INSTRUMENT CLUSTER

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INSTRUMENT CLUSTER

DESCRIPTION

The instrument cluster electronically drives the speedometer, odometer, fuel/temperature gauges, and tachometer. On the back of the cluster are two self-docking connectors, a 26-way and a 10-way.

All the indicators are located within the three gauges:

- Speedometer
- Tachometer
- Fuel/Temperature Gauge

This is a smart cluster and used to control many Body Control Module (BCM) functions.

The purpose of the instrument cluster gauges and indicator lamps is to keep the driver informed about the operating condition of the vehicle. If an abnormal condition occurs, the driver is informed by indicator lamp and a chime. The driver can seek service before damage occurs.

The instrument cluster has warning lamps and indicators for the following systems:

- Airbag
- Anti-lock Brakes (ABS) if equipped
- Brake Warning
- Charging System
- Electronic Throttle Control (ETC) (1.6L only)
- Engine Temperature
- Front Fog Lamps (if equipped)
- High Beam
- Liftgate Ajar
- Low Fuel
- Low Oil Pressure
- Malfunction Indicator Lamp (MIL) (Service Engine Soon)
- Rear Fog Lamps (Export)
- Seat Belt Warning
- Security System
- Trac-Off (if equipped)
- Wait To Start (Diesel Export Only)

The instrument cluster has a Vacuum Fluorescent (VF) display for the following systems:

- Cruise
- Door (ajar)
- Odometer
- Trac (if equipped)
- Trip
- PRNDL (Autostick Only)

CHIME

The functions previously performed by the chime module are now part of the smart cluster. There is no serviceable part of the instrument cluster chime function. Replacement of the instrument cluster is necessary.

KEY IN IGNITION SWITCH

The Key-in switch is built into the ignition switch assembly. Should the Key-in switch require service, the ignition switch assembly must be replaced.

INSTRUMENT CLUSTER (Continued)

INSTRUMENT CLUSTER - EXPORT

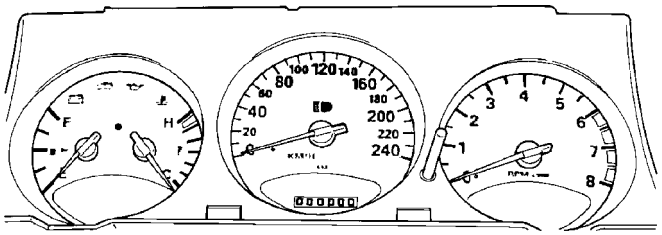

Fig. 1 INSTRUMENT CLUSTER - EXPORT

The instrument cluster (Fig. 1) is referred to as a Electro-Mechanical Instrument Cluster (EMIC). Some of the features it controls are the gauges (except fuel), courtesy lamps, chime control, Daytime Running Lamps (DRL) and cluster self diagnostics. The cluster sends and receives messages via the Programmable Communication Interface (PCI) data bus circuit (J1850). All instrument cluster indicators (Airbag, Seatbelt, etc.) are LED's and are not replaceable, with the exception of the high beam indicator which is a bulb. The gauges are not serviced individually, thereby requiring complete replacement of the cluster if one indicator or gauge becomes defective.

OPERATION

The instrument cluster controls the courtesy lamps. It receives and sends messages to other modules via the PCI (J1850) bus circuit. It controls all the instrument illumination and the chime is also an integral part of the cluster.

All gauges are the analog type. When the ignition switch is moved to the OFF position, the cluster drives each gauge to its lowest position. The individual gauges are not serviceable and require complete replacement of the cluster if one or more gauges are inoperable.

The gauges are the magnetic air-core type. When the ignition switch is OFF, the gauge pointers should rest at or below the lowest graduation. The instrument cluster may be checked quickly by using the cluster self-diagnostics (Refer to 8 - ELECTRICAL/ INSTRUMENT CLUSTER - STANDARD PROCEDURE). After bulb check, (with the key in the RUN position and engine running) all MODULE warning indicators (if so equipped: Airbag, ABS, MIL, Charging System, Trac Off, ETC - Export only) should be extinguished. If any of these indicators stay ON, use the DRB III® scan tool to determine module faults. Also refer to the proper Body Diagnostic Procedures manual for cluster self-diagnostic results.

