Instrument Cluster and Panel Illumination

The instrument cluster (10849) and panel lighting system is powered through the headlamp switch and the panel dimmer switch. The instrument cluster illumination is controlled by the output of the panel dimmer switch. The instrument panel lighting circuit provides illumination for the:

- Climate control panel.
- Instrument cluster.
- Instrument panel ash receptacle (04810).
- Radio chassis (18806).
- Steering wheel control switch(es).
- Rear window defrost (heated backlite) switch.
- Window regulator control switch.
- Power door lock switch.
- Headlamp switch.
- Wiper/washer switch, rear window.
- 4WD mode/ride control (5.0L AWD) switch.
- Message center.
- Fog lamp switch.
- Overhead console.
- Liftgate wiper/washer switch.

Instrument Cluster and Panel Illumination

Refer to Wiring Diagrams Cell 71 , Instrument Illumination for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Inspection and Verification

1. Verify the customer concern by operating the headlamp switch (11654). To duplicate the condition, place the headlamp switch in the PARK position and rotate the panel dimmer switch fully up without turning on the courtesy lamps.

2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged headlamp switch. • Damaged panel dimmer switch.	▪ Blown fuse(s). ▪ Blown bulb(s). ▪ Loose or corroded connections. ▪ Damaged wiring harness.

3. If the fault is not visually evident, verify the symptom and proceed to Symptom Chart.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• The Control Illumination is Inoperative	• Circuitry. • Panel dimmer switch.	• GO to Pinpoint Test A .
• The Instrument Cluster Illumination is Inoperative	• Circuitry. • Illumination bulbs. • Instrument	• GO to Pinpoint Test B .

	cluster printed circuit (10K843).	
• The Climate Control Illumination is Inoperative	• Circuitry. • Illumination bulbs.	• GO to Pinpoint Test C .
• The Climate Control Illumination Is Inoperative — One Bulb	• Illumination bulb. • EATC module.	• CHECK the inoperative illumination bulb. If OK, REPLACE the EATC module. TEST the system for normal operation.
• The Audio System Illumination is Inoperative	• Circuitry. • Illumination bulbs.	• GO to Pinpoint Test D .
• A Single Illumination Source is Inoperative	• Circuitry. • Illumination bulbs.	• GO to Pinpoint Test E .
• A Single Illumination Source Is Inoperative — Steering Wheel Controls	• Circuitry. • Air bag sliding contact (14A664). • Steering wheel control switch (es). • Steering wheel control switch harness.	• GO to Pinpoint Test F .

Pinpoint Tests

PINPOINT TEST A: THE CONTROL ILLUMINATION IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK PARKING LAMPS OPERATION	
1  2	2 Turn the headlamp switch to the parking lamps ON position.

GK0182-A

- **Do the parking lamps operate properly?**

→ **Yes**
TURN the headlamp switch to the OFF position. GO to A2 .

→ **No**
REFER to Section 417-01 .

A2 CHECK PANEL DIMMER SWITCH INPUT VOLTAGE — CIRCUIT 14 (BR)

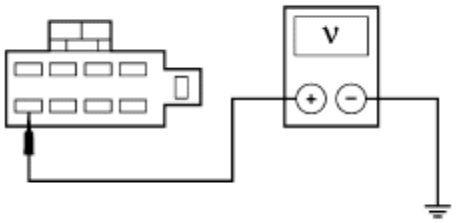
1

Panel Dimmer Switch C219

2 Turn the headlamp switch to the parking lamps ON position.

3

3 Measure the voltage between panel dimmer switch C219-5, circuit 14 (BR), and ground.



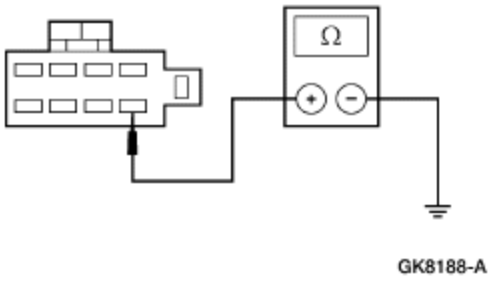
GK8187-A

- **Is the voltage greater than 10 volts?**

→ **Yes**
TURN the headlamp switch to the OFF position. GO to A3 .

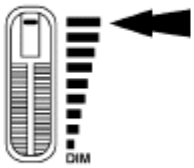
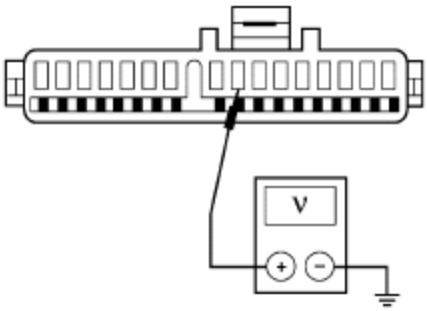
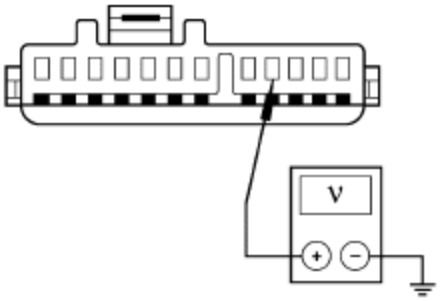
→ **No**
REPAIR circuit 14 (BR). TEST the system for normal operation.

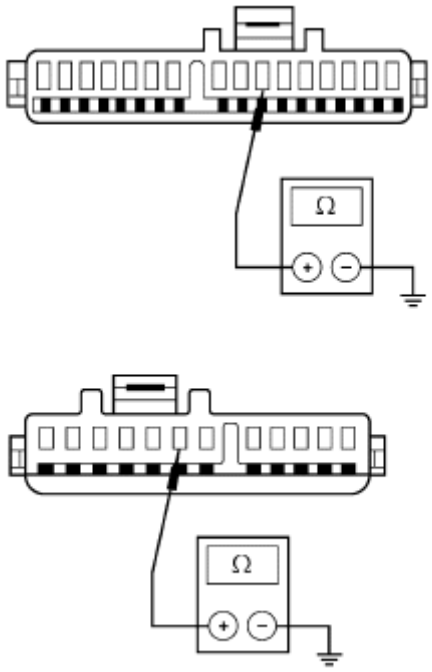
A3 CHECK PANEL DIMMER SWITCH GROUND — CIRCUIT 57 (BK)

1  GK8188-A	1 Measure the resistance between panel dimmer switch C219-8, circuit 57 (BK), and ground. • **Is the resistance less than 5 ohms?** → **Yes** REPLACE the panel dimmer switch. TEST the system for normal operation. → **No** REPAIR circuit 57 (BK). TEST the system for normal operation.

PINPOINT TEST B: THE INSTRUMENT CLUSTER ILLUMINATION IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 TEST THE PANEL DIMMER SWITCH	
1 	
2  Instrument Cluster	
3  GK0182-A	3 Turn the headlamp switch to the parking lamps ON position.
4	4 Rotate the panel dimmer switch to the full

	illumination position.
 GK0112-A	
5   GK4044-A	5 Measure the voltage between instrument cluster C287-4, circuit 235 (R/BK), and ground; and between instrument cluster C286-8, circuit 235 (R/BK), and ground.
	• **Are the voltages greater than 10 volts?** → **Yes** TURN the headlamp switch to the OFF position.GO to B2 . → **No** REPAIR the circuit in question. TEST the system for normal operation.
B2 CHECK THE CONTINUITY OF CIRCUIT 57 (BK)	
1	1 Measure the resistance between instrument cluster C287-7, circuit 57 (BK), and ground; and between instrument cluster C286-7, circuit 57 (BK), and ground.



GK4046-A

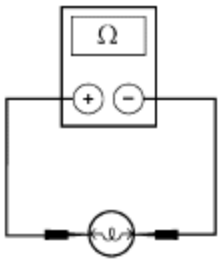
- **Are the resistances less than 5 ohms?**

→ **Yes**
GO to B3 .

→ **No**
REPAIR circuit 57 (BK). TEST the system for normal operation.

B3 CHECK THE ILLUMINATION LAMPS

1



GK4131-A

1 Measure for continuity between the terminals of the instrument cluster illumination lamps.

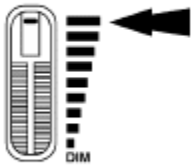
- **Does continuity exist?**

→ **Yes**
REPLACE the instrument cluster printed circuit. TEST the system for normal operation.

→ **No**

	REPLACE the lamps. TEST the system for normal operation.

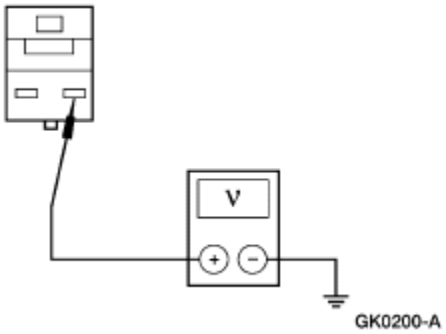
PINPOINT TEST C: THE CLIMATE CONTROL ILLUMINATION IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 VERIFY THE CLIMATE CONTROL ILLUMINATION	
1  GK0182-A	1 Place the headlamp switch in the PARK position.
2  GK0112-A	2 Rotate the panel dimmer switch to the full illumination position. • **Do the electronic automatic temperature control (EATC), front climate control, and/or rear integrated climate control (RICP) illuminations operate properly?** → **Yes** System is OK. → **No** If the front climate control illumination does not operate properly, GO to C2. If the RICP climate control does not operate properly, GO to C4. If the EATC illumination does not operate properly, GO to C7.
C2 CHECK FOR VOLTAGE ON CIRCUIT 235 (R/BK)	
1	

2

A/C Control C276

3



3 Measure the voltage between A/C control C276, circuit 235 (R/BK), and ground.

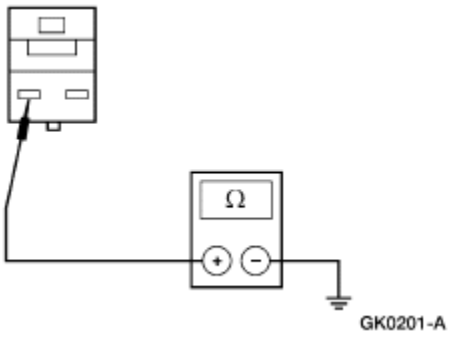
- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to C3 .

→ **No**
REPAIR circuit 235 (R/BK). TEST the system for normal operation.

C3 CHECK THE GROUND

1

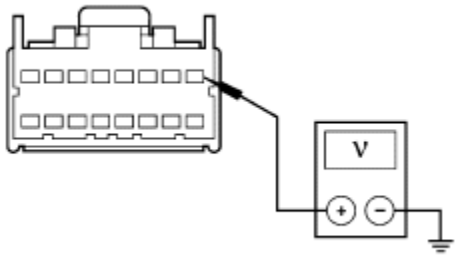
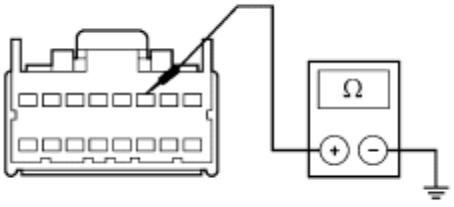


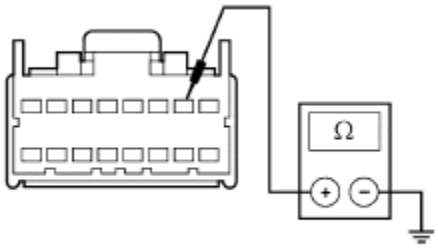
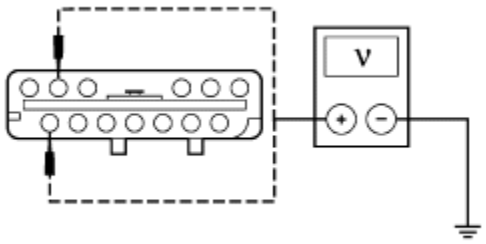
1 Measure the resistance between A/C control C276, circuit 57 (BK), and ground.

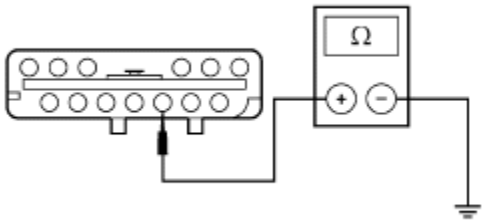
- **Is the resistance less than 5 ohms?**

→ **Yes**
INSPECT the A/C control illumination bulbs. REPLACE as necessary. TEST the system for normal operation.

→ **No**

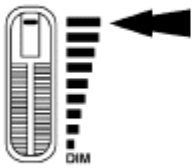
	REPAIR circuit 57 (BK). TEST the system for normal operation.
C4 CHECK FOR VOLTAGE ON CIRCUIT 235 (R/BK)	
1  2  RICP C2003 3  GK3108-A	3 Measure the voltage between RICP C2003-8, circuit 235 (R/BK), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to C5 . → **No** REPAIR circuit 235 (R/BK). TEST the system for normal operation.
C5 CHECK THE CONTINUITY OF CIRCUIT 694 (BK/LG)	
1  GK3109-A	1 Measure the resistance between RICP C2003-6, circuit 694 (BK/LG), and ground. • **Is the resistance less than 5 ohms?** → **Yes**

	GO to C6 . → **No** REPAIR circuit 694 (BK/LG). TEST the system for normal operation.
C6 CHECK CONTINUITY OF CIRCUIT 57 (BK)	
1  GK3110-A	1 Measure the resistance between RICP C2003-7, circuit 57 (BK), and ground. • **Is the resistance less than 5 ohms?** → **Yes** INSPECT the RICP assembly miniature bulbs. REPLACE as necessary. TEST the system for normal operation. → **No** REPAIR circuit 57 (BK). TEST the system for normal operation.
C7 CHECK VOLTAGE TO THE EATC ILLUMINATION	
1  EATC 2  GK8189-A	2 Measure the voltage between EATC C298-14, circuit 235 (R/BK), and ground; and between EATC C297-19, circuit 19 (LB/R), and ground. • **Are the voltages greater than 10 volts?** → **Yes**

	GO to C8 . → **No** REPAIR the circuit in question. TEST the system for normal operation.
C8 CHECK EATC GROUND	
1  GK8190-A	1 Measure the resistance between EATC C297-3, circuit 57 (BK), and ground. • **Is the resistance less than 5 ohms?** → **Yes** CHECK the EATC illumination lamp(s). REPLACE if necessary. If OK, REPLACE the EATC; REFER to Section 412-04 . TEST the system for normal operation. → **No** REPAIR circuit 57 (BK). TEST the system for normal operation.

PINPOINT TEST D: THE AUDIO SYSTEM ILLUMINATION IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
D1 VERIFY THE AUDIO CONTROL ILLUMINATION	
NOTE: If equipped with T100iDM, the radio chassis will only illuminate the controls available for the mode selected.	
1  GK0182-A	1 Place the headlamp switch in the PARK position.
2	2 Rotate the panel dimmer switch to the full



GK0112-A

illumination position.

- **Do the rear integrated control panel (RICP) and radio chassis (18806) illuminate?**

→ **Yes**
System is OK.

→ **No**
If the RICP does not illuminate, GO to Pinpoint Test C .

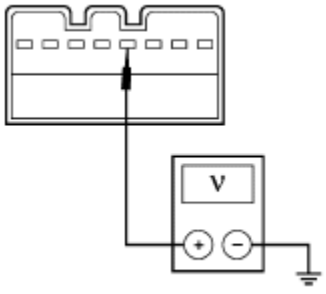
If the radio chassis does not illuminate, GO to D2 .

D2 CHECK FOR VOLTAGE ON CIRCUIT 235 (R/BK)

1

Radio Chassis

2

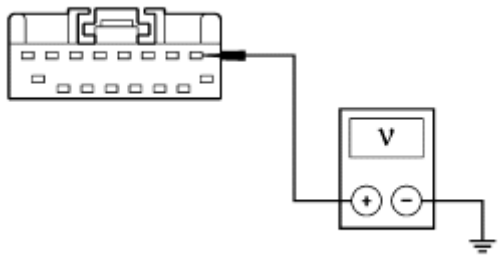


GK3111-A

2 Measure the voltage between radio chassis C228-5, circuit 235 (R/BK), and ground (M100LLCD).

3

3 Measure the voltage between radio chassis C256-1, circuit 235 (R/BK), and ground (all others).



GK7269-A

- **Is the voltage greater than 10 volts?**

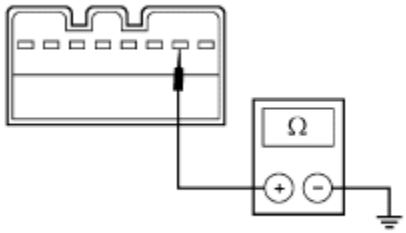
→ **Yes**
GO to D3 .

→ **No**
REPAIR circuit 235 (R/BK). TEST the system for normal operation.

D3 CHECK THE CONTINUITY OF CIRCUIT 57 (BK)

1

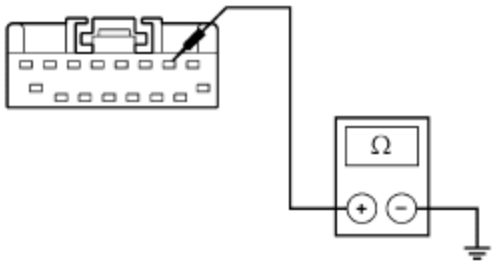
2



GK3112-A

2 Measure the resistance between radio chassis C228-7, circuit 57 (BK), and ground (M100LLCD).

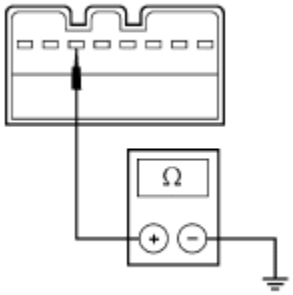
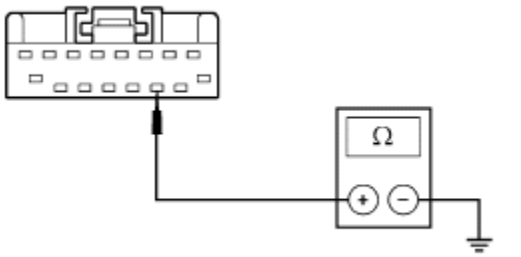
3



GK7270-A

3 Measure the resistance between radio chassis C256-2, circuit 57 (BK), and ground (all others).

- **Is the resistance less than 5 ohms?**

	→ **Yes** GO to D4 . → **No** REPAIR circuit 57 (BK). TEST the system for normal operation.
D4 CHECK CONTINUITY OF CIRCUIT 694 (BK/LG)	
1  	1 Measure the resistance between radio chassis C228-3, circuit 694 (BK/LG), and ground (M100LLCD).
2  	2 Measure the resistance between radio chassis C256-11, circuit 694 (BK/LG), and ground (all others). • **Is the resistance less than 5 ohms?** → **Yes** REMOVE the radio chassis and SEND it to an authorized Ford Audio Service Center for repair. After repair, TEST the system for normal operation. → **No** REPAIR circuit 694 (BK/LG). TEST the system for normal operation.

PINPOINT TEST E: A SINGLE ILLUMINATION SOURCE IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
E1 CHECK VOLTAGE TO THE INOPERATIVE ILLUMINATION SOURCE	
1	

2

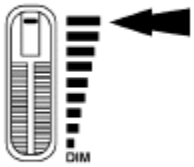
Inoperative Illumination Source

3

GK0182-A

3 Place the headlamp switch in the PARK position.

4



GK0112-A

4 Rotate the panel dimmer switch to the full illumination position.

5 Measure the voltage between inoperative illumination source and ground as follows.

Inoperative Illumination Source	Connector/Pin	Circuit
4WD Mode/Ride Control Switch	C279-4	235 (R/BK)
Ash Receptacle	C208	235 (R/BK)
LF Window Regulator Control/Door Lock Switch (4-Door)	C501-5 and C501-12	235 (R/BK)
RF Window Regulator Control Switch	C615-3	235 (R/BK)

LR Window Regulator Control Switch	C702-3	235 (R/BK)
RR Window Regulator Control Switch	C802-3	235 (R/BK)
RH Door Lock Switch	C614-3	235 (R/BK)
LF Window Regulator Control Switch (2-Door)	C515-7 and C515-14	235 (R/BK)
LF Door Lock Switch	C514-3	235 (R/BK)
Headlamp Switch	C216-9	235 (R/BK)
Heated Backlite Switch	C248-5	235 (R/BK)
Compass/Outside Air Temperature Module	C902-4	19 (LB/R)
Message Center	C2008-2	19 (LB/R)
Message Center Switch	C2007-6	235 (R/BK)
Fog Lamp Switch	C268-5	235 (R/BK)
Liftgate Wiper/Washer Switch	C249-6	235 (R/BK)

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to E2 .

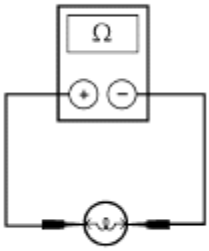
→ **No**
REPAIR the circuit in question. TEST the system for normal operation.

E2 CHECK GROUND TO INOPERATIVE ILLUMINATION SOURCE

1 Measure the resistance between the inoperative illumination source, circuit 57 (BK), and ground.

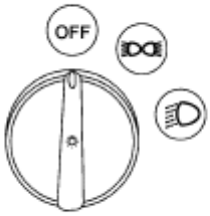
- **Is the resistance less than 5 ohms?**

→ **Yes**
If the inoperative illumination source has replaceable bulbs, GO to E3 . Otherwise, REPLACE the inoperative illumination source.

	TEST the system for normal operation. → **No** REPAIR circuit 57 (BK). TEST the system for normal operation.
E3 CHECK THE SINGLE ILLUMINATION SOURCE BULB	
1  Single Illumination Source Bulb 2  GK3487-A	2 Measure for continuity between the terminals of the single illumination source bulb. • **Does continuity exist?** → **Yes** REPLACE the single illumination source in question. TEST the system for normal operation. → **No** REPLACE the single illumination source bulb in question. TEST the system for normal operation.

PINPOINT TEST F: A SINGLE ILLUMINATION SOURCE IS INOPERATIVE — STEERING WHEEL CONTROL SWITCHES

CONDITIONS	DETAILS/RESULTS/ACTIONS
F1 CHECK VOLTAGE TO THE AIR BAG SLIDING CONTACT CONNECTOR	
1	1 Place the headlamp switch in the OFF position.



GK0183-A

2

Air Bag Sliding Contact C220

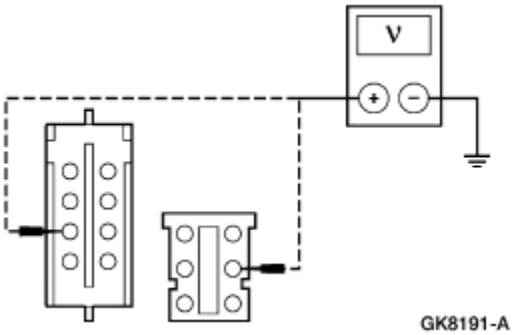
3

3 Place the headlamp switch in the PARK position.

GK0182-A

4

4 Measure the voltage between air bag sliding contact C220-3, circuit 235 (R/BK), and ground.



GK8191-A

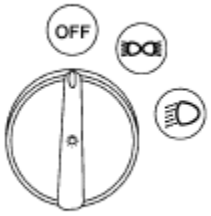
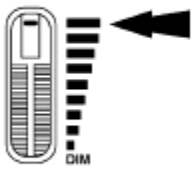
- **Is the voltage greater than 10 volts?**

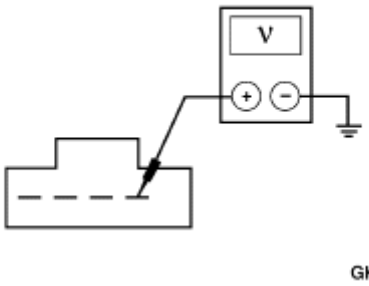
→ **Yes**
RECONNECT air bag sliding contact C220.
GO to F2 .

→ **No**
REPAIR circuit 235 (R/BK). TEST the system for normal operation.

F2 CHECK AIR BAG SLIDING CONTACT FOR VOLTAGE

1 Deactivate the air bag system. Refer to

	Section 501-20B .
2  GK0183-A	2 Place the headlamp switch in the OFF position.
3  Speed Control Actuator Switch	
4  GK0182-A	4 Place the headlamp switch in the PARK position.
5  GK0112-A	5 Rotate the panel dimmer switch to the full illumination position.
6	6 Measure the voltage between speed control actuator switch terminal 4 and ground.



- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to F3 .

→ **No**
REPLACE the air bag sliding contact. TEST the system for normal operation.

F3 CHECK STEERING WHEEL CONTROL SWITCH HARNESS

1 Inspect the steering wheel control switch harness for shorts, opens or any damage.

- **Is the steering wheel control switch harness OK?**

→ **Yes**
REPLACE the steering wheel control switch (es). TEST the system for normal operation.

→ **No**
REPLACE the steering wheel control switch harness. TEST the system for normal operation.

Bulb —Instrument Cluster

Removal and Installation

For additional information, refer to Section 413-01 .

Bulb —Climate Control

Removal and Installation

For additional information, refer to Section 412-04 .

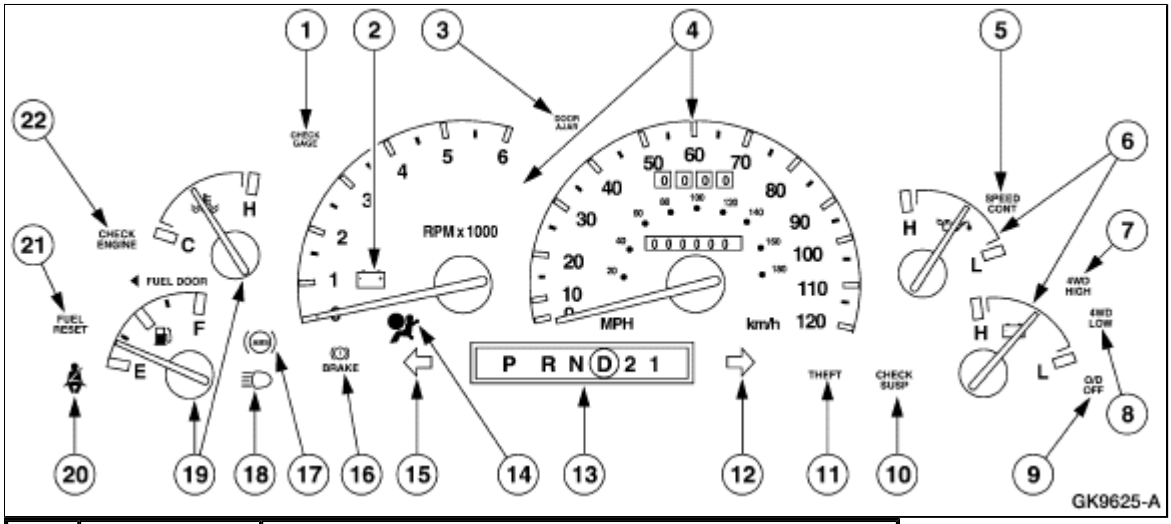
Torque Specifications

Description	Nm	lb-in
Battery Cable Bolt	7-10	62-89
Hood Latch Release Handle	2.7-3.7	25-33
Instrument Cluster Lens Screws	1.4-1.8	12-16
Instrument Cluster Screws	2-3	18-26
Instrument Panel Steering Column Cover Screws	2-3	18-26
Parking Brake Release Handle	2.7-3.7	25-33
Steering Column Opening Cover Reinforcement Screws	10-14	89-124

Instrument Cluster

The instrument cluster (10849) consists of the following:

Instrument Cluster Display



Item	Part Number	Description
1	—	CHECK GAGE Indicator
2	—	Charge System Warning Indicator
3	—	DOOR AJAR Indicator
4	17C290	Tachometer/Speedometer
5	—	Speed Control Indicator (SPEED CONT)
6	—	Oil Pressure/Voltage Gauge
7	—	4 Wheel Drive HIGH Indicator (4WD HIGH)
8	—	4 Wheel Drive LOW Indicator (4WD LOW)
9	—	Overdrive Off Indicator (O/D OFF)
10	—	Rear Load Leveling Indicator (CHECK SUSP)
11	—	Anti-Theft Indicator (THEFT)
12	—	Right Turn Indicator
13	—	Transmission Range Indicator
14	—	Air Bag Indicator
15	—	Left Turn Indicator
16	—	BRAKE Warning Indicator
17	—	Anti-Lock Brake Warning Indicator (ABS)
18	—	High Beam Indicator
19	—	Coolant Temperature/Fuel Level Gauge

20	—	Safety Belt Warning Indicator
21	—	FUEL RESET Indicator
22	—	CHECK ENGINE/Malfunction Indicator Lamp (MIL)

The instrument cluster performs a display prove-out to verify that all warning/indicator lamps and monitored systems are functioning properly. When the ignition switch (11572) is in the ON position with the engine (6007) off, the following indicators will illuminate:

- CHECK ENGINE/malfunction indicator lamp (MIL).
- CHECK GAGE warning indicator.
- Charge system indicator.
- Anti-lock brake (ABS) warning indicator.
- Safety belt warning indicator (60 second prove out).
- Air bag indicator.

