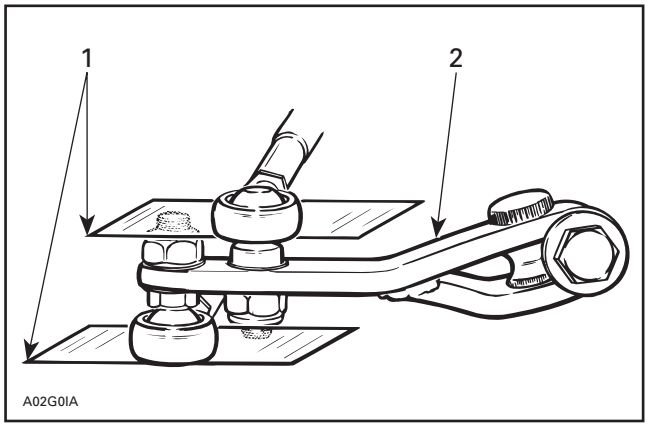
Screw threaded end of ball joint into tie rod. The maximum length for ball joint center to tie rod end must not exceed the value **L** in the following chart:



TYPICAL

MODEL	L	
	mm	(in)
Mini Z	47	(1-27/32)

The cut-off section of the tie rod end must run parallel with the horizontal line of the steering arm when assembled on vehicle. The ball joint should be restrained when tightening tie rod end lock nut. For torque specifications see specific exploded view.



TYPICAL

1. Parallel with steering arm
2. Steering arm

◆ WARNING

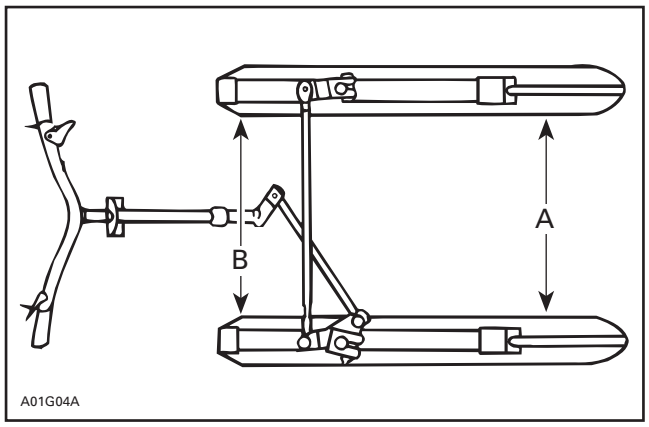
The cut off section of the ball joint must run parallel with the steering arm. When tightening lock nuts, restrain ball joint with appropriate size wrench. Ensure not too many threads are kept outside of the tie rod according to the thread length chart.

STEERING ADJUSTMENT (skis)

Definitions

TOE-OUT:

Difference in measurement between front edge A and rear edge B of skis as viewed from top side of suspension system. It is adjustable.



CAMBER:

A specific inward or outward tilt angle of ski leg compared to a vertical line when viewing vehicle from front. **This angle is not adjustable on Mini Z.**

Adjustments

Adjustments should be performed following this sequence:

– Pivot arm centering/horizontal handlebar.
– Set toe-out.

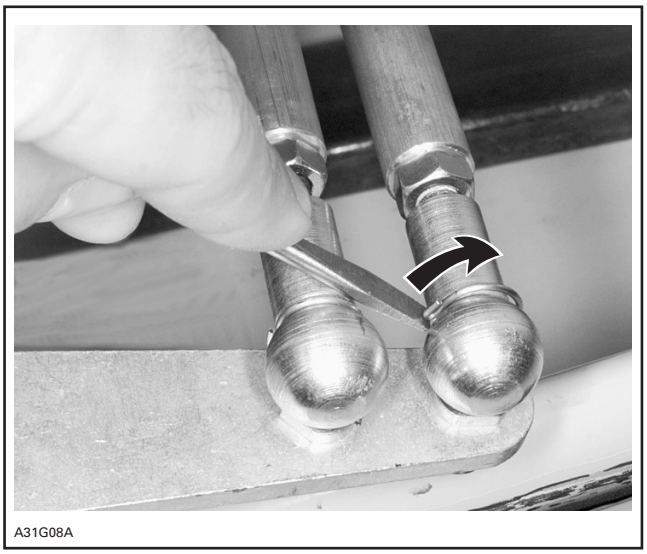
PIVOT ARM CENTERING/HORIZONTAL HANDLEBAR

Turn handlebar **no. 1** until pivot arm **no. 13** is well centered.

Check if handlebar is horizontal and skis aligned with track. If not, adjust as per following procedure:

Loosen lock nut of short tie rod end.

Using a flat screwdriver, remove clip on short tie rod end, as shown in the next photo.



TO REMOVE CLIP — LIFT THEN PULL OUT

Detach short tie rod end from steering arm **no. 10**.

Check that handlebar is horizontal and that skis are aligned with track.

Rotate tie rod end CW or CCW until proper alignment with steering arm is attain. See next photo.

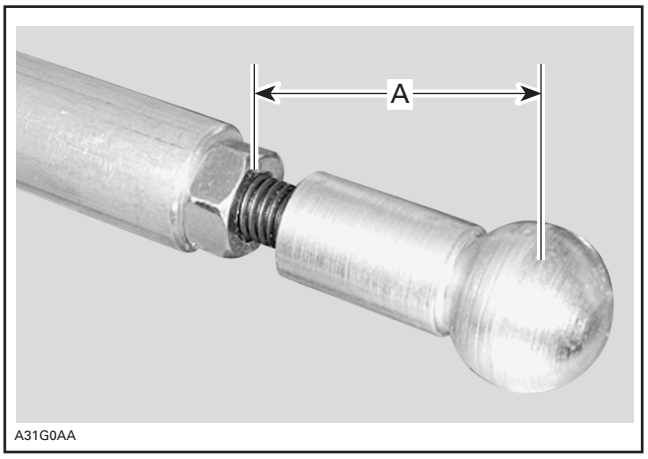


DETACH TIE ROD END AND ROTATE CW OR CCW TO ADJUST

Re-attach tie rod end to steering arm.

◆ WARNING

Maximum length for ball joint center to tie rod end must not exceed 47 mm (1-27/32 in). Torque lock nut to 15 N•m (133 lbf•in).



A. 47 mm (1-27/32 in) maximum

Restrain tie rod while firmly retighten nuts so that ball joint sockets run parallel with steering arm and pivot arm.

◆ WARNING

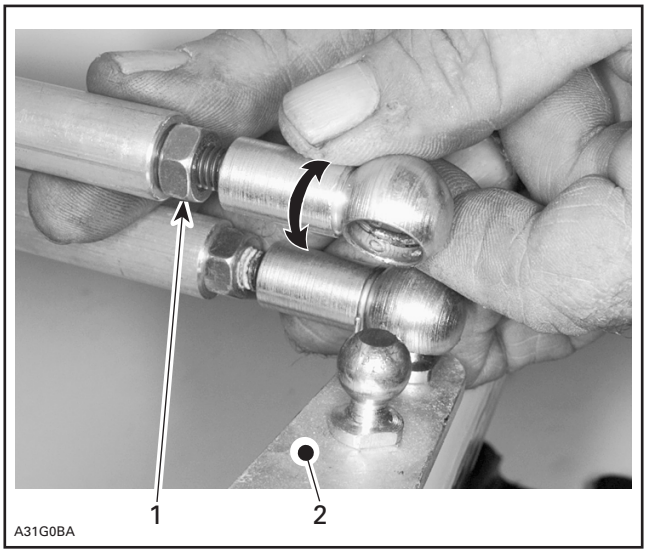
Ball joint sockets must run parallel with steering arm and pivot arm. Tie rod must be restrained when tightening lock nuts.

Ensure that pivot arm **no. 13** is still centered and check ski toe-out.

TOE-OUT

Loosen lock nuts of long tie rod end **no. 9** and detach tie rod end from steering arm **no. 10**.

Turn each tie rod end to adjust toe-out. See next photo.

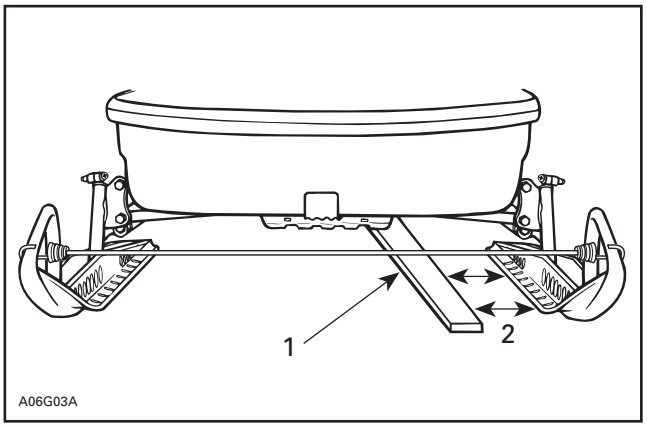


TO ADJUST — ROTATE TIE ROD END

1. *Loosen lock nut*
2. *Steering arm*

Re-attach tie rod end to steering arm then secure with clip.

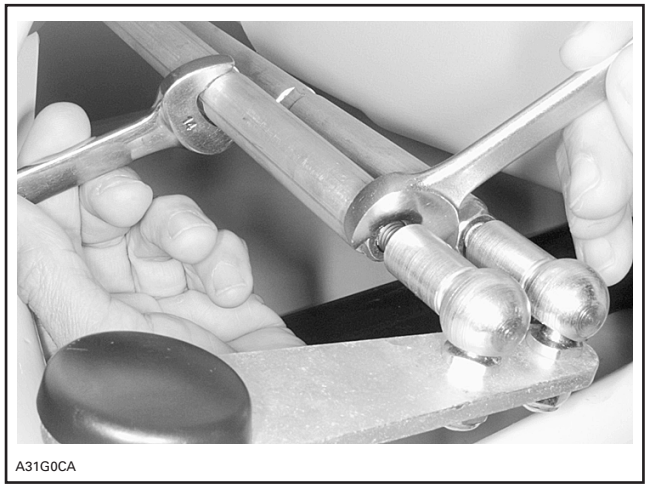
NOTE: To measure toe-out, place a straight edge against pre-adjusted track and measure distance between front and rear of skis and straight edge. Distances should be equal. After ski toe-out adjustment, distance at front of ski must be 3.0 mm (1/8 in) more than at rear on both sides for a total toe-out of 6 mm (1/4 in).



TYPICAL

1. *Straight edge*
2. *3.0 mm (1/8 in) more at front than at rear*

Check external threaded length not engaged and firmly retighten lock nuts, as shown in the next photo.



HOLD TIE ROD THEN TIGHTEN LOCK NUT

LUBRICATION

◆ WARNING

Do not lubricate throttle and/or brake cable, housing and spring coupler bolts.

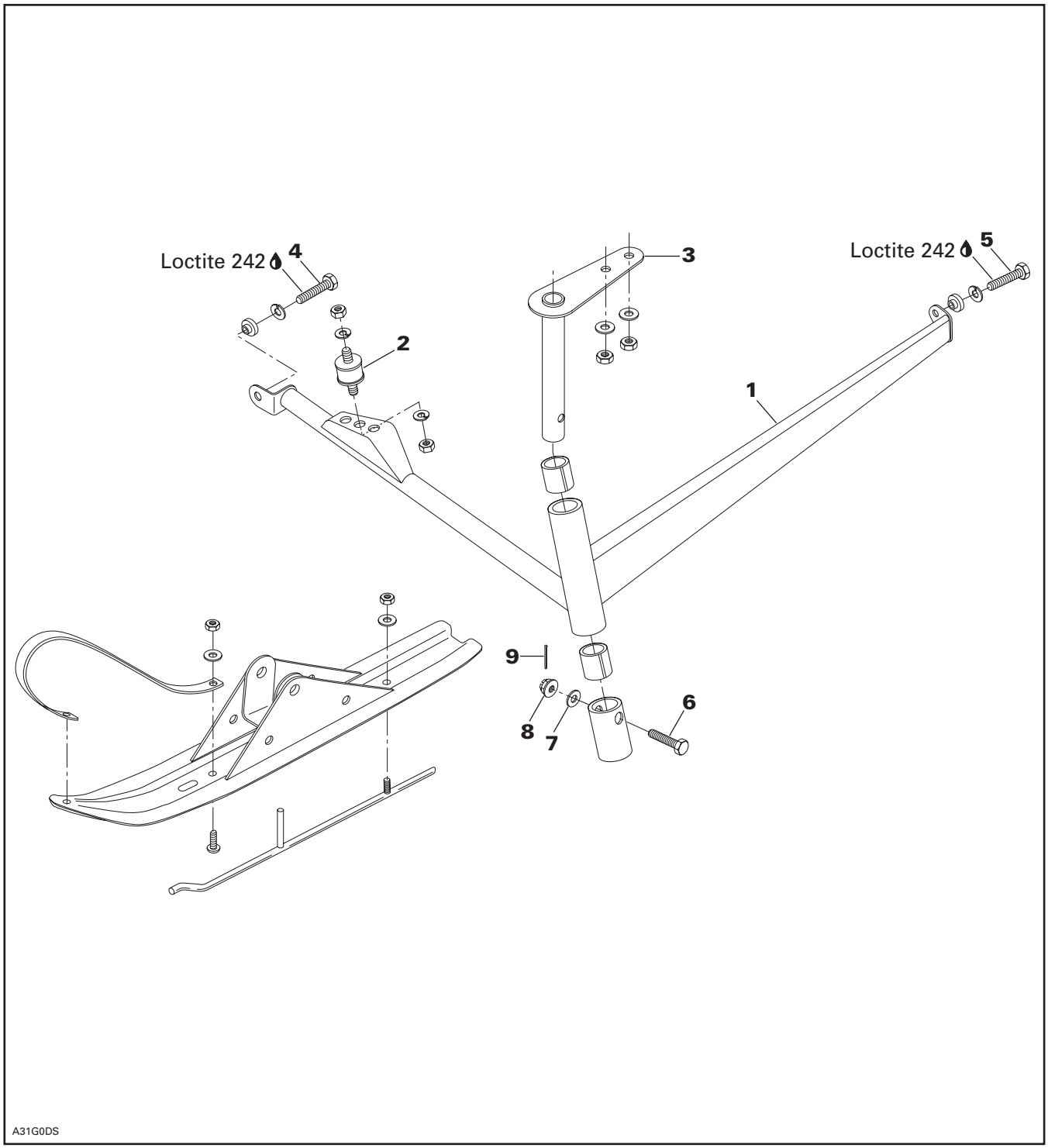
Steering Column

Use lithium grease (P/N 413 706 100) at U-clamp and retaining support location on steering column.

Ball Joints

Lightly grease ball joints with bearing grease (P/N 413 706 100).

SUSPENSION AND SKI SYSTEM



DISASSEMBLY

2, Rubber Mount

Lift front of vehicle and support it off the ground.

Note rubber mount position.

Remove lower nut then upper nut of rubber mount.

1, Swing Arm

Lift front of vehicle and support it off the ground.

Unbolt ski.

Unbolt lower end of rubber mount from swing arm **no. 1**.

Remove nuts and washers then detach tie rod end from steering arm **no. 3**.

Remove swing arm front screw **no. 4** from frame.

Remove swing arm rear screw **no. 5** from frame.

Pull swing arm off the vehicle.

INSPECTION

Check both rubber mounts for loose and wear. If so, replace with new one.

Check all rubber cushions for crack and wear. Replace as required.

Check for straightness of swing arm. Replace as required.

Check skis and runners for wear, replace as necessary.

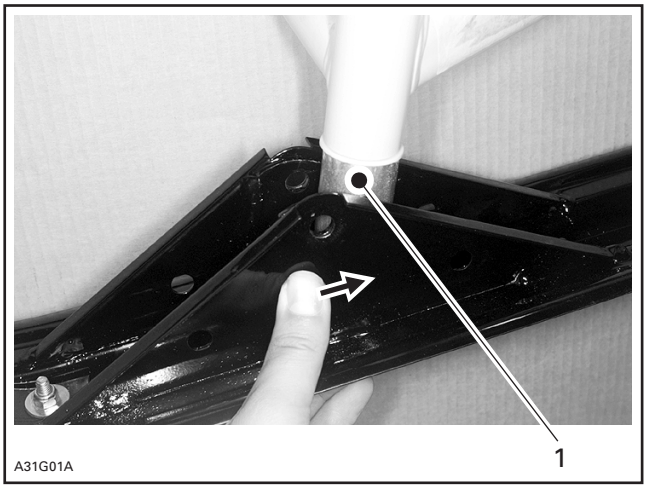
INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Tighten nuts and screws to proper torque and apply Loctite 242 where specified, as mentioned in exploded view.

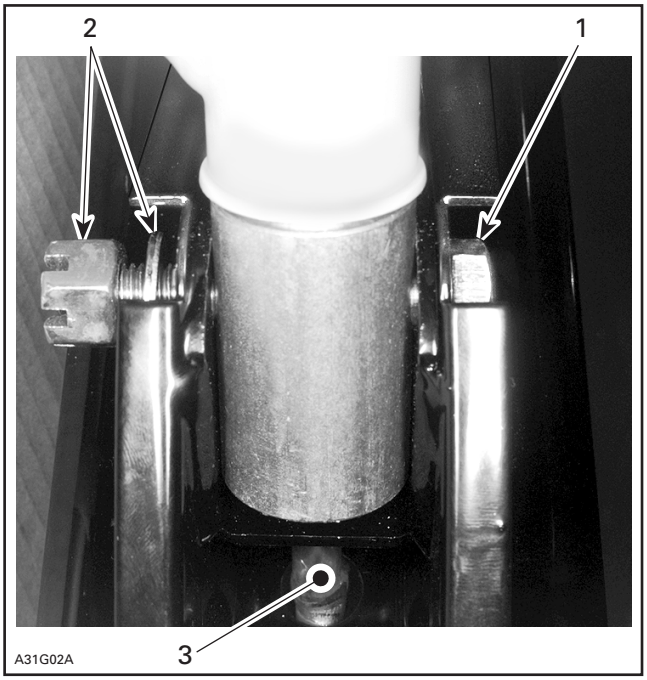
Ski

Slide ski on ski leg as shown in the next photo.



SLIDE SKI
1. Ski leg spacer

Secure ski with screw **no. 6**, washer **no. 7**, nut **no. 8** and cotter pin **no. 9**, then ensure that ski pin is properly centered into ski leg, as shown in the following photo.



1. Bolt head toward OUTSIDE of vehicle
2. Washer, nut and cotter pin (not shown) toward inside of vehicle
3. Ski pin centered into ski leg

◆ WARNING

Always use new cotter pin when reinstalling skis.

Tie Rod

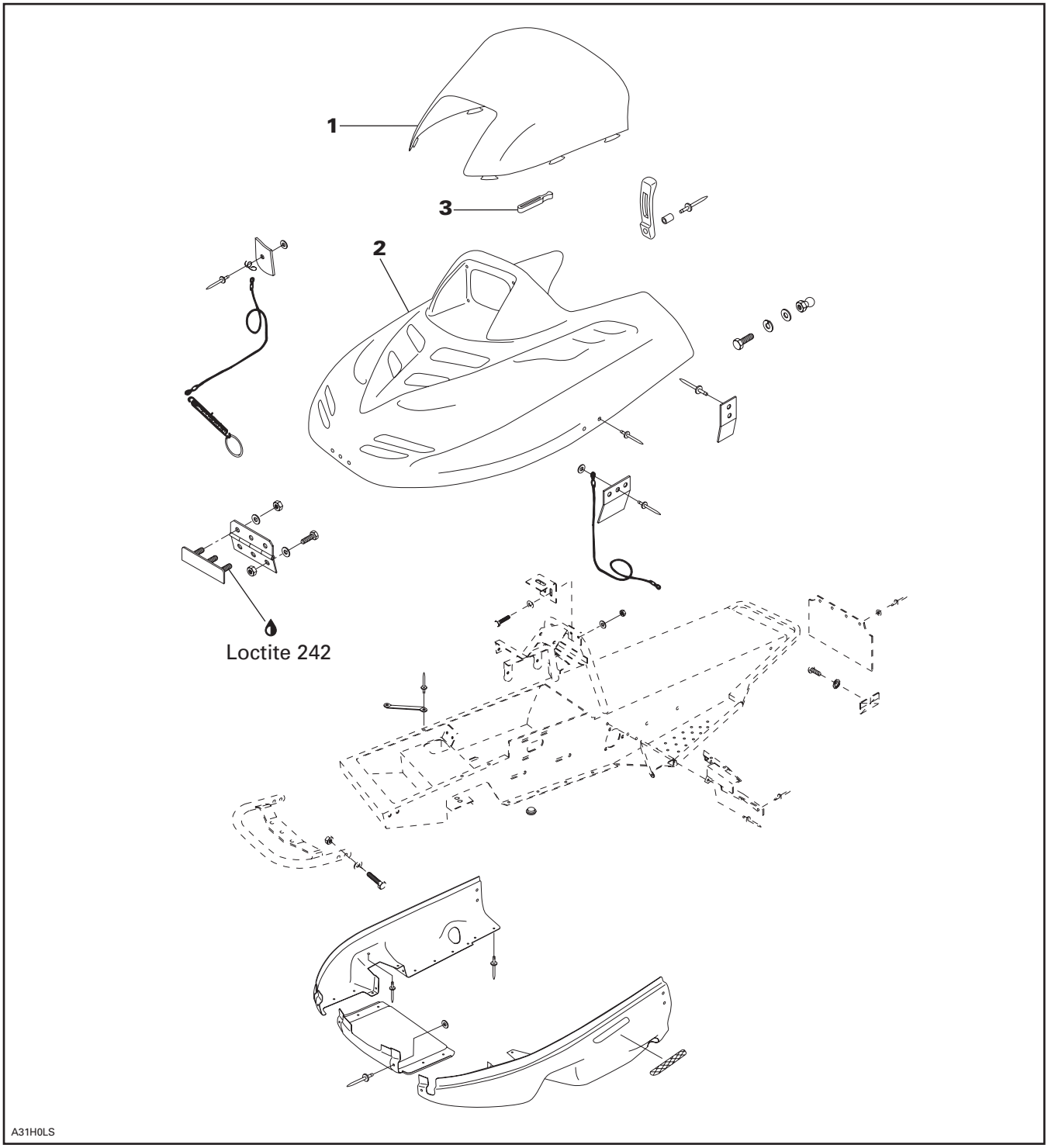
Position tie rods horizontally before tightening nuts.

