INSTRUMENT PANEL AND GAUGES

GROUP INDEX

INSTRUMENT PANEL AND GAUGES—XJE

CONTENTS

INSTRUMENT CLUSTER GENERAL INFORMATION

INDEX

With the ignition switch in the ON or START position, voltage supplied to the instrument cluster is limited by fuse #17. The voltage is supplied to all the gauges and indicator lamps through the instrument cluster printed circuit.

With the ignition switch in the OFF position, voltage is not supplied to the instrument cluster and the gauges do not indicate any vehicle condition.

VOLTMETER

The voltmeter measures battery or generator output voltage, whichever is greater.

OIL PRESSURE GAUGE

The oil pressure gauge pointer position is controlled by a magnetic field created by electrical current flow through the coils within the gauge. A change in current flow will change the magnetic field which changes the pointer position. The oil pressure sender is a variable resistor that changes electrical resistance with a change in oil pressure (values shown in Specifications chart).

OIL PRESSURE INDICATOR LAMP

Voltage is supplied to one side of the indicator bulb and the oil pressure switch is connected to the other side. When oil pressure is too low the switch closes providing a path to ground, and the indicator bulb lights.

COOLANT TEMPERATURE GAUGE

The coolant temperature gauge pointer position is controlled by a magnetic field created by electrical current flow through the coils within the gauge. A change in current flow will change the magnetic field which changes the pointer position. The coolant temperature sensor is a thermistor that changes electrical resistance with a change in coolant temperature (values shown in Specifications chart).

COOLANT TEMPERATURE INDICATOR LAMP

Voltage is supplied to one side of the indicator bulb and the coolant temperature switch is connected to the

other side. When coolant temperature is too high the switch closes providing a path to ground, and the indicator bulb lights.

TACHOMETER

The tachometer displays the engine speed (RPM). With the engine running, the tachometer receives an engine speed signal from the Powertrain Control Module pin 43 (values shown in Specifications chart).

SPEEDOMETER/ODOMETER SYSTEM

The speedometer/odometer system consists of an electric speedometer and pushbutton reset odometer mounted in the cluster. The system also includes the wire harness from the cluster to the vehicle speed sensor at the transmission, and the adapter and pinion in the transmission. A signal is sent from a transmission mounted vehicle speed sensor to the speedometer/odometer circuitry through the wiring harness. Refer to Group 21 - Transmission for selecting the proper pinion, and selecting and indexing the proper adapter.

FUEL GAUGE

The fuel gauge pointer position is controlled by a magnetic field created by electrical current flow through the coils within the gauge. A change in current flow will change the magnetic field which changes the pointer position. The fuel level sender is a variable resistor that changes electrical resistance with a change of the level of fuel in the tank (values shown in Specifications chart).

LOW FUEL WARNING LAMP

The low fuel warning lamp will light when the fuel level falls below approximately 4 gallons. A low fuel warning module controls when the lamp will light. When the module senses 66.5 ohms or less from the fuel level sender for 10 continuous seconds, the lamp will light. The lamp will remain on until the module senses 63.5 ohms or more from the fuel level sender for 20 continuous seconds.

UPSHIFT INDICATOR LAMP

Vehicles equipped with manual transmissions have an optional upshift indicator lamp. The lamp is controlled by the Powertrain Control Module. The lamp lights to indicate when the driver should shift to the next highest gear for best fuel economy. The Powertrain Control Module will turn the lamp off after 3 to 5 seconds if the upshift is not performed. The lamp will remain off until the vehicle stops accelerating and is brought back to the range of lamp operation or shifted into another gear.

The indicator lamp is normally illuminated when the ignition switch is turned ON and is turned off when the engine is started. The lamp will be lighted during engine operation according to engine speed and load.

BRAKE INDICATOR LAMP

The brake indicator lamp warns the driver that the parking brake is applied or that hydraulic pressure in the split brake system is unequal.

Voltage is supplied through the brake indicator bulb to 3 switches. A path to ground for the current is available if:

- The brake warning switch is closed (with unequal brake system hydraulic pressures), or
- The ignition switch is in the START position (to test the bulb), or
- The park brake switch is closed (with the parking brake applied).

ANTI-LOCK BRAKE SYSTEM (ABS) INDICATOR LAMP

The anti-lock brake system (ABS) lamp lights to indicate a system self-check is in process at vehicle start-up. If light remains on after start-up or comes on and stays on while driving, it may indicate that the ABS system has detected a malfunction or has become inoperative.

4WD INDICATOR LAMP

COMMAND-TRAC 4WD

The PART TIME lamp lights when the vehicle is engaged in four-wheel drive mode. Voltage is supplied to one side of the indicator bulb. A switch in the transfer case area is connected to the other side of the indicator bulb. When the switch is closed, a path to ground is provided and the indicator bulb lights.

SELECT-TRAC 4WD

The four-wheel drive icon or FULL TIME lamp lights when the vehicle is engaged in full time four-wheel drive mode. The PART TIME lamp lights when the vehicle is in part time four-wheel drive mode. Voltage is supplied to one side of the indicators. Switches in the transfer case area are connected to the other side of the indicator bulbs. When a switch is closed, a path to ground is provided and the indicator bulb lights.

MALFUNCTION INDICATOR LAMP (CHECK ENGINE)

The Malfunction Indicator Lamp (Check Engine) lights each time the ignition switch is turned ON and stays on for 3 seconds as a bulb test.

If the PCM receives an incorrect signal or no signal from certain sensors or emission related systems the lamp is turned on (pin 32 of PCM). This is a warning that the PCM has recorded a system or sensor malfunction. In some cases when a diagnostic trouble code is declared the PCM will go into a limp-in mode in an attempt to keep the system operating. It signals an immediate need for service.

The lamp also can be used to display diagnostic trouble codes (DTC). Cycle the ignition switch ON, OFF, ON, OFF, ON within 5 seconds. This will allow any trouble codes stored in the PCM memory to be displayed in a series of flashes representing digits.

INSTRUMENT CLUSTER DIAGNOSIS

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SPEEDOMETER/ODOMETER INOPERATIVE

(1) Check for continuity in the wire between the vehicle speed sensor and cluster connector pin A5.

(2) With the ignition switch in the ON position, check for battery voltage across pin A8 (B+) and pin B2 (ground).

(3) Perform vehicle speed sensor test. Refer to the appropriate vehicle Diagnostic Test Procedures manual.

(4) If all the previous tests prove good, replace speedometer/odometer.

GAUGES AND INDICATORS INOPERATIVE

(1) Remove and inspect fuse #17. Replace as required.

(2) Measure resistance at instrument cluster connector terminal A3. Meter should read zero ohms. If not, repair open to ground.

VOLTMETER INOPERATIVE

(1) Turn ignition switch to ON. Voltmeter should read battery voltage. If not, go to step 2.

(2) Measure voltage at instrument cluster connector terminal A8. Meter should read battery voltage. If OK, replace meter. If not, repair open to fuse #17.

OIL PRESSURE GAUGE INOPERATIVE

(1) Turn ignition switch to ON.

(2) Disconnect oil pressure sender connector (Fig. 1). Needle goes to H. If not, go to step 3.

(3) Touch oil pressure sender connector to ground. Needle goes to L. If OK, replace sender. If not, repair open to gauge (instrument cluster connector terminal B7).

OIL PRESSURE INDICATOR INOPERATIVE

(1) Turn ignition switch to ON.

(2) Touch oil pressure switch connector to ground. Lamp should light. If OK, replace switch. If bulb is OK, repair open to instrument cluster connector terminal B7.

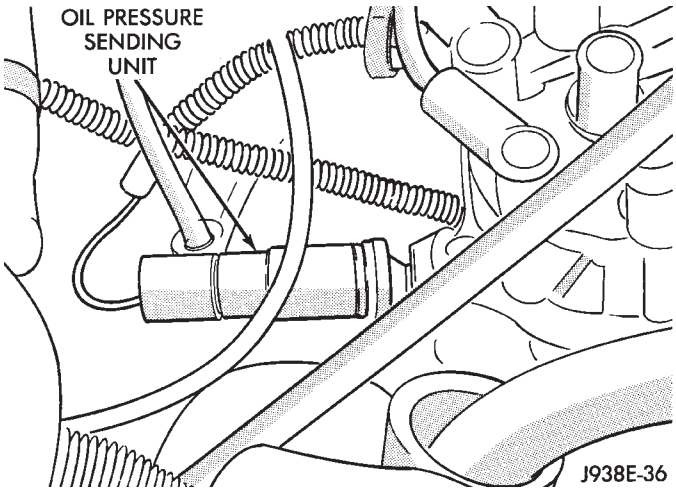


Fig. 1 Oil Pressure Sending Unit—4.0L

COOLANT TEMPERATURE GAUGE INOPERATIVE

(1) Turn ignition switch to ON.

(2) Disconnect coolant temperature sender connector. Needle goes to C. If not, go to step 3.

(3) Touch coolant temperature sender connector to ground. Needle goes to H. If OK, replace sender. If not, repair open to gauge (instrument cluster connector terminal A1).

COOLANT TEMPERATURE INDICATOR INOPERATIVE

(1) Turn ignition switch to ON.

(2) Touch coolant temperature indicator connector to ground. Lamp should light. If OK, replace switch. If bulb is OK, repair open to instrument cluster connector terminal A1.

TACHOMETER INOPERATIVE

Tachometer input is from the Powertrain Control Module pin 43. Use the DRB scan tool to test.

FUEL GAUGE INOPERATIVE

(1) Turn ignition switch to ON.

(2) Disconnect fuel gauge sender connector. Needle should go to E.

(3) Connect a jumper between terminal A and B on the body half of the fuel gauge sender connector. The gauge should move to F. If gauge is OK, replace sender. If not, go to step 4.

(4) Measure resistance of sender. Meter should read 105 to 5 ohms. If OK, go to step 5. If not, replace sender.

(5) Check for an open between sender connector and gauge. If OK, replace gauge. If not, repair open to gauge.

LOW FUEL WARNING INOPERATIVE

(1) Turn ignition switch to ON.

(2) Disconnect terminal B1 of the instrument cluster connector. Wait at least 10 seconds. Lamp (LED) should light. If OK, replace sender. If not, replace low fuel warning module.

UPSHIFT INDICATOR INOPERATIVE

(1) Turn ignition switch to ON.

(2) Ground pin 7 of connector B. Lamp should light. If not, replace bulb. If OK, continue with step 3.

(3) Turn ignition switch to OFF. Check for continuity between connector B pin 2 and pin 54 of the Powertrain Control Module. If OK, replace PCM. If not, repair open.

BRAKE INDICATOR INOPERATIVE

(1) Turn ignition switch to ON. Apply parking brake, brake warning switch connector unplugged.

(2) Jumper brake warning switch connector terminal B to ground. Lamp should light. If bulb is OK, repair open to indicator.

(3) Turn ignition switch to OFF. Measure resistance between brake warning switch connector terminal A and ground. Meter should read zero ohms. If OK, check switch and/or brake system. If not, repair open to park brake switch ground.

4WD INDICATOR INOPERATIVE

(1) Apply parking brake, start engine, vehicle in 4WD Lock or 4WD.

(2) Unplug switch and touch harness side of wire to ground. Lamp should light. If OK, check switch operation, replace if bad. If bulb is OK, repair open to indicator.

LOW WASHER INDICATOR INOPERATIVE

(1) Turn ignition switch to ON.

(2) Jumper 12 volts to fluid level switch connector terminal B. Lamp should light. If not, go to step 3.

(3) Measure resistance between terminal B and ground. Meter should read zero ohms. If not, repair open to bulb. If OK, go to step 4.

(4) Measure voltage at fluid level switch connector terminal A. Meter should read battery voltage. If OK, replace switch. If not, repair open to fuse.

MALFUNCTION INDICATOR LAMP (CHECK ENGINE)

(1) Turn ignition switch to ON.

(2) Jumper Powertrain Control Module terminal 2 to ground. Lamp should light. If bulb is OK, check for open to instrument cluster connector terminal 2.

ANTI-LOCK INDICATOR

(1) Turn ignition switch to ON.

(2) Jumper instrument cluster connector terminal 6 to ground. Lamp should light. If bulb is OK, check wiring for an open to module. Refer to Group 5 - Brakes.

SEAT BELT INDICATOR

Jumper instrument cluster connector terminal 15 to 12 volts. Lamp should light. If not, replace bulb. If OK, check wiring for an open to buzzer module. Refer to Group 8U - Chime/Buzzer Warning Systems.

RADIO/CLOCK ILLUMINATION

With the ignition switch in ACCESSORY or ON, power comes from the radio fuse. It then goes through the normally closed contacts of the radio illumination relay to the radio at connector terminal 11.

Pulling the headlamp switch to ON energizes the radio illumination relay. This closes the normally open contacts of the relay, and the brightness for the radio display is controlled by the headlamp switch rheostat. The back-lighting for the radio is also controlled by the headlamp rheostat through radio connector terminal 10.

Refer to Group 8F - Audio Systems, for radio illumination relay diagnosis.

INSTRUMENT PANEL LAMPS

Voltage is supplied at all times from the 40 amp Maxi fuse (located in the Power Distribution Center) through the park lamps fuse to the headlamp switch. The circuit continues through the instrument lamps fuse to the individual instrument panel lamps to ground. Lamp brightness is controlled by turning the headlamp switch knob.

DIAGNOSIS

(1) Turn parking lamps ON.

(2) Check park lamps fuse. Replace as required.

(3) Check instrument lamps fuse. Replace as required.

(4) Measure voltage at battery side of instrument lamps fuse with rheostat turned counterclockwise to clockwise (LO to HI). Meter should read zero volts to battery voltage. If not, replace headlamp switch.

(5) Measure resistance at ground side of instrument lamps fuse with parking lamps OFF. Meter should read almost zero ohms (except bulb filament). If not, repair open to ground. If zero ohms, 12 volt supply wire from fuse is shorted to ground, repair short.

INSTRUMENT CLUSTER SERVICE PROCEDURES

INDEX

INSTRUMENT CLUSTER REPLACEMENT

(1) Disconnect negative cable from battery.

(2) Remove 4 instrument panel bezel attaching screws and remove instrument panel bezel. Bezel is snap fit at locations shown (Fig. 2).

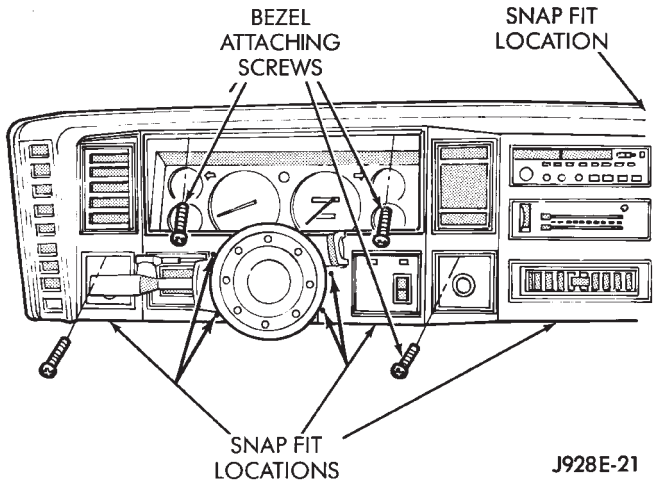


Fig. 2 Instrument Bezel Removal/Installation—XJ

(3) Remove cigar lighter housing attaching screws (Fig. 3).

