POWER DISTRIBUTION SYSTEM

DESCRIPTION

This group covers the various standard and optional power distribution components used on this model. The power distribution system for this vehicle consists of the following components:

- Integrated Power Module (IPM)
- Front Control Module (FCM)
- Power Outlets

Refer to Wiring Diagrams for complete circuit schematics.

The power distribution system also incorporates various types of circuit control and protection features, including:

- Automatic resetting circuit breakers
- Blade-type fuses
- Bus bars
- Cartridge fuses
- Circuit splice blocks
- Flashers
- Fusible links
- Relays

Following are general descriptions of the major components in the power distribution system. See the owner’s manual in the vehicle glove box for more information on the features and use of all of the power distribution system components.

OPERATION

The power distribution system for this vehicle is designed to provide safe, reliable, and centralized distribution points for the electrical current required to operate all of the many standard and optional factory-installed electrical and electronic powertrain, chassis, safety, security, comfort and convenience systems. At the same time, the power distribution system was designed to provide ready access to these electrical distribution points for the vehicle technician to use when conducting diagnosis and repair of faulty circuits. The power distribution system can also prove useful for the sourcing of additional electrical circuits that may be required to provide the electrical current needed to operate many accessories that the vehicle owner may choose to have installed in the aftermarket.

SPECIAL TOOLS

POWER DISTRIBUTION SYSTEMS

Terminal Pick Kit 6680
INTEGRATED POWER MODULE

DESCRIPTION

The Integrated Power Module (IPM) is a combination of the Power Distribution Center (PDC) and the Front Control Module (FCM). The IPM is located in the engine compartment, next to the battery on this model (Fig. 1). The power distribution center mates directly with the Front Control Module (FCM) to form the IPM Fuse and Relay Center. The power distribution center (PDC) is a printed circuit board based module that contains fuses and relays, while the front control module contains the electronics controlling the IPM and other functions. This IPM connects directly to the battery positive via a four pin connector. The ground connection is via two other connectors. The IPM provides the primary means of voltage distribution and protection for the entire vehicle.

The molded plastic IPM housing includes a base and cover. The IPM cover is easily opened or removed for service access by squeezing the two marked cover latches and has a fuse and relay layout map integral to the inside surface of the cover. This IPM housing base and cover are secured in place by an IPM mounting bracket. This mounting bracket is designed to allow the IPM to rotate counter-clockwise once the locking tab is disengaged. The IPM mounting bracket is secured in place by bolts threaded into the left front wheel house.

OPERATION

All of the current from the battery and the generator output enters the Integrated Power Module (IPM) via a four-pin connector on the bottom of the module. The IPM cover is unlatched and opened or removed to access the fuses or relays. Internal connections of all of the power distribution center circuits is accomplished by a combination of bus bars and a printed circuit board. Refer to the Wiring section of the service manual for complete IPM circuit schematics.

REMOVAL

(1) Disconnect the negative and positive battery cables.

(2) Remove the battery thermal guard from the vehicle. Refer to the Battery section for the procedure.

(3) Remove the battery from the vehicle. Refer to the Battery section for the procedure.

(4) Using a flat-bladed screwdriver, twist the Integrated Power Module (IPM) bracket retaining latch outward to free the intelligent power module from its mounting bracket (Fig. 2).

(5) Rotate the IPM counter-clockwise to access and disconnect the various electrical connectors (Fig. 3).

(6) Free the IPM from its mounting bracket by removing the IPM bracket clips from the hinge. A screwdriver slipped up from under the hinge will free the clips.

Fig. 1 BATTERY THERMAL GUARD

1 - BATTERY THERMAL GUARD
2 - INTEGRATED POWER MODULE
3 - FRONT CONTROL MODULE

Fig. 2 RELEASING INTEGRATED POWER MODULE FROM ITS MOUNTING BRACKET

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INSTALLATION

1. Snap the left side of the Integrated Power Module (IPM) housing in its mounting bracket and connect the various electrical connectors. Care must be taken that the Connector Positive Assurance (CPA) on the five-pin B+ connector is positively engaged to prevent generating a Diagnostic Trouble Code (DTC). NOTE: IPM electrical connectors are color coded to ease location reference.

2. Being certain no wires are stressed or pinched, rotate the IPM clockwise until secured in mounting bracket. An audible click may be heard.

3. Install the battery in the vehicle. Refer to the Battery section for the procedure.

4. Install the battery thermal guard in the vehicle. Refer to the Battery section for the procedure.

5. Connect the negative and positive battery cables.

6. Using a diagnostic scan tool, check for any stored diagnostic trouble codes and correct, check that all vehicle options are operational before returning the vehicle to service.

IOD FUSE

DESCRIPTION

All vehicles are equipped with an Ignition-Off Draw (IOD) fuse that is removed from its normal cavity in the Integrated Power Module (IPM) when the vehicle is shipped from the factory. Dealer personnel are to remove the IOD fuse from the storage location and install it into the IPM fuse cavity marked IOD as part of the preparation procedures performed just prior to new vehicle delivery.

