

can-amTM



2010

DPSTM/ACS

Technical Manual

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***2010
DPS/ACS
Technical Manual***

can-am[™]



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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair the DPS™ and ACS systems on 2010 Can-Am™ ATVs.

This edition was primarily published to be used by mechanical technicians who are already familiar with all service procedures relating to BRP products. Mechanical technicians should attend training courses given by B.R.P.T.I.

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

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 time of writing. Service and Warranty Bulletins may be published to update the content of this manual. Make sure to read and understand these. It does not include dealer modifications, whether authorized or not by BRP, 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 BRP 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 for which it was designed.

NOTICE Indicates an instruction which, if not followed, could severely damage vehicle components or other property.

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.

BRP 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.

 **WARNING**

Unless otherwise specified, engine should be turned OFF and cold for all maintenance and repair procedures.

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

 **WARNING**

Indicates a potential hazard, if not avoided, could result in serious injury or death.

 **CAUTION** Indicates a hazard situation which, if not avoided, could result in minor or moderate injury.

INTRODUCTION

This Technical Manual covers the following BRP made 2010 Can-Am ATVs with a DPS or ACS system.

OUTLANDER™			
ENGINE	MODEL	COLOR	MODEL NUMBER
500	XT	Yellow, Red, Camo	2UAA, 2UAB, 2UAC, 2UAD, 2UAE
	XT-P	Black	5JAB
	MAX XT	Yellow, Red, Camo	2XAA, 2XAB, 2XAC, 2XAD, 2XAE
	MAX XT-P	Black	5KAC
	MAX LTD	Steel grey	5NAA
650	XT	Yellow, Red, Camo	2PAA, 2PAB, 2PAC, 2PAD, 2PAE, 2PAF
	XT-P	Black	5GAB
	MAX XT	Yellow, Red, Camo	2SAA, 2SAB, 2SAC, 2SAD, 2SAE, 2SAF
	MAX XT-P	Black	5HAC
800R	XT	Yellow, Red, Camo	2JAA, 2JAB, 2JAC, 2JAE, 2JAF
	XT-P	Black	5EAB, 5EAE
	MAX XT	Yellow, Red, Camo	2LAA, 2LAB, 2LAC, 2LAD, 2LAF
	MAX XT-P	Black	5FAC, 5FAF, 5FAJ
	MAX LTD	Red, Steel grey	2MAA, 2MAB, 2MAC, 2MAD

RENEGADE™			
ENGINE	MODEL	COLOR	MODEL NUMBER
800R	X xc	Black	4DAA, 4DAB, 4DAC

The information and component/system descriptions contained in this manual are correct at time of writing. BRP 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, there may be some differences between the manufactured product and the description and/or specifications in this document.

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

COLOR CODE LEGEND

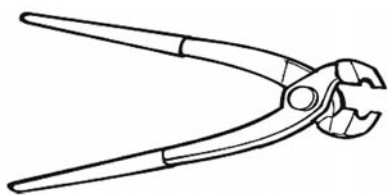
COLOR CODE					
BE	=	BEIGE	OR	=	ORANGE
BK	=	BLACK	PK	=	PK
BU	=	BLUE	RD	=	RED
BR	=	BROWN	VI	=	VIOLET
GN	=	GREEN	WH	=	WHITE
GR	=	GRAY	YL	=	YELLOW

FLUKE 115 MULTIMETER
(P/N 529 035 868)



Page: 9, 11, 32, 35, 37–38, 43–44

OETIKER PLIERS
(P/N 295 000 070)



Page: 44

SPRING REMOVER
(P/N 529 036 007)



Page: 46

DYNAMIC POWER STEERING (DPS)

SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	9, 11

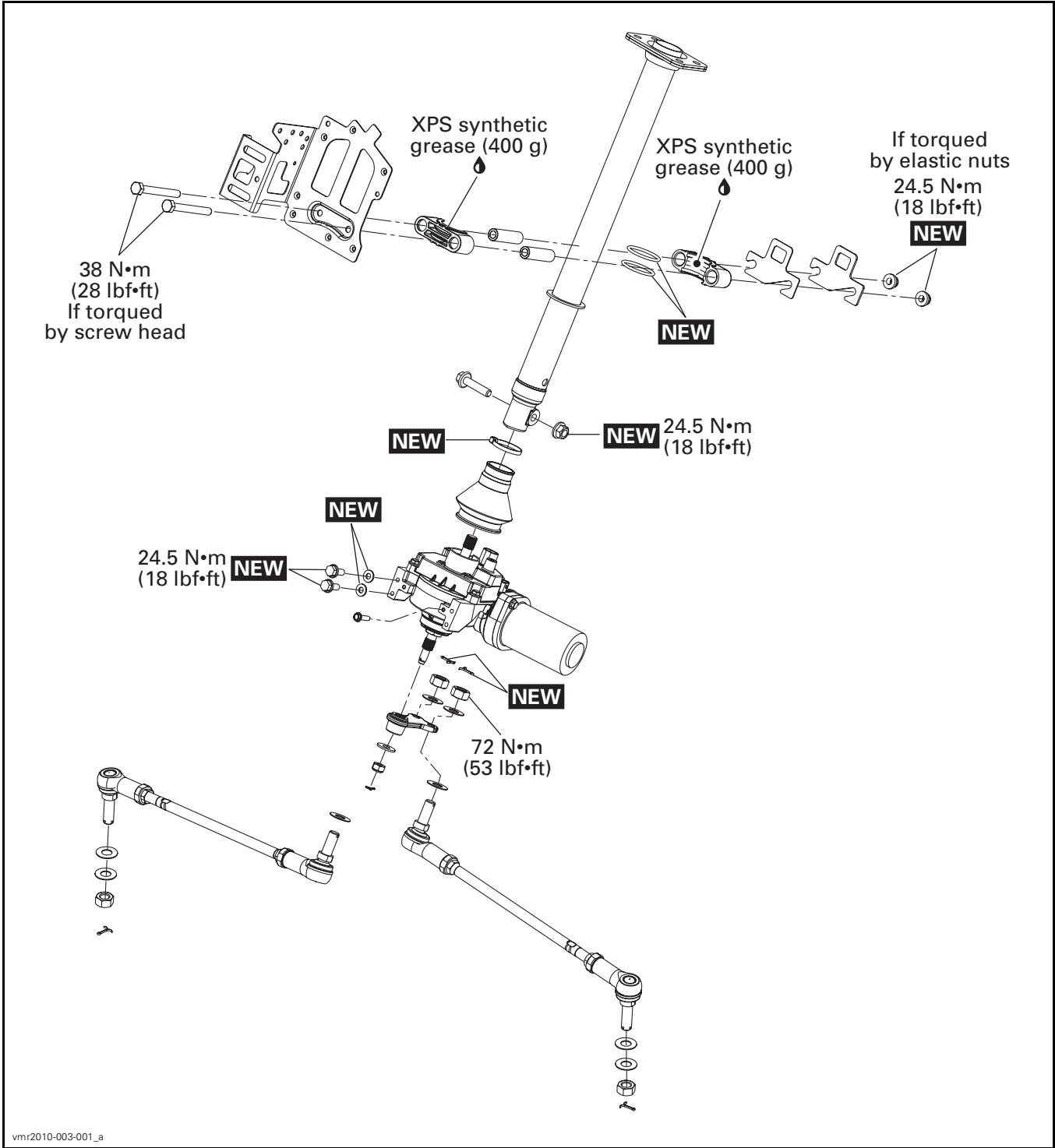
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SNAP-ON® TELESOPING GAUGE SET.....	LST 52616	20

SERVICE PRODUCTS

Description	Part Number	Page
XPS SYNTHETIC GREASE.....	293 550 010	19

Section 01 TECHNICAL MANUAL
Subsection 01 (DYNAMIC POWER STEERING (DPS))



GENERAL

During assembly/installation, use the torque values and service products as in the exploded view.

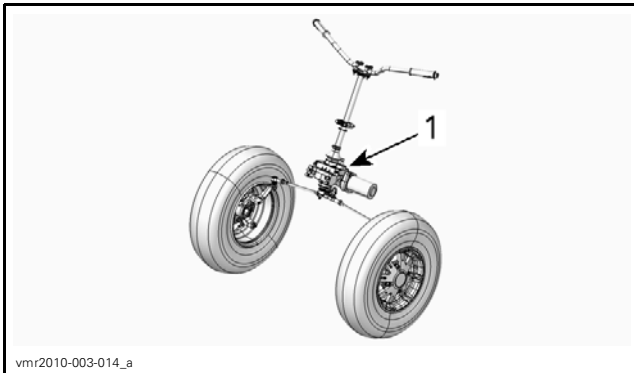
WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pins, etc.) must be replaced.

Hoses, cables or locking ties removed during a procedure must be reinstalled as per factory standards.

SYSTEM DESCRIPTION (FEATURES)

The Dynamic Power Steering (DPS) provides a computer controlled, variable power assist, achieved by an electric motor to optimize the amount of steering input required by the rider.



1. Dynamic power steering unit (DPS)

The DPS system uses the following parameters to determine how much steering assist it provides:

- Engine RPM
- Battery/electrical system voltage
- Vehicle speed
- DPS shaft torque sensor input.

The amount of steering assist provided is dependent on the handlebar effort (steering torque), electrical power available, and vehicle speed.

The greater the handlebar effort (torque), the greater the assist will be.

The slower the vehicle speed, the greater the assist will be.

If the electrical system is activated but the engine is **not** running, there is **no** power assist provided.

When the handlebar is in the straight ahead position, there is no steering assist.

Steering torque may also come from the wheels due to rough terrain. Steering kickback is reduced while providing feedback to the driver.

The greater the power steering assist, the greater the load on the electrical system.

When the electrical system is under high load (battery not at full charge, operating the vehicle for prolonged periods of time at slow speed and low RPM which, requires higher power steering assist), the battery power reserve will gradually decrease. This further increases the load on the charging system and the electrical system voltage will drop. As system voltage drops, so does power steering assist.

NOTE: It is important to maintain the battery at a full state of charge to ensure proper DPS operation. The magneto output is increased to 650 watts minimize battery drain and system voltage drop.

DPS Assist Mode

The DPS system normally provides two rider selectable modes of operation.

DPS MAX provides maximum steering assist for technical low speed riding in rough or muddy terrain, or for touring.

DPS MIN provides less steering assist for increased feedback and aggressive trail riding.

A third mode of operation is available as an accessory to adjust the steering assist level for operation with an approved BRP track kit.

How to View DPS Assist Mode Selection

1. **To view** the active DPS ASSIST mode, press and release the OVERRIDE/DPS button on the LH multifunction switch assembly.

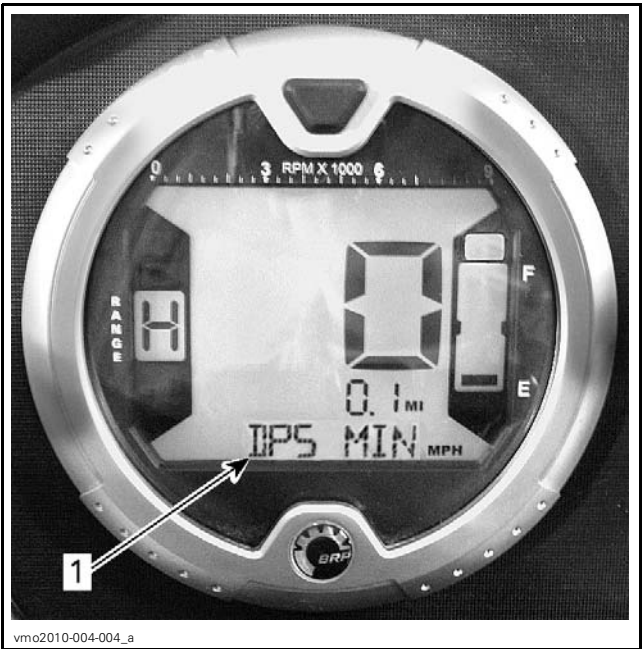


1. OVERRIDE/DPS button

Section 01 TECHNICAL MANUAL

Subsection 01 (DYNAMIC POWER STEERING (DPS))

The active DPS mode will be displayed in the lower portion of multifunction gauge.



1. DPS mode indication

How to Change DPS Assist Mode

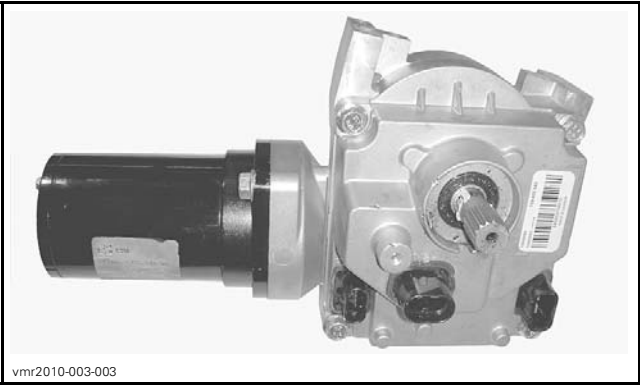
To change DPS ASSIST mode, press and hold the OVERRIDE/DPS button for approximately 4 seconds, the DPS system will toggle to the other available mode. The newly activated DPS mode will be briefly displayed in the multifunction gauge.

NOTE: The DPS mode cannot be changed if the vehicle is in reverse, or if the ACS mode is displayed in the multifunction gauge on vehicles equipped with an Air Controlled Suspension.

SYSTEM DESCRIPTION
(COMPONENTS)

DPS Unit

The DPS unit is a self contained unit that includes the steering gear, the DPS module, the DPS motor, and the torque sensor.



DPS UNIT

The DPS module provides DC power to the motor. The amount and duration of that DC power is determined by the inputs to the DPS module. The direction in which the motor turns is changed by reversing the polarity of the circuit current.

The DPS motor does not "spin", but rather turns in very small increments based on the amount, duration, and direction of DC power delivered by the DPS module.

DPS Unit Protection

To protect the DPS electronic components, the steering assist behavior will change as follows.

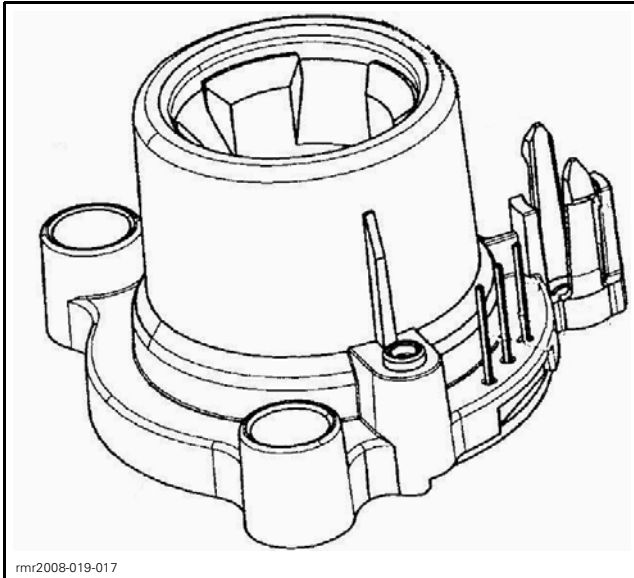
CONDITION	DPS BEHAVIOR
When motor internal temperature reaches a certain temperature (DPS continuously estimates it)	Steering assist will gradually decrease.
DPS internal board temperature is above 85°C (185°F)	
DPS internal board temperature is above 100°C (212°F)	Steering assist is stopped.

When the DPS unit temperature is back within normal operating range:

- Turn the ignition key OFF.
- Wait 30 seconds.
- Turn the ignition key ON.

Steering assist should resume normal operation.

Steering Torque Sensor



The steering column is connected to the shaft on the DPS unit. A small area of the DPS shaft is magnetized. Inside the DPS unit, a torque sensor surrounds the magnetized area of the DPS shaft.

When the handlebar is turned, torque is applied to the shaft which tends to twist the shaft slightly, deforming the magnetic field in the shaft. The sensor detects the torque by measuring the deviation of the magnetic field.

The torque sensor is very sensitive and can detect very small changes in the magnetic field. The harder the handlebar is turned, the greater the magnetic deviation, the greater the power steering assist.

ADJUSTMENT

TORQUE OFFSET RESET

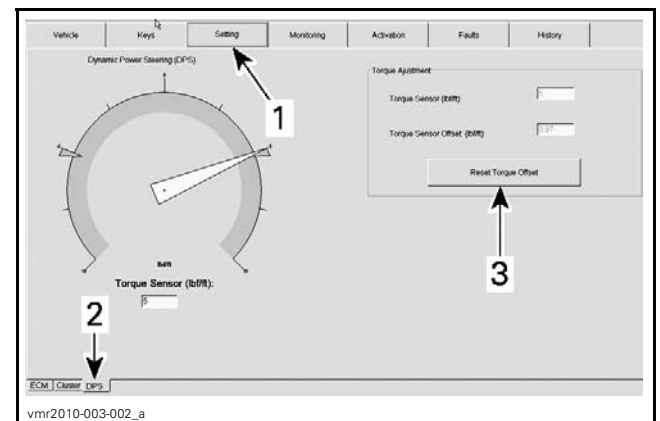
When replacing the following parts or adjusting steering alignment, the sensor torque offset must be reset to zero for proper system operation.

PART ADJUSTED OR REPLACED	WHAT TO DO
– DPS unit – Steering column bearing – Tie rod – Tie rod end – Knuckle – Wheel bearing – Ball joint – Front suspension arm (lower/upper) – Steering alignment	Reset Torque Offset in Setting, DPS

1. Ensure proper *STEERING ALIGNMENT*, refer to appropriate Shop Manual subsection.
2. Connect vehicle to the latest B.U.D.S. software.
3. In B.U.D.S., select **Read Data**.
4. Choose the **Setting** tab.
5. At the bottom LH corner of the **Setting** page, choose the **DPS** tab.

NOTICE Ensure handlebar is free and centered within ± 10 degrees of center position. There **MUST NOT** be any effort applied to the steering column.

6. Press **Reset Torque Offset** button.



DPS TORQUE OFFSET RESET

1. **Setting** page tab
2. **DPS** tab
3. **Reset Torque Offset** button

DPS ASSIST MODE

1. To **view** the active DPS ASSIST mode, press and release the **OVERRIDE/DPS** button on the LH multifunction switch assembly.

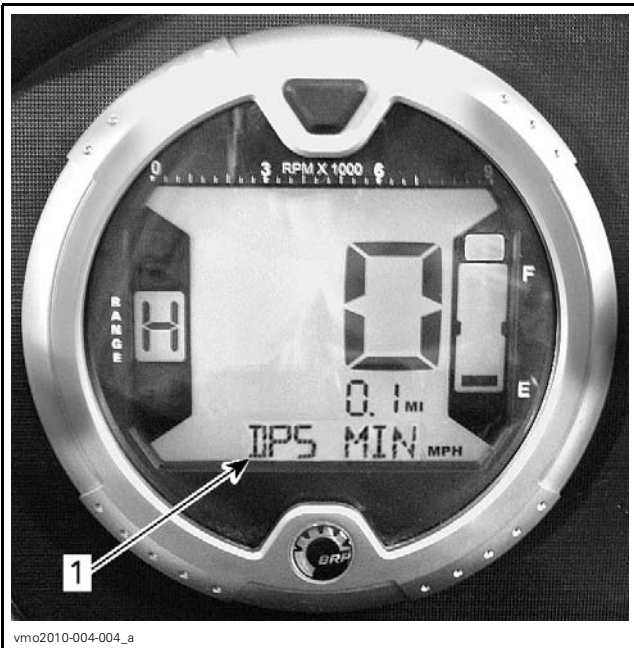
Section 01 TECHNICAL MANUAL

Subsection 01 (DYNAMIC POWER STEERING (DPS))



1. OVERRIDE/DPS button

The active DPS mode will be displayed in the lower portion of multifunction gauge.



1. DPS mode indication

2. To change DPS ASSIST mode, press and hold the OVERRIDE/DPS button for approximately 4 seconds, the DPS system will toggle to the other available mode. The newly activated DPS mode will be briefly displayed in the multifunction gauge.

NOTE: The DPS mode of operation cannot be changed if the vehicle is in reverse, or if the ACS mode is displayed in the multifunction gauge.

TROUBLESHOOTING

NO POWER STEERING ASSIST

1. DPS malfunction.
 - If the CHECK ENGINE light is on and a DPS FAULT message is visible in the gauge, check for fault codes using B.U.D.S. and carry out service action.
2. No power to DPS unit.
 - Carry out a DPS UNIT FUSE TEST as detailed in this subsection. Replace as required.
 - Carry out a DPS UNIT INPUT VOLTAGE TEST (POWER SIDE) as detailed in this subsection. Repair or replace wiring/connectors as required.
 - Carry out a DPS UNIT INPUT VOLTAGE TEST (CONTROL SIDE) as detailed in this subsection. Repair or replace wiring/connectors as required.
3. No ground to DPS unit.
 - Carry out a DPS UNIT GROUND CIRCUIT TEST as detailed in this subsection. Repair or replace wiring/connectors as required.
4. No engine RPM signal from ECM.
 - If engine RPM can be displayed in the multifunction gauge when the engine is running, carry out a DPS UNIT COMMUNICATION LINK (CAN) CONTINUITY TEST as detailed in this subsection. Repair or replace wiring/connector as required.
 - If engine RPM cannot be displayed in the multifunction gauge, use B.U.D.S. to check for applicable fault codes. Carry out service actions.

LOW POWER STEERING ASSIST

1. Low battery voltage.
 - Check battery terminals. Clean, repair, replace or tighten as required.
 - Test battery voltage. Recharge or replace battery as required.
 - Carry out a DPS UNIT INPUT VOLTAGE TEST (POWER SIDE) as detailed in this subsection. Ensure power connector pins (DPS2-A and DPS2-B) are clean, corrosion free, tight, and make good contact. Repair or replace wiring/connectors as required.
 - Carry out a DPS UNIT GROUND CIRCUIT TEST as detailed in this subsection. Ensure ground post connections and DPS connector pins are clean, corrosion free, tight, and make good contact. Repair or replace wiring/connectors as required.
 - Carry out a DPS SYSTEM LOAD TEST as detailed in this subsection.
2. Low input voltage to DPS unit.
 - Carry out a DPS UNIT INPUT VOLTAGE TEST (POWER SIDE) as detailed in this subsection. Ensure power connector pins (DPS2-A and DPS2-B) are clean, corrosion free, tight, and make good contact. Repair or replace wiring/connectors as required.

3. Faulty DPS ground circuit.

- Carry out a **DPS UNIT GROUND CIRCUIT TEST**. Ensure DPS ground connector pins (DPS3-A and DPS3-B) and frame ground post are clean, corrosion free, tight, and make good contact. Repair or replace wiring/connector as required.

