INSTRUMENT CLUSTER

TABLE OF CONTENTS

INSTRUMENT CLUSTER

DESCRIPTION

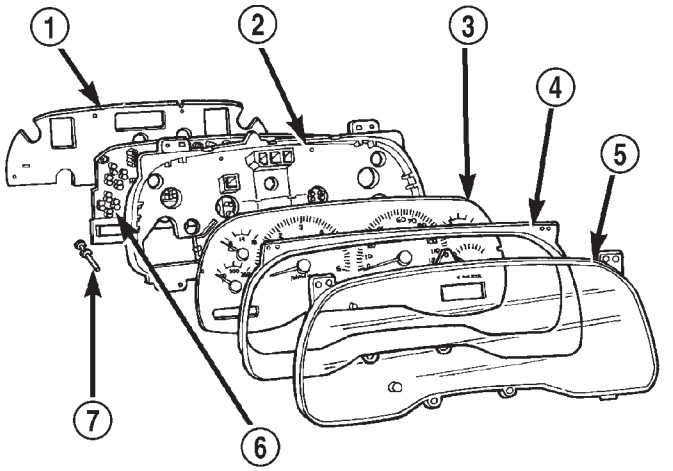

Fig. 1 Instrument Cluster Components

1 - COVER
2 - HOUSING
3 - MASK AND GAUGES
4 - HOOD
5 - LENS
6 - CIRCUIT BOARD
7 - ODOMETER RESET BUTTON

The instrument cluster for this model is an ElectroMechanical Instrument Cluster (EMIC) module that is located in the instrument panel above the steering column opening, directly in front of the driver (Fig. 1). The EMIC gauges and indicators are protected by an integral clear plastic cluster lens, and are visible through a dedicated opening in the cluster bezel on the instrument panel. Just behind the cluster lens is the cluster hood. The cluster hood serves as a visor and shields the face of the cluster from ambient light and reflections to reduce glare. Behind the cluster hood is the cluster overlay and gauges. The overlay is a multi-layered unit. The dark, visible surface of the outer layer of the overlay is marked with all of the gauge identification and graduations, but this layer is also translucent. The darkness of this outer layer prevents the cluster from appearing cluttered or busy by concealing the cluster indicators that are not illuminated, while the translucence of this layer allows those indicators and icons that are illuminated to be readily visible. The underlying layer of the overlay is opaque and allows light from the various indicators and illumination lamps behind it to be visible through the outer layer of the overlay only through predetermined cutouts. On the lower edge of the cluster lens just left of center, the odometer/trip odometer switch knob protrudes through a dedicated hole in the lens. The remainder of the EMIC, including the mounts and the electrical connections, are concealed behind the cluster bezel. The molded plastic EMIC housing has four integral mounting tabs, two each on the upper and lower edges of the housing. The EMIC is secured to the molded plastic instrument panel cluster carrier with four screws. All electrical connections to the EMIC are made at the back of the cluster housing through two take outs of the instrument panel wire harness, each equipped with a self-docking connector.

A single EMIC module is offered on this model. This module utilizes integrated circuitry and information carried on the Chrysler Collision Detection (CCD) data bus network for control of all gauges and many of the indicators. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/COMMUNICATION - DESCRIPTION). The EMIC also uses several hard wired inputs in order to perform its many functions. In addition to instrumentation and indicators, the EMIC has hardware and/or software to support the following functions:

- **Chime Warning Requests** - The EMIC sends chime tone requests over a hard wired circuit to the Central Timer Module (CTM) when it monitors certain conditions or inputs. The CTM replaces the chime or buzzer module and performs the functions necessary to provide audible alerts that are synchronized with the visual alerts provided by the EMIC. (Refer to 8 - ELECTRICAL/CHIME/BUZZER - DESCRIPTION).
- **Vacuum Fluorescent Display (VFD) Dimming Service** - The EMIC performs the functions necessary to eliminate the need for a separate VFD dimming module by providing control and synchronization of the illumination intensity of all vacuum fluorescent displays in the vehicle, as well as a parade mode.

The EMIC module incorporates a blue-green digital VFD for displaying odometer and trip odometer information, as well as the amber cruise-on indicator display function. Some variations of the EMIC are necessary to support optional equipment and regulatory requirements. The EMIC includes the following analog gauges:

- **Coolant Temperature Gauge**
- **Fuel Gauge**
- **Oil Pressure Gauge**
- **Speedometer**
- **Tachometer**
- **Voltage Gauge**

The EMIC also includes provisions for the following indicators:

- **Airbag Indicator**
- **Antilock Brake System (ABS) Indicator**
- **Brake Indicator**

INSTRUMENT CLUSTER (Continued)

- **Check Gauges Indicator**
- **Cruise Indicator (Odometer VFD)**
- **Four-Wheel Drive Indicator**
- **High Beam Indicator**
- **Low Fuel Indicator**
- **Washer Fluid Indicator**
- **Malfunction Indicator Lamp (MIL)**
- **Overdrive-Off Indicator**
- **Seatbelt Indicator**
- **Service Reminder Indicator (SRI)**
- **Transmission Overtemp Indicator**
- **Turn Signal (Right and Left) Indicators**
- **Upshift Indicator**
- **Wait-To-Start Indicator (Diesel Only)**
- **Water-In-Fuel Indicator (Diesel Only)**

Some of these indicators are either programmable or automatically configured when the EMIC is connected to the vehicle electrical system. This feature allows those indicators to be activated or deactivated for compatibility with certain optional equipment. The EMIC also includes a provision for mounting the automatic transmission gear selector indicator in the lower right corner of the cluster. The spring-loaded, cable driven, mechanical gear selector indicator gives an indication of the transmission gear that has been selected with the automatic transmission gear selector lever. The gear selector indicator pointer is easily visible through an opening provided in the front of the cluster overlay, and is also lighted by the cluster illumination lamps for visibility at night. Models equipped with a manual transmission have a blockout plate installed in place of the gear selector indicator.

Cluster illumination is accomplished by adjustable incandescent back lighting, which illuminates the gauges for visibility when the exterior lighting is turned on. The EMIC high beam indicator, turn signal indicators, and wait-to-start indicator are also illuminated by dedicated incandescent bulbs. The remaining indicators in the EMIC are each illuminated by a dedicated Light Emitting Diode (LED) that is soldered onto the electronic circuit board. Each of the incandescent bulbs is secured by an integral bulb holder to the electronic circuit board from the back of the cluster housing.

Hard wired circuitry connects the EMIC to the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the EMIC through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

The EMIC modules for this model are serviced only as complete units. The EMIC module cannot be adjusted or repaired. If a gauge, an LED indicator, the VFD, the electronic circuit board, the circuit board hardware, the cluster overlay, or the EMIC housing are damaged or faulty, the entire EMIC module must be replaced. The cluster lens and hood unit, the rear cluster housing cover, the automatic transmission gear selector indicator, and the incandescent lamp bulbs with holders are available for individual service replacement.

OPERATION

The ElectroMechanical Instrument Cluster (EMIC) is designed to allow the vehicle operator to monitor the conditions of many of the vehicle components and operating systems. The gauges and indicators in the EMIC provide valuable information about the various standard and optional powertrains, fuel and emissions systems, cooling systems, lighting systems, safety systems and many other convenience items. The EMIC is installed in the instrument panel so that all of these monitors can be easily viewed by the vehicle operator when driving, while still allowing relative ease of access for service. The microprocessor-based EMIC hardware and software uses various inputs to control the gauges and indicators visible on the face of the cluster. Some of these inputs are hard wired, but most are in the form of electronic messages that are transmitted by other electronic modules over the Chrysler Collision Detection (CCD) data bus network. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/COMMUNICATION - OPERATION).

The EMIC microprocessor smooths the input data using algorithms to provide gauge readings that are accurate, stable and responsive to operating conditions. These algorithms are designed to provide gauge readings during normal operation that are consistent with customer expectations. However, when abnormal conditions exist, such as low/high battery voltage, low oil pressure, or high coolant temperature, the algorithm drives the gauge pointer to an extreme position and the microprocessor turns on the Check Gauges indicator to provide a distinct visual indication of a problem to the vehicle operator. The instrument cluster circuitry may also generate a hard wired chime tone request to the Central Timer Module (CTM) when it monitors certain conditions or inputs, in order to provide the vehicle operator with an audible alert.

INSTRUMENT CLUSTER (Continued)

The EMIC circuitry operates on battery current received through a fused B(+) fuse in the Junction Block (JB) on a non-switched fused B(+) circuit, and on battery current received through a fused ignition switch output (st-run) fuse in the JB on a fused ignition switch output (st-run) circuit. This arrangement allows the EMIC to provide some features regardless of the ignition switch position, while other features will operate only with the ignition switch in the Start or On positions. The EMIC circuitry is grounded through two separate ground circuits located in one of the two instrument cluster connectors and take outs of the instrument panel wire harness. One ground circuit receives ground through a take out with an eyelet terminal connector of the instrument panel wire harness that is secured by a nut to a ground stud located on the left instrument panel end bracket, while the other ground circuit receives ground through a take out with an eyelet terminal connector of the instrument panel wire harness that is secured by a nut to a ground stud located on the back of the instrument panel armature above the inboard side of the instrument panel steering column opening.

The EMIC also has a self-diagnostic actuator test capability, which will test each of the CCD bus message-controlled functions of the cluster by lighting the appropriate indicators and positioning the gauge needles at several predetermined locations on the gauge faces in a prescribed sequence. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). See the owner's manual in the vehicle glove box for more information on the features, use and operation of the EMIC.

GAUGES

All gauges receive battery current through the EMIC circuitry when the ignition switch is in the On or Start positions. With the ignition switch in the Off position battery current is not supplied to any gauges, and the EMIC circuitry is programmed to move all of the gauge needles back to the low end of their respective scales. Therefore, the gauges do not accurately indicate any vehicle condition unless the ignition switch is in the On or Start positions. All of the EMIC gauges, except the odometer, are air core magnetic units. Two fixed electromagnetic coils are located within each gauge. These coils are wrapped at right angles to each other around a movable permanent magnet. The movable magnet is suspended within the coils on one end of a pivot shaft, while the gauge needle is attached to the other end of the shaft. One of the coils has a fixed current flowing through it to maintain a constant magnetic field strength. Current flow through the second coil changes, which causes changes in its magnetic field strength. The current flowing through the second coil is changed by the EMIC circuitry in response to messages received over the CCD data bus. The gauge needle moves as the movable permanent magnet aligns itself to the changing magnetic fields created around it by the electromagnets.

The gauges are diagnosed using the EMIC self-diagnostic actuator test. (Refer to 8 - ELECTRICAL/ INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). Proper testing of the CCD data bus and the data bus message inputs to the EMIC that control each gauge require the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information. Specific operation details for each gauge may be found elsewhere in this service manual.

VACUUM-FLUORESCENT DISPLAY

The Vacuum-Fluorescent Display (VFD) module is soldered to the EMIC circuit board. The display is active with the ignition switch in the On or Start positions, and inactive when the ignition switch is in any other position. The VFD has several display capabilities including odometer, trip odometer, and an amber “CRUISE” indication whenever the optional speed control system is turned On. The cruise indicator function of the VFD is automatically enabled or disabled by the EMIC circuitry based upon whether the vehicle is equipped with the speed control option. An odometer/trip odometer switch on the EMIC circuit board is used to control several of the display modes. This switch is actuated manually by depressing the odometer/trip odometer switch knob that extends through the lower edge of the cluster lens, just right of center. Actuating this switch momentarily with the ignition switch in the On position will toggle the VFD between the odometer and trip odometer modes. The word “TRIP” will also appear in blue-green text when the VFD trip odometer mode is active. Depressing the switch button for about two seconds while the VFD is in the trip odometer mode will reset the trip odometer value to zero. Holding this switch depressed while turning the ignition switch from the Off position to the On position will activate the EMIC self-diagnostic actuator test. The EMIC will automatically flash the odometer or trip odometer information on and off if there is a loss of CCD data bus communication. The VFD will also display various information used in several diagnostic procedures. Refer to the appropriate diagnostic information for additional details on this VFD function.

The VFD is diagnosed using the EMIC self-diagnostic actuator test. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). Proper testing of the CCD data bus and the data bus message inputs to the EMIC that con-

INSTRUMENT CLUSTER (Continued)

trol some of the VFD functions requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information. Specific operation details for the odometer and trip odometer functions of the VFD may be found elsewhere in this service manual.

INDICATORS

Indicators are located in various positions within the EMIC and are all connected to the EMIC circuit board. The four-wheel drive indicator, high beam indicator, washer fluid indicator, turn signal indicators, and wait-to-start indicator are hard wired. The brake indicator is controlled by CCD data bus messages from the Controller Anti-lock Brake (CAB) and the hard wired park brake switch input to the EMIC. The seatbelt indicator is controlled by the EMIC programming, CCD data bus messages from the Airbag Control Module (ACM), and the hard wired seat belt switch input to the EMIC. The Malfunction Indicator Lamp (MIL) is normally controlled by CCD data bus messages from the Powertrain Control Module (PCM); however, if the EMIC loses CCD data bus communications, the EMIC circuitry will automatically turn the MIL on, and flash the odometer VFD on and off repeatedly until CCD data bus communication is restored. The EMIC uses CCD data bus messages from the Powertrain Control Module (PCM), the diesel engine only Engine Control Module (ECM), the ACM, and the CAB to control all of the remaining indicators. Different indicators are controlled by different strategies; some receive fused ignition switch output from the EMIC circuitry cluster and have a switched ground, while others are grounded through the EMIC circuitry and have a switched battery feed.

In addition, certain indicators in this instrument cluster are programmable or configurable. This feature allows the programmable indicators to be activated or deactivated with a DRBIII® scan tool, while the configurable indicators will be automatically enabled or disabled by the EMIC circuitry for compatibility with certain optional equipment. The only programmable indicator for this model is the upshift indicator. The cruise indicator, four-wheel drive indicator, overdrive-off indicator, service reminder indicator, and the transmission overtemp indicator are automatically configured, either electronically or mechanically.

The hard wired indicators are diagnosed using conventional diagnostic methods. The EMIC and CCD bus message controlled indicator lamps are diagnosed using the EMIC self-diagnostic actuator test. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). Proper testing of the CCD data bus and the data bus message inputs to the EMIC that control each indicator lamp require the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information. Specific operation details for each indicator may be found elsewhere in this service manual.