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BODY

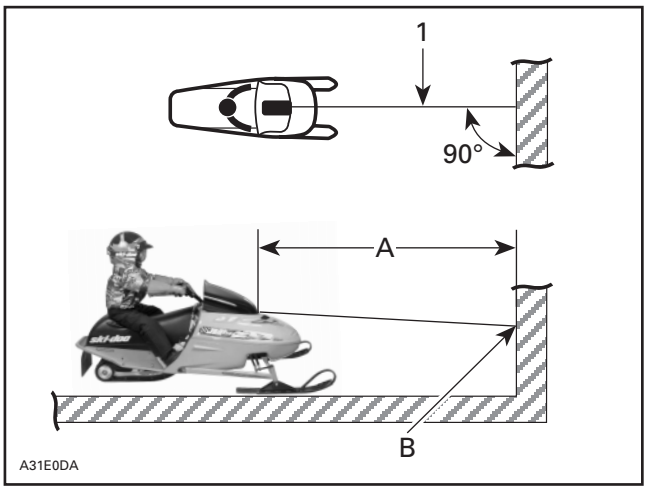


INSTALLATION AND ADJUSTMENT

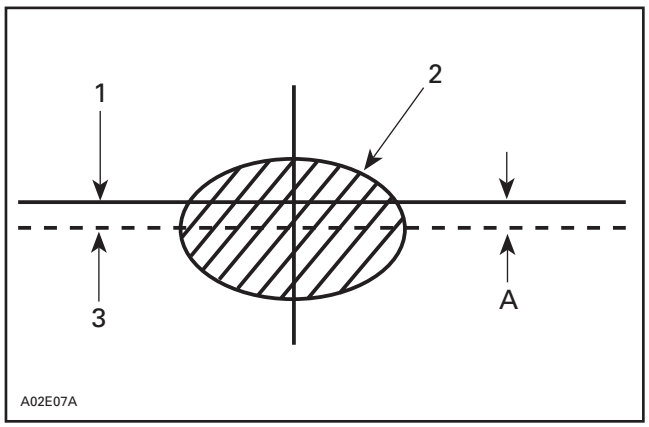
HEADLAMP BEAM AIMING

Beam aiming is correct when center of high beam is 25 mm (1 in) below the headlamp horizontal center line, scribed on a test surface, 381 cm (12 ft 6 in) away.

Measure headlamp center distance from ground. Scribe a line at this height on test surface (wall or screen). Light beam center should be 25 mm (1 in) below scribed line.



1. Headlamp center line
A. 381 cm (12 ft 6 in)
B. 25 mm (1 in) below headlamp center



1. Headlamp horizontal center line
2. Light beam (high beam) (projected on the wall)
3. Light beam center
A. 25 mm (1 in)

Required Conditions

Place the vehicle on a flat surface perpendicular to test surface (wall or screen) and 381 cm (12 ft 6 in) away from it.

Rider or equivalent weight must be on the vehicle.

Adjustment

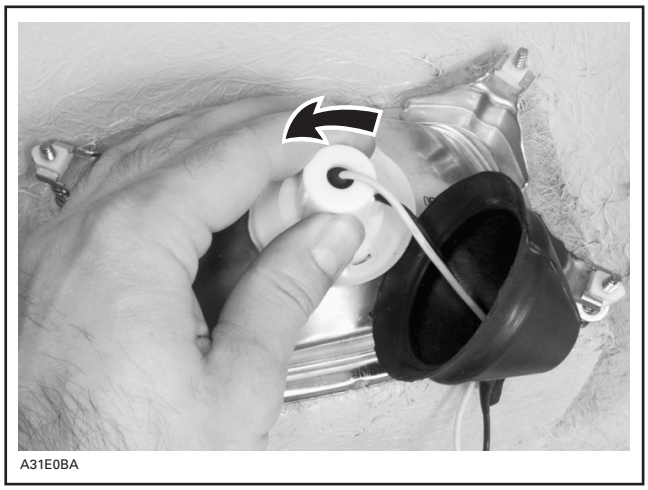
Remove headlamp screw caps. Turn screws accordingly at upper headlamp attachment.

BULB REPLACEMENT

Headlight

If headlamp bulb is burnt, tilt hood.

Remove the rubber boot and turn the bulb retainer ring counterclockwise.



REMOVE RUBBER BOOT AND BULB RETAINER RING

Pull off bulb retainer ring, detach the bulb and replace. Properly reinstall parts.



Taillight

Taillight is sealed, if it is burnt, replace taillight ass'y with new one.

To remove, unscrew the 2 lens screws.

Pull out taillight ass'y.

Unplug connector.

Install new taillight ass'y.

DECAL

To remove a decal; heat old decal with a heat gun and peel off slowly.

Using isopropyl alcohol, clean the surface and dry thoroughly.

Apply liquid soap to new decal and carefully position the decal. Using a sponge or a squeegee, remove the air bubbles and surplus water working from the center toward the edges. Allow to air dry.

▼ CAUTION

Do not apply isopropyl alcohol or solvent directly on decals.

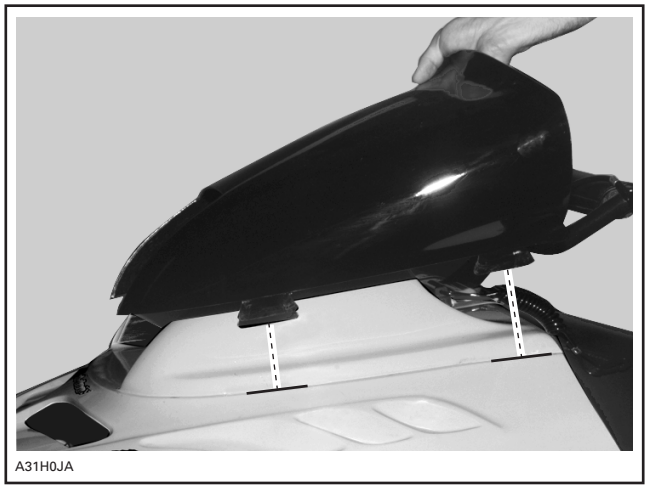
WINDSHIELD INSTALLATION

When peeling off the protective film some polyethylene particles may remain on the windshield **no. 1**. A soft clean cloth moistened with naphtha (camping equipment fuel) will easily remove the remaining particles.

◆ WARNING

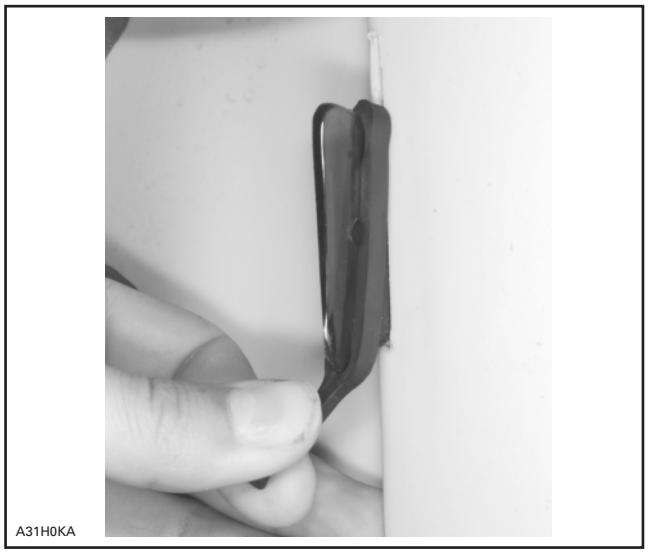
Naphtha is flammable and explosive under certain conditions. Always manipulate in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity.

Position the windshield **no. 1** on the hood **no. 2** then push it down until the tabs are fully inserted into the hood slots, as shown.


A31H0JA

INSERT WINDSHIELD TABS INTO HOOD SLOTS

From inside hood, lock the windshield tabs in position using latches **no. 3** as shown.


A31H0KA

VIEW FROM INSIDE HOOD — LOCK WINDSHIELD TABS

CHAIN GUARD

Disassembly and Assembly

◆ WARNING

Engine should be running only with chain guard well secured in place.

Inspection

Check chain guard mounting tabs and spring nuts for wear.

WIRING HARNESS

◆ WARNING

Ensure all terminals are properly crimped on the wires and that all connector housings are properly fastened. Keep wires away from any rotating, moving, heating and vibrating parts. Use proper fastening devices as required.

CABLES

◆ WARNING

Before installation, ensure that all cables are in perfect condition. Properly install the cable ends and secure them in place. Pay attention to route them properly, away from any rotating, moving, heating, or vibrating parts.

PIPING

◆ WARNING

Always ensure that the fuel and vent, lines are properly fixed to their connectors, that they are not perforated or kinked and that they are properly routed away from any rotating, moving, heating or vibrating parts. Also check for leaks. Replace if required.

NOTE: Refer to proper *Parts Catalog* to find suitable clip part numbers.

PLASTIC REPAIR

REPAIR

Two types of plastic material are used on Mini Z model, as described in the following table.

	MATERIAL
WINDSHIELD	Polycarbonate
HOOD	Polyethylene
BOTTOM PAN	Polyethylene

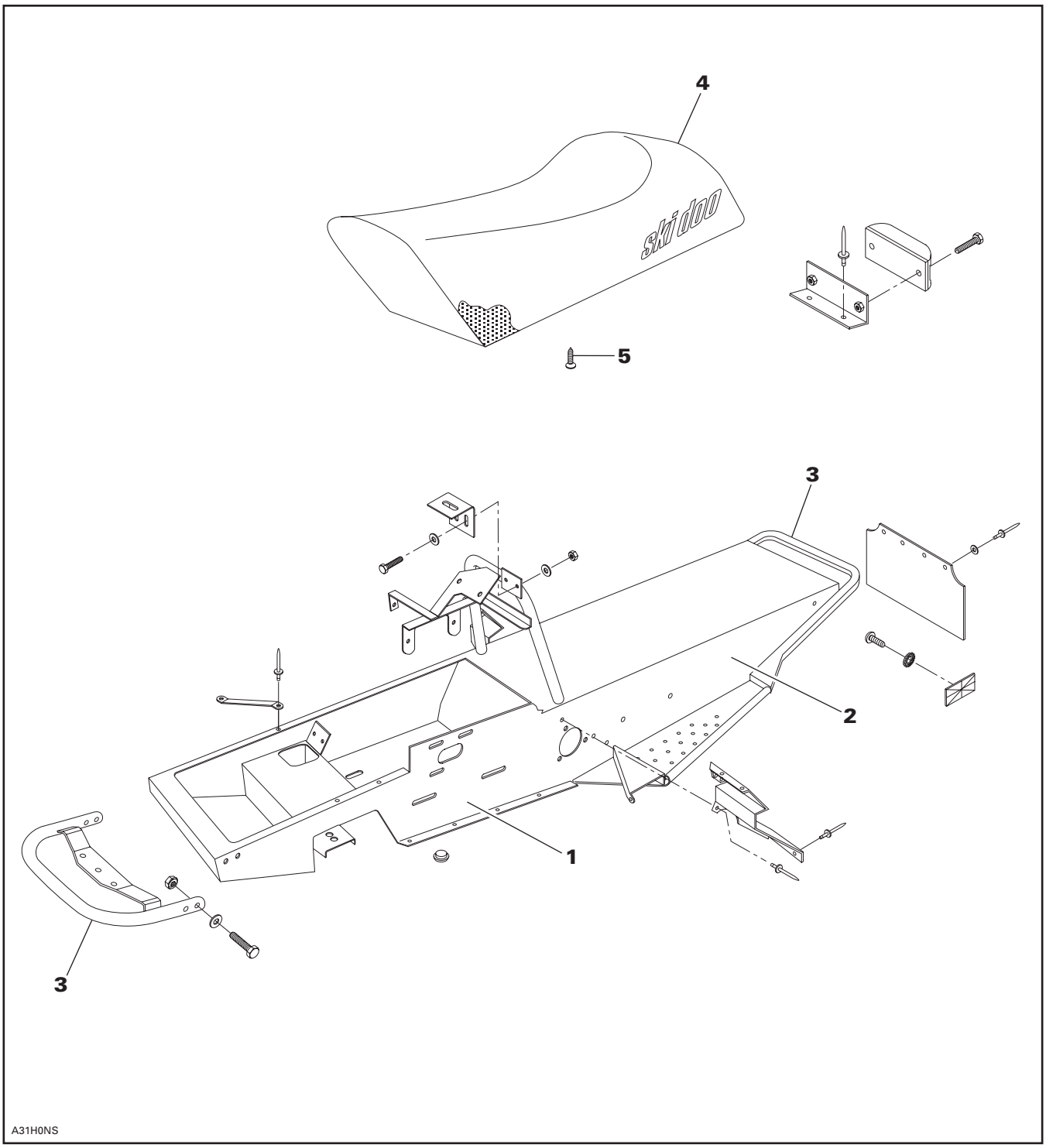
Both plastic materials are irreparable.

In the case that parts are broken or damaged, replace with new one.

◆ WARNING

Polycarbonate windshields must **never** be repaired by welding or otherwise.

FRAME



FRAME CLEANING

Clean frame no. 1, tunnel no. 2 and bumpers no. 3 with appropriate cleaners and rinse with high pressure hose.

Touch up all metal spots where paint has been scratched off. Spray all bare metal parts of vehicle with metal protector.

Seat Removal/Replacement

Seat no. 4 is retained to tunnel with 4 wood screws no. 5. All screws must be removed from inside tunnel.

To remove both front wood screws no. 5, detach rear suspension from tunnel, as described in section 07 REAR SUSPENSION.

CAUTION

Ensure that 4 wood screws no. 5 have been removed before removing seat.

Seat Cleaning

It is recommend to clean the seat no. 4 with a solution of warm soapy water, using a soft clean cloth.

CAUTION

Avoid use of harsh detergents such as strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc. that may cause damage to the seat cover.

FRAME WELDING

Steel Frame:

- electric welding
- amperage: 70-110 A
- voltage: 20-24 V
- rod: E-7014 (3/32 in)

CAUTION

If welding is to be done near plastic material, it is recommended to either remove the part from the area or to protect it with aluminum foil to prevent damage.

FRAME COMPONENT REPLACEMENT

Drilling Procedure

For proper drilling instructions and to prevent premature wear, follow the procedure below.

Always use a variable speed electric drill.

Center the drill bit on the rivet hole and drill.

Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant breaking chip is ejected.

NOTE: To increase bit life, use Bombardier synthetic chaincase oil (P/N 413 803 300) as a cutting oil.

CAUTION

High speed drilling will cause excessive heat which may destroy the cutting edge of the bit, therefore avoid using pneumatic drills.

TECHNICAL DATA

SI* METRIC INFORMATION GUIDE

BASE UNITS

DESCRIPTION	UNIT	SYMBOL
length	meter	m
mass	kilogram	kg
force	newton	N
liquid	liter	L
temperature	Celsius	°C
pressure	kilopascal	kPa
torque	newton•meter	N•m
speed	kilometer per hour	km/h

PREFIXES

PREFIX	SYMBOL	MEANING	VALUE
kilo	k	one thousand	1 000
centi	c	one hundredth	0.01
milli	m	one thousandth	0.001
micro	µ	one millionth	0.000001

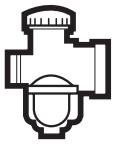
CONVERSION FACTORS

TO CONVERT	TO †	MULTIPLY BY
in	mm	25.4
in	cm	2.54
in^2	cm^2	6.45
in^3	cm^3	16.39
ft	m	0.3
oz	g	28.35
lb	kg	0.45
lbf	N	4.4
lbf•**in**	N•m	0.11
lbf•ft	N•m	1.36
lbf•ft	lbf•**in**	12
PSI (lbf/in^2)	kPa	6.89
imp. oz	U.S. oz	0.96
imp. oz	mL	28.41
imp. gal	U.S. gal	1.2
imp. gal	L	4.55
U.S. oz	mL	29.57
U.S. gal	L	3.79
MPH	km/h	1.61
Fahrenheit	Celsius	(°F – 32) ÷ 1.8
Celsius	Fahrenheit	(°C × 1.8) + 32

* The international system of units abbreviates SI in all languages.

† To obtain the inverse sequence, divide by the given factor. To convert ''mm'' to ''in'', divide by 25.4.

NOTE: Conversion factors are rounded off to 2 decimals for easier use.

	VEHICLE MODEL			**MINI Z**
	ENGINE TYPE			**4 stroke Overhead valves**
	Number of Cylinders			1
	Bore		mm (in)	60.00 (2.362)
	Stroke		mm (in)	42.00 (1.654)
	Displacement		cm^3 (in^3)	118.00 (7.20)
	Compression Ratio (corrected)			8.5 : 1
	Maximum Power Engine Speed		± 100 RPM	4000
	Ring End Gap	Top/Second Oil (wear limit)	mm (in)	0.2 - 0.4 (.008 - .016) 0.15 - 0.35 (.006 - .014) 1.0 (.04)
	Ring/Piston Groove Clearance	(standard) (wear limit)	mm (in) mm (in)	.015 - .045 (.0006 - .0018) .15 (.006)
	Piston/Cylinder Wall Clearance	(standard) (wear limit)	mm (in) mm (in)	.015 - .05 (.0006 - .002) .12 (.005)
	Connecting Rod Big End Side Clearance	(standard) (wear limit)	mm (in) mm (in)	0.1 - 0.7 (.004 - .028) 1.1 (.043)
	Ignition Type			Transistorized
	Spark Plug Make and Type			NGK BPR6 ES
	Spark Plug Gap		mm (in)	0.7 - 0.8 (.028 - .031)
	Ignition Timing BTDC		mm (in)	25° (fixed)
	Lamp Coil ①			0.18 - 0.23
	Ignition Coil ①	Primary	Ω	0.8 - 1.0
		Secondary	Ω	5.9 - 7.1
	Carburetor Type			Horizontal Butterfly Valve
	Main Jet			# 60
	Float Height Adjustment		± 1 mm (± .040 in)	13.7 (.54)
	Pilot Screw Opening		± 1/16 turn	2 turns out
	Idle Speed RPM		± 200 RPM	1400
	Gas Type/Pump Octane Number			Unleaded/86
	Oil			SAE 5W/30
	Type			Radial Fan
	**ENGINE COLD N•m (lb•ft)**	Drive Sprocket Retaining Screw		25 (19)
		Exhaust Nuts		24 (18)
		Crankcase Screws	M6	12 (9)
		Cylinder Head Screws		24 (18)
		Axial Fan/Flywheel Nut		75 (55)

	VEHICLE MODEL				**MINI Z**
	ENGINE TYPE				**4 stroke Overhead valve**
	Drive Chain Ratio				10/48
	Drive Chain	Pitch		mm (in)	12.7 (.500)
		Type/Links		Qty	Single 40/78
	Drive Sprocket	Clutch Engagement			N.A.
	Driven Sprocket	Outside diameter Pitch diameter		mm (in) mm (in)	201.37 (7.93) 194.18 (7.65)
	Drive Chain Part Number (P/N)				412 1075 00
	Drive Chain Adjustment		Deflection		Automatic tensioner
	Track	Width		mm (in)	254.0 (10)
		Length		mm (in)	1748.8 (68.85)
		Profile Height		mm (in)	15.97 (.63)
		Adjustment	Deflection	mm (in)	35 (1-3/8)
			Force ①	kg (lbf)	7.3 (16)
	Suspension Type		Track		Mini Z
			Ski		Mini Z
	Length			mm (in)	1860.0 (73.2)
	Width			mm (in)	885.0 (34.8)
	Height			mm (in)	750.0 (29.5)
	Ski Stance			mm (in)	685.0 (27.0)
	Mass (dry)			kg (lb)	70 (154)
	Ground Contact Area			cm^2 (in^2)	2754.5 (426.9)
	Ground Contact Pressure			kPa (PSI)	2.49 (.361)
	Frame Material				Steel
	Bottom Pan Material				Polyethylene
	Hood Material				Polyethylene
	Battery			V (A•h)	N.A.
	Headlight			W	35
	Taillight			W	4.5
	Fuel Tank			L (U.S. gal)	1.8 (.5)
	Oil Capacity			L (U.S. oz)	0.6 (20.3)

ENGINE TECHNICAL DATA LEGEND

BTDC: Before Top Dead Center

K: Kilo (x 1000)

MAG: Magneto Side

N.A.: Not Applicable

PTO: Power Take Off Side

R: Rectangular

ST: Semi-trapez

① All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.