(4) Remove switch housing attaching screws (if equipped).

(5) Remove instrument panel cluster attaching screws.

(6) Pull out cluster assembly far enough to disconnect 2 multiple plugs and remove instrument cluster.

To install cluster, reverse the removal procedures.

GAUGE REPLACEMENT—INSTRUMENT CLUSTER REMOVED

(1) Remove cluster lens and gauge bezel (Fig. 4). If equipped with trip odometer, gently pull knob off trip odometer push pin.

(2) Remove gauge attaching screws from rear of mounting bezel. Remove gauge from front.

(3) Install gauge. Install attaching screws.

(4) Install cluster bezel and lens.

(5) Install knob on trip odometer push pin.

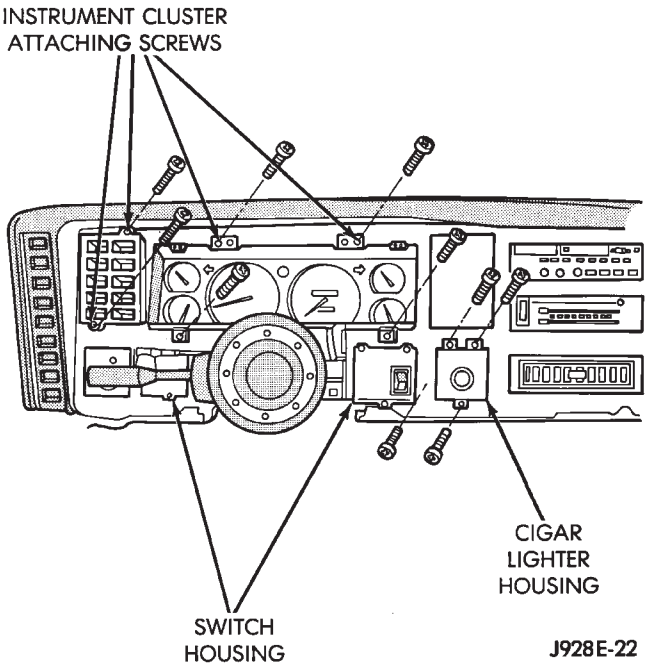


Fig. 3 Instrument Cluster Removal/Installation—XJ

SPEEDOMETER REPLACEMENT—INSTRUMENT CLUSTER REMOVED

(1) Remove cluster lens and gauge bezel. If equipped with trip odometer, gently pull knob off trip odometer push pin.

(2) Remove 6 mounting screws from cluster housing.

(3) Remove 3 screws from rear of cluster housing (Fig. 5).

(4) Remove speedometer assembly including circuit board.

(5) Install speedometer with 3 screws.

(6) Install gauge bezel and lens.

(7) Install knob on trip odometer push pin.

TACHOMETER REPLACEMENT—INSTRUMENT CLUSTER REMOVED

(1) Remove cluster lens and gauge bezel. If equipped with trip odometer, gently pull knob off trip odometer push pin.

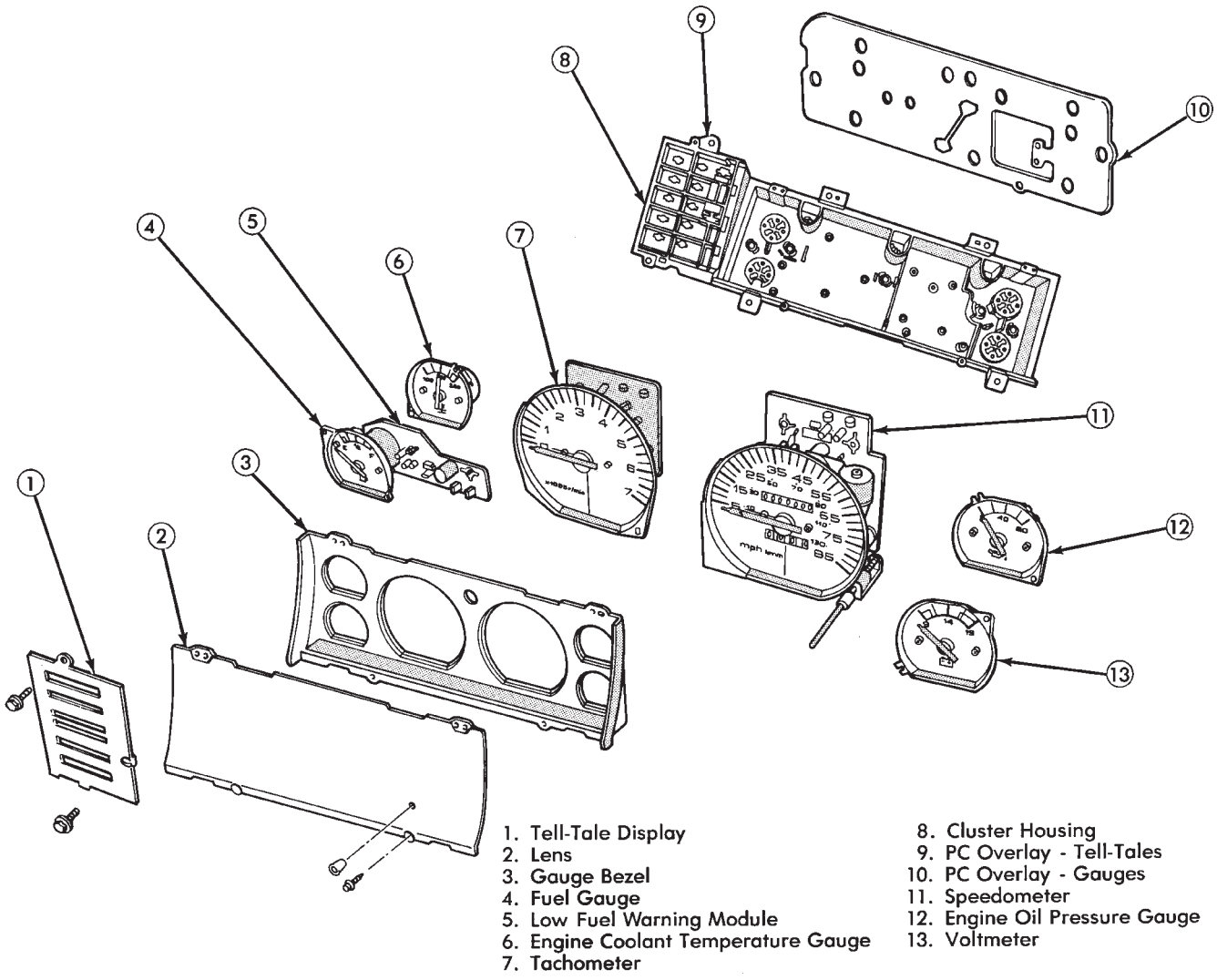


Fig. 4 Instrument Cluster

(2) Remove 3 attaching screws from rear of cluster housing.

(3) Remove tachometer assembly including circuit board.

(4) Install tachometer. Install attaching screws.

(5) Install gauge bezel and lens.

(6) Install knob on trip odometer push pin.

PRINTED CIRCUIT REPLACEMENT—INSTRUMENT CLUSTER REMOVED

DISASSEMBLY

(1) Remove all attaching screws for gauges, tachometer, and speedometer that are contacting printed circuit (Fig. 5).

(2) Remove screw holding the cluster connector retaining strap to bezel. Remove strap and pivot connector down (Figs. 6 and 7).

(3) Remove lamp sockets from circuit board.

(4) Remove printed circuit including connector.

There is a separate printed circuit for the warning lights that is removed by removing the lamp sockets.

ASSEMBLY

(1) Position printed circuit, including connector, on the back of the instrument panel cluster.

(2) Remove gauge bezel and lens.

(3) Hold components in place and install screws.

(4) Install lamp sockets.

(5) Pivot connector up and install retaining strap.

(6) Install gauge bezel and cluster lens.

GEAR SELECTOR INDICATOR REPLACEMENT—INSTRUMENT CLUSTER REMOVED

(1) Remove screws from rear of mounting bezel holding fuel gauge in place.

(2) Remove 2 screws holding gear selector indicator (Fig. 8).

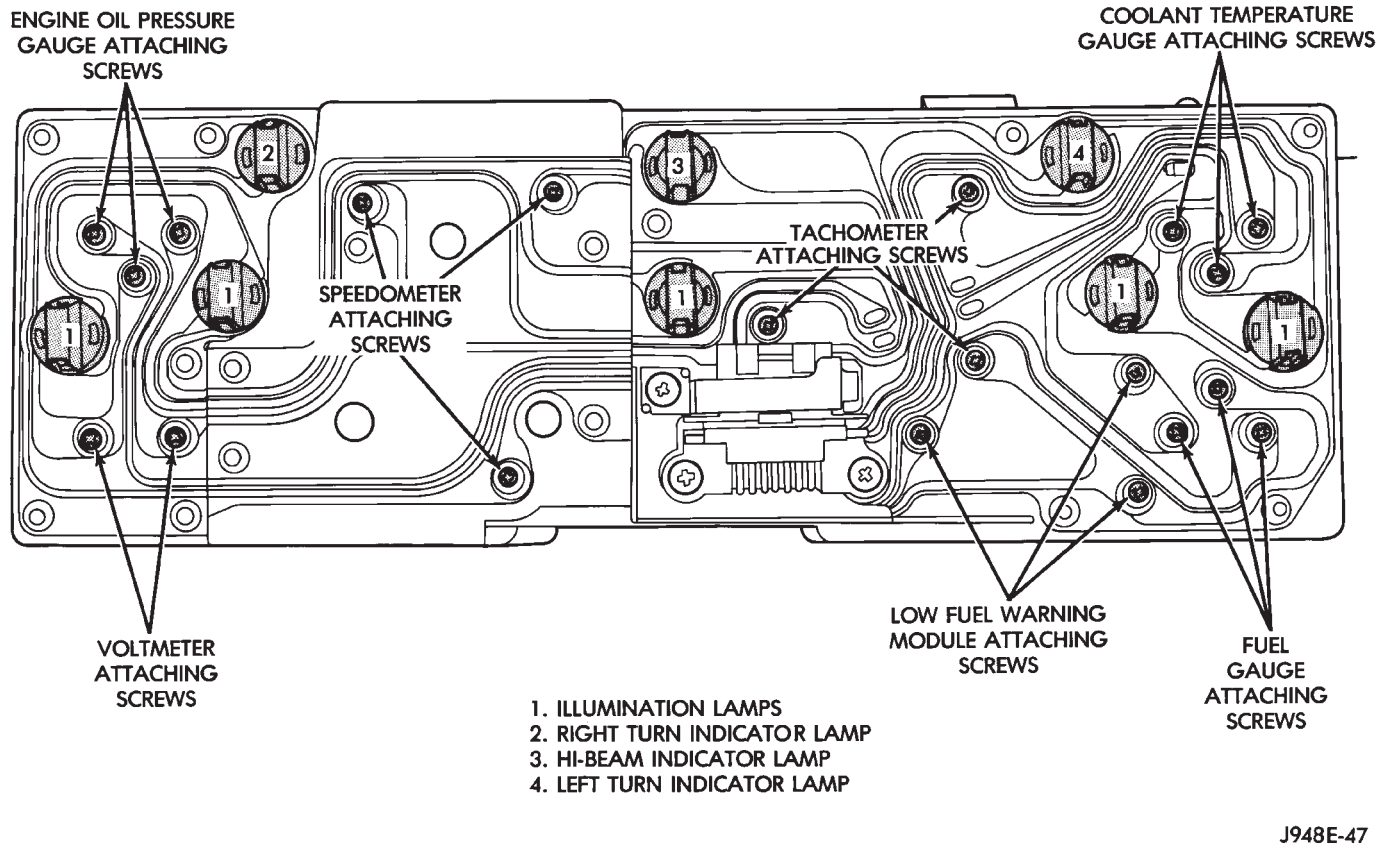


Fig. 5 Printed Circuit Removal/Installation

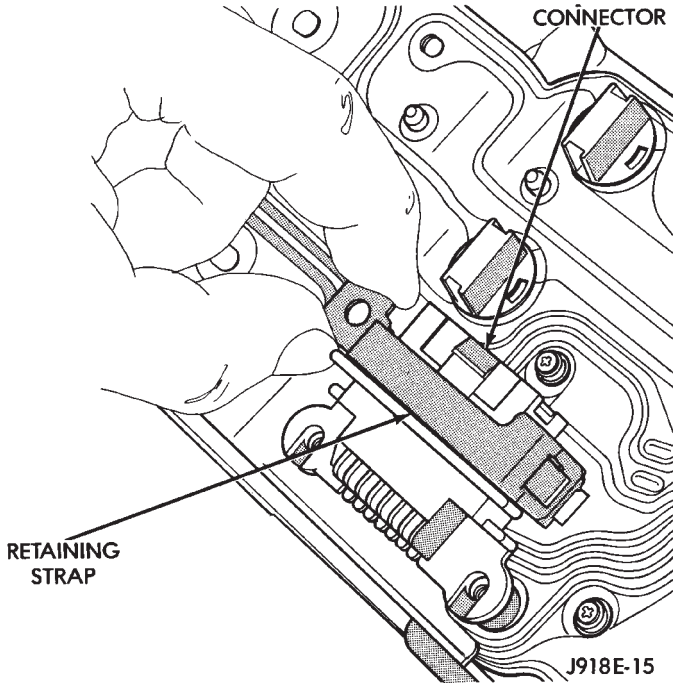


Fig. 6 Cluster Connector Retaining Strap

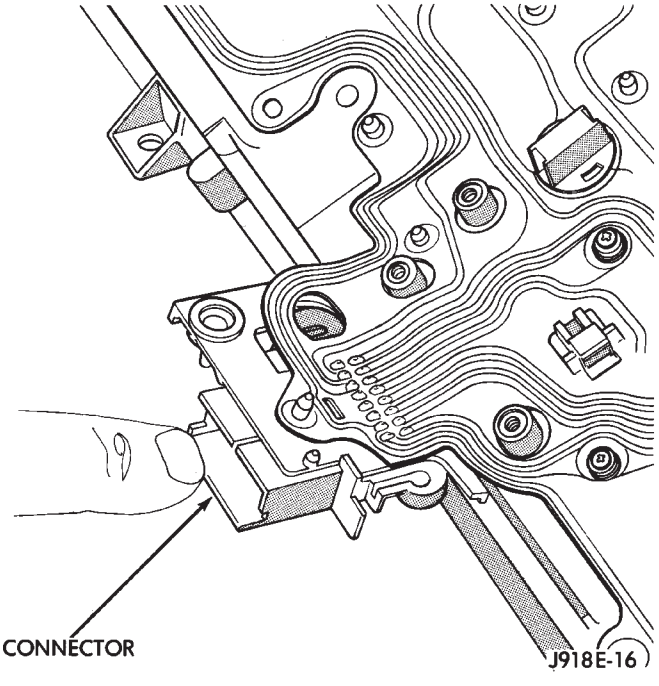


Fig. 7 Printed Circuit And Cluster Connector

(3) Pull cable and clip through hole in the mounting bezel and remove indicator.