ASYMMETRICAL POWER STEERING ASSIST (SIDE TO SIDE)

1. Torque sensor not reset to zero.

- Ensure steering alignment is within specification and carry out the **TORQUE OFFSET RESET** procedure detailed in this subsection.

DPS WILL NOT CHANGE MODES OF OPERATION

1. Faulty OVERRIDE/DPS switch.

- Set transmission to reverse with engine running.
- Press the **OVERRIDE/DPS** button.
- Look for the **OVERRIDE** message to appear in the multifunction gauge. If it comes on, button and wiring to gauge are good.
- If **OVERRIDE** message does not appear in gauge, test drive vehicle to determine if **OVERRIDE** function can be activated. If the function can **not** be activated, test the **OVERRIDE/DPS** switch and wiring. If the function **is** activated, test wiring from switch to multifunction gauge.

PROCEDURES

DPS UNIT

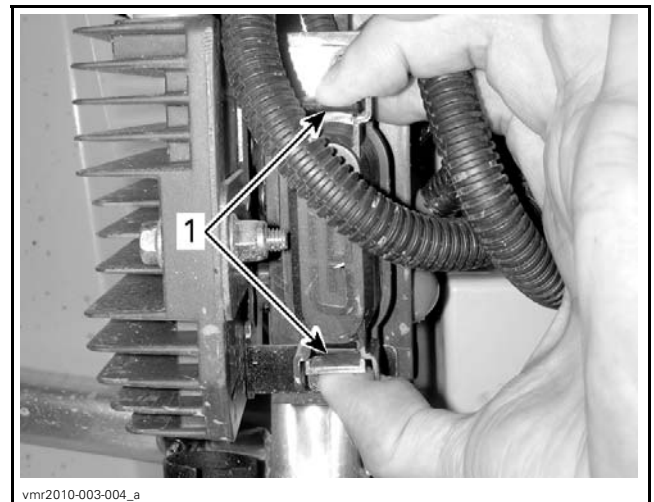
DPS Unit Power Fuse Test

A 40 A DPS fuse located in the rear fuse box (PF2-F3) next to the voltage regulator/rectifier unit provides power for the DPS motor.



TYPICAL - OUTLANDER 800R LTD ILLUSTRATED
1. Rear fuse box (PF2)

1. To remove fuse box cover, simultaneously squeeze tabs inwards on each end of fuse box cover as you pull on the cover.



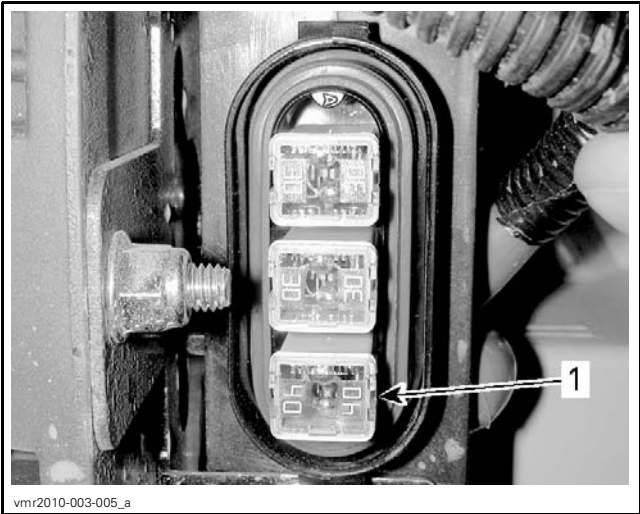
1. Squeeze and pull these tabs to remove cover

2. Using a **FLUKE 115 MULTIMETER** (P/N 529 035 868) set to Ω selection, remove and test the DPS fuse.



Section 01 TECHNICAL MANUAL

Subsection 01 (DYNAMIC POWER STEERING (DPS))

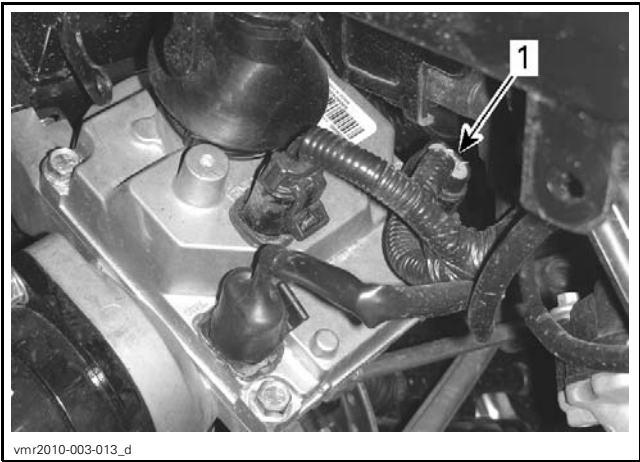


1. 40 amp DPS fuse (PF2-F3)

3. Replace fuse as required.

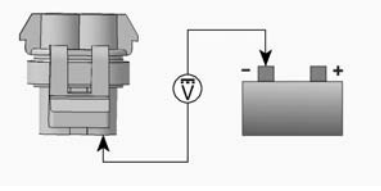
DPS Unit Input Voltage Test (Power Side)

1. Disconnect the DPS PWR (power) connector.



1. DPS PWR connector (motor power)

2. Test for 12 Vdc DPS motor power at DPS2-A and DPS2-B as per following table.

MULTIMETER PROBE POSITIONS		VOLTAGE
DPS power connector pin A	Battery ground	Battery voltage
DPS power connector pin B		
		

rmr2008-028-091_a

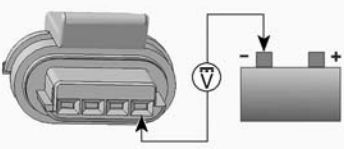
If NO voltage is measured, test the 40 A DPS fuse in the rear fuse box (PF2-F3). If good, check wires and connector pins. Replace or repair defective parts and reset fault codes.

If battery voltage is measured, carry out the following *DPS UNIT INPUT VOLTAGE TEST (CONTROL SIDE)*.

NOTE: This test may also be carried out by connecting a 12 Vdc test light between each DPS PWR connector pins (A and B), and the battery (-) negative terminal. The test light must come on bright.

DPS Unit Input Voltage Test (Control Side)

1. Disconnect DPS CTRL (control) connector and turn ignition switch ON.
2. Set the ignition switch to ON.
3. Set the engine RUN/STOP switch to RUN.
4. Test for 12 Vdc power to the DPS module at DPS1-A as per following table.

MULTIMETER PROBE POSITIONS	VOLTAGE
DPS control connector (pin A) and battery ground	Battery voltage
	

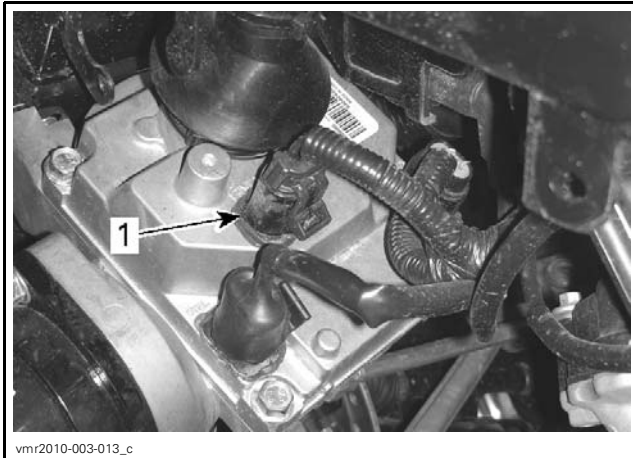
If NO voltage is measured, check wires and connector pins from DPS unit to the Relays/Speedo fuse in front fuse box (PF1-F4). Replace or repair defective parts and reset fault codes.

If battery voltage is measured, carry out the following *DPS UNIT GROUND CIRCUIT TEST*.

NOTE: This test may also be carried out by connecting a 12 Vdc test light between the DPS control connector (pin A), and the battery (-) negative terminal. The test light must come on bright.

DPS Unit Ground Circuit Test

1. Disconnect the DPS ground connector (GDN).



1. DPS ground connector (GDN)

2. Test for continuity between DPS3-A and DPS3-B to battery ground.

MULTIMETER PROBE POSITIONS		READING
DPS GDN connector pin A	Battery ground	Continuity (close to 0 Ω)
DPS GDN connector pin B		

If there is NO continuity or a high resistance is measured, check wires and connector pins from DPS unit to chassis ground post. Replace or repair defective parts and reset fault codes.

If there is good continuity, carry out the following *DPS UNIT COMMUNICATION LINK (CAN) CONTINUITY TEST*.

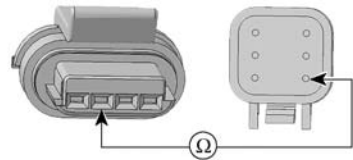
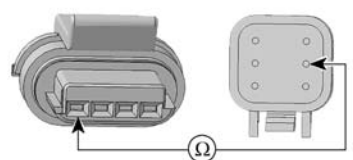
NOTE: This test may also be carried out by connecting a 12 Vdc test light between each GDN connector pin and the battery (+) positive terminal. The test light must come on bright.

DPS Unit Communication Link (CAN) Continuity Test

NOTE: DPS unit must receive an RPM signal to provide power steering assist.

Disconnect the DPS control connector and the diagnostic connector.

Test continuity of CAN Bus Wires at DPS1-C and DPS1-D.

MULTIMETER PROBE POSITIONS	RESISTANCE @ 20°C (68°F)
DPS control connector (pin C) and diagnostic connector (pin 1)	Below 1 Ω
 rmr2008-028-094_a	
DPS control connector (pin D) and diagnostic connector (pin 2)	Below 1 Ω
 rmr2008-028-094_b	

If resistance measured is out of specification, check wires and connector pins. Carry out repairs as required and reset fault codes using B.U.D.S software.

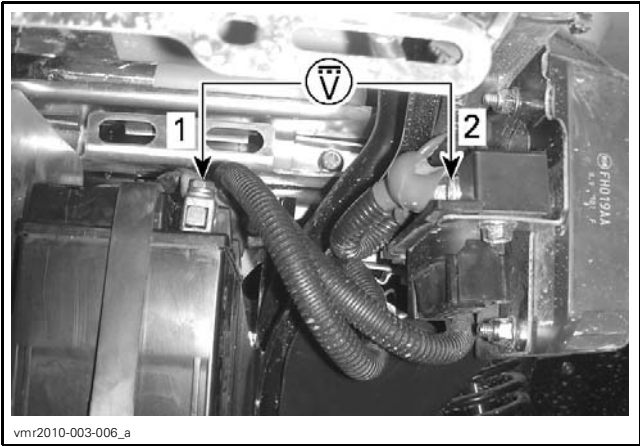
If resistance measured is good, replace the DPS unit and reset fault codes using B.U.D.S software.

DPS System Load Test

If the charging system cannot sustain normal voltage when the DPS is operating, DPS ASSIST may be greatly reduced or nonexistent. Carry out the following steps.

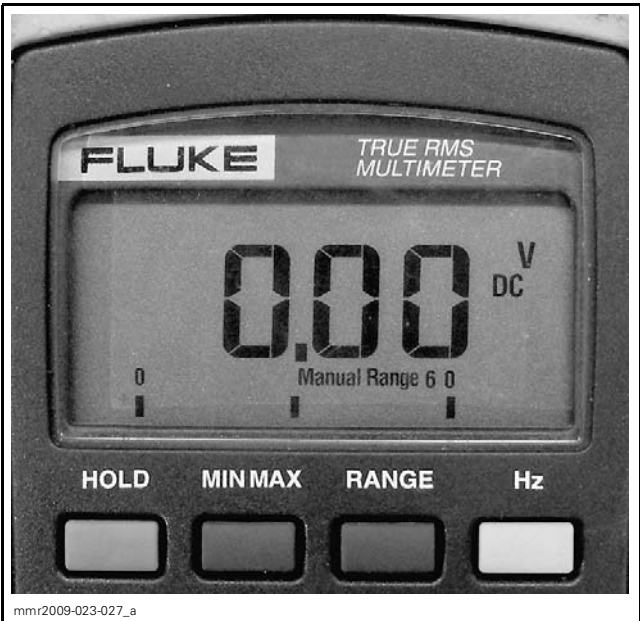
1. Connect the red lead of a FLUKE 115 MULTIMETER (P/N 529 035 868) set to Vdc to the rear fuse box battery terminal.
2. Connect the black multimeter lead to the battery ground.

Section 01 TECHNICAL MANUAL
Subsection 01 (DYNAMIC POWER STEERING (DPS))



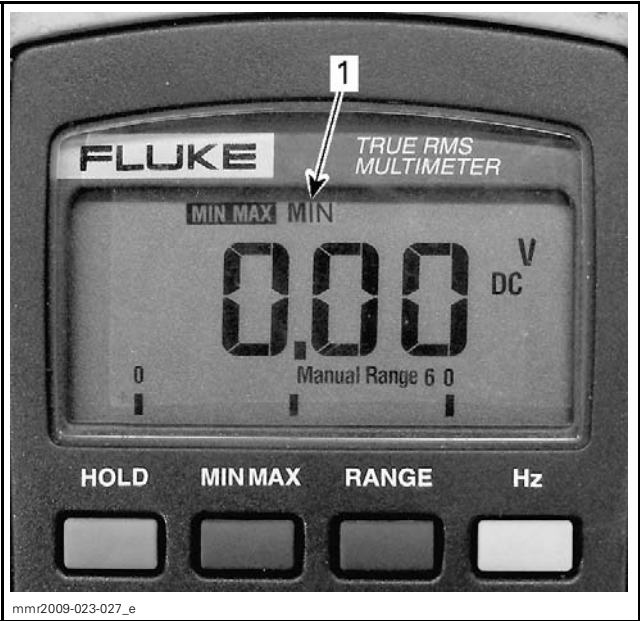
- 1. Negative (-) battery terminal
- 2. Rear fuse box battery terminal

- 3. Measure the battery voltage.
- NOTE:** If battery voltage is low, recharge battery.
- 4. Ensure the vehicle transmission is set to PARK.
- 5. Start the engine.
- 6. Note the voltage on the multimeter with the engine running (charging system voltage).
- 7. Press the **RANGE** button repeatedly to select **Manual Range 6 0**.



VDC SELECTED TO MANUAL RANGE 6 0

- 8. Press the **MIN MAX** button on the multimeter to engage the MIN function.

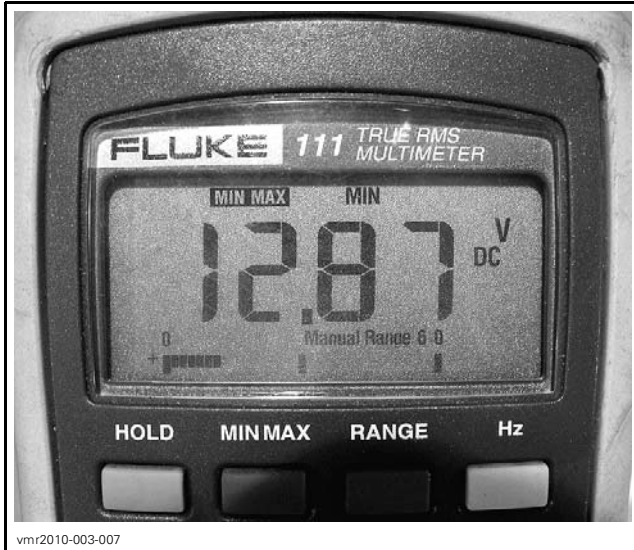


- 1. MIN function selected

- 9. Turn the handlebar **momentarily** against the steering frame stops to each side.
- NOTE:** Do not hold steering against frame stops for an extended period of time.
- 10. Read the MIN charging system voltage recorded while the handlebar was turned against each stop.

DPS SYSTEM LOAD TEST			
PROBE POSITIONS		STEERING POSITION	VOLTAGE READING
Battery (-) terminal	Rear fuse box battery terminal	LH stop	At least 12 Vdc
		RH stop	

NOTE: Turning the handlebar momentarily against the frame stops generates maximum DPS load (maximum current draw on electrical system). Electrical system must sustain at least 12 Vdc for proper DPS operation.



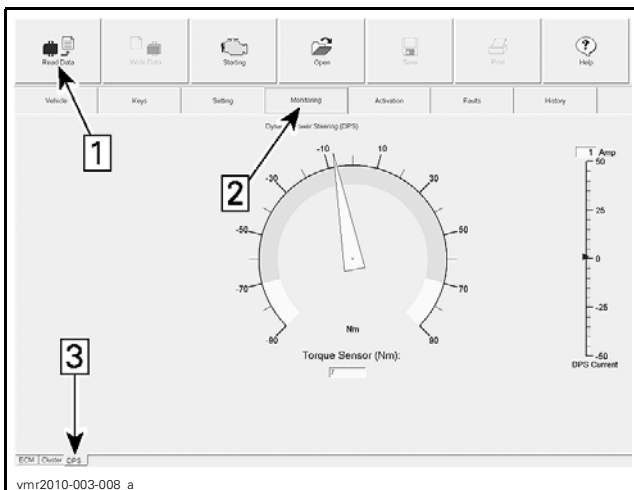
If the electrical system cannot sustain at least 12 Vdc, check the following:

- Battery
- Battery connections
- DPS unit power and ground connections
- Charging system
- Frame and engine ground studs.

If the previously listed items, carry out the following **DPS UNIT CURRENT TEST**.

DPS Unit Current Test

1. Connect vehicle to the latest B.U.D.S. software.
2. Click on the **Read Data** button.
3. Choose the **Monitoring** page tab.
4. At the bottom of the **Monitoring** page, choose the **DPS** tab.

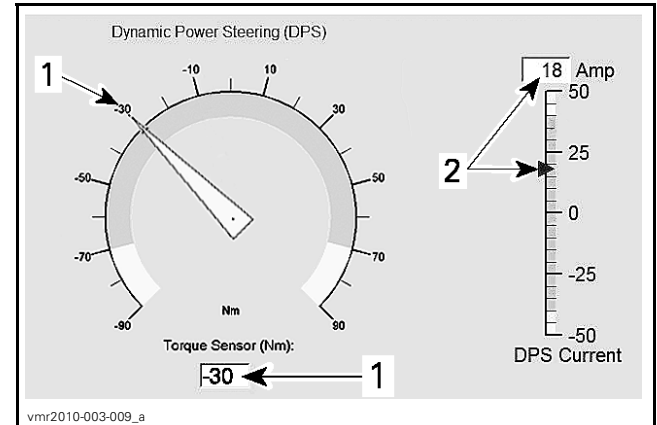


Step 1: Press Data button
 Step 2: Select Monitoring page tab
 Step 3: Select DPS tab

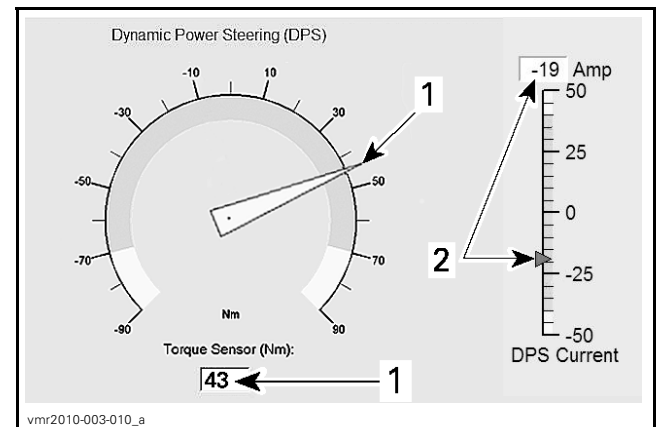
5. With the vehicle engine running in PARK, turn the handlebar side to side, momentarily against each stop and observe the indications on the B.U.D.S. **DPS Monitoring** page.

The **DPS Torque Sensor Nm** increase with torque applied to handlebar.

The **DPS Current** ammeter should increase proportionately to the torque applied, and decrease with the torque as steering assist is provided.



TYPICAL - LH TURN
 1. Torque sensor indication (negative)
 2. DPS current indication (positive)



TYPICAL - RH TURN
 1. Torque sensor indication (positive)
 2. DPS current indication (negative)

NOTE: Increase and decrease in torque and current readings is very brief as steering assist is quickly provided. Current draw should remain within green scale but may momentarily peak to 60 amps, then drop off close to 0 amps as torque applied is nulled out by steering assist. A residual torque of 2 N•m (18 lbf•in) with a corresponding current draw is acceptable.

If current draw tends to remain high, carry out the following:

- Steering alignment check.

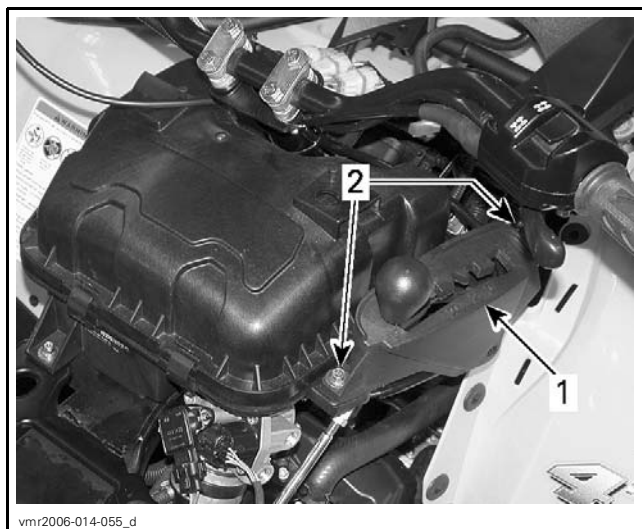
Section 01 TECHNICAL MANUAL

Subsection 01 (DYNAMIC POWER STEERING (DPS))

- Steering column shim adjustment at half bushings as described in the *DPS UNIT INSTALLATION* procedure detailed in this section.
- *TORQUE OFFSET RESET* procedure detailed in this section.
- Replace DPS unit.

DPS Unit Removal

1. Remove the following items:
 - Seat
 - Center panel
 - LH and RH side panels
 - LH and RH inner fender panels.
2. Lift up on the dash board (gauge support) and disconnect the following:
 - Gauge
 - Ignition switch
 - 12 Vdc power outlet.
3. Remove dash board from vehicle.
4. Remove the screw securing the shift lever guide plate to the engine air filter housing.