VEHICLE TECHNICAL DATA LEGEND

N.A.: Not Applicable

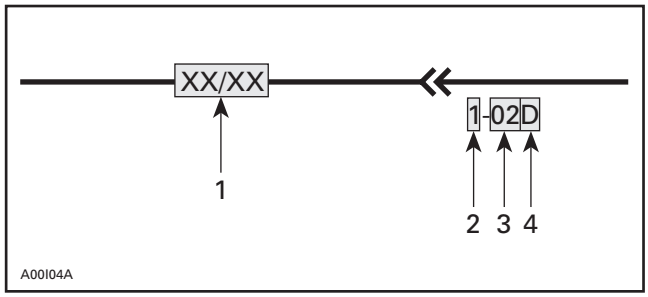
① Force or downward pull applied to track to obtain specified tension deflection.

WIRING DIAGRAM

WIRING DIAGRAM LEGEND

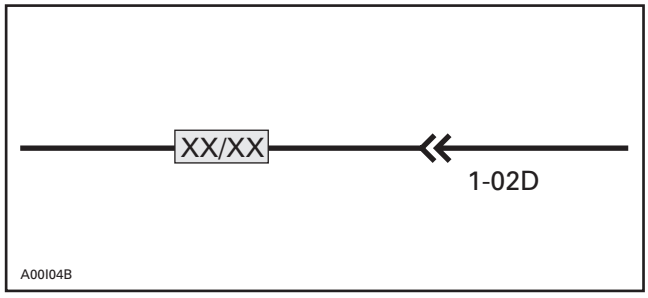
◆ WARNING

Ensure all terminals are properly crimped on the wires and all connector housings are properly fastened.



1. *Wire colors*
2. *Housing area*
3. *Housing number per area*
4. *Wire connector location in housing*

WIRE COLORS AND CIRCUIT

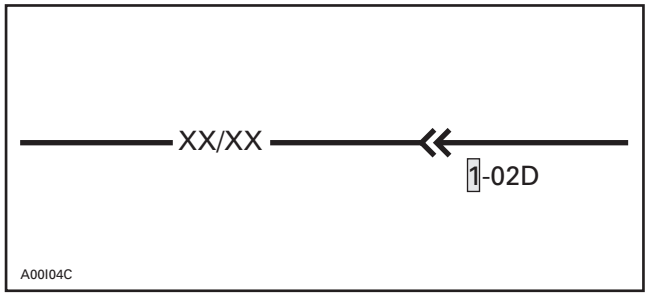


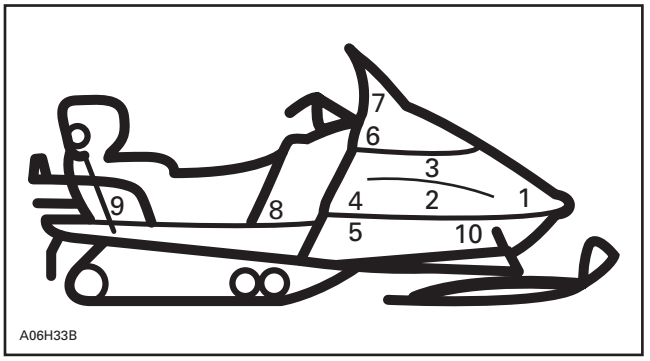
The first color of a wire is the main color, second color is the stripe.

Example: YL/BK is a YELLOW wire with a BLACK stripe.

COLOR CODE	
BK – BLACK WH – WHITE RD – RED BL – BLUE YL – YELLOW GN – GREEN	GY – GREY VI – VIOLET OR – ORANGE BR – BROWN PK – PINK

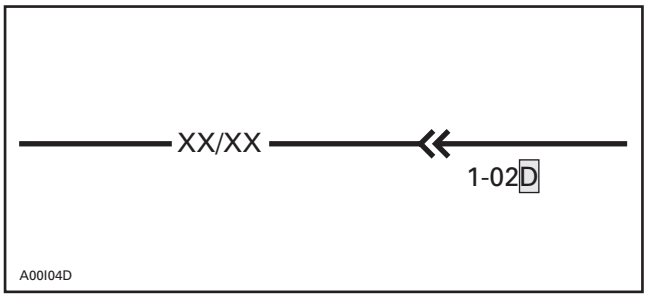
CONNECTOR HOUSING AREA

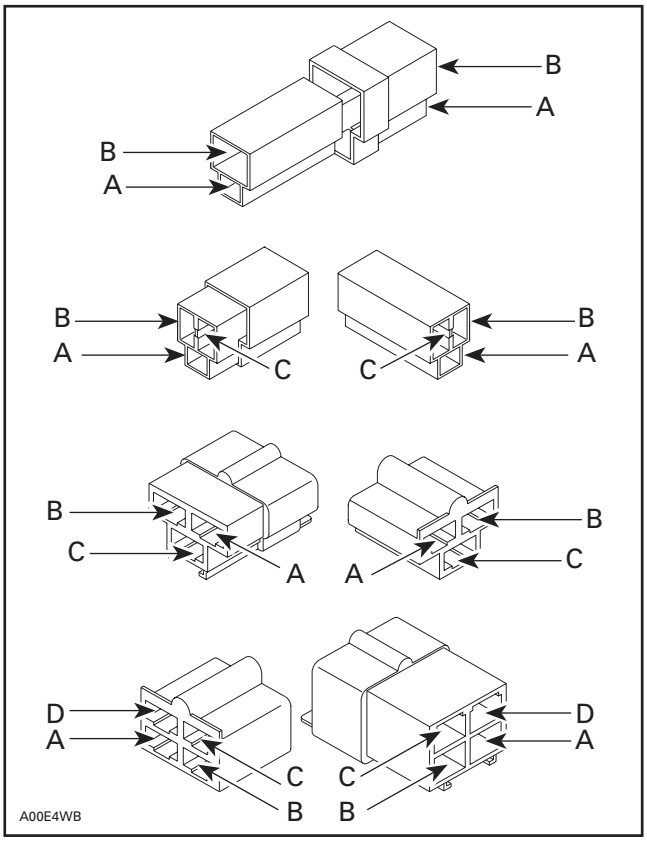




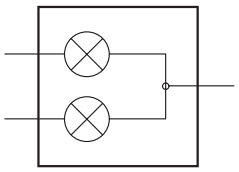
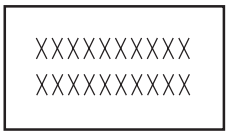
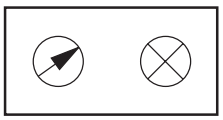
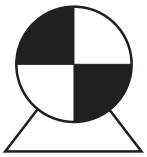
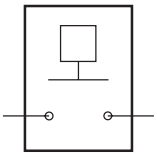
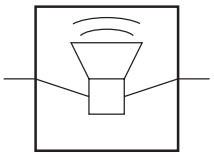
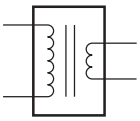
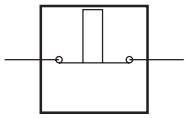
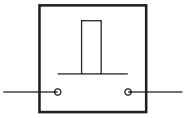
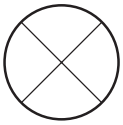
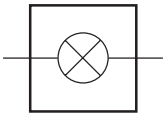
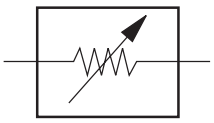
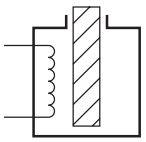
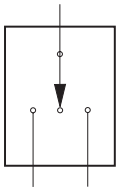
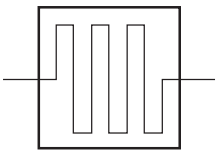
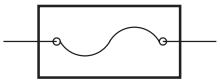
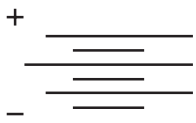
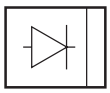
AREA	LOCATION
1	Front of engine compartment
2	Magneto
3	Carburetors
4	Near intake silencer
5	Near driven pulley
6	Under console
7	Under hood
8	Near fuel tank
9	Rear of seat
10	Under engine

CONNECTOR LOCATION IN HOUSING





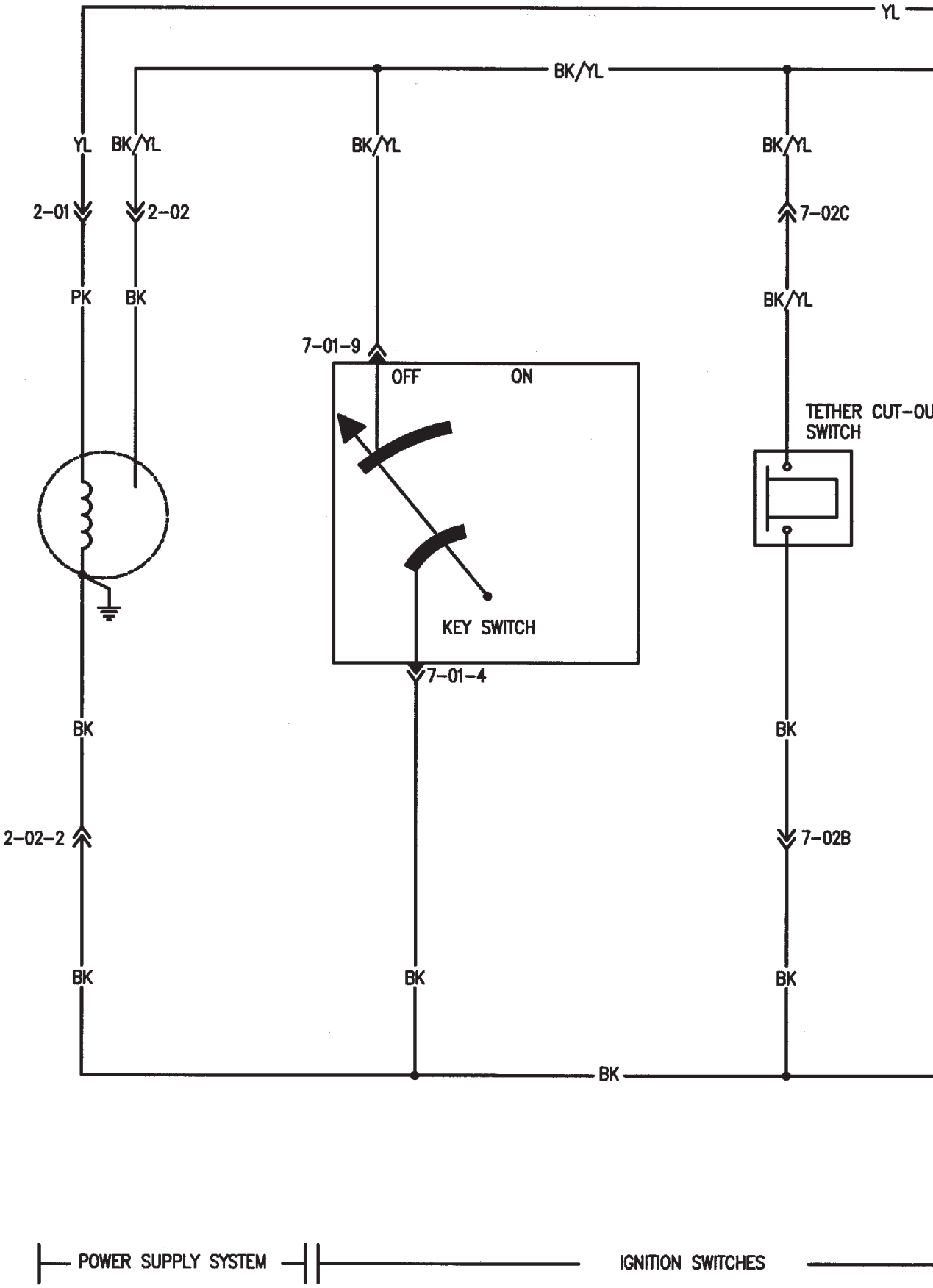
SYMBOLS DESCRIPTION

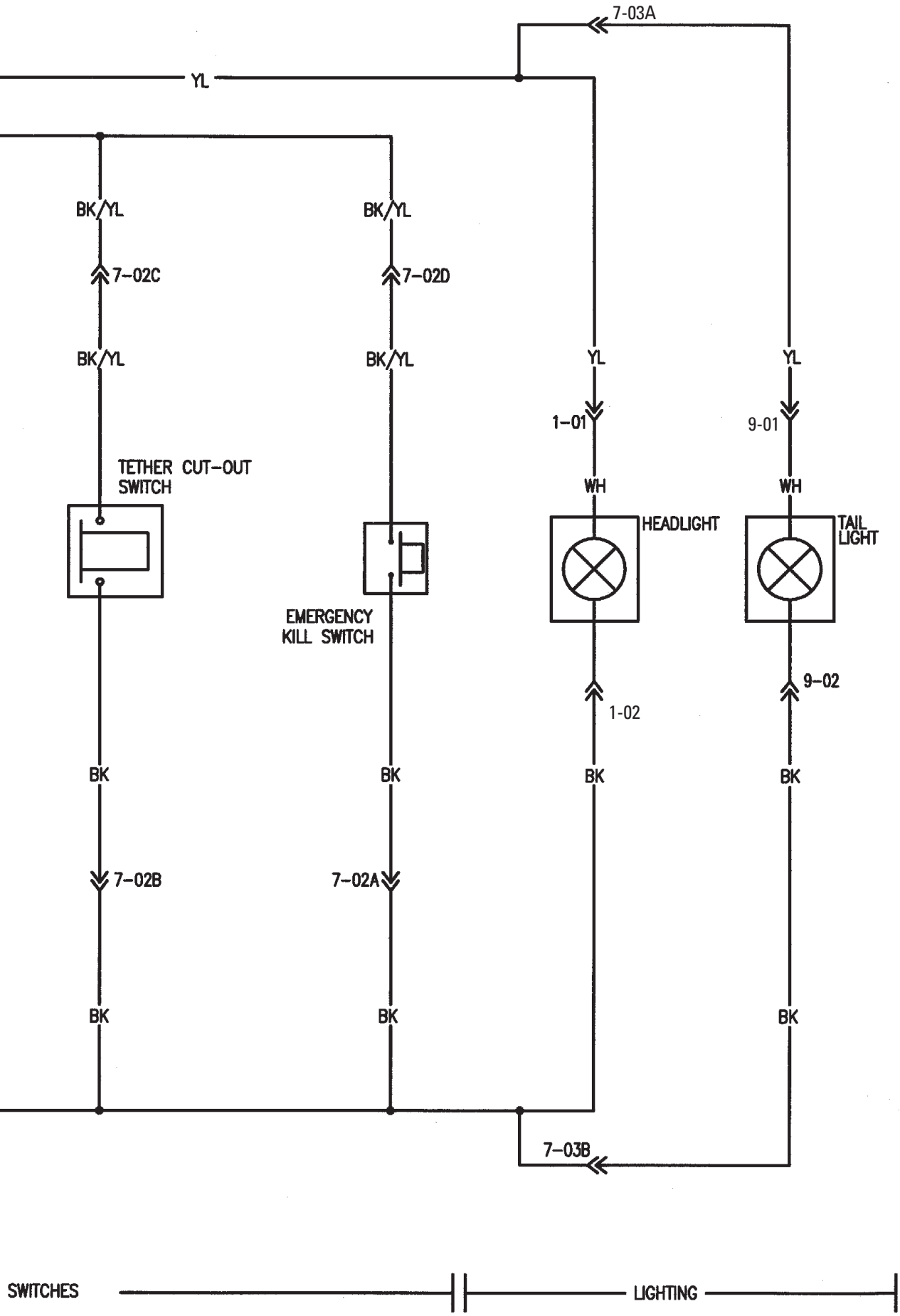
Beam and tail light 	Female terminal 	Male terminal 	Electronic module 
Meter 	Electric motor 	Low level sensor 	Buzzer 
Ignition coil 	Normally close switch 	Normally open switch 	Male terminal on instrument 
Engine ground 	Frame ground  Frame	Spark plug 	Meter movement 
Bulb 	Pilot lamp 	Analog sensor 	Solenoid valve 
Magneto 	3 position switch 	Heating element 	Fuse 
Trigger coil 	Battery 		Diode 

A00E52S

ANNEX 1 MINI Z

MINI Z


YL
BK/YL
YL
BK/YL
BK/YL
BK/YL
2-01
2-02
7-02C
PK
BK
BK/YL
7-01-9
OFF
ON
TETHER CUT-OU
SWITCH
KEY SWITCH
7-01-4
BK
BK
2-02-2
7-02B
BK
BK
BK
BK
POWER SUPPLY SYSTEM
IGNITION SWITCHES


7-03A
YL
BK/YL
7-02C
BK/YL
TETHER CUT-OUT SWITCH
BK
7-02B
BK
BK/YL
7-02D
BK/YL
EMERGENCY KILL SWITCH
BK
7-02A
BK
YL
1-01
WH
HEADLIGHT
1-02
BK
BK
YL
9-01
WH
TAIL LIGHT
9-02
BK
BK
7-03B
SWITCHES
LIGHTING



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ski-doo® Bombardier

SNOWMOBILES

S

SERVICE Bulletin

No. **99-8**

Date: December 29, 1998

SUBJECT: Shop Manual Supplement for MX Z 600/700, MX Zx 440 LC and Summit 600/700

YEAR	MODEL	MODEL NUMBER	SERIAL NUMBER
1999	MX Z 600	1336/1337/1338	All
1999	MX Z 700	1339/1340/1341	All
1999	MX Zx 440 LC	1342/1343/1344	All
1999	Summit 600	1345/1346/1361	All
1999	Summit 700	1467/1468	All

Maintenance and repair procedures on models above are very like those covered in *Ski-Doo 1999 Shop Manual*, volume 2. However, the following points are specific to ZX series snowmobiles and supersede information found in volume 2 of *Shop Manual*.

For exploded views, refer to *Parts and Accessories Catalogs* featuring the models above.

01 — LUBRICATION AND MAINTENANCE CHART

Refer to *Ski-Doo 1999 Shop Manual*, volume 2.

02 — TROUBLESHOOTING

Refer to *Ski-Doo 1999 Shop Manual*, volume 2.

03 — ENGINE

Refer to *Ski-Doo 1999 Shop Manual*, volume 2 for most of procedures except the followings.

Shut-Off Valve

These vehicles have no manual shut-off valve. Fuel pump automatically performs fuel shut-off.

VOLUME 2

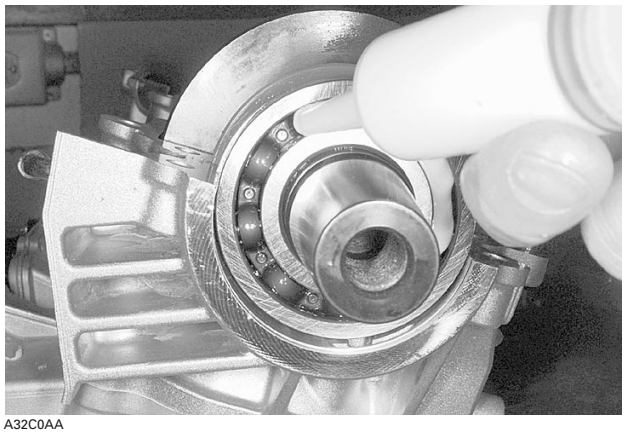
453, 593 and 693 Engine Lubrication and Assembly

Before assembling engine bottom end, ball bearings on PTO must be lubricated with grease (P/N 293 550 021) (the grease tube contains 50 g, which is similar to 50 mL or 50 cc).