(4) Install indicator and cluster.

(5) To adjust indicator, place transmission in PARK.

(6) Align pointer on indicator with PARK position.

(7) Install clip to steering column shroud.

(8) Move transmission shift lever to check proper alignment.

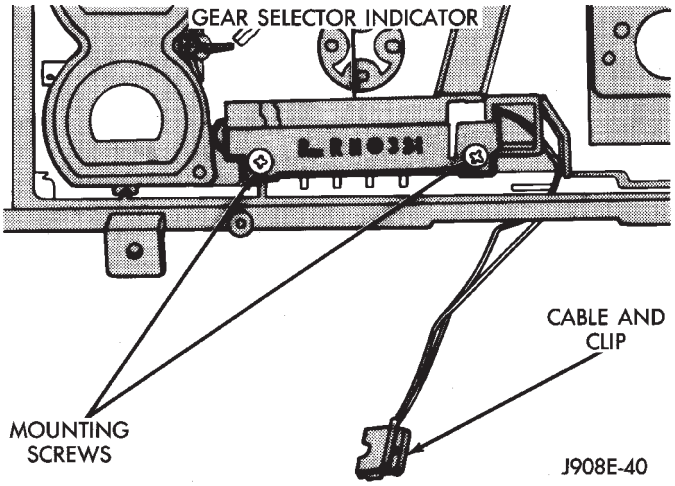


Fig. 8 Gear Selector Indicator

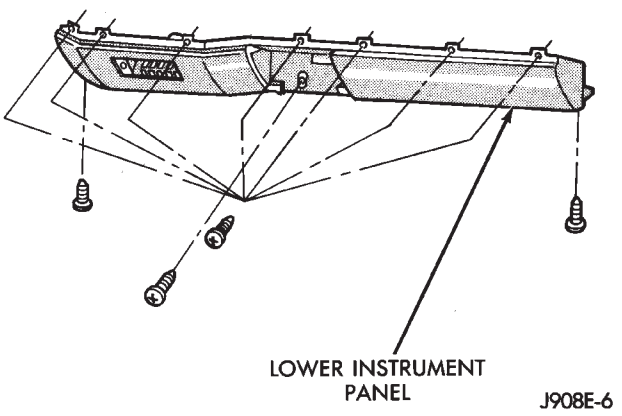


Fig. 10 Lower Instrument Panel Removal/Installation

INSTRUMENT PANEL REPLACEMENT (Fig. 9)

(1) Disconnect negative cable from battery.

(2) Remove:

- Parking brake release handle
- lower heat/AC duct below steering column
- ash receiver
- lower instrument panel (Fig. 10)
- cluster bezel
- cluster assembly
- clock (if equipped)
- radio and heater control panel
- instrument panel switches
- headlamp switch

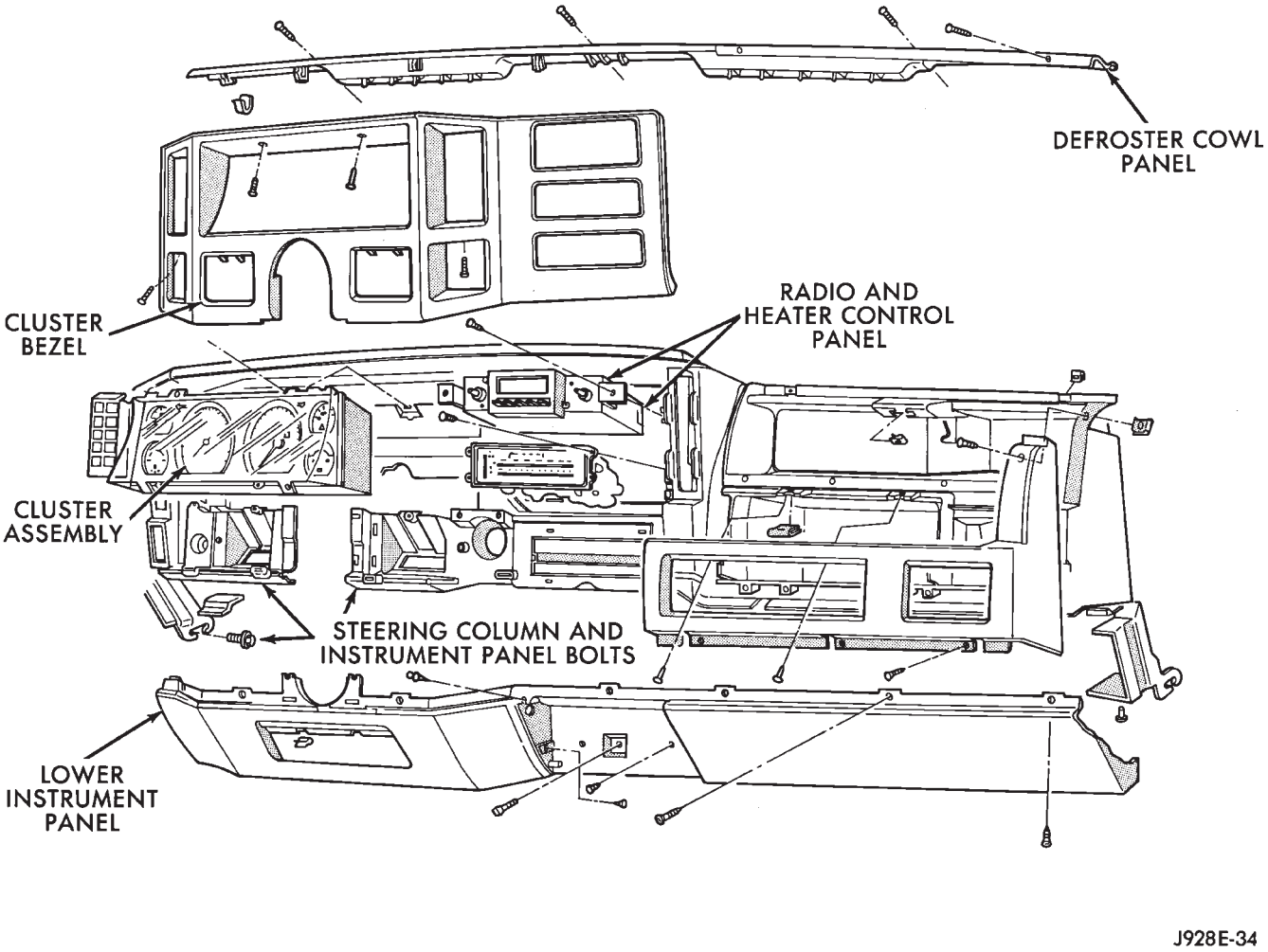


Fig. 9 Instrument Panel Exploded View

- antenna connector
- blower motor resistors
- ground lead
- disconnect glove box light
- defroster cowl panel

Remove driver's side heat/AC outlet to gain access to left hand defroster cowl panel retaining clip to aid in removal (Fig. 11).

- instrument panel attaching bolts
- steering column attaching bolts
- instrument panel assembly

The instrument panel wiring harness is attached to the back of the instrument panel assembly and must be installed correctly for installation.

(3) To install instrument panel, position instrument panel assembly on side mounting bolts (Fig. 12).

(4) Route wiring harnesses and secure instrument panel assembly mounting points.

(5) Connect tube to lap cooler.

(6) Reverse the removal procedures to finish instrument panel installation.

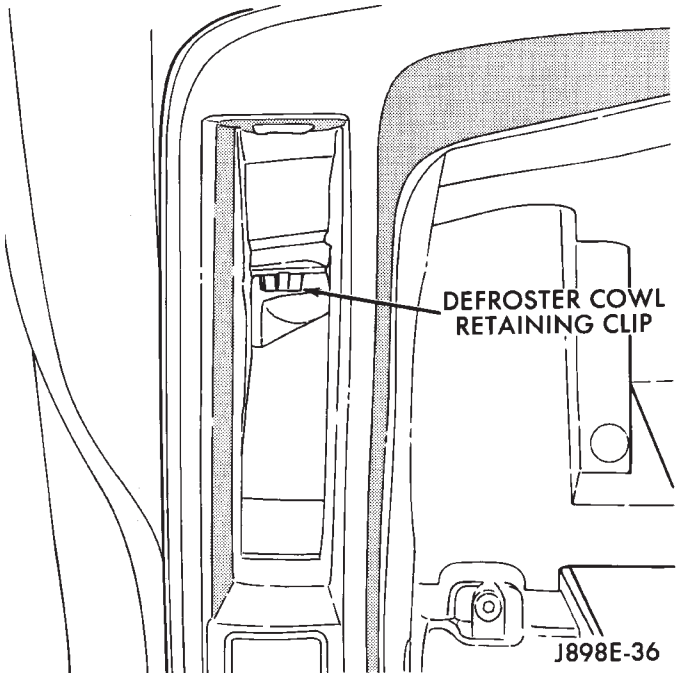


Fig. 11 Driver's Side Defroster Cowl Retaining Clip

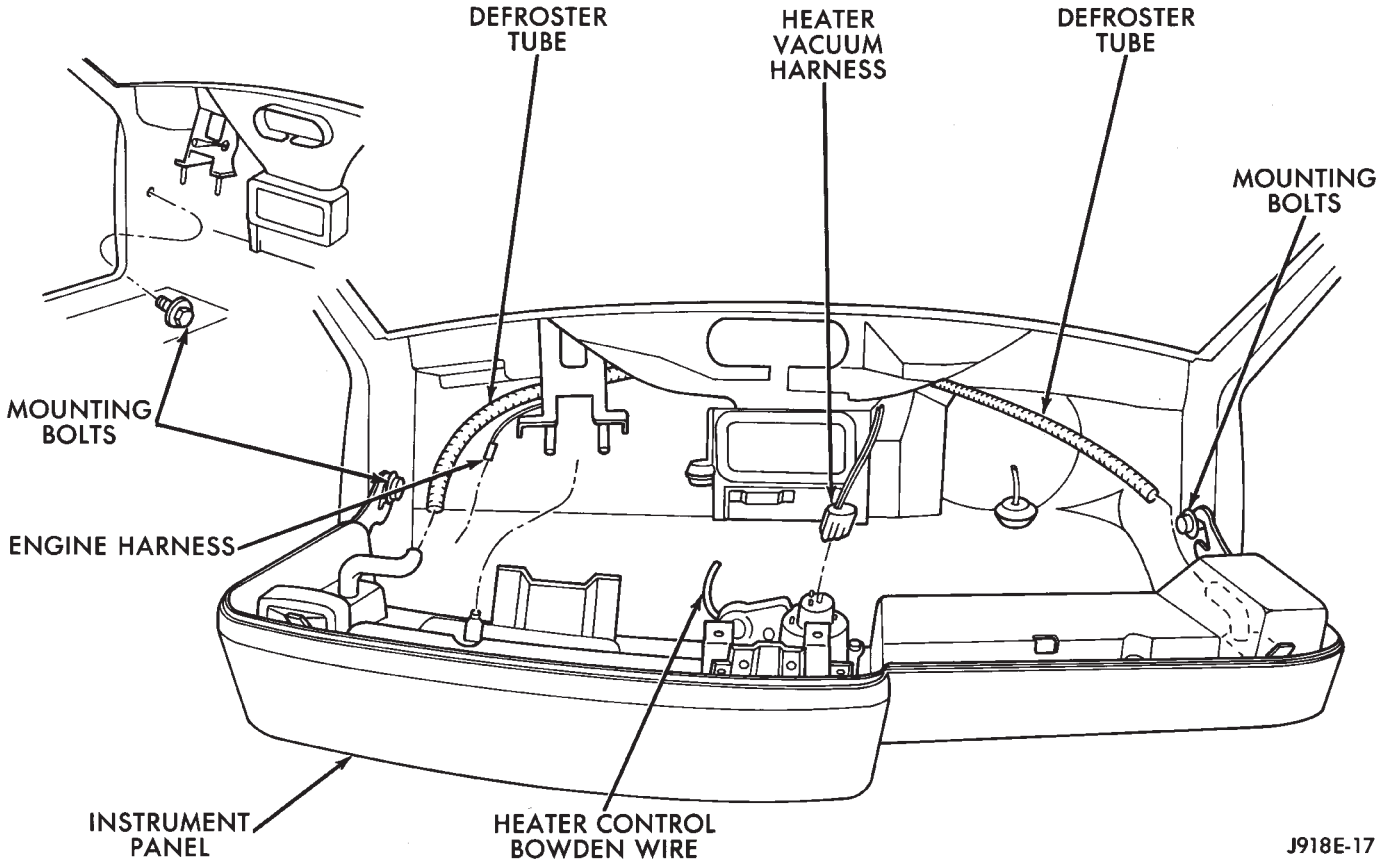
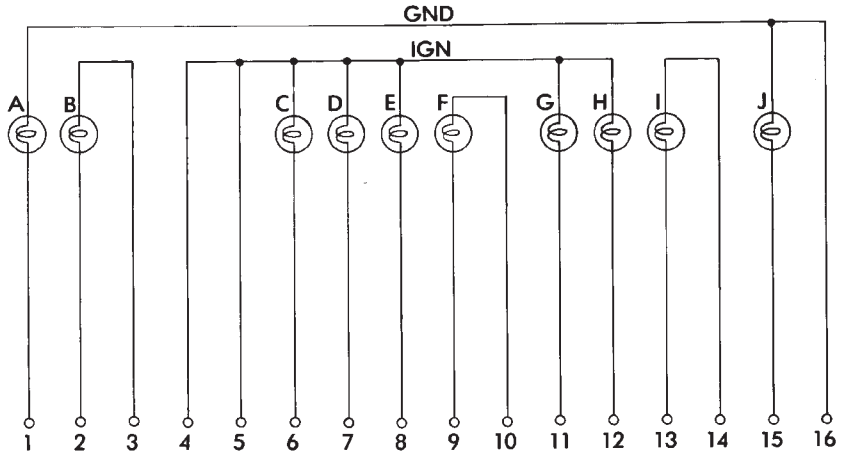
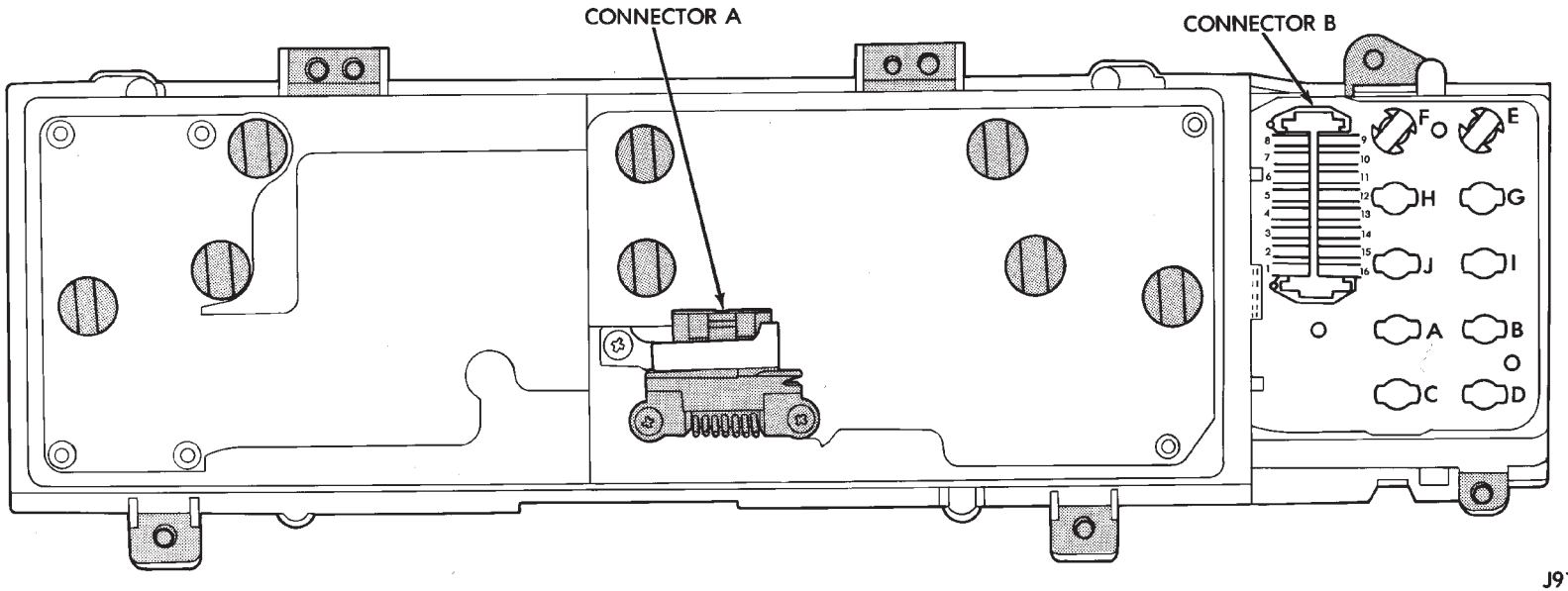