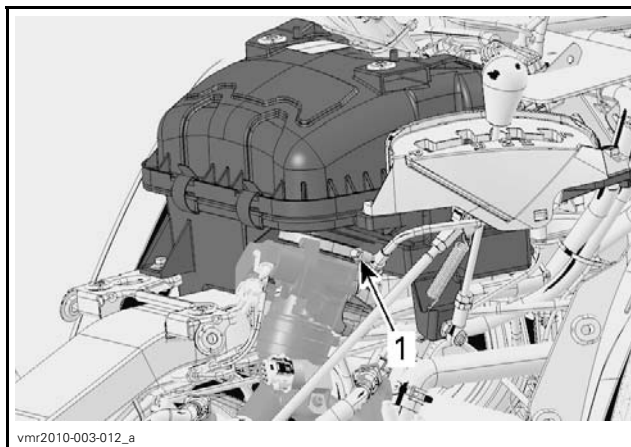


TYPICAL

1. Shift lever guide plate
2. Guide plate screws (forward screw not visible)

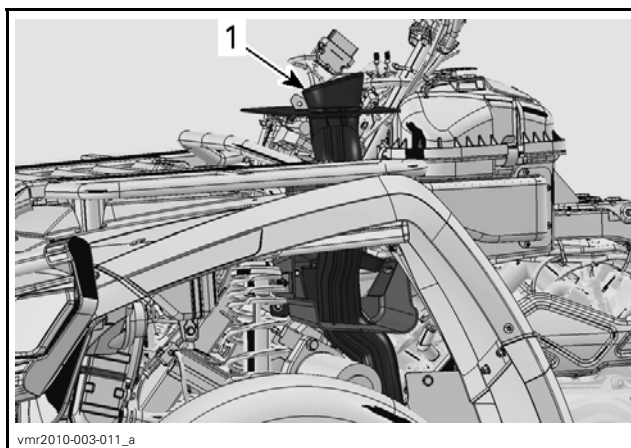
NOTE: It is not necessary to disconnect the shift lever.

5. Loosen the gear clamp securing the air filter housing duct to the throttle body.



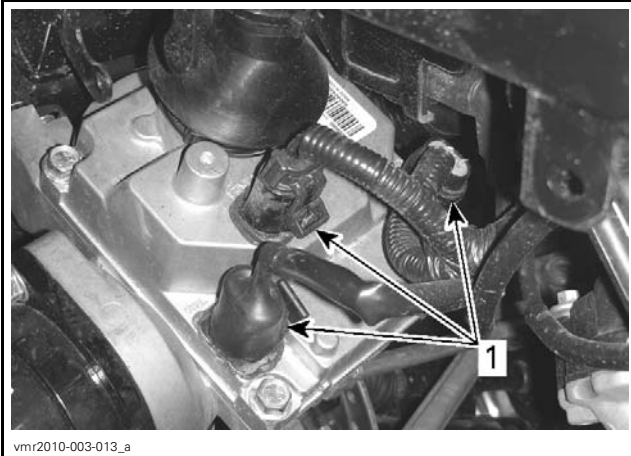
1. Gear clamp to loosen

6. Remove the screws securing the engine air filter housing.
 7. Move the shift lever and guide plate slightly to the right.
 8. Lift up on the air filter housing to release it from the throttle body and move the filter housing towards the RH side of the vehicle.
- NOTE:** Moving the air filter housing to the right provides access required for CVT air inlet duct removal.
9. Remove the CVT air inlet duct assembly.



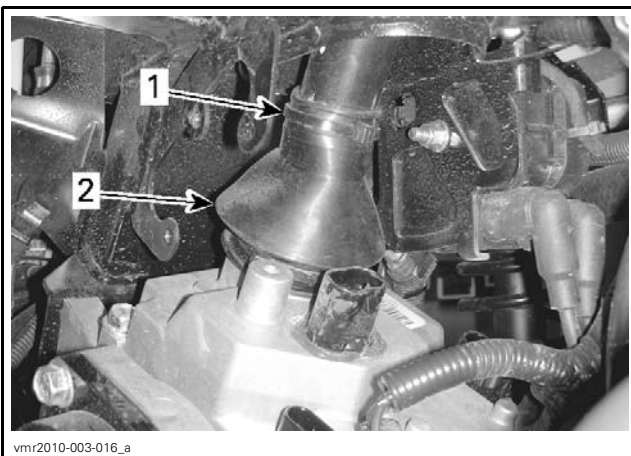
1. CVT air inlet duct

10. Remove the ECM from it's support bracket.
11. Disconnect the 3 electrical connectors from the DPS unit.



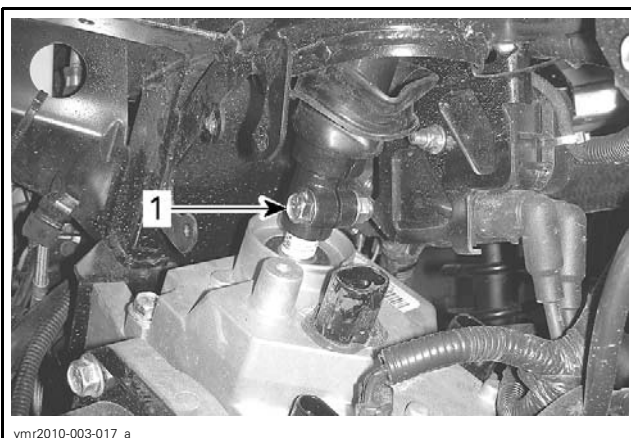
1. DPS connectors (3x)

12. Cut the locking tie securing the bellows at the bottom of steering column near the DPS unit, and pull the bellows upwards sufficiently to access the steering column pinch bolt.



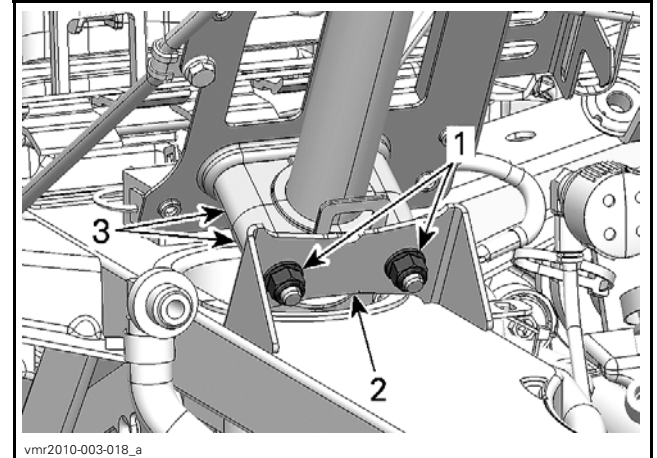
1. Cut this locking tie
2. Steering column bellows

13. Remove the steering column pinch bolt and retaining nut. Discard the retaining nut.



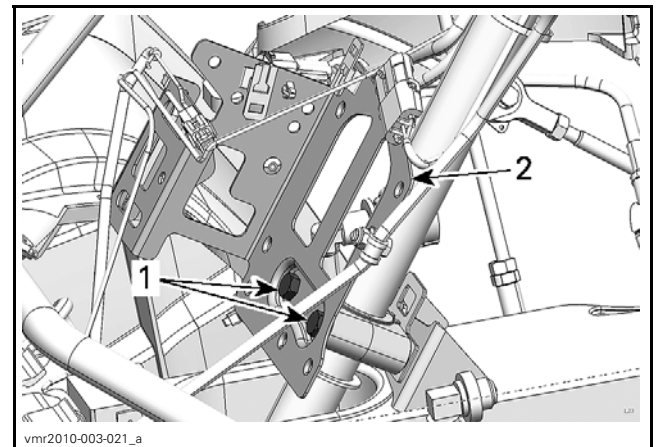
1. Steering column pinch bolt

14. Remove and discard the elastic nuts from the 2 hexagonal screws that secure steering column half bushings to the support on the frame.



1. Elastic nuts to remove and discard
2. Frame support
3. Steering column half bushings

15. Remove the 2 hexagonal screws from the ECM support.

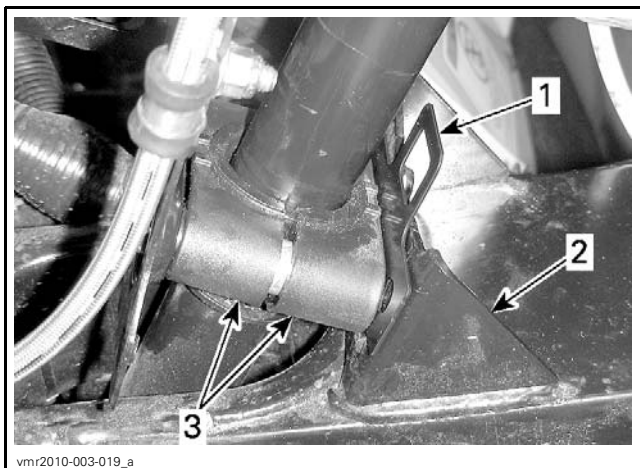


1. Hexagonal screws to remove
2. ECM support

16. Remove and save the shim(s) from between the rear half bushing and the steering support on the frame.

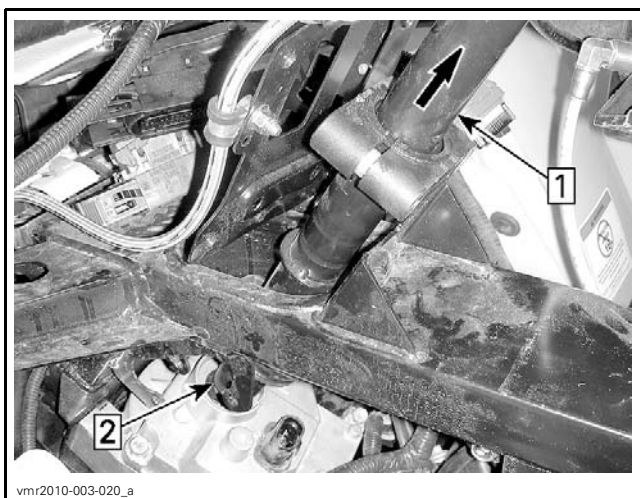
Section 01 TECHNICAL MANUAL

Subsection 01 (DYNAMIC POWER STEERING (DPS))



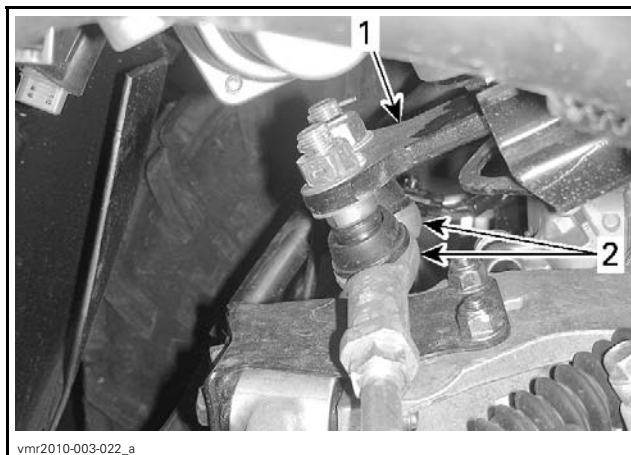
1. Shim
2. Steering column frame support
3. Half bushings

17. Pull up on the steering column to disengage it from the DPS unit and move it to the side.



- Step 1: Pull up on steering column
Step 2: Disengage column from DPS unit

18. Remove the hardware that secures both tie-rod ends to the pitman arm (steering lever). Discard cotter pins.



1. Pitman arm
2. Tie rod ends

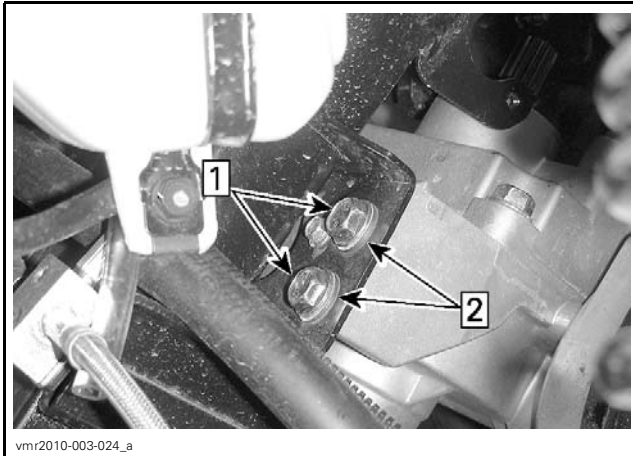
NOTE: Leave the tie rod ends on the pitman arm at this time. They will come off easily when the DPS unit is lifted from its frame support.



TIE ROD ENDS (HARDWARE REMOVED)

19. Remove the 4 hexagonal flanged screws securing DPS unit to frame.

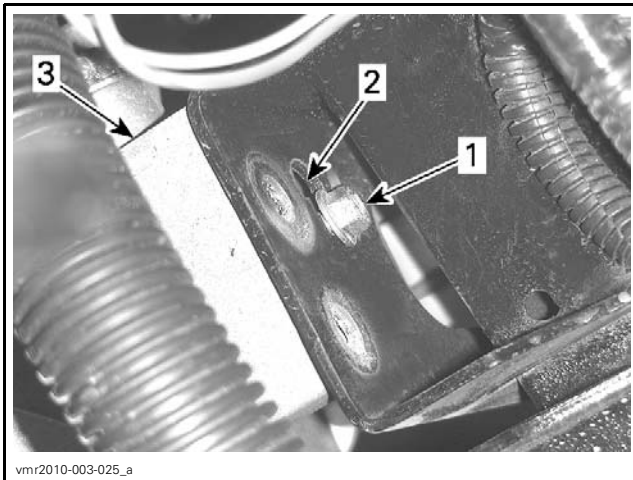
NOTE: Discard the 4 conical spring washers on the DPS retaining screws. Do not remove the 2 small hexagonal forming screws from the DPS unit unless it is being replaced.



TYPICAL - LEFT SIDE ILLUSTRATED

Step 1: Remove DPS retaining screws (2 each side)
Step 2: Discard conical washers under screw head

20. Pull up on DPS unit to align the 2 small hexagonal forming screws with the extraction holes in the DPS mounting bracket, then remove the DPS unit from the bracket.



TYPICAL - RIGHT SIDE ILLUSTRATED

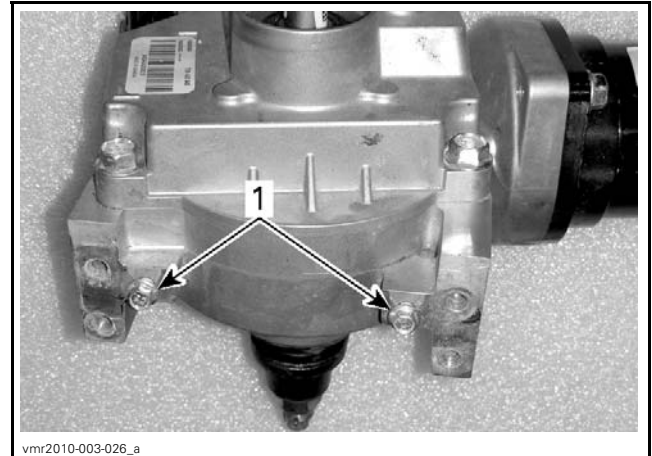
1. Hexagonal forming screws (1 each side)
2. Extraction holes
3. DPS unit

NOTE: As you pull the DPS unit from the frame support, the 2 tie rod ends should release from the pitman arm. Be careful not to loose the hardened steel washers on the tie rod ends.

DPS Unit Installation

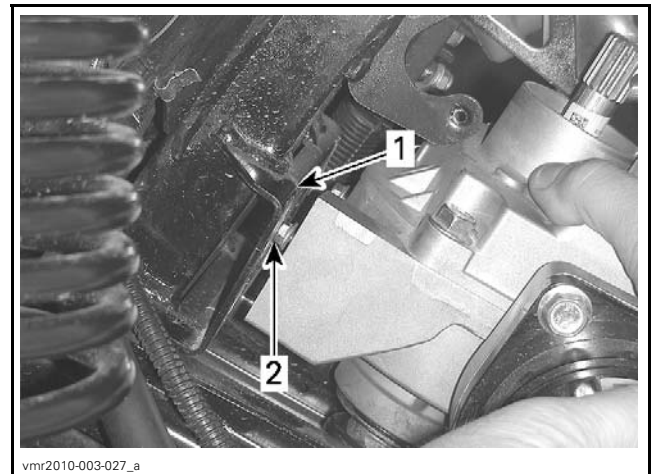
NOTICE The following procedure **MUST** be followed as specified. Failure to do so may result in steering column/DPS misalignment and poor DPS operation due to an induced erroneous torque on the DPS shaft.

1. If installing a new DPS unit, install the two M5 hexagonal forming screws on the mounting flange of the DPS unit.



1. Hexagonal forming screws

2. Position the DPS unit on the frame DPS mounting bracket by engaging the two hexagonal forming screws in the slots provided in the bracket.



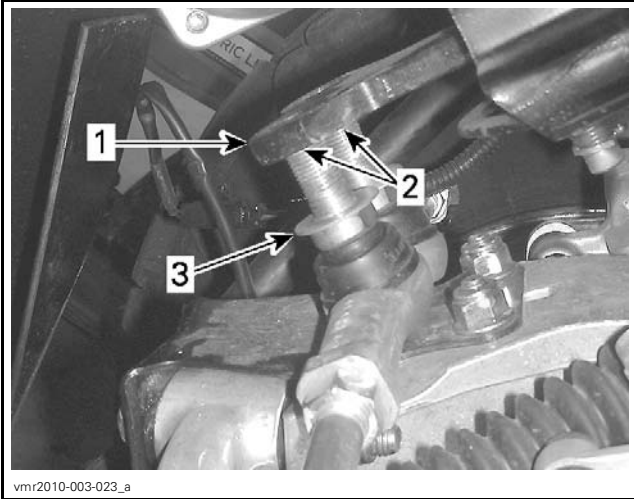
1. DPS mounting bracket
2. Engage hexagonal forming screw on DPS unit here

3. Engage the 2 tie rod ends in the pitman arm as you lower the DPS unit on it's mounting bracket.

NOTE: Ensure both tie rod ends has a hardened steel washer on it.

Section 01 TECHNICAL MANUAL

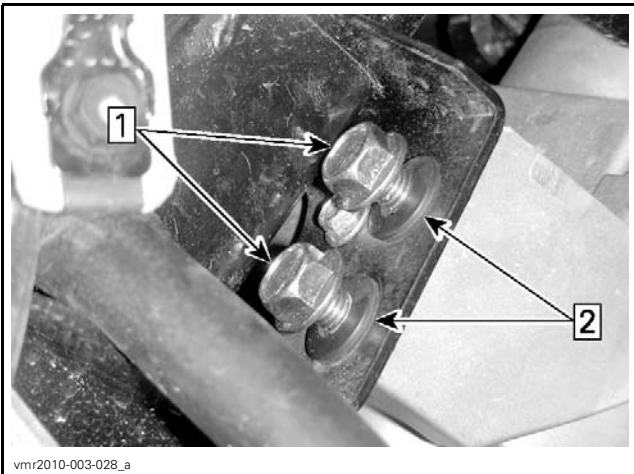
Subsection 01 (DYNAMIC POWER STEERING (DPS))



1. Pitman arm
2. Tie rod ends inserted in pitman arm
3. Hardened steel washer on tie rod end

4. Engage NEW M8 hexagonal flanged screws through the DPS frame support and into the DPS unit.

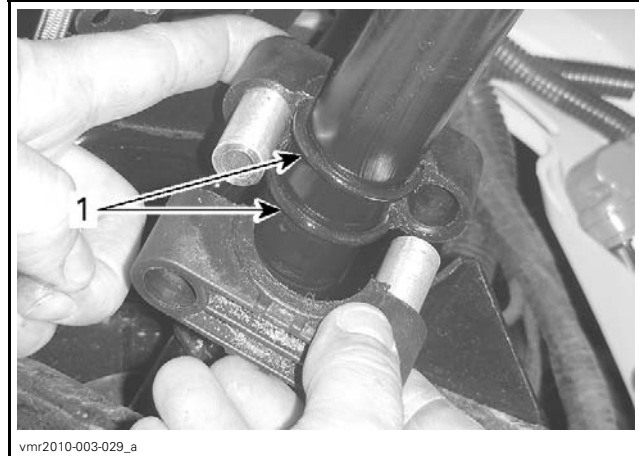
NOTE: Ensure each retaining screw has a NEW conical spring washer between the screw head and the DPS frame support. **Do not** tighten the retaining screws more than half thread length at this time.



TYPICAL - RH SIDE ILLUSTRATED

- Step 1: Engage NEW DPS mounting screws (2 each side)
Step 2: Install NEW conical washers

5. Remove the two half bushings from the steering column and ensure the two O-ring seals are installed on the shaft and in good condition. Replace as required.



1. O-ring seals on steering column

6. Index steering column splines with DPS unit splines.

NOTE: The DPS shaft splines have a key which must be aligned with the keyway in the steering column end.

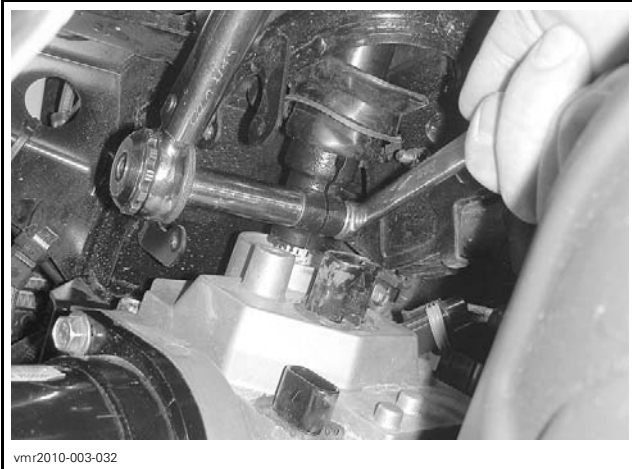


STEERING COLUMN INDEXED TO DPS SHAFT SPLINES

7. Fully insert steering column end onto DPS shaft splines. If necessary, place a rag on steering cover and gently tap on it with a plastic hammer.

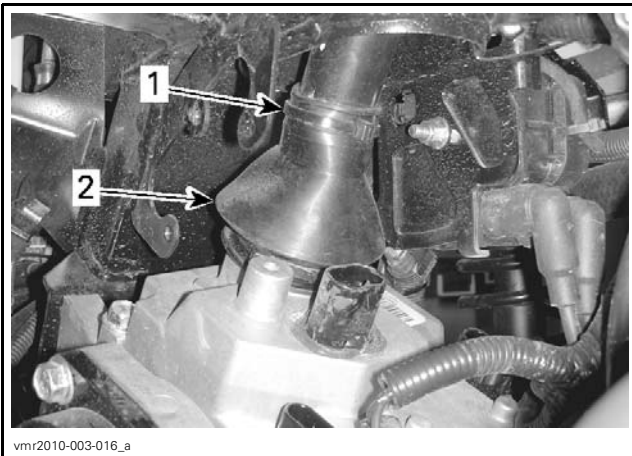
NOTICE The following steps **MUST** be followed as specified. Failure to do so may result in steering column/DPS misalignment and poor DPS operation due to an induced erroneous torque on the DPS shaft.