Printed Circuit

The instrument cluster printed circuit (10K843) is a flexible circuit that supplies power and ground to the instrument cluster indicators and gauges. It is constructed of copper foil bonded to a polyester base film (usually referred to as Mylar).

The flexible circuit is mounted to the instrument cluster housing and, due to its location, cannot be easily tested or inspected in the vehicle. This makes the flexible circuit vulnerable to damage when a probe is used for in-vehicle testing because the probe can pierce the printed circuit or, in some cases, burn the copper conductor.

Since there is no approved procedure for in-vehicle testing of the flexible circuit, the instrument cluster must be removed from the vehicle for visual inspection. If no damage is evident, each circuit should be checked with an ohmmeter. If an open circuit or a short is detected, the flexible circuit must be replaced.

Gauge Indication Systems

The indication systems use magnetic gauges mounted in the instrument cluster. All the gauges are constructed with windings that form coils. Typically one coil is wound at a 90° angle to the other two. The coils form a magnetic field which varies in direction according to the resistance of the sender, except the battery voltage gauge, that is connected between two of them. The battery voltage gauge varies in direction according to the battery voltage. A primary magnet, to which a shaft and pointer are attached, rotates to align to this primary field, resulting in pointer position. No instrument voltage regulator is used with this system. There is no adjustment, calibration or maintenance required for any gauges.

Instrument Cluster Gauge Amplifier/Check Gauge Module

NOTE: The fuel gauge and instrument cluster gauge amplifier must be replaced as a set. The fuel gauge and instrument cluster gauge amplifier are calibrated together.

NOTE: If the ignition key is left in the ON position during fueling, a slow to respond fuel gauge indication may result. The ignition key must be placed in the OFF position during or after refueling for accurate fuel gauge indication.

The instrument cluster gauge amplifier (10E849) electrically averages the fuel sender readings so the gauge displays the actual fuel level and not the fluctuations due to fuel sloshing. The amplifier also supplies the signal to illuminate the CHECK GAGE indicator to indicate low fuel, high engine coolant temperature, or low engine oil pressure. The gauge amplifier is a small printed circuit board located in a pocket on the back of the instrument cluster. The electrical connections are made with a spring-type connector. There are no provisions for calibration or adjustment. The fuel gauge and the instrument cluster gauge amplifier must be replaced as a unit.

Fuel Sending Unit

The fuel sending unit is a variable resistor made up of a ceramic substrate. It is controlled by the action of a float arm. When the fuel level is low, resistance in the unit is low. When the fuel level is high, the resistance is high.

Water Temperature Indicator Sender Unit

When the engine temperature is low, the resistance of the water temperature indicator sender unit is high, thus restricting the flow of current through the gauge and moving the pointer only a short distance. As the temperature of the coolant increases, the resistance decreases, allowing more current to flow through the gauge and results in a corresponding movement of the pointer.

Oil Pressure Indicator Switch

The oil pressure switch is installed in the engine block and consists of a diaphragm and contact points. The contact points are closed with oil pressure causing the gauge to indicate NORMAL oil pressure. With no oil pressure, the contacts open and the gauge indicates low oil pressure.

Charge Indicator System

The battery voltage gauge measures the voltage potential at the battery.

Vehicle Speed Signal

The vehicle speed signal is generated by the rear anti-lock brake sensor and sent to the 4-wheel anti-lock brake system (4WABS) module. The 4WABS module sends the vehicle speed signal via circuit 679 (GY/BK) to all systems which require a vehicle speed signal input.

Speedometer

The electronic speedometer receives a speed signal from the 4WABS module.

Odometer

A million-mile tamper-resistant odometer is standard. Replacement speedometers have an odometer that can be reset to indicate correct vehicle mileage.

NOTE: Some state laws require that the odometer in any replacement speedometer must register the same as on the removed odometer. Replacement speedometers and odometer modules with the mileage preset are available through Ford electronic repair centers.

If the actual vehicle mileage cannot be determined, the repair centers are able to supply odometers set to "0" miles. An odometer mileage sticker is supplied with the replacement odometer. This sticker must display the estimated vehicle mileage and be affixed to the driver door jamb.

Trip Odometer

The trip odometer indicates how many miles the vehicle has been driven since the last reset.

Tachometer

The tachometer is a 6000 rpm tachometer. It has four terminals: one labeled B (12 to 14.5V), one labeled S (EDIS tach signal in), and two labeled G (cylinder selection grounds). The bottom ground (G) terminal is grounded. The top ground (G) terminal is grounded through a 4.32 kohm resistor in a 6-cylinder engine vehicle and is connected directly to ground for an 8-cylinder engine vehicle.

Warning Indicators

Brake System

The red brake warning light (BRAKE) is used to indicate a low fluid level, brake malfunction or a parking brake that is not fully released. The brake fluid level switch is located in the brake fluid reservoir.

The yellow brake warning indicator is used to indicate a malfunction or deactivation of the anti-lock brake system (ABS). It illuminates when triggered by the ABS control module and stays illuminated as long as the malfunction remains in the system.

Charge System Warning Indicator

The charge system warning indicator illuminates when there is no generator (GEN) (10346) output.

When the ignition switch contacts are closed, battery current flows through the charge indicator and the parallel resistor (390 ohm) to the voltage indicator, and the indicator illuminates.

When the generator builds up enough voltage to energize a circuit in the voltage regulator, the indicator goes out.

Check Engine Light

The CHECK ENGINE/malfunction indicator lamp (MIL) is illuminated when a diagnostic trouble code (DTC) or malfunction is sensed in the closed loop by the powertrain control module (PCM) (12A650).

Air Bag

If an air bag system DTC or malfunction is detected, the air bag indicator is illuminated.

Safety Belt

The safety belt warning indicator is powered through the GEM/CTM module. When the ignition key is turned on, the indicator illuminates for four to eight seconds even if the safety belt is buckled.

Low Fuel

When the fuel level drops to a predetermined level, the CHECK GAGE indicator will illuminate.

Door Ajar

The DOOR AJAR indicator illuminates when any of the vehicle doors are open.

High Beam

The high beam indicator is illuminated when the high beams are on.

Overdrive (O/D) Off

The O/D OFF indicator illuminates when the transmission is locked out of O/D. This dual function indicator will also flash off and on if a transmission malfunction is detected.

Anti-Theft

Once triggered, the anti-theft system flashes the low beam headlamps, the parking lamps, the THEFT indicator and sounds the horns.

Speed Control

The speed control indicator (SPEED CONT) lamp will illuminate when the speed control is engaged.

Fuel Reset

The FUEL RESET indicator is grounded through the inertia switch whenever the vehicle is subjected to a high force situation. The inertia fuel shutoff switch (IFS switch) (9341) cuts off the fuel pump motor. The FUEL RESET indicator illuminates when the IFS switch has been tripped.

Check Gage

The CHECK GAGE indicator will illuminate if any of the following occur:

- Engine oil pressure drops below approximately 42 kPa (6 psi).
- Fuel level drops below approximately 4-8L (1-2 gal).
- Engine temperature exceeds approximately 121°C (250°F).

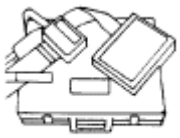
Rear Load Leveling (CHECK SUSP)

The CHECK SUSP indicator illuminates when there is a malfunction of the rear load leveling system or if the air suspension switch is in the OFF position.

Instrument Cluster

Refer to Wiring Diagrams Cell 62 , Instrument Cluster (Analog) for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051
 ST1449-A	EEC-IV 60-Pin Breakout Box or equivalent 418-005 (014-00322)
 ST1450-A	Anti-Lock Brake Adapter 418-063 (T97P-50-ALA)
 ST1391-A	EEC-V 104-Pin Breakout Box or equivalent 418-049 (014-00950)
 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent scan tool
 ST1473-A	Instrument Gauge System Tester or equivalent 014-R1063

Inspection and Verification

NOTE: The generic electronic module (GEM)/central timer module (CTM) must be reconfigured upon replacement. Refer to Section 418-01 .

1. Verify the customer concern by operating the system in question.

2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged engine oil filter • Damaged oil pump • Low engine oil level • Stuck oil pressure gauge needle • Stuck coolant temperature gauge • Door adjustment • Tripped inertia fuel shutoff (IFS) switch • Low engine coolant level • Damaged water thermostat	• Blown central junction box (CJB) fuse(s): ▪ Fuse 11 (7.5A) ▪ Fuse 15 (7.5A) ▪ Fuse 25 (7.5A) • Blown battery junction box (BJB) Maxi-Fuse 1 (60A) • Damaged miniature bulbs • Damaged wiring harness • Loose or corroded connectors • Damaged instrument cluster (10849) • Damaged instrument cluster printed circuit (10K843)

3. Verify the following systems are working correctly:

- Charging.
- Fuel.
- Cooling.
- Safety belt warning chime (GEM/CTM).
- Turn signals.
- Headlamps.
- Anti-theft.
- Rear load leveling.

If the system(s) is/are not working correctly, refer to the appropriate section of the workshop manual.

4. If the concern remains after the inspection, connect the scan tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the scan tool menu. If the scan tool does not communicate with the vehicle:
   - check that the program card is correctly installed.
   - check the connections to the vehicle.
   - check the ignition switch position.

5. If the scan tool still does not communicate with the vehicle, refer to the scan tool manual.

6. Carry out the DATA LINK DIAGNOSTIC TEST. If the scan tool responds with:
   - CKT914, CKT915 or CKT70 = ALL ECUS NO RESP/NOT EQUIP, refer to Section 418-00 .
   - NO RESP/NOT EQUIP for generic electronic module (GEM), go to Pinpoint Test U.
   - SYSTEM PASSED, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and carry out self-test diagnostics for the GEM/CTM.

7. If the DTCs retrieved are related to the concern, go to the GEM/CTM Diagnostic Trouble Code (DTC) Index to continue diagnostics.

8. If no DTCs related to the concern are retrieved, proceed to Symptom Chart to continue diagnostics.

GEM/CTM Diagnostic Trouble Code (DTC) Index

GEM/CTM Diagnostic Trouble Code (DTC) Index

DTC	Description	DTC Caused By	Action
P0500	Vehicle Speed Signal Circuit Failure	GEM	REFER to Section 308-07A .
B1302	Accessory Delay Relay Coil Circuit Failure	GEM	REFER to Section 501-11 .
B1304	Accessory Delay Relay Coil Circuit Short to Battery	GEM	REFER to Section 501-11 .
B1313	Battery Saver Relay Coil Circuit Failure	GEM/CTM	REFER to Section 417-02 .
B1315	Battery Saver Relay Coil Circuit Short to Battery	GEM/CTM	REFER to Section 417-02 .
B1317	Battery Voltage HIGH	GEM/CTM	REFER to Section 414-00 .
B1318	Battery Voltage LOW	GEM/CTM	REFER to Section 414-00 .
B1322	Door Ajar LF Circuit Short to Ground	GEM/CTM	REFER to Section 417-02 .
B1323	Door Ajar Lamp Circuit Failure	GEM/CTM	GO to Pinpoint Test V .
B1325	Door Ajar Lamp Circuit Short to Battery	GEM/CTM	GO to Pinpoint Test V .
B1330	Door Ajar RF Circuit Short to Ground	GEM/CTM	REFER to Section 417-02 .
B1334	Decklid Ajar Rear Door Circuit Short to Ground	GEM/CTM	REFER to Section 417-02 .
B1338	RR Door Ajar Circuit Short to Ground	GEM/CTM	REFER to Section 417-02 .
B1340	Chime Input Request Circuit Short to Ground	GEM/CTM	REFER to Section 413-09 .
B1342	GEM/CTM is Defective	GEM/CTM	CLEAR the DTCs. RETRIEVE the DTCs. If DTC B1342 is retrieved, INSTALL a new GEM/CTM; REFER to Section 419-10 . TEST the system for normal operation.
B1345	Heated Backlight Input Circuit Short to Ground	GEM	REFER to Section 501-11 .
B1347	Heated Backlite Relay Circuit Failure	GEM	REFER to Section 501-11 .
B1349	Heated Backlite Relay Circuit Short to Battery	GEM	REFER to Section 501-11 .

B1352	Ignition Key-In Circuit Failure	GEM/CTM	REFER to Section 413-09 .
B1355	Ignition RUN Circuit Failure	GEM/CTM	REFER to Section 211-05 , Symptom Chart.
B1359	Ignition RUN/ACC Circuit Failure	GEM/CTM	REFER to Section 211-05 , Symptom Chart.
B1371	Illuminated Entry Relay Circuit Failure	GEM/CTM	REFER to Section 417-02 .
B1373	Interior Lamp Relay Coil Circuit Short to Battery	GEM/CTM	REFER to Section 417-02 .
B1398	Power Window Driver One-Touch Window Relay Circuit Failure	GEM	REFER to Section 501-11 .
B1400	Power Window Driver One-Touch Window Relay Coil Circuit Short to Battery	GEM	REFER to Section 501-11 .
B1404	Power Window Driver Down Circuit Open	GEM	REFER to Section 501-11 .
B1405	Driver Power Window Down Circuit to Battery	GEM	REFER to Section 501-11 .
B1410	Power Window Driver Motor Circuit Failure	GEM	REFER to Section 501-11 .
B1426	Seat Belt Lamp Circuit Short to Battery	GEM/CTM	GO to Pinpoint Test W .
B1428	Safety Belt Lamp Output Failure	GEM/CTM	GO to Pinpoint Test W .
B1431	Wiper Brake/Run Relay — Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1432	Wiper Brake/Run Relay Short to Battery	GEM/CTM	REFER to Section 501-16 .
B1434	Wiper Hi/Lo Speed Relay — Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1436	Wiper Hi/Lo Speed Relay Circuit Short to Battery	GEM/CTM	REFER to Section 501-16 .
B1438	Wiper Mode Select Switch Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1441	Wiper Mode Select Switch Input Short to Ground	GEM/CTM	REFER to Section 501-16 .
B1446	Wiper Park Sense Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1450	Wiper/Washer Interval Delay Switch Input Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1453	Wiper/Washer Interval	GEM/CTM	REFER to Section 501-16 .

	Delay Switch Input Short to Ground		
B1458	Wiper/Washer Pump Motor Relay Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1460	Wiper/Washer Pump Motor Relay Coil Short to Battery	GEM/CTM	REFER to Section 501-16 .
B1462	Seat Belt Switch Circuit Failure	GEM/CTM	REFER to Section 413-09 .
B1466	Wiper Hi/Lo Speed Not Switching	GEM/CTM	REFER to Section 501-16 .
B1467	Wiper Hi/Lo Speed Circuit Motor Short to Battery	GEM/CTM	REFER to Section 501-16 .
B1473	Wiper Low Speed Circuit Motor Failure	GEM/CTM	REFER to Section 501-16 .
B1475	Accessory Delayed Relay Contacts Short to Battery	GEM/CTM	REFER to Section 501-11 .
B1476	Wiper High Speed Circuit Motor Failure	GEM/CTM	REFER to Section 501-16 .
B1483	Brake Pedal Input Circuit Failure	GEM	REFER to Section 308-07A .
B1485	Brake Pedal Input Short Circuit to Battery	GEM	REFER to Section 308-07A .
B1574	LR Door Ajar Circuit Short to Ground	GEM/CTM	REFER to Section 417-02 .
B1577	Lamp/Park Input Short Circuit to Battery	GEM/CTM	REFER to Section 413-09 .
B1610	Illuminated Entry Input (From RAP Module) Circuit Short to Ground	GEM	REFER to Section 417-02 .
B1611	Wiper Rear Mode Select Switch Circuit Failure	GEM	REFER to Section 501-16 .
B1614	Wiper Rear Mode Select Switch Circuit Short to Ground	GEM	REFER to Section 501-16 .
B1814	Wiper Rear Motor Down Relay Circuit Failure	GEM	REFER to Section 501-16 .
B1816	Wiper Rear Motor Down Relay Coil Circuit Short to Battery	GEM	REFER to Section 501-16 .
B1818	Wiper Rear Motor Up Relay Coil Circuit Failure	GEM	REFER to Section 501-16 .
B1820	Rear Wiper Motor Up	GEM	REFER to Section 501-16 .

	Relay Circuit Short to Battery		
B1833	Door Unlock Switch Circuit Short to Ground	GEM	REFER to Section 501-14B .
B1834	Door Unlock Disarm Output Circuit Failure	GEM	REFER to Section 501-14B .
B1836	Door Unlock Disarm Output Circuit Short to Battery	GEM	REFER to Section 501-14B .
B1839	Wiper Rear Motor Circuit Failure	GEM	REFER to Section 501-16 .
B1840	Wiper Front Power Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1894	Wiper Rear Motor Speed Sense Circuit Failure	GEM	REFER to Section 501-16 .
B2105	Throttle Position Input (TPI) Signal Out of Range Low	GEM	REFER to Section 308-07A .
B2106	Throttle Position Input (TPI) Signal Out of Range High	GEM	REFER to Section 308-07A .
B2141	NVM Configuration Failure	GEM/CTM	Vehicle speed calibration data is not programmed into the GEM/CTM. REFER to the scan tool help screen on the configuration card to program the tire size and axle ratio. TEST the system for normal operation. If DTC B2141 is still present, INSTALL a new GEM/CTM. REFER to Section 419-10 . TEST the system for normal operation.
P1763	Transmission Neutral In Tow Indicator Circuit Short to Battery	GEM	REFER to Section 413-09 .
P1764	Transmission Neutral In Tow Indicator Circuit Fault	GEM	REFER to Section 413-09 .
P1804	4WD High Indicator Circuit Failure	GEM	GO to Pinpoint Test X .
P1806	4WD High Indicator Short Circuit to Battery	GEM	GO to Pinpoint Test X .
P1808	4WD Low Indicator Circuit Failure	GEM	GO to Pinpoint Test X .
P1810	4WD Low Indicator Short Circuit to Battery	GEM	GO to Pinpoint Test X .
P1812	4WD Mode Select Circuit Failure	GEM	REFER to Section 308-07A .
P1815	4WD Mode Select Short Circuit to Ground	GEM	REFER to Section 308-07A .
P1820	Transfer Case CW Shift Relay Coil Circuit Failure	GEM	REFER to Section 308-07A .

P1822	Transfer Case CW Shift Relay Coil Short to Power	GEM	REFER to Section 308-07A .
P1824	4WD Electric Clutch Relay Circuit Failure	GEM	REFER to Section 308-07A .
P1826	4WD Low Clutch Relay Short to Battery	GEM	REFER to Section 308-07A .
P1828	Transfer Case CCW Shift Relay Circuit Failure	GEM	REFER to Section 308-07A .
P1830	Transfer Case CCW Shift Relay Coil Short to Battery	GEM	REFER to Section 308-07A .
P1836	Transfer Case Front Shaft Speed Sensor Circuit Failure	GEM	REFER to Section 308-07A .
P1837	Transfer Case Rear Shaft Speed Sensor Circuit Failure	GEM	REFER to Section 308-07A .
P1838	Transfer Case Shift Motor Circuit Failure	GEM	REFER to Section 308-07A .
P1846	Transfer Case CONTACT PLATE "A" Circuit Failure	GEM	REFER to Section 308-07A .
P1850	Transfer Case CONTACT PLATE "B" Circuit Failure	GEM	REFER to Section 308-07A .
P1854	Transfer Case CONTACT PLATE "C" Circuit Failure	GEM	REFER to Section 308-07A .
P1858	Transfer Case CONTACT PLATE "D" Circuit Failure	GEM	REFER to Section 308-07A .
P1866	Transfer Case System Concern	GEM	REFER to Section 308-07A .
P1867	Transfer Case Contact Plate General Circuit Failure	GEM	REFER to Section 308-07A .
P1874	Automatic Hall Effect Sensor Power Circuit Failure	GEM	REFER to Section 308-07A .
P1875	Automatic Hall Effect Sensor Power Circuit Short to Battery	GEM	REFER to Section 308-07A .
P1891	Transfer Case Contact Plate Ground Return Open Circuit	GEM	REFER to Section 308-07A .

GEM/CTM Parameter Identification (PID) Index

GEM/CTM Parameter Identification (PID) Index

PID	Description	Expected Values
VSS_GEM	Vehicle Speed Input	0 - 255 KPH
PARK_SW	External Access Ajar Switch Status	OFF, ON
D_DR_SW	Left Front Door Ajar Switch Status	CLOSED, AJAR
DR_DSRM	Door Disarm Switch Status	L_DOOR, R_DOOR, LIFT_G, OFF
DR_UNLK	All Doors Unlock Output State	ON---, OFF---, ON-B-, OFFO-G
P_DR_SW	Right Passenger Door Ajar Switch Status	CLOSED, AJAR
IGN_KEY	Key-In-Ignition Status	IN, OUT
IGN_GEM	Ignition Switch Status	START, RUN, OFF, ACCY
BATSAV	Battery Saver Relay Circuit	ON---, OFF---, ON-B-, OFFO-G
VBATGEM	Battery Voltage	0.0 VDC - 14.3 VDC
LGATESW	Liftgate Ajar Switch Status	CLOSED - AJAR
LRDR_SW	Left Rear Door Ajar Switch Status	CLOSED - AJAR
RRDR_SW	Right Rear Door Ajar Switch Status	CLOSED - AJAR
INTLMP	Illuminated Entry Relay Circuit	ON---, OFF---, ON-B-, OFFO-G
CLTCHSW	Transmission Clutch Interlock Switch (GEM Only)	ENGAGED, NOT ENGAGED
NTRL_SW	Neutral Safety Switch Input (GEM Only)	NTRL, not NTRL
MTR_CCW	Transmission Transfer CCW Motor Output (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
MTR_CW	CW Shift Relay Coil Status (GEM Only)	OFF---, ON---, ON-B-, OFFO-G
4WD_SW	4WD Switch Status (GEM Only)	AUTO, 4WDLOW, 4WDHIGH
4WDELCL	4WD Electric Clutch	ON---, OFF---, ON-B-, OFFO-G
TRANSGR	Transmission Gear Status	REV, notREV
4WDCLCH	4WD Electronic Clutch Output Status (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
4WDLOW	4WD Low Indicator Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
4WDHIGH	4WD High Indicator Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
PLATE_A	Transfer Case Contact Plate Switch A (GEM Only)	OPEN, CLOSED
PLATE_B	Transfer Case Contact Plate Switch B (GEM Only)	OPEN, CLOSED
PLATE_C	Transfer Case Contact Plate Switch C (GEM Only)	OPEN, CLOSED
PLATE_D	Transfer Case Contact Plate Switch D (GEM Only)	OPEN, CLOSED
BOO_GEM	Brake Pedal Position (BPP) Switch Input (GEM Only)	ON, OFF
HALLPWR	Hall Effect Speed Sensor Power (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
4WDCLST	FWD Clutch PWM Output Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
TRA_RSP	Rear Shaft Speed (GEM Only)	0-255 mph
TRA_FSP	Front Shaft Speed (GEM Only)	0-225 mph
PLATEPW	Contact Plate Ground Output (GEM Only)	ON---, OFF---, ON-B-, OFFO-G

PWR_RLY	ABS Active Input	ON, OFF
NTF	Neutral Tow Function (GEM Only)	ON, OFF
NTF_LMP	Neutral Tow Light (GEM Only)	ON, OFF
D_SBELT	Driver Seat Belt Status	OUT, IN
IPCHIME	External Chime Request	ON, OFF
SBLTMP	Seat Belt Indicator Status	OFF, ON, OFFO-G, ON-B-
DRAJR_L	Door Ajar Warning Lamp Circuit	OFF, ON
D_PWRLY	One Touch Down Relay Coil Circuit Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
D_ PWAMP	Driver Power Window Regulator Electric Drive Current (GEM Only)	0.25 amp increments
D_PWPK	Driver Power Window Regulator Electric Drive Peak Current (GEM Only)	0.25 amp increments
ACCDLY	Accessory Delay Relay Coil Circuit (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
RDEF_ SW	Rear Defrost Control Switch Status	ON, OFF
RDEFRLY	Rear Window Defrost Relay Coil Circuit	ON---, OFF---, ON-B-, OFFO-G
WASHRLY	Washer Relay Status	ON---, OFF---, ON-B-, OFFO-G
WPPK_PK	Wiper Park-to-Park Time	0 - 65 Seconds
WPMODE	Wiper Control Mode Status	WASH, OPEN, INVLD, OFF, INTVL 1-7, LOW, HIGH
WPPRKSW	Wiper Motor Status	PARKED, notPRK
WPRUN	Wiper Mode Run Relay	ON---, OFF---, ON-B-, OFFO-G
WPHISP	Windshield Wiper HI/LO Relay Status	ON---, OFF---, ON-B-, OFFO-G
WASH_SW	Washer Pump Relay Switch Status	OFF, ON, ON-B-, OFFO-G
R_WP_UP	Rear Wiper Up Relay Status (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
R_WP_DN	Rear Wiper Down Relay Status (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
R_WP_SW	Rear Wiper Input Switch Status (GEM Only)	WPLOW, OFF, WPHIGH
R_WP_MD	Rear Wiper Mode Switch Status (GEM Only)	OFF, INTVL 1-2, LOW WASH
R_WP_PK	Rear Wiper Park Status (GEM Only)	PARKED, notPRK

GEM/CTM Active Command Index

GEM/CTM Active Command Index

Active Command	Display	Action
PID LATCH	PID LATCH	ON, OFF
FRONT WIPER	WIPER RLY	ON, OFF
FRONT WIPER	SPEED RLY	ON, OFF
FRONT WIPER	WASH RLY	ON, OFF
WARNING LAMPS AND CHIME	SBLT LAMP	ON, OFF

WARNING LAMPS AND CHIME	CHIME	ON, OFF
WARNING LAMPS AND CHIME	AJAR LAMP	ON, OFF
BATTERY SAVER	BATT SAVR	ON, OFF
INTERIOR COURTESY LAMPS	INT LAMPS	ON, OFF
ONE TOUCH DOWN AND ACCY DELAY (GEM Only)	ACCY RLY	ON, OFF
ONE TOUCH DOWN AND ACCY DELAY (GEM Only)	ONE TOUCH	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	CW/CCW	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	HIGH LAMP	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	LOW LAMP	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	PLATE PWR	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	SHFT CLCH	ON, OFF
SHIFT CLUTCH CONTROL	CLUTCH SOL	ANALOG %
NEUTRAL IN TOW LAMP	NTFLAMP	ON, OFF
REAR WIPER (GEM Only)	UP RELAY	ON, OFF
REAR WIPER (GEM Only)	DWN RELAY	ON, OFF
HEATED BACKLIGHT	RLY CNTRL	ON, OFF
DOOR LOCK CONTROL	DD UNLOCK	ON, OFF

GEM/CTM Wiggle Test Diagnostic Trouble Code (DTC) Index

GEM/CTM Wiggle Test Diagnostic Trouble Code (DTC) Index

DTC	Description	DTC Caused By
B1317	Battery Voltage HIGH	GEM/CTM
B1318	Battery Voltage LOW	GEM/CTM
B1322	Door Ajar LF Circuit Short to Ground	GEM/CTM
B1330	Door Ajar RF Circuit Short to Ground	GEM/CTM
B1352	Ignition Key-In Circuit Failure	GEM/CTM
B1410	Power Window LF Motor Circuit Failure	GEM
B1438	Wiper Mode Select Switch Circuit Failure	GEM/CTM
B1441	Wiper Mode Select Switch Input Short to Ground	GEM/CTM
B1446	Wiper Park Sense Circuit Failure	GEM/CTM
B1450	Wiper/Washer Interval Delay Switch Input Circuit Failure	GEM/CTM
B1453	Wiper/Washer Interval Delay Switch Input Short to Ground	GEM/CTM
B1462	Seat Belt Switch Circuit Failure	GEM/CTM
B1577	Lamp/Park Input Short Circuit to Battery	GEM/CTM
B1610	Illuminated Entry Input (From RAP Module) Circuit Short to Ground	GEM
B1833	Door Unlock Disarm Switch Circuit Short to Ground	GEM
B1614	Wiper Rear Mode Select Switch Circuit Short to Ground	GEM

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• Incorrect Fuel Gauge Indication	• Circuitry. • Fuel level sender. • Fuel gauge. • Fuel tank. • Instrument cluster gauge amplifier. • Instrument cluster printed circuit.	• GO to Pinpoint Test A .
• Incorrect Temperature Gauge Indication	• Water temperature indicator sender unit. • Circuitry. • Engine Coolant Temperature Gauge. • Instrument cluster printed circuit.	• GO to Pinpoint Test B .
• Incorrect Oil Pressure Gauge Indication	• Oil pressure switch. • Circuitry. • Instrument cluster printed circuit. • Gauge.	• GO to Pinpoint Test C .
• Incorrect Voltage Gauge Indication	• Circuitry. • Gauge. • Instrument cluster printed circuit.	• REFER to Section 414-00 .
• A Gauge Is Inaccurate — Speedometer	• Speedometer.	• GO to Pinpoint Test D .
• The Speedometer/Odometer Is Inoperative	• Circuitry. • Speedometer.	• GO to Pinpoint Test E .
• The Tachometer Is Inoperative	• Circuitry. • Tachometer. • Instrument cluster printed circuit.	• GO to Pinpoint Test F .
• Incorrect Tachometer Indication	• Circuitry. • Instrument cluster printed circuit. • Tachometer.	• GO to Pinpoint Test G .
• The Charge System Warning Indicator Is Never/Always On	• Fuse. • Bulb. • Circuitry. • Instrument cluster printed circuit.	• GO to Pinpoint Test H .
• Charge System Warning Indicator Stays On Continuously	• Charging system.	• REFER to Section 414-00 .