Fig. 12 Instrument Panel Installation

CONNECTOR B
INDICATORS



NO.	LAMP	TERMINAL NAME
1	A	LOW WASHER
2	B	CHECK ENGINE
3	B	IGN
4		IGN
5		IGN
6	C	CHECK ANTILOCK
7	D	UP SHIFT
8	E	BRAKE
9	F	SECURITY
10	F	BATT
11	G	FULL TIME
12	H	PART TIME
13	I	MAINT REQD
14	I	IGN
15	J	SEAT BELT
16		GND



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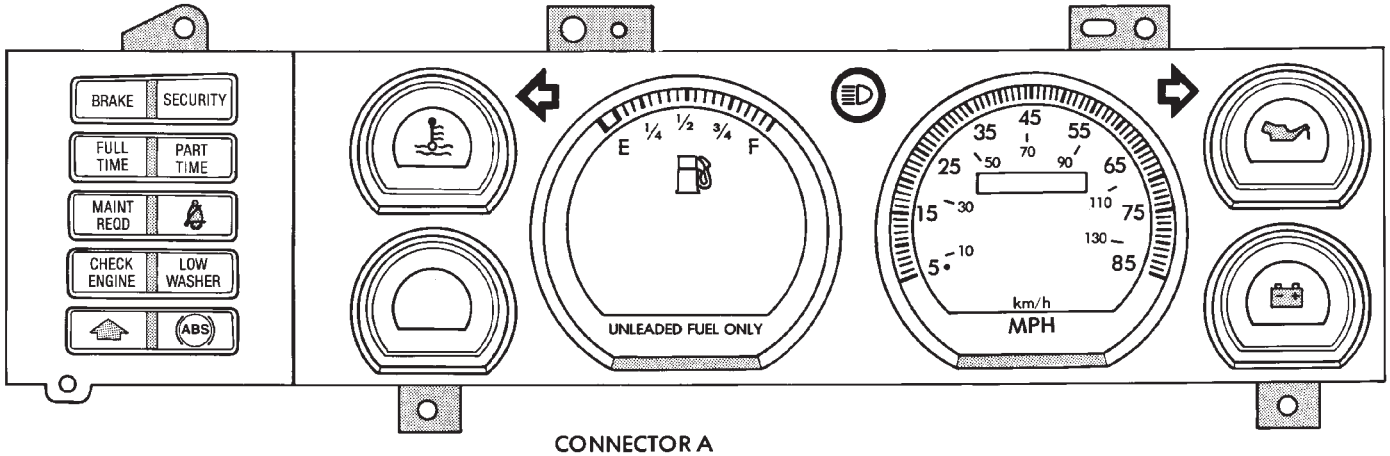
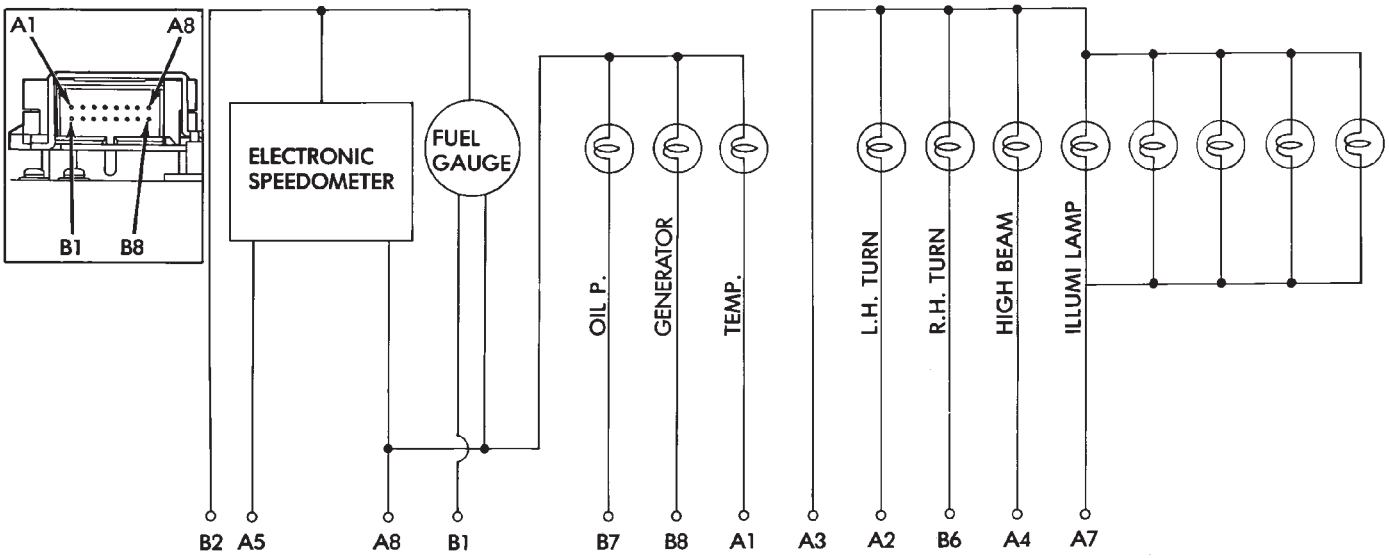
INSTRUMENT CLUSTERS

LOW LINE CLUSTER

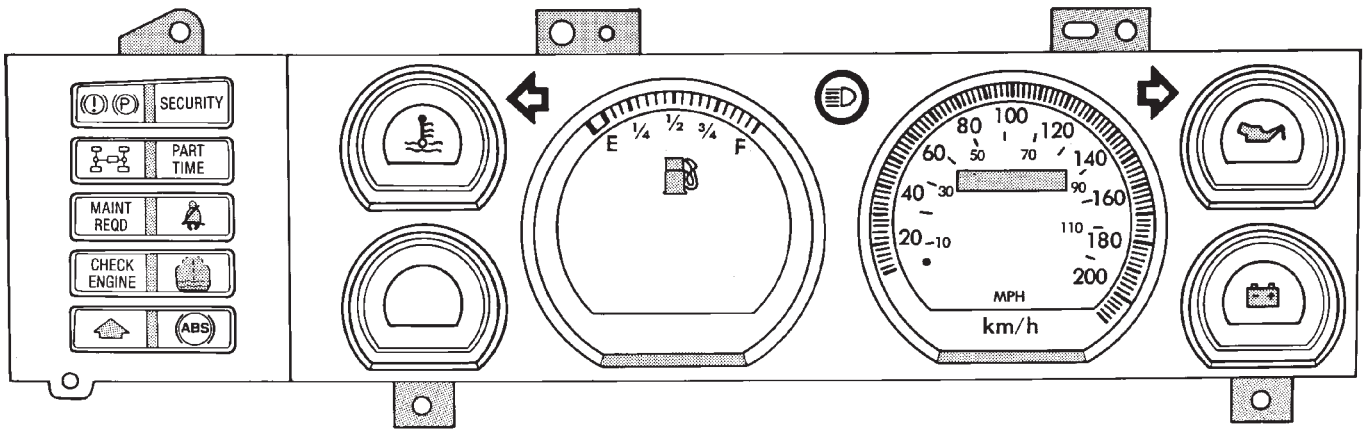
USA



CONNECTOR A



CANADA



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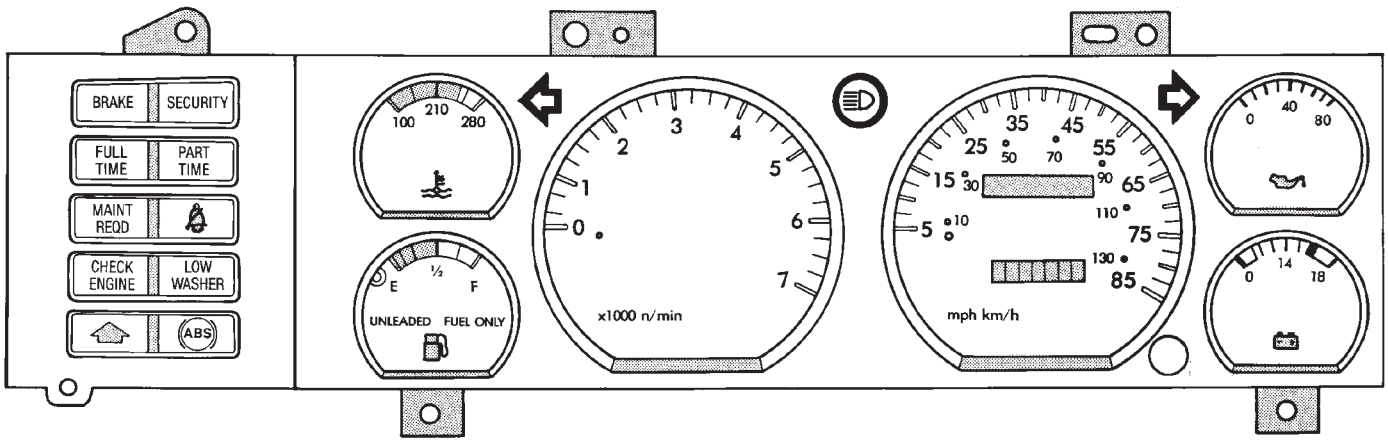
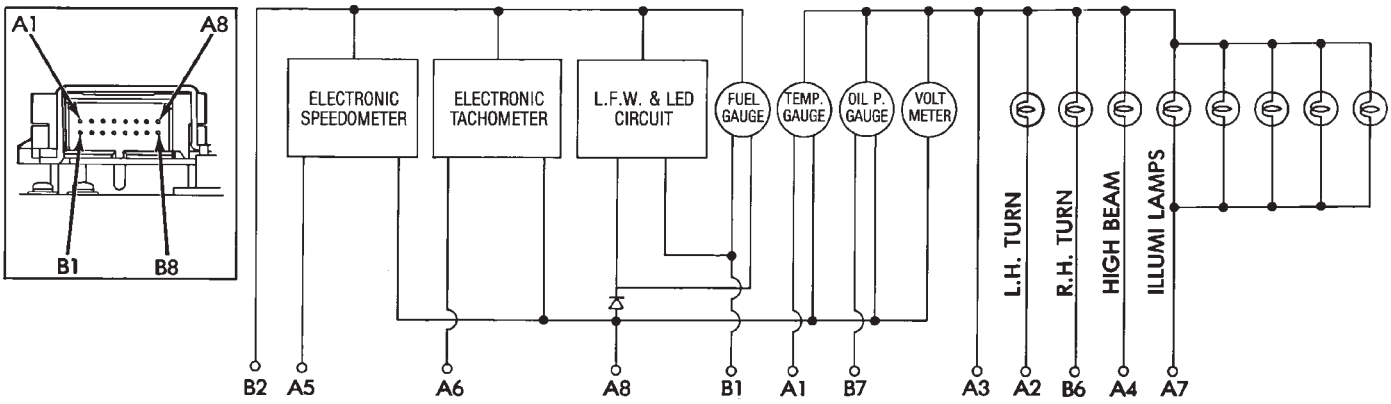
HIGH LINE CLUSTER

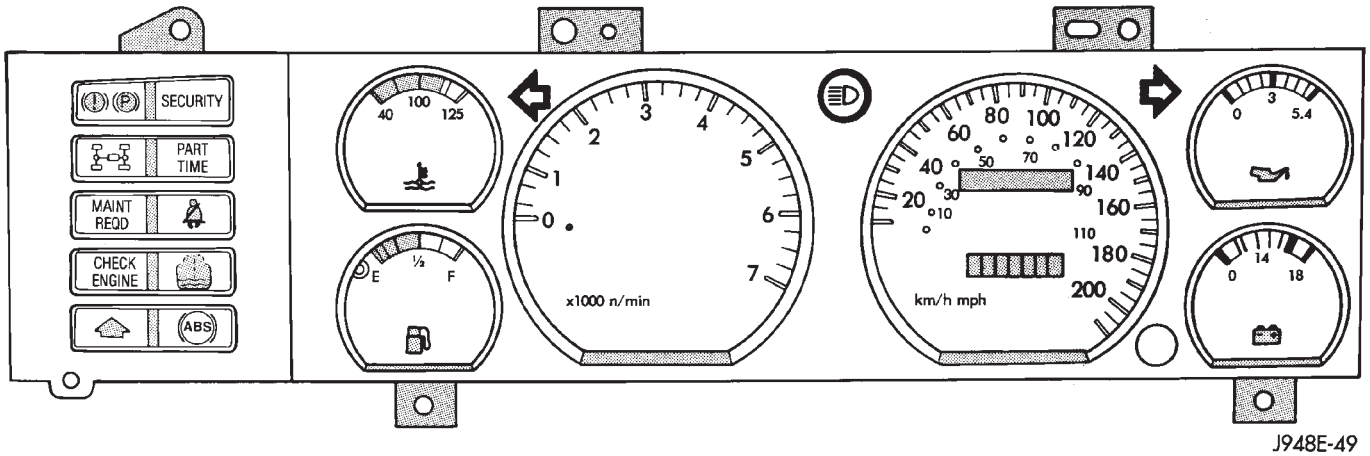
USA



CONNECTOR A



CANADA



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SPECIFICATIONS

INSTRUMENT CLUSTER GAUGES

OIL PRESSURE GAUGE CALIBRATION

POINTER POSITION	RESISTANCE
0 psi Grad. ± 2°	1 ohm
40 psi Grad. ± 3½°	46 ohms
80 psi Grad. ± 3°	87 ohms

TEMPERATURE GAUGE CALIBRATION

POINTER POSITION	RESISTANCE
100°F Grad. ± 3½°	1365 ohms
220°F Grad. ± 2½°	93.5 ohms
260°F Grad. ± 2½°	55.1 ohms

FUEL GAUGE CALIBRATION

POINTER POSITION	RESISTANCE
Empty Grad. +0° −4°	105 ohm
1/2 Full Grad. ± 3½°	33 ohms
Full Grad. + 6° −0°	5 ohms

VOLTMETER CALIBRATION

VOLTAGE INPUT	POINTER POSITION
12V	12V Grad. ±6°
16V	16V Grad. ±3°

TACHOMETER CALIBRATION

ENGINE	FREQUENCY	INDICATION
4 & 6 CYLINDER	66.7 HZ	2000 RPM ± 140
	166.7 HZ	5000 RPM ± 140

SPEEDOMETER CALIBRATION

ENGINE	FREQUENCY	INDICATION
4 & 6 CYLINDER	44.4 HZ	20 mph −1.5 +4.5
	122.2 HZ	55 mph −.3 +3.3
	166.5 HZ	75 mph −.3 +3.3

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INSTRUMENT PANEL AND GAUGES—YJE

CONTENTS

INSTRUMENT CLUSTER GENERAL INFORMATION

SPEEDOMETER/ODOMETER SYSTEM

The speedometer/odometer system consists of an electric speedometer and pushbutton reset odometer mounted in the cluster. The system also includes the wire harness from the cluster to the vehicle speed sensor at the transmission, and the adapter and pinion in the transmission. A signal is sent from a transmission mounted vehicle speed sensor to the speedometer/odometer circuitry through the wiring harness. Refer to Group 21 - Transmission for selecting the proper pinion, and selecting and indexing the proper adapter.