CLUSTER ILLUMINATION

The EMIC has several illumination lamps that are illuminated when the exterior lighting is turned on with the headlamp switch. The illumination brightness of these lamps is adjusted by the panel lamps dimmer rheostat when the headlamp switch thumbwheel is rotated (down to dim, up to brighten). The illumination lamps receive battery current through the panel lamps dimmer rheostat and a fuse in the JB on a fused panel lamps dimmer switch signal circuit. The illumination lamps are grounded at all times.

In addition, an analog/digital (A/D) converter in the EMIC converts the analog panel lamps dimmer rheostat input from the headlamp switch to a digital dimming level signal for controlling the lighting level of the VFD. The EMIC also broadcasts this digital dimming information as a message over the CCD data bus for use by the Compass Mini-Trip Computer (CMTC) in synchronizing the lighting level of its VFD with that of the EMIC. The headlamp switch thumbwheel also has a Parade position to provide a parade mode. The EMIC monitors the request for this mode through a hard wired day brightness sense circuit input from the headlamp switch. In this mode, the EMIC will override the selected panel dimmer switch signal and send a message over the CCD data bus to illuminate all vacuum fluorescent displays at full brightness for easier visibility when driving in daylight with the exterior lighting turned on. The parade mode has no effect on the incandescent bulb illumination intensity.

The hard wired cluster illumination lamps are diagnosed using conventional diagnostic methods. Proper testing of the VFD dimming level and the CCD data bus dimming level message functions requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

CHIME WARNING REQUESTS

The EMIC is programmed to request chime service from the Central Timer Module (CTM) when certain indicator lamps are illuminated. When the programmed conditions are met, the EMIC generates a chime request signal and sends it over a hard wired tone request circuit to the CTM. Upon receiving the proper chime request, the CTM activates an integral chime tone generator to provide the audible chime tone to the vehicle operator. (Refer to 8 - ELECTRICAL/CHIME/BUZZER - OPERATION). Proper testing of the CTM and the EMIC chime requests

requires the use of a DRBIII® scan tool. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING - INSTRUMENT CLUSTER

If all of the instrument cluster gauges and/or indicators are inoperative, refer to PRELIMINARY DIAGNOSIS . If an individual gauge or Chrysler Collision Detection (CCD) data bus message-controlled indicator is inoperative, refer to ACTUATOR TEST . If an individual hard wired indicator is inoperative, refer to the diagnosis and testing information for that specific indicator. If the instrument cluster chime warning request function is inoperative, refer to CHIME WARNING REQUEST DIAGNOSIS . If the instrument cluster illumination lighting is inoperative, refer to CLUSTER ILLUMINATION DIAGNOSIS . If the instrument cluster Vacuum-Fluorescent Display (VFD) dimmer service is inoperative, use a DRBIII® scan tool to diagnose the problem. Refer to the appropriate diagnostic procedures. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pinout information and location views for the various wire harness connectors, splices and grounds.

NOTE: Certain indicators in this instrument cluster are programmable. This feature allows those indicators to be activated or deactivated with a DRBIII® scan tool for compatibility with certain optional equipment. If the problem being diagnosed involves improper illumination of the upshift indicator, use a DRBIII® scan tool to be certain that the instrument cluster has been programmed with the proper vehicle equipment option settings.

PRELIMINARY DIAGNOSIS

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) If the indicators operate, but none of the gauges operate, go to Step 2. If all of the gauges and the CCD data bus message-controlled indicators are inoperative, go to Step 5.

(2) Check the fused B(+) fuse (Fuse 14 - 10 ampere) in the Junction Block (JB). If OK, go to Step 3. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(3) Check for battery voltage at the fused B(+) fuse (Fuse 14 - 10 ampere) in the JB. If OK, go to Step 4. If not OK, repair the open fused B(+) circuit between the JB and the Power Distribution Center (PDC) as required.

(4) Disconnect and isolate the battery negative cable. Remove the instrument cluster. Connect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the instrument panel wire harness connector (Connector C1) for the instrument cluster. If OK, refer to ACTUATOR TEST . If not OK, repair the open fused B(+) circuit between the instrument cluster and the JB as required.

(5) Check the fused ignition switch output (st-run) fuse (Fuse 17 - 10 ampere) in the JB. If OK, go to Step 6. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(6) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (st-run) fuse (Fuse 17 - 10 ampere) in the JB. If OK, go to Step 7. If not OK, repair the open fused ignition switch output (st-run) circuit between the instrument cluster and the JB as required.

(7) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Reinstall the instrument cluster. Reconnect the battery negative cable. Turn the ignition switch to the On position. Set the park brake. The brake indicator in the instrument cluster should light. If OK, go to Step 8. If not OK, go to Step 9.

(8) Turn the ignition switch to the Off position. Turn on the park lamps and adjust the panel lamps dimmer thumbwheel in the headlamp switch to the full bright position. The cluster illumination lamps should light. If OK, go to Step 10. If not OK, repair the open ground circuit (Z3) between the instrument cluster and ground (G201) as required.

(9) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Remove the instrument cluster. Connect the battery negative cable. Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (st-run) circuit cavity of the instrument panel wire harness connector (Connector C1). If OK, refer to ACTUATOR TEST . If not OK, repair the open fused ignition switch output (st-run) circuit between the instrument cluster and the JB as required.

INSTRUMENT CLUSTER (Continued)

(10) Disconnect and isolate the battery negative cable. Remove the instrument cluster. Check for continuity between the ground circuit (Z2) cavity of the instrument panel wire harness connector (Connector C1) and a good ground. There should be continuity. If OK, refer to ACTUATOR TEST . If not OK, repair the open ground circuit to ground (G200) as required.

ACTUATOR TEST

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The instrument cluster actuator test will put the instrument cluster into its self-diagnostic mode. In this mode the instrument cluster can perform a self-diagnostic test that will confirm that the instrument cluster circuitry, the gauges, and the CCD data bus message-controlled indicators are capable of operating as designed. During the actuator test the instrument cluster circuitry position each of the gauge needles at various calibration points, illuminate each of the segments in the Vacuum-Fluorescent Display (VFD), and turn all of the CCD data bus message-controlled indicators on and off.

Successful completion of the actuator test will confirm that the instrument cluster is operational. However, there may still be a problem with the CCD data bus, the Powertrain Control Module (PCM), the Engine Control Module (ECM), the Airbag Control Module (ACM), the Controller Anti-lock Brake (CAB), or the inputs to one of these electronic control modules. Use a DRBIII® scan tool to diagnose these components. Refer to the appropriate diagnostic information.

(1) Begin the test with the ignition switch in the Off position.

(2) Depress the odometer/trip odometer switch button.

(3) While still holding the odometer/trip odometer switch button depressed, turn the ignition switch to the On position, but do not start the engine.

(4) Keep the odometer/trip odometer switch button depressed for about ten seconds, until **CHEC** appears in the odometer display, then release the odometer/trip odometer switch button.

(5) A series of three-digit numeric failure messages may appear in the odometer display, depending upon the failure mode. If a failure message appears, refer to the Instrument Cluster Failure Message chart for the description and proper correction. If no failure message appears, the actuator test will proceed as described in Step 6.

INSTRUMENT CLUSTER FAILURE MESSAGE		
Message	Description	Correction
110	A failure has been identified in the cluster CPU, RAM, or EEPROM.	1. Replace the faulty cluster.
900	The CCD data bus is not operational.	1. Check the CCD data bus connections at the cluster. 2. Check the cluster fuses. 3. Check the CCD data bus bias. 4. Check the CCD data bus voltage. 5. Check the CCD data bus terminations.
920	The cluster is not receiving a vehicle speed message from the PCM.	1. Check the PCM software level and reflash if required. 2. Use a DRBIII® scan tool to verify that the vehicle speed message is being sent by the PCM.
921	The cluster is not receiving a distance pulse message from the PCM.	1. Check the PCM software level and reflash if required. 2. Use a DRBIII® scan tool to verify that the distance pulse message is being sent by the PCM.

INSTRUMENT CLUSTER (Continued)

INSTRUMENT CLUSTER FAILURE MESSAGE		
Message	Description	Correction
940	The cluster is not receiving an airbag lamp-on message from the ACM.	1. Check the CCD data bus connections at the ACM. 2. Check the ACM fuse.
950	The cluster is not receiving an ABS lamp-on message from the CAB.	1. Check the CCD data bus connections at the CAB. 2. Check the CAB fuse.
999	An error has been discovered.	1. Record the failure message. 2. Depress the trip odometer reset button to continue the Self-Diagnostic Test.

(6) The instrument cluster will begin the Vacuum Fluorescent Display (VFD) walking segment test. This test will require the operator to visually inspect each VFD segment as it is displayed to determine a pass or fail condition. First, all of the segments will be illuminated at once; then, each individual segment of the VFD will be illuminated in sequence. If any segment in the display fails to illuminate, repeat the test to confirm the failure. If the failure is confirmed, replace the faulty instrument cluster. Following completion of the VFD walking segment test, the actuator test will proceed as described in Step 7.

(7) The instrument cluster will perform a bulb check of each indicator that the instrument cluster circuitry controls. If the wait-to-start indicator does not illuminate during this test, the instrument cluster should be removed. However, check that the incandescent bulb is not faulty and that the bulb holder is properly installed on the instrument cluster electronic circuit board before considering instrument cluster replacement. If the bulb and bulb holder check OK, replace the faulty instrument cluster. Each of the remaining instrument cluster circuitry controlled indicators except the cruise indicator are illuminated by a Light Emitting Diode (LED). If an LED or the cruise indicator in the VFD, fails to illuminate during this test, the instrument cluster must be replaced. Following the bulb check test, the actuator test will proceed as described in Step 8.

(8) The instrument cluster will perform a gauge actuator test. In this test the instrument cluster circuitry positions each of the gauge needles at three different calibration points, then returns the gauge needles to their relaxed positions. If an individual gauge does not respond properly, or does not respond at all during the gauge actuator test, the instrument cluster should be removed. However, check that the gauge terminal pins are properly inserted through the spring-clip terminal pin receptacles on the instrument cluster electronic circuit board before considering instrument cluster replacement. If the gauge terminal connections are OK, replace the faulty instrument cluster.

(9) The actuator test is now completed. The instrument cluster will automatically exit the self-diagnostic mode and return to normal operation at the completion of the test, if the ignition switch is turned to the Off position during the test, or if a vehicle speed message indicating that the vehicle is moving is received from the PCM on the CCD data bus during the test.

(10) Go back to Step 1 to repeat the test, if required.

CHIME WARNING REQUEST DIAGNOSIS

Before performing this test, complete the testing of the seat belt switch and the Central Timer Module (CTM). (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT SWITCH - DIAGNOSIS AND TESTING) and (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL/CENTRAL TIMER MODULE - DIAGNOSIS AND TESTING). The diagnosis found here consists of confirming the viability of the hard wired tone request circuit between the instrument cluster and the Central Timer Module (CTM). For diagnosis of the CCD data bus and the data bus message inputs that cause the instrument cluster to issue a request for chime service, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

INSTRUMENT CLUSTER (Continued)

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(1) Disconnect and isolate the battery negative cable. Remove the instrument cluster from the instrument panel. Move the CTM away from its mounting bracket far enough to access the instrument panel wire harness connector(s) for the CTM. Disconnect the instrument panel wire harness connector (Connector C1) from the CTM connector receptacle.

(2) Check for continuity between the tone request circuit cavity of the instrument panel wire harness connector (Connector C2) for the instrument cluster and a good ground. There should be no continuity. If OK, go to Step 3. If not OK, repair the shorted tone request circuit between the instrument cluster and the CTM as required.

(3) Check for continuity between the tone request circuit cavities of the instrument panel wire harness connector (Connector C2) for the instrument cluster and the instrument panel wire harness connector (Connector C1) for the CTM. There should be continuity. If OK, replace the faulty instrument cluster. If not OK, repair the open tone request circuit between the instrument cluster and the CTM as required.

CLUSTER ILLUMINATION DIAGNOSIS

The diagnosis found here addresses an inoperative instrument cluster illumination lamp condition. If the problem being diagnosed is a single inoperative illumination lamp, be certain that the bulb and bulb holder unit are properly installed in the instrument cluster electronic circuit board. If no installation problems are found replace the faulty bulb and bulb holder unit. If all of the cluster illumination lamps are inoperative and the problem being diagnosed includes inoperative exterior lighting controlled by the headlamp switch, that system needs to be repaired first. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP - DIAGNOSIS AND TESTING). If no exterior lighting system problems are found, the following procedure will help locate a short or open in the cluster illumination lamp circuit. If the problem being diagnosed involves a lack of dimming control for the odometer/trip odometer Vacuum Fluorescent Display (VFD), but all of the other cluster illumination lamps can be dimmed, test and repair the day brightness circuit between the instrument cluster and the headlamp switch as required. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

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(1) Check the instrument panel dimmer fuse (Fuse 5 - 5 ampere) in the Junction Block (JB). If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Turn the exterior lamps On with the headlamp switch. Rotate the headlamp switch panel lamps dimmer thumbwheel upward to just before the interior lamps detent. Check for battery voltage at the panel lamps dimmer fuse (Fuse 5 - 5 ampere) in the JB. Rotate the panel lamps dimmer thumbwheel downward while observing the test voltmeter. The reading should go from battery voltage to zero volts. If OK, go to Step 3. If not OK, repair the open panel lamps dimmer switch signal circuit between the headlamp switch and the JB as required.

(3) Turn the exterior lamps Off. Disconnect and isolate the battery negative cable. Remove the instrument cluster. Remove the instrument panel dimmer fuse (Fuse 5 - 5 ampere) from the JB. Probe the fused panel lamps dimmer switch signal circuit cavity of the instrument panel wire harness connector (Connector C2) for the instrument cluster. Check for continuity to a good ground. There should be no continuity. If OK, go to Step 4. If not OK, repair the shorted fused panel lamps dimmer switch signal circuit between the instrument cluster and the JB as required.

(4) Reinstall the instrument panel dimmer fuse (Fuse 5 - 5 ampere) in the JB. Reconnect the battery negative cable. Turn the exterior lamps On with the

headlamp switch. Rotate the headlamp switch panel lamps dimmer thumbwheel upward to just before the interior lamps detent. Check for battery voltage at the fused panel lamps dimmer switch signal circuit cavity of the instrument panel wire harness connector (Connector C2) for the instrument cluster. If OK, replace the faulty bulb and bulb holder units. If not OK, repair the open fused panel lamps dimmer switch signal circuit between the instrument cluster and the JB as required.