8. Install steering column pinch bolt and a NEW elastic nut. Torque nut to 24 N•m (18 lbf•ft).

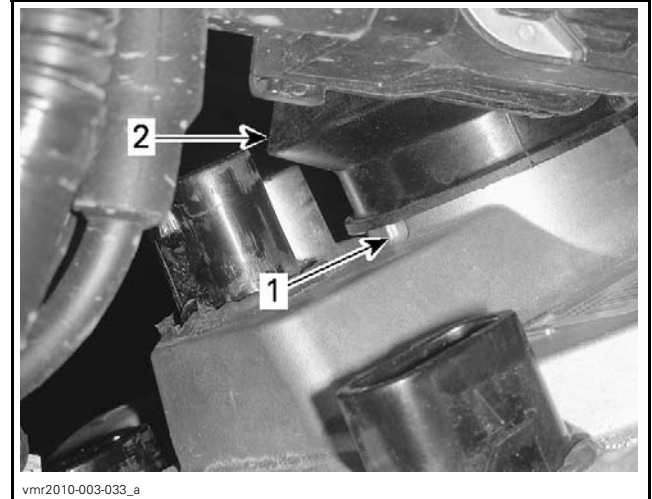


Pull bellows down over steering column bolt and edge of DPS unit housing extension. Secure bellows using the appropriate locking tie.

NOTE: Ensure the locking tie is on the tube part of the steering column, **not** on the forged end. Bellows should cover end of ring flange on DPS unit but **not** cover the drainage hole at the bottom of the ring flange. **Do not** install a locking tie on the DPS end of the bellows. Lower portion of bellows **MUST** remain floating over the DPS housing.

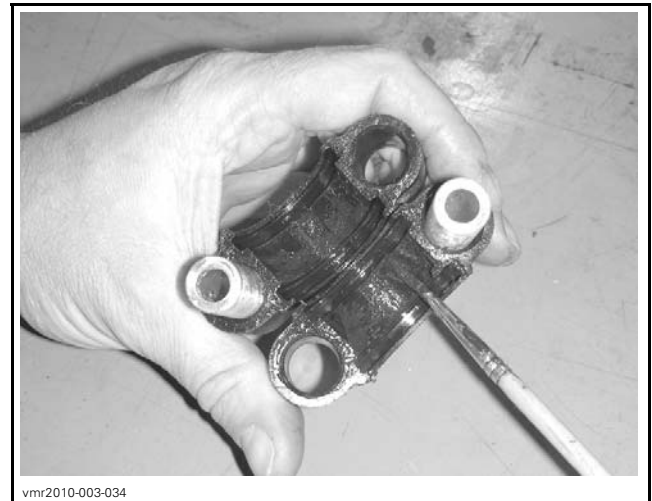


1. Locking tie location
2. Steering column bellows



1. Drainage hole in DPS ring flange
2. Steering column bellows

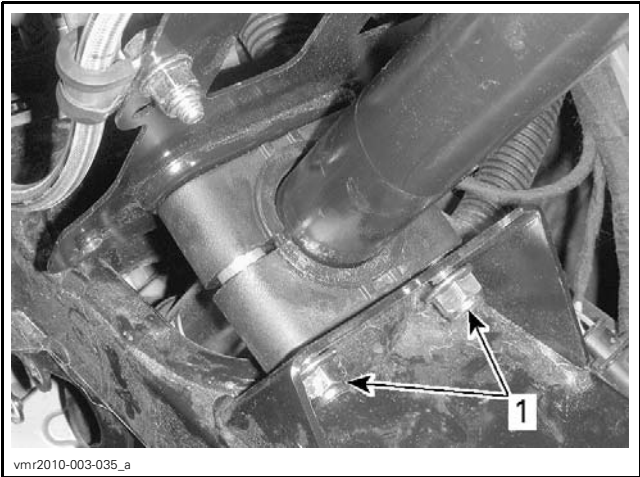
9. Apply XPS SYNTHETIC GREASE (P/N 293 550 010) to the inside of both steering column half bushings.



10. Loosely secure the steering column to its frame support by installing the following parts to provide side to side alignment of steering column.
 - Half bushings (x2)
 - Metal sleeves between bushings (x2)
 - O-ring seals (x2)
 - M8 hexagonal screws (x2)
 - M8 elastic nuts (x2).

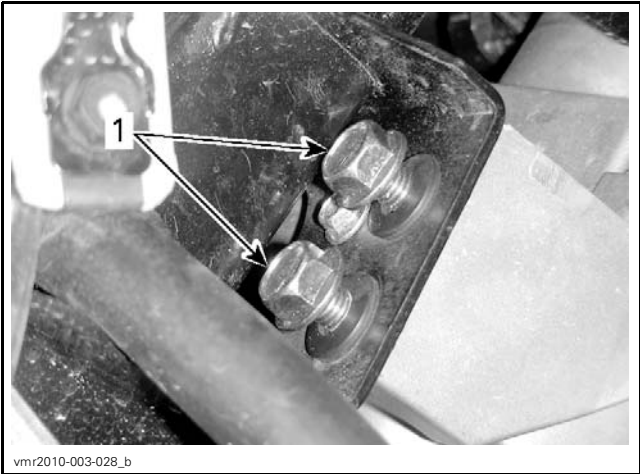
NOTE: Do not install shims and do not torque the fasteners at this time. Hand tighten only. Steering column **must not** be drawn in towards the column support.

Section 01 TECHNICAL MANUAL
Subsection 01 (DYNAMIC POWER STEERING (DPS))



1. These nuts installed hand tight at this time

11. Torque DPS unit mounting screws to 24.5 N•m (18 lbf•ft).



TYPICAL - RH SIDE ILLUSTRATED
1. Torque DPS mounting screws (x4)

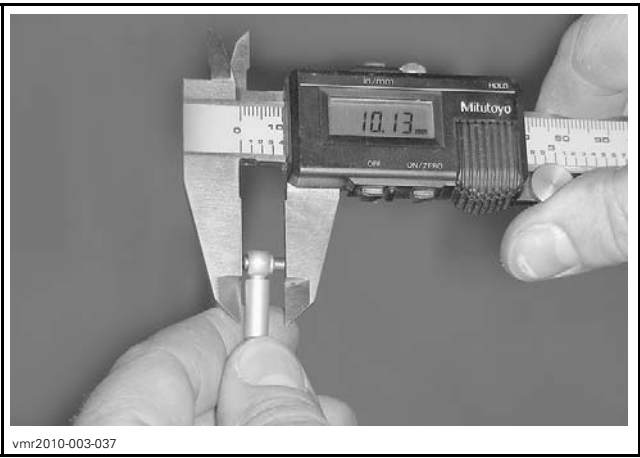
12. Using an 8 mm (5/16 ft) telescoping gauge as found in the SNAP-ON® TELESCOPING GAUGE SET (P/N LST 52616), measure the distance between the steering column shaft and the face of the column frame support. Measurement is taken above rear half bushing.



STEERING COLUMN SHIM MEASUREMENT

NOTE: Ensure the forward end of the tool is in the center of the steering column, and the rearward end does not protrude through the notch in the support.

13. Measure the telescoping gauge using a Vernier caliper (or a micrometer) and compare the measured distance to the following table to establish the required shim thickness



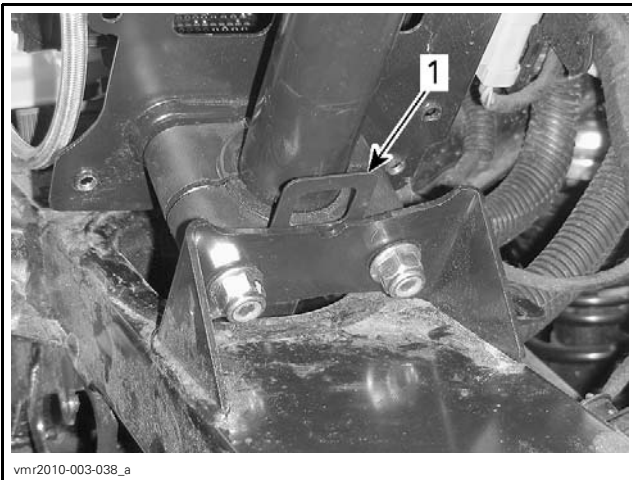
STEERING COLUMN SHIM REQUIREMENT	
MEASURED DISTANCE	TOTAL SHIM THICKNESS REQUIRED
8.63 mm (.34 in)	None
9.63 mm (.379 in)	1 mm (.039 in)
10.65 mm (.419 in)	2 mm (.079 in)
11.66 mm (.459 in)	3 mm (.118 in)
12.65 mm (.498 in)	4 mm (.157 in)

NOTE: Shims come in 1 mm (.039 in) and 2 mm (.079 in) thicknesses. Total shim thickness **must not exceed** 4 mm (.157 in).

If total shim thickness exceeds 4 mm (.157 in), carry out the following:

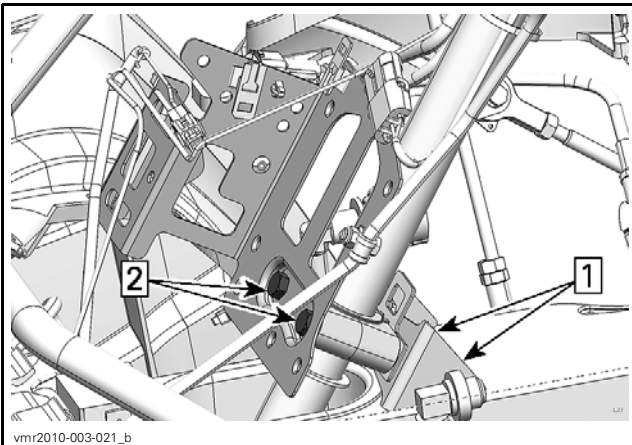
- Re-measure the distance between steering column and support. Ensure the forward end of the tool is in the center of the steering column, and the rearward end does not protrude through the notch in the support.
- Check steering column support and frame to ensure they are not bent, twisted or damaged in any way.
- Check machined flat mounting surface on new DPS.
- Compare old and new DPS units.
- Ensure the 4 DPS mounting screws and the steering column pinch bolt are properly torqued.

14. Insert appropriate shim(s) between the rear half bushing and the steering column support.



1. Insert required shim(s) here

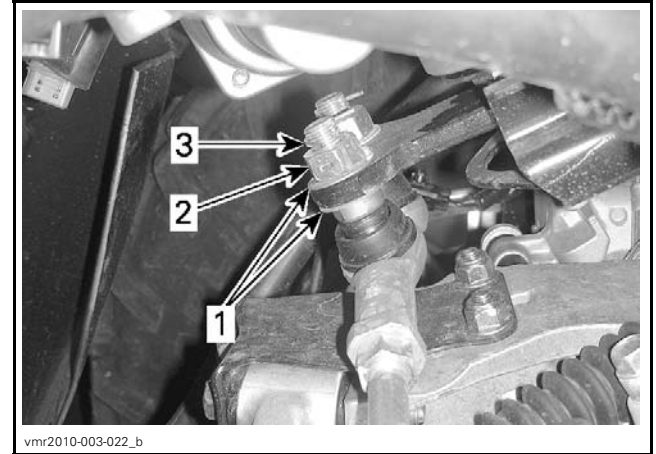
15. As you hold each elastic nut with a wrench, torque the hexagonal **SCREWS** retaining the steering column to 38 N•m (28 lbf•ft).



Step 1: Hold elastic nuts with wrench (not illustrated)
Step 2: Apply specified torque to hexagonal screws

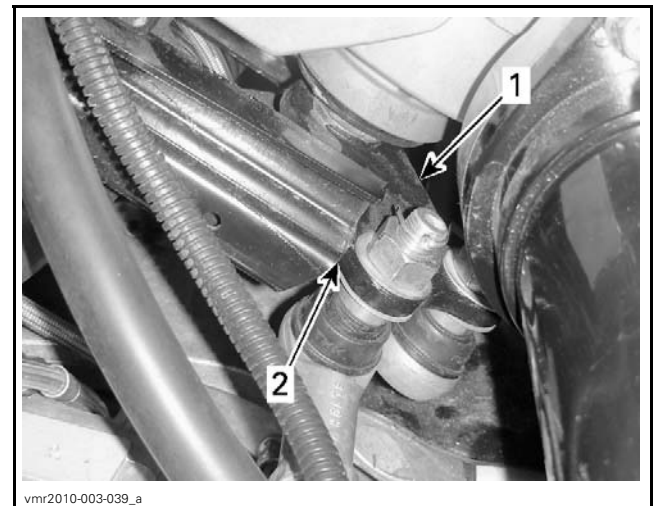
NOTE: If torque is applied to elastic nuts instead of hexagonal screw head, use 24.5 N•m (18 lbf•ft).

16. Install hardware on LH and RH tie rods on pitman arm. Follow parts assembly sequence as in following illustration.
17. Torque tie rod end retaining nuts to 72 N•m (53 lbf•ft).



1. Hardened steel washers (one each side of pitman arm)
2. Tie rod end retaining nut (torque applied)
3. NEW cotter pin installed

18. Turn handlebar fully to each side and check for proper contact between pitman arm and pitman arm frame stops (both sides).



TYPICAL - LH ILLUSTRATED

1. Pitman arm
2. Contact point with frame stop

NOTE: Contact between pitman arm and pitman arm stops must be checked with vehicle weight on wheels.

19. Perform a *STEERING ALIGNMENT* as described in the applicable Shop Manual subsection.

Section 01 TECHNICAL MANUAL

Subsection 01 (DYNAMIC POWER STEERING (DPS))

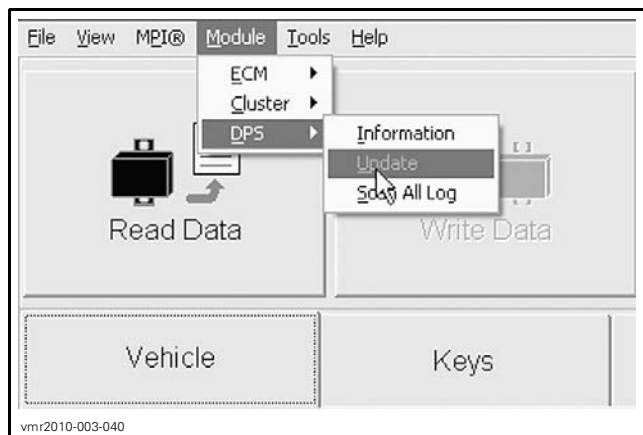
20. Install and connect ECM. Torque ECM mounting screws to 7 N•m (62 lbf•in).
21. Install dash board and reconnect the following:
 - Multifunction gauge
 - Ignition switch
 - 12 Vdc accessories outlet.
22. If installing a replacement DPS unit, refer to *DPS REPLACEMENT* in this subsection.
23. Perform the torque offset reset. Refer to *TORQUE OFFSET RESET* in this subsection.
24. Install all other removed parts in the reverse order of removal.
25. Carry out a test ride of the ATV to ensure proper operation of the DPS unit.

DPS Unit Replacement

New DPS units **do not** come with the required software programmed into the unit. A DPS unit fault will be generated when the vehicle is powered up. The check engine light will come on and a DPS FAULT message will appear in the multifunction gauge.

When DPS unit installation is complete, carry out the following steps.

1. Connect the ATV to the latest B.U.D.S. software.
2. Select the **Read Data** button.
3. In the **Module** menu, choose the **DPS** sub-menu and install the latest DPS software **Update** file as applicable to the type ATV (Outlander or Renegade).



DPS SOFTWARE UPDATE

4. Once the correct DPS software file is installed, go to the **Faults** page and clear the fault codes.
5. Carry out the *TORQUE OFFSET RESET* procedure as described in this subsection.

6. Test drive the ATV to ensure proper DPS operation.

PITMAN ARM

If the pitman arm requires replacement, the DPS unit **MUST** be replaced.

WARNING

DO NOT attempt to replace or repair the pitman arm. Do not use a torch or arc welder on the pitman arm. Failure to comply will result in DPS unit malfunction.

AIR CONTROLLED SUSPENSION (ACS)

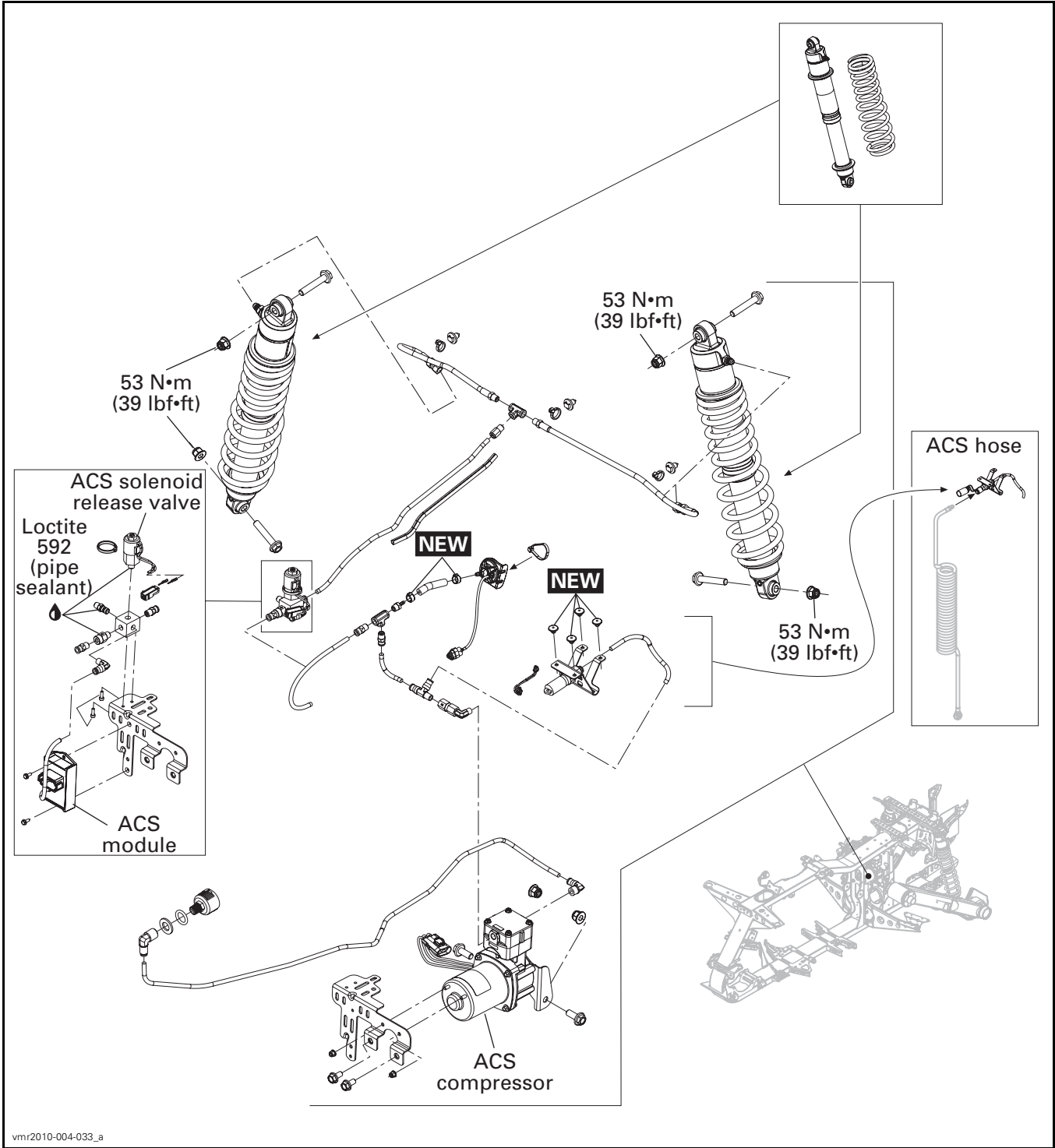
SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	32, 35, 37–38, 43–44
OETIKER PLIERS.....	295 000 070	44
SPRING REMOVER.....	529 036 007	46

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 592 (PIPE SEALANT)	293 800 018	33–34, 41, 47

Section 01 TECHNICAL MANUAL
Subsection 02 (AIR CONTROLLED SUSPENSION (ACS))



GENERAL

During assembly/installation, use torque values and service products as in the exploded views.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
 Locking devices (e.g.: locking tabs, cotter pins, etc.) must replaced with new ones.

Hoses, cables or locking ties removed during a procedure must be reinstalled as per factory standards. Hoses must be properly inserted.

Be careful while manipulating nylon hoses, they must not be kinked.

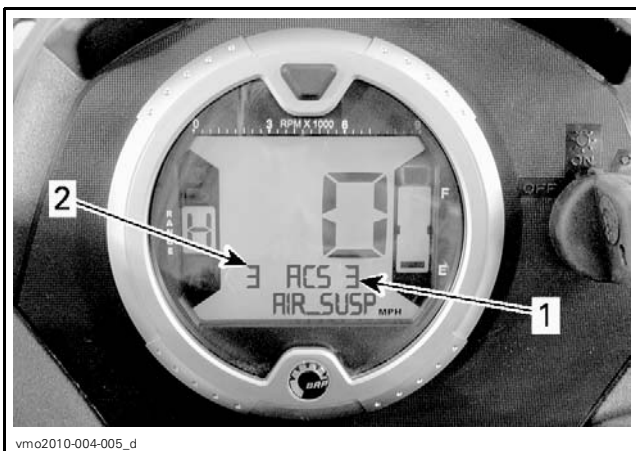
⚠ CAUTION Always wear safety goggles when working with pressurized air system.

⚠ CAUTION The ACS suspension system may be under high pressure (up to 6bar (85PSI)). Release air pressure prior to working on the system. Refer to *RELEASING AIR PRESSURE IN SYSTEM FOR SERVICING*.

SYSTEM DESCRIPTION (FEATURES)

The ACS suspension automatically keeps air pressure constant with changing rider weights or loads applied. The system can be adjusted on the fly to suit rider's preferences.

The multifunction gauge indicates suspension setting as follows.



1. Requested setting (set point)
2. Actual setting (pressure transducer reading)

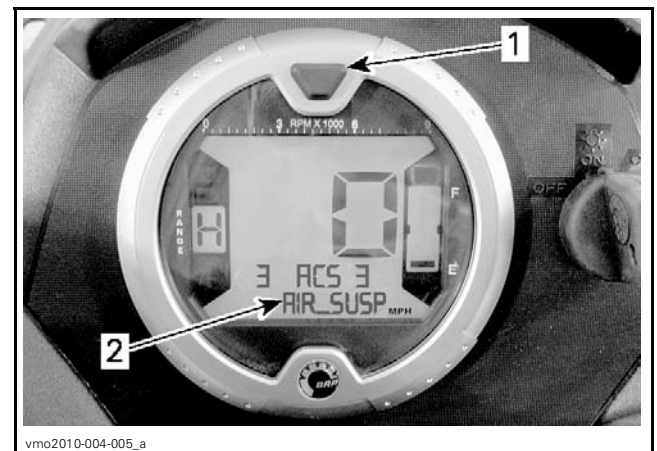
Refer to the following table to know the ACS pressure related to multifunction gauge setting.