TACHOMETER

The tachometer displays the engine speed (RPM). With the engine running, the tachometer receives an engine speed signal from the Powertrain Control Module pin 43 (values shown in Specifications chart).

INDICATOR LAMPS

The Brake, Upshift (2.5L with 5 speed transmission except California), and Malfunction Indicator (Check Engine) lamps are located in the indicator lamp panel above the steering column. The lamps share a common battery feed connection through the ignition switch and fuse #9.

The turn signals, high beam indicator, seat belt reminder, hazard lamp, master lighting and illumination bulbs are supplied battery voltage through various switches and share a common ground.

INSTRUMENT CLUSTER DIAGNOSIS

INDEX

SPEEDOMETER

(1) Raise vehicle.

(2) Disconnect the vehicle speed sensor connector.

(3) Connect a voltmeter between the black wire pin of the connector and ground.

(4) Turn the ignition switch to the ON position.

(5) Check for approximately 5 volts. If OK, perform vehicle speed sensor test. Refer to the appropriate Powertrain Diagnostic Procedures manual. If not OK, continue with step 6.

(6) Turn ignition switch to OFF position.

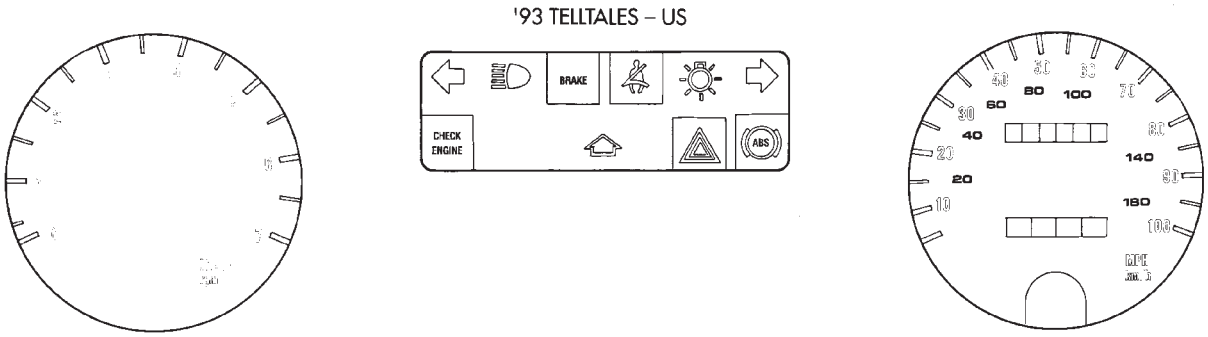
(7) Check continuity between vehicle speed sensor connector and terminal 13 of instrument cluster connector. If OK, replace speedometer. If not OK, repair open circuit.

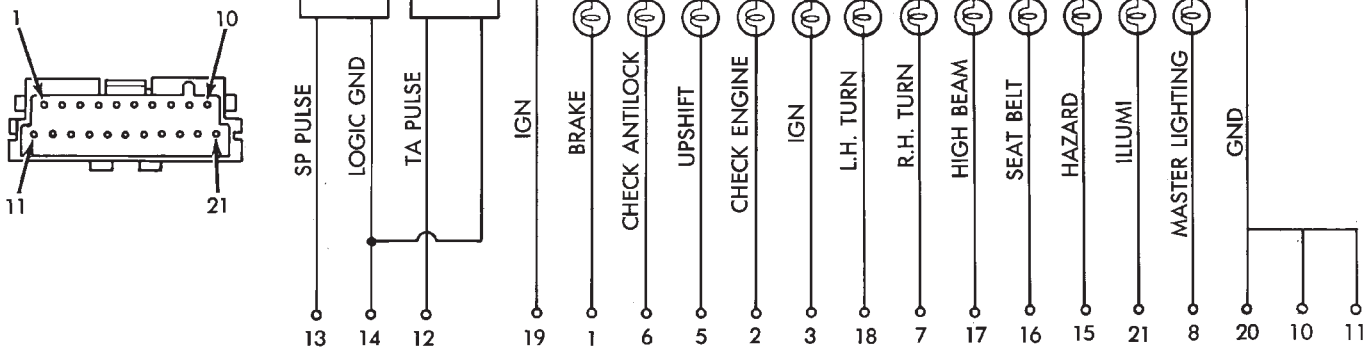
TACHOMETER

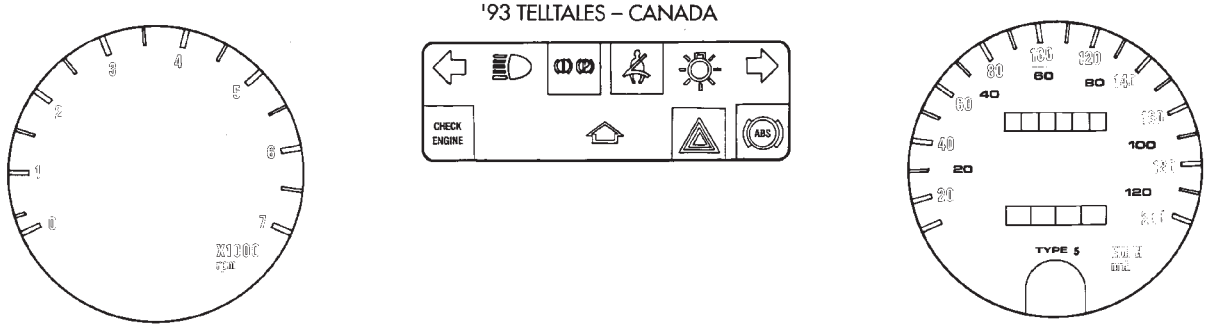
(1) Tachometer input is from the Powertrain Control Module (PCM) pin 43. Use the DRB scan tool to perform actuator test. If OK, continue with step 2. If not, replace PCM.

(2) Check for continuity between cluster connector pin 12 and PCM pin 43. If OK, replace tachometer. If not, repair open circuit.

INSTRUMENT CLUSTER







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DIAGNOSING—ALL LAMPS OUT

(1) Inspect fuse #9. Replace as required.

(2) Measure voltage at instrument cluster connector terminal 20. Meter should read zero ohms. If not, repair open to ground.

UPSHIFT INDICATOR LAMP

Vehicles equipped with manual transmissions have an optional upshift indicator lamp. The lamp is controlled by the PCM. The lamp lights to indicate when the driver should shift to the next highest gear for best fuel economy. The PCM will turn the lamp off after 3 to 5 seconds if the upshift is not performed. The lamp will remain off until the vehicle stops accelerating and is brought back to the range of lamp operation or shifted into another gear.

The indicator lamp is normally illuminated when the ignition switch is turned ON and it is turned off when the engine is started. The lamp will be lighted during engine operation according to engine speed and load.

(1) Turn ignition switch to ON.

(2) Ground pin 2 of cluster connector. Lamp should light. If not, replace bulb. If OK, continue with step 3.

(3) Turn ignition switch to OFF. Check for continuity between cluster connector pin 2 and pin 54 of the PCM. If not, repair open. If OK, refer to DRB scan tool actuator test of upshift indicator.

BRAKE INDICATOR LAMP

The brake indicator is a dual function lamp. It will indicate an unequal pressure condition in the split brake hydraulic system and it also will indicate when the parking brake is engaged. Separate switches are used for each indicator lamp function. A switch mounted on the brake pedal assembly will close a ground circuit whenever the parking brakes are applied. A second switch is installed in the brake hydraulic lines near the master cylinder. If the switch is balanced by equal pressure on both ends of the switch valve, the valve remains centered and the lamp remains off. If the valve is shifted by unequal pressure between the front or rear brake hydraulic systems, the lamp circuit is connected to ground. To make sure the brake lamp is functional before the vehicle is driven, it is illuminated through a ground circuit when the ignition switch is turned to the START position.

(1) Turn ignition switch to ON.

(2) Ground pin 1 of the cluster connector. Lamp should light. If not, replace bulb. If OK, continue with step 3.

(3) Turn ignition switch to OFF. Check for continuity to park brake switch and brake warning switch.

MALFUNCTION INDICATOR LAMP (CHECK ENGINE)

The Malfunction Indicator Lamp (Check Engine) illuminates each time the ignition switch is turned ON and stays on for 3 seconds as a bulb test.

If the PCM receives an incorrect signal or no signal from certain sensors or emission related systems the lamp is turned on (pin 32 of PCM). This is a warning that the PCM has recorded a system or sensor malfunction. In some cases when a diagnostic fault is declared the PCM will go into a limp-in mode in an attempt to keep the system operating. It signals an immediate need for service.

The lamp also can be used to display diagnostic trouble codes (DTC). Cycle the ignition switch ON, OFF, ON, OFF, ON within 5 seconds. This will allow any DTC's stored in the PCM memory to be displayed in a series of flashes representing digits.

(1) Turn ignition switch to ON.

(2) Ground pin 4 of cluster connector. Lamp should light. If not, replace bulb. If OK, continue with step 3.

(3) Turn ignition switch to OFF. Check for continuity between cluster connector pin 4 and PCM cavity 32. If OK, replace PCM. If not, repair open.

SEAT BELT REMINDER LAMP

Apply 12 volts to terminal 16 of cluster connector. Lamp should light. If not, replace bulb. If OK, check wiring for an open to buzzer module. Refer to Group 8U - Chime/Buzzer Warning Systems.

INSTRUMENT PANEL ILLUMINATION LAMPS

The instrument panel illumination lamps share two common connections. There is a splice after fuse #10 that connects the lamps to battery feed. There is also a splice that connects all lamps to ground. Because they share these common connection points in a parallel circuit, the illumination lamps will all come on at the same time. It also means one or more lamps can be out without affecting the operation of the other lamps.

On the battery side of the circuit, the headlamp switch illumination rheostat/switch and panel lamps fuse receive battery feed in series from the park/tail fuse. In the park lamp position, the headlamp switch completes the circuit from the park/tail fuse to the illumination rheostat/switch and panel lamps fuse.

The illumination rheostat contains a variable resistor that allows the driver to vary illumination intensity from off to full brightness.

DIAGNOSIS

(1) Turn parking lamps ON.

(2) Check fuse #10. Replace as required.

(3) Measure voltage at battery side of fuse #10 with rheostat turned counterclockwise to clockwise (LO to HI). Meter should read zero volts to battery voltage. If not, replace headlamp switch.

(4) Measure resistance at ground side of fuse #10 with parking lamps OFF. Meter should read almost zero ohms (except bulb filament). If not, repair open to ground. If zero ohms, 12 volt supply wire from fuse is shorted to ground, repair short.

INSTRUMENT CLUSTER SERVICE PROCEDURES

INDEX

INSTRUMENT CLUSTER REPLACEMENT

(1) Remove 6 shroud screws (Fig. 1).

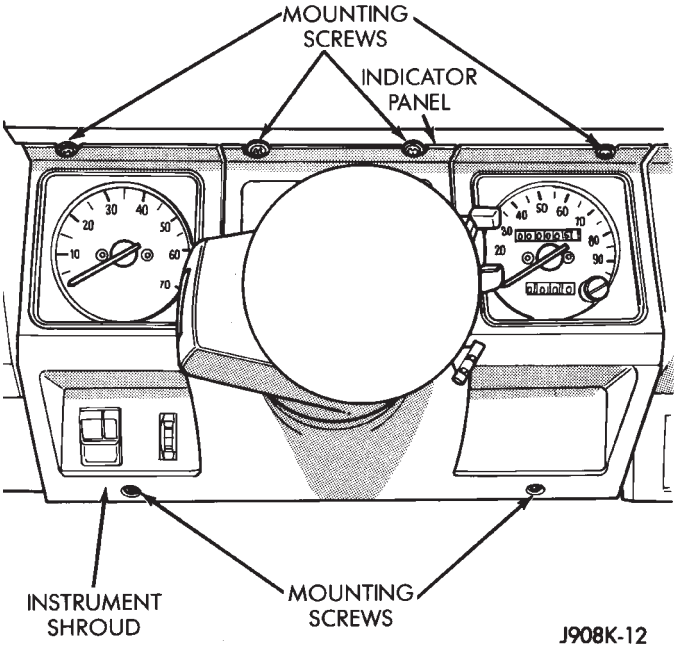

Fig. 1 Instrument Shroud Removal/Installation

(2) Slide shroud toward steering wheel.

(3) Remove 3 screws holding right side switch panel (Fig. 2).

(4) Remove 3 screws holding left side switch bezel.

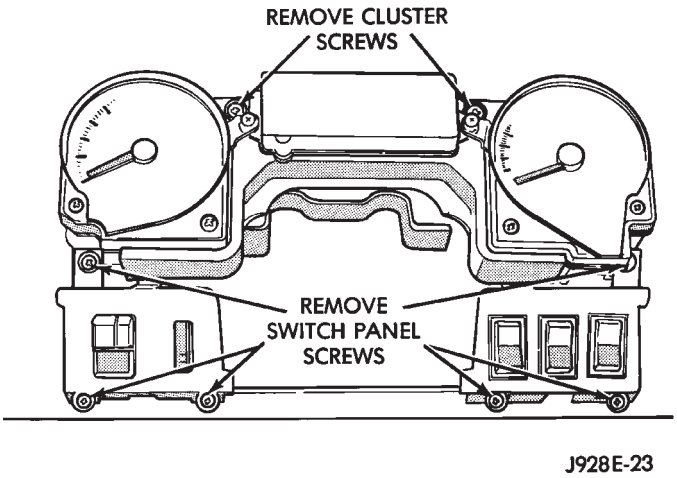

Fig. 2 Cluster Removal

(5) Remove 2 screws holding cluster in place.