REMOVAL

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(1) Disconnect and isolate the battery negative cable.

(2) Remove the cluster bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/ CLUSTER BEZEL - REMOVAL).

(3) Remove the four screws that secure the instrument cluster to the instrument panel (Fig. 2).

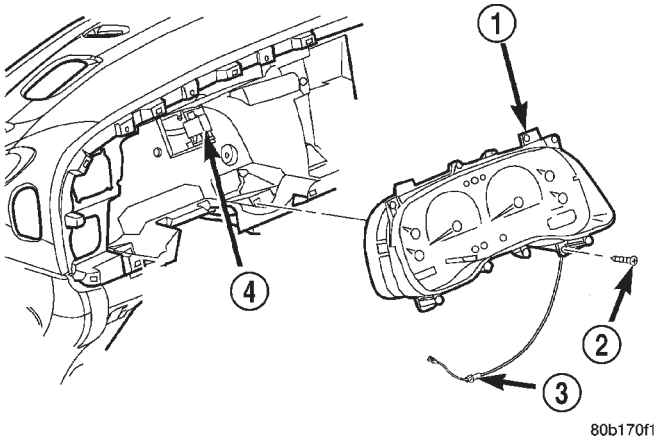

Fig. 2 Instrument Cluster Remove/Install

1 - INSTRUMENT CLUSTER
2 - SCREW
3 - PRNDL CABLE
4 - SELF-DOCKING WIRE HARNESS CONNECTOR

(4) If the vehicle is equipped with an automatic transmission, place the automatic transmission gear selector lever in the Park position.

(5) Pull the instrument cluster rearward far enough to disengage the two self-docking instrument panel wire harness connectors from the cluster connector receptacles.

(6) If the vehicle is equipped with an automatic transmission, pull the instrument cluster rearward far enough to access and remove the two screws that secure the gear selector indicator to the back of the instrument cluster housing (Fig. 3).

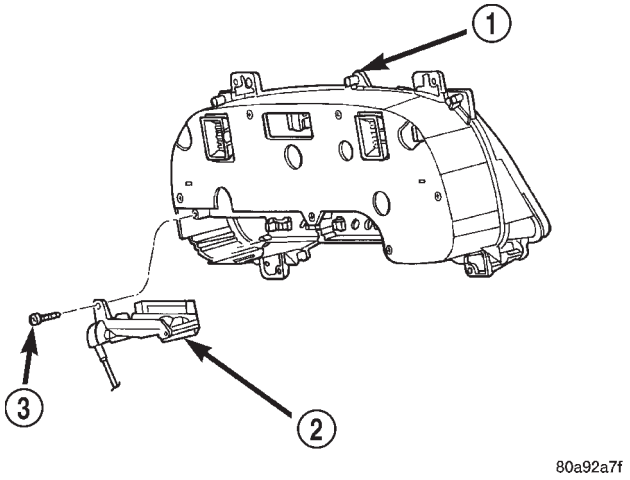

Fig. 3 Gear Selector Indicator Remove/Install

1 - INSTRUMENT CLUSTER
2 - GEAR SELECTOR INDICATOR
3 - SCREW

(7) If the vehicle is equipped with an automatic transmission, disengage the gear selector indicator from the back of the instrument cluster housing.

(8) Remove the instrument cluster from the instrument panel.

DISASSEMBLY

Some of the components for the instrument cluster used in this vehicle are serviced individually. The serviced components include: the automatic transmission gear selector indicator, the incandescent instrument cluster indicator lamp and illumination lamp bulbs (including the integral bulb holders), the cluster lens and hood unit, and the cluster housing rear cover. The remaining components are serviced only as a part of the cluster housing unit, which includes: the cluster housing, the electronic circuit board unit, the cluster overlay, the gauges, and the odometer/trip odometer reset switch button. Following are the procedures for disassembling the serviced components from the instrument cluster unit.

INSTRUMENT CLUSTER (Continued)

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GEAR SELECTOR INDICATOR

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument cluster from the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

(3) Remove the steering column opening cover from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(4) Reach through the instrument panel steering column opening to access and disengage the loop end of the gear selector indicator cable from the PRNDL driver lever on the left side of the steering column (Fig. 4).

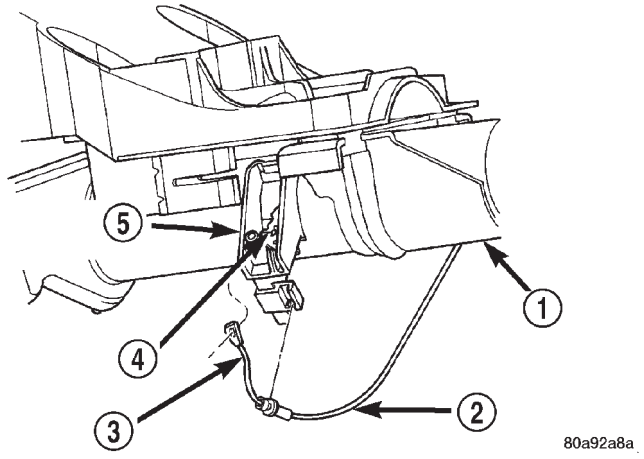

Fig. 4 Gear Selector Indicator Cable Remove/Install

1 - STEERING COLUMN
2 - CABLE
3 - LOOP END
4 - LEVER
5 - ADJUSTER AND BRACKET

(5) Squeeze the sides of the plastic adjuster and bracket unit to disengage the tabs that secure it to the sides of the steering column window.

(6) Remove the gear selector indicator mechanism and cable unit through the instrument panel cluster opening.

CLUSTER BULB

This procedure applies to each of the incandescent cluster illumination lamp or indicator lamp bulb and bulb holder units. However, the illumination lamps and the indicator lamps use different bulb and bulb holder unit sizes. They must never be interchanged.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument cluster from the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

(3) Turn the bulb holder counterclockwise about sixty degrees on the cluster electronic circuit board (Fig. 5).

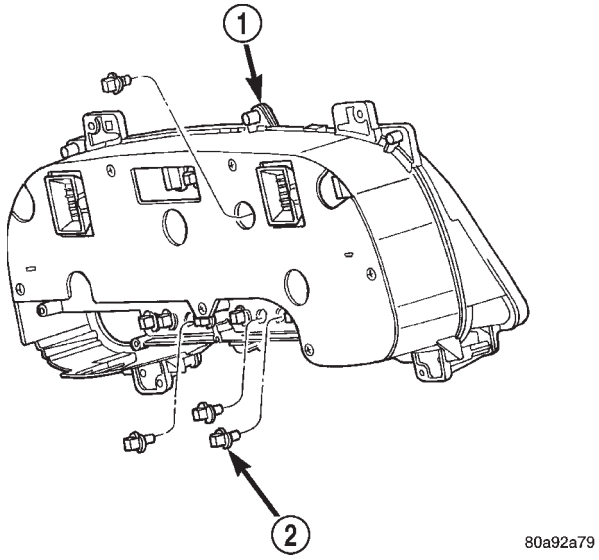

Fig. 5 Cluster Bulb Remove/Install

1 - INSTRUMENT CLUSTER
2 - BULB AND HOLDER

(4) Pull the bulb and bulb holder unit straight back to remove it from the bulb mounting hole in the cluster electronic circuit board.

CLUSTER LENS AND HOOD

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument cluster from the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

INSTRUMENT CLUSTER (Continued)

(3) Remove the seven screws that secure the lens and hood unit to the cluster housing (Fig. 6).

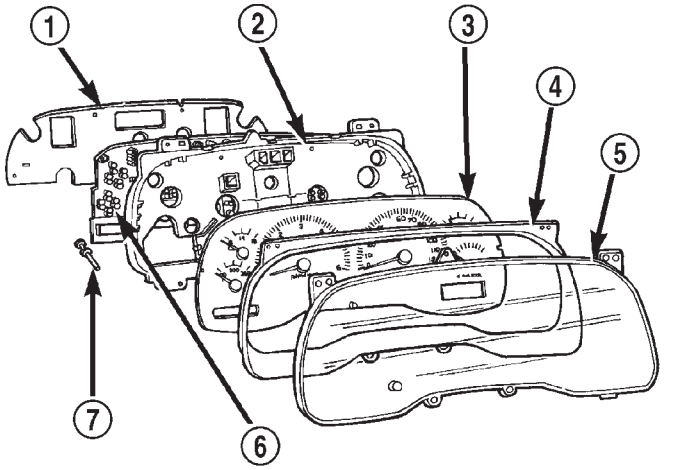

Fig. 6 Instrument Cluster Components

1 - COVER
2 - HOUSING
3 - MASK AND GAUGES
4 - HOOD
5 - LENS
6 - CIRCUIT BOARD
7 - ODOMETER RESET BUTTON

(4) Gently pull the lens and hood unit away from the cluster housing.

CAUTION: Do not touch the face of the gauge overlay or the back of the cluster lens with your finger. It will leave a permanent finger print.

CLUSTER HOUSING REAR COVER

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument cluster from the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

(3) Remove the six screws that secure the rear cover to the back of the cluster housing (Fig. 7).

(4) Remove the rear cover from the back of the cluster housing.

CLUSTER HOUSING

(1) Disconnect and isolate the battery negative cable.

(2) Remove the instrument cluster from the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

(3) Remove the lens and hood unit from the cluster housing. Refer to CLUSTER LENS AND HOOD .

(4) Remove the rear cover from the cluster housing. Refer to CLUSTER HOUSING REAR COVER .

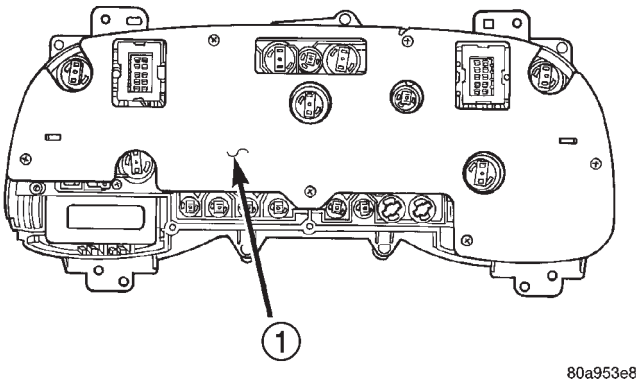

Fig. 7 Cluster Housing Rear Cover Remove/Install

1 - REAR CLUSTER HOUSING COVER

ASSEMBLY

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GEAR SELECTOR INDICATOR

(1) Position the gear selector indicator mechanism and cable unit into the instrument panel cluster opening.

(2) Route the cable through the instrument panel and under the steering column to the PRNDL driver lever on the left side of the steering column.

(3) Squeeze the sides of the plastic adjuster and bracket unit and engage the tabs that secure it with the sides of the steering column window.

(4) Engage the loop end of the gear selector indicator cable onto the PRNDL driver lever on the left side of the steering column (Fig. 4).

(5) Reinstall the instrument cluster onto the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).

(6) Confirm proper operation of the gear selector indicator. Calibrate the indicator, if required. (Refer to 19 - STEERING/COLUMN - INSTALLATION).

(7) Reinstall the steering column opening cover onto the instrument panel. (Refer to 23 - BODY/IN-

INSTRUMENT CLUSTER (Continued)

STRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(8) Reconnect the battery negative cable.

CLUSTER BULB

This procedure applies to each of the incandescent cluster illumination lamp or indicator lamp bulb and bulb holder units. However, the illumination lamps and the indicator lamps use different bulb and bulb holder unit sizes. They must never be interchanged.

CAUTION: Be certain that any bulb and bulb holder unit removed from the cluster electronic circuit board is reinstalled in the correct position. Always use the correct bulb size and type for replacement. An incorrect bulb size or type may overheat and cause damage to the instrument cluster, the electronic circuit board and/or the gauges.

(1) Insert the bulb and bulb holder unit straight into the correct bulb mounting hole in the cluster electronic circuit board (Fig. 5).

(2) With the bulb holder fully seated against the cluster electronic circuit board, turn the bulb holder clockwise about sixty degrees to lock it into place.

(3) Reinstall the instrument cluster onto the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).

(4) Reconnect the battery negative cable.

CLUSTER LENS AND HOOD

CAUTION: Do not touch the face of the gauge overlay or the back of the cluster lens with your finger. It will leave a permanent finger print.

(1) Align the cluster lens and hood unit with the cluster housing. Be certain that the odometer/trip odometer switch button is installed through the clearance hole in the lens (Fig. 6).

(2) Install and tighten the seven screws that secure the lens and hood unit to the cluster housing. Tighten the screws to 2.2 N·m (20 in. lbs.).

(3) Reinstall the instrument cluster onto the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).

(4) Reconnect the battery negative cable.

CLUSTER HOUSING REAR COVER

(1) Position the rear cover onto the back of the cluster housing (Fig. 7).

(2) Install and tighten the six screws that secure the rear cover to the back of the cluster housing. Tighten the screws to 2.2 N·m (20 in. lbs.).

(3) Reinstall the instrument cluster onto the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).

(4) Reconnect the battery negative cable.

CLUSTER HOUSING

(1) Assemble the rear cover onto the cluster housing. Refer to CLUSTER HOUSING REAR COVER .

(2) Assemble the lens and hood unit onto the cluster housing. Refer to CLUSTER LENS AND HOOD .

(3) Reinstall the instrument cluster onto the instrument panel. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).

(4) Reconnect the battery negative cable.

INSTALLATION

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(1) Position the instrument cluster to the instrument panel.

(2) If the vehicle is equipped with an automatic transmission, position the gear selector indicator onto the back of the cluster housing (Fig. 3).

(3) If the vehicle is equipped with an automatic transmission, install and tighten the two screws that secure the gear selector indicator mechanism to the back of the cluster housing. Tighten the screws to 2.2 N·m (20 in. lbs.).

(4) Align the instrument cluster with the cluster opening in the instrument panel and push the cluster firmly and evenly into place. The instrument panel wire harness has two self-docking connectors that will be automatically aligned with, and connected to the instrument cluster connector receptacles when the cluster is properly installed in the instrument panel.

(5) Install and tighten the four screws that secure the instrument cluster to the instrument panel (Fig. 2). Tighten the screws to 2.2 N·m (20 in. lbs.).

(6) Reinstall the cluster bezel onto the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - INSTALLATION).