• An Indicator Is Inoperative — Anti-Lock Brake Warning	• Bulb. • Circuitry. • Instrument cluster printed circuit. • Anti-lock brake system (ABS) module.	• GO to Pinpoint Test J.
• Anti-Lock Brake Warning Indicator Stays On Continuously	• ABS.	• REFER to Section 206-09.
• An Indicator Is Inoperative — Anti-Theft Alarm	• Anti-theft alarm indicator LED. • Circuitry. • Instrument cluster printed circuit. • Remote anti-theft personality (RAP) module. • Passive anti-theft system (PATS) module.	• REFER to Section 419-01.
• Anti-Theft Alarm Indicator Stays On Continuously	• RAP system. • PATS system.	• REFER to Section 419-01.
• An Indicator Is Inoperative — Fuel Reset	• Bulb. • Circuitry.	• GO to Pinpoint Test K.
• Fuel Reset Indicator Stays On Continuously	• Circuitry.	• REPAIR circuit 921 (GY/OG) for short to ground. TEST the system for normal operation.
• An Indicator Is Inoperative — High Beam	• Bulb. • Circuitry. • Instrument cluster printed circuit.	• GO to Pinpoint Test L.
• An Indicator Is Inoperative — CHECK ENGINE/Malfunction Indicator Lamp (MIL)	• Bulb. • Circuitry. • Instrument cluster printed circuit. • Powertrain control module (PCM).	• GO to Pinpoint Test M.
• Check Engine Warning Indicator Stays On Continuously	• Powertrain/emissions concern.	• REFER to Powertrain Control/Emissions Diagnosis (PC/ED) manual.
• An Indicator Is Inoperative — LH Turn Signal	• Circuitry. • Bulb. • Instrument cluster printed circuit.	• GO to Pinpoint Test N.
• An Indicator Is Inoperative — RH Turn Signal	• Circuitry. • Bulb. • Instrument cluster printed circuit.	• GO to Pinpoint Test P.
• An Indicator Is Inoperative — O/D Off	• Circuitry. • Dimmer control relay.	• GO to Pinpoint Test Q.

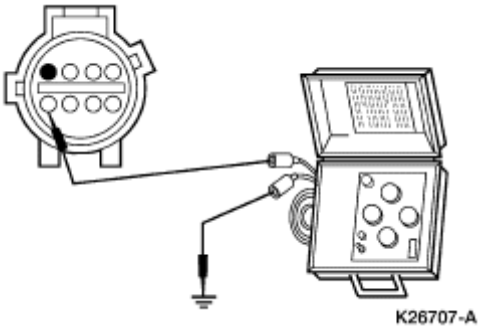
	• Headlamp switch. • Bulb. • Instrument cluster printed circuit.	
• Overdrive Off Indicator Stays On Continuously	• Circuitry. • PCM.	• REFER to Section 307-05 .
• Speed Control Indicator Stays On Continuously	• Circuitry. • Speed control servo.	• REFER to Section 310-03 .
• The Speed Control Indicator Is Never/Always On	• Circuitry. • Dimmer control relay. • Headlamp switch. • Bulb. • Instrument cluster printed circuit.	• GO to Pinpoint Test R .
• An Indicator Is Inoperative — Red Brake Warning	• Circuitry. • Bulb. • Parking brake switch. • Brake fluid level sensor. • Instrument cluster printed circuit.	• GO to Pinpoint Test S .
• Red Brake Warning Indicator Stays On Continuously	• Parking brake. • Brake master cylinder reservoir. • Parking brake switch. • Circuitry. • Instrument cluster printed circuit.	• REFER to Section 206-00 .
• An Indicator Is Inoperative — CHECK GAGE	• Bulb. • Circuitry. • Fuel gauge. • Instrument cluster gauge amplifier. • Instrument cluster printed circuit.	• GO to Pinpoint Test T .
• No Communication with the Module — Generic Electronic Module	• BJB Maxi-Fuse 1 (60A). • CJB Fuse 25 (7.5A). • Circuitry. • GEM/CTM.	• GO to Pinpoint Test U .
• The Door Ajar Indicator Does Not Operate Correctly	• Bulb. • Circuitry. • GEM. • Instrument cluster printed circuit.	• GO to Pinpoint Test V .
• The Safety Belt Warning Indicator Does Not Operate Correctly	• Bulb. • Circuitry. • GEM. • Instrument cluster printed circuit.	• GO to Pinpoint Test W .
• An Indicator Is Inoperative — 4x4 High, 4x4 Low	• Bulb. • Circuitry. • GEM. • Instrument cluster	• GO to Pinpoint Test X .

	printed circuit.	
• An Indicator Is Inoperative — Air Bag	• Bulb. • Circuitry. • Instrument cluster printed circuit.	• GO to Pinpoint Test Y .
• Air Bag Indicator Stays On Continuously	• Circuitry. • Air bag diagnostic monitor.	• REFER to Section 501-20B .
• An Indicator is Inoperative — CHECK SUSP	• Bulb. • Circuitry. • Instrument cluster printed circuit.	• GO to Pinpoint Test Z .
• An Indicator Is Always On — CHECK SUSP	• Circuitry. • Instrument cluster printed circuit. • Air suspension control module. • Air suspension switch. • Rear load leveling system concern.	• GO to Pinpoint Test AA .

Pinpoint Tests

PINPOINT TEST A: INCORRECT FUEL GAUGE INDICATION

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK THE FUEL GAUGE READING	
1  2  Fuel Level Sensor and Pump C311 3	3 Connect one lead of Instrument Gauge System Tester to fuel level sensor and pump C311-8, circuit 29 (YE/WH), harness side. Connect the other lead to ground.



4 Set Instrument Gauge System Tester to 160 ohms.

5

6 Set the power switch on Instrument Gauge System Tester to the ON position.

7 Wait one minute.

8 Read the fuel gauge. The fuel gauge should read full or above.

9

10 Set Instrument Gauge System Tester to 15 ohms.

11

12 Wait one minute.

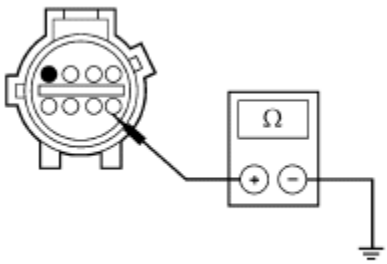
13 Read the fuel gauge. The fuel gauge should read empty or below.

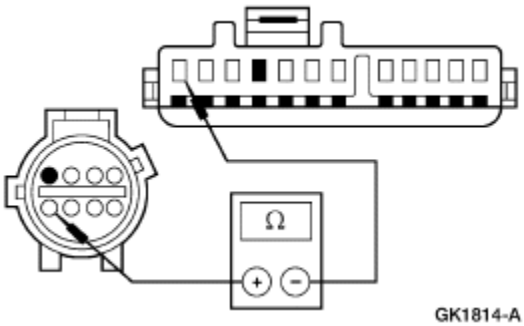
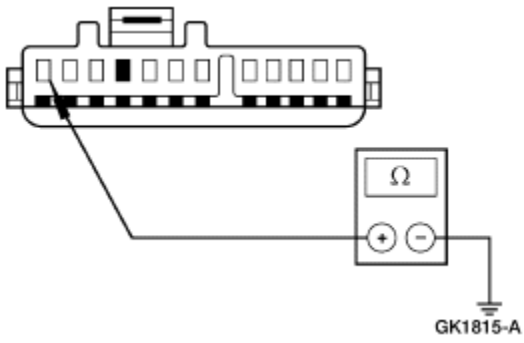
14

- **Does the fuel gauge operate correctly?**

→ **Yes**
GO to A2 .

→ **No**

	GO to A4 .
A2 INSPECT THE FUEL TANK	
	1 Visually inspect the fuel tank for any damage or deformation. • **Is the fuel tank OK?** → **Yes** GO to A3 . → **No** INSTALL a new fuel tank. REFER to Section 310-01 . TEST the system for normal operation.
A3 INSPECT THE FUEL LEVEL SENSOR AND PUMP ASSEMBLY	
	1 Visually inspect the fuel pump assembly for damaged wiring or connectors. 2 Visually inspect the float and float rod for damage or obstruction. • **Are the fuel pump and wiring OK?** → **Yes** INSTALL a new fuel level sender. TEST the system for normal operation. → **No** REPAIR as necessary. TEST the system for normal operation.
A4 CHECK FUEL LEVEL SENSOR AND PUMP GROUND	
1  K26710-A	1 Measure the resistance between fuel level sensor and pump C311-5, circuit 651 (BK/YE), and ground. • **Is the resistance less than 5 ohms?** → **Yes** GO to A5 . → **No**

	REPAIR circuit 651 (BK/YE). TEST the system for normal operation.
A5 CHECK CIRCUIT 29 (YE/WH) FOR OPEN AND SHORT	
1  2  Instrument Cluster 3  GK1814-A 4  GK1815-A	3 Measure the resistance of circuit 29 (YE/WH) between fuel level sensor and pump C311-8, and instrument cluster C287-12. 4 Measure the resistance between instrument cluster C287-12, circuit 29 (YE/WH), and ground. • **Is the resistance less than 5 ohms between the instrument cluster and fuel level sensor and pump and greater than 10,000 ohms between the instrument cluster and ground?** → **Yes** GO to A6 . → **No** REPAIR circuit 29 (YE/WH). TEST the system for normal operation.
A6 CHECK THE INSTRUMENT CLUSTER PRINTED CIRCUIT	

	1 Measure the resistance of the instrument cluster printed circuit between the following: ■ Fuel gauge S terminal and gauge amplifier Pin 3. ■ Fuel gauge terminal G and instrument cluster printed circuit terminal C287-2. ■ Fuel gauge terminal B and instrument cluster printed circuit terminal C287-8. ■ Fuel gauge ground terminal and gauge amplifier Pin 5. ■ Gauge amplifier and instrument cluster printed circuit terminals C287-2, C287-12, and C288-1. • **Are the resistances less than 1 ohm?** → **Yes** INSTALL a new fuel gauge and instrument cluster gauge amplifier. REFER to Gauges . TEST the system for normal operation. → **No** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation.

PINPOINT TEST B: INCORRECT TEMPERATURE GAUGE INDICATION

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CARRY OUT THE COMPONENT TEST	
	1 Carry out the Engine Coolant Temperature Gauge Component Test; refer to Component Tests. • **Is the engine coolant temperature gauge OK?** → **Yes** INSTALL a new water temperature indicator sender unit. TEST the system for normal operation. → **No** GO to B2 .

B2 CHECK WIRE BETWEEN INSTRUMENT CLUSTER AND WATER TEMPERATURE INDICATOR SENDER UNIT

1

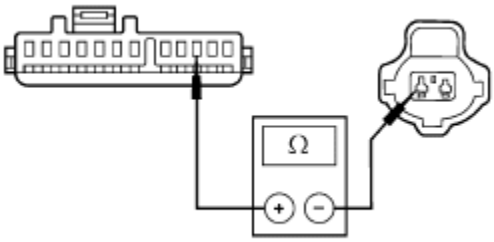
2

Water Temperature Indicator Sender Unit C104

3

Instrument Cluster

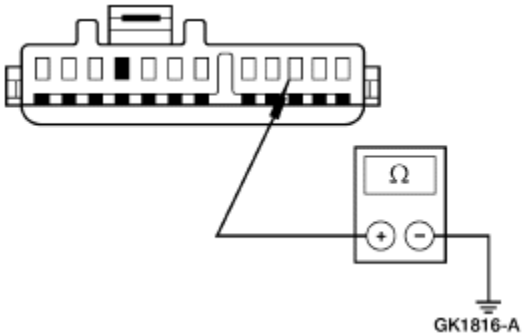
4



GK6906-A

4 Measure the resistance between instrument cluster C287-3, circuit 39 (RD/WH), and water temperature indicator sender unit C104-1, circuit 39 (RD/WH).

5

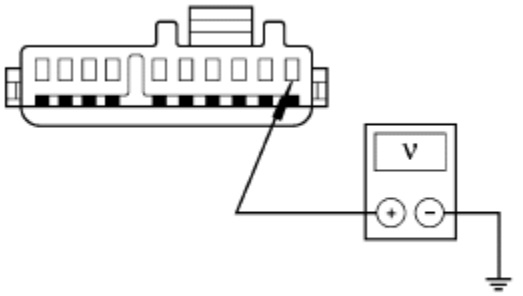


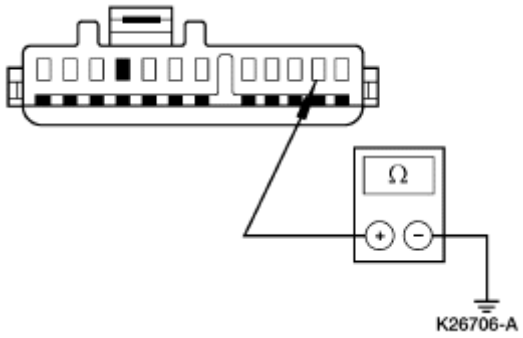
GK1816-A

5 Measure the resistance between instrument cluster C287-3, circuit 39 (RD/WH), and ground.

- **Is the resistance less than 5 ohms between instrument cluster C287 and water temperature indicator sender unit C104; and greater than 10,000 ohms between instrument cluster C287 and ground?**

→ **Yes**
GO to B3 .

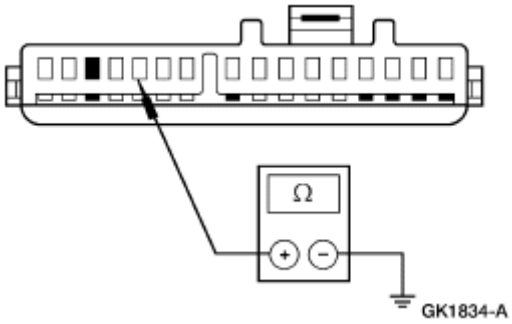
	→ **No** REPAIR circuit 39 (RD/WH). TEST the system for normal operation.
B3 CHECK THE POWER TO THE INSTRUMENT CLUSTER	
1  Instrument Cluster 2  3  GK2025-A	3 Measure the voltage between instrument cluster C288-1, circuit 640 (RD/YE), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to B4 . → **No** REPAIR circuit 640 (RD/YE). TEST the system for normal operation.
B4 CHECK THE GROUND TO THE INSTRUMENT CLUSTER	
1  2	2 Check the resistance between instrument cluster C287-2, circuit 570 (BK/WH), and ground.

	• **Is the resistance less than 5 ohms?** → **Yes** GO to B5 . → **No** REPAIR circuit 570 (BK/WH). TEST the system for normal operation.
B5 CHECK INSTRUMENT CLUSTER TEMPERATURE GAUGE	
	1 Measure the resistance between instrument cluster temperature gauge clip "B" and instrument cluster temperature gauge clip "S." 2 Measure the resistance between instrument cluster temperature gauge clip "S" and instrument cluster temperature gauge clip "G." • **Is the resistance 235 +/- 21 ohms between the "B" clip and "S" clip; and 100 +/- 10 ohms between the "S" clip and "G" clip?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** INSTALL a new engine coolant temperature gauge. REFER to Gauges . TEST the system for normal operation.

PINPOINT TEST C: INCORRECT OIL PRESSURE GAUGE INDICATION

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 CHECK THE OIL PRESSURE GAUGE (LOW)	
NOTE: For correct operation of the oil pressure gauge, verify the engine oil is at the correct level and the connector is securely mated to the oil pressure switch. During hard braking, a momentary drop in oil pressure is normal.	

1 	2 Check the oil pressure gauge. • **Does the gauge read L (low) or below?** → **Yes** GO to C5 . → **No** GO to C2 .
C2 CHECK THE OIL PRESSURE GAUGE (KEY ON — ENGINE OFF)	
1 	2 Check the oil pressure gauge. • **Does the gauge indicate oil pressure?** → **Yes** GO to C3 . → **No** System OK.
C3 CHECK THE INPUT SIGNAL TO THE OIL PRESSURE GAUGE	
1  2  Instrument Cluster 3  4	4 Measure the resistance between instrument cluster C286-12, circuit 253 (DG/WH), and ground.



- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to C4 .

→ **No**
INSTALL a new oil pressure gauge. REFER to Gauges . TEST the system for normal operation.

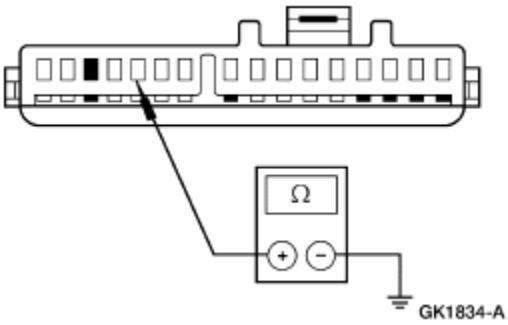
C4 CHECK CIRCUIT 253 (DG/WH) FOR SHORT TO GROUND

1

2

Oil Pressure Switch C175

3

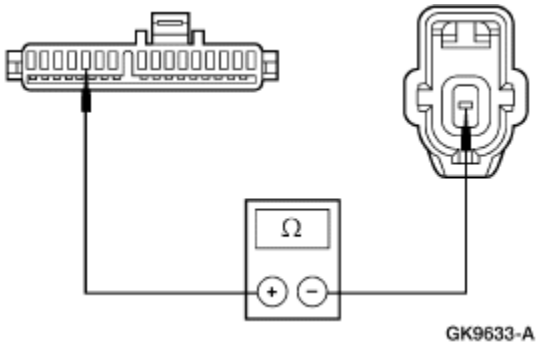


3 Measure the resistance between instrument cluster C286-12, circuit 253 (DG/WH), and ground.

- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
INSTALL a new oil pressure switch. TEST the system for normal operation.

	→ **No** REPAIR circuit 253 (DG/WH). TEST the system for normal operation.
C5 CHECK THE OIL PRESSURE GAUGE (NORMAL)	
1  2  Oil Pressure Switch C175 3  4  GK9424-A	4 Connect a 7.5A fused jumper wire between oil pressure switch C175, circuit 253 (DG/WH), and ground. 5 Check the oil pressure gauge. • **Does the gauge read in the normal range?** → **Yes** INSTALL a new oil pressure switch. TEST the system for normal operation. → **No** GO to C6 .
C6 CHECK CIRCUIT 253 (DG/WH) FOR OPEN	
1  2	

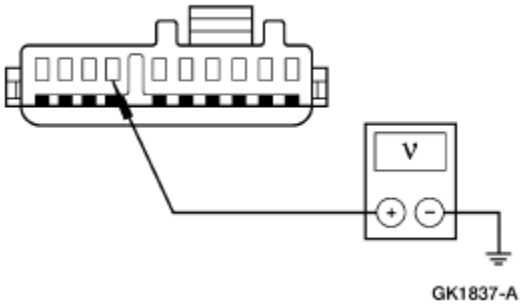
 Instrument Cluster 3  	3 Measure the resistance between instrument cluster C286-12, circuit 253 (DG/WH), and oil pressure switch C175, circuit 253 (DG/WH). • **Is the resistance less than 5 ohms?** → **Yes** GO to C7 . → **No** REPAIR circuit 253 (DG/WH). TEST the system for normal operation.
C7 CHECK THE INSTRUMENT CLUSTER PRINTED CIRCUIT	
	1 Measure the resistance between instrument cluster printed circuit terminal C286-12 and oil pressure gauge contact clip S. • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new oil pressure gauge. REFER to Gauges . TEST the system for normal operation. → **No** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation.

PINPOINT TEST D: A GAUGE IS INACCURATE — SPEEDOMETER

CONDITIONS	DETAILS/RESULTS/ACTIONS
D1 CHECK THE TIRES	
	1 Check for factory recommended tire size.

	• **Are the tires the correct size?** → **Yes** GO to D2 . → **No** INSTALL new tires as necessary. TEST the system for normal operation.
D2 CHECK THE ODOMETER	
	1 Check the accuracy of the odometer; refer to Component Tests. • **Is the odometer accurate?** → **Yes** GO to Pinpoint Test E . → **No** INSTALL a new speedometer. REFER to Gauges . TEST the system for normal operation.

PINPOINT TEST E: THE SPEEDOMETER/ODOMETER IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
E1 CHECK THE VOLTAGE TO THE INSTRUMENT CLUSTER	
1  2  Instrument Cluster 3  GK1837-A	3 Measure the voltage between instrument cluster C288-7, circuit 1001 (WH/YE), and ground. • **Is the voltage greater than 10 volts?**

→ **Yes**
GO to E2 .

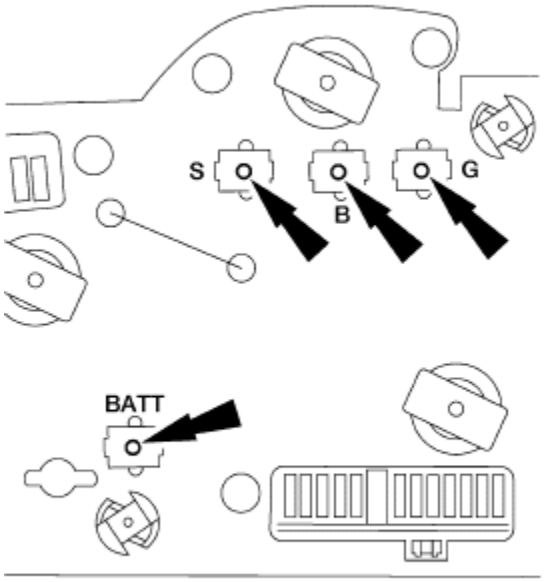
→ **No**
REPAIR circuit 1001 (WH/YE). TEST the system for normal operation.

E2 CHECK THE INSTRUMENT CLUSTER PRINTED CIRCUIT

1

Instrument Cluster

2



GK6907-A

2 **NOTE:** Measurements must be made to the speedometer gauge pins that are inside the instrument cluster printed circuit clips.

Measure the resistance between the speedometer pins (which can be seen in the middle of the instrument cluster printed circuit clips) and the corresponding instrument cluster terminal. Refer to the table for the pin and terminal assignments.

Instrument Cluster Terminal	Speedometer Gauge Pin
C286-13	B
C287-1	S
C287-2	G
C288-7	BATT

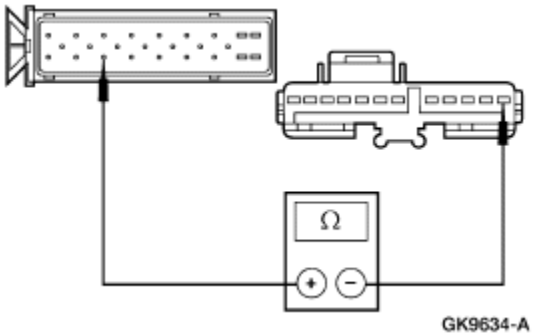
- **Are the resistances less than 1 ohm?**

→ **Yes**
GO to E3 .

→ **No**
INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation.

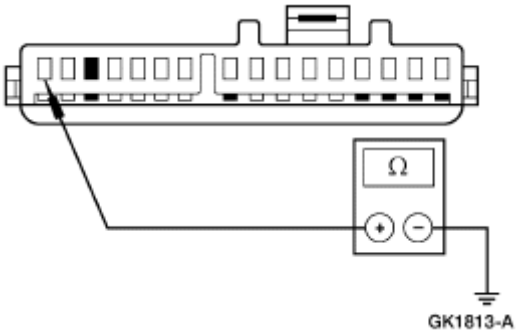
E3 CHECK CIRCUIT 679 (GY/BK)

1

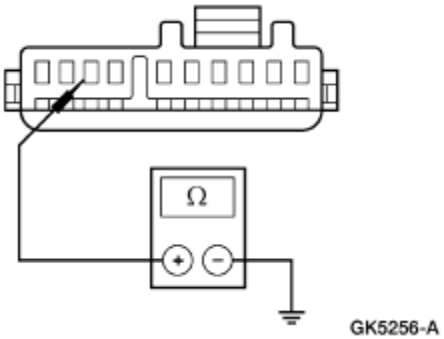
 Anti-Lock Brake Control Module C186 2 	2 Measure the resistance between anti-lock brake control module C186-19, circuit 679 (GY/BK), and instrument cluster C287-1, circuit 679 (GY/BK). • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new speedometer. REFER to Gauges . TEST the system for normal operation. → **No** REPAIR circuit 679 (GY/BK). TEST the system for normal operation.