Crankcase Lubrication

Put 35 to 40 mL of grease in a syringe.

With the syringe, fill the outer ball bearing with grease.

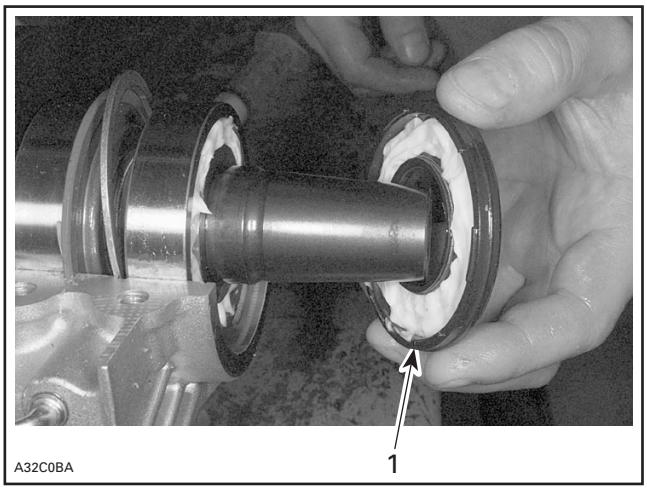


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BALLS COATED WITH A SEAM OF GREASE

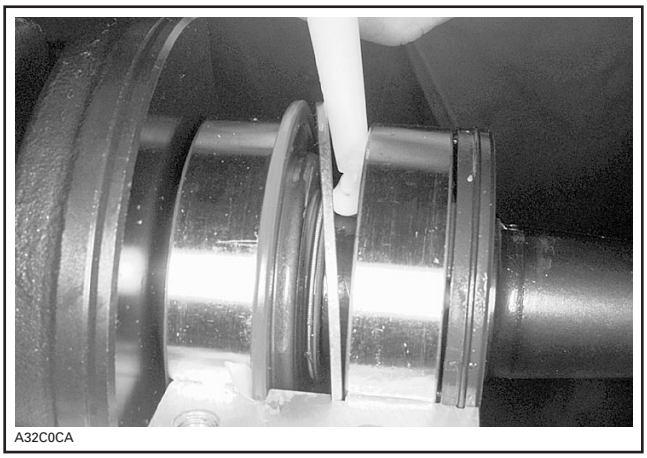
Coat inner side of seal and set it in place.

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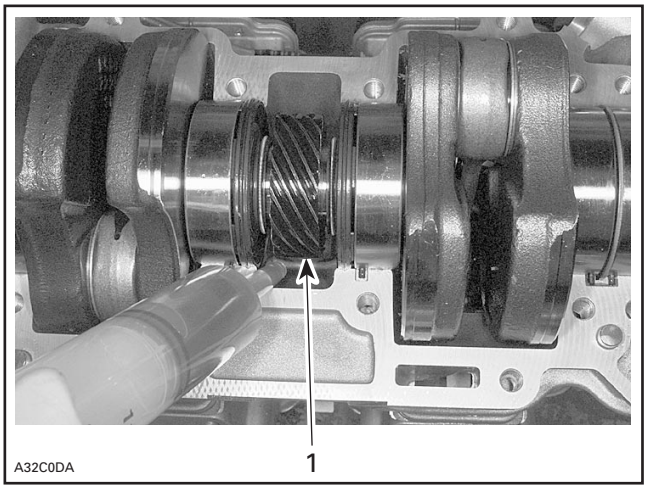


1. Fill with grease and set in place

Use the remaining grease to coat the inner side of the ball bearing.



Drop 50 mL of injection oil in the pan under central gear to lubricate pump gearing as per photo.

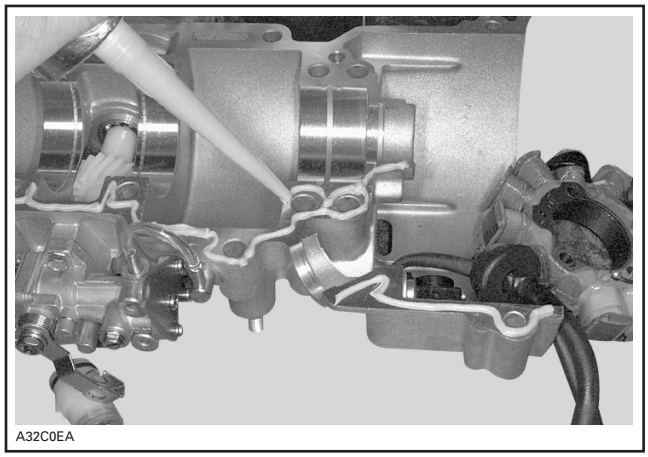


1. Oil bath

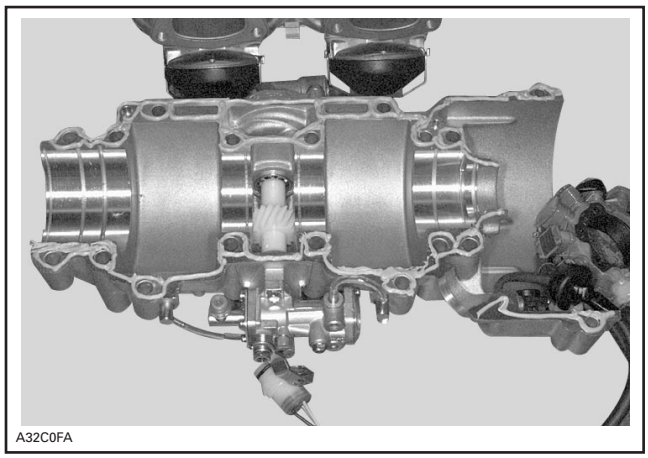
Crankcase Assembly

Before screwing both parts of crankcase, seal it with a silicon sealing compound (P/N 420 297 905). Make sure surfaces are clean and degreased before applying silicon sealing compound.

Spread a seam of 1.2 mm (1/16 in) maximum in diameter on the surface of the crankcase.



As far as possible, silicon compound must be applied in one run to avoid any risks of leaking through the crankcase.



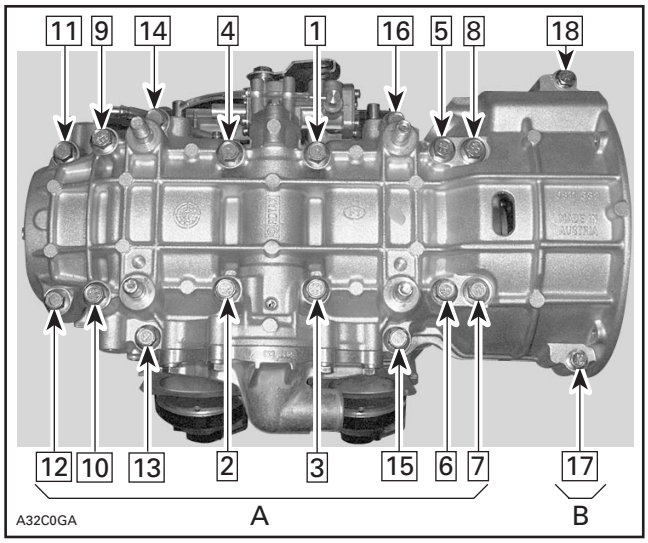
SEAMING COMPLETED — CONTACT SURFACES COVERED AND SCREW HOLES SURROUNDED

Screw the 4 central bolts to squeeze compound between crankcase halves before it starts to dry.

NOTE: Sealing compound spreading plus screwing of engine central four bolts must be performed within 2 minutes to ensure a good sealing and avoid linking.

Screw all crankcase bolts in place in the following sequence and to the appropriate torque through a two steps torquing: first, screw bolts up to 60% of the final torque (18 N•m (13.5 lbf•ft) for most of the bolts), then, secure to the required torque (i.e. between 28 and 30 N•m (21 and 22 lbf•ft).

VOLUME 2



A. Torque bolts 1 through 16 to 28-30 N•m (21-22 lbf•ft)
B. Torque bolts 17 and 18 to 8-10 N•m (6-8 lbf•ft)

NOTE: The total assembly sequence, including sealing compound spreading, screwing and torquing of bolts according to the proper sequence must be performed within 10 minutes.

Oil Pump

Identification

Different engines use different pumps. See identification on lever.

▼ CAUTION

Always mount proper pump on engine.

ENGINE TYPE	OIL PUMP IDENTIFICATION
693	L-8
593	L-7
453	No oil pump

Bleeding and Adjustment

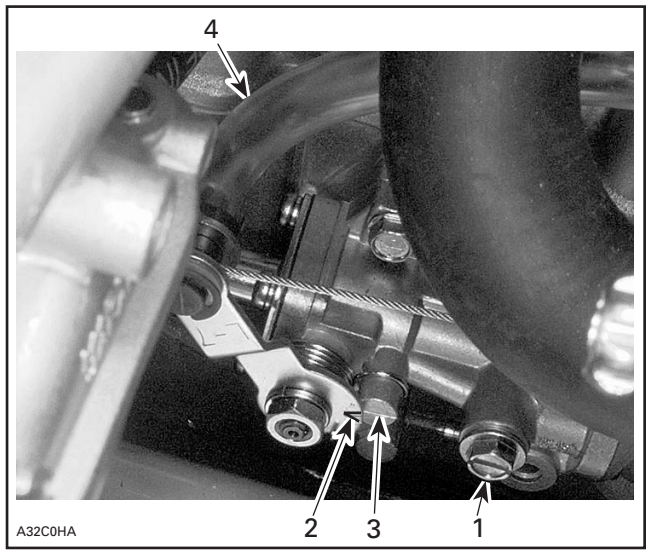
All Models Except MX Zx 440 LC

Remove air silencer and move carburetors aside.

Bleed main oil line (between tank and pump) by loosening the bleeder screw until air has escaped from the line. Add injection oil as required.

Check also for proper oil lever adjustment. Mark on pump body must be set from 0 to 1 mm (0 to 1/32 in) farther than second mark on lever. **Do not take cable play by pressing throttle lever**.

VOLUME 2



TYPICAL (FUEL PUMP IS REMOVED)
1. Bleeder screw
2. Marks on pump lever
3. Mark on pump body
4. Main line

Reinstall all parts.

Bleed the small oil line by running engine at idle while holding the pump lever in fully open position.

NOTE: Make a J hook out of mechanical wire to reach the lever from magneto side and pull it in open position.

Oil System Leak Test

All Models Except MX Zx 440 LC

Install a hose pincher on hose going to crankcase for lubrication of coolant and oil shaft gears.

When performing leak test, pressurize oil system to 20 kPa (2.9 PSI). Pressure must not drop within 3 minutes.

Never use a hammer to install oil seals. These pieces must be installed on shaft using a press and appropriate pushers.

Rave System

MX Z 600 Only

There is a O-ring under red adjustment screw.

All Models

Remove spring clip, cover and spring and unscrew valve piston. Remove cylindrical screws then valve rod housing. Remove bellows and spring. Pull out exhaust valve.

Check valve rod housing and cylinder for clogged passages.

NOTE: Oil dripping from draining hole indicates a loosen spring or damaged bellows.

Check for cracked, dried or perforated bellows.

Spring

ENGINE TYPE	SPRING P/N	WIRE DIA. mm (in)	FREE LENGTH mm (in)	PRELOAD IN N (LBF) AT COMPRESSED LENGTH OF 14.7 mm (.579 in)
693 on MX Z 700	420 239 947	1.1 (.043)	42.0 (1.65)	30.0 (6.7)
693 on Summit 700	420 239 944	0.9 (.031)	48.5 (1.91)	16.9 (3.8)
593	420 239 946	1.00 (.039)	42.0 (1.65)	16.4 (3.7)
453	420 239 945	1.00 (.039)	48.5 (1.91)	20.3 (4.5)

Digital Performance Management (DPM)

Summit 600/700 and MX Z 700

These models are equipped of a DPM to manage air/fuel mixture according to temperature and atmospheric pressure. However, this DPM features only a compensation mode. Only one solenoid is mounted on DPM manifold. There is no air pump nor DPM engine coolant sensor because no enrichment mode exists on this DPM version. See *Ski-Doo 1999 Shop Manual*, volume 2 for further details.

Carburetor

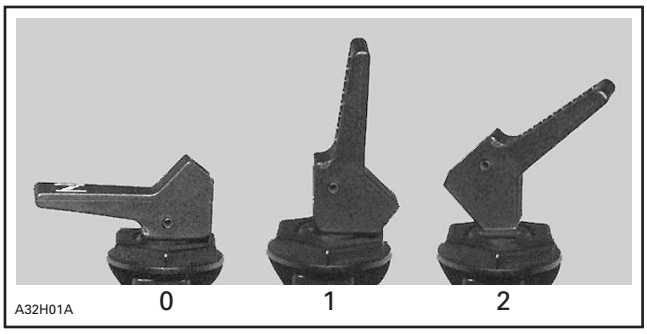
All Models Except MX Zx 440 LC

These models are equipped with a new three-position choke.

Cold Engine Starting

When temperature is below - 10°C (+ 15°F), set the choke lever to the second position.

When temperature is - 10°C or over (+ 15°F or over), set the choke lever to the first position.



0. OFF
1. Position 1
2. Position 2

After the engine is started, close off choke to ensure proper air-fuel mix when speed drops below 2000 RPM.

Warm Engine Starting

Start the engine without any choke.

◆ WARNING

Do not apply throttle while starting.

Choke Plunger Adjustment

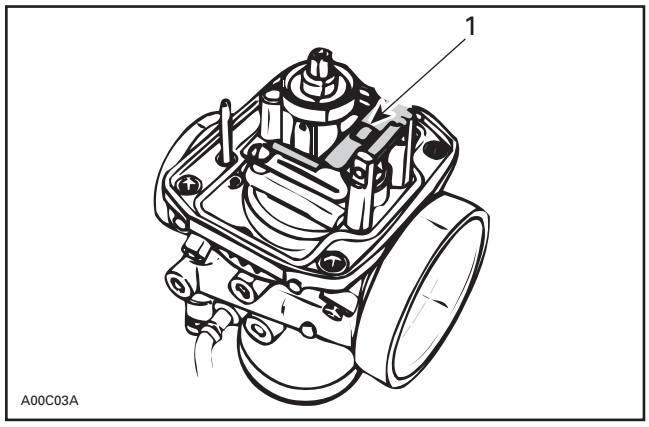
A new tool is developped for choke adjustment (P/N is not available at time of printing).

Float Level Adjustment

CARBURETOR MODEL	FLOAT HEIGHT H ± 1 mm	(± .040 in)
MX Zx 440 LC	N.A.	N.A.
MX Z 600/700	22.9	(.902)
Summit 600/700	22.9	(.902)

To Adjust Height H

– Bend the contact tab of float arm until the specified height is reached.



1. Contact tab

Throttle Slide Height

Adjust throttle slide height (see following table) by turning idle speed screw. Throttle slide height is measured on **outlet** side of carburetor (engine side).

NOTE: Make sure that throttle cable does not hold throttle slide. Loosen cable adjuster accordingly. Throttle cable adjustment will be done during adjustment of throttle-slide-to-cover free play.

Final idle speed adjustment (engine running at idle speed) should be within 1/2 turn of idle speed screw from preliminary adjustment.

VOLUME 2

MODELS	THROTTLE SLIDE HEIGHT mm (in)
MX Zx 440 LC	1.8 (0.071)
MX Z 600	1.3 (0.051)
MX Z 700	1.5 (0.059)
Summit 600	1.7 (0.067)
Summit 700	1.9 (0.075)

MX Zx 440 LC

Primer

This model is equipped with a primer instead of a choke.

Jet Needle

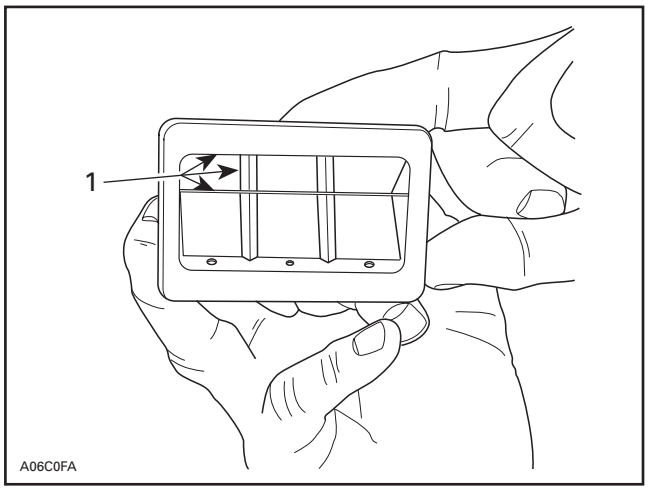
MX Zx 440 LC features a new TMX-34 carburetor. On this model, needle jets are press fit mounted and cannot be sold separately. Otherwise, servicing is similar to other Mikuni carburetors.

Reed Valve

Engines concerned with this bulletin are equipped with reed valves. Perform reed valves inspection as per following.

With blade stopper removed, check reed valve for proper tightness. There must be no play between blade and valve body when exerting a finger pressure on blade at blade stopper location.

In case of a play, turn blade upside down and recheck. If there is still a play, replace blade and/or valve body.



1. No play

Check blade stopper distance from center of reed valve block.



TYPICAL

A. 693 Engine: 13 ± 0.25 mm (.512 ± .010 in)
593 Engine: 14 ± 0.25 mm (.551 ± .010 in)
453 Engine: 12 ± 0.25 mm (.472 ± .010 in)

Bent blade stopper as required to obtain the proper distance.

Cooling System

The new ZX platform features a new cooling system. As S-series, a cold engine circuitry stands beside a hot engine circuitry. Cooling liquid routing is managed through a thermostat.

The difference consists in a new hot engine circuitry with a front radiator on firewall and only one rear radiator.

For inspection and servicing, refer to *Ski-Doo 1999 Shop Manual*, volume 2 **(Liquid Cooling system and Coolant pump)**.

Recommended Fuel

All Models Except MX Zx 440 LC

Use regular unleaded fuel with minimum octane number of 87.

MX Zx 440 LC

Use regular unleaded fuel with minimum octane number of 87 premixed 40:1 with Bombardier synthetic injection oil (P/N 413 710 500, 12 x 1 liter).

Racers who will install high compression cylinder inserts provided with this vehicle **must** use racing fuel with a minimum octane of 112. Refer to instruction sheet for further details.

04 — TRANSMISSION

Refer to *Ski-Doo 1999 Shop Manual*, volume 2 for inspection and servicing procedures on transmission and brake systems.

VOLUME 2

Drive Belt

MODEL	PART NUMBER	WIDTH (NEW) ± 0.25 mm (.010 in)	MINIMUM WIDTH (WEAR LIMIT)
Summit 600, MX Z 600 and MX Zx 440 LC	414 860 700	35.30 mm (1.390 in)	32.30 mm (1.272 in)
Summit 700, MX Z 700	417 300 067	35.10 mm (1.382 in)	32.10 mm (1.264 in)

05 — ELECTRICAL SYSTEM

Refer to *Ski-Doo 1999 Shop Manual*, volume 2 for inspection and servicing.

Models involved with this bulletin feature no battery and no electric starter.

Changing Timing

Timing can only be changed using the programmer (P/N 529 035 589).

Start engine. Turn on programmer then enter password.

Increase engine speed to 2500 RPM.

From main menu select INFO VEHICLE.

Engine will misfire during vehicle information is transferred from MPEM to programmer. If engine stalls, restart it, keep engine speed at 2500 RPM and select VEHICLE INFO again.

NOTE: In fact the programmer takes a **copy** of all vehicle parameters scribed in MPEM. This copy will be modified within the programmer then transferred to the MPEM.

Select ENGINE PARAMETER.

Select TIMING ADJUSTMENT.

Press ENTER.

Now the display shows the engine timing correction factor that is programmed in the MPEM. In the following example timing correction factor is 4.

Press any key.

Select YES using the key ↔.

Press ENTER.

Select a timing correction factor corresponding to correction needed.

Example: Timing mark as verified with a timing light at 3500 RPM was too early by 2°. The correction factor programmed is no. 4.

Select correction factor no. 5. This will retard the timing by 2° because the difference between correction factor no. 4 and no. 5 is - 2° (passing from 1° to - 1°).

IGNITION CORRECTION FACTOR	
CORRECTION FACTOR PROGRAMMED IN MPEM	IGNITION TIMING CORRECTION
2	3°
3	2°
4	1°
1	0°
5	- 1°
6	- 2°
7	- 3°
8	- 4°

Press ENTER twice.