(7) If the vehicle is equipped with an automatic transmission, confirm proper operation of the gear selector indicator. Calibrate the indicator, if required.

(Refer to 19 - STEERING/COLUMN - INSTALLATION).

(8) Reconnect the battery negative cable.

NOTE: Some of the indicators in this instrument cluster are either programmable (upshift indicator) or automatically configured (cruise, overdrive-off, and transmission overtemp indicators) when the cluster is connected to the vehicle electrical system. This feature allows those indicator lamps to be enabled or disabled for compatibility with certain optional equipment. If a new instrument cluster is being installed, use a DRBIII® scan tool to program the instrument cluster with the proper vehicle equipment option setting to enable and/or disable the upshift indicator lamp. Refer to the appropriate diagnostic information.

ABS INDICATOR

DESCRIPTION

An Antilock Brake System (ABS) indicator is standard equipment on all instrument clusters. This indicator serves both the standard equipment Rear Wheel Anti-Lock (RWAL) and optional equipment 4-Wheel Anti-Lock (4WAL) brake systems. The ABS indicator is located near the lower edge of the instrument cluster overlay, to the left of center. The ABS indicator consists of a stencilled cutout of the International Control and Display Symbol icon for “Failure of Anti-lock Braking System” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber lens behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The ABS indicator is serviced as a unit with the instrument cluster.

OPERATION

The ABS indicator gives an indication to the vehicle operator when the ABS system is faulty or inoperative. This indicator is controlled by a transistor on the instrument cluster circuit board based upon cluster programming and electronic messages received by the cluster from the Controller Antilock Brake (CAB) over the Chrysler Collision Detection (CCD) data bus. The ABS indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the ABS indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the ABS indicator is illuminated by the cluster for about two seconds as a bulb test.
- **ABS Lamp-On Message** - Each time the cluster receives a lamp-on message from the CAB, the ABS indicator will be illuminated. The indicator remains illuminated until the cluster receives a lamp-off message from the CAB, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Communication Error** - If the cluster receives no lamp-on or lamp-off messages from the CAB for six consecutive seconds, the ABS indicator is illuminated. The indicator remains illuminated until the cluster receives a valid message from the CAB, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the instrument cluster is put through the actuator test, the ABS indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.
- **ABS Diagnostic Test** - The ABS indicator is blinked on and off by lamp-on and lamp-off messages from the CAB during the performance of the ABS diagnostic tests.

The CAB continually monitors the ABS circuits and sensors to decide whether the system is in good operating condition. The CAB then sends the proper lamp-on or lamp-off messages to the instrument cluster. If the CAB sends a lamp-on message after the bulb test, it indicates that the CAB has detected a system malfunction and/or that the ABS system has become inoperative. The CAB will store a Diagnostic Trouble Code (DTC) for any malfunction it detects. Each time the ABS indicator fails to light due to an open or short in the cluster ABS indicator circuit, the cluster sends a message notifying the CAB of the condition, and the CAB will store a DTC. For proper diagnosis of the antilock brake system, the CAB, the CCD data bus, or the message inputs to the instrument cluster that control the ABS indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

AIRBAG INDICATOR

DESCRIPTION

An airbag indicator is standard equipment on all instrument clusters. However, on vehicles not equipped with airbags, this indicator is electronically disabled. The airbag indicator is located near the lower edge of the instrument cluster overlay, to the right of center. The airbag indicator consists of a stenciled cutout of the word “AIRBAG” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red lens behind the cutout in the opaque layer of the overlay causes the “AIRBAG” text to appear in red through the translucent outer layer of the overlay when it is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The airbag indicator is serviced as a unit with the instrument cluster.

OPERATION

The airbag indicator gives an indication to the vehicle operator when the airbag system is faulty or inoperative. The airbag indicator is controlled by a transistor on the instrument cluster circuit board based upon cluster programming and electronic messages received by the cluster from the Airbag Control Module (ACM) over the Chrysler Collision Detection (CCD) data bus. The airbag indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the indicator will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the airbag indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the airbag indicator is illuminated for about seven seconds. The first two seconds is the cluster bulb test function, and the remainder is the ACM bulb test function.
- **ACM Lamp-On Message** - Each time the cluster receives a lamp-on message from the ACM, the airbag indicator will be illuminated. The indicator remains illuminated for about twelve seconds or until the cluster receives a lamp-off message from the ACM, whichever is longer.
- **Communication Error** - If the cluster receives no airbag messages for three consecutive seconds, the airbag indicator is illuminated. The indicator remains illuminated for about twelve seconds or until the cluster receives a single lamp-off message from the ACM, whichever is longer.
- **Actuator Test** - Each time the cluster is put through the actuator test, the airbag indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The ACM continually monitors the airbag system circuits and sensors to decide whether the system is in good operating condition. The ACM then sends the proper lamp-on or lamp-off messages to the instrument cluster. If the ACM sends a lamp-on message after the bulb test, it indicates that the ACM has detected a system malfunction and/or that the airbags may not deploy when required, or may deploy when not required. The ACM will store a Diagnostic Trouble Code (DTC) for any malfunction it detects. Each time the airbag indicator fails to illuminate due to an open or short in the cluster airbag indicator circuit, the cluster sends a message notifying the ACM of the condition, the ACM will store a DTC, and the cluster begins blinking the seat belt indicator. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER/ SEATBELT INDICATOR - OPERATION). For proper diagnosis of the airbag system, the ACM, the CCD data bus, or the message inputs to the instrument cluster that control the airbag indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

BRAKE/PARK BRAKE INDICATOR

DESCRIPTION

A brake indicator is standard equipment on all instrument clusters. The brake indicator is located near the lower edge of the instrument cluster overlay, to the right of center. The brake indicator consists of a stenciled cutout of the word “BRAKE” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red lens behind the cutout in the opaque layer of the overlay causes the “BRAKE” text to appear in red through the translucent outer layer of the overlay when it is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The brake indicator is serviced as a unit with the instrument cluster.

OPERATION

The brake indicator gives an indication to the vehicle operator when the parking brake is applied, or when there are certain brake hydraulic system malfunctions. This indicator is controlled by a transistor

on the instrument cluster circuit board based upon a hard wired input to the instrument cluster, cluster programming, and electronic messages received by the cluster from the Controller Antilock Brake (CAB) over the Chrysler Collision Detection (CCD) data bus. The brake indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the brake indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the brake indicator is illuminated by the instrument cluster for about four seconds as a bulb test.
- **Park Brake-On** - If the park brake is applied or not fully released with the ignition switch in the On position, the brake indicator is illuminated solid. The brake indicator will blink on and off repeatedly when the park brake is applied or not fully released and the ignition switch is in the On position if a vehicle with an automatic transmission is not in Park or Neutral, or if the engine is running on vehicles with a manual transmission.
- **Brake Lamp-On Message** - Each time the cluster receives a lamp-on message from the CAB, the brake indicator will be illuminated. The indicator remains illuminated until the cluster receives a lamp-off message from the CAB, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the instrument cluster is put through the actuator test, the brake indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The park brake switch on the park brake pedal mechanism provides a hard wired ground input to the instrument cluster circuitry through the park brake switch sense circuit whenever the park brake is applied or not fully released. The CAB continually monitors the brake pressure switch on the brake combination valve to determine if the pressures in the two halves of the split brake hydraulic system are unequal. The CAB then sends the proper lamp-on or lamp-off messages to the instrument cluster. If the CAB sends a lamp-on message after the bulb test, it indicates that the CAB has detected a brake hydraulic system malfunction and/or that the ABS system has become inoperative. The CAB will store a Diagnostic Trouble Code (DTC) for any malfunction it detects. The park brake switch input to the instrument cluster can be diagnosed using conventional diagnostic tools and methods. For proper diagnosis of the antilock brake system, the CAB, the CCD data bus, or the message inputs to the instrument cluster that control the brake indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

DIAGNOSIS AND TESTING - BRAKE INDICATOR

The diagnosis found here addresses an inoperative brake indicator condition. If the brake indicator comes on or stays on with the ignition switch in the On position and the park brake released, or comes on while driving, the brake system must be diagnosed and repaired prior to performing the following tests. (Refer to 5 - BRAKES - DIAGNOSIS AND TESTING). If no brake system problem is found, the following procedure will help locate a faulty park brake switch or park brake switch sense circuit. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

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(1) Disconnect and isolate the battery negative cable. Disconnect the instrument panel wire harness connector for the park brake switch from the switch terminal. With the park brake released, check for continuity between the park brake switch terminal and a good ground. There should be no continuity. If OK, go to Step 2. If not OK, adjust or replace the faulty park brake switch.

(2) Remove the instrument cluster from the instrument panel. With the park brake switch still disconnected, check for continuity between the park brake switch sense circuit cavity of the instrument panel wire harness connector for the park brake switch and a good ground. There should be no continuity. If OK, go to Step 3. If not OK, repair the shorted park

BRAKE/PARK BRAKE INDICATOR (Continued)

brake switch sense circuit between the park brake switch and the instrument cluster as required.

(3) Check for continuity between the park brake switch sense circuit cavities of the instrument panel wire harness connector for the park brake switch and the instrument panel wire harness connector (Connector C1) for the instrument cluster. There should be continuity. If OK, proceed with diagnosis of the instrument cluster. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). If not OK, repair the open park brake switch sense circuit between the park brake switch and the instrument cluster as required.

CHECK GAUGES INDICATOR

DESCRIPTION

A check gauges indicator is standard equipment on all instrument clusters. The check gauges indicator is located on the lower edge of the instrument cluster overlay, to the right of center. The check gauges indicator consists of a stenciled cutout of the words “CHECK GAGES” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red lens behind the cutout in the opaque layer of the overlay causes the “CHECK GAGES” text to appear in red through the translucent outer layer of the overlay when the indicator is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The check gauges indicator is serviced as a unit with the instrument cluster.

OPERATION

The check gauges indicator gives an indication to the vehicle operator when certain instrument cluster gauge readings reflect a condition requiring immediate attention. This indicator is controlled by a transistor on the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The check gauges indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the check gauges indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the check gauges indicator is illuminated for about two seconds as a bulb test.
- **Engine Temperature High Message** - Each time the cluster receives a message from the PCM indicating the engine coolant temperature of a gasoline engine is about 122° C (253° F) or higher, or a diesel engine is about 112° C (233° F) or higher, the check gauges indicator will be illuminated. The indicator remains illuminated until the cluster receives a message from the PCM indicating that the temperature of a gasoline engine is about 119° C (246° F) or lower, a diesel engine is about 109° C (226° F) or lower, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Engine Oil Pressure Low Message** - Each time the cluster receives a message from the PCM indicating the engine oil pressure of a gasoline engine is about 3.45 kPa (0.5 psi) or lower, or a diesel engine is about 51.71 kPa (7.5 psi) or lower, the check gauges indicator will be illuminated. The indicator remains illuminated until the cluster receives a message from the PCM indicating that the engine oil pressure of a gasoline engine is above 3.45 kPa (0.5 psi), a diesel engine is above 51.71 kPa (7.5 psi), or until the ignition switch is turned to the Off position, whichever occurs first. The cluster will only turn the indicator on in response to an engine oil pressure low message if the engine speed is greater than zero.
- **System Voltage Low Message** - Each time the cluster receives a message from the PCM indicating the electrical system voltage is less than 11.5 volts, the check gauges indicator will be illuminated. The indicator remains illuminated until the cluster receives a message from the PCM indicating the electrical system voltage is greater than 12.0 volts (but less than 16.6 volts), or until the ignition switch is turned to the Off position, whichever occurs first.
- **System Voltage High Message** - Each time the cluster receives a message from the PCM indicating the electrical system voltage is greater than 16.6 volts, the check gauges indicator will be illuminated. The indicator remains illuminated until the cluster receives a message from the PCM indicating the electrical system voltage is less than 16.1 volts (but greater than 11.5 volts), or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test, the indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the engine temperature, oil pressure, and electrical system voltage, then sends the proper messages to the instrument cluster. For further diagnosis of the check gauges

CHECK GAUGES INDICATOR (Continued)

indicator or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the check gauges indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

CRUISE INDICATOR

DESCRIPTION

A cruise indicator is standard equipment on all instrument clusters. However, on vehicles not equipped with the optional speed control system, this indicator is electronically disabled. The cruise indicator consists of the word “CRUISE”, which appears in the lower portion of the odometer/trip odometer Vacuum-Fluorescent Display (VFD). The VFD is part of the cluster electronic circuit board, and is visible through a cutout located in the lower left corner of the cluster overlay. The dark lens of the VFD prevents the indicator from being clearly visible when it is not illuminated. The word “CRUISE” appears in an amber color and at the same lighting level as the odometer/trip odometer information when it is illuminated by the instrument cluster electronic circuit board. The cruise indicator is serviced as a unit with the VFD in the instrument cluster.

OPERATION

The cruise indicator gives an indication to the vehicle operator when the speed control system is turned On, regardless of whether the speed control is engaged. This indicator is controlled by the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The cruise indicator receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the indicator will always be off when the ignition switch is in any position except On or Start. The indicator only illuminates when it is switched to ground by the instrument cluster circuitry. The instrument cluster will turn on the cruise indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the cruise indicator is illuminated for about two seconds as a bulb test.
- **Cruise Lamp-On Message** - Each time the cluster receives a cruise lamp-on message from the PCM indicating the speed control system has been turned On, the cruise indicator is illuminated. The indicator remains illuminated until the cluster receives a cruise lamp-off message from the PCM or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test, the cruise indicator will be turned on during the VFD portion of the test to confirm the functionality of the VFD, and again during the bulb check portion of the test to confirm the functionality of the cluster control circuitry.

The PCM continually monitors the speed control switches to determine the proper outputs to the speed control servo. The PCM then sends the proper cruise indicator lamp-on and lamp-off messages to the instrument cluster. For further diagnosis of the cruise indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the speed control system, the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the cruise indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

ENGINE TEMPERATURE GAUGE

DESCRIPTION

An engine coolant temperature gauge is standard equipment on all instrument clusters. The engine coolant temperature gauge is located in the lower left quadrant of the instrument cluster, below the voltage gauge. The engine coolant temperature gauge consists of a movable gauge needle or pointer controlled by the instrument cluster circuitry and a fixed 90 degree scale on the cluster overlay that reads left-to-right from 54° C (130° F) to 127° C (260° F) for gasoline engines, or from 60° C (140° F) to 116° C (240° F) for diesel engines. An International Control and Display Symbol icon for “Engine Coolant Temperature” is located on the cluster overlay, directly below the lowest graduation of the gauge scale. The engine coolant temperature gauge graphics are white against a black field except for a single red graduation at the high end of the gauge scale, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster illumination lighting with the exterior lamps turned On, the white graphics appear blue-green and the red graphics appear red. The orange gauge needle is internally illuminated. Gauge illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The

ENGINE TEMPERATURE GAUGE (Continued)

engine coolant temperature gauge is serviced as a unit with the instrument cluster.