PINPOINT TEST F: THE TACHOMETER IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
F1 CHECK THE GROUND TO THE TACHOMETER	
1  2  Instrument Cluster 3	3 If equipped with 5.0L engine, measure the resistance between instrument cluster C286-16, circuit 397 (BK/WH), and ground.



4



4 If equipped with 4.0L engine, measure the resistance between instrument cluster C288-8, circuit 398 (BK/YE), and ground.

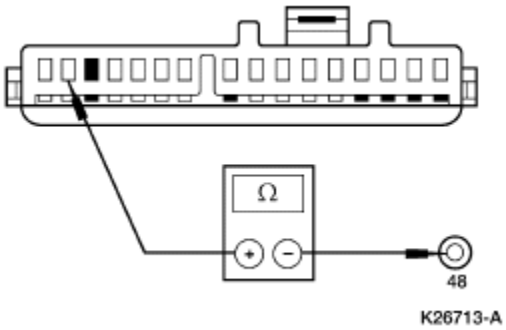
- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to F2 .

→ **No**
REPAIR circuit 397 (BK/WH) or circuit 398 (BK/YE). TEST the system for normal operation.

F2 CHECK CIRCUIT 11 (TN/YE) FOR OPEN

2

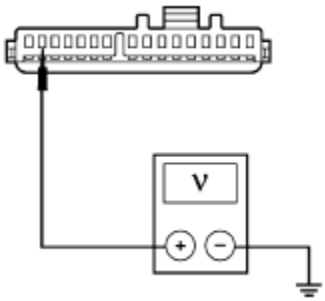


1 Connect the EEC-V 104-Pin Breakout Box.

2 Measure the resistance between instrument cluster C286-15, circuit 11 (TN/YE), and EEC-V 104-Pin Breakout Box pin 48, circuit 11 (TN/YE).

- **Is the resistance less than 5 ohms?**

→ **Yes**
RECONNECT the powertrain control module

	(PCM). GO to F3 . → **No** REPAIR circuit 11 (TN/YE). TEST the system for normal operation.
F3 CHECK CLEAN TACH OUT (CTO) SIGNAL TO TACHOMETER	
1  2  GK9635-A	2 Measure the voltage between instrument cluster C286-15, circuit 11 (TN/YE), and ground. • **Is the voltage between 5 and 8 volts?** → **Yes** GO to F4 . → **No** INSTALL a new PCM. TEST the system for normal operation.
F4 CHECK THE INSTRUMENT CLUSTER PRINTED CIRCUIT	
1  Instrument Cluster	2 Measure the resistance between the tachometer and instrument cluster printed circuit terminals; refer to the following chart:

Instrument Cluster Printed Circuit Terminal	Tachometer Terminal	Expected Values
C286-13	B	Less than 5 ohms
C286-15	S	Less than

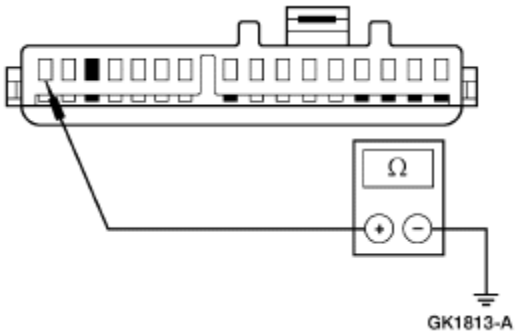
		5 ohms
C286-16	Upper G (8 CYL)	Less than 5 ohms
C287-2	Lower G	Less than 5 ohms
C288-8	Upper G (6 CYL)	3.9-4.7 kohms

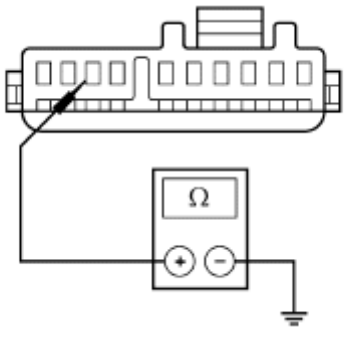
- **Are the resistances as specified?**

→ **Yes**
INSTALL a new tachometer. Gauges . TEST the system for normal operation.

→ **No**
INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation.

PINPOINT TEST G: INCORRECT TACHOMETER INDICATION

CONDITIONS	DETAILS/RESULTS/ACTIONS
G1 CHECK THE GROUND TO THE TACHOMETER	
1 	
2  Instrument Cluster	
3  GK1813-A	3 If equipped with 5.0L engine, measure the resistance between instrument cluster C286-16, circuit 397 (BK/WH), and ground.
4	4 If equipped with 4.0L engine, measure the resistance between instrument cluster C288-8, circuit 398 (BK/YE), and ground.



- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to G2 .

→ **No**
REPAIR circuit 397 (BK/WH) or circuit 398 (BK/YE). TEST the system for normal operation.

G2 CHECK THE INSTRUMENT CLUSTER PRINTED CIRCUIT

1

Instrument Cluster

2 Measure the resistance between the tachometer and instrument cluster printed circuit terminals; refer to the following chart:

Instrument Cluster Printed Circuit Terminal	Tachometer Terminal	Expected Values
C286-13	B	Less than 5 ohms
C286-15	S	Less than 5 ohms
C286-16	Upper G (8 CYL)	Less than 5 ohms
C287-2	Lower G	Less than 5 ohms
C288-8	Upper G (6 CYL)	3.9-4.7 kohms

- **Are the resistances as specified?**

→ **Yes**

	GO to G3 . → **No** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation.
G3 CHECK FOR CLEAN TACH OUT (CTO) CIRCUIT OPEN OR SHORT	
	1 Check for CTO circuit open or short; refer to Powertrain Control/Emissions Diagnosis (PC/ED) manual. • **Is the CTO circuit OK?** → **Yes** INSTALL a new tachometer. REFER to Gauges . TEST the system for normal operation. → **No** INSTALL a new PCM. TEST the system for normal operation.

PINPOINT TEST H: THE CHARGE SYSTEM WARNING INDICATOR IS NEVER/ALWAYS ON

CONDITIONS	DETAILS/RESULTS/ACTIONS
H1 CHECK THE FUSE	
1  2  CJB Fuse 15 (7.5A)	• **Is the fuse OK?** → **Yes** GO to H2 . → **No** INSTALL a new fuse. If the fuse fails again, CHECK for a short to ground. REPAIR as necessary. TEST the system for normal operation.
H2 CHECK THE CHARGE SYSTEM WARNING INDICATOR CONTROL CIRCUIT	
1	

Generator C121

2

3

GK1867-A

3 Connect a 7.5A fused jumper wire between generator C121-I, circuit 904 (LG/RD), and ground.

- **Does the charge system warning indicator illuminate?**

→ **Yes**
REFER to Section 414-00 .

→ **No**
GO to H3 .

H3 CHECK THE POWER TO THE INSTRUMENT CLUSTER

1

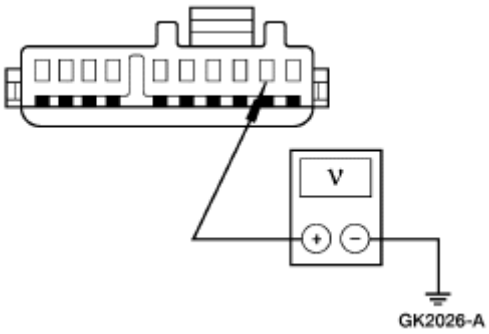
2

Instrument Cluster

3

4

4 Measure the voltage between instrument cluster C288-2, circuit 584 (YE), and ground.



- **Is the voltage greater than 10 volts?**

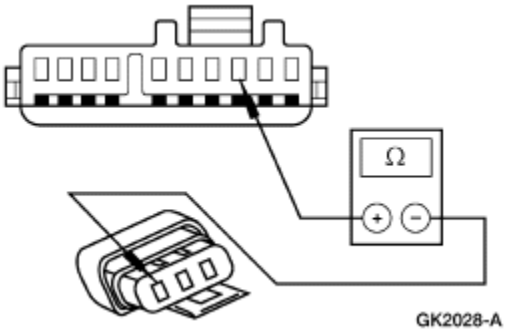
→ **Yes**
GO to H4 .

→ **No**
REPAIR circuit 584 (YE). TEST the system for normal operation.

H4 CHECK CIRCUIT 904 (LG/RD) FOR OPEN

1

2



2 Measure the resistance between instrument cluster C288-3, circuit 904 (LG/RD), and generator C121-I.

- **Is the resistance less than 5 ohms?**

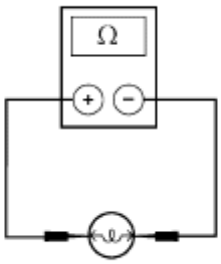
→ **Yes**
GO to H5 .

→ **No**
REPAIR circuit 904 (LG/RD). TEST the system for normal operation.

H5 CHECK THE CHARGE SYSTEM WARNING INDICATOR BULB

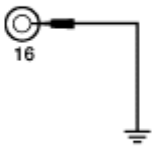
1

1 Measure for continuity between the terminals of the charge system warning indicator bulb.

 GK4131-A	• **Does continuity exist?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** INSTALL a new bulb. TEST the system for normal operation.

PINPOINT TEST J: AN INDICATOR IS INOPERATIVE — ANTI-LOCK BRAKE WARNING

CONDITIONS	DETAILS/RESULTS/ACTIONS
J1 CHECK THE ANTI-LOCK BRAKE WARNING INDICATOR CONTROL CIRCUIT	
1 	
2  Anti-Lock Brake Control Module C186	
	3 Connect the EEC-IV 60-Pin Breakout Box.
4 	
5	5 Connect a 7.5A fused jumper wire between EEC-IV 60-Pin Breakout Box pin 16, circuit 603 (DG), and ground.



GK6012-A

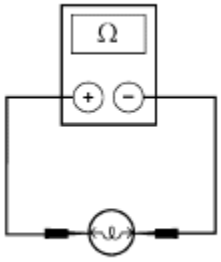
- **Does the anti-lock brake warning indicator illuminate?**

→ **Yes**
REFER to Section 206-09 .

→ **No**
GO to J2 .

J2 CHECK THE ANTI-LOCK BRAKE WARNING INDICATOR BULB

1



GK4131-A

1 Measure for continuity between the terminals of the anti-lock brake warning indicator bulb.

- **Does continuity exist?**

→ **Yes**
GO to J3 .

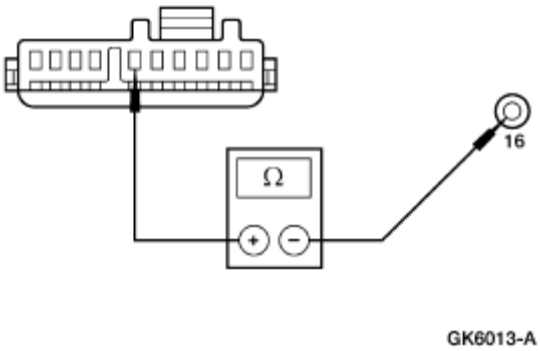
→ **No**
INSTALL a new bulb. TEST the system for normal operation.

J3 CHECK CIRCUIT 603 (DG) FOR OPEN

1

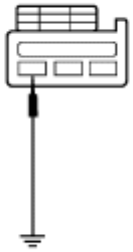
2

2 Measure the resistance between instrument cluster C288-6, circuit 603 (DG), and EEC-IV 60-Pin Breakout Box pin 16.

 GK6013-A	• **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** REPAIR circuit 603 (DG). TEST the system for normal operation.

PINPOINT TEST K: AN INDICATOR IS INOPERATIVE — FUEL RESET

CONDITIONS	DETAILS/RESULTS/ACTIONS
K1 CHECK THE FUEL RESET INDICATOR CONTROL CIRCUIT	
1  2  Inertia Fuel Shutoff Switch C203 3  4	4 Connect a 7.5A jumper wire between inertia fuel shutoff switch C203-1, circuit 921 (GY/OG), and ground.



GK2018-A

- **Does the FUEL RESET indicator illuminate?**

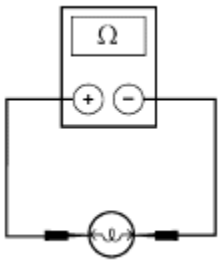
→ **Yes**
REFER to Powertrain Control/Emissions Diagnosis (PC/ED) manual.

→ **No**
GO to K2 .

K2 CHECK THE FUEL RESET INDICATOR BULB

1

2



GK4131-A

2 Measure for continuity between the terminals of the FUEL RESET indicator bulb.

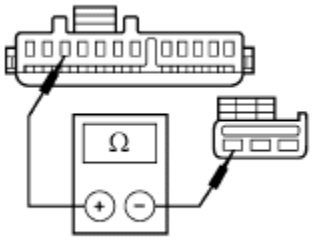
- **Does continuity exist?**

→ **Yes**
GO to K3 .

→ **No**
INSTALL a new bulb. TEST the system for normal operation.

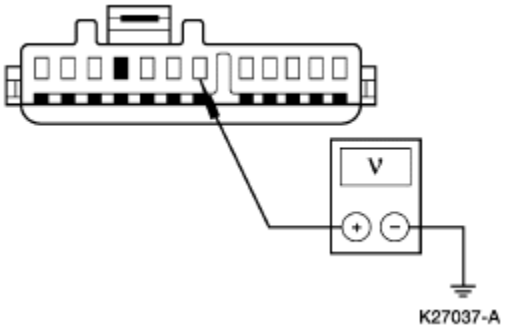
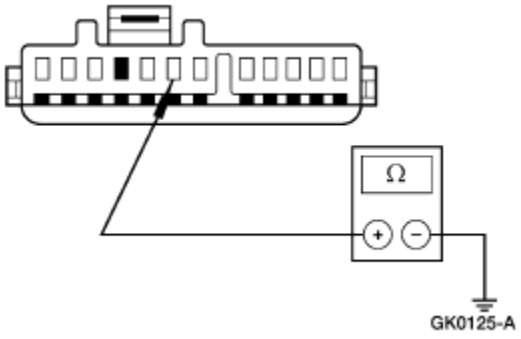
K3 CHECK CIRCUIT 921 (GY/OG) FOR OPEN

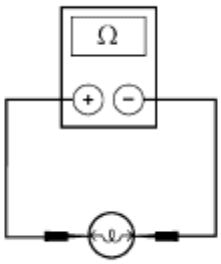
1

 Instrument Cluster 2  GK6257-A	2 Measure the resistance between instrument cluster C287-10, circuit 921 (GY/OG), and inertia fuel shutoff switch C203-1, circuit 921 (GY/OG). • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** REPAIR circuit 921 (GY/OG). TEST the system for normal operation.

PINPOINT TEST L: AN INDICATOR IS INOPERATIVE — HIGH BEAM

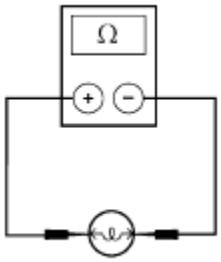
CONDITIONS	DETAILS/RESULTS/ACTIONS
L1 CHECK THE POWER TO THE INSTRUMENT CLUSTER	
1  2  Instrument Cluster 3 	4 Turn the headlamp switch to the ON position. 5 Set the multifunction switch to the high beam

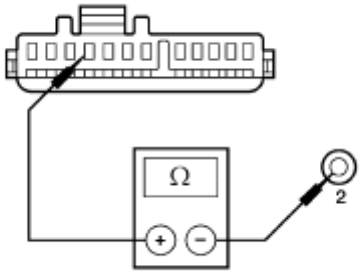
6  	position. 6 Measure the voltage between instrument cluster C287-6, circuit 12 (LG/BK), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to L2 . → **No** REPAIR circuit 12 (LG/BK). TEST the system for normal operation.
L2 CHECK THE GROUND TO THE INSTRUMENT CLUSTER	
1  2  	2 Measure the resistance between instrument cluster C287-7, circuit 57 (BK), and ground. • **Is the resistance less than 5 ohms?** → **Yes** GO to L3 . → **No** REPAIR circuit 57 (BK). TEST the system for normal operation.
L3 CHECK THE HIGH BEAM INDICATOR BULB	
1	1 Measure for continuity between the terminals

 GK4131-A	of the high beam indicator bulb. • **Does continuity exist?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** INSTALL a new bulb. TEST the system for normal operation.

PINPOINT TEST M: AN INDICATOR IS INOPERATIVE — CHECK ENGINE/MALFUNCTION INDICATOR LAMP (MIL)

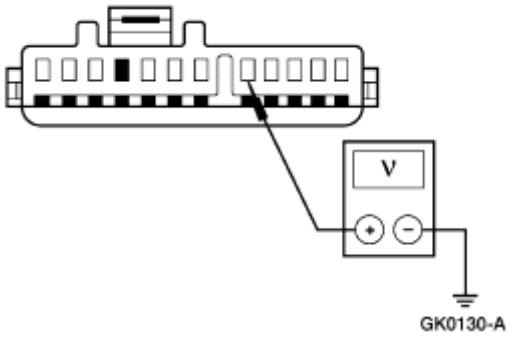
CONDITIONS	DETAILS/RESULTS/ACTIONS
M1 CHECK THE ENGINE WARNING INDICATOR CONTROL CIRCUIT	
1  3  4  GK1841-A	2 Connect the EEC-V 104-Pin Breakout Box. 4 Connect a 7.5A fused jumper wire between EEC-V 104-Pin Breakout Box pin 2 and pin 24.

	• **Does the CHECK ENGINE warning indicator illuminate?** → **Yes** REFER to Powertrain Control/Emissions Diagnosis (PC/ED) manual. → **No** GO to M2 .
M2 CHECK THE BULB	
1  2  GK4131-A	2 Measure for continuity between the terminals of the CHECK ENGINE warning indicator bulb. • **Does continuity exist?** → **Yes** GO to M3 . → **No** INSTALL a new bulb. TEST the system for normal operation.
M3 CHECK CIRCUIT 658 (PK/LG) FOR OPEN	
1  Instrument Cluster 2	2 Measure the resistance between EEC-V 104-Pin Breakout Box pin 2 and instrument cluster C287-9, circuit 658 (PK/LG).

 GK8307-A	• **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** REPAIR circuit 658 (PK/LG). TEST the system for normal operation.

PINPOINT TEST N: AN INDICATOR IS INOPERATIVE — LH TURN SIGNAL

CONDITIONS	DETAILS/RESULTS/ACTIONS
N1 CHECK THE POWER TO THE INSTRUMENT CLUSTER	
1  2  Instrument Cluster 3  5	4 Place the multifunction switch in the LH turn signal position. 5 Measure the voltage between instrument cluster C287-5, circuit 3 (LG/WH), and ground.



- **Does the voltage vary from 0 to greater than 10 volts?**

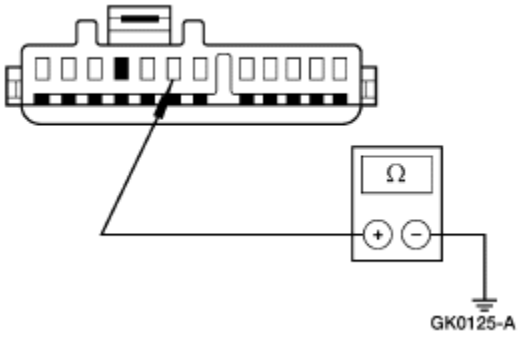
→ **Yes**
GO to N2 .

→ **No**
REPAIR circuit 3 (LG/WH). TEST the system for normal operation.

N2 CHECK THE GROUND TO THE INSTRUMENT CLUSTER

1

2



2 Measure the resistance between instrument cluster C287-7, circuit 57 (BK), and ground.

- **Is the resistance less than 5 ohms?**

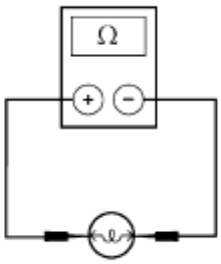
→ **Yes**
GO to N3 .

→ **No**
REPAIR circuit 57 (BK). TEST the system for normal operation.

N3 CHECK THE LH TURN INDICATOR BULB

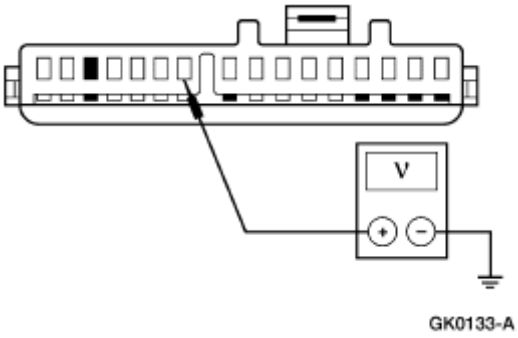
1

1 Measure for continuity between the terminals of the LH turn indicator bulb.

 GK4131-A	• **Does continuity exist?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** INSTALL a new bulb. TEST the system for normal operation.

PINPOINT TEST P: AN INDICATOR IS INOPERATIVE — RH TURN SIGNAL

CONDITIONS	DETAILS/RESULTS/ACTIONS
P1 CHECK THE POWER TO THE INSTRUMENT CLUSTER	
1  2  Instrument Cluster 3  5	4 Place the multifunction switch in the RH turn signal position. 5 Measure the voltage between instrument cluster C286-10, circuit 2 (WH/LB), and ground.



- **Does the voltage vary from 0 to greater than 10 volts?**

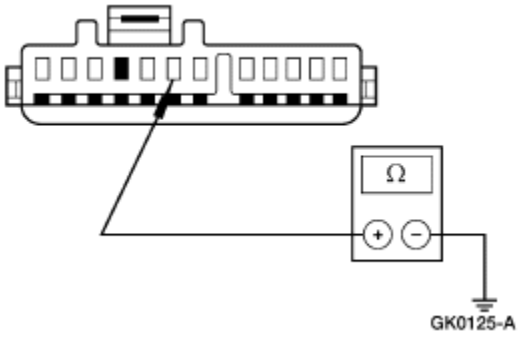
→ **Yes**
GO to P2 .

→ **No**
REPAIR circuit 2 (WH/LB). TEST the system for normal operation.

P2 CHECK THE GROUND TO THE INSTRUMENT CLUSTER

1

2



2 Measure the resistance between instrument cluster C287-7, circuit 57 (BK), and ground.

- **Is the resistance less than 5 ohms?**

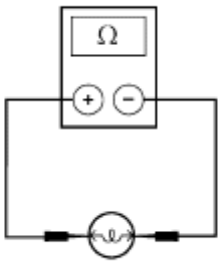
→ **Yes**
GO to P3 .

→ **No**
REPAIR circuit 57 (BK). TEST the system for normal operation.

P3 CHECK THE RH TURN INDICATOR BULB

1

1 Measure for continuity between the terminals of the RH turn indicator bulb.

 GK4131-A	• **Does continuity exist?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** INSTALL a new bulb. TEST the system for normal operation.

PINPOINT TEST Q: AN INDICATOR IS INOPERATIVE — O/D OFF

CONDITIONS	DETAILS/RESULTS/ACTIONS
Q1 CHECK OVERDRIVE OPERATION	
	1 Test drive the vehicle. • **Does overdrive operate correctly?** → **Yes** GO to Q2 . → **No** REFER to Section 307-05 .
Q2 CHECK THE O/D OFF INDICATOR CIRCUIT	
1  3  4	2 Connect EEC-V 104-Pin Breakout box. 4 Connect a 7.5A fused jumper wire between

GK1925-A

EEC-V 104-Pin Breakout Box pin 79 and pin 24.

5 Place the headlamp switch in the OFF position.

6 Place the headlamp switch in the ON position.

- **Does the O/D OFF indicator illuminate?**

→ **Yes**
REFER to Section 307-05 .

→ **No**
If the O/D OFF indicator does not illuminate with the headlamp switch in the ON position, GO to Q3 .

If the O/D OFF indicator does not illuminate with the headlamp switch in the OFF position, GO to Q4 .

If the O/D OFF indicator does not illuminate with the headlamp switch in the ON or OFF position, GO to Q5 .

Q3 CHECK VOLTAGE ON CIRCUIT 19 (LB/RD) TO HEADLAMP SWITCH

1

2

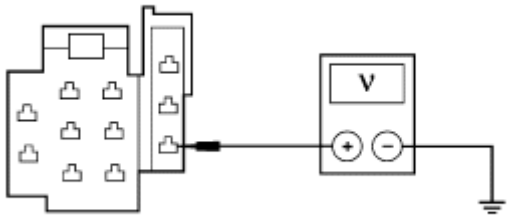
Headlamp Switch C216

3

4 Rotate the panel dimmer switch to the full illumination position.

5

5 Measure the voltage between headlamp



GK5300-A

switch C216-9, circuit 235 (RD/BK), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
INSTALL a new headlamp switch. REFER to Section 417-01 . TEST the system for normal operation.

→ **No**
REPAIR circuit 235 (RD/BK). TEST the system for normal operation.

Q4 CHECK VOLTAGE TO THE HEADLAMP SWITCH

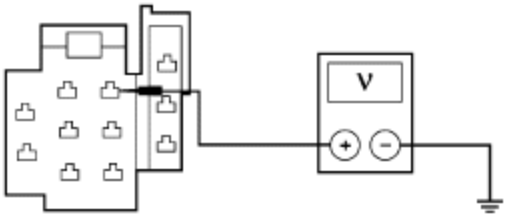
1

2

Headlamp Switch C216

3

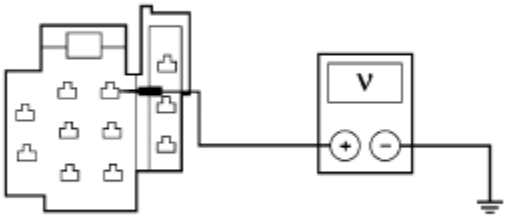
4



GK5301-A

4 Measure the voltage between headlamp switch C216-4, circuit 192 (BN/WH), and ground.

- **Is the voltage greater than 10 volts?**

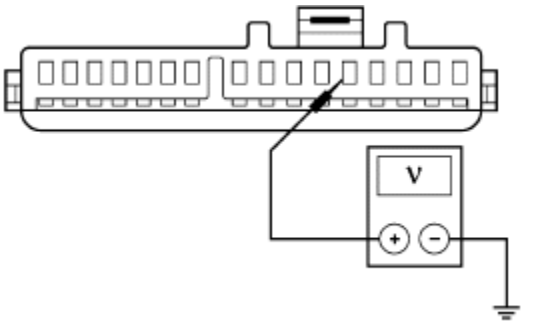
	→ **Yes** INSTALL a new headlamp switch. REFER to Section 417-01 . TEST the system for normal operation. → **No** REPAIR circuit 192 (BN/WH). TEST the system for normal operation.
Q5 CHECK POWER SUPPLY TO THE HEADLAMP SWITCH	
1  2  Headlamp Switch C216 3  4  GK5301-A	4 Measure the voltage between headlamp switch C216-4, circuit 192 (BN/WH), and ground. • **Is the voltage greater than 10 volts?** → **Yes** RECONNECT headlamp switch C216. GO to Q6 . → **No** REPAIR circuit 192 (BN/WH). TEST the system for normal operation.
Q6 CHECK VOLTAGE TO THE INSTRUMENT CLUSTER	
1 	

2

Instrument Cluster

3

4



4 Measure the voltage between instrument cluster C286-5, circuit 484 (OG/BK), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to Q8 .