ACS SUSPENSION SETTINGS			
SETTING	PRESSURE	RIDING COMFORT	RECOMMENDED LOAD
ACS 1	0.5 bar (8 PSI)	Softest	Operator only
ACS 2	1 bar (15 PSI)	Soft	
ACS 3	2 bar (30 PSI)	Semi-soft	Transporting a passenger OR a cargo
ACS 4	4 bar (55 PSI)	Semi-firm	
ACS 5	5 bar (70 PSI)	Firm	Transporting a passenger AND a cargo
ACS 6	6 bar (85 PSI)	Firmest	

Changing ACS Setting

To change the ACS setting proceed as follows:

- Press selector button several times until *AIR_SUSP* is displayed.
- Press and release **ACS** button until the requested setting is displayed.



1. Selector button
2. *AIR_SUSP* displayed



- TYPICAL**
1. ACS button

The requested setting is controlled by the ACS electronic module. The module is equipped with a pressure transducer to keep air pressure constant in the system. Depending on the rider adjustment, the module will increase pressure using the compressor or release pressure using the solenoid release valve.

ACS Setting Acknowledgement

If ACS suspension was set to *ACS 5* or *ACS 6* before shutting down the vehicle, the multifunction gauge will scroll an acknowledgement message at startup.

To acknowledge the ACS suspension setting, press and release **ACS** button while message appears.



TYPICAL
1. ACS button

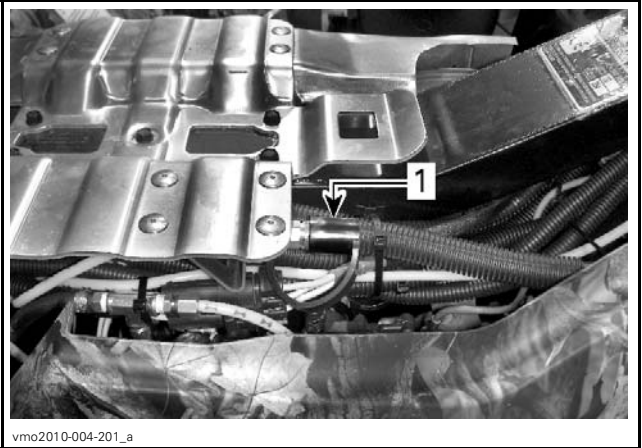
NOTE: If the message is not acknowledged, the suspension will automatically return to setting *ACS 3*.

NOTE: If the selector button in the multifunction gauge is pressed while the acknowledgement message appears, the suspension will directly return to setting *ACS 3*.

NOTE: If the vehicle transmission is set to REVERSE position at startup, the override message will be displayed instead of acknowledgement message.

Using the Auxiliary Line to Inflate Tires

The ACS system is equipped with an auxiliary line specially designed to inflate tires. The air pressure in this auxiliary line is controlled by a second pressure transducer connected to the ACS module.



1. Auxiliary line adaptor to inflate tire

To ensure that the use of the auxiliary line will not change the pressure setting inside shock absorber, the system has been divided in two zones using check valves. With this layout, both pressure zones are independent to eliminate any air pressure variation.

NOTE: The auxiliary line output pressure will vary according to the ACS suspension setting. The *ACS 1* adjustment will provide less pressure than the *ACS 6* adjustment.

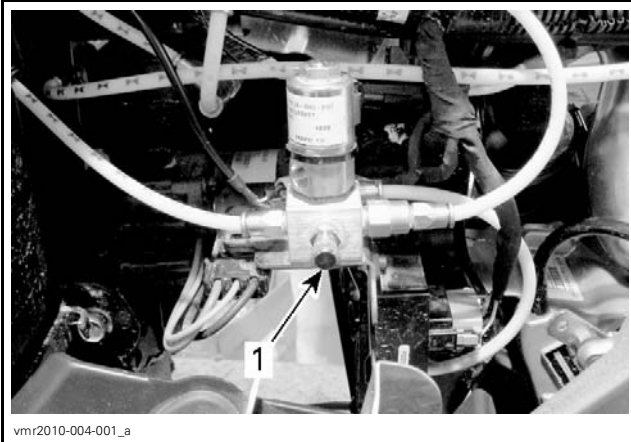
NOTICE Never inflate tires above the recommended pressure.

ACS SYSTEM		
ZONE	LINK WITH	PRESSURE TRANSDUCER LOCATION
High-pressure zone	Shock absorbers	Inside ACS module
Low-pressure zone	Auxiliary line	In line between solenoid release valve and compressor

Releasing Air Pressure in System for Servicing

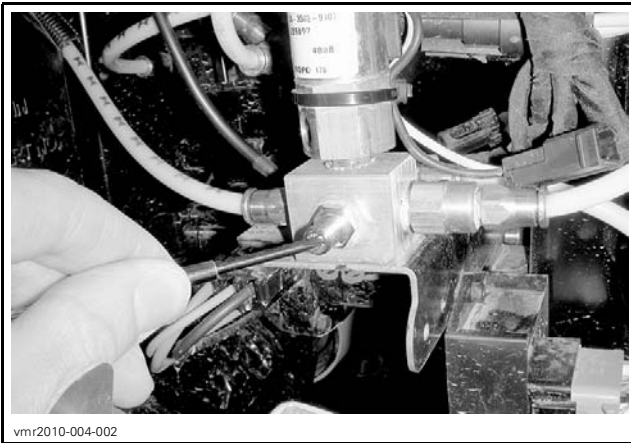
It is recommended to release air pressure in the system before servicing any components.

1. Remove seats.
2. Remove RH side panel.
3. Unscrew pneumatic valve cap.



1. Pneumatic valve cap

4. Push and hold pneumatic valve pin using a small screwdriver.



5. Wait until the system is completely empty of air.

NOTE: Make sure to wait enough time in order to let the system expel the air. (no more pressurized air sound from the valve).

6. Reinstall pneumatic valve cap.

SYSTEM DESCRIPTION (COMPONENTS)

Fuse and Relay

ACS Fuse (F14)

1. ACS fuse (F14) is located in the front fuse box.

FRONT FUSES BOX		
NO	DESCRIPTION	RATING
F14	ACS	20 A



TYPICAL - FRONT SERVICE COMPARTMENT

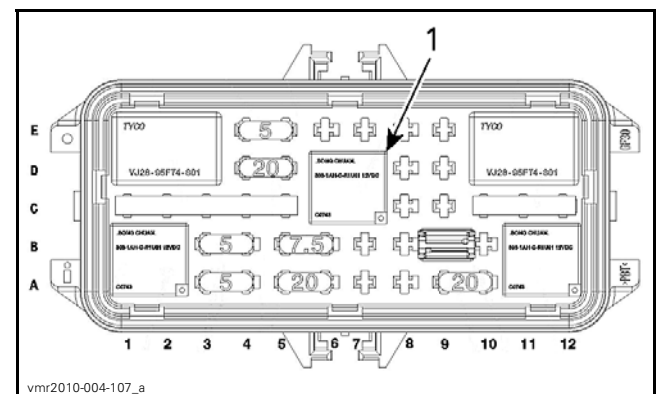
1. Front fuse box

ACS Compressor Relay (R5)

Compressor relay is located in the front fuse box, under front service compartment panel. Note that the relay is not at the same position on a 500 LTD and on a 800R LTD models. Refer to the following table.

RELAY (R5) TERMINAL	FRONT FUSE BOX PIN	
	500 LTD	800R LTD
86	6D	11B
85	7C	12A
30	7D	12B
87	6C	11A

Outlander 500 LTD



OUTLANDER 500 LTD MODEL

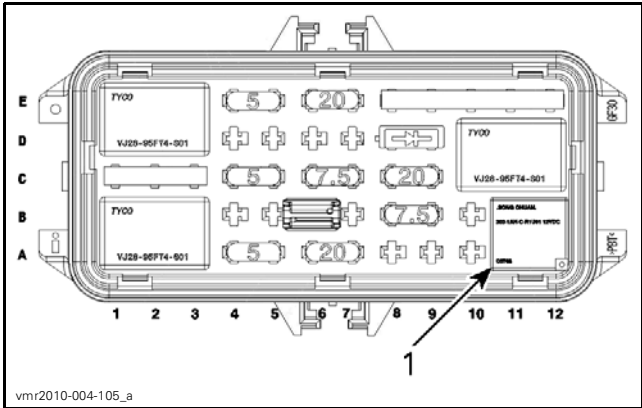
1. ACS compressor relay (R5)

Section01

TECHNICAL MANUAL

Subsection 02 (AIR CONTROLLED SUSPENSION (ACS))

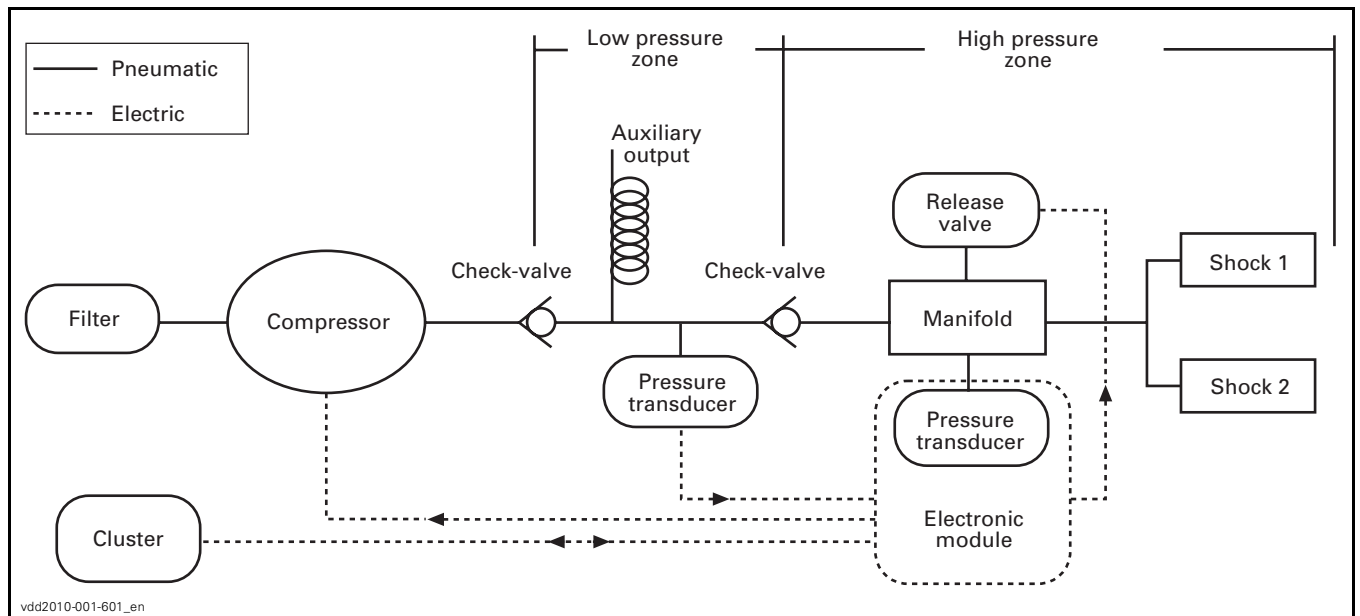
Outlander 800R LTD



OUTLANDER 800R LTD MODEL
1. ACS compressor relay (R5)

ACS Main Components

ACS COMPONENTS	MAIN FUNCTION
Filter	To filter air intake of the compressor
Compressor	To pressurize the system
Solenoid release valve	To release air in the system
Electronic module	To control the compressor or the solenoid release valve
Manifold	To split the air hoses and allows to manually release air in the system
Pressure transducer (Low-pressure zone)	To monitor the air pressure of the auxiliary line
Pressure transducer (High-pressure zone)	To monitor the air pressure of the shock absorbers
Check valve (compressor)	To protect the compressor
Check valve (between both zones)	To eliminate air pressure variation between low and high pressure zone
Auxiliary line	To inflate tire
Cluster	To monitor the air pressure setting



TROUBLESHOOTING

DIAGNOSTIC TIPS

Error Code (AIR FAULT) Displayed in Gauge

The error code **AIR FAULT** can appear on the multifunction gauge for different reasons that are not necessarily related to a failure of the ACS system.

If the error code appears on the multifunction gauge, it indicates a disparity between the requested and the actual suspension settings. The system should react to correct this situation and the error code will disappear.

If the error code remains active for a long period, it may indicate a major leak in the system. In this case, the module will automatically shut down the compressor to prevent it from overheating. The shut down procedure of the compressor will stay active until the next restart of the vehicle (key OFF, key ON).

If there is a major leak in the system, check the system for leakage, refer to *ACS SYSTEM LEAK TEST (TROUBLESHOOTING WITH B.U.D.S.)* subsection.

Error Code Displayed and Suspension Setting Can Not Be Adjusted

If there is no leak, it is probably an electrical problem. In this case, an electrical failure of the compressor or the solenoid valve will result in the impossibility to change the actual suspension setting.

After multiple attempts to change suspension setting, the module will activate error code **AIR FAULT**. Refer to *TROUBLESHOOTING GUIDELINES* for further troubleshooting procedure.

TROUBLESHOOTING GUIDELINES

Requested Setting Display Does Not Change in Gauge

1. Check the override/**ACS** button as detailed in *VERRIDE SWITCH* in the *LIGHTS GAUGE AND ACCESSORIES* subsection of the appropriate Shop Manual.

Suspension Setting Can Not Be Changed

1. Check the override/**ACS** button as detailed in *VERRIDE SWITCH* in the *LIGHTS GAUGE AND ACCESSORIES* subsection of the appropriate Shop Manual.

2. Check fuse (F14).
3. Check ACS module signal continuity.
4. Check ACS module input voltage.
5. Check ACS module ground.

Refer to *ACS MODULE* to see the complete testing procedures.

Suspension Setting Can Be Reached to Decrease Pressure Only

1. Check relay (R5).
2. Check ACS compressor operation.
3. Check ACS compressor input voltage.

Refer to *ACS COMPRESSOR* to see the complete testing procedures.

Suspension Setting Can Be Reached To Increase Pressure Only

1. Check ACS solenoid valve operation.
2. Check ACS solenoid valve input voltage.

Refer to *ACS SOLENOID VALVE* to see the complete testing procedures.

No Pressure Output from the Auxiliary Line

1. Ensure that ACS suspension setting is adjusted to *ACS 6* to provide the maximum air pressure in the auxiliary line.
2. Check pressure transducer for air leakage.
3. Check signal continuity of the auxiliary line pressure transducer.
4. Check input voltage of the auxiliary line pressure transducer.
5. Check ground of the auxiliary line pressure transducer.
6. Check compressor operation.

Multifunction Gauge Display Flickers OFF and Back ON

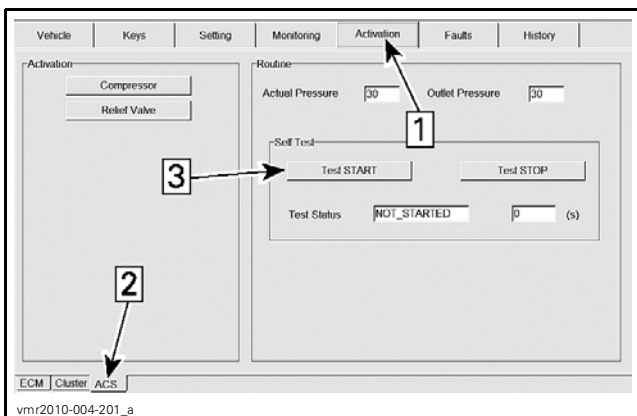
1. Check diode (D7) of the solenoid valve.

NOTE: The diode (D7) is located on the main harness near the ACS sub-harness junction. Refer to the appropriate *WIRING DIAGRAM* for location.

TROUBLESHOOTING WITH B.U.D.S.

ACS System Leak Test

1. Connect vehicle to B.U.D.S. Refer to *COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE* subsection of the appropriate Shop Manual.
2. Select **Activation** page.
3. Select **ACS** folder.
4. Press **Test START** button to proceed.

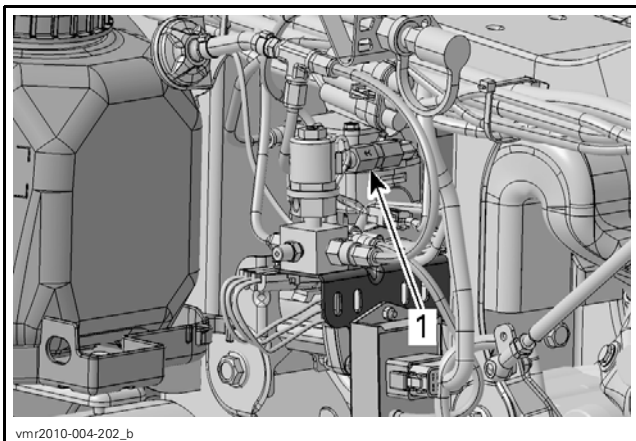


Step 1: Activation page
 Step 2: ACS folder
 Step 3: Leak Test START button

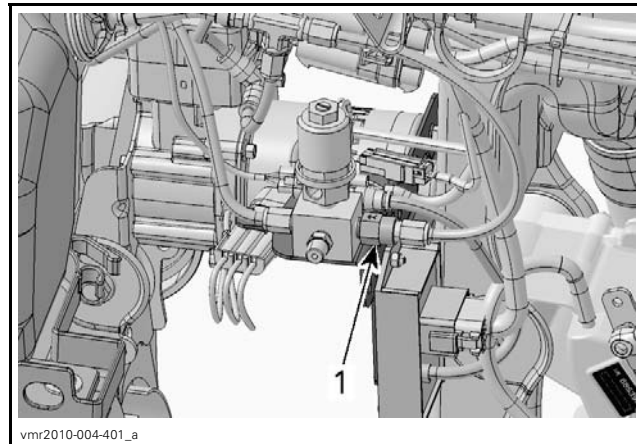
After pressing **Test START** button, the compressor will pressurize the air system at 6.5 bar (90 PSI) for approximately 2 minutes and B.U.D.S. will monitor the system for any leakage. The result will be indicated in the TEST STATUS box.

If a leak is detected, pressurize the system again and inspect hoses and fittings with soapy water to locate the faulty component.

If no leak is detected from hoses or fittings, inspect the compressor check valve and the auxiliary line check valve with soapy water.



1. Compressor check valve

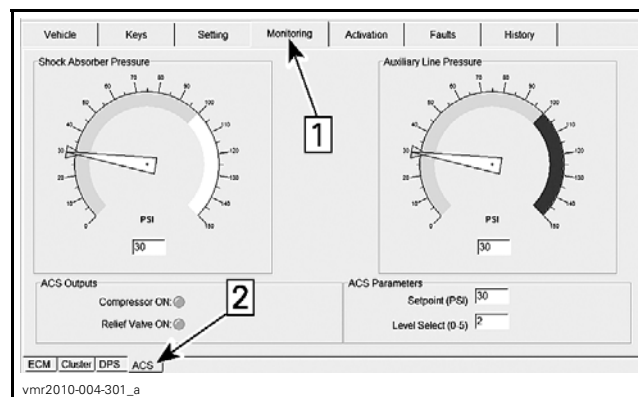


1. Auxiliary line check valve

ACS Air Pressure Monitoring

To monitor air pressure in the system during troubleshooting operation, proceed as follows:

1. Connect vehicle to B.U.D.S. Refer to *COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE* subsection of the appropriate Shop Manual.
2. Select **Monitoring** page.
3. Select **ACS** folder.



Step 1: Monitoring page
 Step 2: ACS folder

PROCEDURES

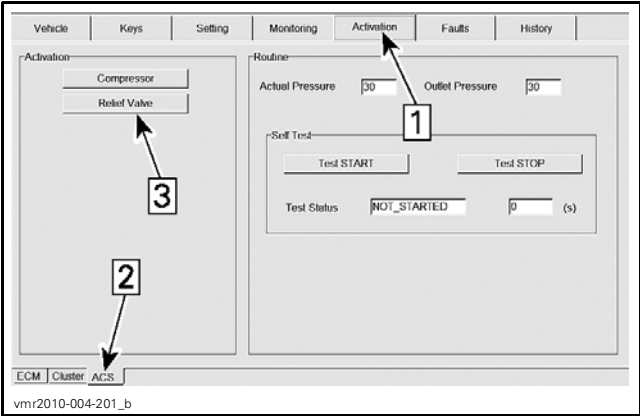
ACS SOLENOID VALVE

ACS Solenoid Valve Operation Test

1. Connect vehicle to B.U.D.S. Refer to *COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE* subsection of the appropriate Shop Manual.
2. Select **Activation** page.
3. Select **ACS** folder.
4. Press **Relief Valve** button to proceed.

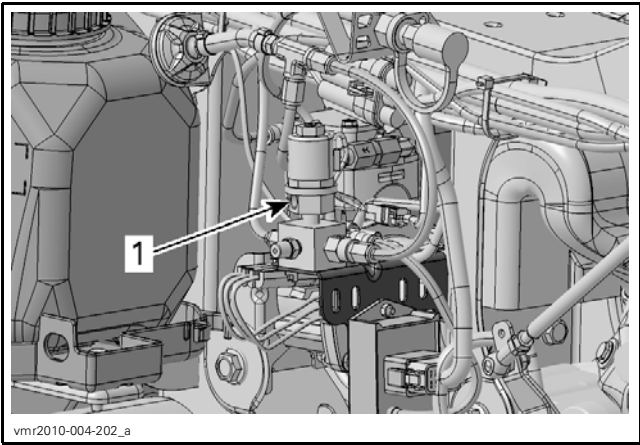
Section 01 TECHNICAL MANUAL

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Step 1: Activation page
Step 2: ACS folder
Step 3: Solenoid valve operation test button

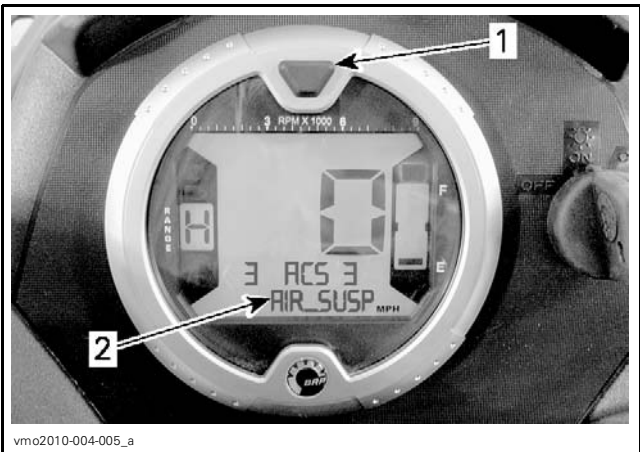
5. Verify that air exits from side port to confirm proper solenoid operation.