OPERATION

The engine coolant temperature gauge gives an indication to the vehicle operator of the engine coolant temperature. This gauge is controlled by the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The engine coolant temperature gauge is an air core magnetic unit that receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions. The cluster is programmed to move the gauge needle back to the low end of the scale after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the gauge needle position and provides the following features:

- **Engine Temperature Message** - Each time the cluster receives a message from the PCM indicating the engine coolant temperature is between the low end of normal [about 57° C (130° F) for gasoline engines, or 60° C (140° F) for diesel engines] and the high end of normal [about 129° C (264° F) for gasoline engines, or 116° C (240° F) for diesel engines], the gauge needle is moved to the actual temperature position on the gauge scale.
- **Engine Temperature Low Message** - Each time the cluster receives a message from the PCM indicating the engine coolant temperature is below the low end of normal [about 57° C (130° F) for gasoline engines, or 60° C (140° F) for diesel engines], the gauge needle is held at the lowest increment [57° C (130° F) for gasoline engines, or 60° C (140° F) for diesel engines] at the far left end of the gauge scale. The gauge needle remains at the far left end of the scale until the cluster receives a message from the PCM indicating that the engine temperature is above about 57° C (130° F) for gasoline engines, or 60° C (140° F) for diesel engines, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Engine Temperature High Message** - Each time the cluster receives a message from the PCM indicating the engine coolant temperature is above about 122° C (253° F) for gasoline engines, or 112° C (233° F) for diesel engines, the gauge needle is moved to the appropriate position on the gauge scale, the check gauges indicator is illuminated, and a single chime tone is sounded. The check gauges indicator remains illuminated until the cluster receives a message from the PCM indicating that the engine temperature is below about 119° C (246° F) for gasoline engines, or 109° C (226° F) for diesel engines, or until the ignition switch is turned to the Off position, whichever occurs first. The chime tone feature will only repeat during the same ignition cycle if the check gauges indicator is cycled off and then on again by the appropriate engine temperature messages from the PCM.
- **Message Failure** - If the cluster fails to receive an engine temperature message, it will hold the gauge needle at the last indication until a new message is received, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test, the gauge needle will be swept to several calibration points on the gauge scale in a prescribed sequence in order to confirm the functionality of the gauge and the cluster control circuitry.

The PCM continually monitors the engine coolant temperature sensor to determine the engine operating temperature. The PCM then sends the proper engine coolant temperature messages to the instrument cluster. For further diagnosis of the engine coolant temperature gauge or the instrument cluster circuitry that controls the gauge, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). If the instrument cluster turns on the check gauges indicator due to a high engine temperature gauge reading, it may indicate that the engine or the engine cooling system requires service. For proper diagnosis of the engine coolant temperature sensor, the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the engine coolant temperature gauge, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

FUEL GAUGE

DESCRIPTION

A fuel gauge is standard equipment on all instrument clusters. The fuel gauge is located in the lower right quadrant of the instrument cluster, below the oil pressure gauge. The fuel gauge consists of a movable gauge needle or pointer controlled by the instrument cluster circuitry and a fixed 90 degree scale on the cluster overlay that reads left-to-right from E (or Empty) to F (or Full). An International Control and Display Symbol icon for “Fuel” is located on the cluster overlay, directly below the highest graduation of the gauge scale. The text “FUEL DOOR” and an arrowhead pointed to the left side of the vehicle is imprinted on the cluster overlay directly below the fuel gauge to provide the driver with a reminder as

to the location of the fuel filler access. The fuel gauge graphics are white against a black field except for a single red graduation at the low end of the gauge scale, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster illumination lighting with the exterior lamps turned On, the white graphics appear blue-green and the red graphics appear red. The orange gauge needle is internally illuminated. Gauge illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The fuel gauge is serviced as a unit with the instrument cluster.

OPERATION

The fuel gauge gives an indication to the vehicle operator of the level of fuel in the fuel tank. This gauge is controlled by the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The fuel gauge is an air core magnetic unit that receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions. The cluster is programmed to move the gauge needle back to the low end of the scale after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the gauge needle position and provides the following features:

- **Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating the percent tank full, the cluster programming applies an algorithm to calculate the proper gauge needle position, then moves the gauge needle to the proper position on the gauge scale. The algorithm is used to dampen gauge needle movement against the negative effect that fuel sloshing within the fuel tank can have on accurate inputs from the fuel tank sending unit to the PCM.
- **Less Than 12.5 Percent Tank Full Message** - Each time the cluster receives messages from the PCM indicating the percent tank full is 12.5 (one-eighth) or less for 10 consecutive seconds and the vehicle speed is zero, or for 60 consecutive seconds and the vehicle speed is greater than zero, the gauge needle is moved to the proper position on the gauge scale, the low fuel indicator is illuminated, and a single chime tone is sounded. The low fuel indicator remains illuminated until the cluster receives messages from the PCM indicating that the percent tank full is greater than 12.5 (one-eighth) for 10 consecutive seconds and the vehicle speed is zero, or for 60 consecutive seconds and the vehicle speed is greater than zero, or until the ignition switch is turned to the Off position, whichever occurs first. The chime tone feature will only repeat during the same ignition cycle if the low fuel indicator is cycled off and then on again by the appropriate percent tank full messages from the PCM.
- **Less Than Empty Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating the percent tank full is less than empty, the gauge needle is moved to the far left (low) end of the gauge scale and the low fuel indicator is illuminated immediately. This message would indicate that the fuel tank sender input to the PCM is a short circuit.
- **More Than Full Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating the percent tank full is more than full, the gauge needle is moved to the far left (low) end of the gauge scale and the low fuel indicator is illuminated immediately. This message would indicate that the fuel tank sender input to the PCM is an open circuit.
- **Message Failure** - If the cluster fails to receive a percent tank full message, it will hold the gauge needle at the last indication until a new message is received, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test, the gauge needle will be swept to several calibration points on the gauge scale in a prescribed sequence in order to confirm the functionality of the gauge and the cluster control circuitry.

The PCM continually monitors the fuel tank sending unit, then sends the proper messages to the instrument cluster. For further diagnosis of the fuel gauge or the instrument cluster circuitry that controls the gauge, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the fuel tank sending unit, the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the fuel gauge, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

GEAR SELECTOR INDICATOR

DESCRIPTION

A mechanical automatic transmission gear selector indicator is standard factory-installed equipment on this model, when it is also equipped with an optional automatic transmission. The gear selector indicator consists of a molded black plastic housing with integral mounting tabs that is secured to the back of the

GEAR SELECTOR INDICATOR (Continued)

instrument cluster housing with two screws. A face plate on the indicator housing is visible through a rectangular cutout in the lower right corner of the instrument cluster overlay, just below the fuel gauge. Vehicles with a manual transmission have a block-off plate mounted to the back of the instrument cluster behind this cutout in the overlay, in place of the gear selector indicator. Near the top of this face plate the following characters are imprinted from left to right: "P," "R," "N," "D," "2," and "1." Respectively, these characters represent the park, reverse, neutral, drive, second gear, and first gear positions of the transmission gear selector lever on the steering column. Directly below each character on the face plate is a small, rectangular window, and behind these windows is a single, movable red pointer.

The gear selector indicator graphics are white against a black field except for the single red pointer, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster illumination lighting with the exterior lamps turned On, the white graphics appear blue-green, while the red pointer still appears red. Indicator illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The gear selector indicator is available for service replacement separate from the instrument cluster. The instrument cluster must be removed from the instrument panel for service access to the gear selector indicator. (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

OPERATION

The mechanical gear selector indicator gives an indication of the transmission gear that has been selected with the automatic transmission gear selector lever. A red pointer appears in a window below the character in the indicator representing the transmission gear that has been selected. The small, spring-loaded pointer moves on a track through a trolley-like mechanism within the indicator housing. A short length of small diameter stranded cable is attached to one side of the pointer trolley and is encased in a tubular plastic housing that exits the right side of the indicator. The cable is routed through the instrument panel and under the steering column to the left side of the column. The looped end of the cable is hooked over the end of the PRNDL driver lever on the steering column gearshift mechanism, and the cable housing is secured in a molded plastic adjuster and bracket on the column housing. When the gear selector lever is moved the PRNDL driver lever moves, which moves the pointer through the mechanical actuator cable. The cable adjuster and bracket unit mounted on the steering column housing provides a mechanical means of calibrating the gear selector indicator mechanism. (Refer to 19 - STEERING/COLUMN - INSTALLATION).

HIGH BEAM INDICATOR

DESCRIPTION

A high beam indicator is standard equipment on all instrument clusters. The high beam indicator is located near the upper edge of the instrument cluster overlay, between the tachometer and the speedometer. The high beam indicator consists of a stenciled cutout of the International Control and Display Symbol icon for "High Beam" in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A blue lens behind the cutout in the opaque layer of the overlay causes the icon to appear in blue through the translucent outer layer of the overlay when it is illuminated from behind by a replaceable incandescent bulb and bulb holder unit located on the instrument cluster electronic circuit board. The high beam indicator is serviced as a unit with the instrument cluster.

OPERATION

The high beam indicator gives an indication to the vehicle operator when the headlamp high beams are illuminated. This indicator is hard wired on the instrument cluster electronic circuit board, and is controlled by a headlamp beam select switch input to the cluster. The headlamp high beam indicator bulb receives battery current on the instrument cluster electronic circuit board through a fused B(+) circuit at all times; therefore, the indicator remains operational regardless of the ignition switch position. The headlamp beam select switch is integral to the multi-function switch on the left side of the steering column, and is connected in series between ground and the headlamp high beam indicator. The indicator bulb only illuminates when it is provided with a path to ground through the high beam indicator driver circuit by the headlamp beam select switch. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - OPERATION). The high beam indicator can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - HIGH BEAM INDICATOR

The diagnosis found here addresses an inoperative headlamp high beam indicator condition. If the problem being diagnosed is related to inoperative headlamp high beams, be certain to repair the headlamp system before attempting to diagnose or repair the

HIGH BEAM INDICATOR (Continued)

high beam indicator. If no headlamp system problems are found, the following procedure will help locate a short or open in the high beam indicator circuit. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

INDICATOR DOES NOT ILLUMINATE WITH HIGH BEAMS SELECTED

(1) Check the fused B(+) fuse (Fuse 14 - 10 ampere) in the Junction Block (JB). 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 (Fuse 14 - 10 ampere) in the JB. If OK, go to Step 3. If not OK, repair the open fused B(+) circuit between the JB and the Power Distribution Center (PDC) as required.

(3) Be certain that the headlamp high beams are selected with the headlamp beam select switch by turning the headlamp switch to the On position, pulling the multi-function switch stalk toward the steering wheel, then inspecting the headlamps at the front of the vehicle. Once the headlamp high beams are selected, turn the headlamp switch to the Off position. Disconnect and isolate the battery negative cable. Remove the instrument cluster from the instrument panel. Reconnect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the instrument panel wire harness connector (Connector C1) for the instrument cluster. If OK, go to Step 4. If not OK, repair the open fused B(+) circuit between the instrument cluster and the JB as required.

(4) Disconnect and isolate the battery negative cable. Check for continuity between the high beam indicator driver circuit cavity of the instrument panel wire harness connector (Connector C2) for the instrument cluster and a good ground. There should be continuity. If OK, replace the faulty headlamp high beam indicator bulb and bulb holder unit. If not OK, repair the open high beam indicator driver circuit between the instrument cluster and the headlamp beam select (multi-function) switch as required.

INDICATOR STAYS ILLUMINATED WITH HIGH BEAMS NOT SELECTED

(1) Be certain that the headlamp low beams are selected with the headlamp beam select switch by turning the headlamp switch to the On position, pulling the multi-function switch stalk toward the steering wheel, then inspecting the headlamps at the front of the vehicle. Once the headlamp low beams are selected, turn the headlamp switch to the Off position. Disconnect and isolate the battery negative cable. Remove the instrument cluster from the instrument panel. Check for continuity between the high beam indicator driver circuit cavity of the instrument panel wire harness connector (Connector C2) for the instrument cluster and a good ground. There should be no continuity. If OK, replace the faulty instrument cluster. If not OK, repair the shorted high beam indicator driver circuit between the instrument cluster and the headlamp beam select (multi-function) switch as required.

LOW FUEL INDICATOR

DESCRIPTION

A low fuel indicator is standard equipment on all instrument clusters. The low fuel indicator is located near the lower edge of the instrument cluster overlay, to the right of center. The low fuel indicator consists of a stenciled cutout of the International Control and Display Symbol icon for “Fuel” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber lens behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when the indicator is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The low fuel indicator is serviced as a unit with the instrument cluster.

OPERATION

The low fuel indicator gives an indication to the vehicle operator when the level of fuel in the fuel tank becomes low. This indicator is controlled by a transistor on the instrument cluster circuit board based upon cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision

LOW FUEL INDICATOR (Continued)

Detection (CCD) data bus. The low fuel indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the low fuel indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the indicator is illuminated for about two seconds as a bulb test.
- **Less Than 12.5 Percent Tank Full Message** - Each time the cluster receives messages from the PCM indicating the percent tank full is 12.5 (one-eighth) or less for 10 consecutive seconds and the vehicle speed is zero, or for 60 consecutive seconds and the vehicle speed is greater than zero, the low fuel indicator is illuminated and a single chime tone is sounded. The low fuel indicator remains illuminated until the cluster receives messages from the PCM indicating that the percent tank full is greater than 12.5 (one-eighth) for 10 consecutive seconds and the vehicle speed is zero, or for 60 consecutive seconds and the vehicle speed is greater than zero, or until the ignition switch is turned to the Off position, whichever occurs first. The chime tone feature will only repeat during the same ignition cycle if the low fuel indicator is cycled off and then on again by the appropriate percent tank full messages from the PCM.
- **Less Than Empty Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating the percent tank full is less than empty, the low fuel indicator is illuminated immediately. This message would indicate that the fuel tank sender input to the PCM is a short circuit.
- **More Than Full Percent Tank Full Message** - Each time the cluster receives a message from the PCM indicating the percent tank full is more than full, the low fuel indicator is illuminated immediately. This message would indicate that the fuel tank sender input to the PCM is an open circuit.
- **Actuator Test** - Each time the cluster is put through the actuator test, the indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the fuel tank sending unit, then sends the proper messages to the instrument cluster. For further diagnosis of the low fuel indicator or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the fuel tank sending unit, the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the low fuel indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

MALFUNCTION INDICATOR LAMP MIL

DESCRIPTION

A Malfunction Indicator Lamp (MIL) is standard equipment on all instrument clusters. The MIL is located near the lower edge of the instrument cluster overlay, to the left of center. The MIL consists of a stencilled cutout of the International Control and Display Symbol icon for “Engine” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber lens behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when the indicator is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The MIL is serviced as a unit with the instrument cluster.