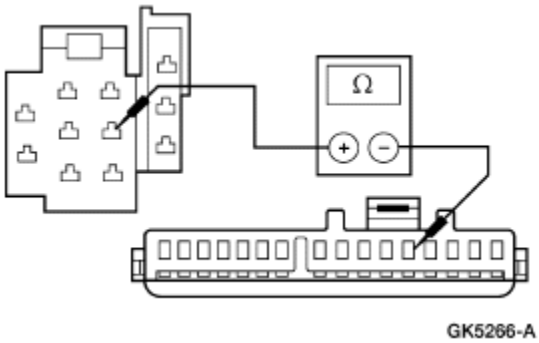
→ **No**
GO to Q7 .

Q7 CHECK CIRCUIT 484 (OG/BK) FOR OPEN

1

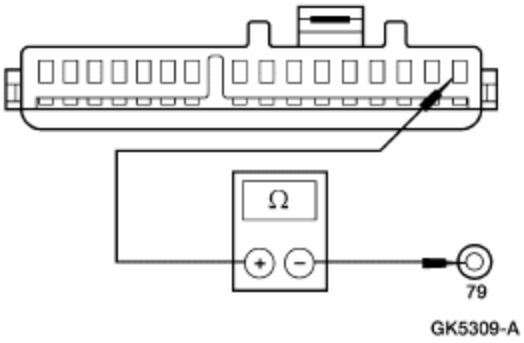
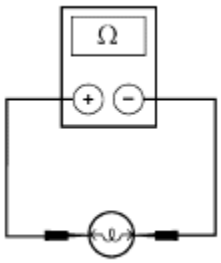
Headlamp Switch C216

2



2 Measure the resistance between headlamp switch C216-8, circuit 484 (OG/BK), and instrument cluster C286-5, circuit 484 (OG/BK).

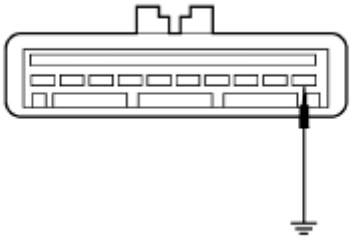
- **Is the resistance less than 5 ohms?**

	→ **Yes** INSTALL a new headlamp switch. REFER to Section 417-01 . TEST the system for normal operation. → **No** REPAIR circuit 484 (OG/BK). TEST the system for normal operation.
Q8 CHECK CIRCUIT 911 (WH/LG)	
1  PCM 3  GK5309-A	2 Connect EEC-V 104-Pin Breakout Box. 3 Measure the resistance between EEC-V 104-Pin Breakout Box pin 79, circuit 911 (WH/LG), and instrument cluster C286-1, circuit 911 (WH/LG). • **Is the resistance less than 5 ohms?** → **Yes** GO to Q9 . → **No** REPAIR circuit 911 (WH/LG). TEST the system for normal operation.
Q9 CHECK THE O/D OFF INDICATOR BULB	
1  GK4131-A	1 Measure for continuity between the terminals of the O/D OFF indicator bulb. • **Does continuity exist?**

	→ **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** INSTALL a new bulb. TEST the system for normal operation.

PINPOINT TEST R: THE SPEED CONTROL INDICATOR IS NEVER/ALWAYS ON

CONDITIONS	DETAILS/RESULTS/ACTIONS
R1 CHECK SPEED CONTROL OPERATION	
	1 Test drive the vehicle and operate the speed control. • **Does the speed control operate correctly?** → **Yes** GO to R2 . → **No** REFER to Section 310-03 .
R2 CHECK THE SPEED CONTROL INDICATOR CIRCUIT	
1  2  Speed Control Servo C171 3  4	4 Connect a 7.5A fused jumper wire between speed control servo C171-1, circuit 203 (OG/LB), and ground.



GK6319-A

5 Place the headlamp switch in the OFF position.

6 Place the headlamp switch in the ON position.

- **Does the speed control indicator illuminate?**

→ **Yes**
INSTALL a new speed control servo. REFER to Section 310-03 . TEST the system for normal operation.

→ **No**
If the speed control indicator does not illuminate in the ON position, GO to R3 .

If the speed control indicator does not illuminate in the OFF position, GO to R4 .

If the speed control indicator does not illuminate in the ON or OFF position, GO to R5 .

R3 CHECK VOLTAGE ON CIRCUIT 235 (RD/BK) TO HEADLAMP SWITCH

1

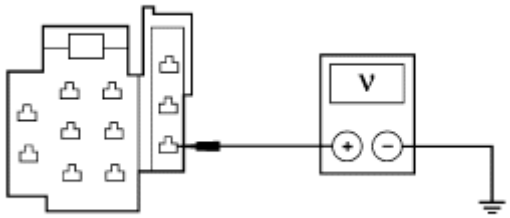
2

Headlamp Switch C216

3

4

4 Measure the voltage between headlamp switch C216-9, circuit 235 (RD/BK), and ground.



GK5300-A

- **Is the voltage greater than 10 volts?**

→ **Yes**
INSTALL a new headlamp switch. REFER to Section 417-01 . TEST the system for normal operation.

→ **No**
REPAIR circuit 235 (RD/BK). TEST the system for normal operation.

R4 CHECK VOLTAGE TO THE HEADLAMP SWITCH

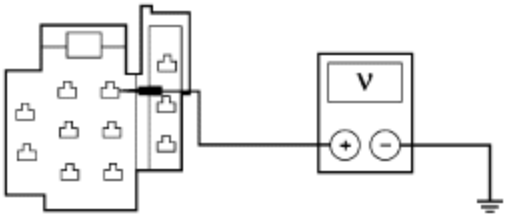
1

2

Headlamp Switch C216

3

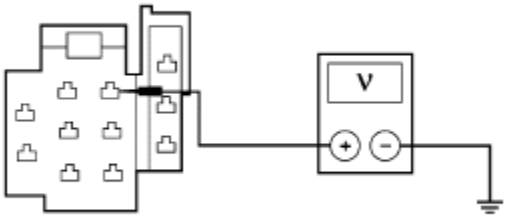
4



GK5301-A

4 Measure the voltage between headlamp switch C216-4, circuit 192 (BN/WH), and ground.

- **Is the voltage greater than 10 volts?**

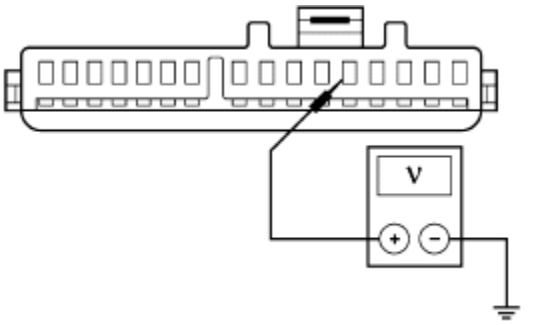
	→ **Yes** INSTALL a new headlamp switch. REFER to Section 417-01 . TEST the system for normal operation. → **No** REPAIR circuit 192 (BN/WH). TEST the system for normal operation.
R5 CHECK POWER SUPPLY TO THE HEADLAMP SWITCH	
1  2  Headlamp Switch C216 3  4  GK5301-A	4 Measure the voltage between headlamp switch C216-4, circuit 192 (BN/WH), and ground. • **Is the voltage greater than 10 volts?** → **Yes** RECONNECT headlamp switch C205. GO to R6 . → **No** REPAIR circuit 640 (RD/YE). TEST the system for normal operation.
R6 CHECK VOLTAGE TO THE INSTRUMENT CLUSTER	
1 	

2

Instrument Cluster

3

4



4 Measure the voltage between instrument cluster C286-5, circuit 484 (OG/BK), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to R8.

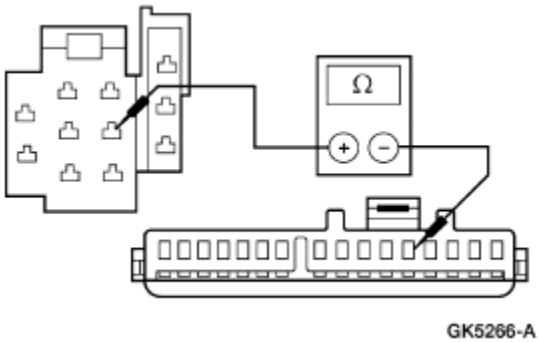
→ **No**
GO to R7.

R7 CHECK CIRCUIT 484 (OG/BK) FOR OPEN

1

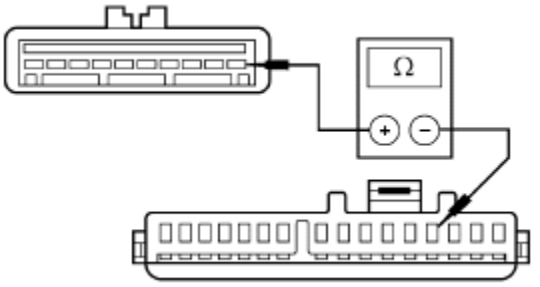
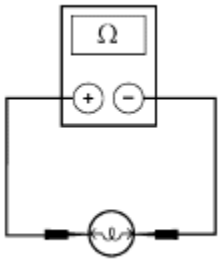
Headlamp Switch C216

2



2 Measure the resistance between headlamp switch C216-8, circuit 484 (OG/BK) and instrument cluster C286-5, circuit 484 (OG/BK).

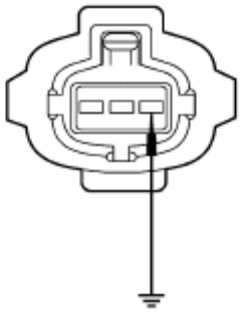
- **Is the resistance less than 5 ohms?**

	→ **Yes** INSTALL a new headlamp switch. REFER to Section 417-01 . TEST the system for normal operation. → **No** REPAIR circuit 484 (OG/BK). TEST the system for normal operation.
R8 CHECK CIRCUIT 203 (OG/LB)	
1  Speed Control Servo C171 2  GK5302-A	2 Measure the resistance between speed control servo C171-1, circuit 203 (OG/LB), and instrument cluster C286-4, circuit 203 (OG/LB). • **Is the resistance less than 5 ohms?** → **Yes** GO to R9 . → **No** REPAIR circuit 203 (OG/LB). TEST the system for normal operation.
R9 CHECK THE SPEED CONTROL INDICATOR BULB	
1  GK4131-A	1 Measure for continuity between the terminals of the speed control indicator bulb. • **Does continuity exist?**

	→ **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** INSTALL a new bulb. TEST the system for normal operation.

PINPOINT TEST S: AN INDICATOR IS INOPERATIVE — RED BRAKE WARNING

CONDITIONS	DETAILS/RESULTS/ACTIONS
S1 CHECK THE PARKING BRAKE SWITCH CONTROL CIRCUIT	
1 	2 Set the parking brake. • **Does the red BRAKE warning indicator illuminate?** → **Yes** RELEASE the parking brake. GO to S2 . → **No** GO to S5 .
S2 CHECK THE RED BRAKE WARNING INDICATOR CONTROL CIRCUIT	
1  2  Brake Fluid Level Switch C143 3  4	4 Connect a 7.5A fused jumper wire between brake fluid level switch C143-3, circuit 977 (VT/WH), and ground.



GK9636-A

- **Does the red BRAKE warning indicator illuminate?**

→ **Yes**
REFER to Section 206-00 .

→ **No**
GO to S3 .

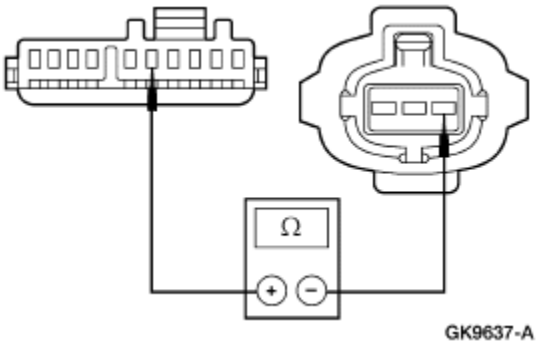
S3 CHECK CIRCUIT 977 (VT/WH) FOR OPEN

1

2

Instrument Cluster

3



GK9637-A

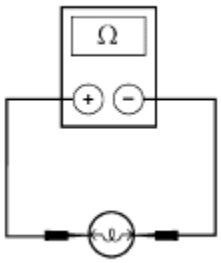
3 Measure the resistance between instrument cluster C288-5, circuit 977 (VT/WH), and brake fluid level switch C143-3, circuit 977 (VT/WH).

- **Is the resistance less than 5 ohms?**

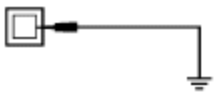
→ **Yes**
GO to S4 .

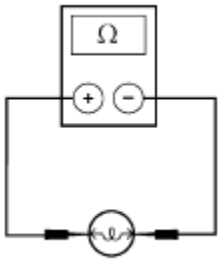
→ **No**
REPAIR circuit 977 (VT/WH). TEST the system for normal operation.

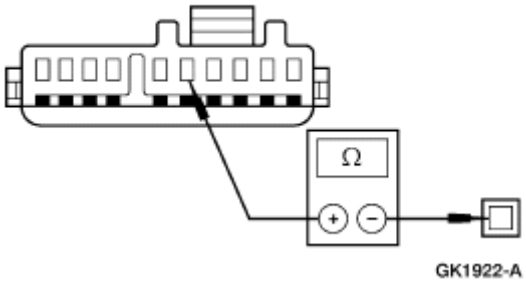
S4 CHECK THE RED BRAKE WARNING INDICATOR BULB

1  GK4131-A	1 Measure for continuity between the terminals of the red BRAKE warning indicator bulb. • **Does continuity exist?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** INSTALL a new bulb. TEST the system for normal operation.

S5 CHECK THE PARKING BRAKE SWITCH

1  2  Parking Brake Switch C211 3  4  GK1921-A	4 Connect a 7.5A fused jumper wire between parking brake switch C211, circuit 162 (LG/RD), and ground.

	• **Does the red BRAKE warning indicator illuminate?** → **Yes** INSTALL a new parking brake switch. TEST the system for normal operation. → **No** GO to S6.
S6 CHECK THE RED BRAKE WARNING INDICATOR BULB	
1  2  GK4131-A	2 Measure for continuity between the terminals of the red BRAKE warning indicator bulb. • **Does continuity exist?** → **Yes** GO to S7. → **No** INSTALL a new bulb. TEST the system for normal operation.
S7 CHECK CIRCUIT 977 (VT/WH) FOR OPEN	
1  Instrument Cluster 2	2 Measure the resistance between instrument cluster C288-5, circuit 977 (VT/WH), and parking brake switch C211, circuit 162 (LG/RD).

	• **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation. → **No** REPAIR circuit 977 (VT/WH) or circuit 162 (LG/RD). TEST the system for normal operation.

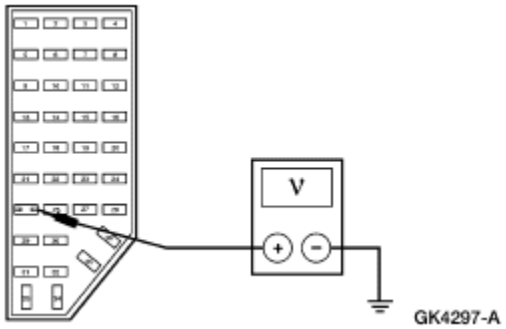
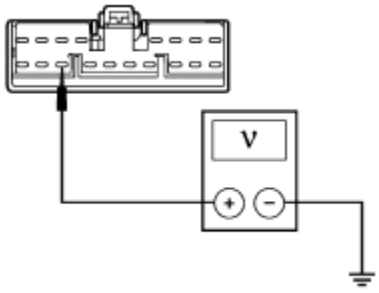
PINPOINT TEST T: AN INDICATOR IS INOPERATIVE — CHECK GAGE

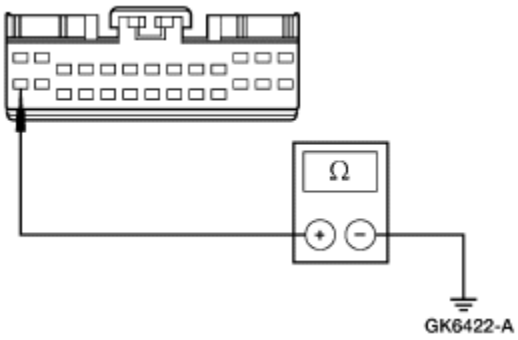
CONDITIONS	DETAILS/RESULTS/ACTIONS
T1 CHECK GAUGES	
1 	• **Are the gauges OK?** → **Yes** GO to T2 . → **No** RETURN to Symptom Chart.
T2 CHECK THE INSTRUMENT CLUSTER PRINTED CIRCUIT	
1  Instrument Cluster	2 Measure the resistance of the instrument cluster printed circuit between the following:

	■ CHECK GAGE indicator lamp socket and instrument cluster printed circuit terminal C287-8. ■ CHECK GAGE indicator lamp socket and instrument cluster gauge amplifier Pin 2. • **Are the resistances less than 5 ohms?** → **Yes** INSTALL a new coolant temperature/fuel level gauge and instrument cluster gauge amplifier. REFER to Gauges . TEST the system for normal operation. → **No** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation.

PINPOINT TEST U: NO COMMUNICATION WITH THE MODULE — GENERIC ELECTRONIC MODULE

CONDITIONS	DETAILS/RESULTS/ACTIONS
U1 CHECK BJB MAXI-FUSE 1 (60A)	
1  BJB Maxi-Fuse 1 (60A)	• **Is the fuse OK?** → **Yes** GO to U2 . → **No** INSTALL a new fuse. CLEAR the DTCs. TEST the system for normal operation. If the fuse fails again CHECK circuit 1052 (TN/BK) for a short to ground. REPAIR as necessary.
U2 CHECK CJB FUSE 25 (7.5A)	
1  CJB Fuse 25 (7.5A)	• **Is the fuse OK?** → **Yes** GO to U3 .

	→ **No** INSTALL a new fuse. CLEAR the DTCs. TEST the system for normal operation. If the fuse fails again CHECK circuit 1001 (WH/YE) for a short to ground. REPAIR as necessary.
U3 CHECK CIRCUIT 1052 (TN/BK) FOR VOLTAGE	
1  	1 Measure the voltage between CJB Fuse 25 (7.5A) pin 2, circuit 1052 (TN/BK), and ground. • **Is voltage greater than 10 volts?** → **Yes** GO to U4 . → **No** REPAIR circuit 1052 (TN/BK). CLEAR the DTCs. TEST the system for normal operation.
U4 CHECK THE VOLTAGE TO THE GEM/CTM — CIRCUIT 1001 (WH/YE)	
1  2  GEM/CTM C283 3  	3 Measure the voltage between GEM/CTM C283-11, circuit 1001 (WH/YE), and ground. • **Is the voltage greater than 10 volts?**

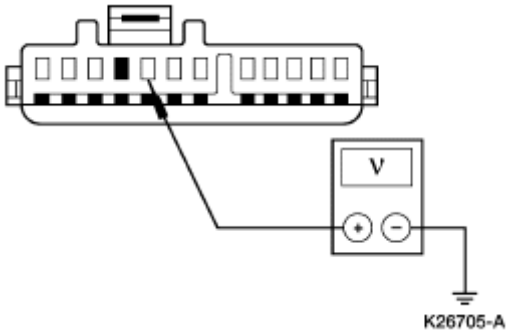
	→ **Yes** GO to U5 . → **No** REPAIR circuit 1001 (WH/YE). CLEAR the DTCs. TEST the system for normal operation.
U5 CHECK CIRCUIT 570 (BK/WH) FOR OPEN	
1  GEM/CTM C280 2  	2 Measure the resistance between GEM/CTM C280-14, circuit 570 (BK/WH), and ground; and between GEM/CTM C280-26, circuit 570 (BK/WH), and ground. • **Are the resistances less than 5 ohms?** → **Yes** REFER to Section 418-00 . → **No** REPAIR circuit 570 (BK/WH). CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST V: THE DOOR AJAR INDICATOR DOES NOT OPERATE CORRECTLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
V1 CHECK THE IGNITION SWITCH STATES	
1  2  Scan Tool	

3 	3 **NOTE:** If the vehicle is equipped with a manual transmission depress the clutch while turning the ignition switch to START. Monitor the PID IGN_GEM while turning the ignition switch through the START, RUN, OFF and ACC positions. • **Do the PID values agree with the ignition switch positions?** → **Yes** GO to V2 . → **No** REFER to Section 417-02 .
V2 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCs)	
	1 Use the recorded results from the continuous and on-demand self-tests. • **Are any DTCs recorded?** → **Yes** If DTC B1322, REFER to Section 417-02 . If DTC B1323, GO to V3 . If DTC B1325, GO to V9 . If DTC B1330, REFER to Section 417-02 . If DTC B1334, REFER to Section 417-02 . If DTC B1338, REFER to Section 417-02 . If DTC B1574, REFER to Section 417-02 . If DTC B1342, INSTALL a new GEM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to V4 .
V3 CHECK THE DOOR AJAR WARNING INDICATOR OPERATION — MONITOR THE PID DRAJR_L	
1  2	2 Monitor the PID DRAJR_L.

 3 	3 Toggle the active command AJAR LAMP ON and OFF. • **Does the PID DRAJR_L read OFF--- when the active command is OFF and read ON--- when the active command is ON?** → **Yes** INSTALL a new GEM. CLEAR the DTCs. TEST the system for normal operation. → **No** If the PID DRAJR_L reads OFFO-G, GO to V4 . If the PID DRAJR_L reads OFF-B-, GO to V9 .
V4 VERIFY THE OPERATION OF THE FUEL AND OIL GAUGE	
	1 Verify fuel and oil gauge operation. • **Do the fuel and oil gauges operate?** → **Yes** GO to V6 . → **No** GO to V5 .
V5 CHECK VOLTAGE TO THE INSTRUMENT CLUSTER	
1  2  Instrument Cluster 3  4	4 Measure the voltage between instrument



cluster C287-8, circuit 640 (RD/YE), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to V6 .

→ **No**
REPAIR circuit 640 (RD/YE). TEST the system for normal operation.

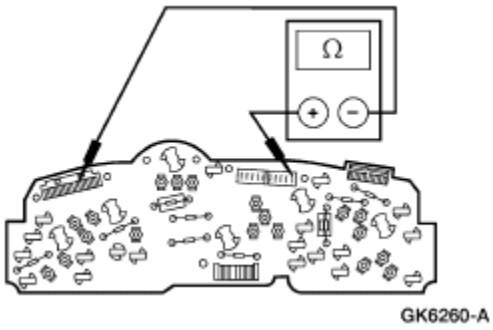
V6 CHECK THE INSTRUMENT CLUSTER PRINTED CIRCUIT FOR OPEN

1

2

Instrument Cluster

3

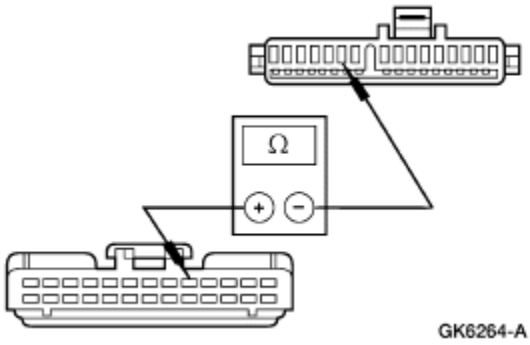
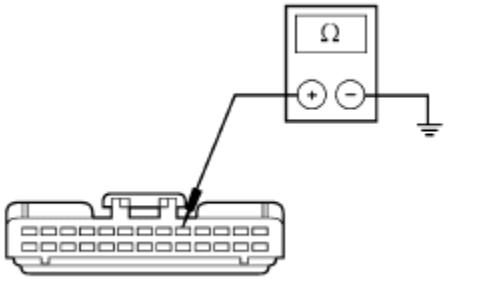


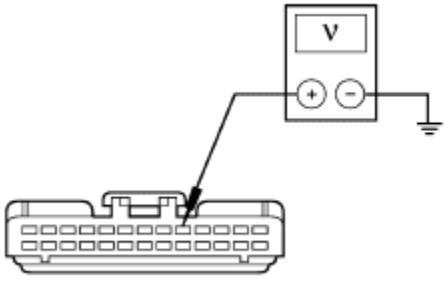
3 Measure the resistance between instrument cluster C286 terminal 11 and C287 terminal 8 (component side).

- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to V7 .

→ **No**
CHECK the DOOR AJAR warning indicator lamp. INSTALL a new lamp if necessary. If the

	lamp is OK, INSTALL a new instrument cluster printed circuit. CLEAR the DTCs. TEST the system for normal operation.
V7 CHECK CIRCUIT 627 (BK/OG) FOR OPEN	
1  GEM C280 2  GK6264-A	2 Measure the resistance between GEM C280-9, circuit 627 (BK/OG), and instrument cluster C286-11, circuit 627 (BK/OG). • **Is the resistance less than 5 ohms?** → **Yes** GO to V8 . → **No** REPAIR circuit 627 (BK/OG). CLEAR the DTCs. TEST the system for normal operation.
V8 CHECK CIRCUIT 627 (BK/OG) FOR SHORT TO GROUND	
1  GK3447-A	1 Measure the resistance between GEM C280-9, circuit 627 (BK/OG), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** INSTALL a new GEM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

	→ **No** REPAIR circuit 627 (BK/OG). CLEAR the DTCs. TEST the system for normal operation.
V9 CHECK CIRCUIT 627 (BK/OG) FOR SHORT TO POWER	
1  2  GEM C280 3  Instrument Cluster 4  5  GK3448-A	5 Measure the voltage between GEM C280-9, circuit 627 (BK/OG), and ground. • **Is any voltage indicated?** → **Yes** REPAIR circuit 627 (BK/OG). CLEAR the DTCs. TEST the system for normal operation. → **No** GO to V10 .
V10 CHECK THE INSTRUMENT CLUSTER FOR SHORT TO POWER — MONITOR THE PID DRAJR_L	
1	1 Monitor the PID DRAJR_L.

 2 	2 Set the active command AJAR LAMP to OFF. • **Does the PID DRAJR_L read OFF---?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . CLEAR the DTCs. TEST the system for normal operation. → **No** INSTALL a new GEM. CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST W: THE SAFETY BELT WARNING INDICATOR DOES NOT OPERATE CORRECTLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
W1 CHECK THE IGNITION STATES	
1  2  Scan Tool 3 	4 **NOTE:** If the vehicle is equipped with a manual transmission depress the clutch while turning the ignition switch to START. Monitor the PID IGN_GEM while turning the ignition switch through the START, RUN, OFF and ACC positions. • **Do the PID values agree with the ignition switch positions?**

	→ **Yes** GO to W2 . → **No** REFER to Section 417-02 .
W2 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCS)	
	1 Use the recorded results from the continuous and on-demand self-tests. • **Are any DTCs recorded?** → **Yes** If DTC B1342, INSTALL a new GEM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. If DTC B1426, GO to W9 . If DTC B1428, GO to W3 . If DTC B1462, REFER to Section 413-09 . → **No** GO to W3 .
W3 VERIFY THE SAFETY BELT WARNING CHIME OPERATION	
	1 Verify the safety belt warning chime operation. • **Does the safety belt warning chime operate?** → **Yes** GO to W4 . → **No** REFER to Section 413-09 .
W4 CHECK THE PID SBLTLMP WHILE TOGGLING THE ACTIVE COMMAND SBLT LAMP	
1  2  3	2 Monitor the PID SBLTLMP. 3 Toggle the active command SBLT LAMP ON and OFF.