NOTE: If any of the gauge pointers are stuck on the wrong side of the pointer stop, perform one of the following:

- **Pull the M1 fuse in the fuseblock (refer to Wiring Diagrams for fuse locations) and key on. The gauge pointer will "sweep" the gauges and return all pointers to the correct side of the stop. Key OFF, reinsert the M1 fuse. The cluster will "sweep" the gauges one additional time. The cluster will "sweep" the gauges anytime there was a change in the state of the M1 fuse.**
- **Perform the instrument self-diagnostic check (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - STANDARD PROCEDURE). This will "sweep" all the pointers to the correct side of the pointer stop.**

One button is used to switch the display from trip to total mileage. Holding the button when the display is in the trip mode will reset the trip mileage. This button is also used to put the cluster in self-diagnostic mode (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - STANDARD PROCEDURE). Some of the indicators will come on briefly for a bulb check when the ignition is turned from OFF to ON. The LED's are non serviceable and if one or more warning indictor LED's are out, the entire cluster must be replaced.

In the event that the instrument cluster looses communication with all other modules on the PCI bus, the cluster will display "nobuS" in the VF display. The VF display also displays "Door", "Cruise", "Trac", and odometer trip or total.

If the cluster does not detect voltage on the M1 circuit, the message "FUSE" will alternate with the odometer/trip odometer. The lack of voltage can be due to the M1 Fused B(+) (IOD) fuse being open, or a circuit problem.

Indicator lamps use ON/OFF switch functions for operation, while gauges use a sending unit or sensor.

The instrument cluster will learn some features of the vehicle that it is installed in so swapping clusters from vehicle to vehicle is not recommended.

The features that are learned are:

- ABS
- Traction Control
- SKIM
- RKE
- Air Bags
- Cruise Control
- Lowest/Highest Fuel Level

INSTRUMENT CLUSTER - EXPORT

When the ignition key is ON, the instrument cluster indicator lamps will come on for a brief bulb check. The seat belt indicator lamp will remain ON until the (Driver) seat belt is fastened. The chime will sound for 6 seconds if the seat belt is unbuckled when the ignition is first turned ON. The export

instrument cluster operates in the same manner as non-export clusters. Refer to the appropriate Body Diagnostic Procedures manual for complete diagnosis and testing of the instrument cluster.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - INSTRUMENT CLUSTER WARNING/INDICATOR LAMPS

Every time the vehicle is switched to the START/RUN position, the cluster goes through a BULB CHECK. This tests most of the indicator lamps and Vacuum Fluorescent (VF) displays. If any of the lamps fail to light during the bulb check, refer to the proper Body Diagnostic Procedures manual. The lamps are not replaceable except for the high beam indicator and gauge illumination bulbs. None of these though will illuminate, along with the security indicator, during the bulb check at initial KEY ON.

To diagnose the cluster lamps first place the cluster in self-diagnostic mode. With the ignition switch in the OFF position, press the trip odometer reset button down. Simultaneously turn the ignition key to the ON position and release the trip reset button. Depending on optional equipment, the indicator lamps and VF displays should illuminate except for the fog lampm liftgate ajar, and any unlearned features.

DIAGNOSIS AND TESTING - MULTIPLE/INDIVIDUAL GAUGES INOPERATIVE

Test speedometer, tachometer and other gauges for malfunction using the following:

(1) First perform Cluster Self-Diagnostics (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - STANDARD PROCEDURE). If there is a response, watch for the effected gauge(s) for operation. Replace cluster as necessary. If there is no response to the cluster self-diagnostics, go to Step 2.

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

(3) Check for ignition voltage at Pin 14 of the 26-way cluster wire harness connector. Refer to Wiring Diagrams for connector views. Check for battery voltage at Pin 4 of the 26-way connector. If no voltage, repair as necessary.

(4) Check Pin 1 and Pin 2 of the 26-way connector for continuity to ground. If no ground, repair as necessary.

(5) If the voltage and ground are OK, and the pins or the connectors are not distorted, replace the instrument cluster(Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

(6) **Autostick clusters only** - In KEY UNLOCK/RUN/START there is B+ battery voltage at Pin 15 of the 26-way connector. Refer to Step 3.

26-WAY CLUSTER HARNESS CONNECTOR PIN CALL-OUT

CAV.	FUNCTION
1	POWER GROUND
2	LOGIC GROUND
3	PARK LAMP ILLUMINATION FEED
4	BATTERY FEED - M1
5	
6	
7	DOME/MAP/CARGO LAMP
8	
9	DRIVER DOOR AJAR
10	LEFT TURN OUTPUT (DRL)
11	LEFT TURN SIGNAL INPUT
12	RIGHT TURN OUTPUT (DRL)
13	RIGHT TURN SIGNAL INPUT
14	IGNITION RUN/START
15	UNLOCK/RUN/START (AUTOSTICK ONLY
16	SPARE OUTPUT B
17	
18	HIGH BEAM
19	KEY-IN IGNITION
20	SEAT BELT
21	PARK BRAKE
22	PANEL ILLUMINATION DRIVER
23	PASSENGER DOOR AJAR
24	LIFTGATE AJAR
25	PROGRAM VPM
26	PCI BUS