OPERATION

The Malfunction Indicator Lamp (MIL) gives an indication to the vehicle operator when the Powertrain Control Module (PCM) has recorded a Diagnostic Trouble Code (DTC) for an On-Board Diagnostics II (OBDII) emissions-related circuit or component malfunction. In addition, on models with a diesel engine an Engine Control Module (ECM) supplements the PCM, and can also record an OBDII DTC. The MIL is controlled by a transistor on the instrument cluster circuit board based upon cluster programming and electronic messages received by the cluster from the PCM or ECM over the Chrysler Collision Detection (CCD) data bus. The MIL Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the MIL for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the indicator is illuminated for about seven seconds as a bulb test.

MALFUNCTION INDICATOR LAMP MIL (Continued)

- **PCM Lamp-On Message** - Each time the cluster receives a lamp-on message from the PCM or ECM, the indicator will be illuminated. The indicator can be flashed on and off, or illuminated solid, as dictated by the PCM or ECM message. For some DTC's, if a problem does not recur, the PCM or ECM will send a lamp-off message automatically. Other DTC's may require that a fault be repaired and the PCM or ECM be reset before a lamp-off message will be sent. For more information on the PCM, the ECM, and the DTC set and reset parameters, (Refer to 25 - EMISSIONS CONTROL - OPERATION).
- **Communication Error** - If the cluster receives no lamp-on message from the PCM or ECM for twenty seconds, the MIL is illuminated by the instrument cluster to indicate a loss of bus communication. The indicator remains controlled and illuminated by the cluster until a valid lamp-on message is received from the PCM or ECM.
- **Actuator Test** - Each time the cluster is put through the actuator test, the indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM/ECM continually monitor the fuel and emissions system circuits and sensors to decide whether the system is in good operating condition. The PCM or ECM then sends the proper lamp-on or lamp-off messages to the instrument cluster. For further diagnosis of the MIL or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). If the instrument cluster turns on the MIL after the bulb test, it may indicate that a malfunction has occurred and that the fuel and emissions systems may require service. For proper diagnosis of the fuel and emissions systems, the PCM, the ECM, the CCD data bus, or the message inputs to the instrument cluster that control the MIL, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

ODOMETER

DESCRIPTION

An odometer and trip odometer are standard equipment in all instrument clusters. The odometer and trip odometer information are displayed in a common electronic Vacuum-Fluorescent Display (VFD), which is visible through a small window cutout located in the left lower quadrant of the cluster overlay. However, the odometer and trip odometer information are not displayed simultaneously. The trip odometer reset switch on the instrument cluster circuit board toggles the display between odometer and trip odometer modes by depressing the odometer/trip odometer switch knob that extends through the lower edge of the cluster lens, just right of the tachometer. Both the odometer and the trip odometer information is stored in the instrument cluster memory.

The odometer can display values up to 499,999 kilometers (499,999 miles). The odometer latches at these values, and will not roll over to zero. The trip odometer can display values up to 999.9 kilometers (999.9 miles) before it rolls over to zero. The odometer display does not have a decimal point and will not show values less than a full unit (kilometer or mile), the trip odometer display does have a decimal point and will show tenths of a unit (kilometer or mile). The unit of measure (kilometers or miles) for the odometer and trip odometer display is not shown in the VFD. The unit of measure for the instrument cluster odometer/trip odometer is selected at the time that it is manufactured, and cannot be changed. During daylight hours (exterior lamps Off) the VFD is illuminated at full brightness for clear visibility. At night (exterior lamps are On) the VFD lighting level is adjusted with the other cluster illumination lamps using the panel lamps dimmer thumbwheel on the headlamp switch. However, a “Parade” mode position of the panel lamps dimmer thumbwheel allows the VFD to be illuminated at full brightness while the exterior lamps are turned On during daylight hours. The VFD, the trip odometer switch, and the trip odometer switch button are serviced as a unit with the instrument cluster.

OPERATION

The odometer and trip odometer give an indication to the vehicle operator of the distance the vehicle has traveled. This gauge is controlled by the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The odometer and trip odometer information is displayed by the instrument cluster Vacuum Fluorescent Display (VFD), and the VFD will not display odometer or trip odometer information after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the VFD and provides the following features:

- **Odometer/Trip Odometer Display Toggling** - Actuating the trip odometer reset switch momentarily with the ignition switch in the On position will toggle the VFD between the odometer and trip odometer display. Each time the ignition switch is turned to the On position the VFD will automatically return to the mode (odometer or trip odometer) last dis-

ODOMETER (Continued)

played when the ignition switch was turned to the Off position.

- **Trip Odometer Reset** - When the trip odometer reset switch is pressed and held for longer than about two seconds, the trip odometer will be reset to 000.0 kilometers (miles). The VFD must be displaying the trip odometer information in order for the trip odometer information to be reset.
- **Message Failure** - If the cluster fails to receive a distance message during normal operation, it will flash the odometer/trip odometer distance information on and off repeatedly until a distance message is received, or until the ignition switch is turned to the Off position, whichever occurs first. If the cluster does not receive a distance message within one second after the ignition switch is turned to the On position, it will display the last distance message stored in the cluster memory. If the cluster is unable to display distance information due to an error internal to the cluster, the VFD display will be blank.
- **Actuator Test** - Each time the cluster is put through the actuator test, the VFD will display all of its characters at once, then step through each character segment individually during the VFD portion of the test to confirm the functionality of the VFD and the cluster control circuitry.

The PCM continually monitors the vehicle speed sensor, then sends the proper distance messages to the instrument cluster. For further diagnosis of the odometer/trip odometer or the instrument cluster circuitry that controls these functions, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the vehicle speed sensor, the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the odometer/trip odometer, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

OIL PRESSURE GAUGE

DESCRIPTION

An oil pressure gauge is standard equipment on all instrument clusters. The oil pressure gauge is located in the upper right quadrant of the instrument cluster, above the fuel gauge. The oil pressure gauge consists of a movable gauge needle or pointer controlled by the instrument cluster circuitry and a fixed 90 degree scale on the cluster overlay that reads left-to-right either from 0 kPa (0 psi) to 758 kPa (110 psi). An International Control and Display Symbol icon for “Engine Oil” is located on the cluster overlay, directly below the highest graduation of the gauge scale. The oil pressure gauge graphics are white against a black field except for a single red graduation at the low end of the gauge scale, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster illumination lighting with the exterior lamps turned On, the white graphics appear blue-green and the red graphics appear red. The orange gauge needle is internally illuminated. Gauge illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The oil pressure gauge is serviced as a unit with the instrument cluster.

OPERATION

The oil pressure gauge gives an indication to the vehicle operator of the engine oil pressure. This gauge is controlled by the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The oil pressure gauge is an air core magnetic unit that receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions. The cluster is programmed to move the gauge needle back to the low end of the scale after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the gauge needle position and provides the following features:

- **Engine Oil Pressure Message** - The instrument cluster circuitry restricts the oil pressure gauge needle operation in order to provide readings that are consistent with customer expectations. Each time the cluster receives a message from the PCM indicating the engine oil pressure is between about 6.9 kPa (1 psi) and 137.9 kPa (20 psi) for gasoline engines, or 55 kPa (8 psi) and 58.6 kPa (8.5 psi) for diesel engines, the cluster holds the gauge needle at a point about 11 degrees above the low end of normal increment on the gauge scale. Each time the cluster receives a message from the PCM indicating the engine oil pressure is between about 517.1 kPa (75 psi) and 755 kPa (109.5 psi) for gasoline engines, or 551.6 kPa (80 psi) and 755 kPa (109.5 psi) for diesel engines, the cluster holds the gauge needle at a point about 7.4 degrees below the high end of normal increment on the gauge scale. When the cluster receives messages from the PCM indicating the engine oil pressure is between about 137.9 kPa (20 psi) and 517.1 kPa (75 psi) for gasoline engines, or 58.6 kPa (8.5 psi) and 551.6 kPa (80 psi) for diesel engines], the gauge needle is moved to the actual pressure position on the gauge scale.

OIL PRESSURE GAUGE (Continued)

- **Engine Oil Pressure Low Message** - Each time the cluster receives a message from the PCM indicating the engine oil pressure is below about 6.9 kPa (1 psi) for gasoline engines, or 55 kPa (8 psi) for diesel engines, the gauge needle is moved to the 0 kPa (0 psi) graduation at the far left (low) end of the gauge scale, the check gauges indicator is illuminated, and a single chime tone is generated. The gauge needle remains at the low end of the scale and the check gauges indicator remains illuminated until the cluster receives a message from the PCM indicating that the engine oil pressure is above about 6.9 kPa (1 psi) for gasoline engines, or 55 kPa (8 psi) for diesel engines, or until the ignition switch is turned to the Off position, whichever occurs first. The cluster will only turn the check gauges indicator lamp on in response to an engine oil pressure low message if the engine speed message is greater than zero.
- **Engine Oil Pressure High Message** - Each time the cluster receives a message from the PCM indicating the engine oil pressure is above about 755 kPa (109.5 psi) for gasoline or diesel engines, the gauge needle is moved to the 758.4 kPa (110 psi) graduation at the far right (high) end of the gauge scale. The gauge needle remains at the high end of the scale until the cluster receives a message from the PCM indicating that the engine oil pressure is below about 755 kPa (109.5 psi) for gasoline or diesel engines, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Message Failure** - If the cluster fails to receive an engine oil pressure message, it will hold the gauge needle at the last indication until a new message is received, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test, the gauge needle will be swept to several calibration points on the gauge scale in a prescribed sequence in order to confirm the functionality of the gauge and the cluster control circuitry.

The PCM continually monitors the engine oil pressure sensor to determine the engine oil pressure. The PCM then sends the proper engine oil pressure messages to the instrument cluster. For further diagnosis of the oil pressure gauge or the instrument cluster circuitry that controls the gauge, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). If the instrument cluster turns on the check gauges indicator due to a low oil pressure gauge reading, it may indicate that the engine or the engine oiling system requires service. For proper diagnosis of the engine oil pressure sensor, the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the oil pressure gauge, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

OVERDRIVE OFF INDICATOR

DESCRIPTION

An overdrive off indicator is standard equipment on all instrument clusters. However, on vehicles not equipped with the optional overdrive automatic transmission, this indicator is electronically disabled. The overdrive off indicator is located near the lower edge of the instrument cluster overlay, to the right of center. The overdrive off indicator consists of a stencilled cutout of the words “O/D OFF” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber lens behind the cutout in the opaque layer of the overlay causes the “O/D OFF” text to appear in amber through the translucent outer layer of the overlay when the indicator is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The overdrive off indicator is serviced as a unit with the instrument cluster.

OPERATION

The overdrive off indicator gives an indication to the vehicle operator when the Off position of the overdrive off switch has been selected, disabling the electronically controlled overdrive feature of the automatic transmission. This indicator is controlled by a transistor on the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The overdrive off indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the overdrive off indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the overdrive off indicator is illuminated for about two seconds as a bulb test.
- **Overdrive Off Lamp-On Message** - Each time the cluster receives an overdrive off lamp-on message from the PCM indicating that the Off position of the overdrive off switch has been selected, the overdrive off indicator will be illuminated. The indicator

OVERDRIVE OFF INDICATOR (Continued)

remains illuminated until the cluster receives an overdrive off lamp-off message from the PCM, or until the ignition switch is turned to the Off position, whichever occurs first.

- **Actuator Test** - Each time the cluster is put through the actuator test, the indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the overdrive off switch to determine the proper outputs to the automatic transmission, then sends the proper messages to the instrument cluster. For further diagnosis of the overdrive off indicator or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the overdrive control system, the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the overdrive off indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

SEATBELT INDICATOR

DESCRIPTION

A seatbelt indicator is standard equipment on all instrument clusters. The seatbelt indicator is located near the lower edge of the instrument cluster overlay, to the right of center. The seatbelt indicator consists of a stencilled cutout of the International Control and Display Symbol icon for “Seat Belt” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red lens behind the cutout in the opaque layer of the overlay causes the icon to appear in red through the translucent outer layer of the overlay when the indicator is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The seatbelt indicator is serviced as a unit with the instrument cluster.

OPERATION

The seatbelt indicator gives an indication to the vehicle operator of the status of the driver side front seatbelt buckle. This indicator is controlled by a transistor on the instrument cluster circuit board based upon the cluster programming, and a hard wired input from the seatbelt switch in the driver side front seatbelt through the seat belt switch sense circuit. The seatbelt indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the indicator will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is switched to ground by the instrument cluster transistor. The instrument cluster will turn on the seatbelt indicator for the following reasons:

- **Seatbelt Reminder Function** - Each time the cluster receives a battery current input on the fused ignition switch output (st-run) circuit, the indicator will be illuminated as a seatbelt reminder for about seven seconds, or until the ignition switch is turned to the Off position, whichever occurs first. This reminder function will occur regardless of the status of the seatbelt switch input to the cluster.
- **Driver Side Front Seatbelt Not Buckled** - Following the seatbelt reminder function, each time the cluster receives a ground input on the seat belt switch sense circuit (seatbelt switch closed - seatbelt unbuckled) with the ignition switch in the Start or On positions, the indicator will be illuminated. The seatbelt indicator remains illuminated until the seat belt switch sense input to the cluster is an open circuit (seatbelt switch opened - seatbelt buckled), or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test, the indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The seatbelt switch input to the instrument cluster circuitry can be diagnosed using conventional diagnostic tools and methods. For further diagnosis of the seatbelt indicator or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING).

