

CHARGING SYSTEM

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DESCRIPTION AND OPERATION

CHARGING SYSTEM

DESCRIPTION

The charging system consists of:

- Generator
- Electronic Voltage Regulator (EVR) circuitry within the Powertrain Control Module (PCM)
- Ignition switch (refer to the Ignition System for information)
- Battery (refer to the Battery for information)
- Battery temperature sensor
- Wiring harness and connections (refer to the Wiring for information)

OPERATION

The charging system is turned on and off with the ignition switch. When the ignition switch is turned to the ON position, battery voltage is applied to the generator rotor through one of the two field terminals to produce a magnetic field. The generator is driven by the engine through a serpentine belt and pulley arrangement.

The amount of DC current produced by the generator is controlled by the EVR (field control) circuitry, contained within the PCM. This circuitry is connected in series with the second rotor field terminal and ground.

Temperature data, along with data from monitored line voltage, is used by the PCM to vary the battery charging rate. This is done by cycling the ground path to control the strength of the rotor magnetic field. The PCM then compensates and regulates generator current output accordingly and to maintain the proper voltage depending on battery temperature.

All vehicles are equipped with On-Board Diagnostics (OBD). All OBD-sensed systems, including the EVR (field control) circuitry, are monitored by the

PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for any failure it detects.

GENERATOR

DESCRIPTION

The generator is belt-driven by the engine. It is serviced only as a complete assembly. If the generator fails for any reason, the entire assembly must be replaced.

OPERATION

As the energized rotor begins to rotate within the generator, the spinning magnetic field induces a current into the windings of the stator coil. Once the generator begins producing sufficient current, it also provides the current needed to energize the rotor.

The Y type stator winding connections deliver the induced AC current to 3 positive and 3 negative diodes for rectification. From the diodes, rectified DC current is delivered to the vehicles electrical system through the generator, battery, and ground terminals.

Noise emitting from the generator may be caused by:

- Worn, loose or defective bearings
- Loose or defective drive pulley
- Incorrect, worn, damaged or misadjusted drive belt
- Loose mounting bolts
- Misaligned drive pulley
- Defective stator or diode
- Damaged internal fins

ELECTRONIC VOLTAGE REGULATOR

DESCRIPTION

The Electronic Voltage Regulator (EVR) is not a separate component. It is actually a voltage regulating circuit located within the Powertrain Control

DESCRIPTION AND OPERATION (Continued)

Module (PCM). The EVR is not serviced separately. If replacement is necessary, the PCM must be replaced.

OPERATION

The amount of DC current produced by the generator is controlled by EVR circuitry contained within the PCM. This circuitry is connected in series with the generator's second rotor field terminal and its ground.

Voltage is regulated by cycling the ground path to control the strength of the rotor magnetic field. The EVR circuitry monitors system line voltage (B+) and battery temperature (refer to Battery Temperature Sensor for more information). It then determines a target charging voltage. If sensed battery voltage is 0.5 volts or lower than the target voltage, the PCM grounds the field winding until sensed battery voltage is 0.5 volts above target voltage. A circuit in the PCM cycles the ground side of the generator field up to 100 times per second (100Hz), but has the capability to ground the field control wire 100% of the time (full field) to achieve the target voltage. If the charging rate cannot be monitored (limp-in), a duty cycle of 25% is used by the PCM in order to have some generator output. Also refer to Charging System Operation for additional information.

REMOVAL AND INSTALLATION

GENERATOR

REMOVAL

- (1) Disconnect battery negative cable (Fig. 1).

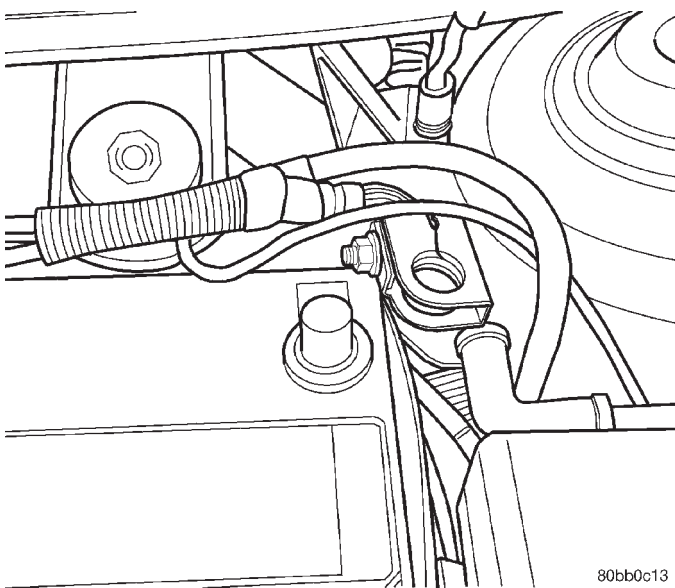


Fig. 1 Battery Cable

- (2) Loosen the jam nut and adjustment bolt.
- (3) Raise vehicle and support.

- (4) Remove accessory drive splash shield (Fig. 2).