10-WAY CLUSTER HARNESS CONNECTOR PIN CALL-OUT

CAV.	FUNCTION
1	FRONT FOG
2	VEHICLE THEFT/SECURITY SYSTEM (VTSS)
3	SPARE INPUT 5
4	SPARE INPUT 4
5	SPARE INPUT 3
6	REAR FOG
7	PANEL DIMMING LEVEL
8	REVERSE INPUT
9	FUEL SENSOR
10	SPARE INPUT 2

INSTRUMENT CLUSTER (Continued)

STANDARD PROCEDURE - SELF-DIAGNOSTICS

To put the instrument cluster in Self-Diagnostic Mode, press the trip reset button down and then turn the ignition to the ON position simultaneously, then release the button. The gauges will increment to selected stops and all indicators will light with the exception of liftgate ajar and fog lamp indicators. The oil lamp will come on when the ignition is turned ON and the engine is OFF. Refer to the proper Body Diagnostic Procedures manual if one or more indicators don't light, or a gauge does not appear to be functioning correctly.

NOTE: If a vehicle/instrument cluster is received with the instrument cluster gauge pointers on the wrong side of the pointer stops, momentarily remove the M1 fuse, located in the Power Distribution Center (PDC) in the engine compartment, then replace. The gauge pointers should then step through the scales and then sweep back to the proper side of the pointer stops.

REMOVAL

CAUTION: DO NOT turn cluster upside down for longer than 30 minutes (preferably NEVER). This can result in dampening fluid within the gauge pointer assembly to leak causing permanent damage to the instrument cluster gauges.
DO NOT expose the instrument cluster to direct sunlight for extended periods of time. Any overexposure to direct sunlight permanently warps the internal mask of the instrument cluster, causing the pointers to stick. It is acceptable to store the instrument cluster on the floor of the vehicle, gauges facing up, out of direct sunlight.
DO NOT do an electrical "HOT SWAP" when replacing or testing clusters. Ensure that the ignition is OFF with the M1 fuse removed, or the battery negative cable is disconnected. Partial mating of the cluster connector circuits can damage and/or destroy the cluster microprocessor if power is available.
DO NOT swap clusters between vehicles. The instrument cluster has learned information stored in its microprocessor for Airbags, Anti-Lock Brakes, Traction Control, Cruise, and Smart Key Immobilizer. Swapping clusters between cars, may result in the improper illumination of cluster indicators associated with the above features.

(1) Open hood.
(2) Disconnect and isolate the battery negative cable.
(3) Remove the instrument cluster bezel. Refer to Body, Instrument Panel, Instrument Cluster Bezel, Removal.
(4) Remove four screws to the instrument cluster (Fig. 2) and pull straight back to release off of self-docking connectors (Fig. 3).

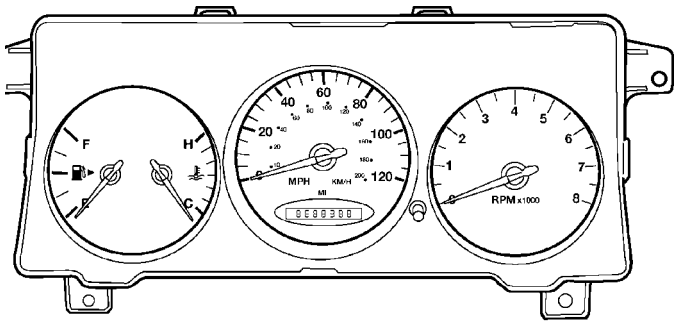

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Fig. 2 INSTRUMENT CLUSTER

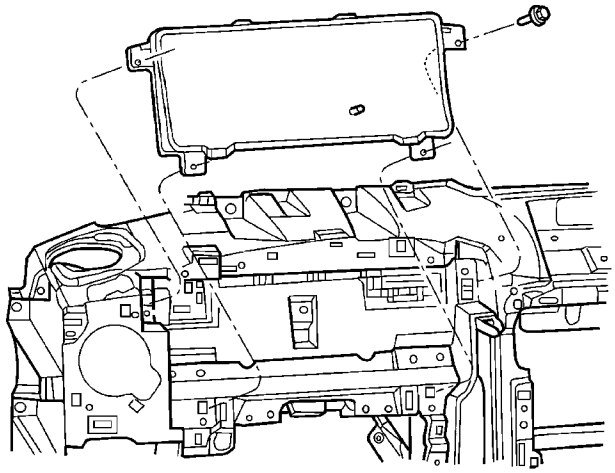

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Fig. 3 INSTRUMENT CLUSTER REMOVE/INSTALL