- **Does the PID SBLTLMP agree with the active command mode?**

→ **Yes**
INSTALL a new GEM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

→ **No**
If the PID SBLTLMP reads OFFO-G, GO to W5 .

If the PID SBLTLMP reads ON-B-, GO to W10 .

W5 VERIFY THE OPERATION OF THE FUEL GAUGE

1 Verify the fuel gauge operation.

- **Does the fuel gauge operate?**

→ **Yes**
GO to W7 .

→ **No**
GO to W6 .

W6 CHECK VOLTAGE TO THE INSTRUMENT CLUSTER

1

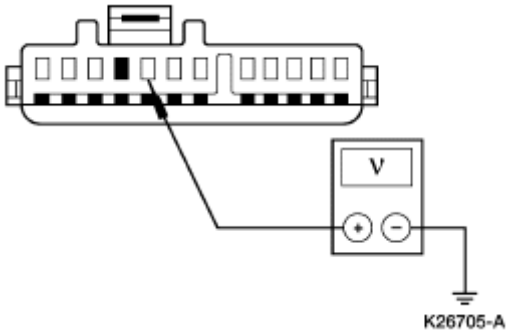
2

Instrument Cluster

3

4

4 Measure the voltage between instrument cluster C287-8, circuit 640 (RD/YE), and ground.



- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to W7 .

→ **No**
REPAIR circuit 640 (RD/YE). TEST the system for normal operation.

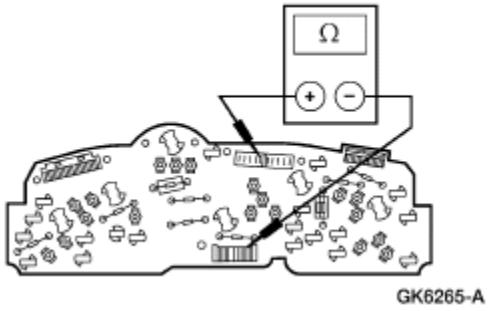
W7 CHECK THE INSTRUMENT CLUSTER PRINTED CIRCUIT FOR OPEN

1

2

Instrument Cluster

3

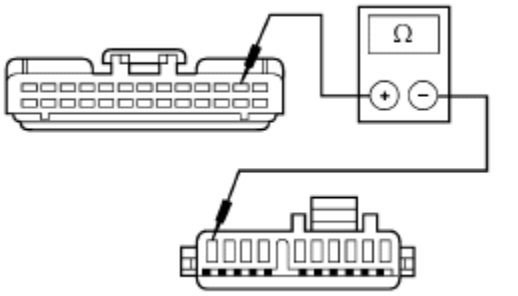
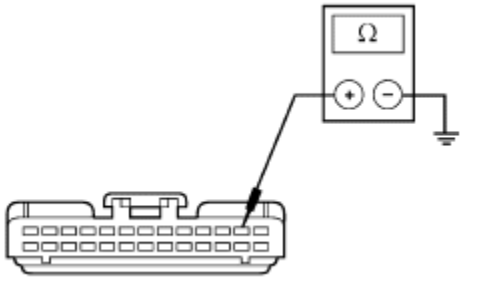


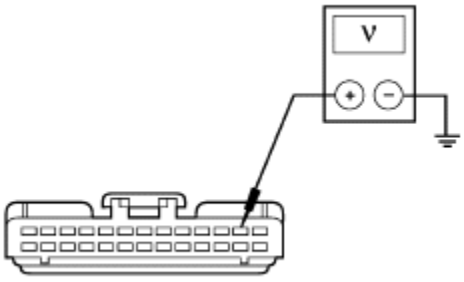
3 Measure the resistance between instrument cluster C287 terminal 8 and C288 terminal 10.

- **Is resistance less than 5 ohms?**

→ **Yes**
GO to W8 .

→ **No**
CHECK the safety belt warning indicator bulb. INSTALL a new bulb if necessary. If the bulb is

	OK, INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . CLEAR the DTCs. TEST the system for normal operation.
W8 CHECK CIRCUIT 871 (YE) FOR OPEN	
1  GEM C280 2  GK3451-A	2 Measure the resistance between GEM C280-12, circuit 871 (YE), and instrument cluster C288-10, circuit 871 (YE). • **Is the resistance less than 5 ohms?** → **Yes** GO to W9 . → **No** REPAIR circuit 871 (YE). CLEAR the DTCs. TEST the system for normal operation.
W9 CHECK CIRCUIT 871 (YE) FOR SHORT TO GROUND	
1  GK3452-A	1 Measure the resistance between GEM C280-12, circuit 871 (YE), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** INSTALL a new GEM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for

	normal operation. → **No** REPAIR circuit 871 (YE). CLEAR the DTCs. TEST the system for normal operation.
W10 CHECK CIRCUIT 871 (YE) FOR SHORT TO POWER	
1  2  GEM C280 3  Instrument Cluster 4  5  GK3453-A	5 Measure the voltage between GEM C280-12, circuit 871 (YE), and ground. • **Is any voltage indicated?** → **Yes** REPAIR circuit 871 (YE). CLEAR the DTCs. TEST the system for normal operation. → **No** GO to W11 .
W11 CHECK THE PID SBLTLMP WITH THE ACTIVE COMMAND SBLTLMP OFF	
1	1 Monitor the PID SBLTLMP.

 2 	2 Set the active command SBLT LAMP to OFF. • **Does the PID SBLTLMP read OFF O-G?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . CLEAR the DTCs. TEST the system for normal operation. → **No** INSTALL a new GEM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST X: AN INDICATOR IS INOPERATIVE — 4X4 HIGH, 4X4 LOW

CONDITIONS	DETAILS/RESULTS/ACTIONS
X1 CHECK THE IGNITION STATES	
1  Scan Tool	2 **NOTE:** If the vehicle is equipped with a manual transmission, depress the clutch pedal when turning the ignition switch to START. Monitor the PID IGN_GEM while turning the ignition switch through the START, RUN, OFF, and ACC positions. • **Do the PID values agree with the ignition switch positions?** → **Yes** GO to X2 . → **No** REFER to Section 417-02 .
X2 RETRIEVE THE DIAGNOSTIC TROUBLE CODES	

	1 Use the recorded results from the continuous and on-demand self-tests. • **Are any DTCs recorded?** → **Yes** If DTC B1342, REPLACE GEM. CLEAR the DTCs. TEST the system for normal operation. If DTC P1804, GO to X3 . If DTC P1806, GO to X3 . If DTC P1808, GO to X3 . If DTC P1810, GO to X3 . → **No** GO to X3 .
X3 VERIFY THE INOPERATIVE INDICATOR LAMP	
	1 Verify the inoperative indicator. • **Is the 4x4 HIGH indicator inoperative?** → **Yes** GO to X7 . → **No** If the 4x4 LOW indicator is inoperative, GO to X13 . If both the 4x4 HIGH and 4x4 LOW indicators are inoperative, GO to X4 .
X4 VERIFY THE O/D OFF LAMP OPERATES	
1 	2 Verify the O/D OFF indicator operates. • **Does the O/D OFF indicator operate?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to X5 .

X5 CHECK THE VOLTAGE TO THE INDICATORS

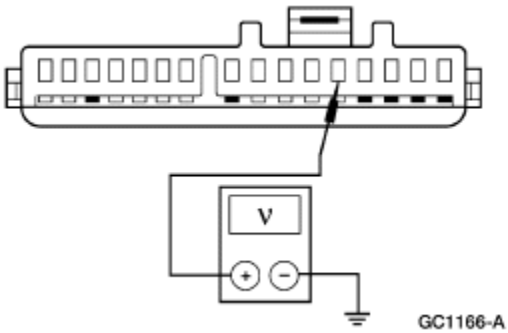
1

2

Instrument Cluster

3

4



4 Measure the voltage between instrument cluster C286-5, circuit 484 (OG/BK) and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . CLEAR the DTCs. TEST the system for normal operation.

→ **No**
GO to X6 .

X6 CHECK CIRCUIT 484 (OG/BK) FOR OPEN AND SHORT TO GROUND

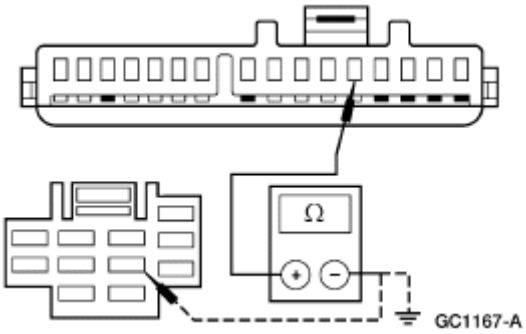
1

2

Headlamp Switch C216

3

3 Measure the resistance between instrument



cluster C286-5, circuit 484 (OG/BK), and headlamp switch C216-8, circuit 484 (OG/BK); and between instrument cluster C286-5, circuit 484 (OG/BK), and ground.

- **Is the resistance less than 5 ohms between the instrument cluster and headlamp switch; and greater than 10,000 ohms between the instrument cluster and ground?**

→ **Yes**
REFER to Section 417-01 .

→ **No**
REPAIR circuit 484 (OG/BK). CLEAR the DTCs. TEST the system for normal operation.

X7 CHECK THE 4X4 HIGH INDICATOR

1

2

3

2 Monitor the PID 4WDHIGH.

3 Toggle the active command HIGH LAMP to ON then OFF. The 4X4 HIGH indicator should illuminate, then go off.

- **Does the indicator operate correctly?**

→ **Yes**
Indicator is operating correctly; REFER to Section 308-07A .

→ **No**
If the PID 4WDHIGH displays ON-B-, GO to X11 .

If the PID 4WDHIGH displays OFFO-G, GO to X8 .

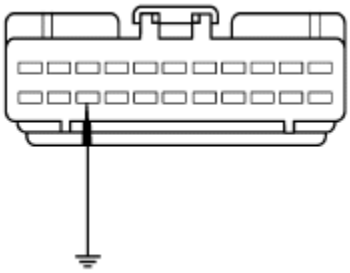
X8 CHECK THE GEM

1

2

GEM C282

3



GC1168-A

4

3 Connect a 7.5A fused jumper wire between GEM C282-14, circuit 783 (GY) and ground.

- **Does the 4x4 HIGH indicator illuminate?**

→ **Yes**
INSTALL a new GEM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

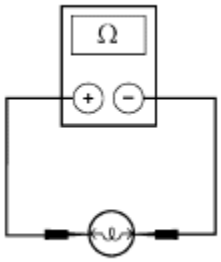
→ **No**
GO to X9 .

X9 CHECK THE 4X4 HIGH INDICATOR BULB

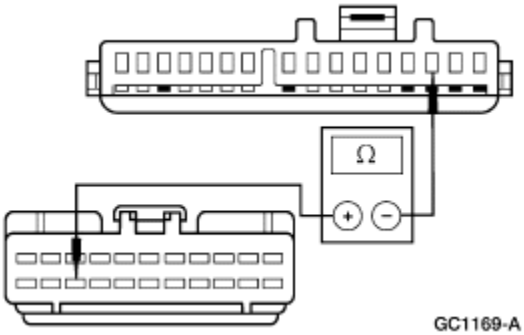
1 Remove the 4X4 HIGH indicator bulb.

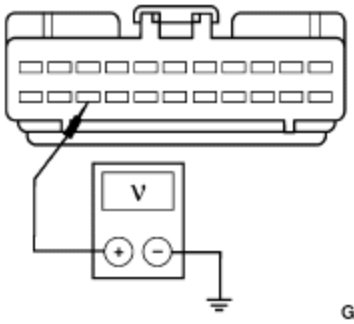
2 Measure for continuity between the terminals of the bulb.

2

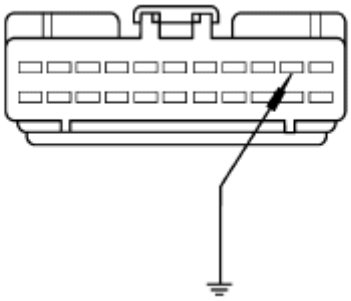


GK4131-A

	• **Does continuity exist?** → **Yes** GO to X10 . → **No** INSTALL a new bulb. CLEAR the DTCs. TEST the system for normal operation.
X10 CHECK CIRCUIT 783 (GY) FOR OPEN	
1  Instrument Cluster 2  GC1169-A	2 Measure the resistance between GEM C282-14, circuit 783 (GY) and instrument cluster C286-3, circuit 783 (GY). • **Is resistance less than 5 ohms?** → **Yes** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR circuit 783 (GY). CLEAR the DTCs. TEST the system for normal operation.
X11 CHECK THE INSTRUMENT CLUSTER PRINTED CIRCUIT FOR SHORT TO POWER	
1  2  Instrument Cluster	

3  4  5 	4 Monitor the PID 4WDHIGH. 5 Toggle the active command HIGH LAMP to ON then OFF. • **Does the PID 4WDHIGH read ON-B-?** → **Yes** GO to X12 . → **No** INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . CLEAR the DTCs. TEST the system for normal operation.
X12 CHECK CIRCUIT 783 (GY) FOR SHORT TO POWER	
1  2  GEM C282 3  GC1170-A	3 Measure the voltage between GEM C282-14, circuit 783 (GY) and ground. • **Is any voltage indicated?**

	→ **Yes** REPAIR circuit 783 (GY). CLEAR the DTCs. TEST the system for normal operation. → **No** INSTALL a new GEM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.
X13 CHECK THE 4X4 LOW INDICATOR	
1  2  3 	2 Monitor the PID 4WDLOW. 3 Toggle the active command LOW LAMP to ON then OFF. The 4x4 LOW indicator should illuminate, then go off. • **Does the indicator operate correctly?** → **Yes** Indicator is operating correctly; REFER to Section 308-07A . → **No** If the PID 4WDLOW displays ON-B-, GO to X17 . If the PID 4WDLOW displays OFFO-G, GO to X14 .
X14 CHECK THE GEM	
1  2  GEM C282 3	3 Connect a 7.5A fused jumper wire between GEM C282-10, circuit 784 (LB/BK) and ground.


GC1171-A

4

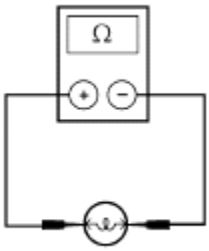
- **Does the 4X4 LOW indicator illuminate?**

→ **Yes**
INSTALL a new GEM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

→ **No**
GO to X15 .

X15 CHECK THE 4X4 LOW INDICATOR BULB

2



GK3487-A

1 Remove the 4x4 LOW indicator bulb.

2 Measure for continuity between the terminals of the bulb.

- **Does continuity exist?**

→ **Yes**
GO to X16 .

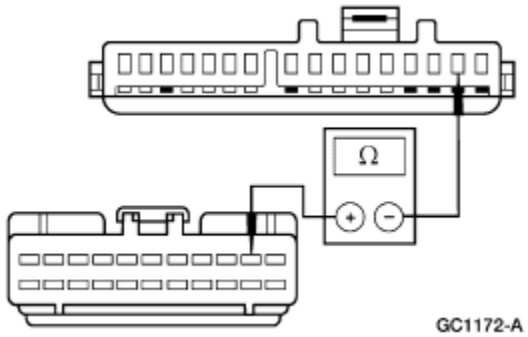
→ **No**
INSTALL a new bulb. CLEAR the DTCs. TEST the system for normal operation.

X16 CHECK CIRCUIT 784 (LB/BK) FOR OPEN

1

Instrument Cluster

2



2 Measure the resistance between GEM C282-10, circuit 784 (LB/BK) and instrument cluster C286-2, circuit 784 (LB/BK).

- **Is resistance less than 5 ohms?**

→ **Yes**
INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . CLEAR the DTCs. TEST the system for normal operation.

→ **No**
REPAIR circuit 784 (LB/BK). CLEAR the DTCs. TEST the system for normal operation.

X17 CHECK THE INSTRUMENT CLUSTER PRINTED CIRCUIT FOR SHORT TO POWER

1

2

Instrument Cluster

3

4

5

4 Monitor the PID 4WDLOW.

5 Toggle the active command LOW LAMP to ON then OFF.

- **Does the PID 4WDLOW read ON-B-?**

→ **Yes**
GO to X18 .

→ **No**
INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . CLEAR the DTCs. TEST the system for normal operation.

X18 CHECK CIRCUIT 784 (LB/BK) FOR SHORT TO POWER

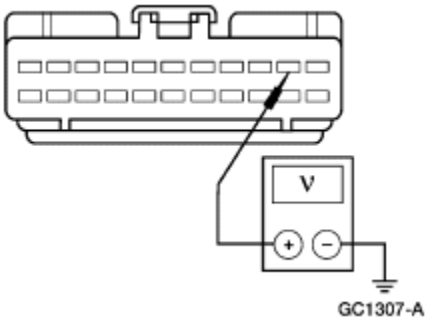
1

2

GEM C282

3

4



4 Measure the voltage between GEM C282-10, circuit 784 (LB/BK) and ground.

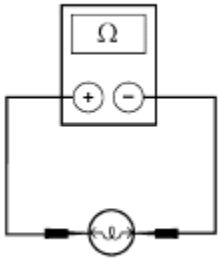
- **Is any voltage indicated?**

→ **Yes**
REPAIR circuit 784 (LB/BK). CLEAR the DTCs. TEST the system for normal operation.

→ **No**
INSTALL a new GEM. REFER to Section 419-

	10 . CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST Y: AN INDICATOR IS INOPERATIVE — AIR BAG

CONDITIONS	DETAILS/RESULTS/ACTIONS
Y1 CHECK BULB	
2  GK4131-A	1 Remove the air bag indicator bulb; refer to Warning Indicator Bulb . 2 Measure for continuity between the terminals of the air bag indicator bulb. • **Does continuity exist?** → **Yes** GO to Y2 . → **No** INSTALL a new bulb. TEST the system for normal operation.
Y2 CHECK INSTRUMENT CLUSTER PRINTED CIRCUIT	
	1 Visually inspect the instrument cluster printed circuit for damage, cracks, or hot spots. • **Is the instrument cluster printed circuit OK?** → **Yes** REFER to Section 501-20B . → **No** INSTALL a new instrument cluster printed circuit; REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation.

PINPOINT TEST Z: AN INDICATOR IS INOPERATIVE — CHECK SUSP

CONDITIONS	DETAILS/RESULTS/ACTIONS

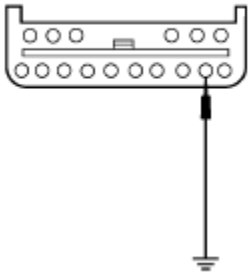
Z1

1

2

Air Suspension Control Module C2000

3



GK9638-A

4

3 Connect a 7.5A fused jumper wire between air suspension control module C2000 Pin 12, Circuit 419 (DG/LG), harness side and ground.

- **Does the CHECK SUSP indicator illuminate?**

→ **Yes**
REFER to Section 204-05 .

→ **No**
GO to Z2 .

Z2 CHECK CIRCUIT 419 (DG/LG) FOR OPEN

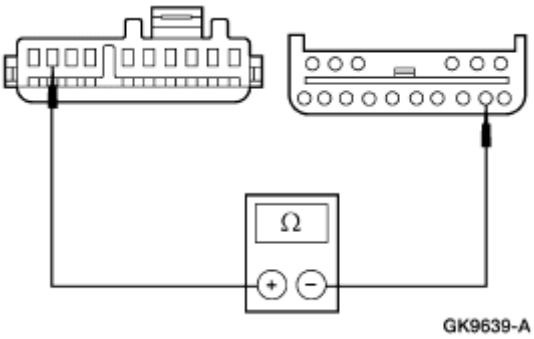
1

2

Instrument Cluster

3

3 Measure the resistance between instrument cluster C288 Pin 9, Circuit 419 (DG/LG), harness side and air suspension control



module C2000 Pin 12, Circuit 419 (DG/LG), harness side.

- **Is the resistance less than 5 ohms?**

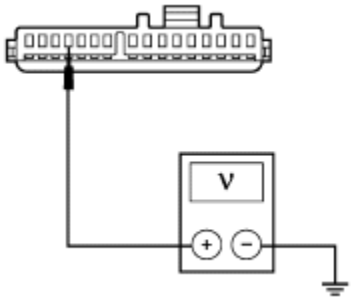
→ **Yes**
GO to Z3 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

Z3 CHECK POWER TO CLUSTER — CIRCUIT 640 (RD/YE)

1

2



2 Measure the voltage between instrument cluster C286 Pin 13, Circuit 640 (RD/YE), harness side and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
INSTALL a new instrument cluster printed circuit. REFER to Instrument Cluster Printed Circuit . TEST the system for normal operation.

→ **No**
REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST AA: AN INDICATOR IS ALWAYS ON — CHECK SUSP

CONDITIONS	DETAILS/RESULTS/ACTIONS
AA1 CHECK CIRCUIT 419 (DG/LG) FOR SHORT TO GROUND	
1  2  Air Suspension Control Module C2000 3 	• **Is the CHECK SUSP indicator illuminated?** → **Yes** REPAIR Circuit 419 (DG/LG) for short to ground. TEST the system for normal operation. → **No** REFER to Section 204-05 .

Component Tests

Gauge Test — Magnetic Gauge Test

Instrument Gauge System Tester is used to diagnose concerns with the instrument cluster magnetic gauges.

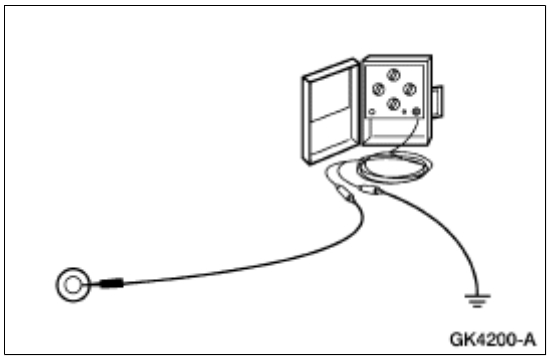
To test the magnetic gauges:

1. Disconnect the connector from the appropriate sender and connect the signal wire to the Instrument Gauge System Tester.

2. Turn the vehicle ignition switch lock cylinder to the ON position.

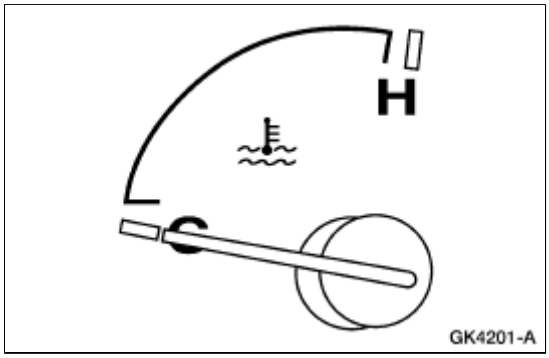
Gauge Test — Engine Coolant Temperature Gauge

Preliminary Setup



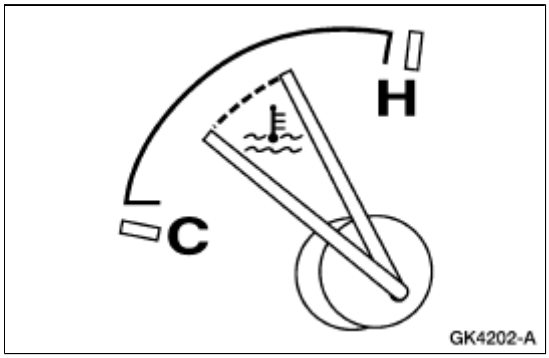
1. Disconnect water temperature indicator sender unit C104. Connect one lead of Instrument Gauge System Tester to water temperature indicator sender unit C104, circuit 39 (RD/WH), and the other lead to ground.

Check C (Cold) Indication



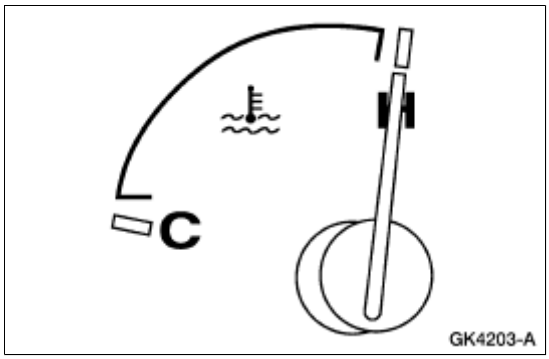
2. Set Instrument Gauge System Tester to 300 ohms. Key ON. Wait one minute. The engine coolant temperature gauge should indicate C (cold). Key OFF.

Check Normal Range Indication



3. Set Instrument Gauge System Tester to 45 ohms. Key ON. Wait one minute. The engine coolant temperature gauge pointer should be in the one quarter range to mid range. Key OFF.

Check H (Hot) Indication



4. Set Instrument Gauge System Tester to 18 ohms. Key ON. Wait one minute. The engine coolant temperature gauge should indicate H (hot). Key OFF. Return to the Pinpoint Test.

Gauge Test — Oil Pressure Gauge/Oil Pressure Switch

With Instrument Gauge System Tester attached to the oil pressure switch connector and the ignition switch lock cylinder in the RUN position (engine not running), set Instrument Gauge System Tester to infinite resistance. The center line of the pointer should fall on or below the "L" mark.

Short the connector directly to engine ground. The centerline of the pointer should fall slightly above mid-scale.

- If the oil pressure gauge tests within calibration, install a new oil pressure switch.
- If the oil pressure gauge still tests out of calibration, install a new gauge.

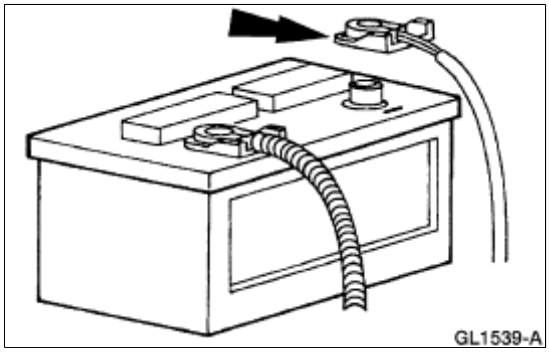
Gauge Test — Odometer Accuracy Test

To test the odometer accuracy, drive the vehicle over a measured distance of at least 16 consecutive kilometers (10 mile). Check measured distance against odometer measured distance. Acceptable odometer measured distance is 15.5-16.7 km (9.6-10.4 mile).

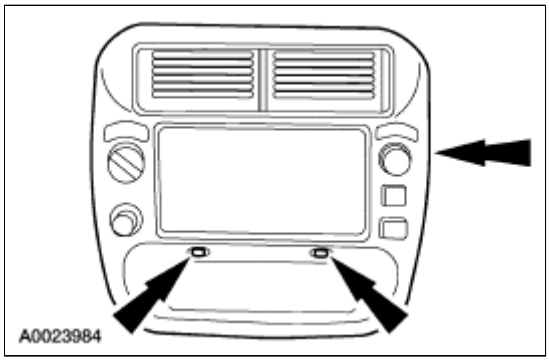
Instrument Cluster

Removal

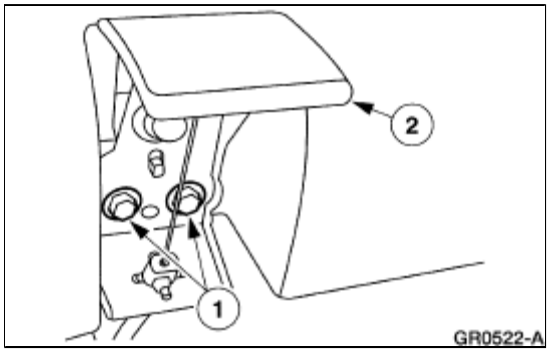
1. Disconnect the battery ground cable (14301).