(6) Lift up top of cluster. Roll cluster out between steering column and instrument panel far enough to reach connector located behind tachometer.

(7) Disconnect cluster connector and remove cluster (Fig. 3).

(8) To install cluster, reverse the removal procedures.

TACHOMETER REPLACEMENT

(1) Disconnect negative cable from battery.

(2) Remove instrumentation shroud (Fig. 1). Refer to Instrument Cluster Replacement.

(3) Remove cluster as described in Instrument Cluster replacement.

(4) Remove 3 screws and tachometer lens (Fig. 4).

(5) Gently pry up clip to release lens from bezel (Fig. 5).

(6) Remove 3 screws from rear of housing (Fig. 6). Remove tachometer.

(7) Install tachometer with 3 screws.

(8) Snap lens into place.

(9) Install lens with 3 screws.

(10) To install the cluster, reverse the removal procedures.

SPEEDOMETER REPLACEMENT

(1) Disconnect negative cable from battery.

(2) Remove instrument shroud (Fig. 1). Refer to Instrument Cluster Replacement.

(3) Remove cluster as described in Instrument Cluster Replacement.

(4) Remove 3 screws and speedometer lens (Fig. 7).

(5) Gently pry up clip to release lens from bezel (Fig. 5).

(6) Remove 3 screws from rear of housing (Fig. 8). Remove speedometer.

(7) Install speedometer with 3 screws.

(8) Snap lens into place.

(9) Install lens with 3 screws.

(10) To install the cluster, reverse the removal procedures.

INDICATOR BEZEL REPLACEMENT

(1) Disconnect negative cable from battery.

(2) Remove instrumentation shroud (Fig. 1).

(3) Remove 3 screws and tachometer lens (Fig. 4).

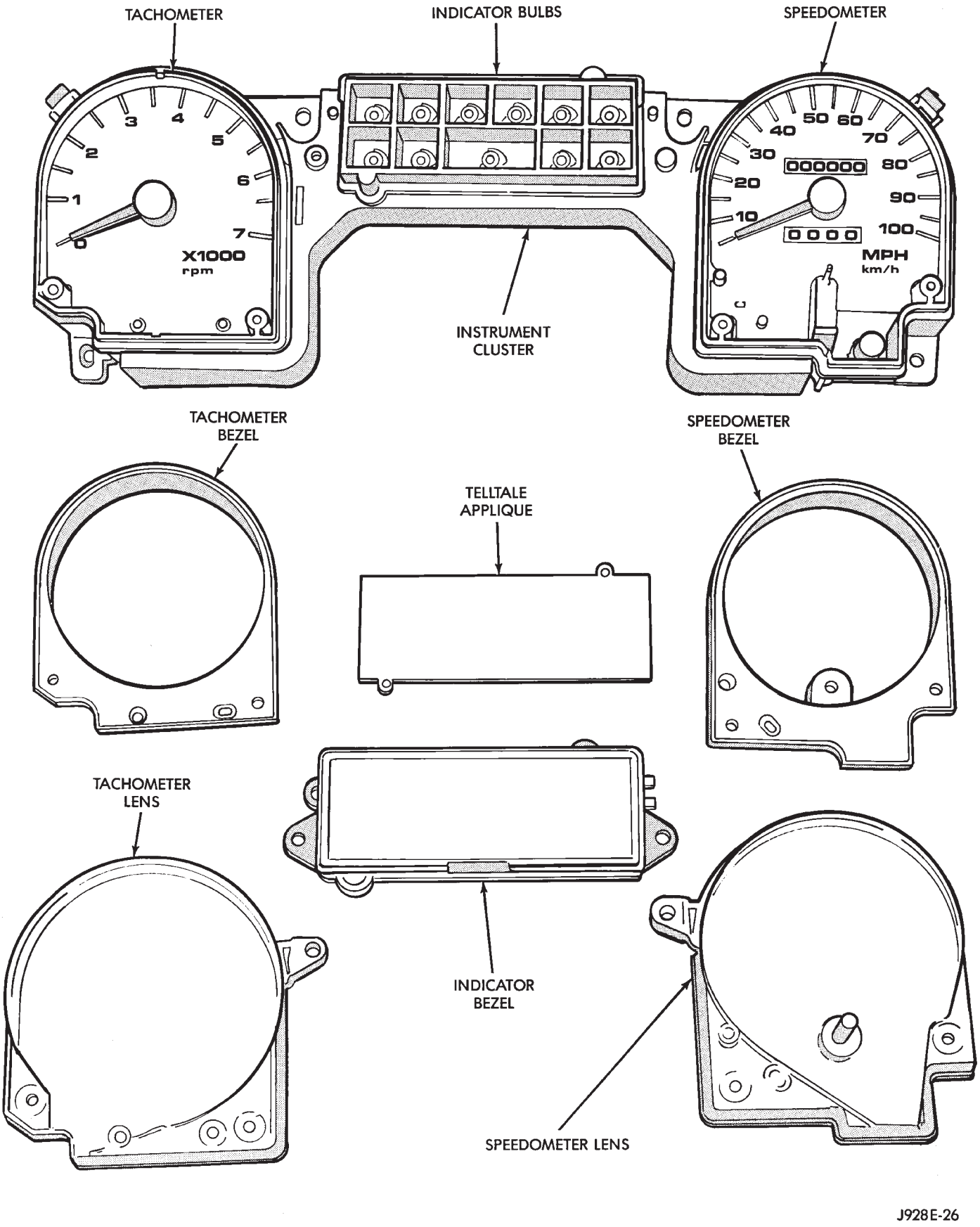

Fig. 3 Instrument Cluster

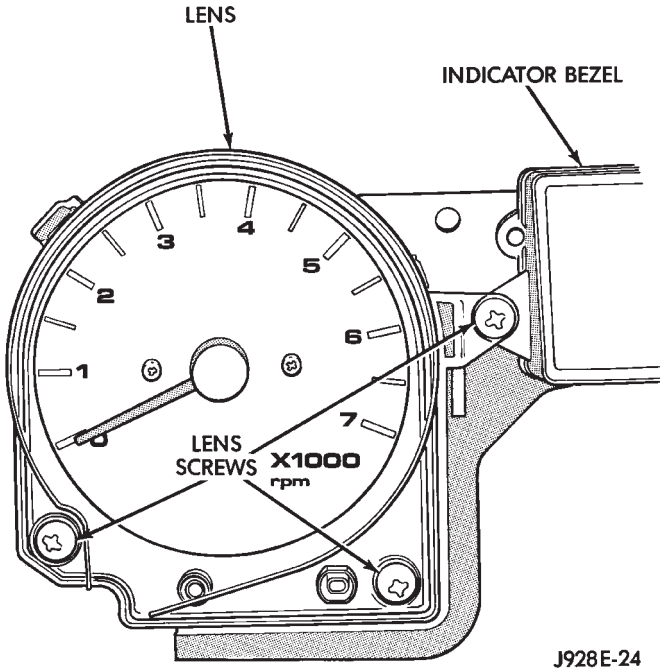

Fig. 4 Tachometer Lens

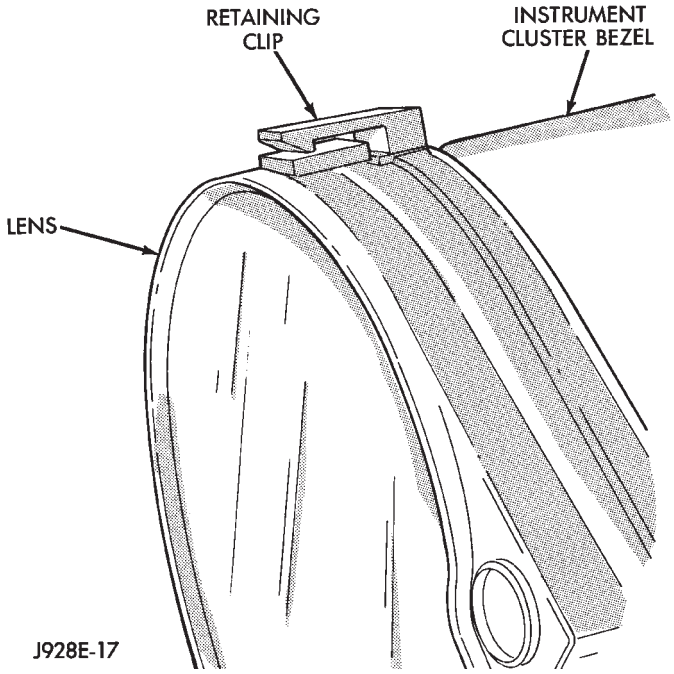

Fig. 5 Cluster Lens Retaining Clip

(4) Gently pry up clip to release lens from bezel (Fig. 5).

(5) Remove 3 screws and speedometer lens (Fig. 7).

(6) Gently pry up clip to release lens from bezel (Fig. 5).

(7) Remove indicator bezel (Fig. 3).

(8) Lift indicator panel off locating pins.

(9) Reverse removal procedures to install new panel and bezel.

(10) Install speedometer and tachometer lenses.

(11) Install shroud.

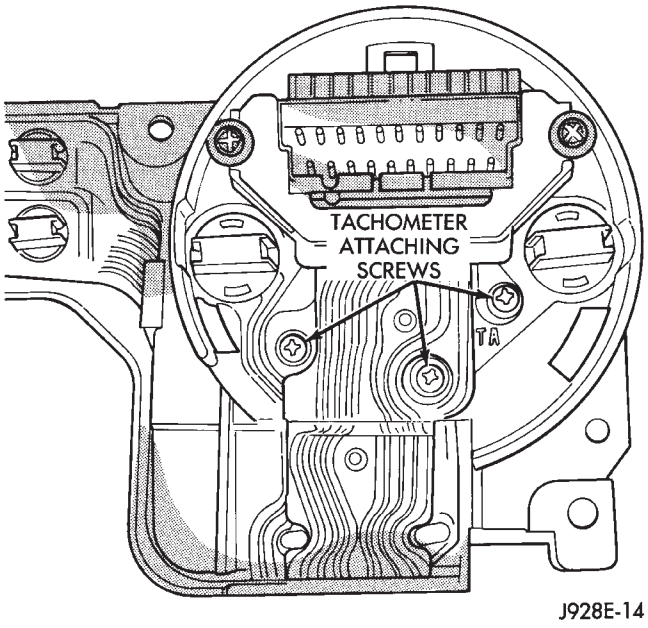

Fig. 6 Tachometer Removal/Installation

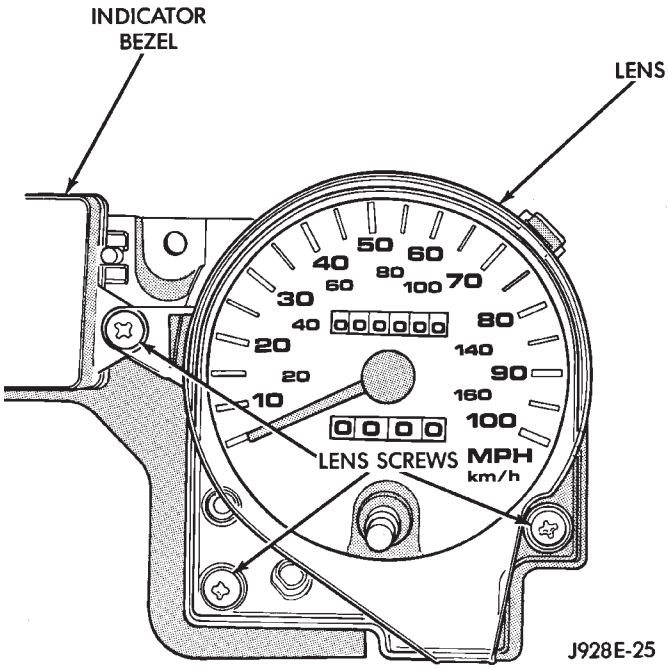

Fig. 7 Speedometer Lens

(12) Install negative cable to battery.

INSTRUMENT CLUSTER BULB REPLACEMENT

Refer to Printed Circuit Replacement for bulb replacement.

PRINTED CIRCUIT REPLACEMENT

Remove cluster as described in cluster replacement.

DISASSEMBLY

(1) Remove all attaching screws for speedometer and tachometer (Fig. 9).

