

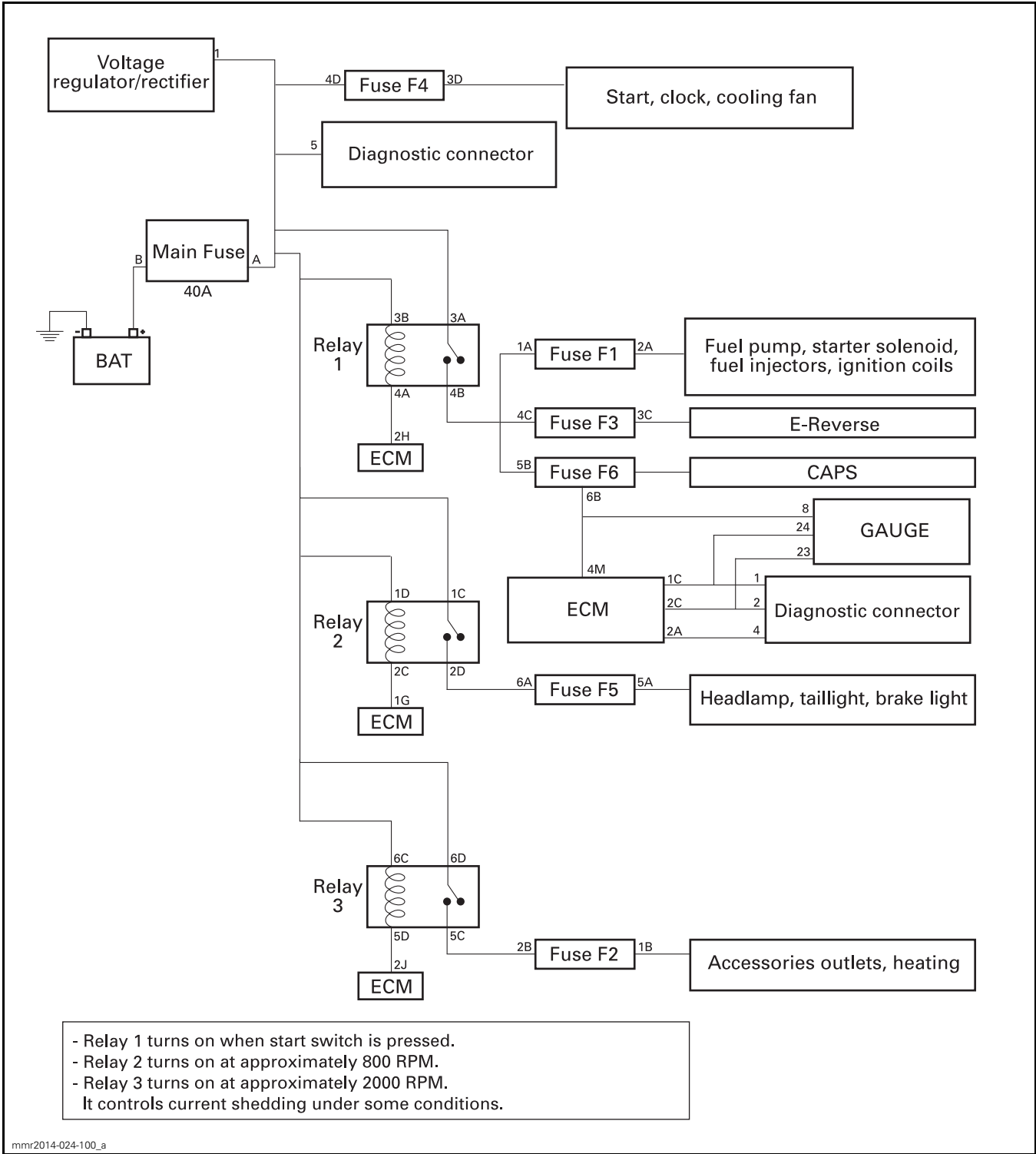
POWER DISTRIBUTION AND GROUNDS

SERVICE TOOLS

Description	Part Number	Page
ECM ADAPTER TOOL.....	529 036 166	6
FLUKE 115 MULTIMETER	529 035 868	5

GENERAL

POWER DISTRIBUTION DIAGRAM



OVERVIEW

All the electrical system is powered by DC current supplied by a 12 V battery. The battery charge is maintained by the charging system.

Electrical system is protected by fuses located in a fuse box.

The system uses 3 relays that control different electrical components.

Relay 1 Activation

When the START button is briefly pressed or held, it wakes up the ECM that in turn, powers the relay 1 and its contact close to deliver power.

The relay supplies the following components:

- ECM power
- Fuel pump
- Starter solenoid
- Injectors
- Ignition coils
- Gauge
- Diagnostic connector.