2. Remove the screws and the center instrument panel finish panel.
    1. Disconnect the electrical connectors.

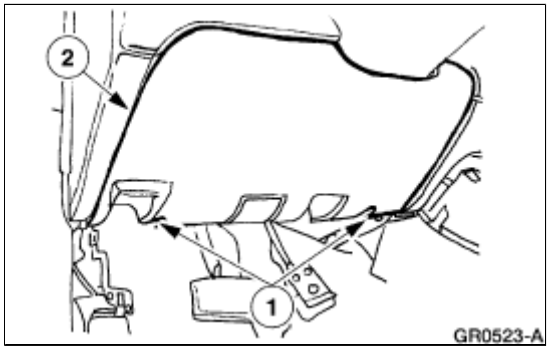


3. Remove the hood latch release handle.
    1. Remove the screws.
    2. Remove the hood latch release handle.

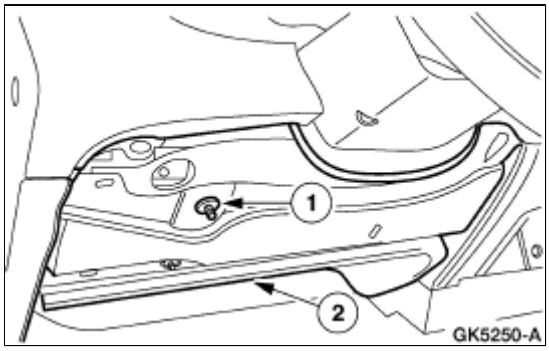


4. Remove the instrument panel steering column cover (044F08).
    1. Remove the screws.

2. Remove the instrument panel steering column cover.

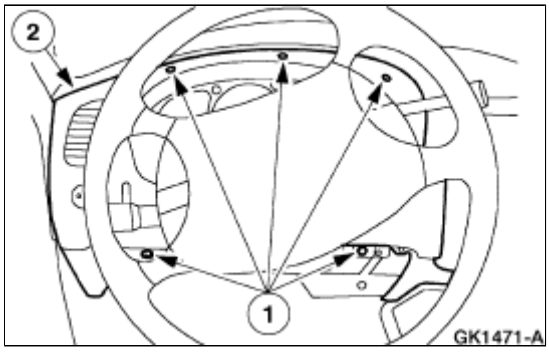


5. Remove the instrument panel steering column opening cover reinforcement (04502).
    1. Remove the four screws.
    2. Remove the instrument panel steering column opening cover reinforcement.

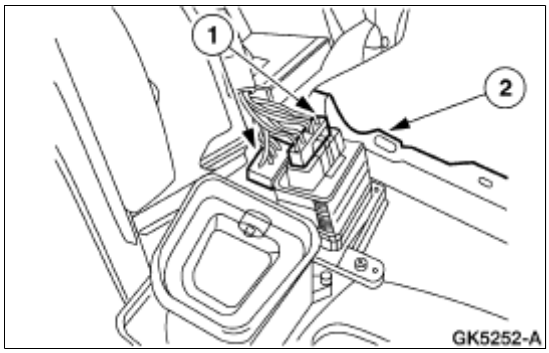


6. If equipped, position the column gearshift lever aside.

7. Pull out the cluster finish panel.
    1. Remove the screws.
    2. Pull out the cluster finish panel.

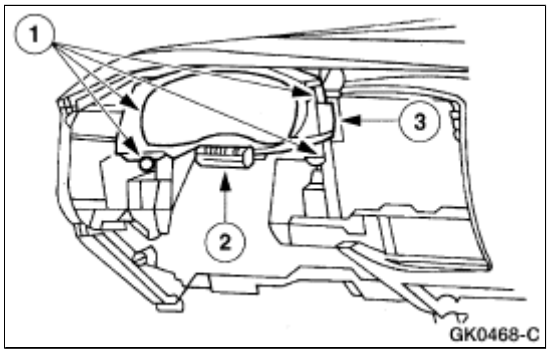


8. Remove the cluster finish panel.
    1. Disconnect the connectors.
    2. Remove the cluster finish panel.



9. **NOTE:** Illustration shows steering column removed for clarity.

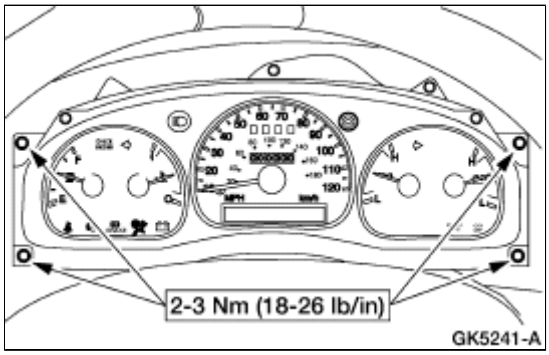
   Remove the instrument cluster.
   1. Remove the screws.
   2. If equipped with an automatic transmission, remove the transmission range indicator and pull the cluster forward to disconnect the three electrical connectors on the back.
   3. Remove the instrument cluster.

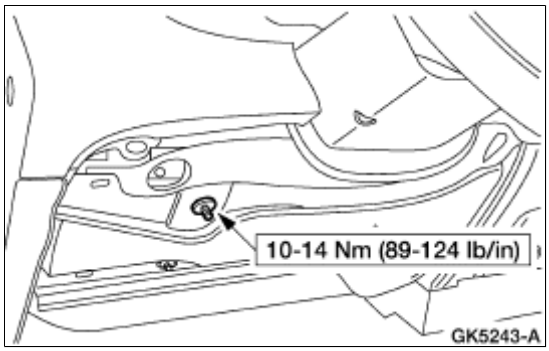


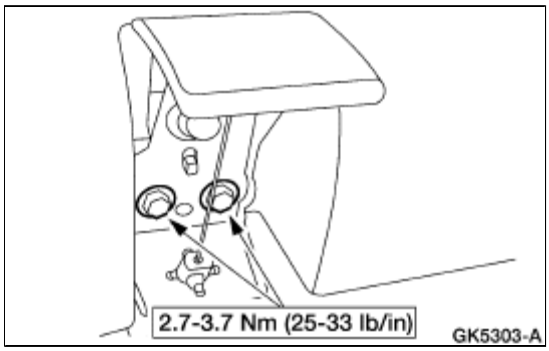
Installation

1. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   To install, reverse the removal procedure.




10-14 Nm (89-124 lb/in)
GK5243-A


2.7-3.7 Nm (25-33 lb/in)
GK5303-A

Instrument Cluster Printed Circuit

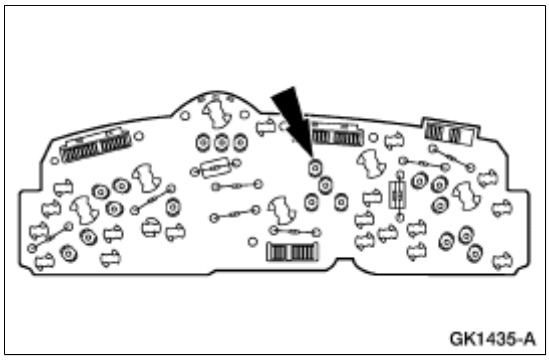
Removal

WARNING: ILLUMINATION BULBS ARE PRESSURIZED AND MAY SHATTER IF IMPROPERLY HANDLED. WEAR EYE PROTECTION WHEN REPLACING ILLUMINATION BULBS.

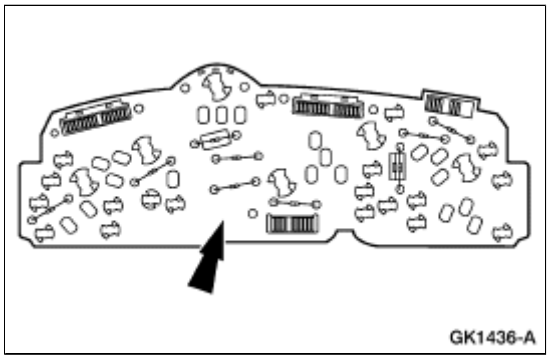
CAUTION: If gauges are being removed from the cluster assembly, do not remove the gauge pointers. Magnetic gauges cannot be recalibrated.

1. Remove the instrument cluster; refer to Instrument Cluster .
2. Remove the illumination and indicator bulbs; refer to Warning Indicator Bulb .
3. Remove the gauges; refer to Gauges .
4. **NOTE:** Do not reuse instrument gauge clips.

   Remove the nineteen instrument gauge clips.



5. Remove the instrument cluster printed circuit.



Installation

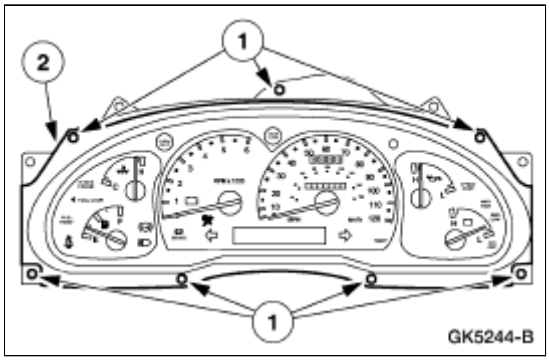
1. To install, reverse the removal procedure.

Cluster Lens

Removal

1. Remove the instrument cluster; refer to Instrument Cluster .

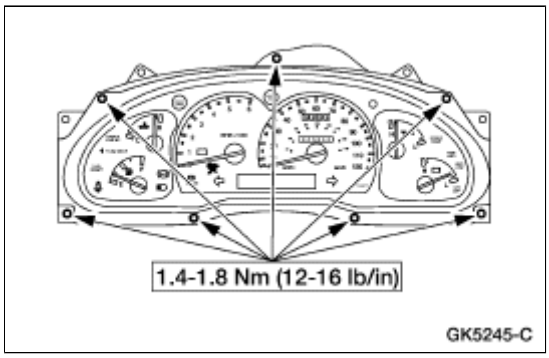
2. Remove the instrument cluster lens and mask assembly.
    1. Remove the screws.
    2. Remove the instrument cluster lens and mask assembly.

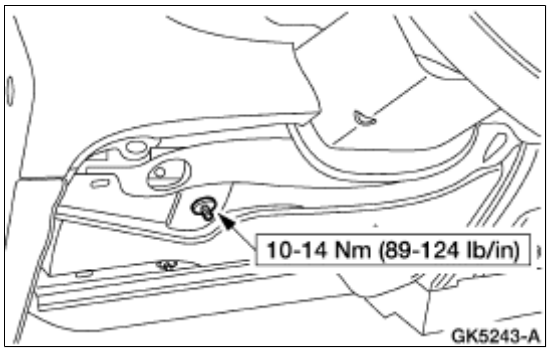


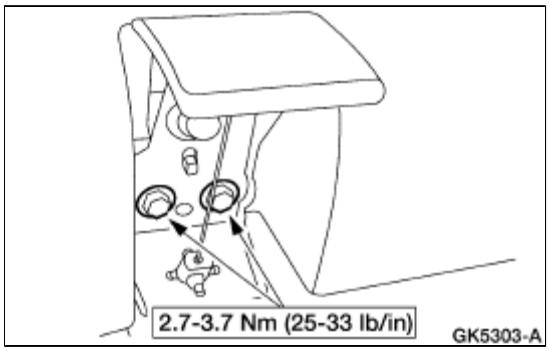
Installation

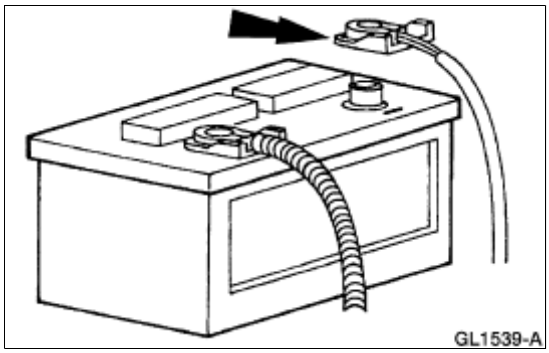
1. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   To install, reverse the removal procedure.




10-14 Nm (89-124 lb/in)
GK5243-A


2.7-3.7 Nm (25-33 lb/in)
GK5303-A

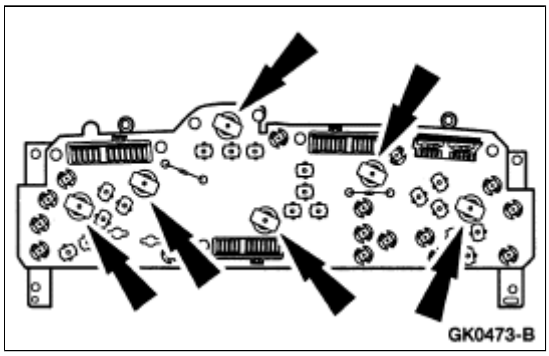

GL1539-A

Warning Indicator Bulb

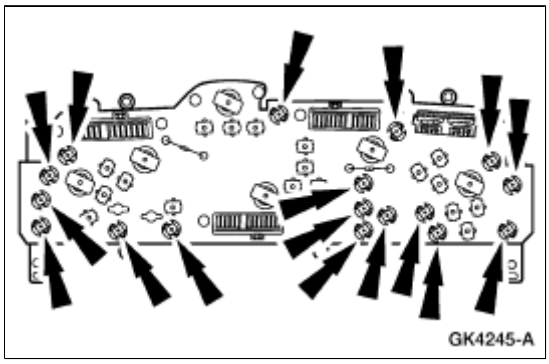
Removal

WARNING: Illumination bulbs are pressurized and may shatter if improperly handled. Wear eye protection when replacing illumination bulbs.

1. Remove the instrument cluster; refer to Instrument Cluster .
2. Remove the illumination sockets and bulbs.



3. Remove the indicator sockets and bulbs.



Installation

1. To install, reverse the removal procedure.

Gauges

Removal

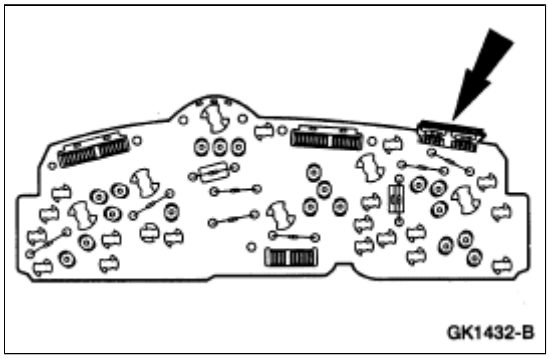
WARNING: Illumination bulbs are pressurized and may shatter if improperly handled. Wear eye protection when replacing illumination bulbs.

CAUTION: If gauges are being removed from the cluster assembly, do not remove the gauge pointers. Magnetic gauges cannot be recalibrated.

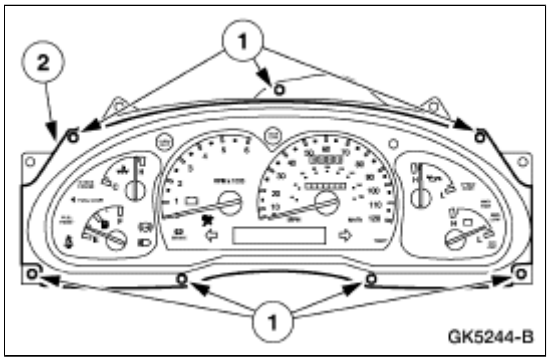
NOTE: Gauges are replaced as assemblies. They are not available individually.

NOTE: Do not reuse instrument gauge clips.

1. Remove the instrument cluster; refer to Instrument Cluster .
2. Remove the instrument cluster gauge amplifier (10E849).

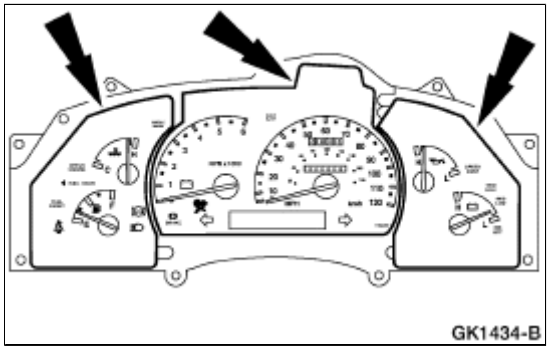


3. Remove the instrument cluster lens and mask assembly.
   1. Remove the screws.
   2. Remove the instrument cluster lens and mask assembly.



4. **NOTE:** The side gauge assemblies must be removed before removing the center assembly.

Gently remove the gauge assemblies.



Installation

1. To install, reverse the removal procedure.

Torque Specifications

Description	Nm	lb-ft	lb-in
Inner Fender Apron Bolts	10-14	8-10	—
Horn Bracket Mounting Bolt	8-12	—	71-106
Horn Switch Screws	6.5-7.5	—	58-66
Battery Ground Cable	7-10	—	62-89

Horn

Dual, electrically operated horns are mounted in the left front corner above the fender apron.

Horn Switch, Steering Wheel Mounted

The horn blow switches (13A875) are underneath the driver side air bag module (043B13) in the steering wheel (3600). The switches are powered through the air bag sliding contact (14A664) and ground through the steering column.

Horn

Refer to Wiring Diagrams Cell 44 , Horn/Cigar Lighter for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Inspection and Verification

1. Verify the customer concern by operating the horn.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged horns • Damaged horn blow switch	• Blown fuse • Damaged wiring harness • Loose or corroded connections

3. If the fault is not visually evident, determine the symptom and proceed to Symptom Chart.

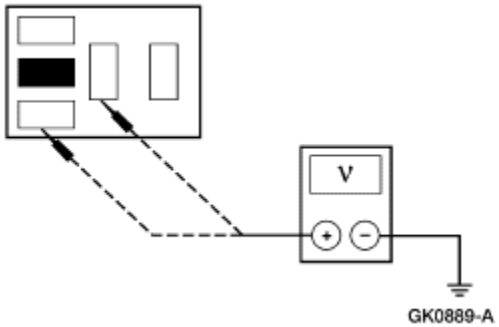
Symptom Chart

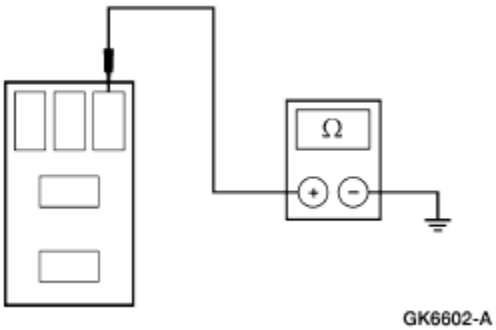
Symptom Chart

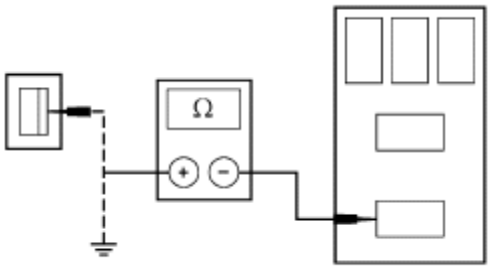
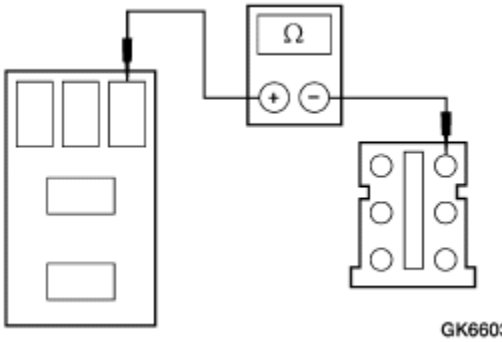
Condition	Possible Sources	Action
• The Horn Does Not Sound	• Fuse. • Circuitry. • Horn(s). • Horn relay. • Horn blow switch.	• GO to Pinpoint Test A .
• The Horn Sounds Continuously	• Circuitry. • Horn relay. • Horn(s). • Horn blow switch.	• GO to Pinpoint Test B .

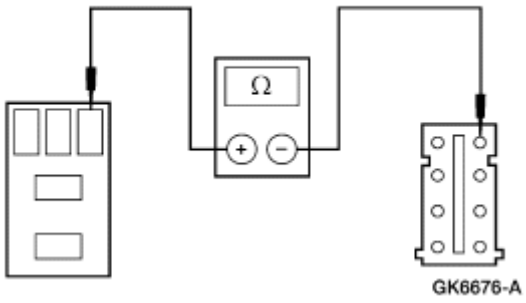
Pinpoint Tests

PINPOINT TEST A: THE HORN DOES NOT SOUND

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK POWER DISTRIBUTION BOX MINI-FUSE 10 (15A)	
1  2  Power Distribution Box Mini-Fuse 10 (15A)	• **Is the fuse OK?** → **Yes** REINSTALL the fuse. GO to A2 . → **No** REPLACE the fuse. TEST the system for normal operation. If the fuse fails again, CHECK for short to ground. REPAIR as necessary.
A2 CHECK POWER SUPPLY TO HORN RELAY	
1  Horn Relay 2  GK0889-A	2 Measure the voltage between the horn relay connector pin 2, circuit 460 (Y/LB), and ground; and between the horn relay connector pin 5, circuit 460 (Y/LB), and ground. • **Are the voltages greater than 10 volts?**

	→ **Yes** GO to A3 . → **No** REPAIR circuit 460 (Y/LB). TEST the system for normal operation.
A3 CHECK HORN RELAY	
	1 Perform the Horn Relay Component Test; refer to Component Test. • **Is the horn relay OK?** → **Yes** GO to A4 . → **No** REPLACE the horn relay. TEST the system for normal operation.
A4 CHECK THE HORN BLOW SWITCH SIGNAL TO HORN RELAY	
1  GK6602-A	1 Measure the resistance between the horn relay connector pin 1, circuit 6 (Y/LG), and ground under the following conditions: **Horn Blow Switch Position** — **Resistance** Pressed — Less Than 5 Ohms Released — Greater Than 10,000 Ohms • **Are the resistances correct?** → **Yes** GO to A5 . → **No** GO to A6 .
A5 CHECK WIRE BETWEEN HORN RELAY AND HORN	
1  2  Horn(s)	

3  GK5839-A	3 Measure the resistance between the horn relay connector pin 3, circuit 1 (DB), and horn connector(s); and between the horn relay connector pin 3, circuit 1 (DB), and ground. • **Is the resistance less than 5 ohms between the horn relay connector and horn; and greater than 10,000 ohms between the horn relay connector and ground?** → **Yes** REPLACE the horn(s). TEST the system for normal operation. → **No** REPAIR circuit 1 (DB). TEST the system for normal operation.
A6 CHECK WIRE BETWEEN HORN RELAY AND AIR BAG SLIDING CONTACT	
2  3  Air Bag Sliding Contact C220 4  GK6603-A 5	1 Deactivate the air bag system; refer to Section 501-20B . 4 Measure the resistance between air bag sliding contact C220-2, circuit 6 (Y/LG), and horn relay connector pin 1, circuit 6 (Y/LG) (without steering wheel audio controls). 5 Measure the resistance between air bag



sliding contact C220-2, circuit 6 (Y/LG), and horn relay connector pin 1, circuit 6 (Y/LG) (with steering wheel audio controls).

- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to A7 .

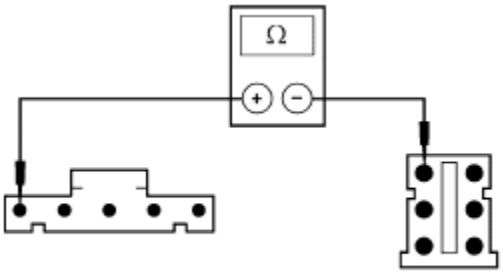
→ **No**
REPAIR circuit 6 (Y/LG). TEST the system for normal operation.

A7 CHECK AIR BAG SLIDING CONTACT

1

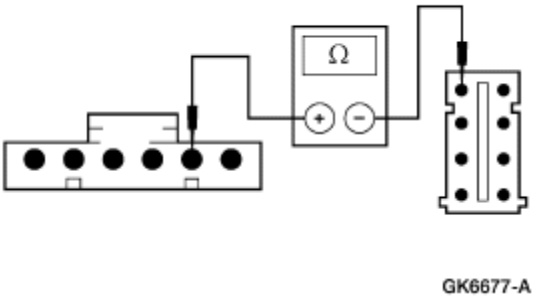
1 Disconnect the steering wheel switch harness from the air bag sliding contact.

2



2 Measure the resistance between upper air bag sliding contact connector pin 1, circuit 6 (Y/LG) (component side), and lower air bag sliding contact connector pin2, circuit 6 (Y/LG) (component side) (without steering wheel audio controls).

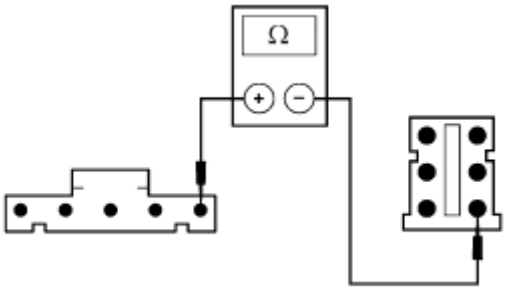
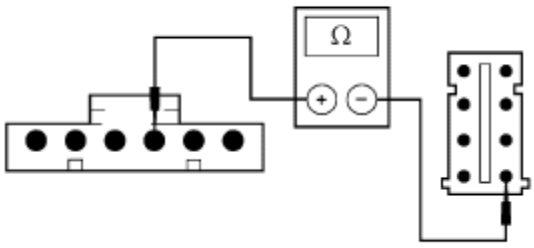
3



3 Measure the resistance between upper air bag sliding contact connector pin 5, circuit 6 (Y/LG) (component side), and lower air bag sliding contact connector pin 2, circuit 6 (Y/LG) (component side) (with steering wheel audio controls).

4

4 Measure the resistance between upper air bag sliding contact connector pin 5, circuit 570 (BK/W) (component side) (without steering wheel audio controls), and air bag

 GK6605-A 5  GK6678-A	sliding contact connector pin 5, circuit 570 (BK/W). 5 Measure the resistance between upper air bag sliding contact connector pin 4, circuit 570 (BK/W) (component side) (with steering wheel audio controls), and air bag sliding contact connector pin 7, circuit 570 (BK/W) (component side) (with steering wheel audio controls). • **Are the resistances less than 5 ohms?** → **Yes** GO to A8 . → **No** REPLACE the air bag sliding contact (14A664). TEST the system for normal operation.
A8 CHECK THE STEERING WHEEL SWITCH HARNESS	
	1 Inspect the steering wheel switch harness for chaffing, opens or possible short to ground. • **Is the steering wheel switch harness OK?** → **Yes** REPLACE the air bag. REFER to Section 501-20B . TEST the system for normal operation. → **No** REPLACE the steering wheel switch harness. TEST the system for normal operation.