The display confirms that correction factor has been changed to no. 5.

Press any key.

If the new correction factor selected above is the good one select NO. Otherwise select YES to choose an other correction factor.

Press MENU.

Scroll to SAVE AND QUIT.

Press ENTER.

Increase engine speed to 2500 RPM.

Press ENTER.

Engine will misfire during vehicle information is transferred from programmer to MPEM. If engine stalls, restart it, keep engine speed at 2500 RPM and select SAVE AND QUIT again.

Digital Encoded Security System (DESS)

MX Zx 440 LC only

This model is equipped with a mechanical tether switch. Its function is similar to the emergency cut-off switch. To allow snowmobile to start, tether cap must be installed on post.

NOTE: Never allows transmission to be engaged (and even snowmobile to be started) if tether cord is not tied to yourself.

A cap covers a hole designed to allow electronic DESS to be installed. DESS switch is already installed under console and may be drawn out from console, if needed.

VOLUME 2

DESS is active as input terminal for programming but cut-off function is disabled.

06 — REAR SUSPENSION

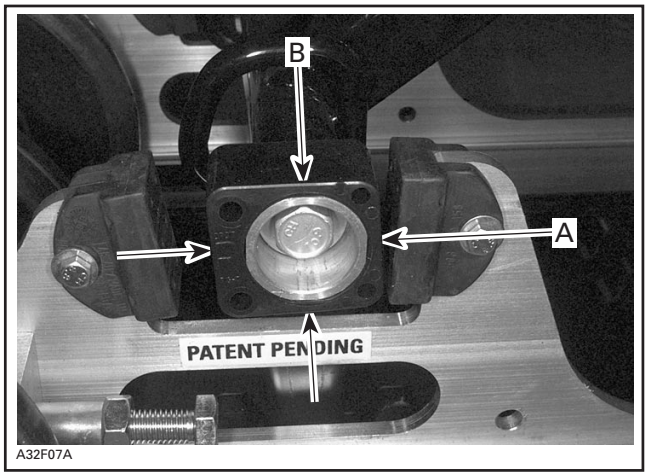
All Models Except MX Zx 440 LC

Refer to *Ski-Doo 1999 Shop Manual*, volume 2 for most of inspection and servicing procedures.

MX Zx 440 LC

Suspension Adjustment

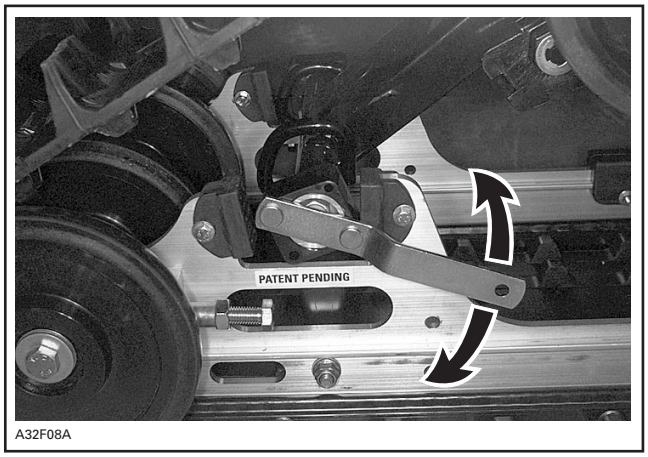
This model is equipped with a new two-position anti-transfer system. To adjust to the preferred position, turn both left and right blocks by steps of 90°.



ANTI-TRANSFER BLOCK — RIGHT SIDE VIEW ("R" — RIGHT —EMBOSSED ON BLOCK)

A. Wider side — less track grip and more skis steering
B. Narrower side — more track grip and less skis steering

Use tool provided in tool bag to adjust anti-transfer blocks.



TURN BOTH BLOCKS BY STEPS OF 90°

▼ CAUTION

Both blocks must be set at the same position. Otherwise, vehicle behavior will be impaired and suspension may be warped.

Track Tension Adjustment

Refer to *Ski-Doo 1999 shop Manual*, volume 2 for track tension adjustment except for the following:

Loosen lock nuts on adjustment screws before proceeding to adjustment and secure when track adjustment is done.

07 — FRONT SUSPENSION AND STEERING SYSTEM

Models concerned with this bulletin are equipped with an Advanced Direct Shock Action suspension system. For most of the servicing and inspections procedures, refer to *Ski-Doo 1999 Shop Manual*, volume 2. The following items only state the differences between the snowmobiles listed in heading and the ones described in volume 2.

Shock Absorber Servicing

MX Zx 440 LC only

Reservoir Disassembly and Reassembly

Remove air valve cap from air valve on reservoir.

Using air valve cap, release pressure from reservoir as shown on the next photo.



RELEASING PRESSURE FROM RESERVOIR

VOLUME 2

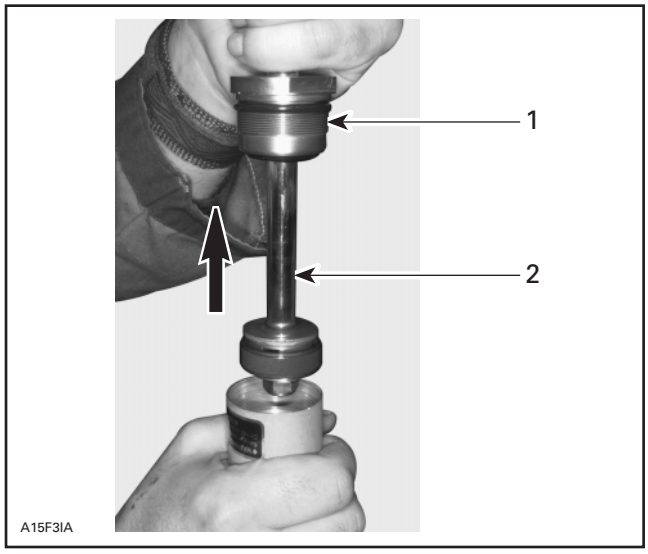
Damper Disassembly

WARNING

Never perform any maintenance onto damper and reservoir assemblies until pressure is completely released from reservoir.

Remove seal carrier assembly from damper body.

Slide out the damper rod assembly. Refer to *Shop Manual* or *Racing Handbook* to change damper valving.



1. *Seal carrier assembly*
2. *Damper rod assembly*

Discard used oil into storage container. Never reuse old oil during damper rework.

Reservoir Disassembly

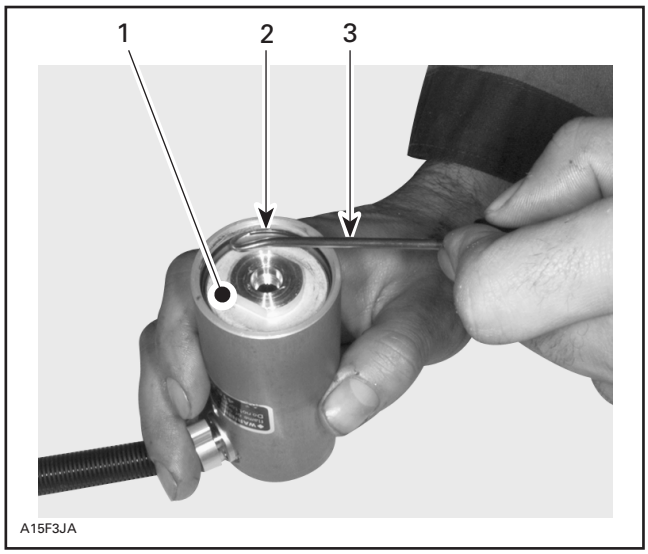
Remove air valve from reservoir cap assembly on the remote reservoir.

Using both thumbs, press on the reservoir cap assembly.

Remove circlip with Snap-on 3ASH special tool.

CAUTION

Ensure not to scratch any inner parts of the cylinder.



1. *Reservoir cap assembly*
2. *Circlip*
3. *Snap-on 3ASH special tool*

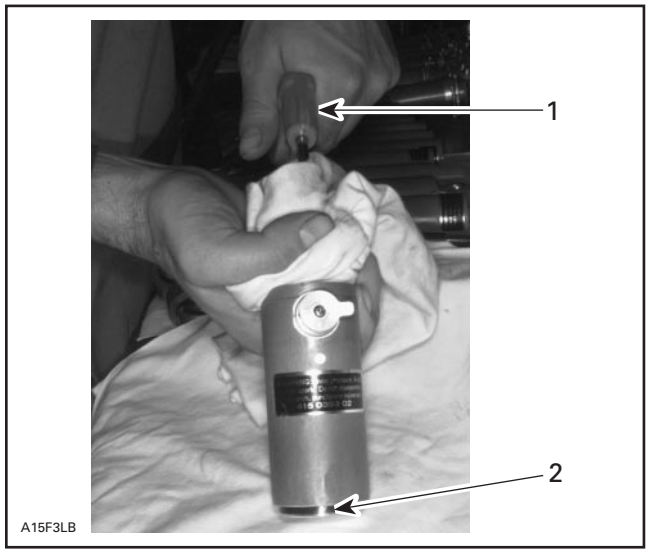
Using a M8 (pitch 1.0 mm) bolt, pull out reservoir cap assembly.

Hold reservoir in hand, then use compressed air pressure and carefully remove floating piston from reservoir body.

NOTE: Shock oil will leak from reservoir. Use shop cloth to catch excess oil.

WARNING

Use extreme caution when removing piston with compressed air. Protective eye wear should be used.



TYPICAL

1. *Compressed air*
2. *Floating piston*

VOLUME 2

Reservoir Assembly

Fill reservoir with 150 mL of Bombardier HPG shock oil (P/N 413 709 400).

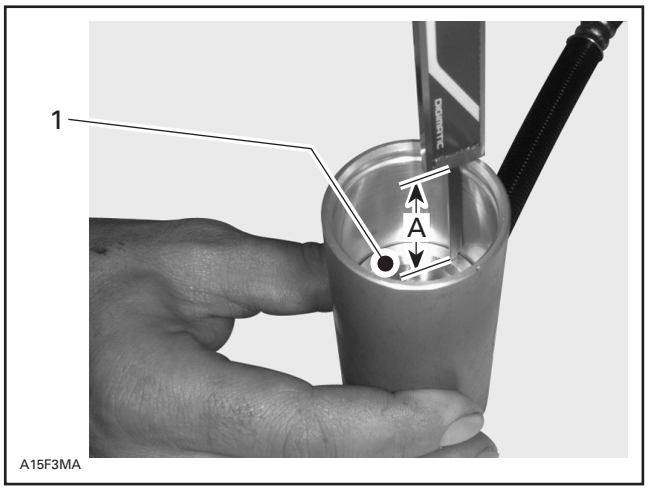
Reinstall floating piston into reservoir body. Concave side of piston must be facing outside. Use oil to ease O-ring pass reservoir body groove.

Invert reservoir. Using both thumbs apply pressure on floating piston to position floating piston to a depth of 44.5 ± 1 mm (1-3/4 ± 1/32 in). Measure from the top edge of reservoir body.

▼ CAUTION

When positioning floating piston turn damper with reservoir facing down. This will allow air to exit from reservoir. Oil transferring from reservoir to damper body indicates that no more air remains in reservoir.

NOTE: If the floating piston is installed too far into reservoir body, wait for damper rod assembly installation to adjust floating piston position.



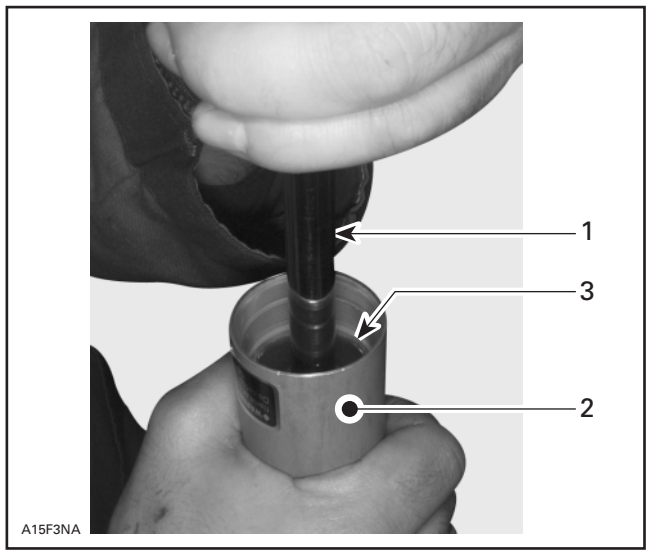
RESERVOIR TURNED UPSIDE DOWN TO SHOW HOW TO MEASURE

1. *Concave side of piston facing upward*

A. 44.5 ± 1 mm (1-3/4 ± 1/32 in)

Damper Assembly

Refill damper with Bombardier HPG shock oil (P/N 413 709 400) up to lowest threads of damper seal carrier.



1. *Damper rod assembly*
2. *Damper body*
3. *Oil level*

Install damper rod assembly into the damper body. Lightly oil damper piston seal ring with shock oil to ease installation.

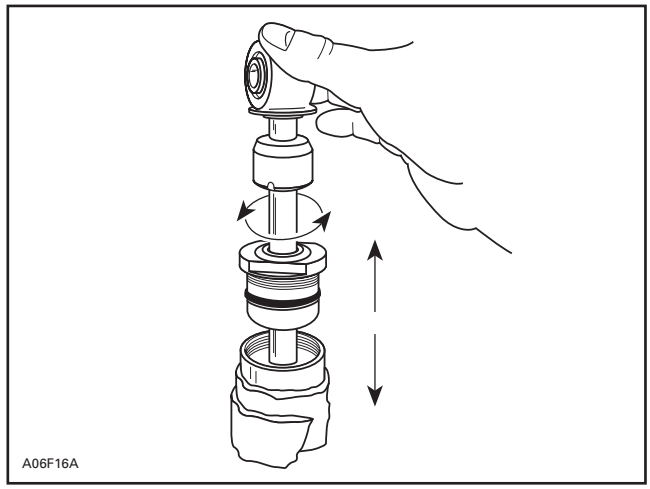
NOTE: Some shock oil may overflow when installing damper rod assembly. Wrap damper with shop cloth to catch possible oil overflow.

▼ CAUTION

Use care when passing piston into damper body at damper body threads.

Slight oscillation of damper rod may be required to allow piston to enter damper body bore.

Slowly push piston into damper body. Slight up and down movement may be required to allow all air to pass through piston assembly.



NOTE: Fast installation of the damper rod may displace the floating piston from its original position. Do not allow this to occur.

VOLUME 2

Reservoir Floating Piston Final Check (before damper seal carrier installation)

Perform a final check of the floating piston position (44.5 ± 1 mm (1-3/4 ± 1/32 in)):

– If floating piston is positioned 43 mm and less, apply pressure on floating piston to position floating piston to a depth of 44.5 mm (1-3/4 in).

– If floating piston is too far (45 mm and more). Move damper rod with fast movement to allow oil to transfer from damper body to reservoir. Floating piston will move back.

Damper Final Assembly

With damper rod piston into oil volume, re-top damper oil volume. Oil level should be to damper body thread base.

Seal carrier assembly can now be threaded into damper body. This should be done slowly to allow weepage of shock oil from body while installing.

NOTE: When reinstalling seal carrier, oil must overflow. This overflow indicates that damper is full of oil.

Reservoir Final Assembly

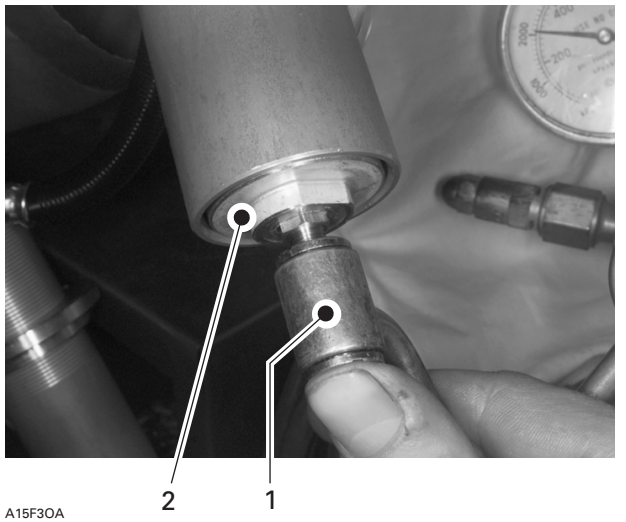
NOTE: If all previous procedures have been properly performed, **final floating piston position must be 41 ± 2 mm (1-5/8 ± 5/64 in)**. Final floating piston position must be measured after damper seal carrier assembly has been completely threaded.

Reinstall reservoir cap assembly with circlip then install air valve.

Gas Pressure Adjustment

Nitrogen (N_2) can now be added to reservoir body.

Preset pressure regulator to 2070 kPa (300 PSI), this gas pressure will restore the correct pressure for the damper.



1. Valve tip (Nitrogen)
2. Reservoir cap assembly

▼ CAUTION

Do not exceed the recommended pressure value.

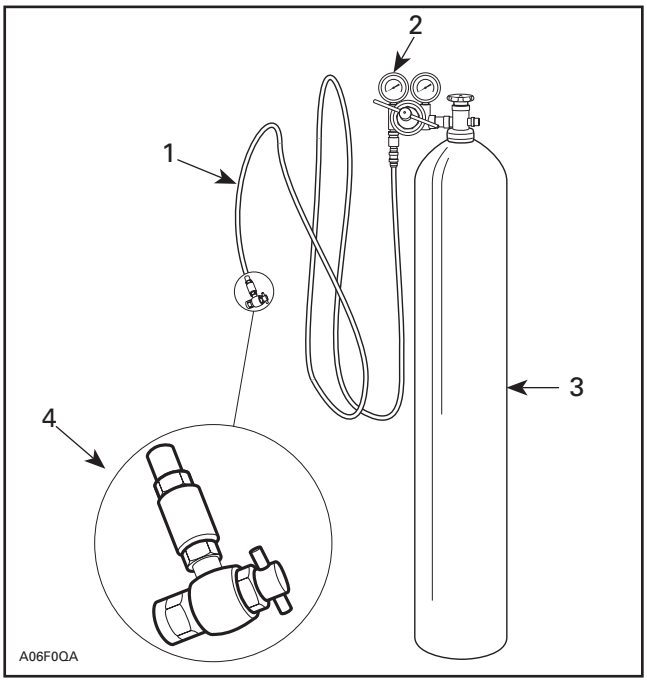
◆ WARNING

Whenever working with high pressure gas, use eyewear protection. Never direct gas pressure toward anybody.

NOTE: Carefully inspect damper for gas or oil leaks. Any leaks must be corrected before continuing.

Damper gas pressure can be confirmed by using a pressure gauge available through your local industrial gas supplier.

VOLUME 2



1. Automotive type air pressure hose
2. Two stage regulator, delivery pressure range 2070 kPa (300 PSI)
3. High pressure cylinder filled with industrial grade nitrogen
4. Valve tip

Front Suspension Springs Preload Adjustment

Lift snowmobile to remove tension from front springs.

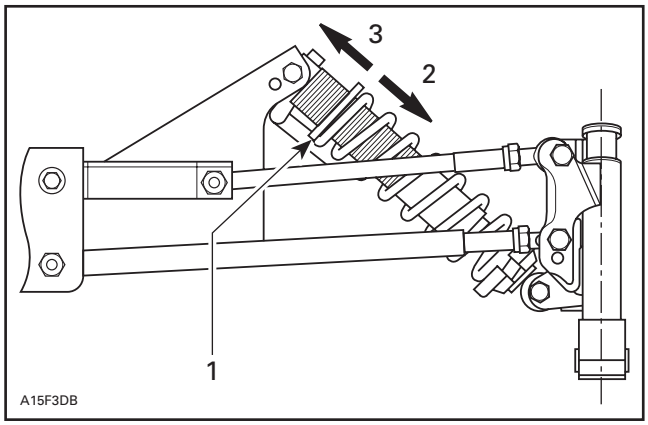
NOTE: Always set preload to the same value (or the same number of turns) on both shocks.

MX Z 600/700 and MX Zx 440 LC

Perform preload adjustment on HPG shock absorber by setting adjusting nut upward (remove preload) or downward (add preload) by hand.

▼ CAUTION

Ensure that shock absorber is extended when adjusting preload and make sure that tension remains on spring when removing preload.



TYPICAL — FRONT HPG SHOCK ABSORBER

1. Adjusting nut
2. Add preload
3. Remove preload

Summit 600/700

Perform preload adjustment on Motion Control shock absorber by setting adjusting cam upward (add preload) or downward (remove preload). Use provided tool to set preload.