1. Side port

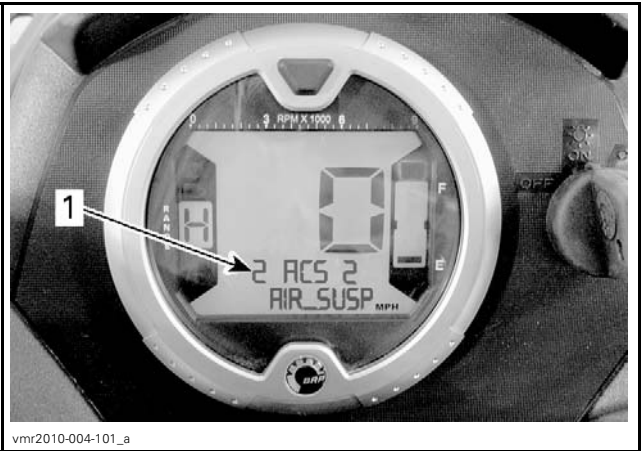
ACS Solenoid Valve Input Voltage Test

1. Remove seats and RH side panel.
2. Place ignition switch to ON position.
3. Press selector button several times until *AIR_SUSP* is displayed.



1. Selector button
2. *AIR_SUSP* displayed

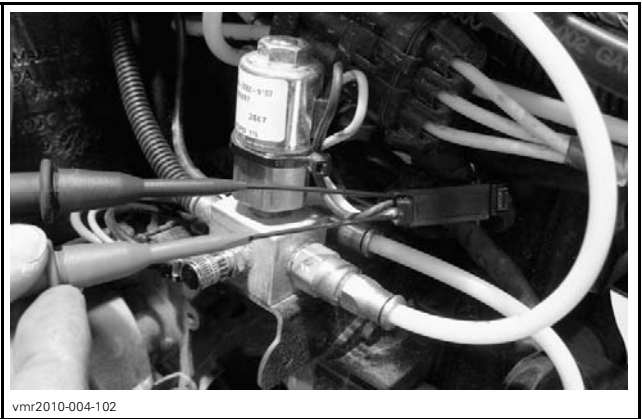
4. Set suspension mode to **ACS 2** using the ACS button.
5. Wait until the actual setting shows 2 (LH display).



1. Actual setting (pressure transducer reading)

NOTE: Make sure to wait enough time in order to let the system adjust the air pressure.

6. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc.
7. Back probe solenoid connector (without disconnecting).



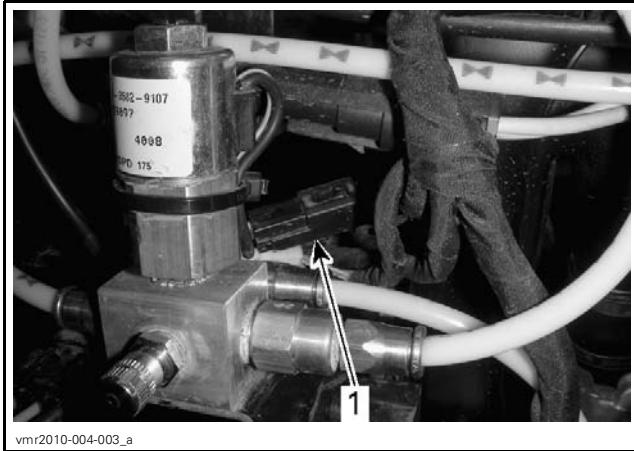
8. Set suspension mode to **ACS 1** using the ACS button.
9. Measure voltage between solenoid connector terminals as per the following table.

TEST PROBES	VOLTAGE
Pin 2 (YL/GN)	Battery voltage (± 12 Vdc)
Pin 1 (BK)	

ACS Solenoid Valve Removal

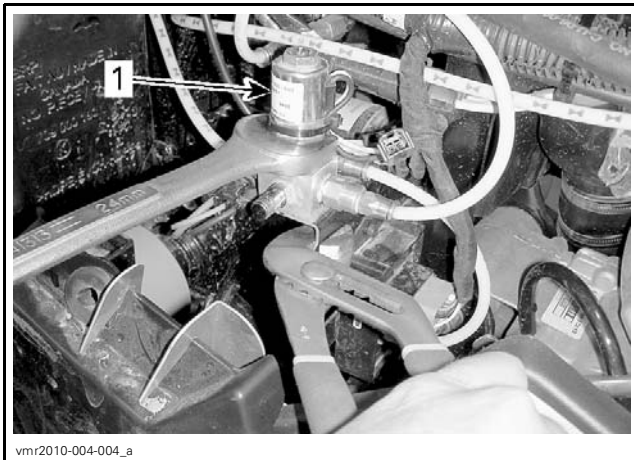
1. Release air pressure, refer to *RELEASING AIR PRESSURE IN SYSTEM FOR SERVICING* in this subsection.

2. Disconnect solenoid valve connector.



1. Solenoid valve connector

3. Unscrew solenoid valve from manifold while holding support.



1. Solenoid valve

ACS Solenoid Valve Installation

The installation procedure is the reverse of removal procedure, however pay attention to the following.

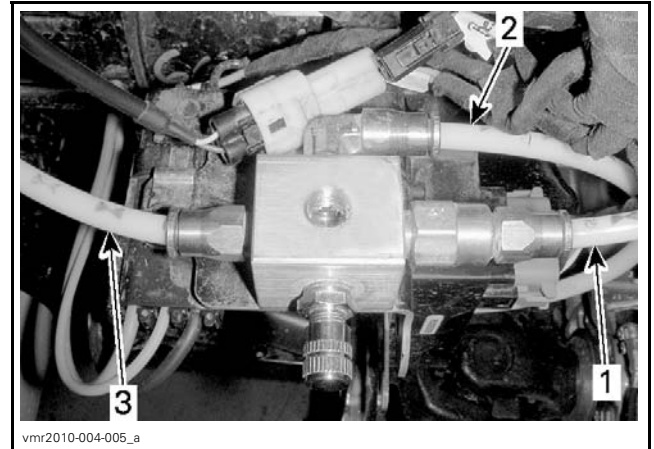
Apply LOCTITE 592 (PIPE SEALANT) (P/N 293 800 018) on solenoid valve male threads.

ACS MANIFOLD

ACS Manifold Removal

1. Release air pressure, refer to *RELEASING AIR PRESSURE IN SYSTEM FOR SERVICING* in this subsection.
2. Remove solenoid valve. Refer to *ACS SOLENOID VALVE REMOVAL*.
3. Disconnect the following hoses from manifold air fittings.
 - Manifold air inlet hose (from compressor)

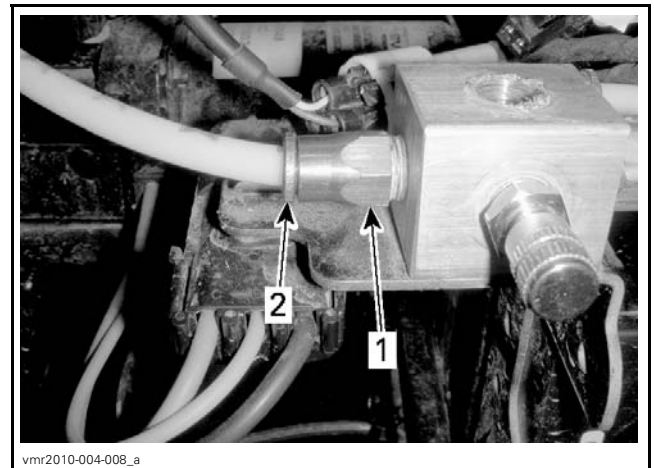
- Module hose
- Shocks hose.



1. Manifold air inlet hose (from compressor)
2. Module hose
3. Shocks hose

4. To disconnect hoses, proceed as follows:

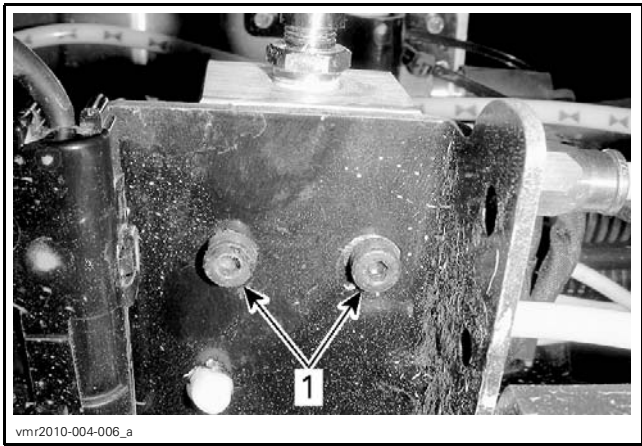
- 4.1 Push fitting ring toward manifold.
- 4.2 Hold ring in place.
- 4.3 Pull air hose.



1. Fitting
2. Fitting ring

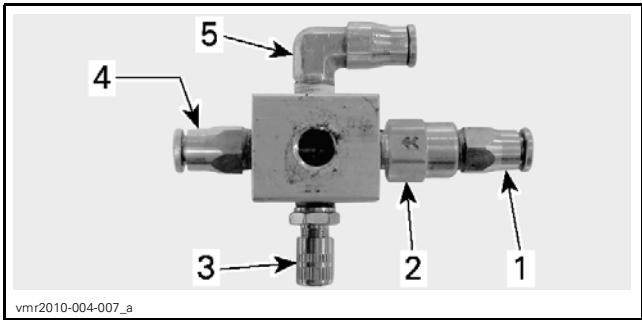
5. From underneath support, remove manifold retaining screws.

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1. Retaining screws

6. Unscrew air fittings, pneumatic valve and check valve.



1. Manifold air inlet fitting (from compressor)
2. Auxiliary line check valve
3. Pneumatic valve
4. Shocks fitting
5. Module fitting

ACS Manifold Installation

The installation procedure is the reverse of removal procedure, however pay attention to the following.

If fitting is the one previously removed (old one), apply LOCTITE 592 (PIPE SEALANT) (P/N 293 800 018) on all male threads.

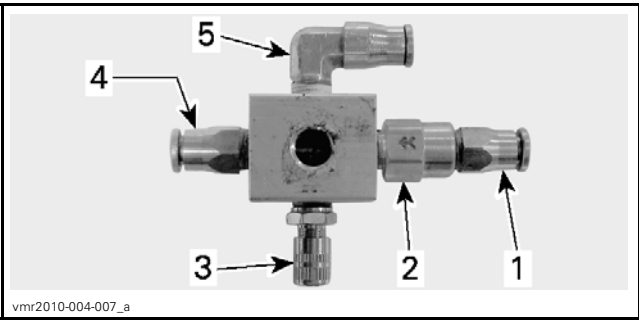
If fitting is a new one, do not apply sealant, it should be already applied on male threads.

On pneumatic valve, check valve, and solenoid valve, apply LOCTITE 592 (PIPE SEALANT) (P/N 293 800 018) on all male threads.

Install check valve with arrows pointing toward manifold.

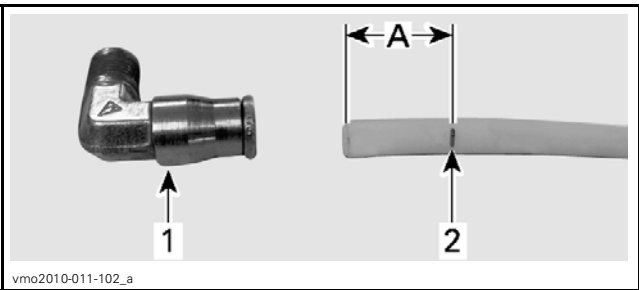


Install air fittings, pneumatic valve and check valve as follows.

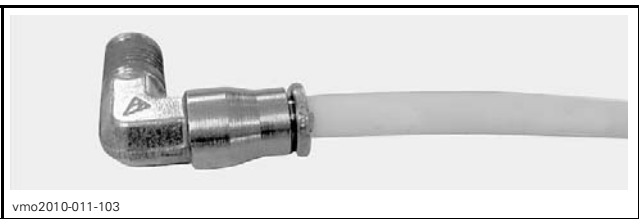


RETAINING SCREWS ARE OFFSET TOWARD MODULE FITTING
1. Manifold air inlet fitting (from compressor)
2. Auxiliary line check valve
3. Pneumatic valve
4. Shocks fitting
5. Module fitting

Ensure that air hoses are properly inserted into fittings, refer to the following illustrations.



PUSH HOSE UNTIL THE MARK IS COMPLETELY INSERTED
1. Fitting
2. Mark
A. Must be inserted into fitting

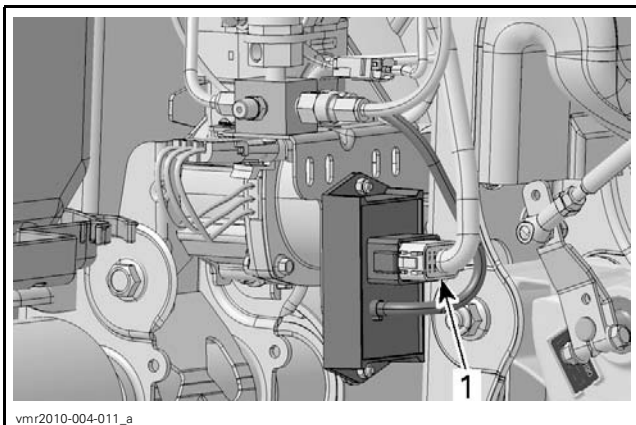


HOSE PROPERLY INSERTED INTO FITTING

ACS MODULE

ACS Module Signal Circuit Continuity Test

1. Remove seats and RH side panel.
2. Disconnect multifunction gauge from vehicle.
Refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection of the appropriate Shop Manual.
3. Disconnect ACS module connector.



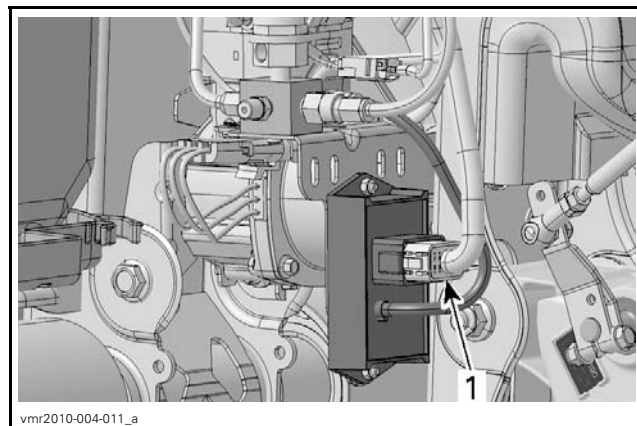
1. Module connector

4. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Ω .
5. Measure resistance as per the following tables.

TEST PROBES	RESISTANCE
Gauge pin 18 (BK/BE)	Close to 0 Ω
Module pin 5 (BE/GN)	
TEST PROBES	RESISTANCE
Gauge pin 19 (BE/GN)	Close to 0 Ω
Module pin 6 (WH/BE)	

ACS Module Input Voltage Test

1. Remove seats and RH side panel.
2. Disconnect module connector.



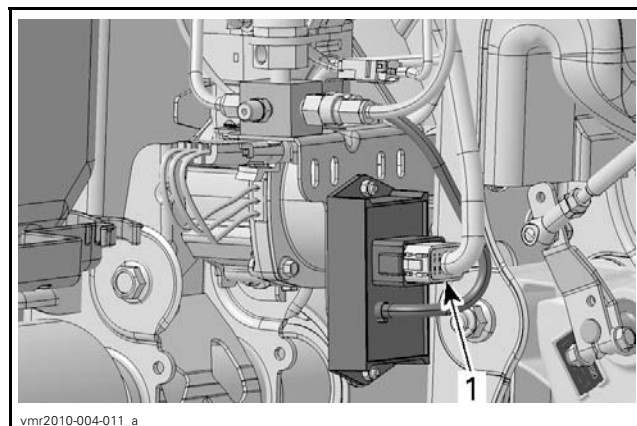
1. Module connector

3. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc.
4. Place ignition switch to ON position.
5. Measure voltage as per the following table.

TEST PROBES	VOLTAGE
Pin 12 (OR/GN)	Battery voltage ($\pm$ 12 Vdc)
Battery negative (-) post	

ACS Module Ground Test

1. Remove seats and RH side panel.
2. Disconnect module connector.



1. Module connector

3. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc.
4. Place ignition switch to ON position.
5. Measure voltage as per the following table.

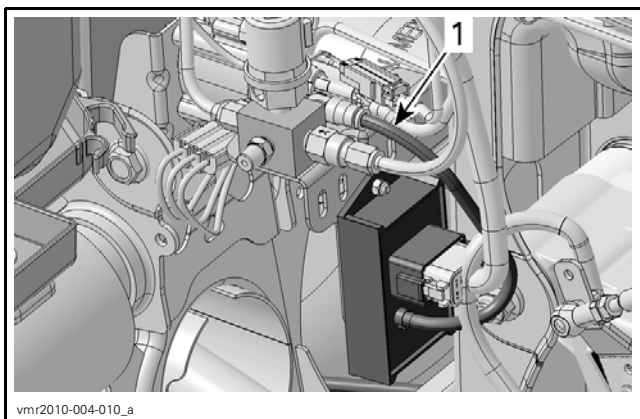
TEST PROBES	VOLTAGE
Pin 7 (BK)	Battery voltage ($\pm$ 12 Vdc)
Battery positive (+) post	

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Subsection 02 (AIR CONTROLLED SUSPENSION (ACS))

ACS Module Removal

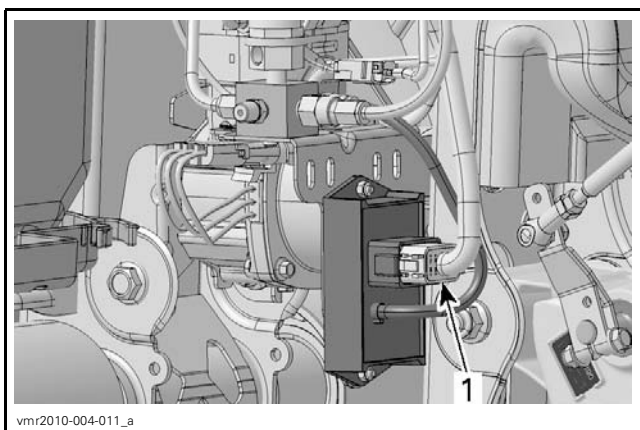
1. Release air pressure, refer to *RELEASING AIR PRESSURE IN SYSTEM FOR SERVICING* in this subsection.
2. Disconnect module hose from manifold air fitting as follows:
 - 2.1 Push fitting ring toward manifold.
 - 2.2 Hold ring in place.
 - 2.3 Pull air hose.



1. Module hose

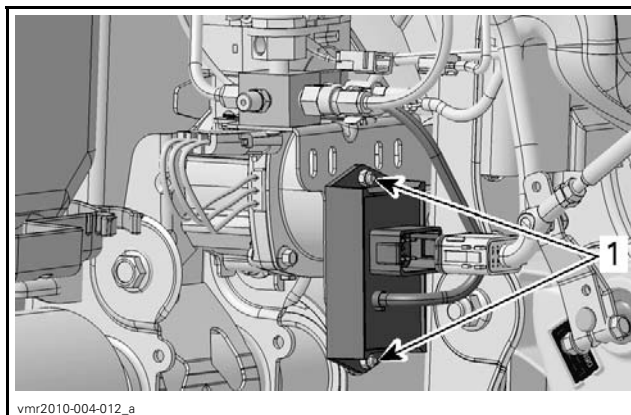
NOTICE Do not attempt to disconnect hose from module.

3. Disconnect module connector.



1. Module connector

4. Remove module retaining bolts and nuts.



1. Module retaining bolt

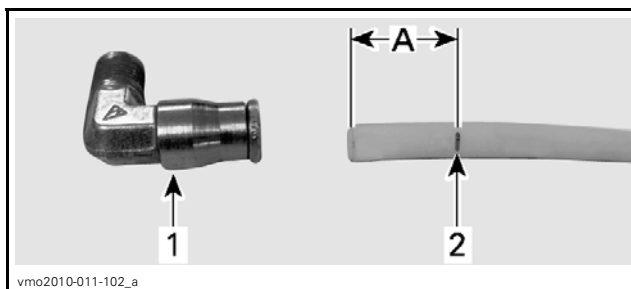
5. Remove module from vehicle.

ACS Module Installation

The installation procedure is the reverse of removal procedure, however pay attention to the following.

If a new ACS module is installed, check diode (D7) of the solenoid valve to ensure that it is not defective as it can damage the ACS module. The diode (D7) is located on the main harness near the ACS sub-harness junction. Refer to the appropriate *WIRING DIAGRAM* for diode location.

Ensure that air hoses are properly inserted into fittings, refer to the following illustrations.

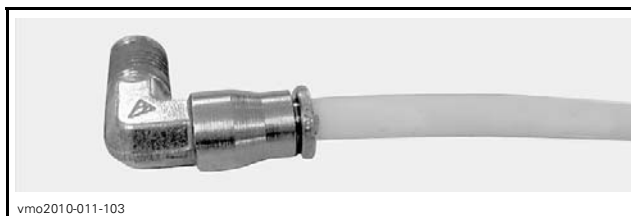


PUSH HOSE UNTIL THE MARK IS COMPLETELY INSERTED

1. Fitting

2. Mark

A. Must be inserted into fitting



HOSE PROPERLY INSERTED INTO FITTING

ACS COMPRESSOR RELAY (R5)

ACS Relay Continuity Test

1. Remove relay (R5), refer to *FUSE AND RELAY* at the beginning of this section.
2. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Ω .
3. Measure resistance as per the following table.

TEST PROBES	RESISTANCE
Terminal 30	Open (OL)
Terminal 87	

4. Apply 12 volts on terminals 86 and 85.
5. Measure resistance again as per the following table.

TEST PROBES	RESISTANCE
Terminal 30	Close to 0 Ω
Terminal 87	

If results are not as per the above tables, replace relay.

ACS Relay Input Voltage Test

1. Remove relay (R5), refer to *FUSE AND RELAY* at the beginning of this section.
2. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc.
3. Place ignition switch to ON position.
4. Measure voltage as per the following tables.