The IPM has a molded plastic cover that can be removed to provide service access to all of the fuses and relays in the IPM. An integral latch and hinges are molded into the IPM cover for easy removal. A fuse layout map is integral to the underside of the IPM cover to ensure proper fuse and relay identification. The IOD fuse is a 20 ampere blade-type mini fuse and, when removed, it is stored in a fuse cavity adjacent to the washer fuse within the IPM.

OPERATION

The term ignition-off draw identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. The IOD fuse feeds the memory and sleep mode functions for some of the electronic modules in the vehicle as well as various other accessories that require battery current when the ignition switch is in the Off position, including the clock. The only reason the IOD fuse is removed is to reduce the normal IOD of the vehicle electrical system during new vehicle transportation and pre-delivery storage to reduce battery depletion, while still allowing vehicle operation so that the vehicle can be loaded, unloaded and moved as needed by both vehicle transportation company and dealer personnel.

The IOD fuse is removed from the IPM fuse cavity when the vehicle is shipped from the assembly plant. Dealer personnel must install the IOD fuse when the vehicle is being prepared for delivery in order to restore full electrical system operation. Once the vehicle is prepared for delivery, the IOD function of this fuse becomes transparent and the fuse that has been assigned the IOD designation becomes only another Fused B(+) circuit fuse. The IOD fuse serves no useful purpose to the dealer technician in the service or diagnosis of any vehicle system or condition, other than the same purpose as that of any other standard circuit protection device.

The IOD fuse can be used by the vehicle owner as a convenient means of reducing battery depletion when a vehicle is to be stored for periods not to exceed about thirty days. However, it must be remembered that removing the IOD fuse will not eliminate IOD, but only reduce this normal condition. If a vehicle will be stored for more than about thirty days, the battery negative cable should be disconnected to eliminate normal IOD; and, the battery should be tested and recharged at regular intervals during the vehicle storage period to prevent the battery from becoming discharged or damaged. Refer to Battery System for additional service information.
POWER OUTLET

DESCRIPTION
Accessory power outlets are standard equipment on this model. Two power outlets are installed in the instrument panel center lower bezel, which is located near the bottom of the instrument panel center stack area. Two additional power outlets are also incorporated into the vehicle, one on the left rear C-pillar trim and the other in the center console, if equipped. The power outlets bases are secured by a snap fit in the appropriate bezels. A hinged plug flips closed to conceal and protect the power outlet base when the power outlet is not being used.

The power outlet receptacle unit and the power outlet plugs are each available for service replacement.

OPERATION
The power outlet base or receptacle shell is connected to ground, and an insulated contact in the bottom of the shell is connected to battery current. The power outlet on the instrument panel marked with a battery receives battery voltage from a fuse in the Integrated Power Module (IPM) at all times. The other power outlet on the instrument panel marked with a key receives battery voltage only when the key is in the on position.

The power outlet located in the center console receives battery voltage all the time when positioned between the front seats and key-on voltage when positioned between the rear seats. The power outlet located on the C-pillar receives battery voltage only when the key is in the on position.

DIAGNOSIS AND TESTING

DIAGNOSIS & TESTING - POWER OUTLET
For complete circuit diagrams, refer to Cigar Lighter/Power Outlet in Wiring Diagrams.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO RESTRAINTS BEFORE ATTEMPTING ANY Steering Wheel, Steering Column, Seat or Instrument Panel Component DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Check the fused B(+) fuse in the Integrated Power Module (IPM). If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Check for battery voltage at the fused B(+) fuse in the IPM. If OK, go to Step 3. If not OK, repair the open fused B(+) circuit to the IPM fuse as required.

(3) Open the power outlet door. Check for continuity between the inside circumference of the power outlet receptacle and a good ground. There should be continuity. If OK, go to Step 4. If not OK, go to Step 5.

(4) Check for battery voltage at the insulated contact located at the back of the power outlet receptacle. If not OK, go to Step 5.

(5) Disconnect and isolate the battery negative cable. Remove the appropriate bezel. Check for continuity between the ground circuit cavity of the power outlet wire harness connector and a good ground. There should be continuity. If OK, go to Step 6. If not OK, repair the open ground circuit to ground as required.

(6) Connect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the power outlet wire harness connector. If OK, replace the faulty power outlet receptacle. If not OK, repair the open fused B(+) circuit to the IPM fuse as required.
POWER OUTLET (Continued)

REMOVAL

1. Disconnect and isolate the battery negative cable.
2. Look inside and note position of the retaining bosses (Fig. 4).
3. Using external snap ring pliers with 90 degree tips. Insert pliers with tips against bosses and squeeze forcing bosses out of base.
4. Pull out the base through mounting ring by gently rocking pliers. A tool can be made to do the same. Refer to (Fig. 5).
5. Disconnect the base wires.

INSTALLATION

1. Position the mounting ring on the instrument panel and feed the wires through the ring. Index the cap and the mounting ring with the index tab at the 9 o'clock position to the key in the instrument panel. Install the ring.
2. Connect the wires to the base. Orientate the base alignment rib at the 11 o'clock position to mate the groove in the mounting ring to the base.
3. Push the base into the bezel until it locks in place.
4. Check operation of outlet or element and install the 12 volt outlet cap.