Relay 2 Activation

When engine reaches approximately 800 RPM, the ECM activates the relay 2 and its contact close to deliver power.

The relay supplies the following components:

- Lights.

Relay 3 Activation

When engine reaches approximately 2000 RPM, the ECM activates the relay 3 and its contact close to deliver power.

The relay supplies the following components:

- ACC for driver and passenger through connectors VC and ES
- Front power outlet.

The following actions will be taken by the ECM to preserve electrical power for the most important functions.

CONDITION	ECM CORRECTIVE ACTION
If battery voltage is lower than 12 V for 10 seconds	Relay 3 is disabled.
If battery voltage is lower than 11.5 V	Engine idle speed is increased
If battery voltage is lower than 11 V	Low battery pilot lamp turns on

Automatic Power Cut-Off

The ECM features an automatic power cut-off that will completely turn off the ECM (after engine was running) and thus cutting all power to components. All the vehicle electrical loads will be turned off (except the clock in the multifunction gauge). This feature prevents the battery from discharging if the tether cord cap is left on engine cut-off switch when the engine is not running.

NOTE: If a power cable is connected to the communication connector power cut-off will not occur.

The cut-off time is as follows.

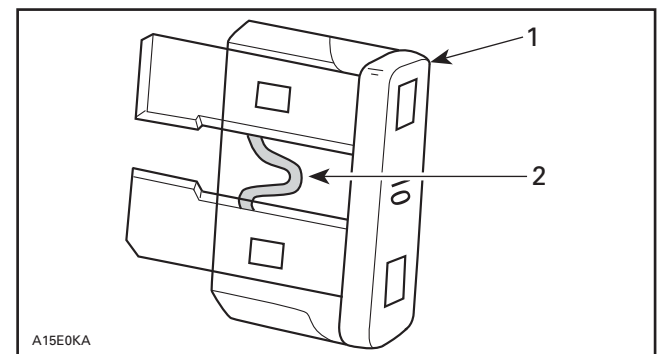
ACTION	POWER CUT-OFF TIME
Removing tether cord cap	Approximately 15 seconds
Setting emergency engine stop switch to STOP (tether cord cap connected)	Approximately 20 seconds

NOTE: The ECM will remain off until the START/RER button is pressed.

FUSES

Fuse Inspection

Check if filament is melted. Replace as necessary.



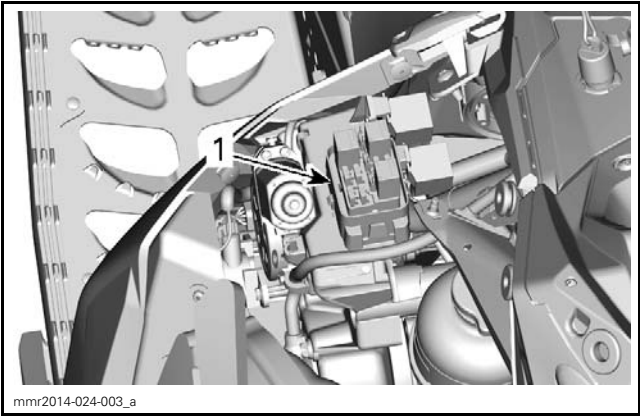
1. Fuse
2. Check if melted

WARNING

Do not use a higher rated fuse as this can cause severe damage to electric components and/or a fire. If fuse has burnt out, the cause of the malfunction should be determined and corrected before restarting.

Fuse Location

The fuse box is located on the RH side.



1. Fuse boxes

Fuse Box

F1: Ignition coils, fuel injectors, fuel pump and starter solenoid	10 A
F2: Accessories	20 A
F3: Electro mechanical reverse	20 A
F4: Start, clock and cooling fan	15 A
F5: Headlight, brake light and tail light	20 A
F6: ECM, gauge and CAPS	10 A
Relay 1 (Main Relay)	—
Relay 2 (Lighting Relay)	—
Relay 3 (Accessory Relay)	—

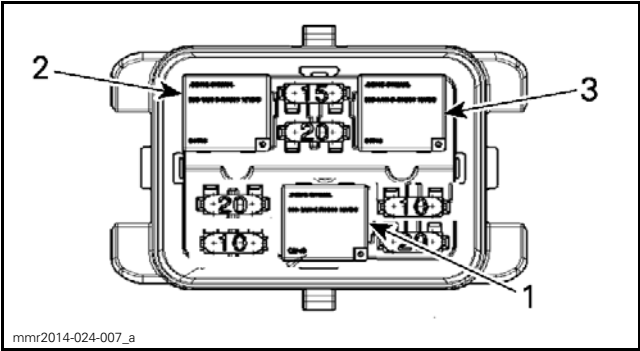
Fuse box contacts are identified as seen from the top of the fuse box with letters to identify rows and numbers to identify columns. The combined letter and number identify the coordinate of a contact that is used in the wiring diagram and procedures.