Steering Adjustments

Steering adjustment must be performed in the following sequence:

- Center pivot arm.
- Set camber angle.
- Check for a handlebar perpendicular to skis.
- Set toe-out.

For most of procedures (i.e. handlebar levelling and adjustments and lubrication), refer to *Ski-Doo 1999 Shop Manual*, volume 2. Following are items which differ.

Pivot Arm Centering

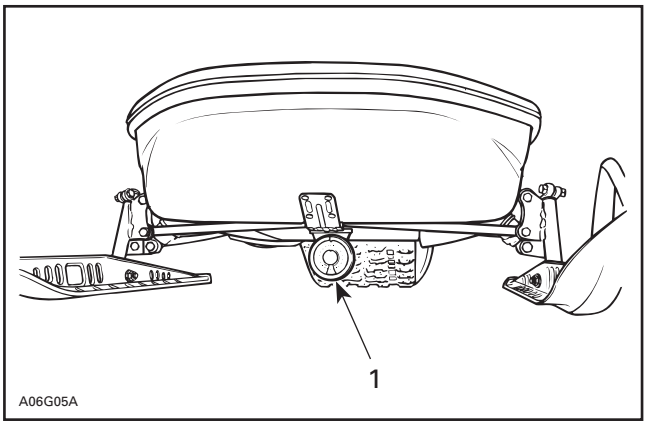
Pivot arm should be midstroke when handlebar and skis are straight ahead.

NOTE: If servicing is needed, torque pivot arm bolt between 37 and 45 N•m (28 and 33 lbf•ft) when reassembling.

Camber Angle Setting

NOTE: Identical adjustments are required on both sides of the vehicle.

- Make sure the vehicle is leveled by placing an angle finder under the main frame member as shown on the following illustration.



TYPICAL
1. Angle finder

Using special tool (P/N 529 021 600) mounted to the ski leg, position the angle finder on the tool as shown in the following illustration. An alternative location for the angle finder, if the special tool is not available, is the outside of the ski leg housing.

Camber should be set as follows (with shock completely stretched):

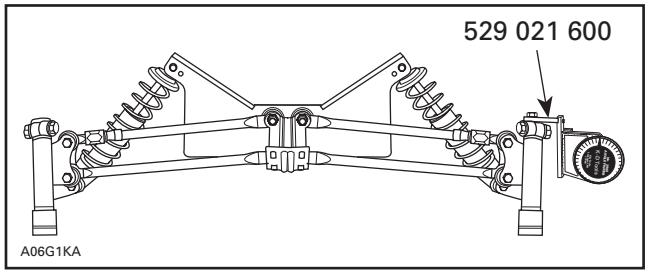
MX Z 600/700: 1° ± 1°

MX Zx 440 LC: 2° ± 1°

Summit 600/700: (no adjustment on these models).

▼ CAUTION

Angle finder must sit square against swing arm. Positioning angle finder against weld bead or decal may result in false reading.



TYPICAL — ADSA CAMBER ADJUSTMENT SET-UP

Adjusting

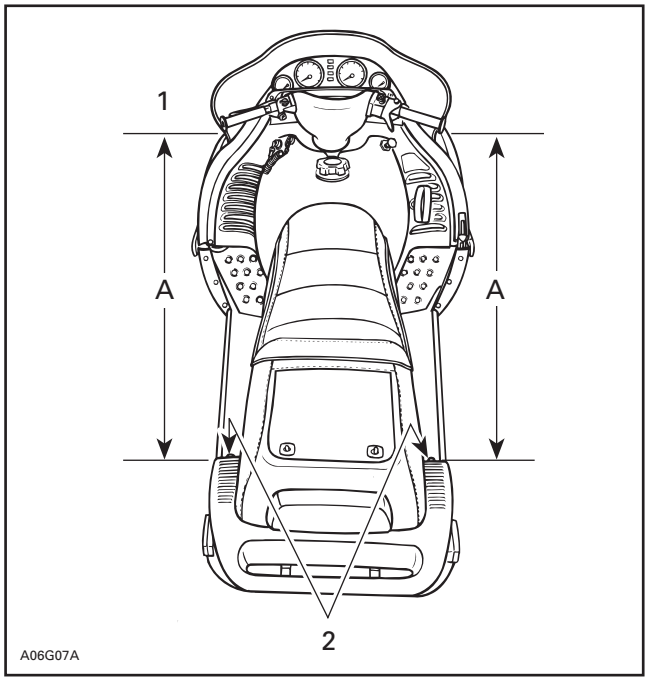
– Loosen lock nut on both upper control arms.
– Unbolt both upper control arms at ski leg housing. Turn ball joint of tie rod half a turn at a time to obtain right camber value. Bolt upper control arms.

NOTE: Always use new elastic nuts when retightening control arms.

HANDLEBAR AND SKI TOE-OUT

Check that handlebar is horizontal when skis are in straight-ahead position by measuring from the extremities of the grips to the rearmost edge of the tunnel, as shown.

NOTE: The reference point must be the same relative to each side.



TYPICAL
1. Equal distance A on each side
2. Same reference point (rivet)

Adjustment is performed by adjusting length of left and right tie rods.

◆ WARNING

Do not attempt to adjust skis straight-ahead position by turning ball joint on tie rod between steering column and pivot arm.

Procedure:

– Apply a slight tension to close skis using an rubber cord.
– Lift snowmobile high enough to stretch completely front suspension and unload skis.
– Lay a straight edge alongside track (make sure track is perfectly aligned).
– Check for snowmobile toe-out
  – Measure distance between edge and runner rearmost stud.
  – Measure distance between edge and runner frontmost stud.
  – Difference between both measures must be **half** of the following specifications:

MX Z 600/700: 8 ± 3 mm (5/16 ± 1/8 in);

MX Zx 440 LC: 0 ± 3 mm (0 ± 1/8 in);

Summit 600/700: 8 ± 3 mm (5/16 ± 1/8 in).

Perform toe-out check on the other ski. If measures are out of specifications:

- Loosen jam nuts of both ends of tie rods.
- Turn the tie rod to adjust its length.
- Tighten jam nuts to 18 N•m (159 lbf•**in**).
- Measure distance between both runners rearmost studs.
- Measure distance between both runners frontmost studs.
- Difference between both measures must be according to the previous specifications. If not, adjust tie rod length as described high above.

◆ WARNING

Never lengthen tie rod making threaded portion of ball joint exceed 20 mm (25/32 in).

Handlebar Levelling

Handlebar can be adjusted for the driver's comfort and driving preferences.

Remove steering pad and foam padding.

Unscrew the four bolts and adjust handlebar height. Lock the handlebar in place by tightening the 4 nuts to 25 N•m (19 lbf•ft).

NOTE: When levelling handlebar, make sure brake oil reservoir is level too.

◆ WARNING

Avoid contact between the brake handle and the windshield by NOT adjusting the handlebar too high.

◆ WARNING

Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.

Reinstall foam padding and steering pad.

Skis Installation and Torquing

On ZX platform, ski stoppers must be installed with higher side in front and ski bolts must be torqued to 32 N•m (24 lbf•ft).

08 — BODY/FRAME

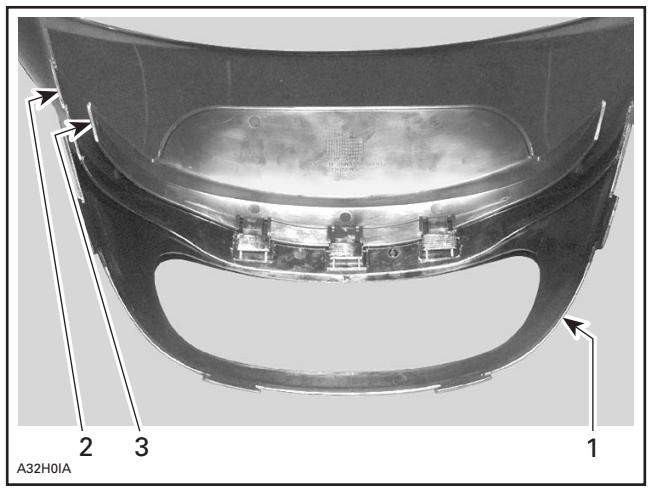
Refer to *Ski-Doo 1999 Shop Manual*, volume 2 for inspection and servicing. Body and frame materials on ZX platform and S-series are the same.

Windshield Installation

Insert tabs of headlamp protector in windshield square holes.

Clip inner protector in place.

Secure windshield assembly on hood using latches.



1. Headlamp Protector
2. Windshield
3. Inner Protector

09 — TECHNICAL DATA

See following pages.

10 — WIRING DIAGRAMS

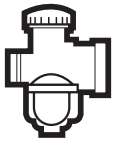
See last pages.

IMPORTANT: Use the MX Z 600 and Summit 600 wiring diagram for MX Z 700 and Summit 700.

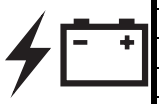
VOLUME 2

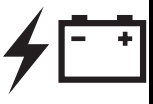
ENGINE SPECIFICATIONS

	VEHICLE MODEL			MX Zx 440 LC	MX Z 600	MX Z 700
	ENGINE TYPE			**453**	**593**	**693**
	Number of Cylinders			2	2	2
	Bore		mm (in)	65.00 (2.57)	76.00 (2.99)	78.00 (3.0709)
	Stroke		mm (in)	65.80 (2.59)	65.80 (2.59)	73.00 (2.874)
	Displacement		cm^3 (in^3)	436.7 (26.65)	597.00 (36.43)	697.64 (42.573)
	Compression Ratio (corrected)			7.2	6.7	6.7
	Maximum Power Engine Speed ①		± 100 RPM	8500	8000	8000
	Piston Ring Type			Semi-trapez	Semi-trapez	Semi-trapez
	Ring End Gap	(new) (wear limit)	mm (in) mm (in)	0.200 (0.008) 1.0 (.039)	0.400 (0.016) 1.0 (.039)	0.400 (0.016) 1.0 (.039)
	Ring/Piston Groove Clearance	(new) (wear limit)	mm (in) mm (in)	0.040 (0.002) 0.2 (.008)	0.040 (0.002) 0.2 (.008)	0.040 (0.002) 0.2 (.008)
	Piston/Cylinder Wall Clearance	(new) (wear limit)	mm (in) mm (in)	0.113 (0.004) 0.15 (0.006)	0.110 (.0043) 0.2 (.008)	0.070 (.0028) 0.150 (.0059)
	Connecting Rod Big End Axial Play	(new) (wear limit)	mm (in) mm (in)	0.390 (0.015) 1.2 (0.047)	0.390 (0.015) 1.2 (0.047)	0.390 (0.015) 1.2 (0.047)
	Maximum Crankshaft End-Play ②		mm (in)	0.3 (.0118)	0.3 (.0118)	0.3 (.0118)
	Maximum Crankshaft Deflection Measured at Center		mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)
	Rotary Valve Timing		Opening Closing	N.A.	N.A.	N.A.
	Magneto Generator Output		W	290	290	290
	Ignition Type			CDI	CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES
	Spark Plug Gap		± 0.05 mm (± 0.002 in)	0.45 (.018)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ③		mm (in)	3.14 (0.124)	3.0 (0.118)	3.36 (0.132)
	Trigger Coil Air Gap		mm (in)	0.55 - 1.45 (0.22 - 0.57)	0.55 - 1.45 (0.22 - 0.57)	0.55 - 1.45 (0.22 - 0.57)
	Trigger Coil ④		Ω	190 - 300	190 - 300	190 - 300
	Generating Coil ④		Ω	11.6 - 21.6	11.6 - 21.6	11.6 - 21.6
	Lighting Coil ④		Ω	0.1 - 0.4	0.1 - 0.4	0.1 - 0.4
	High Tension Coil ④	Primary Secondary	Ω kΩ			
	Carburetor Type		PTO/MAG	TMX-34 1/1	VM 40-107/107	VM 40-117/117
	Main Jet		PTO/MAG	290/290	280/280	310/310
	Needle Jet			Q-6	224 Z-9	224 Z-5
	Pilot Jet			25	37.5	40
	Needle Identification — Clip Position			6FIY5-58 - 3	7DFY1-3	7DHY6-4
	Slide Cut-Away			4.0	2.5	2.5
	Float Adjustment		± 1 mm (± .04 in)	N.A.	22.9 (.90)	22.9 (.90)
	Air Screw Adjustment		± 1/16 turn	1	1/2	1
	Idle Speed RPM		± 200 RPM	1600	1600	1600
	Gas Type/Pump Octane Number			Unleaded/87	Unleaded/87	Unleaded/87
	Gas/Oil Ratio			40:1	Injection	Injection
	Type			Liquid cooled	Liquid cooled	Liquid cooled
	Axial Fan Belt Adjustment	Deflection Force ⑤	mm (in) kg (lbf)	N.A. N.A.	N.A. N.A.	N.A. N.A.
	Thermostat Opening Temperature		°C (°F)	42 (108)	42 (108)	42 (108)
	Radiator Cap Opening Pressure		kPa (PSI)	90 (13)	90 (13)	90 (13)
	ENGINE COLD N•m (lb•ft)	Drive Pulley Retaining Screw ⑥		95 (70)	95 (70)	95 (70)
		Exhaust Manifold Nuts or Bolts		23 (17)	23 (17)	23 (17)
		Magneto Ring Nut		125 (92)	125 (92)	125 (92)
		Crankcase Nuts or Screws	M6 M8	9 (6.5) 29 (21)	9 (6.5) 29 (21)	9 (6.5) 29 (21)
		Crankcase/Engine Support Nuts or Screws		40 (29.5)	40 (29.5)	40 (29.5)
		Cylinder Head Nuts		29 (21)	29 (21)	29 (21)
		Crankcase/Cylinder Nuts or Screws		29 (21)	29 (21)	29 (21)
		Axial Fan Shaft Nut		N.A.	N.A.	N.A.

	VEHICLE MODEL			SUMMIT 600	SUMMIT 700
	ENGINE TYPE			**593**	**693**
	Number of Cylinders			2	2
	Bore		mm (in)	76.00 (2.9921)	78.00 (3.0709)
	Stroke		mm (in)	65.80 (2.59)	73.00 (2.874)
	Displacement		cm^3 (in^3)	597.00 (36.43)	697.64 (42.573)
	Compression Ratio (corrected)			6.7	6.7
	Maximum Power Engine Speed ①		± 100 RPM	8000	8000
	Piston Ring Type			Semi-trapez	Semi-trapez
	Ring End Gap	(new) (wear limit)	mm (in) mm (in)	0.400 (0.016) 1.0 (.039)	0.400 (0.016) 1.0 (.039)
	Ring/Piston Groove Clearance	(new) (wear limit)	mm (in) mm (in)	0.040 (0.002) 0.2 (.008)	0.040 (0.002) 0.2 (.008)
	Piston/Cylinder Wall Clearance	(new) (wear limit)	mm (in) mm (in)	0.110 (.0043) 0.2 (.008)	0.070 (.0028) 0.150 (.0059)
	Connecting Rod Big End Axial Play	(new) (wear limit)	mm (in) mm (in)	0.390 (0.015) 1.2 (0.047)	0.390 (0.015) 1.2 (0.047)
	Maximum Crankshaft End-Play ②		mm (in)	0.3 (.0118)	0.3 (.0118)
	Maximum Crankshaft Deflection Measured at Center		mm (in)	0.08 (.0031)	0.08 (.0031)
	Rotary Valve Timing		Opening Closing	N.A.	N.A.
	Magneto Generator Output		W	290	290
	Ignition Type			CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES
	Spark Plug Gap		± 0.05 mm (± 0.002 in)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ③		mm (in)	3.0 (0.118)	3.36 (0.132)
	Trigger Coil Air Gap		mm (in)	0.55 - 1.45 (0.22 - 0.57)	0.55 - 1.45 (0.22 - 0.57)
	Trigger Coil ④		Ω	190 - 300	190 - 300
	Generating Coil ④		Ω	11.6 - 21.6	11.6 - 21.6
	Lighting Coil ④		Ω	0.1 - 0.4	0.1 - 0.4
	High Tension Coil ④	Primary	Ω		
		Secondary	kΩ		
	Carburetor Type		PTO/MAG	VM 40 113/113	VM 40 121/121
	Main Jet		PTO/MAG	280/280	310/310
	Needle Jet			224 Z-9	224 Z-5
	Pilot Jet			37.5	40
	Needle Identification — Clip Position			7DFY1-3	7DHY6-4
	Slide Cut-Away			2.5	2.5
	Float Adjustment		± 1 mm (± .04 in)	22.9 (.90)	22.9 (.90)
	Air Screw Adjustment		± 1/16 turn	1/2	1
	Idle Speed RPM		± 200 RPM	1600	1600
	Gas Type/Pump Octane Number			Unleaded/87	Unleaded/87
	Gas/Oil Ratio			Injection	Injection
	Type			Liquid cooled	Liquid cooled
	Axial Fan Belt Adjustment	Deflection	mm (in)	N.A.	N.A.
		Force ⑤	kg (lbf)	N.A.	N.A.
	Thermostat Opening Temperature		°C (°F)	42 (108)	42 (108)
	Radiator Cap Opening Pressure		kPa (PSI)	90 (13)	90 (13)
	**ENGINE COLD N•m (lb•ft)**	Drive Pulley Retaining Screw ⑥		95 (70)	95 (70)
		Exhaust Manifold Nuts or Bolts		23 (17)	23 (17)
		Magneto Ring Nut		125 (92)	125 (92)
		Crankcase Nuts or Screws	M6 M8	9 (6.5) 29 (21)	9 (6.5) 29 (21)
		Crankcase/Engine Support Nuts or Screws		40 (29.5)	40 (29.5)
		Cylinder Head Nuts		29 (21)	29 (21)
		Crankcase/Cylinder Nuts or Screws		29 (21)	29 (21)
		Axial Fan Shaft Nut		N.A.	N.A.