INSTRUMENT CLUSTER (Continued)

INSTALLATION

CAUTION: DO NOT turn cluster upside down for longer than 30 minutes (preferably NEVER). This can result in dampening fluid within the gauge pointer assembly to leak causing permanent damage to the instrument cluster gauges.
DO NOT expose the instrument cluster to direct sunlight for extended periods of time. Any overexposure to direct sunlight permanently warps the internal mask of the instrument cluster, causing the pointers to stick. It is acceptable to store the instrument cluster on the floor of the vehicle, gauges facing up, out of direct sunlight.
DO NOT do an electrical "HOT SWAP" when replacing or testing clusters. Ensure that the ignition is OFF with the M1 fuse removed, or the battery negative cable is disconnected. Partial mating of the cluster connector circuits can damage and/or destroy the cluster microprocessor if power is available.
DO NOT swap clusters between vehicles. The instrument cluster has learned information stored in its microprocessor for Airbags, Anti-Lock Brakes, Traction Control, Cruise, and Smart Key Immobilizer. Swapping clusters between cars, may result in the improper illumination of cluster indicators associated with the above features.

(1) Align the cluster over the self-docking connectors and push firmly into place until seated.
(2) Install four screws to the instrument cluster (Fig. 2)and pull straight back to release off of self-docking connectors (Fig. 3).
(3) Install the instrument cluster bezel. Refer to Body, Instrument Panel, Instrument Cluster Bezel, Installation.
(4) Connect the battery negative cable.
(5) Close hood.
(6) Verify vehicle and system operation.

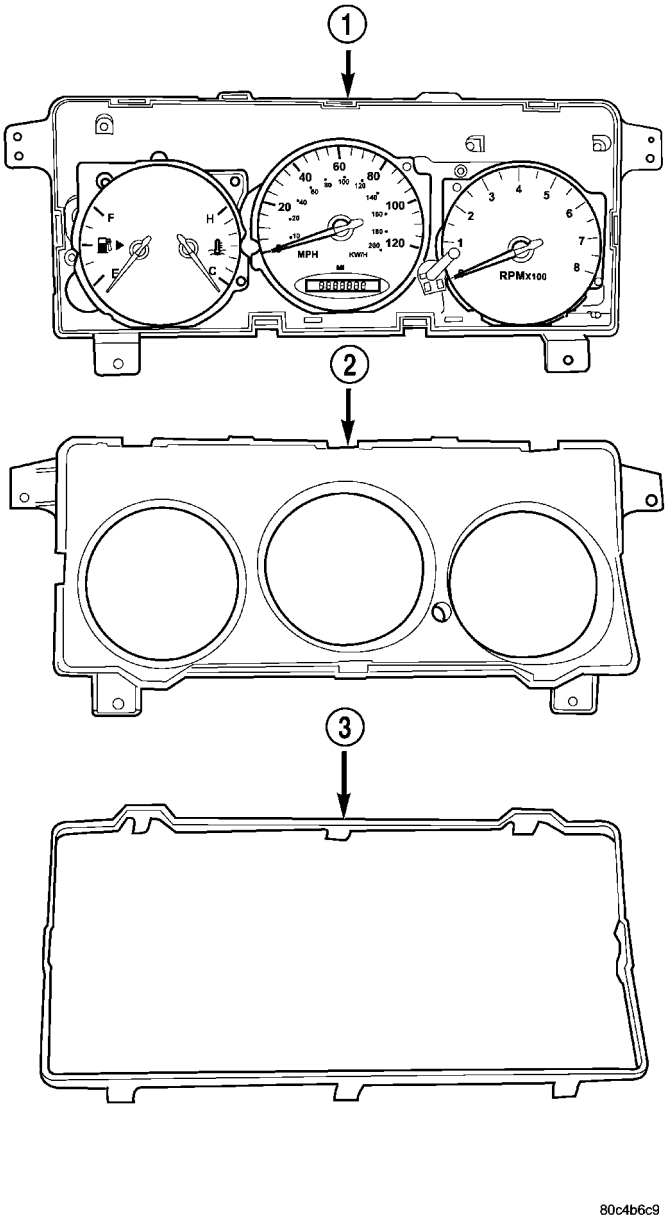

Fig. 4 INSTRUMENT CLUSTER BREAKDOWN

1 - CLUSTER
2 - MASK
3 - LENS

CLUSTER MASK/LENS

REMOVAL

(1) Remove instrument cluster (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).
(2) To separate the mask/lens from the cluster housing, depress the locking tabs, starting at one point and working all the way around the cluster, and then pull up on the mask/lens (Fig. 4).

INSTALLATION

(1) To install new mask/lens, just place in position and snap together.
(2) Install instrument cluster (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).