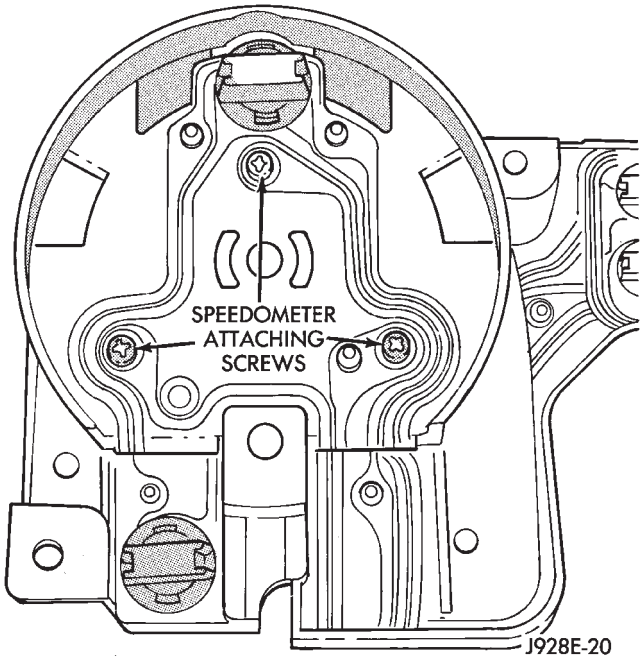

Fig. 8 Speedometer Removal/Installation

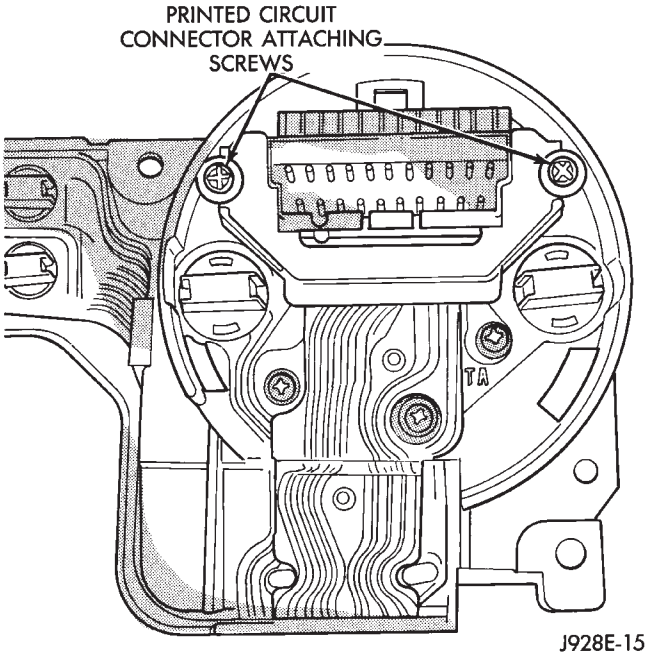

Fig. 10 Printed Circuit Connector Attaching Screws

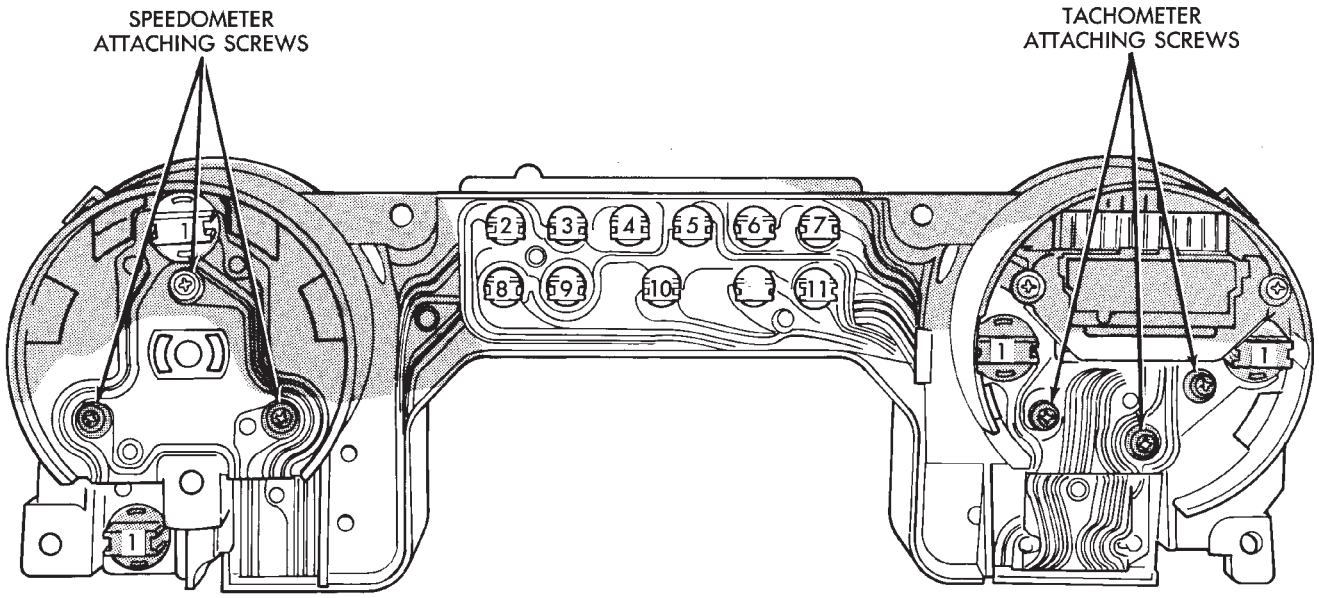

Fig. 9 Printed Circuit Removal/Installation

(2) Remove 2 screws holding cluster connector retaining plate to housing (Fig. 10).

(3) To remove plate, slide it toward bottom of housing (Fig. 11).

(4) Remove lamp sockets from circuit board.

(5) Remove printed circuit including connector.

ASSEMBLY

(1) Position printed circuit, including connector, on the back of instrument panel cluster.

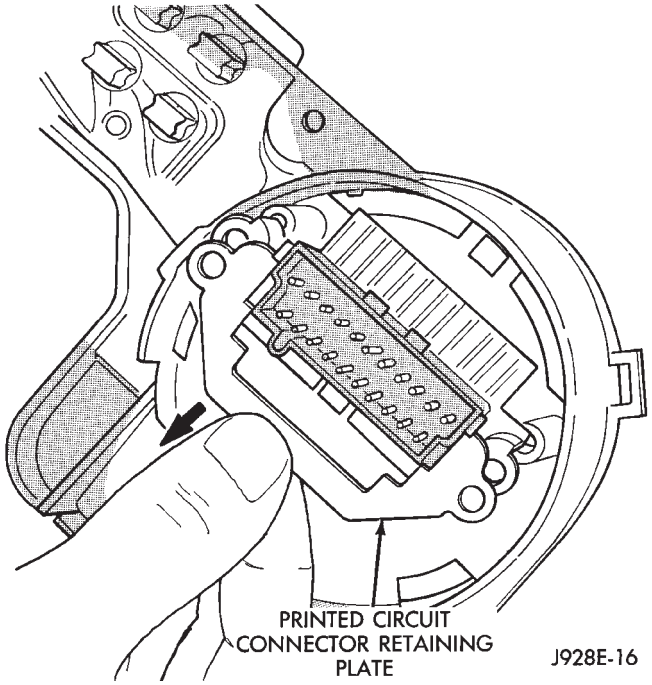

Fig. 11 Cluster Connector Retaining Strap

(2) Remove gauge bezel and lens.
(3) Hold components in place and install screws.
(4) Install lamp sockets.
(5) Pivot connector up and install retaining plate.
(6) Install gauge bezel and cluster lens.

HEADLAMP SWITCH/ILLUMINATION RHEOSTAT

(1) Disconnect negative cable from battery.
(2) Remove instrument cluster shroud (Fig. 1).
(3) Remove 3 screws holding switch bezel (Fig. 12).
(4) Remove 2 screws from the appropriate switch to be replaced (Fig. 13).
(5) Remove the switch connector.
(6) Reverse the removal procedures for installation.

REAR DEFOGGER/FOG LAMP/REAR WIPER SWITCHES

(1) Disconnect negative cable from battery.
(2) Remove instrument cluster shroud (Fig. 1).
(3) Remove 3 screws holding switch bezel (Fig. 14).
(4) Remove the switch connector.
(5) Release tabs holding switch and remove switch.
(6) Reverse the removal procedures for installation.

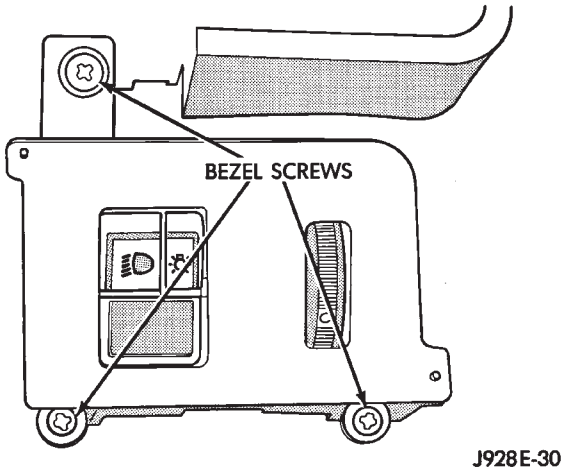

Fig. 12 Left Hand Instrument Panel Switch Bezel.

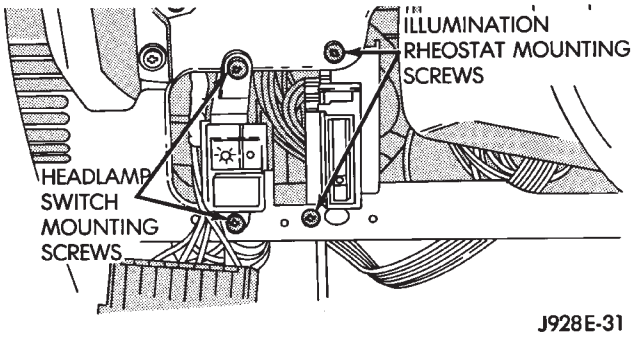

Fig. 13 Headlamp Switch/Illumination Rheostat

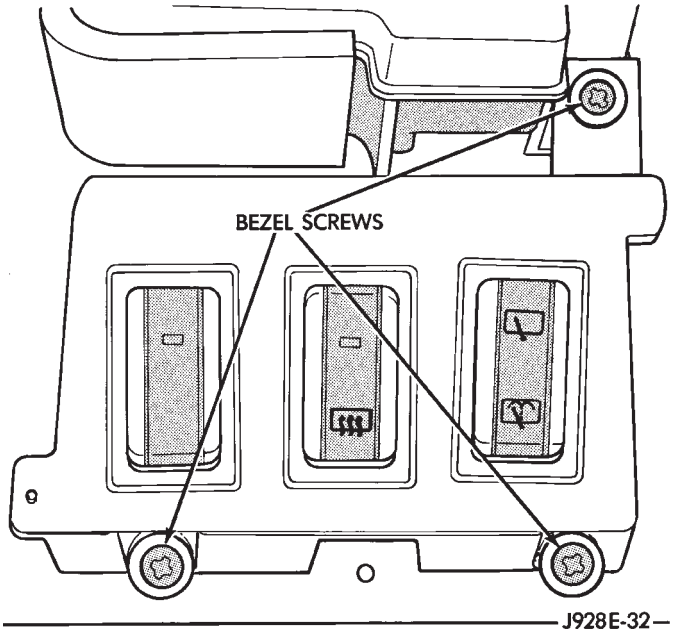

Fig. 14 Right Hand Instrument Panel Switch Bezel

GAUGE PACKAGE GENERAL INFORMATION

The gauge package contains 4 gauges and the 4 wheel drive indicator. The gauges have a common battery feed from fuse #9 and ignition switch. Although they have separate power sources, the 4 gauges share a common ground connection.

The voltmeter indicates electrical system voltage. When the engine is not running, the voltage registered is from the battery. After the engine is started, charging system voltage is indicated. In the gauge package, the voltmeter forms a parallel connection across the battery feed and ground.

The remaining gauges - oil pressure, fuel and coolant temperature - are connected to individual sender units. Variable resistors in the senders will change the amount of current allowed to flow through the gauge coils. As current flow through the coils varies, the position of the indicator needle also will vary.

The 4 gauges are connected to battery feed, ground and the sender units through a printed circuit mounted on the back of the gauge housing.

GAUGE PACKAGE DIAGNOSIS

ALL GAUGES INOPERATIVE (Fig. 15)

(1) Check the fuse #9. Replace as required.

(2) Turn ignition switch to ON and measure voltage at battery side of fuse #9. Meter should read battery voltage. If not, repair open from ignition switch.

(3) Unplug gauge package connector from gauge package.

(4) Turn ignition switch to OFF and measure resistance from instrument cluster connector terminals 1 and 13 to a clean chassis ground. Meter should read zero ohms. If not, repair open to ground.

(5) Turn ignition switch to ON and measure voltage at instrument cluster connector terminals 2 and 12. Meter should read battery voltage. If not, repair open from fuse panel.

ONE GAUGE INOPERATIVE

Does not apply to voltmeter.

OIL PRESSURE SENDER

(1) Turn ignition switch to ON.

(2) Unplug oil pressure sender connector from oil pressure sender.

(3) Touch connector to engine block (ground). Gauge should read at low end of scale.

(4) When connector is NOT touching ground (open circuit) gauge should read at high end of scale. If OK replace sender. If not, proceed with step 5.

(5) Check circuit between sender and gauge for an open. Repair as required. If wiring is OK, replace gauge.

COOLANT TEMPERATURE SENDER

(1) Turn ignition switch to ON.

(2) Unplug coolant temperature sender connector from coolant temperature sender.

(3) Touch connector to engine block (ground). Gauge should read at high end of scale.

(4) When connector is NOT touching ground (open circuit) gauge should read at low end of scale. If OK replace sender. If not, proceed with step 5.

(5) Check circuit between sender and gauge for an open. Repair as required. If wiring is OK, replace gauge.

FUEL GAUGE SENDER

(1) Turn ignition switch to ON.

(2) Separate fuel gauge sender connector from fuel gauge sender near tank.

(3) Ground the center wire of the body harness side of the connector. The gauge should read at low end of scale. If OK, check sending unit (step 4). If not, check circuit between connector and gauge. Repair as required. If circuit is OK, replace gauge.

(4) Turn ignition switch to OFF.

(5) Measure resistance from fuel gauge sender connector center terminal to a clean chassis ground. Meter readings should correspond to those shown in Specifications. If not OK, replace sender. If OK, repair open from fuel gauge sender connector to ground.

PRINTED CIRCUIT

(1) Turn ignition switch to ON.

(2) Unplug gauge package connector from gauge package.

(3) Measure resistance from gauge package terminal 12 (fuel and coolant temperature gauge) or from terminal 2 (voltmeter and oil pressure gauge) to gauge battery terminal. Meter should read zero ohms. If not, replace/repair printed circuit.

(4) Measure resistance from gauge package terminal 13 (fuel and coolant temperature gauge) or from terminal 1 (voltmeter and oil pressure gauge) to gauge ground terminal. Meter should read zero ohms. If not, replace/repair printed circuit. If zero ohms, replace gauge.

GAUGE CALIBRATION VALUES

Use the charts in Specifications. The calibration of the gauge can be checked. If the indicator needle is not in the correct position, replace the gauge.

4WD INDICATOR

The four-wheel drive indicator lamp circuit is completed by the Command-Trac switch located below the battery.

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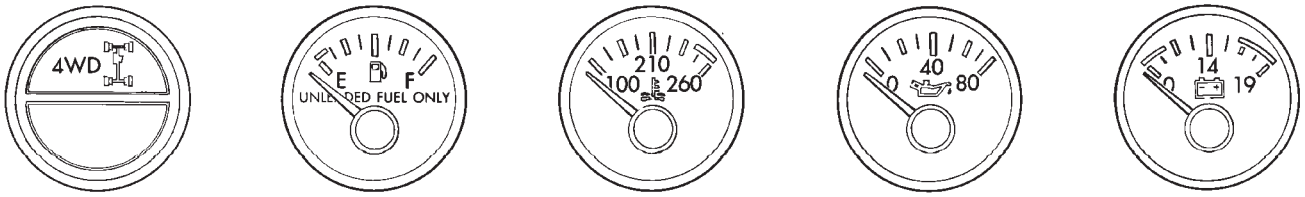

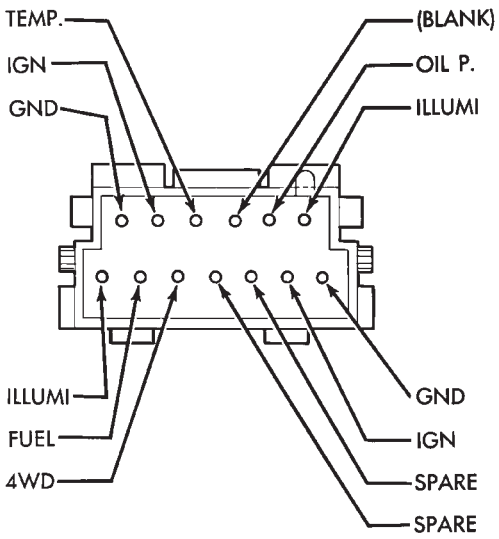

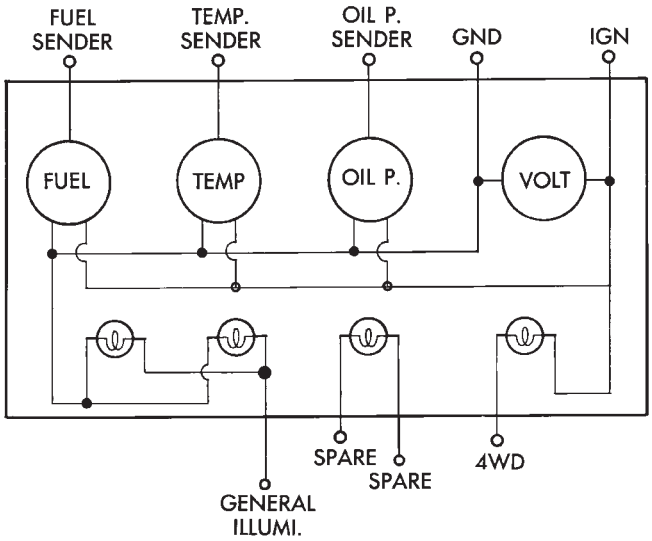

CANADA

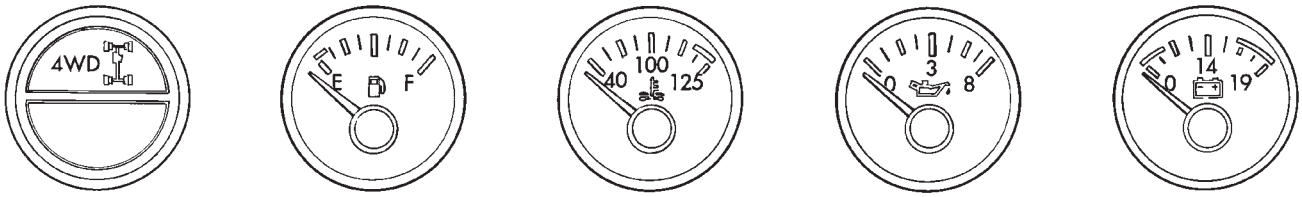

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Fig. 15 Gauge Package Wiring Schematic—YJ

GAUGE PACKAGE SERVICE PROCEDURES

PRINTED CIRCUIT REMOVAL

DISASSEMBLY

(1) Remove all gauge attaching screws (Fig. 16).