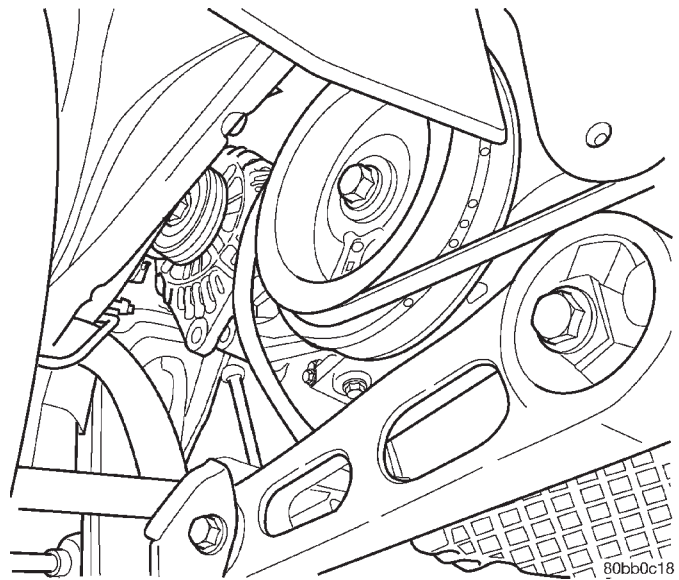
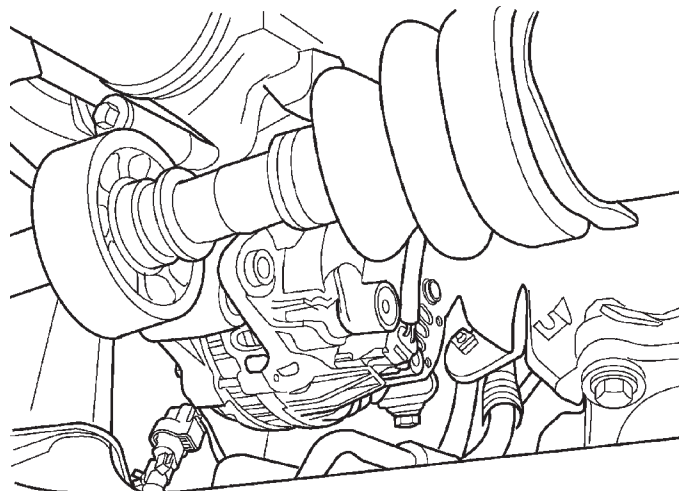


Fig. 2 Splash Shield and Belt

- (5) Loosen the lower mounting bolt.
- (6) Remove the generator drive belt.
- (7) Disconnect the generator field circuit wiring connector. Push the **RED** locking tab to release.
- (8) Remove the B+ terminal nut and wire.
- (9) Remove the upper and lower mounting bolt (Fig. 3) and move generator off of pivot bracket.
- (10) Remove pivot bracket.



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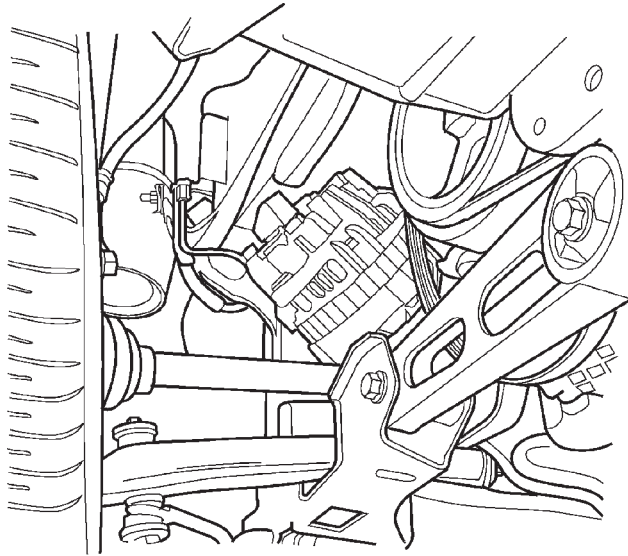
Fig. 3 Lower Mounting Bolt

- (11) Remove Generator (Fig. 4) through wheel well.

INSTALLATION

- (1) Install generator (Fig. 4) through wheel well.

REMOVAL AND INSTALLATION (Continued)



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Fig. 4 Generator

(2) Install lower pivot bracket and tighten bolts to 54 N·m (40 ft. lbs.).

- (3) Loosely install the upper and lower mounting bolts (Fig. 3).
- (4) Connect the generator field circuit wiring connector. Push the **RED** locking tab to lock.
- (5) Install the B+ terminal nut and wire.
- (6) Install the generator drive belt.
- (7) Lower vehicle.
- (8) Tension belt.
- (9) Tighten adjustment bolt.
- (10) Tighten the jam nut
- (11) Raise vehicle and support.
- (12) Tighten lower mounting bolt and tighten bolts to 54 N·m (40 ft. lbs.).
- (13) Install splash shield (Fig. 2).
- (14) Lower vehicle.
- (15) Connect battery cable (Fig. 1).

SPECIFICATIONS

GENERATOR RATINGS

TYPE	PART NUMBER	RATED SAE AMPS	ENGINES	MINIMUM TEST AMPS
Mitsubishi	4794222AA	85 AMPS	2.0L	75 AMPS

TORQUE

DESCRIPTION	TORQUE
Battery Terminal Nut	9 N·m (75 in. lbs.)
Battery Hold Down Clamp Bolt . .	9 N·m (75 in. lbs.)
Generator Mounting Bolt	54 N·m (40 ft. lbs.)
Generator Pivot Bolt	54 N·m (40 ft. lbs.)
Pivot Bracket Bolts	54 N·m (40 ft. lbs.)