Outlander 500 LTD

TEST PROBES	VOLTAGE
Fuse box pin 6D (OR/GN)	Battery voltage (± 12 Vdc)
Battery negative (-) post	

Outlander 800R LTD

TEST PROBES	VOLTAGE
Fuse box pin 12A (OR/GN)	Battery voltage (± 12 Vdc)
Battery negative (-) post	

Outlander 500 LTD

TEST PROBES	VOLTAGE
Fuse box pin 7D (BE/PK)	Battery voltage (± 12 Vdc)
Battery negative (-) post	

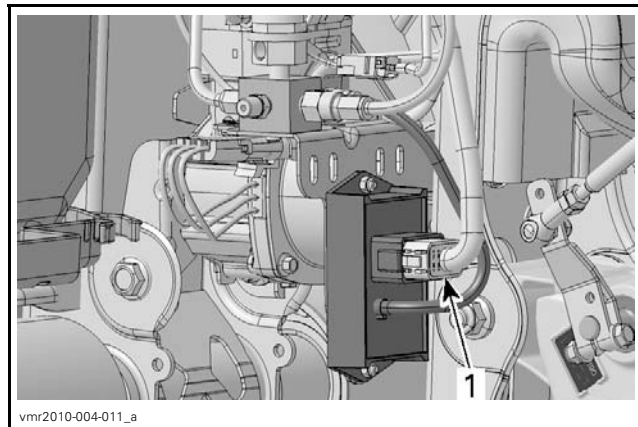
Outlander 800R LTD

TEST PROBES	VOLTAGE
Fuse box pin 12B (BE/PK)	Battery voltage (± 12 Vdc)
Battery negative (-) post	

If voltage is not as specified, check wiring, connector and terminal condition.

ACS Relay Ground Wire Continuity Test

1. Remove relay (R5), refer to *FUSE AND RELAY* at the beginning of this section.
2. Disconnect module connector.



1. Module connector

3. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Ω .
4. Measure resistance as per the following table.

Outlander 500 LTD

TEST PROBES	RESISTANCE
Module pin 8 (OR/PK)	Close to 0 Ω
Fuse box pin 7C (OR/PK)	

Outlander 800R LTD

TEST PROBES	RESISTANCE
Module pin 8 (OR/PK)	Close to 0 Ω
Fuse box pin 11B (OR/PK)	

ACS COMPRESSOR

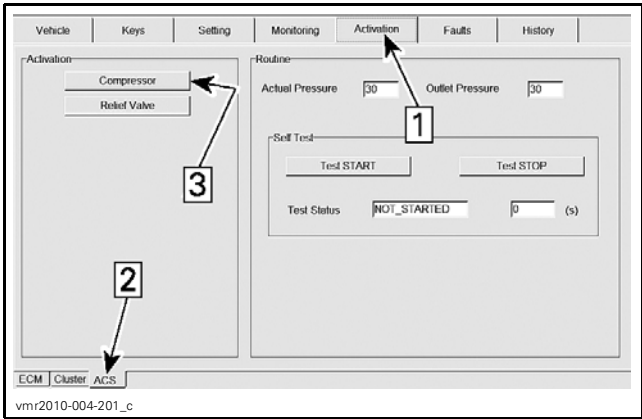
ACS Compressor Operation Test

1. Connect vehicle to B.U.D.S. Refer to *COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE* subsection of the appropriate Shop Manual.

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2. Select **Activation** page.
3. Select **ACS** folder.
4. Press **Compressor** button to proceed.



Step 1: Activation page
Step 2: ACS folder
Step 3: Compressor operation test button

5. Verify if compressor works properly.

ACS Compressor Power Wire Continuity Test (from Relay)

1. Remove relay, refer to *FUSE AND RELAY* at the beginning of this section.
2. Disconnect compressor connector.



1. Compressor connector

3. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Ω .
4. Measure resistance as per the following table.

Outlander 500 LTD

TEST PROBES	RESISTANCE
Compressor pin C (BE/VI)	Close to 0 Ω
Fuse box pin 6C (BE/VI)	

Outlander 800R LTD

TEST PROBES	RESISTANCE
Compressor pin C (BE/VI)	Close to 0 Ω
Fuse box pin 11A (BE/VI)	

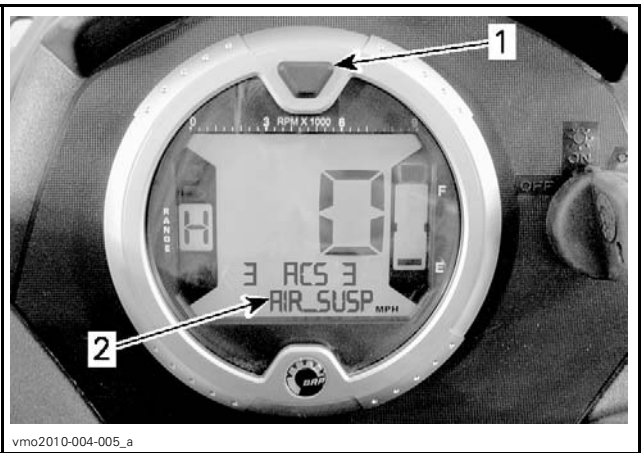
ACS Compressor Input Voltage Test

1. Release air pressure, refer to *RELEASING AIR PRESSURE IN SYSTEM FOR SERVICING* in this subsection.
2. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc.
3. Disconnect compressor connector.



1. Compressor connector

4. Place ignition switch to ON position.
5. Probe compressor connector.
6. Press selector button several times until *AIR_SUSP* is displayed.



1. Selector button
2. AIR_SUSP displayed

7. Set suspension mode to **ACS 2** using the **ACS** button.



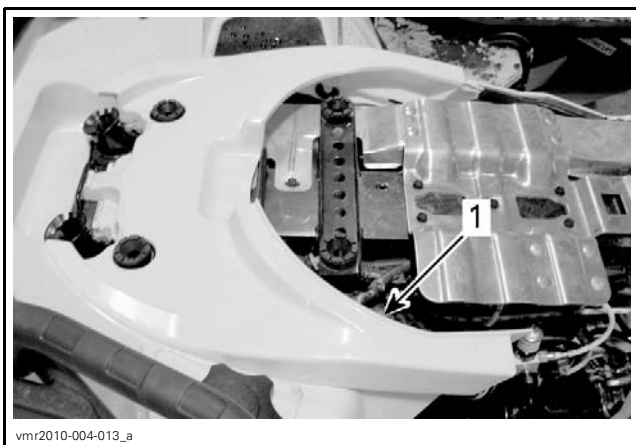
1. Actual setting (pressure transducer reading)

8. Measure voltage between compressor connector terminals as per the following table.

TEST PROBES	VOLTAGE
Pin C (BE/VI)	Battery voltage (± 12 Vdc)
Pin A (BK)	

ACS Compressor Removal

1. Release air pressure, refer to *RELEASING AIR PRESSURE IN SYSTEM FOR SERVICING* in this subsection.
2. Remove LH side panel.
3. Remove storage tray.



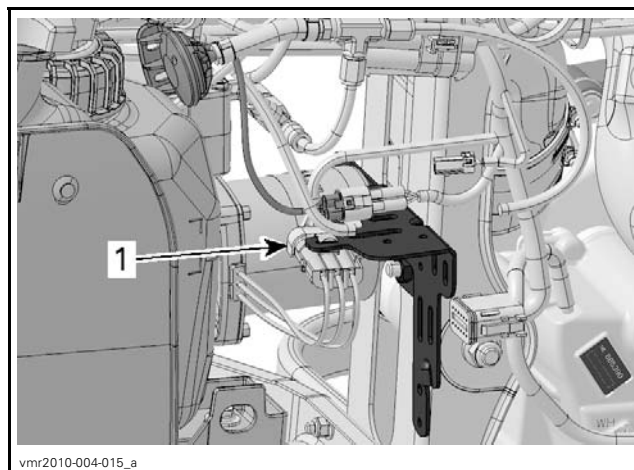
1. Storage tray

4. Remove solenoid valve. Refer to *ACS SOLENOID VALVE REMOVAL*.
5. Remove manifold. Refer to *ACS MANIFOLD REMOVAL*.
6. Remove module. Refer to *ACS MODULE REMOVAL*.
7. Remove connector of auxiliary line pressure transducer from support.



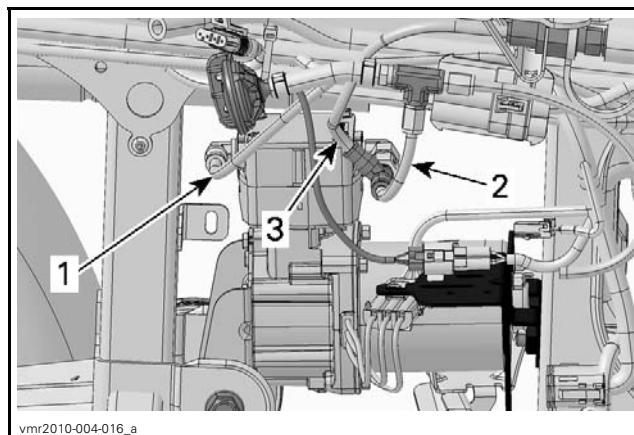
1. Connector of auxiliary line pressure transducer

8. Disconnect compressor connector.



1. Compressor connector

9. Disconnect the following hoses from compressor air fittings.
- Compressor air inlet hose
 - Compressor air outlet hose
 - Auxiliary line hose.



1. Compressor air inlet hose
 2. Compressor air outlet hose
 3. Auxiliary line hose

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Subsection 02 (AIR CONTROLLED SUSPENSION (ACS))

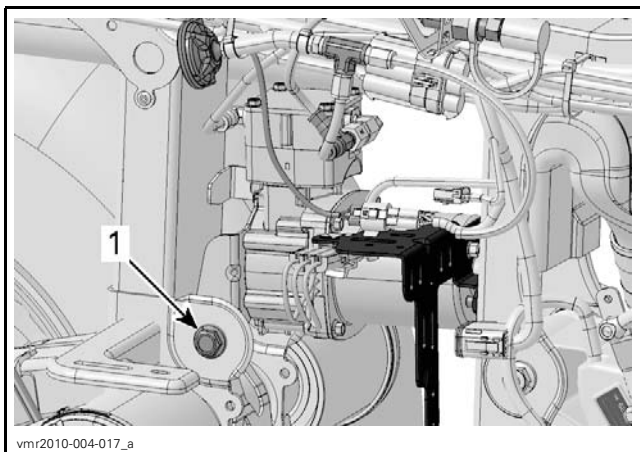
10. To disconnect hoses, proceed as follows:

10.1 Push fitting ring toward manifold.

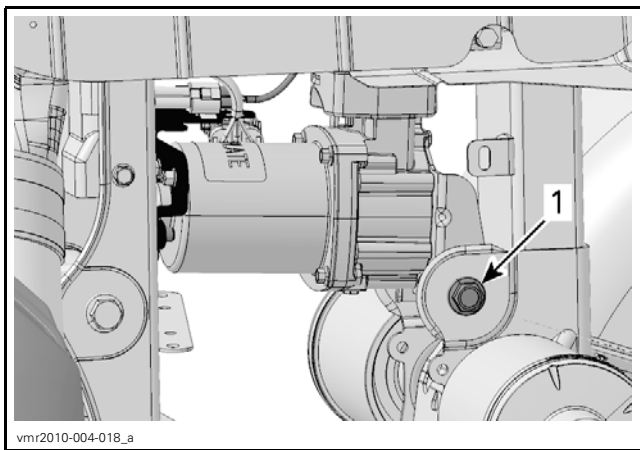
10.2 Hold ring in place.

10.3 Pull air hose.

11. Remove compressor side retaining bolts and nuts.

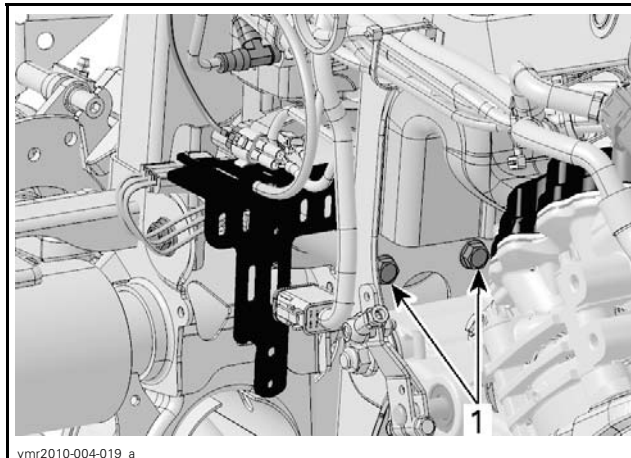


1. RH side retaining bolt



1. LH side retaining bolt

12. Remove compressor front retaining screws.



1. Front retaining screws

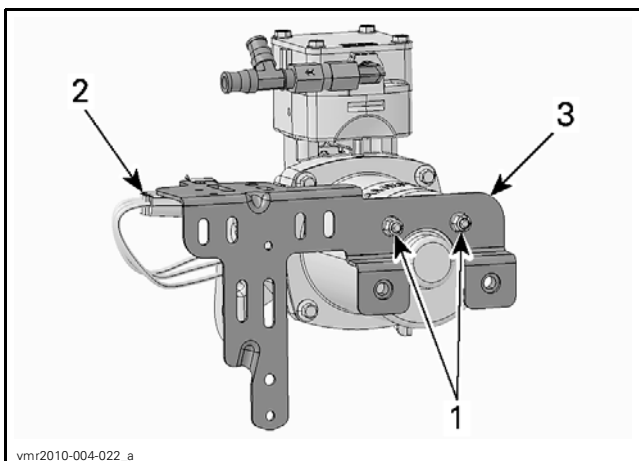
13. Remove compressor from vehicle by pulling it upwards.



14. Detach compressor connector from front support.

15. Remove mounting nuts from compressor front support.

16. Remove front support from compressor.

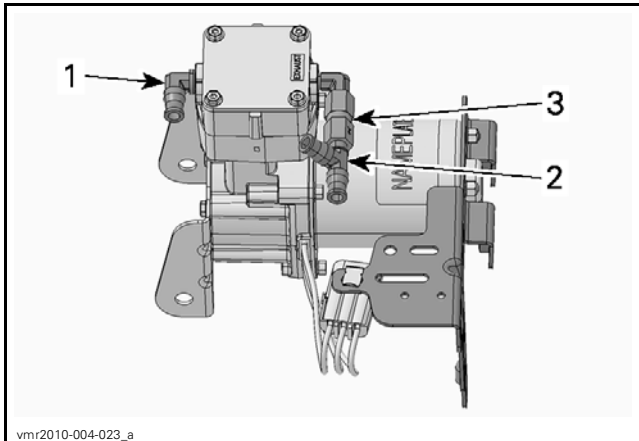


1. Front support mounting nuts
 2. Compressor connector
 3. Front support

NOTICE Do not remove rear support from compressor.

17. Remove the following fittings from compressor.

- Compressor air inlet fitting
- Compressor T-fitting
- Compressor check valve.



1. Compressor air inlet fitting
 2. Compressor T-fitting
 3. Compressor check valve

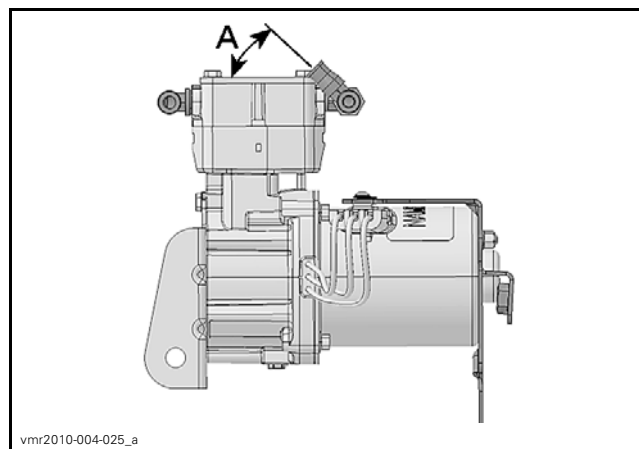
ACS Compressor Installation

The installation procedure is the reverse of removal procedure, however pay attention to the following.

If fitting or valve is the one previously removed (old one), apply LOCTITE 592 (PIPE SEALANT) (P/N 293 800 018) on all male threads.

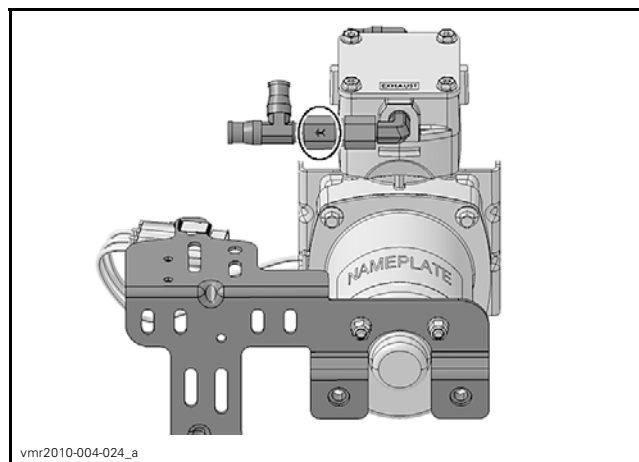
If fitting or valve is a new one, do not apply sealant, it should be already applied on male threads.

Install T-fitting with an angle of 45° as shown on following illustration.

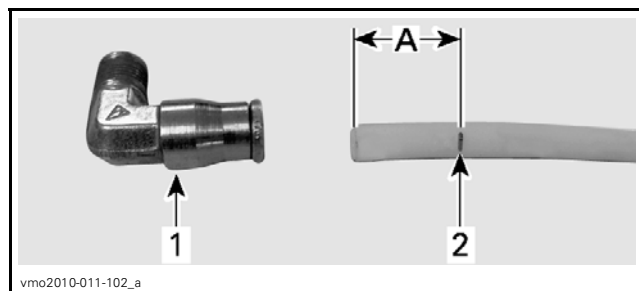


A. 45°

Ensure that check valve is installed with arrows pointing toward T-fitting.



Ensure that air hoses are properly inserted into fittings, refer to the following illustrations.



PUSH HOSE UNTIL THE MARK IS COMPLETELY INSERTED

1. Fitting

2. Mark

A. Must be inserted into fitting



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HOSE PROPERLY INSERTED INTO FITTING

Section 01 TECHNICAL MANUAL

Subsection 02 (AIR CONTROLLED SUSPENSION (ACS))

ACS AIR FILTER

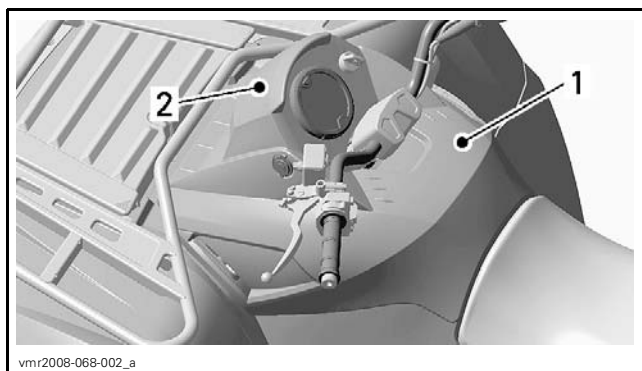
ACS Air Filter Removal

1. Remove seat.
2. Remove central panel.



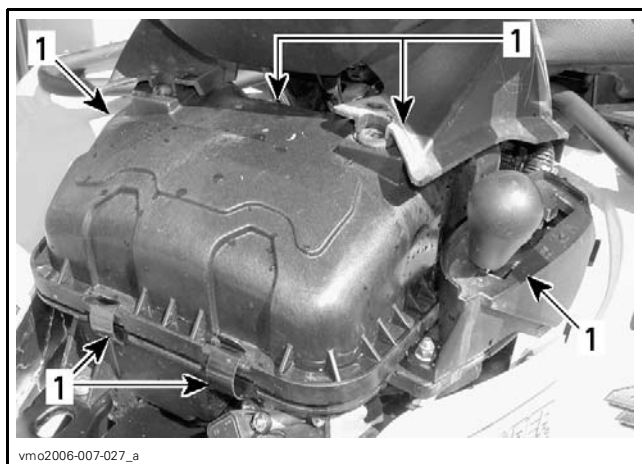
1. Central panel
2. Tabs to pull

3. Lift dashboard upwards.



- TYPICAL**
1. Central panel
 2. Dashboard

4. Release clamps and remove air filter box cover.



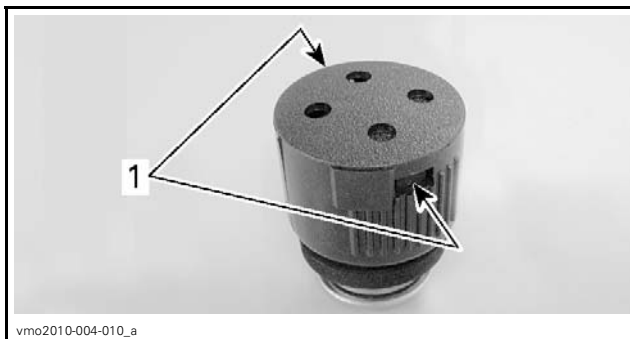
1. Release clamps

5. Locate ACS compressor air filter.
6. Unscrew ACS compressor air filter from air box.



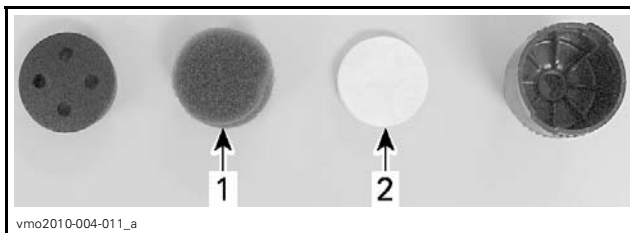
1. ACS compressor air filter

7. Push tabs then open cover.



1. tabs

8. Remove prefilter (foam) and filter (disc).



1. Prefilter (foam)
2. Filter (disc)

The installation is the reverse of removal procedure.

ACS Air Filter Cleaning

Remove ACS compressor air filter, refer to *A/R FILTER REMOVAL*.

Prefilter (Foam) Cleaning

1. Pour cleaning solution (P/N 219 700 341) or an equivalent into a bucket.
2. Put the prefilter in to soak for a few minutes.

3. Rinse the prefilter with warm water until all cleaning solution disappears.
4. Let the prefilter dry completely.

Filter (Disc) Cleaning

1. Blow low pressure compressed air on filter to clean it.

NOTICE Do not wash the filter (disc) with any cleaning solution.