SERVICE REMINDER INDICATOR

DESCRIPTION

A Service Reminder Indicator (SRI) is standard equipment on all instrument clusters. However, on vehicles not equipped with certain optional heavy duty emission cycle gasoline engines, this indicator is electronically disabled. The SRI is located near the lower edge of the instrument cluster overlay, to the left of center. The SRI consists of a stencilled cutout of the words “MAINT REQD” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber lens behind the cutout in the opaque layer of the

SERVICE REMINDER INDICATOR (Continued)

overlay causes the “MAINT REQD” text to appear in amber through the translucent outer layer of the overlay when the indicator is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The SRI is serviced as a unit with the instrument cluster.

OPERATION

The Service Reminder Indicator (SRI) gives an indication to the vehicle operator when engine emissions maintenance procedures should be performed. This indicator is controlled by a transistor on the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The SRI Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the SRI for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the SRI is illuminated for about two seconds as a bulb test.
- **Service Required Lamp-On Message** - Each time the cluster receives a service required lamp-on message from the PCM indicating that an emissions maintenance interval has been reached, the SRI will be illuminated. The indicator remains illuminated until the cluster receives a service required lamp-off message from the PCM, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test, the SRI will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the vehicle speed sensor to determine the distance the vehicle has been driven, then sends the proper messages to the instrument cluster. Once the SRI has been illuminated and the required emissions maintenance procedures have been completed, the PCM must be reset using a DRBIII® scan tool before it will send the proper service required lamp-off message to the instrument cluster. Refer to the appropriate diagnostic information. For further diagnosis of the SRI or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the SRI, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

SHIFT INDICATOR (TRANSFER CASE)

DESCRIPTION

A four-wheel drive indicator is standard equipment on all instrument clusters. However, on vehicles not equipped with the optional four-wheel drive system, this indicator is mechanically disabled. The four-wheel drive indicator is located near the lower edge of the instrument cluster overlay, to the right of center. The four-wheel drive indicator consists of a stencilled cutout of the text “4WD” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber lens behind the cutout in the opaque layer of the overlay causes the “4WD” text to appear in amber through the translucent outer layer of the overlay when the indicator is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The four-wheel drive indicator is serviced as a unit with the instrument cluster.

OPERATION

The four-wheel drive indicator lamp gives an indication to the vehicle operator that a four-wheel drive operating mode is engaged. The indicator will be illuminated when either high range (4H) or low range (4L) have been selected with the transfer case shift lever. This indicator is controlled by a transistor on the instrument cluster circuit board based upon the cluster programming, and a hard wired input from the four-wheel drive switch on the front axle disconnect housing. The four-wheel drive indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the lamp will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is switched to ground by the instrument cluster transistor.

The four-wheel drive switch is connected in series between ground and the four-wheel drive switch sense input to the instrument cluster. For further information on the transfer case and the transfer case operating ranges, (Refer to 21 - TRANSMISSION/TRANSAXLE/TRANSFER CASE - OPERATION. For further information on the front axle

SHIFT INDICATOR (TRANSFER CASE) (Continued)

disconnect mechanism, (Refer to 3 - DIFFERENTIAL & DRIVELINE/FRONT AXLE/AXLE VACUUM MOTOR - OPERATION). The four-wheel drive switch input to the instrument cluster circuitry can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - FOUR-WHEEL DRIVE INDICATOR

The diagnosis found here addresses an inoperative four-wheel drive indicator condition. If the problem being diagnosed is related to indicator accuracy, be certain to confirm that the problem is with the indicator and not with a damaged or inoperative front axle disconnect mechanism. (Refer to 3 - DIFFERENTIAL & DRIVELINE/FRONT AXLE/AXLE VACUUM MOTOR - DIAGNOSIS AND TESTING). If no front axle disconnect problem is found, the following procedure will help locate a short or open in the four-wheel drive switch input to the instrument cluster. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

INDICATOR DOES NOT ILLUMINATE WITH FOUR-WHEEL DRIVE MODE SELECTED

(1) Disconnect and isolate the battery negative cable. Disconnect the engine wire harness connector for the four-wheel drive switch from the switch connector receptacle. Check for continuity between the ground circuit cavity of the engine wire harness connector for the four-wheel drive switch and a good ground. There should be continuity. If OK, go to Step 2. If not OK, repair the open ground circuit to ground (G100) as required.

(2) Reconnect the battery negative cable. Turn the ignition switch to the On position. Install a jumper wire between the 4WD switch sense circuit cavity of the engine wire harness connector for the four-wheel drive switch and a good ground. The four-wheel drive indicator should light. If OK, replace the faulty four-wheel drive switch. If not OK, go to Step 3.

(3) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Remove the instrument cluster from the instrument panel. Check for continuity between the 4WD switch sense circuit cavities of the instrument panel wire harness connector (Connector C2) for the instrument cluster and the engine wire harness connector for the four-wheel drive switch. There should be continuity. If OK, replace the faulty instrument cluster. If not OK, repair the open 4WD switch sense circuit between the instrument cluster and the four-wheel drive switch as required.

INDICATOR STAYS ILLUMINATED WITH FOUR-WHEEL DRIVE MODE NOT SELECTED

(1) Disconnect and isolate the battery negative cable. Disconnect the engine wire harness connector for the four-wheel drive switch from the switch connector receptacle. Check for continuity between the ground circuit terminal and the 4WD switch sense circuit terminal in the four-wheel drive switch connector receptacle. There should be no continuity. If OK, repair the shorted 4WD switch sense circuit between the four-wheel drive switch and the instrument cluster as required. If not OK, replace the faulty four-wheel drive switch.

SPEEDOMETER

DESCRIPTION

A speedometer is standard equipment on all instrument clusters. The speedometer is located just to the right of the tachometer near the center of the instrument cluster. The speedometer consists of a movable gauge needle or pointer controlled by the instrument cluster circuitry and a fixed 210 degree primary scale on the gauge dial face that reads left-to-right either from 0 to 120 mph, or from 0 to 200 km/h, depending upon the market for which the vehicle is manufactured. Each version also has a secondary inner scale on the gauge dial face that provides the equivalent opposite units from the primary scale. Text appearing on the cluster overlay just below the hub of the speedometer needle abbreviates the unit of measure for the primary scale in all upper case letters (i.e.: MPH or KM/H), followed by the unit of measure for the secondary scale in all lower case letters (i.e.: mph or km/h). The speedometer graphics are white (primary scale) and red (secondary scale) against a black field, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster

SPEEDOMETER (Continued)

illumination lighting with the exterior lamps turned On, the white graphics appear blue-green, while the red graphics still appear red. The orange gauge needle is internally illuminated. Gauge illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The speedometer is serviced as a unit with the instrument cluster.

OPERATION

The speedometer gives an indication to the vehicle operator of the vehicle road speed. This gauge is controlled by the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The speedometer is an air core magnetic unit that receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions. The cluster is programmed to move the gauge needle back to the low end of the scale after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the gauge needle position and provides the following features:

- **Message Failure** - If the cluster fails to receive a speedometer message, it will hold the gauge needle at the last indication for about four seconds, or until the ignition switch is turned to the Off position, whichever occurs first. If a new speedometer message is not received after about four seconds, the gauge needle will return to the far left (low) end of the scale.
- **Actuator Test** - Each time the cluster is put through the actuator test, the gauge needle will be swept to several calibration points on the gauge scale in a prescribed sequence in order to confirm the functionality of the gauge and the cluster control circuitry.

The PCM continually monitors the vehicle speed sensor to determine the vehicle road speed, then sends the proper vehicle speed messages to the instrument cluster. For further diagnosis of the speedometer or the instrument cluster circuitry that controls the gauge, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the vehicle speed sensor, the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the speedometer, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

TACHOMETER

DESCRIPTION

A tachometer is standard equipment on all instrument clusters. The tachometer is located just to the left of the speedometer near the center of the instrument cluster. The tachometer consists of a movable gauge needle or pointer controlled by the instrument cluster circuitry and a fixed 210 degree scale on the gauge dial face that reads left-to-right either from 0 to 6 for gasoline engines, or from 0 to 4 for diesel engines. The text “RPM X 1000” imprinted on the cluster overlay directly below the hub of the tachometer needle identifies that each number on the tachometer scale is to be multiplied times 1000 rpm. The gauge scale of the gasoline engine tachometer is red lined at 5000 rpm, while the diesel engine tachometer is red lined at 3375 rpm. The diesel engine tachometer also includes text that specifies “DIESEL FUEL ONLY” located just above the hub of the tachometer needle. The tachometer graphics are white and red against a black field, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster illumination lighting with the exterior lamps turned On, the white graphics appear blue-green, while the red graphics still appear red. The orange gauge needle is internally illuminated. Gauge illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The tachometer is serviced as a unit with the instrument cluster.

OPERATION

The tachometer gives an indication to the vehicle operator of the engine speed. This gauge is controlled by the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The tachometer is an air core magnetic unit that receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions. The cluster is programmed to move the gauge needle back to the low end of the scale after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the gauge needle position and provides the following features:

- **Message Failure** - If the cluster fails to receive an engine speed message, it will hold the gauge needle at the last indication for about four seconds, or until the ignition switch is turned to the Off position, whichever occurs first. If a new engine speed mes-

TACHOMETER (Continued)

sage is not received after about four seconds, the gauge needle will return to the far left (low) end of the scale.

- **Actuator Test** - Each time the cluster is put through the actuator test, the gauge needle will be swept to several calibration points on the gauge scale in a prescribed sequence in order to confirm the functionality of the gauge and the cluster control circuitry.

The PCM continually monitors the crankshaft position sensor to determine the engine speed, then sends the proper engine speed messages to the instrument cluster. For further diagnosis of the tachometer or the instrument cluster circuitry that controls the gauge, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the crankshaft position sensor, the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the tachometer, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

TRANS OVERTEMP INDICATOR

DESCRIPTION

A transmission over-temperature indicator lamp is standard equipment on all instrument clusters. However, on vehicles not equipped with the optional automatic transmission, this indicator is electronically disabled. The transmission over-temperature indicator is located near the lower edge of the instrument cluster overlay, to the left of center. The transmission over-temperature indicator consists of a stencilled cutout of the words “TRANS TEMP” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red lens behind the cutout in the opaque layer of the overlay causes the “TRANS TEMP” text to appear in red through the translucent outer layer of the overlay when the indicator is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The transmission over-temperature indicator is serviced as a unit with the instrument cluster.

OPERATION

The transmission over-temperature indicator gives an indication to the vehicle operator when the transmission fluid temperature is excessive, which may lead to accelerated transmission component wear or failure. This indicator is controlled by a transistor on the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The transmission over-temperature indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the LED will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the transmission over-temperature indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the transmission over-temperature indicator is illuminated for about two seconds as a bulb test.
- **Trans Over-Temp Lamp-On Message** - Each time the cluster receives a trans over-temp lamp-on message from the PCM indicating that the transmission fluid temperature is 135° C (275° F) or higher, the indicator will be illuminated and a single chime tone is sounded. The lamp remains illuminated until the cluster receives a trans over-temp lamp-off message from the PCM, or until the ignition switch is turned to the Off position, whichever occurs first. The chime tone feature will only repeat during the same ignition cycle if the transmission over-temperature indicator is cycled off and then on again by the appropriate trans over-temp messages from the PCM.
- **Actuator Test** - Each time the cluster is put through the actuator test, the indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The PCM continually monitors the transmission temperature sensor to determine the transmission operating condition, then sends the proper messages to the instrument cluster. If the instrument cluster turns on the transmission over-temperature indicator due to a high transmission oil temperature condition, it may indicate that the transmission and/or the transmission cooling system are being overloaded or that they require service. For further diagnosis of the transmission over-temperature indicator or the instrument cluster circuitry that controls the LED, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the transmission temperature sensor, the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the transmission over-temperature indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

TURN SIGNAL INDICATOR

DESCRIPTION

Two turn signal indicators are standard equipment on all instrument clusters. The turn signal indicators are located near the upper edge of the instrument cluster overlay, between the speedometer and the tachometer. Each turn signal indicator consists of a stenciled cutout of the International Control and Display Symbol icon for “Turn Warning” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents these icons from being clearly visible when their lamps are not illuminated. The icons appear in green through the translucent outer layer of the overlay when the indicator is illuminated from behind by a replaceable incandescent bulb and bulb holder unit located on the instrument cluster electronic circuit board. The turn signal indicators are serviced as a unit with the instrument cluster.

OPERATION

The turn signal indicators give an indication to the vehicle operator that the turn signal (left or right indicator flashing) or hazard warning (both left and right indicators flashing) have been selected. These indicators are controlled by two individual hard wired inputs to the instrument cluster electronic circuit board. The turn signal indicator bulbs are grounded on the instrument cluster electronic circuit board at all times. The turn signal indicator bulbs only illuminate when they are provided with battery current by the turn signal and hazard warning switch circuitry of the left multi-function switch on the steering column through separate left and right turn signal inputs to the instrument cluster; therefore, these indicators can be illuminated, regardless of the ignition switch position.

The turn signal indicators are connected in series between ground and the output of the turn signal and hazard warning switch circuitry, but in parallel with the other turn signal circuits. This arrangement allows the turn signal indicators to remain functional regardless of the condition of the other circuits in the turn signal and hazard warning system. For more information on the turn signal and hazard warning system, (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR - OPERATION - TURN SIGNAL & HAZARD WARNING SYSTEM). The turn signal indicators can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - TURN SIGNAL INDICATOR

The diagnosis found here addresses an inoperative turn signal indicator lamp condition. If the problem being diagnosed is related to inoperative turn signals or hazard warning lamps, be certain to repair the turn signal and hazard warning system before attempting to diagnose or repair the turn signal indicators. If no turn signal or hazard warning system problems are found, the following procedure will help locate a short or open in the left or right turn signal indicator circuit. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(1) Disconnect and isolate the battery negative cable. Remove the instrument cluster.

(2) Connect the battery negative cable. Activate the hazard warning system by moving the hazard warning switch button to the On position. Check for battery voltage at the inoperative (right or left) turn signal circuit cavity of the instrument panel wire harness connector (Connector C2) for the instrument cluster. There should be a switching (on and off) battery voltage signal. If OK, replace the faulty turn signal indicator bulb. If not OK, repair the open (right or left) turn signal circuit to the left multi-function switch as required.