VEHICLE SPECIFICATIONS

	VEHICLE MODEL			MX Zx 440 LC	MX Z 600	MX Z 700
	ENGINE TYPE			453	593	693
	Chain Drive Ratio			21/43	24/43	25/43
	Chain	Pitch	in	3/8	3/8	3/8
		Type/Links Qty/Plates Qty		Silent/74/13	Silent/74/13	Silent/76/13
	Drive Pulley	Type of Drive Pulley		TRA	TRA	TRA
		Ramp Identification		296 ③	281 ①	297 ①
		Calibration Screw Position or Calibration Part		3	3	3
		Spring Color		White/Silver	Violet/Yellow	Violet/Yellow
		Spring Length	± 1.5 mm (± .060 in)	127.6 (5.0)	157.9 (6.22)	157.9 (6.22)
		Clutch Engagement	± 100 RPM	5300	3800	3800
	Driven Pulley	Type of Driven Pulley		Formula	Formula	Formula
		Spring Preload	± 0.7 kg (± 1.5 lb)	7.0 (15.4)	7.0 (15.4)	7.0 (15.4)
		Cam Angle	degree	44	50	47
	Pulley Distance Z		mm (in)	16.5 ± 0.5 (.650 ± .020)	16.5 ± 0.5 (.650 ± .020)	16.5 ± 0.5 (.650 ± .020)
	Offset	X	mm (in)	35.5 ± 0.5 (1.398 ± .020)	35.5 ± 0.5 (1.398 ± .020)	35.5 ± 0.5 (1.398 ± .020)
		Y – X	MIN. MAX.	+ 1 (+ .040) + 2 (+ .080)	+ 1 (+ .040) + 2 (+ .080)	+ 1 (+ .040) + 2 (+ .080)
	Drive Belt Part Number (P/N)			414 860 700	414 860 700	417 300 067
	Drive Belt Width (new) ④		mm (in)	35.3 (1.398)	35.3 (1.398)	35.1 (1.382)
	Drive Belt Adjustment	Deflection	± 5 mm (± 13/64 in)	38 (1-1/2)	38 (1-1/2)	38 (1-1/2)
		Force ⑤	kg (lbf)	11.3 (25)	11.3 (25)	11.3 (25)
	Track	Width	cm (in)	38.1 (15)	38.1 (15)	38.1 (15)
		Length	cm (in)	307.4 (121)	307.4 (121)	307.4 (121)
		Profile Height	mm (in)	31.8 (1.25)	22.3 (.878)	22.3 (.878)
		Adjustment – Deflection	mm (in)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)
		Adjustment – Force ⑥	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type	Track		SC-10 Cross-Country	SC-10 Cross-Country	SC-10 Cross-Country
		Ski		ADSA	ADSA	ADSA
	Length		cm (in)	275 (108.3)	275 (108.3)	275 (108.3)
	Width		cm (in)	117.4 (46.2)	121.25 (47.75)	121.25 (47.75)
	Height		cm (in)	95.0 (37.4)	100 (39.4)	100 (39.4)
	Ski Stance		cm (in)	104.1 (41)	108 (42.5)	108 (42.5)
	Mass (dry)		kg (lb)	210 (463)	216 (475)	221 (487)
	Ground Contact Area		cm^2 (in^2)	6671 (1034)	6671 (1034)	6671 (1034)
	Ground Contact Pressure		kPa (PSI)	3.09 (.448)	3.18 (.461)	3.25 (.471)
	Frame Material			Aluminum	Aluminum	Aluminum
	Bottom Pan Material			Impact Copolymer	Impact Copolymer	Impact Copolymer
	Hood Material			RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane
	Battery		V (A•h)	N.A.	N.A.	N.A.
	Headlight		W	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight		W	8/27	8/27	8/27
	Tachometer and Speedometer Bulb		W	2 x 3	2 x 3	2 x 3
	Fuel and Temperature Gauge Bulb		W	N.A.	N.A.	N.A.
	Fuse	Starter Solenoid	A	N.A.	N.A.	N.A.
		Tachometer	A	N.A.	N.A.	N.A.
	Fuel Tank		L (U.S. gal)	40 (10.6)	40 (10.6)	40 (10.6)
	Chaincase Gearbox		mL (U.S. oz)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System ⑦		L (U.S. oz)	3.3 (111.6)	3.8 (128.5)	3.8 (128.5)
	Injection Oil Reservoir		L (U.S. oz)	N.A.	3.5 (118)	3.5 (118)

	VEHICLE MODEL			SUMMIT 600	SUMMIT 700
	ENGINE TYPE			**593**	**693**
	Chain Drive Ratio			21/43	23/43
	Chain	Pitch	in	3/8	3/8
		Type/Links Qty/Plates Qty		Silent/74/13	Silent/74/13
	Drive Pulley	Type of Drive Pulley		TRA	TRA
		Ramp Identification		294 ②	297 ②
		Calibration Screw Position or Calibration Part		5	4
		Spring Color		Green/Blue	Violet/Yellow
		Spring Length	± 1.5 mm (± .060 in)	147.4 (5.80)	157.9 (6.22)
		Clutch Engagement	± 100 RPM	4200	4100
	Driven Pulley	Type of Driven Pulley		Formula	Formula
		Spring Preload	± 0.7 kg (± 1.5 lb)	7.0 (15.4)	7.0 (15.4)
		Cam Angle	degree	47	47
	Pulley Distance Z		mm (in)	16.5 ± 0.5 (.65 ± .020)	16.5 ± 0.5 (.65 ± .020)
	Offset	X	mm (in)	35.5 ± 0.5 (1.398 ± .020)	35.5 ± 0.5 (1.398 ± .020)
		Y – X	MIN. MAX.	+ 1 (+ .040) + 2 (+ .080)	+ 1 (+ .040) + 2 (+ .080)
	Drive Belt Part Number (P/N)			414 860 700	417 300 067
	Drive Belt Width (new) ④		mm (in)	35.3 (1.398)	35.1 (1.382)
	Drive Belt Adjustment	Deflection	± 5 mm (± 13/64 in)	38 (1-1/2)	38 (1-1/2)
		Force ⑤	kg (lbf)	11.3 (25)	11.3 (25)
	Track	Width	cm (in)	38.1 (15)	38.1 (15)
		Length	cm (in)	345 (136)	345 (136)
		Profile Height	mm (in)	44.5 (1.752)	44.5 (1.752)
		Adjustment – Deflection	mm (in)	30 – 35 (1-3/16 – 1-3/8)	30 – 35 (1-3/16 – 1-3/8)
		Adjustment – Force ⑥	kg (lbf)	7.3 (16)	7.3 (16)
	Suspension Type	Track		SC-10 Mountain	SC-10 Mountain
		Ski		ADSA	ADSA
	Length		cm (in)	294 (115.7)	294 (115.7)
	Width		cm (in)	107.3 (42.25)	107.3 (42.25)
	Height		cm (in)	113 (44.5)	113 (44.5)
	Ski Stance		cm (in)	94.0 (37.0)	94.0 (37.0)
	Mass (dry)		kg (lb)	226 (497)	226 (497)
	Ground Contact Area		cm^2 (in^2)	7357 (1140)	7357 (1140)
	Ground Contact Pressure		kPa (PSI)	3.01 (0.436)	3.01 (.436)
	Frame Material			Aluminum	Aluminum
	Bottom Pan Material			Impact Copolymer	Impact Copolymer
	Hood Material			RRIM Polyurethane	RRIM Polyurethane
	Battery		V (A•h)	N.A.	N.A.
	Headlight		W	H4 60/55	H4 60/55
	Taillight and Stoplight		W	8/27	8/27
	Tachometer and Speedometer Bulb		W	2 x 3	2 x 3
	Fuel and Temperature Gauge Bulb		W	N.A.	N.A.
	Fuse	Starter Solenoid	A	N.A.	N.A.
		Tachometer	A	N.A.	N.A.
	Fuel Tank		L (U.S. gal)	40 (10.6)	40 (10.6)
	Chaincase Gearbox		mL (U.S. oz)	250 (8.5)	250 (8.5)
	Cooling System ⑦		L (U.S. oz)	4.0 (135)	4.0 (135)
	Injection Oil Reservoir		L (U.S. oz)	3.5 (118)	3.5 (118)

ENGINE LEGEND

BTDC: Before Top Dead Center

CDI: Capacitor Discharge Ignition

CTR: Center

K: Kilo (× 1000)

MAG: Magneto Side

N.A.: Not Applicable

PTO: Power Take Off Side

① The maximum horsepower RPM applicable on the vehicle. It may be different under certain circumstances and BOMBARDIER INC. reserves the right to modify it without obligation.

② Crankshaft end-play is not adjustable on these models. Specification is given for verification purposes only.

③ At 3500 RPM with headlamp turned on.

④ All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.

⑤ Drive pulley retaining screw: torque to 90 to 100 N•m (66 to 74 lbf•ft), install drive belt, accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake; repeat 5 times. Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

VEHICLE LEGEND

ADSA: Advanced Direct Shock Action

TRA: Total Range Adjustable

N.A.: Not Applicable

① Lever with solid roller pin (P/N 417 004 308).

② Lever with hollow roller pin (P/N 417 004 309).

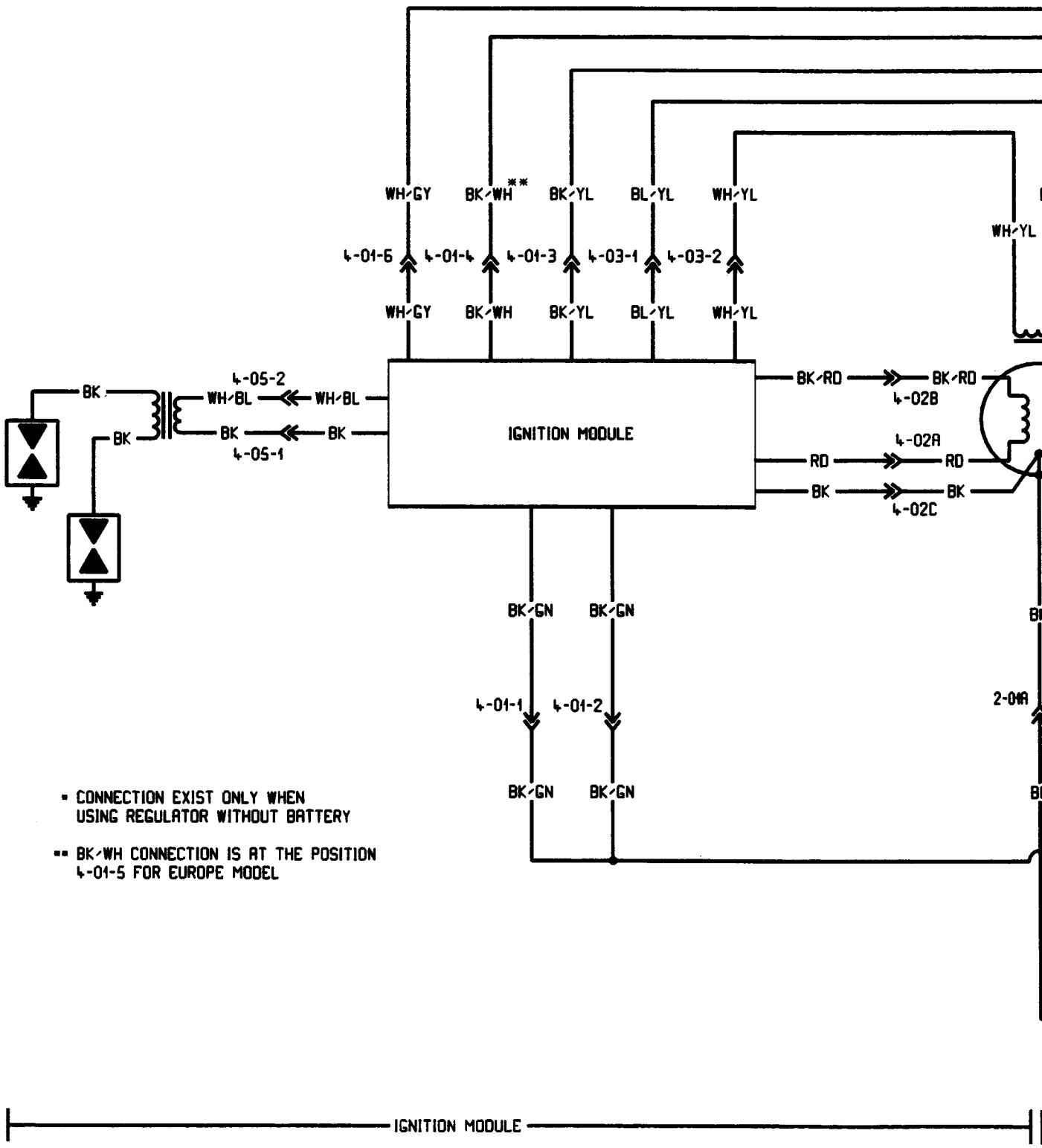
③ Lever with threaded hollow roller pin (P/N 504 151 700) with 10.3 g.

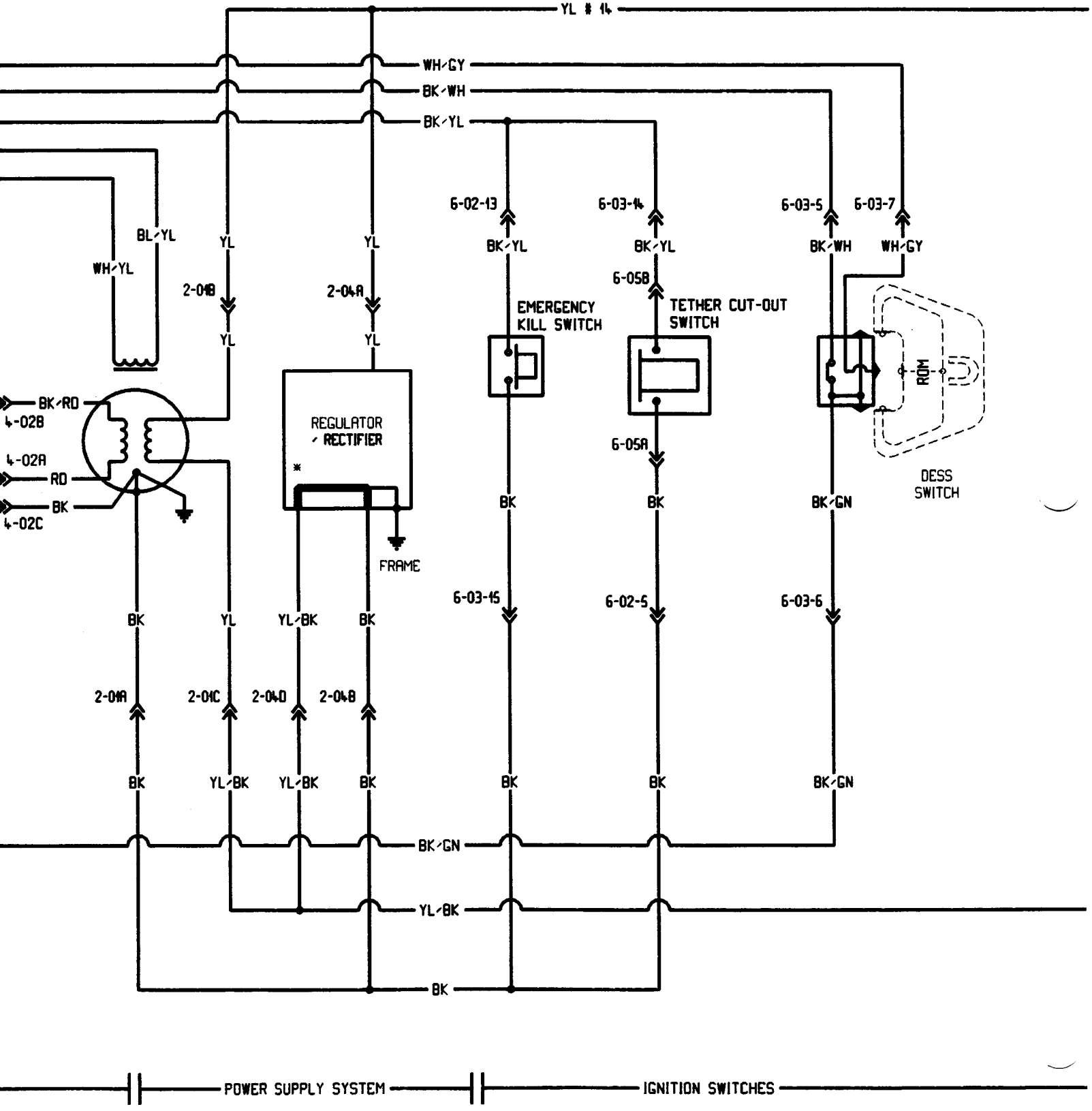
④ Minimum allowable width may not be less than 3.0 mm (1/8 in) of new drive belt.

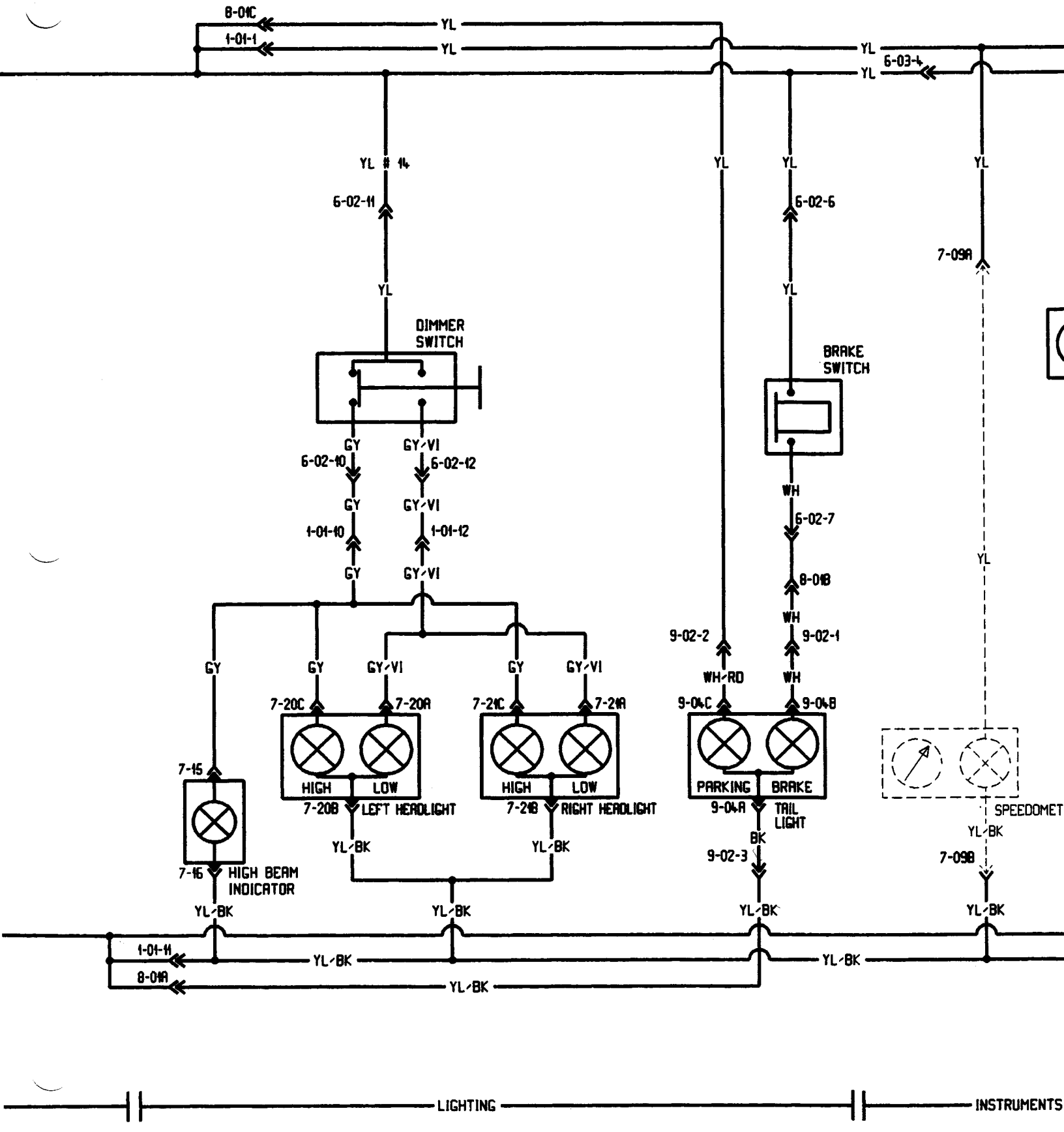
⑤ Force applied midway between pulleys to obtain specified tension deflection.

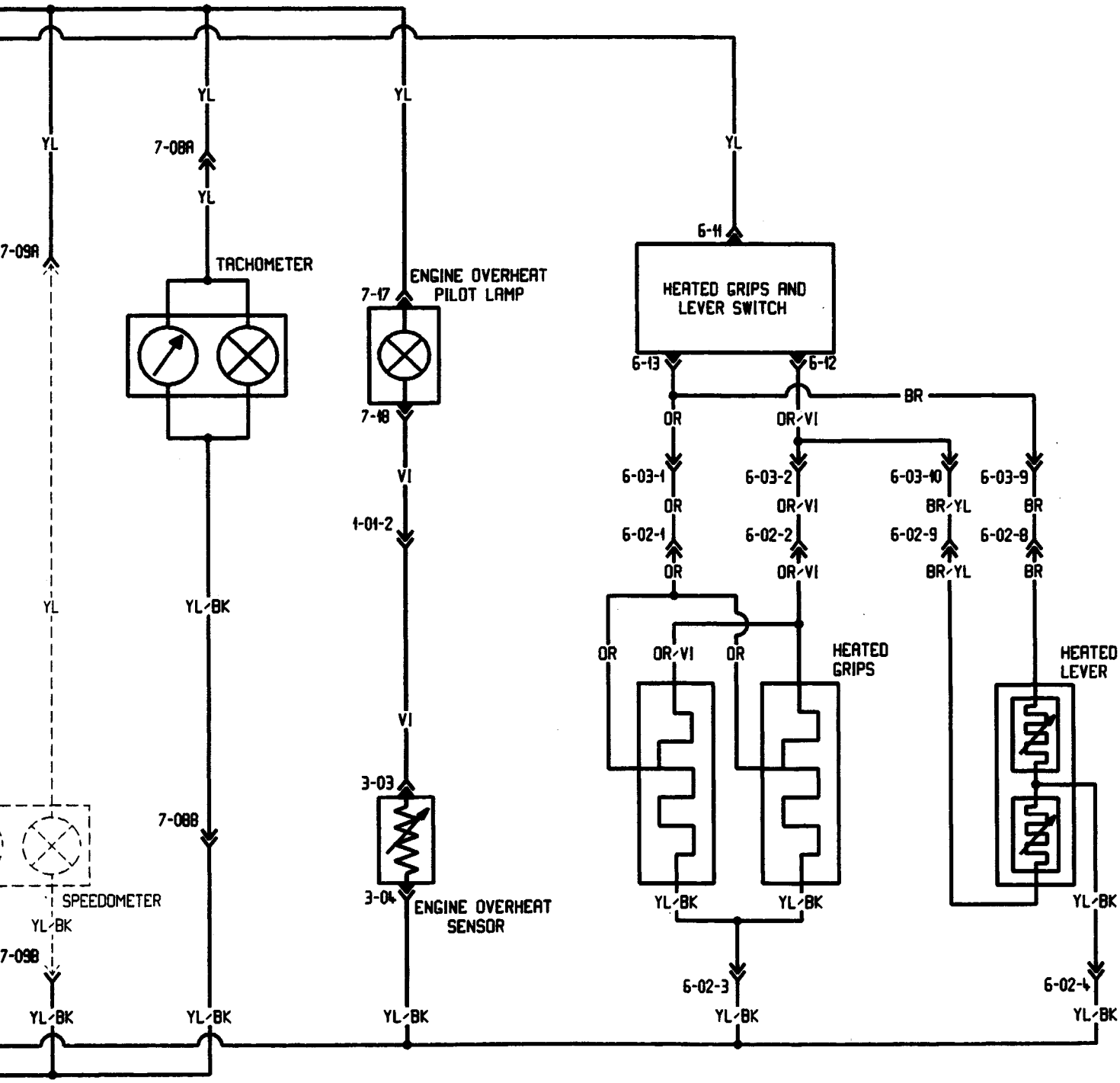
⑥ Force or downward pull applied to track to obtain specified tension deflection.