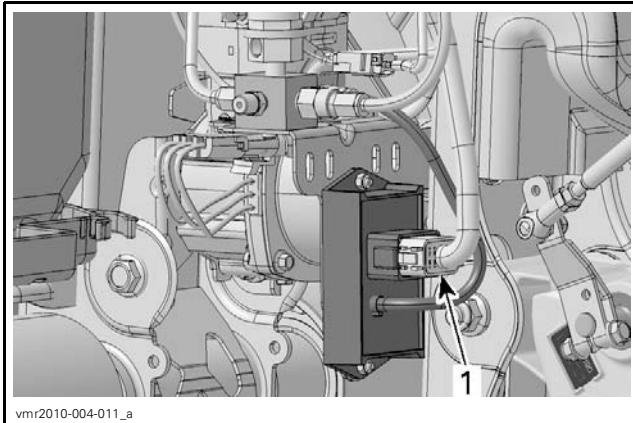
Housing Cleaning

1. Blow low pressure compressed air in housing to clean it.

PRESSURE TRANSDUCER (ACS AUXILIARY LINE)

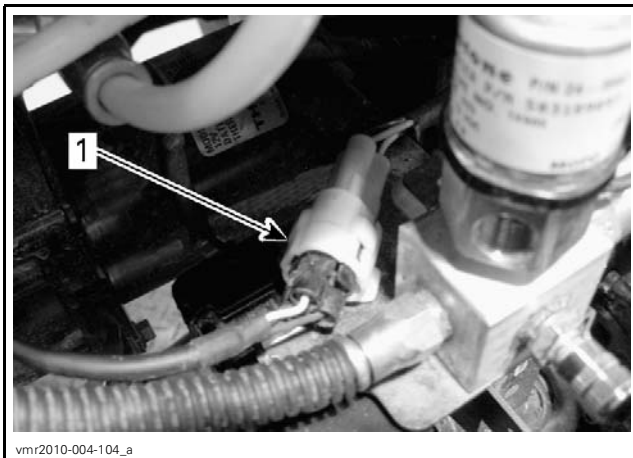
Pressure Transducer Signal Circuit Continuity Test

1. Remove seats and RH side panel.
2. Disconnect module connector.



1. Module connector

3. Disconnect pressure transducer connector.

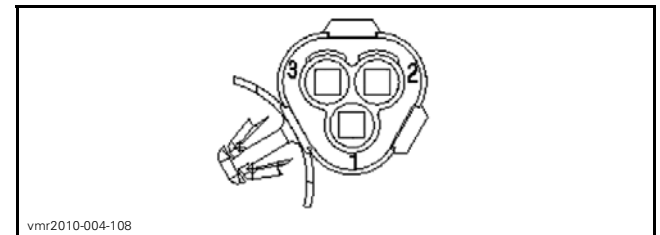


1. Pressure transducer connector

4. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Ω .
5. Measure resistance as per the following table.

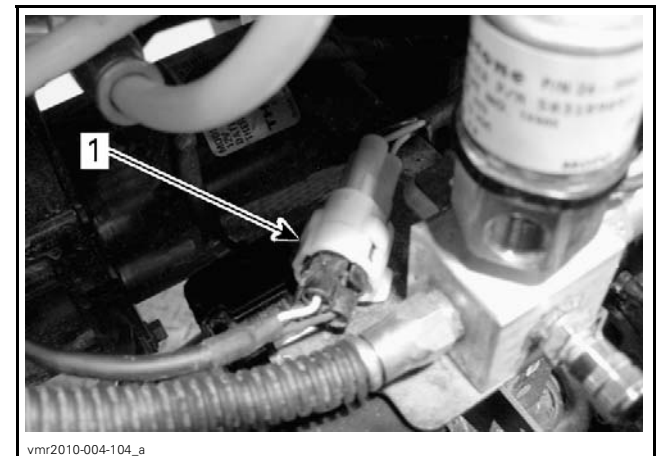
TEST PROBES	RESISTANCE
Pressure transducer pin 2 (PK/BR)	Close to 0 Ω
Module pin 3 (PK/BR)	

Refer to the following illustration for the pressure transducer connector pinout.



Pressure Transducer Input Voltage Test

1. Remove seats and RH side panel.
2. Disconnect pressure transducer connector.

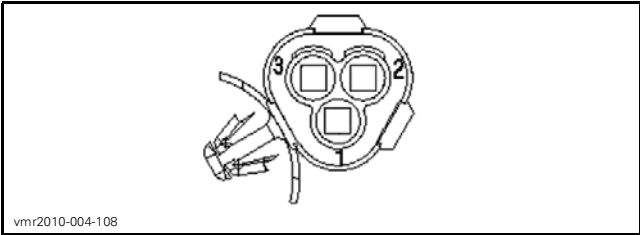


1. Pressure transducer connector

3. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc.
4. Place ignition switch to ON position.
5. Measure voltage as per the following table.

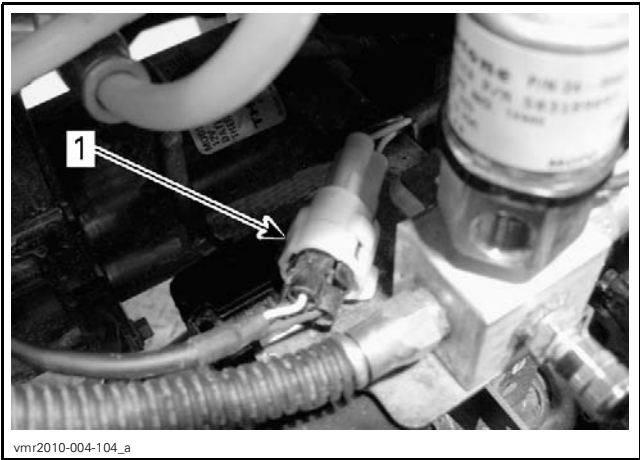
TEST PROBES	VOLTAGE
Pin 3 (PK/OR)	Battery voltage (± 12 Vdc)
Battery negative (-) post	

Refer to the following illustration for the pressure transducer connector pinout.



Pressure Transducer Ground Test

- 1. Remove seats and RH side panel.
- 2. Disconnect pressure transducer connector.

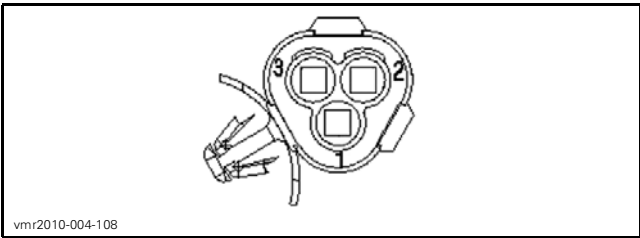


1. Pressure transducer connector

- 3. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc.
- 4. Place ignition switch to ON position.
- 5. Measure voltage as per the following table.

TEST PROBES	VOLTAGE
Pin 1 (BK/GY)	Battery voltage (± 12 Vdc)
Battery positive (+) post	

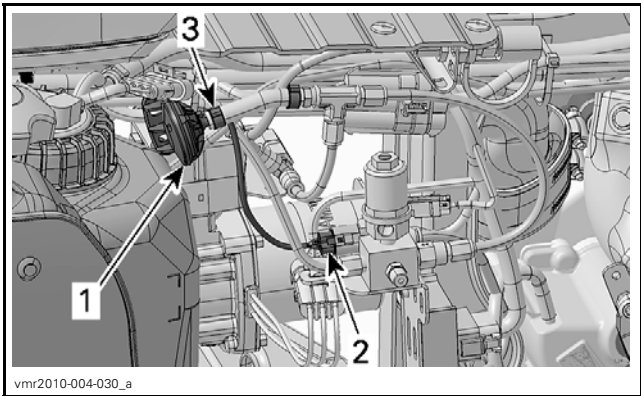
Refer to the following illustration for the pressure transducer connector pinout.



Pressure Transducer Replacement

- 1. Release air pressure, refer to *RELEASING AIR PRESSURE IN SYSTEM FOR SERVICING* in this subsection.
- 2. Disconnect pressure transducer connector.
- 3. Remove Oetiker clamp.

- 4. Remove pressure transducer from hose.



1. Auxiliary line pressure transducer
2. Connector
3. Oetiker clamp

- 5. Install a new pressure transducer on hose.
- 6. Install a new Oetiker clamp using OETIKER PLIERS (P/N 295 000 070).
- 7. Connect pressure transducer connector.
- 8. Ensure that there is no air leaks from pressure transducer hose. Refer to *ACS SYSTEM LEAK TEST (WITH B.U.D.S.)*.

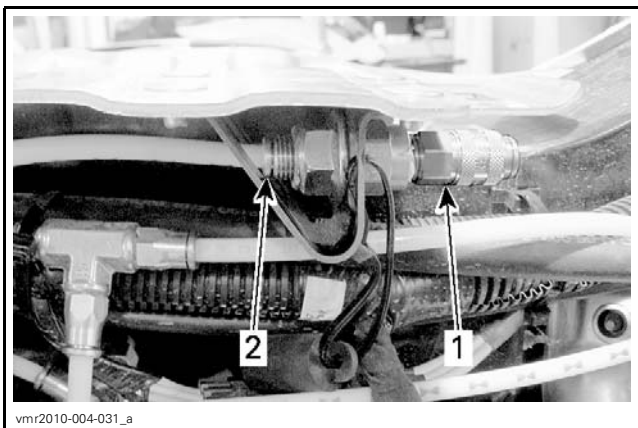
ACS HOSES

ACS Hose and Fitting Replacement

- 1. Release air pressure, refer to *RELEASING AIR PRESSURE IN SYSTEM FOR SERVICING* in this subsection.
- 2. Locate hose or fitting to be replaced.
- 3. Remove it from vehicle.
- 4. Install the new hose or fitting.
- 5. Perform a *ACS SYSTEM LEAK TEST (WITH B.U.D.S.)*.

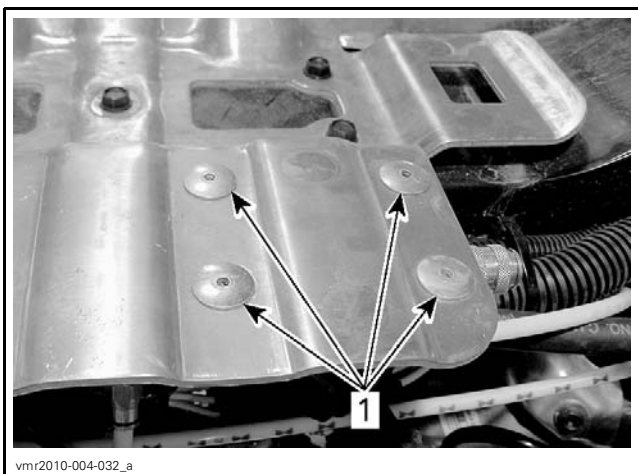
Auxiliary Line Adapter Replacement

- 1. Release air pressure, refer to *RELEASING AIR PRESSURE IN SYSTEM FOR SERVICING* in this subsection.
- 2. Disconnect auxiliary line hose from adapter as follows:
 - 2.1 Push fitting ring toward adapter.
 - 2.2 Hold ring in place.
 - 2.3 Pull air hose.



1. Auxiliary line adapter
 2. Fitting ring

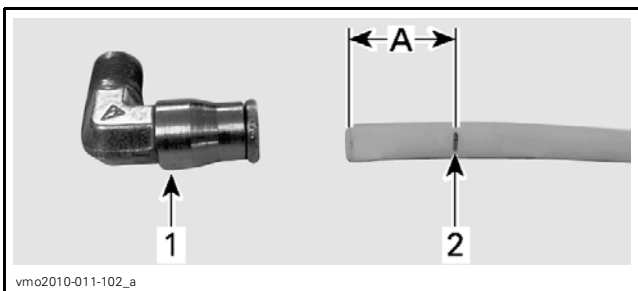
3. Drill retaining rivets.



1. Retaining rivets

4. Install new adapter.
5. Secure adapter support using rivets.
6. Connect auxiliary line hose into adapter.

Ensure that air hoses are properly inserted into fittings, refer to the following illustrations.



PUSH HOSE UNTIL THE MARK IS COMPLETELY INSERTED

1. Fitting
 2. Mark

A. Must be inserted into fitting

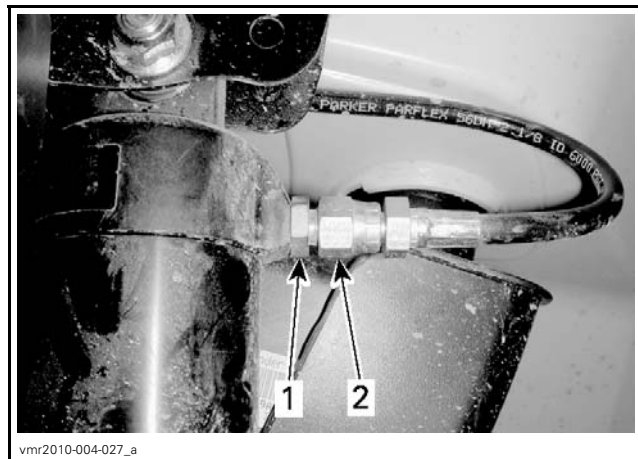


HOSE PROPERLY INSERTED INTO FITTING

SHOCK ABSORBERS

Shock Absorber Removal

1. Lift rear of vehicle until rear shock absorbers are fully extended.
2. Install jack stands or blocks under the frame to support the vehicle.
3. Unscrew air hose from shock absorber as follows:
 - 3.1 Install an appropriate wrench on shock fitting to hold it in place.
 - 3.2 Unscrew air hose fitting using another wrench.



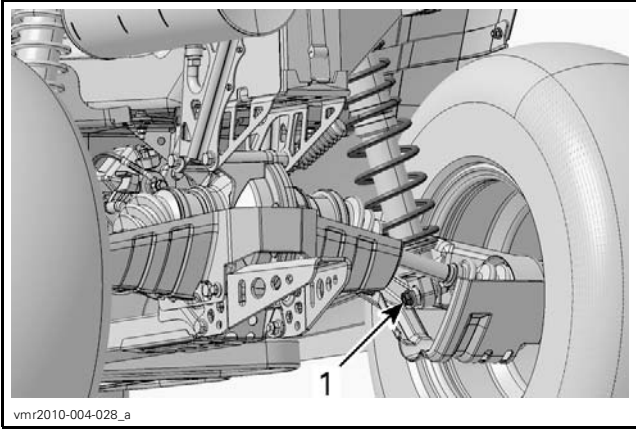
1. Shock absorber fitting
 2. Air hose fitting

NOTICE To avoid damaging the shock fitting threads, install a wrench on the shock fitting to hold it in place while unscrewing the air hose fitting.

4. Remove the shock absorber lower bolt and nut.

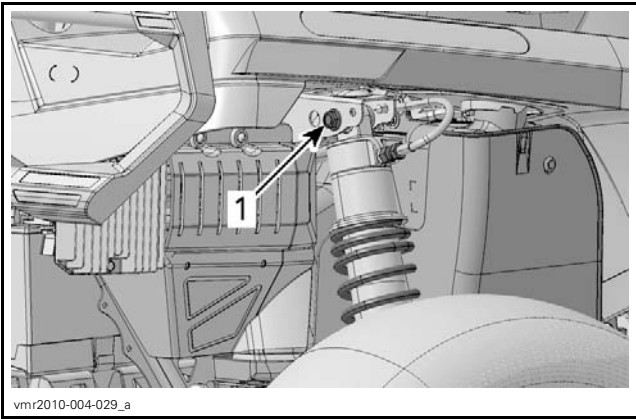
Section 01 TECHNICAL MANUAL

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1. Shock absorber lower bolt

5. Remove the shock absorber upper bolt and nut.



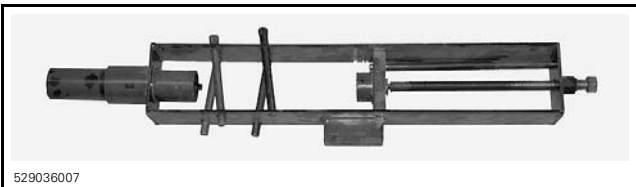
1. Shock absorber upper bolt

6. Remove shock absorber from vehicle.

Shock Absorber Disassembly

NOTICE Be careful while manipulating or installing the shock absorber in the spring remover tool. The shock absorber body must not be scratched or damaged to avoid air leakage.

1. Use the SPRING REMOVER (P/N 529 036 007).



2. Place the tool in a vise.
3. Position the shock absorber in the tool and install the spring compressor pins.
4. Tighten the spring remover screw until the spring is sufficiently compressed to remove spring locking devices.

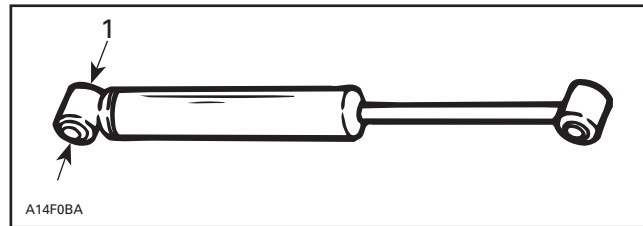
5. Remove spring stopper and its cap then loosen the spring remover screw.

6. Remove spring from shock.

Shock Absorber Inspection

Inspect the spring for damage. Replace if necessary.

Secure the end of shock body in a vise with its rod upward.



TYPICAL

1. Clamp here

NOTICE Do not clamp directly on shock body.

Inspect shock absorber as following:

1. Examine the shock absorber for leaks.
2. Extend and compress the shock absorber shaft several times over its entire stroke.
3. Check that the shock absorber shaft moves smoothly and with uniform resistance with its rod upward.

Any of the following conditions will denote a defective shock absorber:

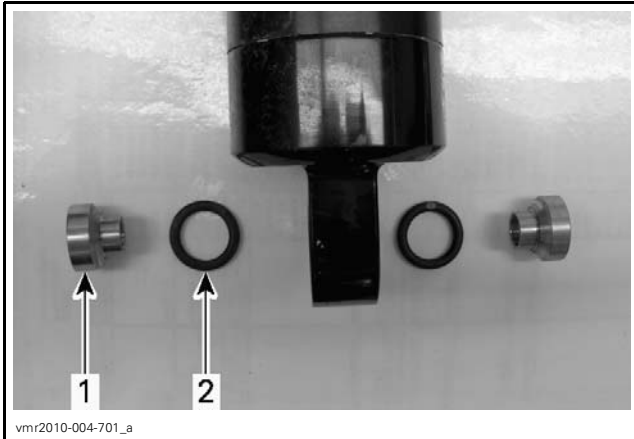
- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme end of either stroke.
- A gurgling noise, after completing one full compression and extension stroke.

Replace shock absorber if any faults are present.

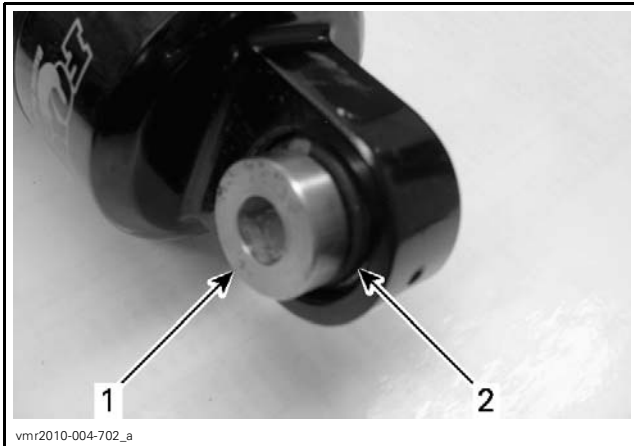
Shock Absorber Assembly and Installation

Assembly and installation are the reverse of disassembly and removal procedures, however pay attention to the following.

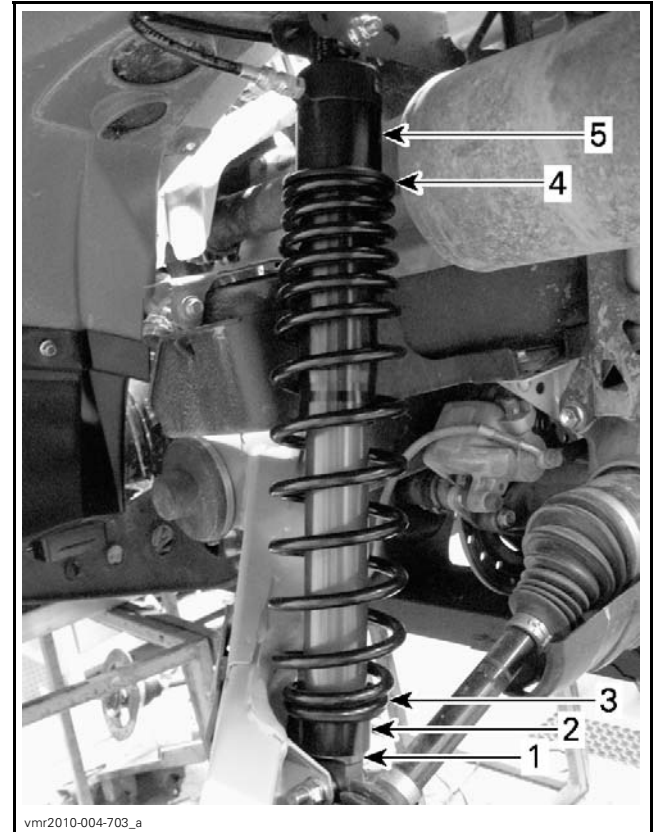
Assemble shock absorber as per the following illustrations.



1. Sleeve
2. O-ring



1. Sleeve
2. O-ring



TYPICAL

1. Circlip
2. Small sleeve
3. Lower cap
4. Upper cap
5. Large sleeve

Install shock absorber cap opening at 180° from spring stopper opening.

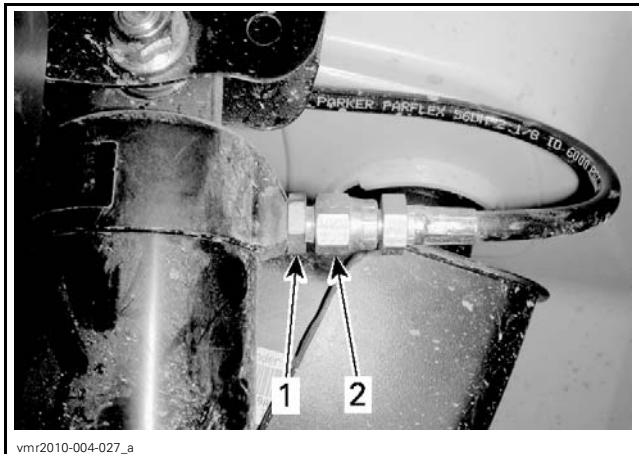
Torque upper and lower shock absorber bolts to 53 N•m (39 lbf•ft).

If the same shock absorber is reused, apply LOC-TITE 592 (PIPE SEALANT) (P/N 293 800 018) on air hose sleeve male threads.

While holding shock fitting with a wrench, tighten air hose fitting to 19 N•m (168 lbf•in).

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1. Shock absorber fitting
2. Air hose fitting

Ensure that there is no air leaks from shock absorber fitting and air hose. Refer to *ACS SYSTEM LEAK TEST (WITH B.U.D.S.)*.

NOTICE Never screw shock absorber air hose by using the air hose fitting only. To avoid damaging the shock fitting threads, install a wrench on the shock fitting to hold it in place while screwing the air hose fitting.

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NOTES



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