UPSHIFT INDICATOR

DESCRIPTION

An upshift indicator is standard equipment on all instrument clusters. However, on vehicles not equipped with a manual transmission, this indicator is disabled. The upshift indicator is located near the fuel gauge in the instrument cluster overlay, to the left of center. The upshift indicator consists of an upward pointed arrow icon that is a stenciled cutout in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber lens behind the cutout in the opaque layer of the overlay causes the icon to appear in amber through the translucent outer layer of the overlay when the indicator is illuminated from behind by a replaceable incandescent bulb and bulb holder unit located on the instrument cluster electronic circuit board. The upshift indicator is serviced as a unit with the instrument cluster.

UPSHIFT INDICATOR (Continued)

OPERATION

The upshift indicator gives an indication to the vehicle operator when the transmission should be shifted to the next highest gear in order to achieve the best fuel economy. This indicator is controlled by a transistor on the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The upshift indicator bulb receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the lamp will always be off when the ignition switch is in any position except On or Start. The bulb only illuminates when it is provided a path to ground by the instrument cluster transistor. On models not equipped with a manual transmission, the incandescent bulb and bulb holder unit are not installed at the factory when the vehicle is built. The instrument cluster will turn on the upshift indicator for the following reasons:

- **Upshift Lamp-On Message** - Each time the cluster receives an upshift lamp-on message from the PCM indicating the engine speed and load conditions are right for a transmission upshift to occur, the upshift indicator is illuminated. The indicator remains illuminated until the cluster receives an upshift lamp-off message from the PCM or until the ignition switch is turned to the Off position, whichever occurs first. The PCM will normally send an upshift lamp-off message three to five seconds after a lamp-on message, if an upshift is not performed. The indicator will then remain off until the vehicle stops accelerating and is brought back into the range of indicator operation, or until the transmission is shifted into another gear.
- **Actuator Test** - Each time the cluster is put through the actuator test, the indicator will be turned on during the bulb check portion of the test to confirm the functionality of the indicator and the cluster control circuitry.

The PCM continually monitors the engine speed and load conditions to determine the proper fuel and ignition requirements. The PCM then sends the proper messages to the instrument cluster. If the upshift indicator fails to light during normal vehicle operation, replace the bulb with a known good unit. For further diagnosis of the upshift indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the PCM, the CCD data bus, or the message inputs to the instrument cluster that control the upshift indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

VOLTAGE GAUGE

DESCRIPTION

A voltage gauge is standard equipment on all instrument clusters. The voltage gauge is located in the upper left quadrant of the instrument cluster, above the temperature gauge. The voltage gauge consists of a movable gauge needle or pointer controlled by the instrument cluster circuitry and a fixed 90 degree scale on the cluster overlay that reads left-to-right from 8 volts to 18 volts. An International Control and Display Symbol icon for “Battery Charging Condition” is located directly below the lowest graduation of the gauge scale. The voltage gauge graphics are white against a black field except for a single red graduation at each end of the gauge scale, making them clearly visible within the instrument cluster in daylight. When illuminated from behind by the panel lamps dimmer controlled cluster illumination lighting with the exterior lamps turned On, the white graphics appear blue-green and the red graphics appear red. The orange gauge needle is internally illuminated. Gauge illumination is provided by replaceable incandescent bulb and bulb holder units located on the instrument cluster electronic circuit board. The voltage gauge is serviced as a unit with the instrument cluster.

OPERATION

The voltage gauge gives an indication to the vehicle operator of the electrical system voltage. This gauge is controlled by the instrument cluster circuit board based upon the cluster programming and electronic messages received by the cluster from the Powertrain Control Module (PCM) over the Chrysler Collision Detection (CCD) data bus. The voltage gauge is an air core magnetic unit that receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions. The cluster is programmed to move the gauge needle back to the low end of the scale after the ignition switch is turned to the Off position. The instrument cluster circuitry controls the gauge needle position and provides the following features:

- **Charge Fail Message** - Each time the cluster receives a message from the PCM indicating a charge fail condition (system voltage is 10.8 volts or lower), the gauge needle is moved to the 8 volt graduation on the gauge scale and the check gauges indicator is illuminated. The gauge needle remains on the 8 volt

VOLTAGE GAUGE (Continued)

graduation and the check gauges indicator remains illuminated until the cluster receives a message from the PCM indicating there is no charge fail condition (system voltage is 10.9 volts or higher, but lower than 16.7 volts), or until the ignition switch is turned to the Off position, whichever occurs first. On models equipped with the optional diesel engine, the instrument cluster is programmed to support the voltmeter gauge needle above the low end of normal graduation and suppress the check gauges indicator operation until ten seconds after the engine intake manifold air heater has completed its cycle.

- **Voltage High Message** - Each time the cluster receives a message from the PCM indicating a voltage high condition (system voltage is 16.7 volts or higher), the gauge needle is moved to the 18 volt graduation on the gauge scale and the check gauges indicator is illuminated. The gauge needle remains on the 18 volt graduation and the check gauges indicator remains illuminated until the cluster receives a message from the PCM indicating there is no voltage high condition (system voltage is 16.6 volts or lower, but higher than 10.9 volts), or until the ignition switch is turned to the Off position, whichever occurs first.
- **Message Failure** - If the cluster fails to receive a system voltage message, it will hold the gauge needle at the last indication until a new message is received, or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test, the gauge needle will be swept to several calibration points on the gauge scale in a prescribed sequence in order to confirm the functionality of the gauge and the cluster control circuitry.

The PCM continually monitors the system voltage to control the generator output. The PCM then sends the proper system voltage messages to the instrument cluster. For further diagnosis of the voltage gauge or the instrument cluster circuitry that controls the gauge, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). If the instrument cluster turns on the check gauges indicator due to a charge fail or voltage high condition, it may indicate that the charging system requires service. For proper diagnosis of the charging system, the CCD data bus, or the message inputs to the instrument cluster that control the voltage gauge, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

WAIT-TO-START INDICATOR

DESCRIPTION

A wait-to-start indicator is standard equipment on all instrument clusters, but is only functional in vehicles equipped with an optional diesel engine. The wait-to-start indicator is located near the lower edge of the instrument cluster overlay, to the right of center. The wait-to-start indicator consists of a stenciled cutout of the text “WAIT TO START” in the opaque layer of the cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red lens located behind the cutout causes the “WAIT TO START” text to appear in red through the translucent outer layer of the overlay when the indicator is illuminated from behind by a Light Emitting Diode (LED) that is soldered onto the instrument cluster electronic circuit board. The wait-to-start indicator is serviced as a unit with the instrument cluster.

OPERATION

The wait-to-start indicator gives an indication to the vehicle operator when the diesel engine intake air heater is energized in its preheat operating mode. This indicator is controlled by a hard wired input to the instrument cluster from the Engine Control Module (ECM). The wait-to-start indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the lamp will always be off when the ignition switch is in any position except On or Start. The indicator LED only illuminates when it is switched to ground by the input from the ECM. The ECM will turn on the wait-to-start indicator by pulling the wait-to-start indicator driver circuit to ground each time the ignition switch is turned to the On or Start positions. The indicator then remains illuminated until the ECM detects that the air within the intake manifold is the proper temperature to ensure reliable and efficient engine starting, until the ECM detects that the engine is running, or until the ignition switch is turned to the Off position, whichever occurs first.

The ECM continually monitors the intake manifold air temperature sensor, the Manifold Absolute Pressure (MAP) sensor, and many other vehicle conditions to determine when the wait-to-start indicator should be illuminated. For proper diagnosis of the wait-to-start indicator, the ECM, or the inputs the ECM uses to control the wait-to-start indicator operation, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.

WASHER FLUID INDICATOR

DESCRIPTION

A washer fluid indicator is standard equipment on all instrument clusters. The washer fluid indicator is located near the lower edge of the instrument cluster overlay, to the right of center. The washer fluid indicator consists of a stenciled cutout of the words “LOW WASHER” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. An amber lens behind the cutout in the opaque layer of the overlay causes the “LOW WASHER” text to appear in amber through the translucent outer layer of the overlay when it is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The washer fluid indicator is serviced as a unit with the instrument cluster.

OPERATION

The washer fluid indicator gives an indication to the vehicle operator when the fluid level in the washer fluid reservoir is low. This indicator is controlled by a transistor on the instrument cluster electronic circuit board based upon cluster programming and a hard wired washer fluid level switch input to the cluster. The washer fluid indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the indicator will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is provided a path to ground by the instrument cluster transistor. The instrument cluster will turn on the washer fluid indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the indicator is illuminated for about two seconds as a bulb test.
- **Washer Fluid Level Switch Input** - Immediately after the bulb test, if the cluster senses ground on the washer fluid switch sense circuit for more than about thirty seconds, it turns on the washer fluid indicator. Any time after the bulb test, the cluster must sense ground on the washer fluid switch sense circuit for more than about sixty seconds before it turns on the indicator. Once illuminated, the indicator will remain illuminated until the ignition switch is cycled and the cluster senses an open circuit on the low washer fluid sense input. This strategy is intended to reduce the effect that fluid sloshing within the washer reservoir can have on reliable indicator operation.
- **Actuator Test** - Each time the cluster is put through the actuator test, the indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The washer fluid level switch is connected in series between ground and the washer fluid switch sense input to the instrument cluster. For more information on the washer fluid level switch,(Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WASHER FLUID LEVEL SWITCH - OPERATION). For further diagnosis of the washer fluid indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). The washer fluid level switch input to the cluster can be diagnosed using conventional diagnostic tools and methods.

DIAGNOSIS AND TESTING - WASHER FLUID INDICATOR

The diagnosis found here addresses an inoperative washer fluid indicator condition. If the problem being diagnosed is related to indicator accuracy, be certain to confirm that the problem is with the indicator or washer fluid level switch input and not with a damaged or empty washer fluid reservoir, or inoperative instrument cluster indicator control circuitry. Inspect the washer fluid reservoir for proper fluid level and signs of damage or distortion that could affect washer fluid level switch performance and perform the instrument cluster actuator test before you proceed with the following diagnosis. If no washer fluid reservoir or instrument cluster control circuitry problem is found, the following procedure will help to locate a short or open in the washer fluid switch sense circuit. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WASHER FLUID INDICATOR (Continued)

INDICATOR DOES NOT ILLUMINATE WITH WASHER RESERVOIR EMPTY

(1) Disconnect and isolate the battery negative cable. Disconnect the headlamp and dash wire harness connector for the washer fluid level switch from the washer fluid level switch connector receptacle. Check for continuity between the ground circuit cavity of the headlamp and dash wire harness connector for the washer fluid level switch and a good ground. There should be continuity. If OK, go to Step 2. If not OK, repair the open ground circuit to ground (G100) as required.

(2) Remove the instrument cluster from the instrument panel. Check for continuity between the washer fluid switch sense circuit cavities of the headlamp and dash wire harness connector for the washer fluid level switch and the instrument panel wire harness connector (Connector C2) for the instrument cluster. If OK, replace the faulty washer fluid level switch. If not OK, repair the open washer fluid switch sense circuit between the washer fluid level switch and the instrument cluster as required.

INDICATOR STAYS ILLUMINATED WITH WASHER RESERVOIR FULL

(1) Disconnect and isolate the battery negative cable. Disconnect the headlamp and dash wire harness connector for the washer fluid level switch from the washer fluid level switch connector receptacle. Check for continuity between the ground circuit terminal and the washer fluid switch sense terminal in the washer fluid level switch connector receptacle. There should be no continuity. If OK, go to Step 2. If not OK, replace the faulty washer fluid level switch.

(2) Remove the instrument cluster from the instrument panel. Check for continuity between the washer fluid switch sense circuit cavity of the headlamp and dash wire harness connector for the washer fluid level switch and a good ground. There should be no continuity. If not OK, repair the shorted washer fluid switch sense circuit between the washer fluid level switch and the instrument cluster as required.

WATER-IN-FUEL INDICATOR

DESCRIPTION

A water-in-fuel indicator is standard equipment on all instrument clusters, but is only functional in vehicles equipped with an optional diesel engine. The water-in-fuel indicator is located near the lower edge of the instrument cluster overlay, to the left of center. The water-in-fuel indicator consists of a stencilled cutout of the text “WATER IN FUEL” in the opaque layer of the instrument cluster overlay. The dark outer layer of the overlay prevents the indicator from being clearly visible when it is not illuminated. A red lens located behind the cutout causes the “WATER IN FUEL” text to appear in red through the translucent outer layer of the overlay when the indicator is illuminated from behind by a Light Emitting Diode (LED) soldered onto the instrument cluster electronic circuit board. The water-in-fuel indicator is serviced as a unit with the instrument cluster.

OPERATION

The water-in-fuel indicator gives an indication to the vehicle operator when the water accumulated in the diesel engine fuel filter/separator filter bowl requires draining. This indicator is controlled by a transistor on the instrument cluster circuit board based upon cluster programming and electronic messages received by the cluster from the Engine Control Module (ECM) over the Chrysler Collision Detection (CCD) data bus. The water-in-fuel indicator Light Emitting Diode (LED) receives battery current on the instrument cluster electronic circuit board through the fused ignition switch output (st-run) circuit whenever the ignition switch is in the On or Start positions; therefore, the indicator will always be off when the ignition switch is in any position except On or Start. The LED only illuminates when it is switched to ground by the instrument cluster transistor. The instrument cluster will turn on the water-in-fuel indicator for the following reasons:

- **Bulb Test** - Each time the ignition switch is turned to the On position the indicator is illuminated for about two seconds as a bulb test.
- **Water-In-Fuel Lamp-On Message** - Each time the cluster receives a water-in-fuel lamp-on message from the ECM, the indicator will be illuminated. The indicator remains illuminated until the cluster receives a water-in-fuel lamp-off message from the ECM or until the ignition switch is turned to the Off position, whichever occurs first.
- **Actuator Test** - Each time the cluster is put through the actuator test, the indicator will be turned on during the bulb check portion of the test to confirm the functionality of the LED and the cluster control circuitry.

The ECM continually monitors the water-in-fuel sensor, then sends the proper messages to the instrument cluster. For further diagnosis of the water-in-fuel indicator or the instrument cluster circuitry that controls the indicator, (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - DIAGNOSIS AND TESTING). For proper diagnosis of the water-in-fuel sensor, the ECM, the CCD data bus, or the message inputs to the instrument cluster that control the water-in-fuel indicator, a DRBIII® scan tool is required. Refer to the appropriate diagnostic information.