⑦ Coolant mixture: 60% antifreeze/40% water.

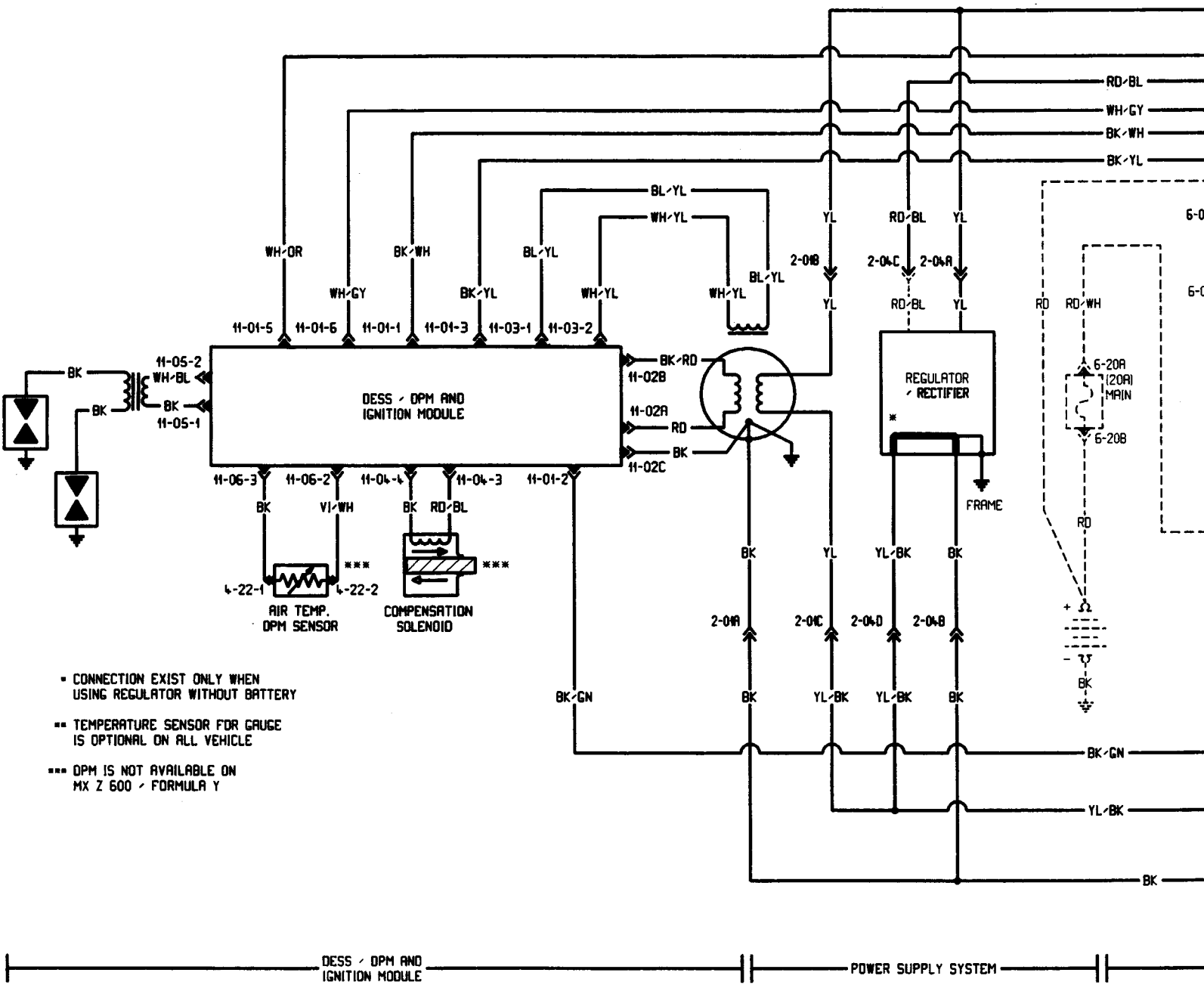

WH/GY
BK/WH**
BK/YL
BL/YL
WH/YL
4-01-6
4-01-4
4-01-3
4-03-1
4-03-2
WH/GY
BK/WH
BK/YL
BL/YL
WH/YL
WH/YL
BK
BK
4-05-2
WH/BL
WH/BL
BK
BK
4-05-1
IGNITION MODULE
BK/RD
BK/RD
4-02B
4-02A
RD
RD
BK
BK
4-02C
BK/GN
BK/GN
4-01-1
4-01-2
2-01A
BK/GN
BK/GN
* CONNECTION EXIST ONLY WHEN USING REGULATOR WITHOUT BATTERY
** BK/WH CONNECTION IS AT THE POSITION 4-01-5 FOR EUROPE MODEL
IGNITION MODULE


YL # 14
WH/GY
BK/WH
BK/YL
BL/YL
WH/YL
YL
2-04B
2-04A
6-02-13
6-03-14
6-03-5
6-03-7
BK/YL
BK/YL
BK/WH
WH/GY
6-05B
EMERGENCY KILL SWITCH
TETHER CUT-OUT SWITCH
ROM
DESS SWITCH
BK/RD
4-02B
4-02A
RD
BK
4-02C
REGULATOR / RECTIFIER
*
FRAME
6-05A
BK
BK
BK/GN
6-03-15
6-02-5
6-03-6
BK
YL
YL/BK
BK
2-01A
2-01C
2-04D
2-04B
BK
YL/BK
YL/BK
BK
BK
BK
BK/GN
BK/GN
YL/BK
BK
POWER SUPPLY SYSTEM
IGNITION SWITCHES


8-01C
YL
1-01-1
YL
YL
6-03-4
YL
YL # 14
YL
YL
YL
6-02-11
6-02-6
7-09A
YL
YL
DIMMER SWITCH
BRAKE SWITCH
GY
GY/VI
6-02-10
6-02-12
WH
6-02-7
GY
GY/VI
1-01-10
1-01-12
8-01B
YL
GY
GY/VI
WH
9-02-1
9-02-2
GY
GY
GY/VI
GY
GY/VI
WH/RD
WH
7-20C
7-20A
7-21C
7-21A
9-04C
9-04B
7-15
HIGH
LOW
HIGH
LOW
PARKING
BRAKE
7-20B
LEFT HEADLIGHT
7-21B
RIGHT HEADLIGHT
9-04A
TAIL LIGHT
SPEEDOMET
YL/BK
YL/BK
BK
YL/BK
9-02-3
7-09B
7-16
HIGH BEAM INDICATOR
YL/BK
YL/BK
YL/BK
YL/BK
1-01-11
YL/BK
YL/BK
8-01A
YL/BK



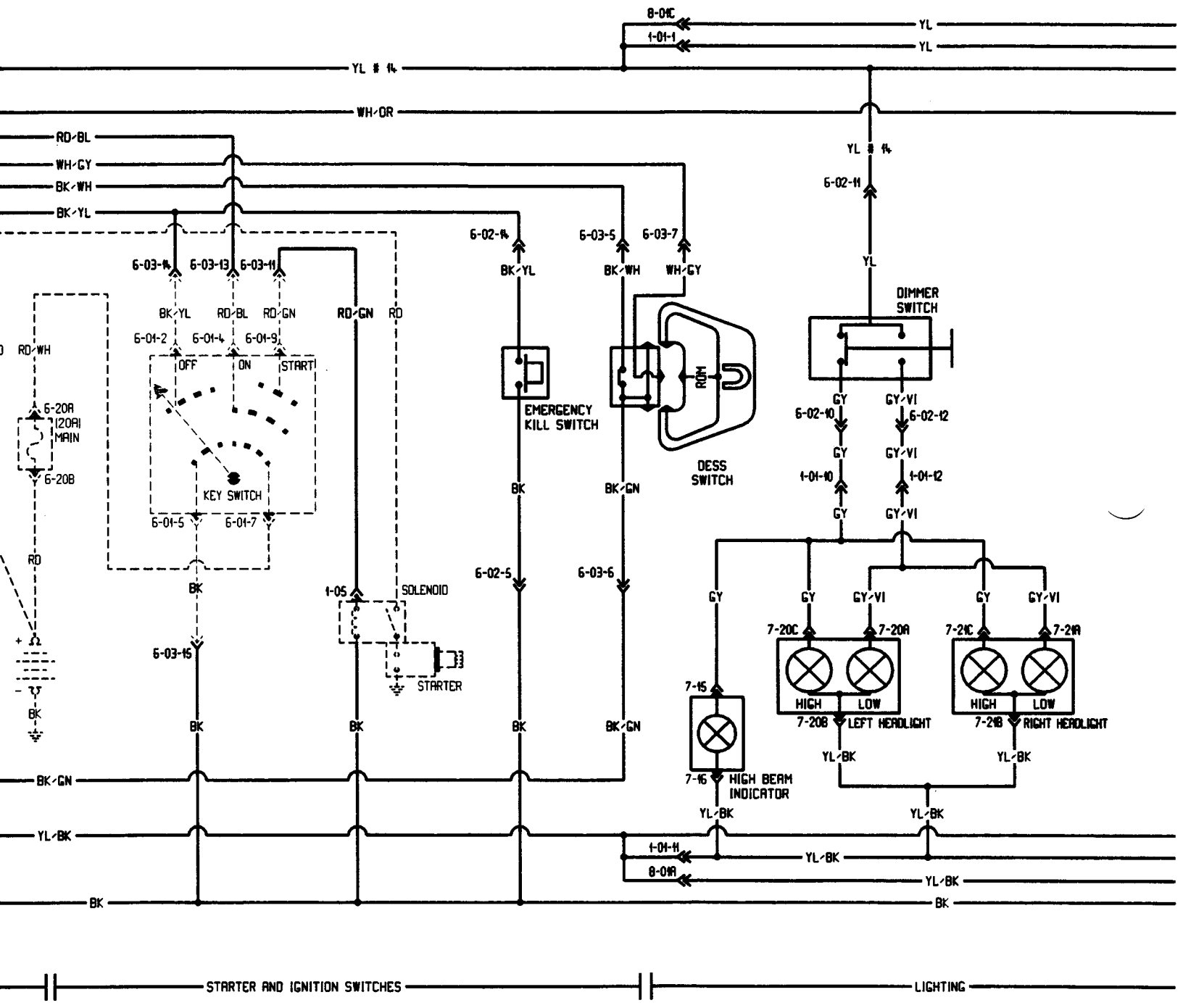
INSTRUMENTS — HEATING ELEMENTS

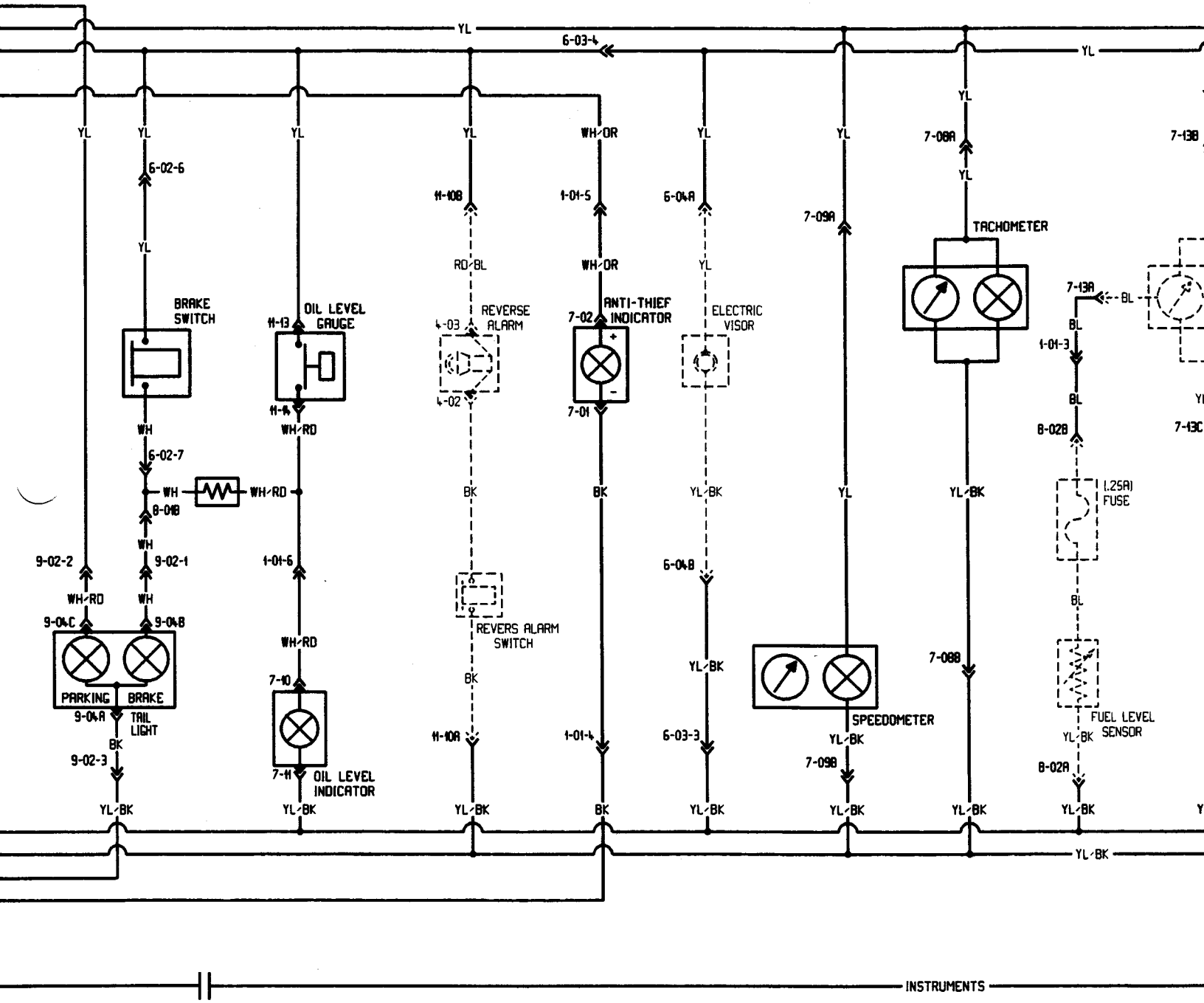


- CONNECTION EXIST ONLY WHEN USING REGULATOR WITHOUT BATTERY

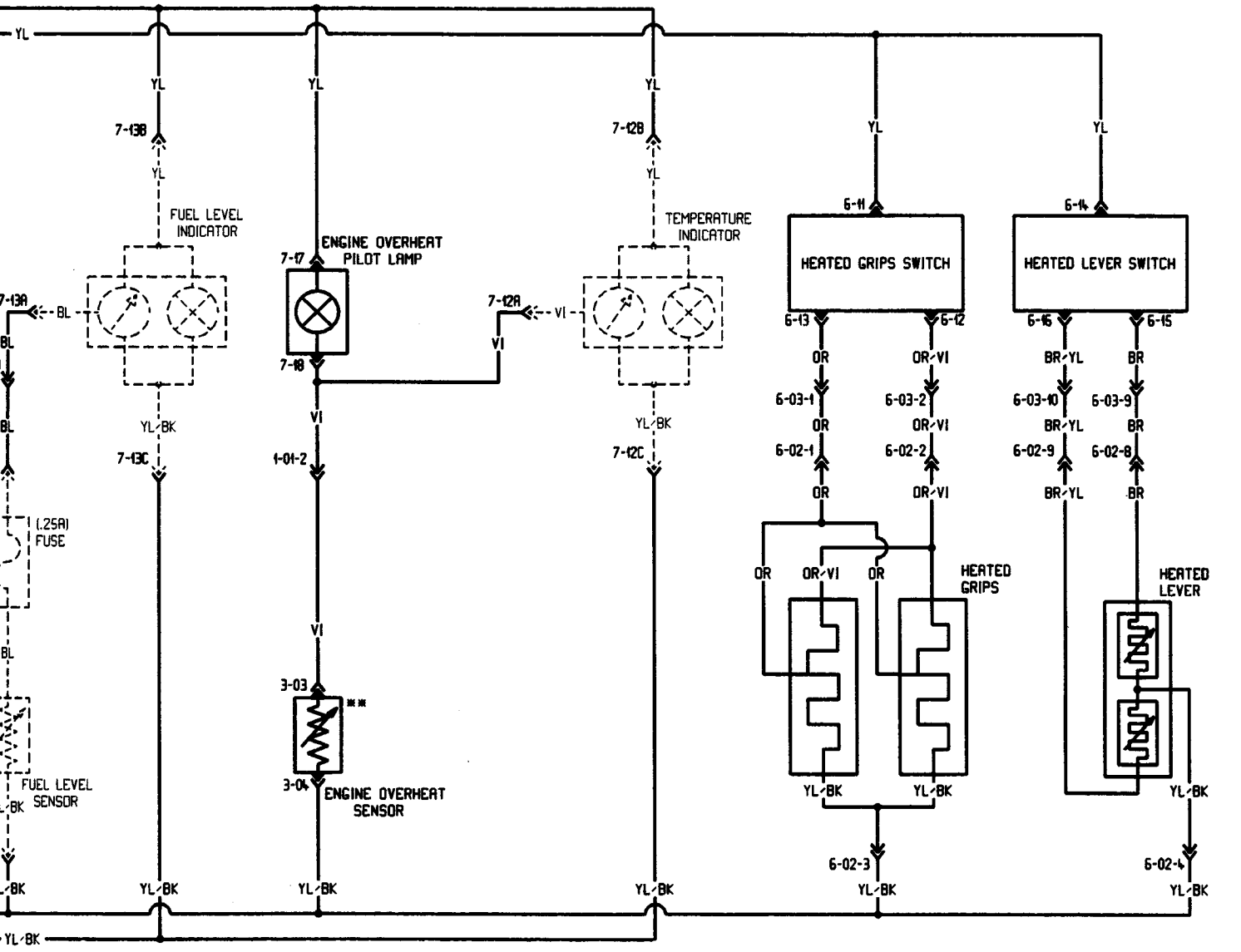
** TEMPERATURE SENSOR FOR GAUGE IS OPTIONAL ON ALL VEHICLE

*** DPM IS NOT AVAILABLE ON MX Z 600 / FORMULA Y


8-01C
1-01-1
YL
YL
YL # 14
WH/OR
RD/BL
WH/GY
BK/WH
BK/YL
6-03-14
6-03-13
6-03-11
BK/YL
RD/BL
RD/GN
RD/GN
RD
6-01-2
6-01-4
6-01-9
OFF
ON
START
KEY SWITCH
6-01-5
6-01-7
RD/WH
6-20A
(20A)
MAIN
6-20B
RD
BK
6-03-15
BK
BK
1-05
SOLENOID
STARTER
BK
6-02-14
BK/YL
BK
6-02-5
BK
6-03-5
6-03-7
BK/WH
WH/GY
EMERGENCY
KILL SWITCH
RUN
BK/GN
6-03-6
BK/GN
DESS
SWITCH
YL # 14
6-02-11
YL
DIMMER
SWITCH
GY
GY/YL
6-02-10
6-02-12
GY
GY/YL
1-01-10
1-01-12
GY
GY/YL
GY
GY
GY/YL
GY
GY/YL
7-20C
7-20A
7-21C
7-21A
HIGH
LOW
HIGH
LOW
7-20B
LEFT HEADLIGHT
7-21B
RIGHT HEADLIGHT
7-15
YL/BK
YL/BK
7-16
HIGH BEAM
INDICATOR
YL/BK
YL/BK
BK/GN
YL/BK
1-01-14
YL/BK
8-01A
YL/BK
BK
BK
STARTER AND IGNITION SWITCHES
LIGHTING



MX Z 600 / SUMMIT 600



HEATING ELEMENTS