(2) Remove screw holding the cluster connector retaining plate to the housing (Fig. 16).

(3) To remove the plate, slide it toward the bottom of the housing (Fig. 17).

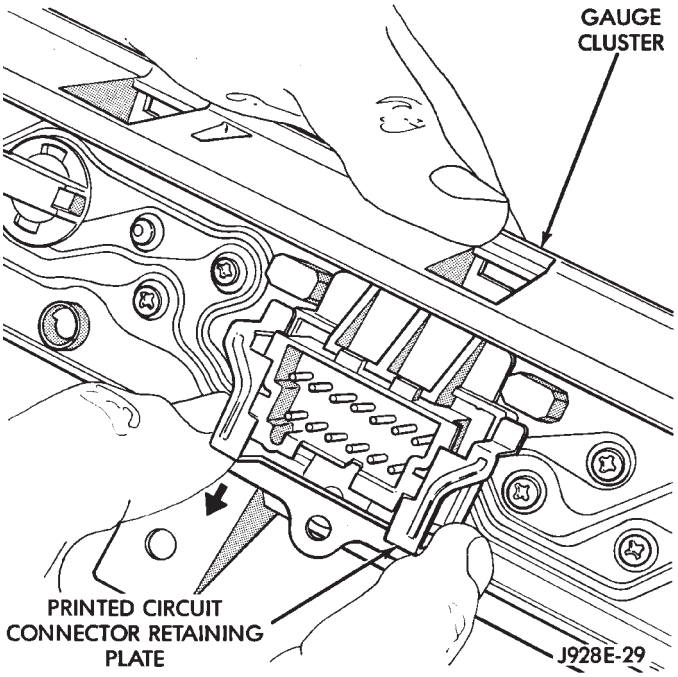

Fig. 17 Cluster Connector Retaining Plate

(4) Remove the lamp sockets from the circuit board.

(5) Remove the printed circuit including the connector.

ASSEMBLY

(1) Position the printed circuit, including connector, on the back of the instrument panel cluster.

(2) Remove gauge bezel and lens.

(3) Hold the components in place and install the screws.

(4) Install the lamp sockets.

(5) Pivot connector up and install retaining plate.

(6) Install gauge bezel and cluster lens.

GAUGE CLUSTER REPLACEMENT

(1) Remove 6 bezel screws (Fig. 18).

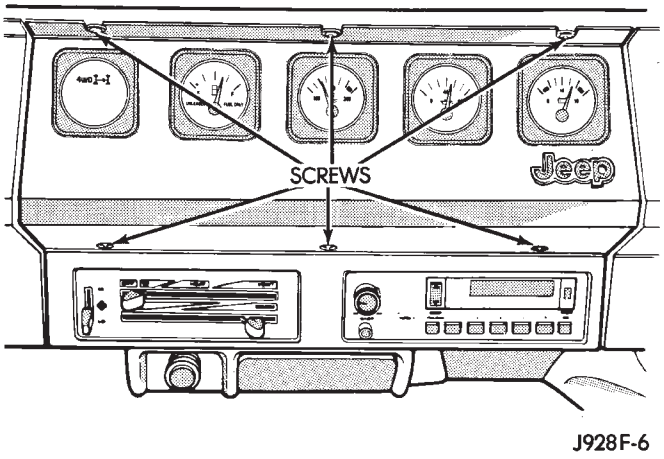

Fig. 18 Gauge Cluster Bezel Removal/Installation

(2) Remove 6 gauge housing mounting screws (Fig. 19).

(3) Unplug the connector from cluster.

(4) To install, reverse the removal procedure.

GAUGE PACKAGE GAUGE REPLACEMENT

This procedure is to be performed with the gauge cluster removed.

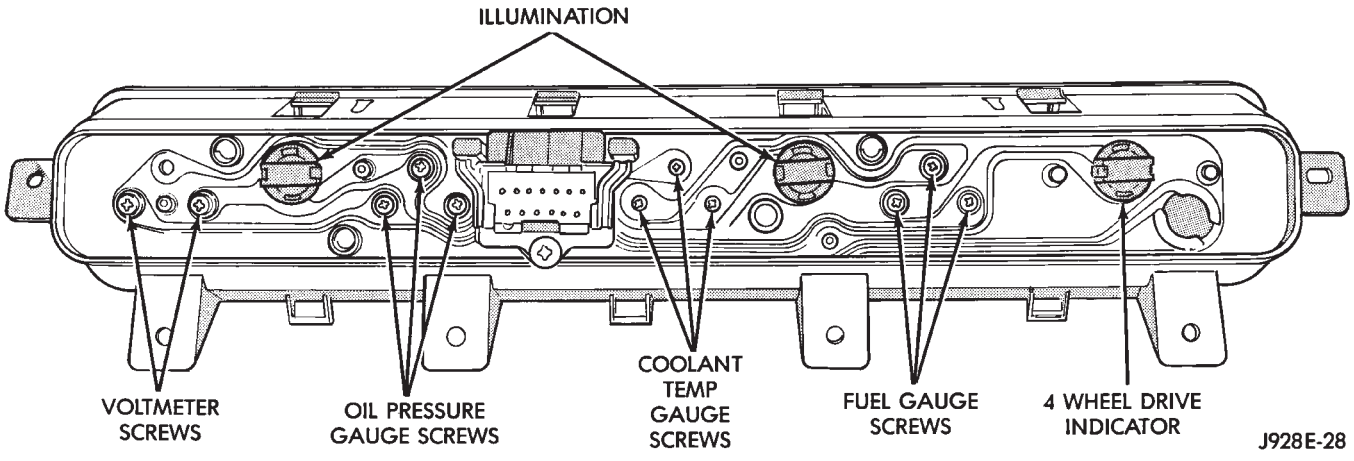

Fig. 16 Gauge Package Printed Circuit Removal/Installation

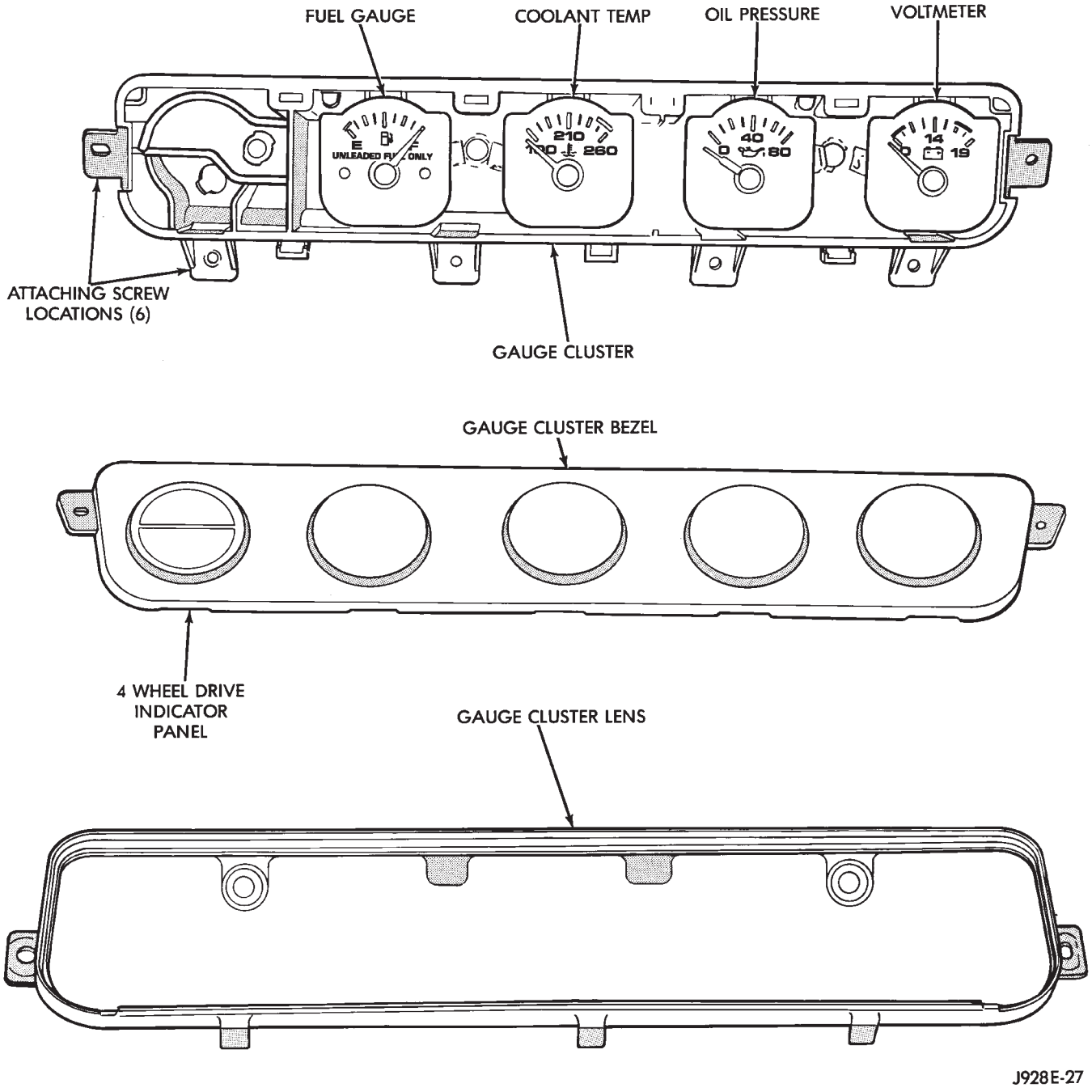

Fig. 19 Gauge Cluster Exploded View

(1) Remove 2 screws from lens.
(2) Remove lens by tilting off of lower hooks (Fig. 20).
(3) Remove bezel.
(4) Remove screws holding appropriate gauge.
(5) To install, insert gauge into housing.
(6) Install screws as required.
(7) Install bezel.
(8) Install lens.

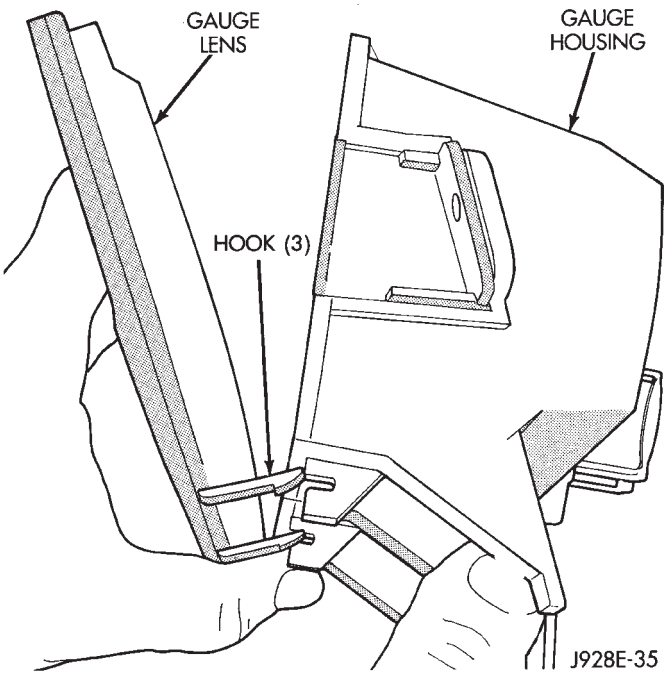

Fig. 20 Gauge Package Lens Removal

SPECIFICATIONS

INSTRUMENT PANEL GAUGES

OIL PRESSURE GAUGE CALIBRATION

POINTER POSITION	RESISTANCE
0 psi Grad. ± 3°	1 ohm
40 psi Grad. ± 3.6°	47 ohms
80 psi Grad. ± 3.6°	89 ohms

FUEL GAUGE CALIBRATION

POINTER POSITION	RESISTANCE
Empty Grad. +0° −5°	1 ohm
1/2 Full Grad. ± 3.6°	44 ohms
Full Grad. − 0° +6°	88 ohms

TEMPERATURE GAUGE CALIBRATION

POINTER POSITION	RESISTANCE
100°F Grad. ± 3.5°	1365 ohms
210°F Grad. ± 2.5°	115 ohms
240°F Grad. ± 2.5°	55.1 ohms

VOLTMETER CALIBRATION

POINTER POSITION	VOLTAGE INPUT
12V Grad. ± 6°	12V ± 0.02V
16V Grad. ± 3°	16V ± 0.02V

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INSTRUMENT CLUSTER GAUGES

SPEEDOMETER CALIBRATION

ENGINE	FREQUENCY	INDICATION
4 & 6 CYLINDER	44.4 HZ	20 mph +0 −1.5
	122.2 HZ	55 mph +3.3 −0.3
	166.7 HZ	75 mph +3.3 −0.3
	55.2 HZ	40 km/h +6 −0
	110.4 HZ	80 km/h +8 −0
	165.6 HZ	120 km/h +10 −0

TACHOMETER CALIBRATION

ENGINE	FREQUENCY	INDICATION
4 & 6 CYLINDER	33.3 HZ	1000 RPM ±150
	100 HZ	3000 RPM ±250
	200 HZ	6000 RPM ±250

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