NOTICE Do not apply any lubricant or sealant product to the terminal contacts in fuse box.

RELAYS

Relay Location

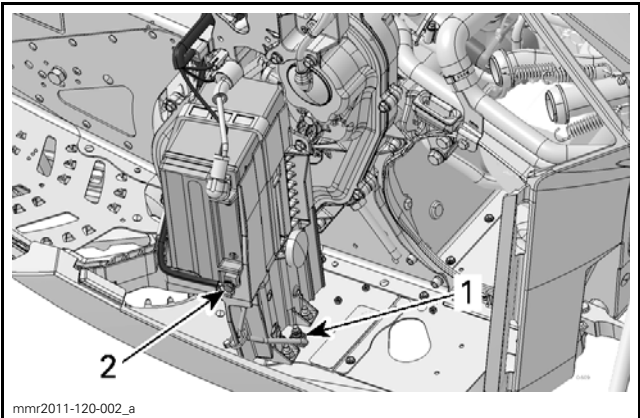
Relays are in the fuse boxe.



- 1. Relay 1 (R1)
- 2. Relay 2 (R2)
- 3. Relay 3 (R3)

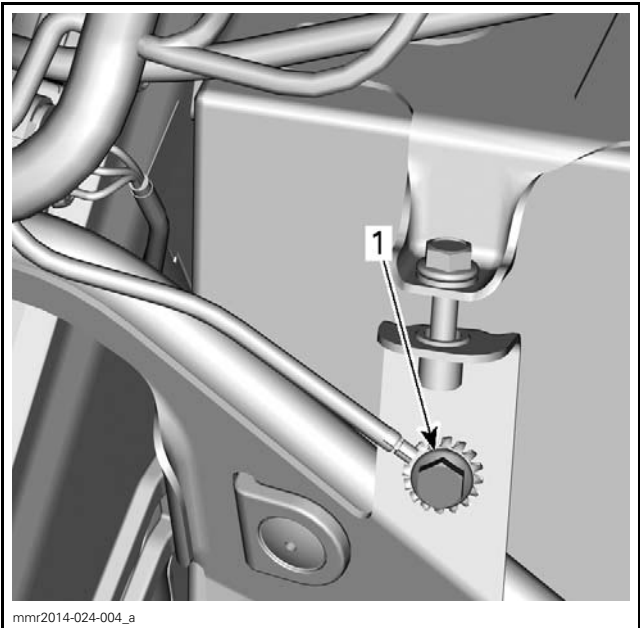
GROUNDS

Ground Location



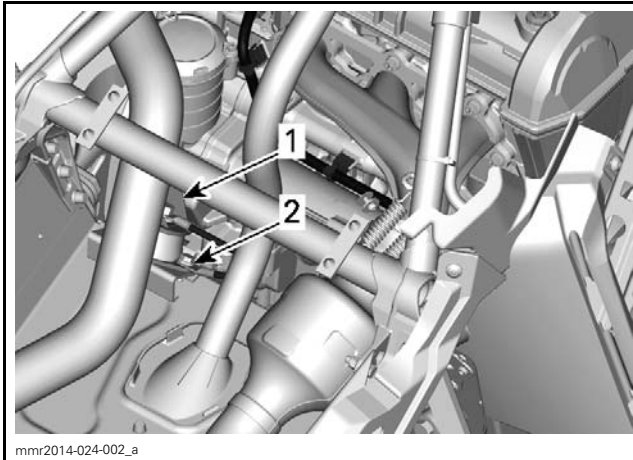
BATTERY AND FRAME GROUNDS - TYPICAL

- 1. Battery ground
- 2. Frame ground



VOLTAGE REGULATOR GROUND

- 1. Ground



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ENGINE GROUND

1. Engine mount
2. Ground

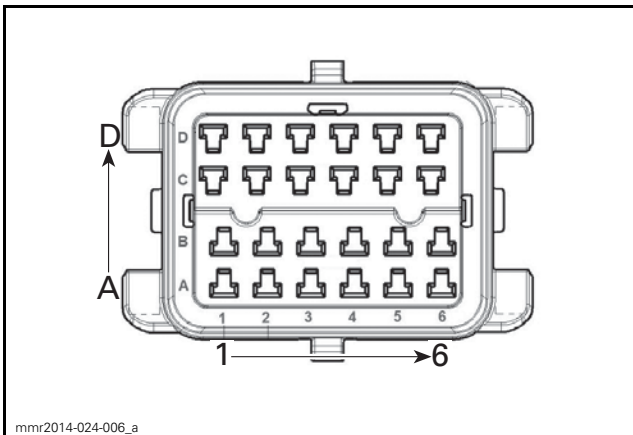
PROCEDURES

RELAYS

Relay Input Voltage Test

Remove relay from fuse box.

Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vdc and measure voltage between fuse box terminals and ground.



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FUSE BOX

RELAY 1 (R1)		
PROBES		VOLTAGE
Winding input: fuse box pin 3 B	Battery ground	Battery voltage
Contact input: fuse box pin 3 A	Battery ground	

RELAY 2 (R2)		
PROBES		VOLTAGE
Winding input: fuse box pin 1 D	Battery ground	Battery voltage
Contact input: fuse box pin 1 C	Battery ground	

RELAY 3 (R3)		
PROBES		VOLTAGE
Winding input: fuse box pin 6 C	Battery ground	Battery voltage
Contact input: fuse box pin 6 D	Battery ground	

If input voltages are good, check the following:

- Relay, refer to *RELAY CONTINUITY TEST* in this subsection.
- ECM ground signal. Refer to *RELAY 1 (R1) GROUND SIGNAL TEST* or *RELAY 2 (R2) GROUND SIGNAL TEST* or *RELAY 3 (R3) GROUND SIGNAL TEST*.
- ECM ground signal wire, refer to *GROUND WIRE CONTINUITY TEST (R1, R2 AND R3)* in this subsection.
- Accessory supply wire for an open circuit. Refer to *WIRING DIAGRAM*.

If input voltages are not good, refer to *WIRING DIAGRAM* and check for an open circuit on the applicable relay winding supply wire.

Relay 1 (R1) Ground Signal Test

1. Connect test light between battery positive terminal (+) and pin 4A.
2. Press on the START button.

If light does **not** turn ON, replace relay.

If test fails, perform *GROUND SIGNAL WIRE CONTINUITY TEST*.

Relay 2 (R2) Ground Signal Test

1. Connect test light between battery positive terminal (+) and pin 2C.
2. Start engine.

If light does **not** turn ON after engine is started, replace relay.

If test fails, perform *GROUND SIGNAL WIRE CONTINUITY TEST*.

Relay 3 (R3) Ground Signal Test

1. Connect test light between battery positive terminal (+) and pin 5D.

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2. .Raise engine RPM above 2000.
If light does **not** turns ON, replace relay.
If test fails, perform *GROUND SIGNAL WIRE CONTINUITY TEST*.

Ground Wire Continuity Test
(R1, R2 and R3)

- 1. Disconnect ECM connector B and install it on the ECM ADAPTER TOOL (P/N 529 036 166). Refer to *ELECTRONIC FUEL INJECTION* section.
- 2. Remove applicable relay.
- 3. Set the multimeter to Ω .
- 4. Measure resistance as per the following table.

RELAY 1 (R1)		
PROBES		RESISTANCE
Fuse box pin 4A	ECM pin 2H	Close to 0 Ω

RELAY 2 (R2)		
PROBES		RESISTANCE
Fuse box pin 2C	ECM pin 1G	Close to 0 Ω

RELAY 3 (R3)		
PROBES		RESISTANCE
Fuse box pin 5D	ECM pin 2J	Close to 0 Ω

Relay Test

Substitution Test

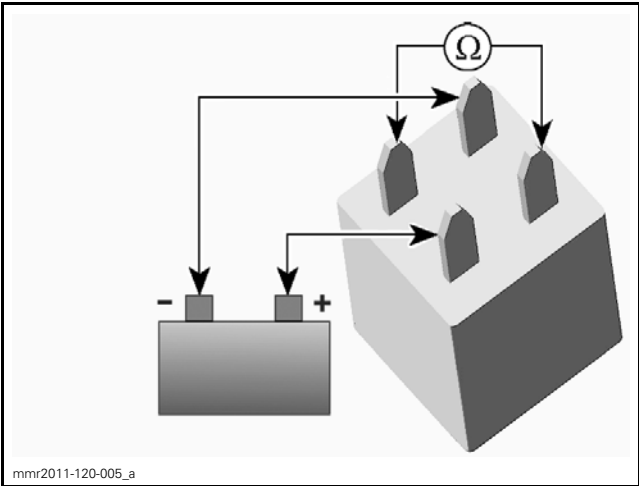
- 1. Remove the suspected relay.
- 2. Remove another relay from fuse box.
- 3. Replace it by the suspected relay.
- 4. Check if the relay related functions work.
 - 4.1 If the functions work, the suspected relay is good.
 - 4.2 If the functions do not work, the suspected relay is bad. Replace by a new one.
- 5. Reinstall the removed relays.

Continuity Test

- 1. Remove relay to be tested from fuse box.
- 2. Set multimeter to the beeper position.



- 3. Activate relay by connecting terminals 85 and 86 to a 12 V battery then place the multimeter probe on terminal 30 and the other probe on the terminal 87.



The audible signal should be continuous. If not, replace the relay.