PINPOINT TEST B: THE HORN SOUNDS CONTINUOUSLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CHECK HORN CIRCUIT	

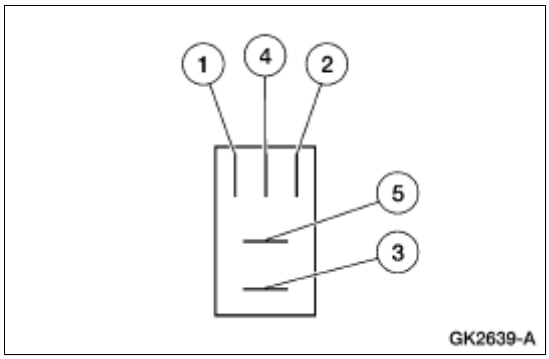
1  2  Horn Relay	• **Does the horn continue to sound?** → **Yes** REPAIR circuit 1 (DB). TEST the system for normal operation. → **No** GO to B2 .
B2 CHECK HORN RELAY	
	1 Perform the Horn Relay Component Test; refer to Component Test. • **Is the horn relay OK?** → **Yes** REINSTALL the horn relay. GO to B3 . → **No** REPLACE the horn relay. TEST the system for normal operation.
B3 CHECK CIRCUIT 6 (Y/LG)	
1  2  Air Bag Sliding Contact C220	• **Does the horn continue to sound?** → **Yes** GO to B4 . → **No** RECONNECT the air bag sliding contact. GO to B5 .
B4 CHECK REMOTE ANTI-THEFT PERSONALITY (RAP) MODULE INPUT	

1  RAP Module C409	• **Does the horn continue to sound?** → **Yes** REPAIR circuit 6 (Y/LG). TEST the system for normal operation. → **No** REPLACE the RAP module. REFER to Section 419-10 .
B5 CHECK THE AIR BAG SLIDING CONTACT	
2 	1 Deactivate the air bag system; refer to Section 501-20B . 2 Disconnect the steering wheel switch harness from the air bag sliding contact. • **Does the horn continue to sound?** → **Yes** REPLACE the air bag sliding contact. TEST the system for normal operation. → **No** GO to B6 .
B6 CHECK THE STEERING WHEEL SWITCH HARNESS	
	1 Inspect the steering wheel switch harness for chaffing, opens or possible short to ground. • **Is steering wheel switch harness OK?** → **Yes** REPLACE the air bag. REFER to Section 501-20B . TEST the system for normal operation. → **No** REPLACE the steering wheel switch harness. TEST the system for normal operation.

Component Test

Horn Relay

Horn Relay Terminal Location

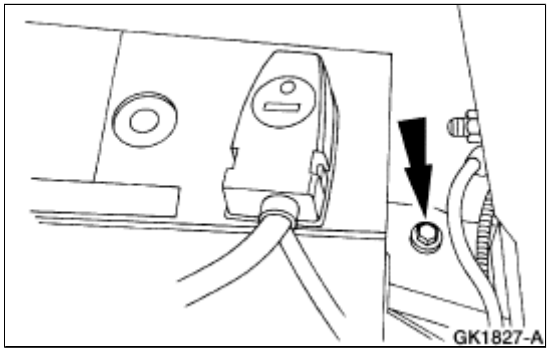


1. Use 73 Digital Multimeter to check for continuity between terminal 2 and all other terminals. If resistance is 5 ohms or less between terminal 2 and any other terminal, replace the relay. If resistance is greater than 5 ohms, continue the test. Use two jumper wires to connect relay terminal 1 and terminal 3 directly to the positive battery terminal. Set 73 Digital Multimeter in the volts position and check for voltage at terminal 4. If battery voltage is not indicated, replace the relay. If battery voltage is indicated, connect a third jumper wire to terminal 2 and ground the jumper wire to a known good ground. Check for voltage at terminal 5. If battery voltage is not indicated, replace the relay.

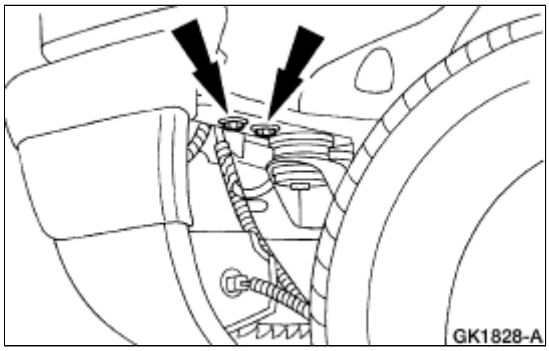
Horn

Removal

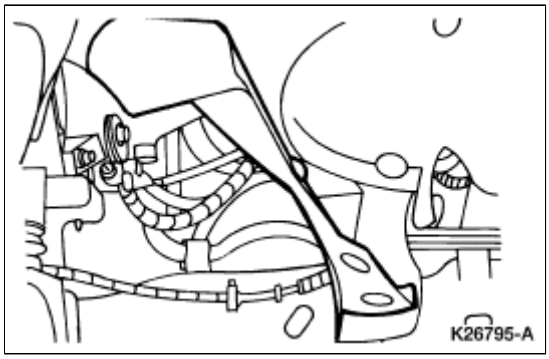
1. Raise and support the hood.
2. Remove the horn bracket bolt.



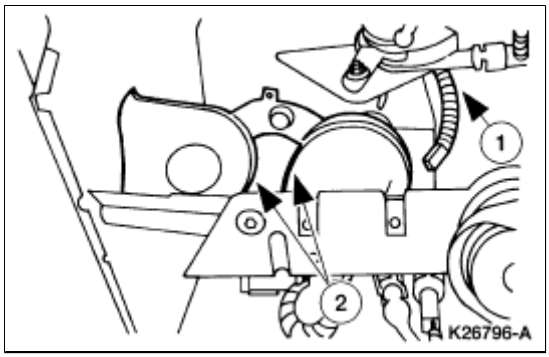
3. Remove the fender apron bolts.



4. Position the fender apron aside.

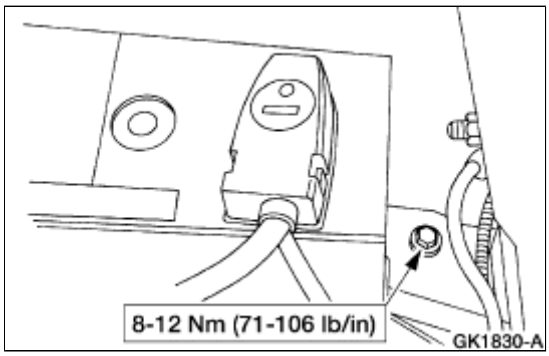


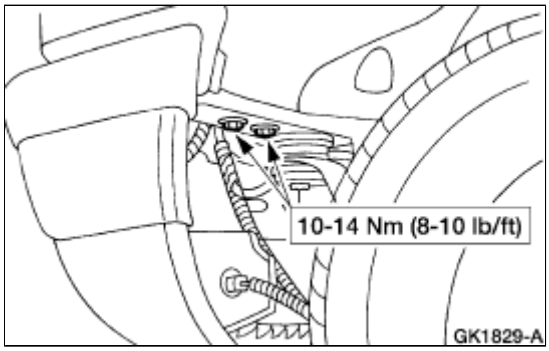
5. Remove the horn.
    1. Disconnect the electrical connector.
    2. Remove the horn.



Installation

1. To install, reverse the removal procedure.



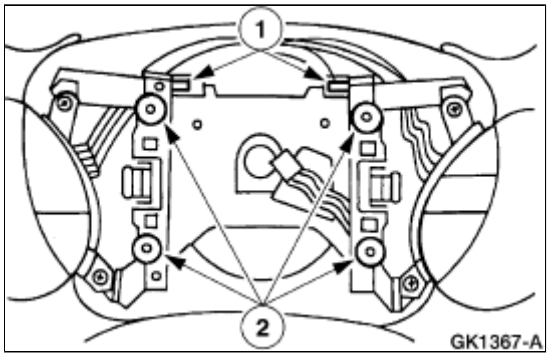


Switch

Removal

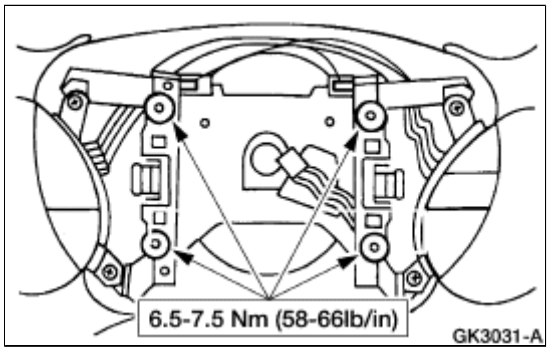
1. Remove the driver side air bag; refer to Section 501-20B .

2. Remove the switches.
    1. Disconnect the horn wire (BK) from the switches.
    2. Remove the attaching bolts from the switches and remove the switches.



Installation

1. To install, reverse the removal procedure.
    - Prove out the air bag system; refer to Section 501-20B .



Information and Message Center

The message center system consists of:

- message center switch module (10D996)
- message center indicator (10D898)

Message Center Switch Module

The message center switch module has seven switches and is located below the message center indicator in the center console.

The message center switches are:

- ENGLISH/METRIC mode
- fuel computer (FUEL)
  - RANGE
  - STATUS
  - economy (ECON)
- RESET
- system check and warnings (SYSTEM CHECK)
- OIL CHANGE RESET

Information and Message Center

Refer to Wiring Diagrams Cell 69 , Message Center for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter 105-R0051 or equivalent

Principles of Operation

Display Dimming

The dimming of the indicator display is controlled by the pulse width dimmer module. The voltage on Pin 2 controls the brightness of the message center display. When the exterior lamps are off, this voltage will be zero volts and the message center display will be at maximum brightness. When the exterior lamps are on, this voltage will be controlled by the pulse width dimmer module and will be between 2.5 volts and battery voltage. The message center display will be brighter as this voltage approaches battery voltage. If there is a warning on the message center display, the display will not dim to its lowest level.

When the headlamps (13008) or parking lamps are OFF, the display of the message center indicator will be maximum brightness and the labels for the center five switches of the message center switch module will not be illuminated.

When the headlamps or parking lamps are ON, the brightness of the display of the message center indicator and the labels for the center five switches of the message center switch module will be controlled by the pulse width dimmer module.

For additional information, refer to Section 413-00 .

English/Metric Mode

The ENGLISH/METRIC switch controls the display mode for both the message center indicator and the electronic automatic temperature control. A press of the ENGLISH/METRIC switch will change both displays between english mode and metric mode.

Vehicle Speed Signal

The vehicle speed signal is generated by the rear anti-lock brake sensor and sent to the 4-wheel anti-lock brake system (4WABS) module. The 4WABS module sends the vehicle speed signal via circuit 679 (GY/BK) to all systems which require a vehicle speed signal input.

Fuel Computer — Range

The RANGE feature has two displays: the distance that can be traveled before refueling, and the distance that was traveled since the last trip odometer reset. The RANGE switch will change the message center indicator between the two displays.

The RANGE (distance to empty) feature is calculated using the fuel flow signal from the powertrain control module (PCM) (12A650), the speed signal from the 4WABS module and the fuel level signal from the fuel level sender.

The fuel flow and speed signals are used to calculate a running average fuel economy (RAFE), which is multiplied by the fuel remaining to give the range.

RAFE is not the same number as the Average Fuel Economy displayed by the message center indicator.

RAFE is based on the past driving history and can only be reset by disconnecting the battery.

When the range decreases to 80 km (50 mile) to empty, the message center will display the LOW FUEL LEVEL warning.

With a fuel tank (9002) full of fuel (160 ohm signal from fuel sender) and after a battery disconnect, the RANGE should be approximately 644 km (400 miles) to empty.

The RANGE (trip odometer) feature is calculated using the speed signal from the 4WABS module. It can be reset to zero by pressing the reset switch while the trip odometer is displayed on the message center.

Fuel Computer — Status

The STATUS feature has two displays: Fuel-to-Empty and Fuel-Used. The STATUS switch will change the message center indicator between the two displays.

The fuel-to-empty calculation is achieved using the fuel level signal from the fuel level sender.

The fuel-used feature is calculated using the fuel flow signal from the PCM and can be reset to zero by pressing the RESET switch while the fuel-used feature is displayed on the message center.

Fuel Computer — Economy

The economy (ECON) feature has two displays: average and instant.

Depressing the ECON switch changes the message center indicator between both displays.

The economy is calculated using the fuel flow signal from the powertrain control module and the speed signal from the 4WABS module.

The average fuel economy feature can be reset by pressing the RESET switch while the average fuel economy feature is displayed on the message center indicator.

System Check and Warnings

The SYSTEM CHECK feature cycles the message center indicator through a status of each system being monitored.

- For each of the monitored systems, the message center indicator will indicate either an OK message or a warning message for two seconds.
- At normal conclusion of the system check sequence, the message center indicator will display all

active warnings or the last feature displayed before entering the SYSTEM CHECK mode.

- System warnings alert the driver to possible concerns or malfunctions in the vehicle operating systems.
- There are 7 warning messages which can be displayed for two seconds by the message center indicator to show the status of the monitored systems.
- When a warning occurs, the warning message is displayed and a one-second tone sounds. The warning message will appear at a brighter level if the message center indicator is dimmed.
- In the event of a multiple warning situation, the message center indicator will cycle the display to show all warnings by displaying each warning message for four seconds.
- To display the operator selectable features of the message center indicator while a warning is displayed, the warning message may be removed from the message center indicator display by pressing the RESET switch. The message center indicator will display the last selected feature if there are no more warning messages.
- This allows operation of all functions of the message center indicator after pressing the RESET switch and clearing the warning message.

Warning messages which have been reset will either reappear on the display in 10 minutes from the reset or will not reappear until an ignition switch OFF-RUN cycle.

If warning messages reappear it is a reminder that these warning conditions still exist. Warnings may be repeatedly reset. All warning messages will reappear after an entire SYSTEM CHECK sequence has been completed.

Charging System Warning (CHECK CHARGING SYSTEM)

This warning message is displayed when the electrical system is not maintaining correct voltage at the message center indicator. There will be a few seconds delay before the warning is displayed or removed.

Engine Coolant Temperature Warning (CHECK ENGINE TEMP)

This warning message is displayed when the engine coolant is overheating.

The message center indicator senses the voltage level on Circuit 39 (RD/WH) (C2008-8 to the message center indicator).

If that voltage is greater than approximately 2.7 volts, at a battery voltage of 13.5 volts there will be no warning. If it is less than approximately 2.7 volts, at a battery voltage of 13.5 volts then the warning will be displayed.

The message center indicator filters this input; therefore, there will be a few seconds delay before the warning is displayed or removed.

Fuel Level Warning (LOW FUEL LEVEL)

This warning message is displayed when there is approximately 80 km (50 mile) or less left before the vehicle runs out of fuel.

Oil Level Warning (LOW OIL LEVEL)

This warning message is displayed when the engine oil level is low.

When the engine oil level is normal, the input to the message center indicator will be an open circuit.

When the engine oil level is low, the low oil level sensor (6C624) will close, grounding the input to the

message center indicator and the warning will be displayed during the next ignition cycle of OFF to RUN. This low oil level sensor is only monitored when the ignition switch (11572) is OFF.

There is a delay of up to 12 minutes in this monitoring in order to allow the oil to drain back into the oil pan (6675) and reach the correct level.

Oil Life Warning (CHANGE OIL SOON or OIL CHANGE REQUIRED)

If the connection to the oil temperature sensor is open circuit or shorted, the message center display will read OIL TEMP SIGNAL ERROR instead of displaying the PERCENTAGE OIL LIFE LEFT during system check sequence.

One of these warning messages is displayed when the engine oil life remaining is five percent or less.

- When oil life left is between five percent and zero percent, the "CHANGE OIL SOON" message will be displayed.
- When oil life left reaches zero percent, the "OIL CHANGE REQUIRED" message will be displayed.

The message center indicator will indicate the percent of oil life remaining during System Check. This percentage is based on the driving history and the time since the last oil change. In order to ensure accurate oil life left indications, the driver should only carry out the OIL CHANGE RESET procedure, as described in the Owner's Guide, after an oil change.

To calculate the percentage of oil life remaining, the oil life feature uses:

- oil temperature sensor input
- tachometer input from the PCM
- vehicle speed signal input
- clock time (maintained internally by the message center)

- The oil life will decrease from 100 percent to 0 percent in no more than 12,070 km (7,500 mile) or 6 months. It will reach zero percent sooner under different driving conditions.
- The percentage of oil life remaining is the second display in the system check sequence.
- When oil life remaining is between five percent and zero percent, the "CHANGE OIL SOON" message will be displayed.
- When oil life left reaches zero percent, the "OIL CHANGE REQUIRED" message will be displayed.

Washer Fluid Level Warning (LOW WASHER FLUID)

This warning message is displayed when there is less than one quarter of the container of washer fluid remaining.

- When the washer fluid level is normal, the windshield washer reservoir fluid level sensor (17B649) will close, grounding the input Circuit 82 (PK/YE) at C2009-31 of the message center indicator.
- When the washer fluid level is low, the input to the message center indicator will be open and the warning will be displayed.

The message center indicator filters this input — therefore, there will be a 20-second delay before the warning is displayed or removed.

Warning Chime

A short warning chime (0.1 second) is output with every message center switch press. A longer warning

chime (1.0 second) is output when a new warning first appears on the message center indicator display.

To activate the warning, the message center pulls the chime request output below one volt during the length of the tone.

Inspection and Verification

1. Verify the customer concern.

2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical

• Damaged message center indicator
• Damaged message center switch module
• Low engine coolant level
• Low engine oil level
• Low windshield washer fluid level
	• Blown central junction box (CJB) fuse(s):
	  • Fuse 10 (7.5A)
	  • Fuse 36 (7.5A)
	• Damaged wiring harness
	• Loose or corroded connector(s)
	• Circuitry open/shorted

3. If inspection reveals obvious concerns that can be readily identified, repair as required.

4. Carry out the Message Center On-Board Diagnostic Test as follows:
   - Press RANGE and SYSTEM CHECK simultaneously while turning the ignition switch from the OFF position to the RUN position.
   - The following chart describes each test.

Message Center On-Board Diagnostic Test

Test	Description
ROM Level	Displays the Read Only Memory (ROM) level of the message center. This is used when requesting assistance from the hotline.
NVM Level	Displays the Non-Volatile Memory (NVM) level of the message center. This is used when requesting assistance from the hotline.
NVM Check	Displays the Non-Volatile Memory (NVM) for accuracy. If the message is NVM OK, proceed to the next step. If the message is REPLACE M/C, remove the message center switch module and install a new message center.
Display Check	Displays the same character in all 24 character positions. The initial character is all dots ON. Presses of the ENGLISH/METRIC switch sequence the display character through the entire character set. INSTALL a new message center indicator if the characters are not displayed correctly.
Tach Check	Determines if a tach signal is being received by the message center. If the message is TACH SIGNAL OK, the tach signal is being retrieved. If the message is TACH SIGNAL ERROR, no tach signal is being received. The engine must be running to receive a tach signal. GO to pinpoint test F, to check signal circuit. INSTALL a new message center indicator if concern is not in circuit or powertrain control module.
A/D (Analog-to-Digital	Displays the status of each of the analog inputs to the message center. Pressing the ENGLISH/METRIC switch sequences the A/D test forward, and the FUEL STATUS switch

Channel)	sequences the test backwards. See the A/D table for the analog voltage inputs associated with each test. This is used when requesting assistance from the hotline.
Digital Port	Displays the status of each of the digital inputs to the message center. Presses of the ENGLISH/METRIC switch sequence the digital port tests forward. See the digital port tables for the digital inputs associated with each test. This is used when requesting assistance from the hotline.

A/D Table

Test #	Analog Input Voltage Tested	Message Center Pin
A/D 0	Battery	27
A/D 1	Run	10
A/D 2	Fuel Level	3
A/D 3	Oil Temperature	9
A/D 4	Rheostat (Dimming)	2
A/D 5	Coolant Temperature	8
A/D 6	Switch Bank #2	1
A/D 7	Switch Bank #1	7

Digital Port Table (Port A)

Port A	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Bit Function	Internal Use Only	Internal Use Only	Internal Use Only	Fuel Tank Select	Internal Use Only	Internal Use Only	Washer Fluid Level	Engine Select
Bit = 0	N/A	N/A	N/A	20.8 gal Fuel Tank Selected	N/A	N/A	Low Washer Fluid	V6 Engine Selected
Message Center Pin	N/A	N/A	N/A	Pin 21 = 5V	N/A	N/A	Pin 31 = 5V	Pin 32 = 5V
Bit = 1	N/A	N/A	N/A	18.4 gal Fuel Tank Selected	N/A	N/A	Washer Fluid OK	V8 Engine Selected
Message Center Pin	N/A	N/A	N/A	Pin 21 = 0V	N/A	N/A	Pin 31 = 0V	Pin 32 = 0V

Digital Port Table (Port B)

Port B	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Bit Function	Oil Level Input	Spare	Spare	Internal Use Only	Spare	Internal Use Only	Internal Use Only	Internal Use Only
Bit = 0	Oil Level	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	OK							
Message Center Pin	Pin 23 = 5V	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bit = 1	Low Oil Level	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Message Center Pin	Pin 23 = 0V	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- Press the RANGE switch to advance the message center indicator to the next test.
- To abort the on-board diagnostic mode and return to normal operation, turn the ignition switch to the OFF position.

5. If the concern(s) remain(s) after the inspection, determine the symptom(s) and proceed to Symptom Chart.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action

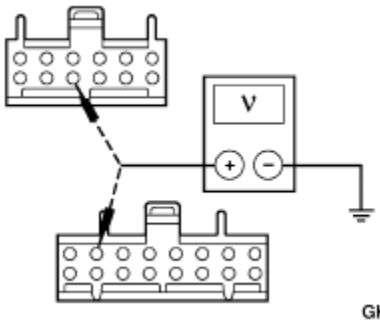
• The Message Center Is Not Operating Correctly	• CJB fuse(s):
	  ▪ Fuse 10 (7.5A)
	  ▪ Fuse 36 (7.5A)
	• Circuitry.
	• Message center indicator.
		• GO to Pinpoint Test A .

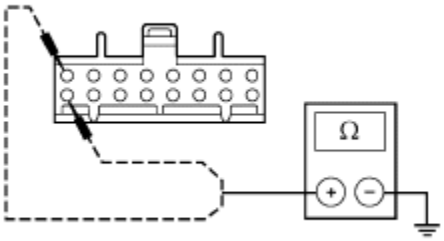
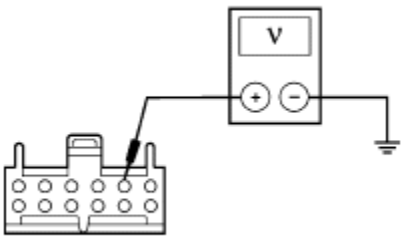
• The Message Center Switch Is Not Operating Correctly	• Circuitry. • Message center switch module. • Message center indicator.	• GO to Pinpoint Test B .
• The Fuel Computer Range Is Incorrect	• Circuitry. • Message center indicator. • Fuel level sender. • Powertrain control module (PCM).	• GO to Pinpoint Test C .
• The Charging System Warning Is Incorrect	• Circuitry. • Message center indicator.	• GO to Pinpoint Test D .
• The Engine Coolant Temperature Warning Is Not Operating Correctly	• Circuitry. • Message center indicator. • Water temperature sender unit.	• GO to Pinpoint Test E .
• The Oil Life Warning Is Incorrect — Oil Temp Signal Error	• Circuitry. • Message center indicator. • Low oil level sensor. • PCM.	• GO to Pinpoint Test F .

• The Oil Level Warning Is Not Operating Correctly	• Circuitry. • Message center indicator. • Low oil level sensor.	• GO to Pinpoint Test G .
• The Washer Fluid Level Warning Is Not Operating Correctly	• Circuitry. • Message center indicator. • Windshield washer reservoir fluid level sensor.	• GO to Pinpoint Test H .
• The Audible Warning Is Inoperative	• Circuitry. • Message center indicator. • CTM/GEM.	• REFER to Section 413-09 .

Pinpoint Tests

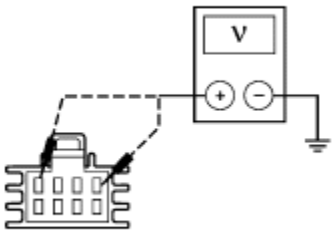
PINPOINT TEST A: THE MESSAGE CENTER IS NOT OPERATING CORRECTLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK POWER FEED CIRCUITS 1003 (GY/YE) AND 54 (LG/YE)	
1  Message Center Indicator 2  3  	3 Measure the voltage between message center indicator C2008 Pin 10, Circuit 1003 (GY/YE), harness side and ground; and between message center indicator C2009 Pin 27, Circuit 54 (LG/YE), harness side and ground. • **Are the voltages greater than 10 volts?** → **Yes** GO to A2 .

	→ **No** REPAIR the circuit(s) in question. TEST the system for normal operation.
A2 CHECK GROUND CIRCUITS 570 (BK/WH) AND 57 (BK)	
1  2  GK3244-A	2 Measure the resistance between message center indicator C2009 Pin 28, Circuit 570 (BK/WH), harness side and ground; and between message center indicator C2009 Pin 36, Circuit 57 (BK), harness side and ground. • **Are the resistances less than 5 ohms?** → **Yes** GO to A3 . → **No** REPAIR the circuit(s) in question. TEST the system for normal operation.
A3 CHECK CIRCUIT 19 (LB/RD)	
3  GK3245-A	1 Place the headlamp switch (11654) in the PARK position. 2 Rotate the panel dimmer switch to the full illumination position. 3 Measure the voltage between message center indicator C2008 Pin 2, Circuit 19 (LB/RD), and ground. • **Is the voltage greater than 10 volts?**

	→ **Yes** INSTALL a new message center indicator. REFER to Message Center Assembly . TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.

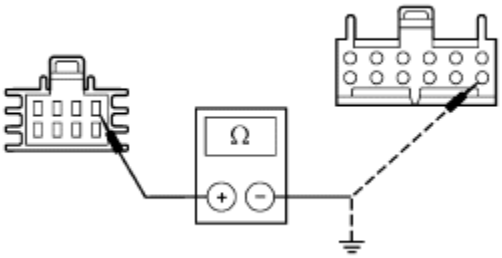
PINPOINT TEST B: THE MESSAGE CENTER SWITCH IS NOT OPERATING CORRECTLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CHECK THE VOLTAGE INPUTS TO THE MESSAGE CENTER SWITCH	
1  2  Message Center Switch Module C2007 3  4  GK4251-A	4 Measure the voltage between message center switch module C2007 Pin 1, Circuit 704 (DG/LG), harness side and ground; and between message center switch module C2007 Pin 4, Circuit 715 (LG), harness side and ground. • **Are the voltages approximately 5 volts?** → **Yes** GO to B4 . → **No** GO to B2 .
B2 CHECK CIRCUIT 704 (DG/LG) FOR AN OPEN OR SHORT	
1	

2

Message Center Indicator C2008

3



GK3248-A

3 Measure the resistance between message center switch module C2007 Pin 1, Circuit 704 (DG/LG), harness side and message center indicator C2008 Pin 7, Circuit 704 (DG/LG), harness side; and between the message center switch module C2007 Pin 1, Circuit 704 (DG/LG), harness side and ground.

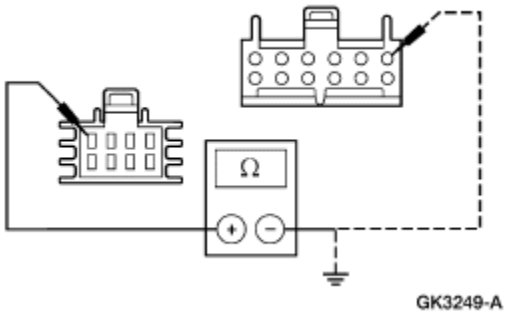
- **Is the resistance less than 5 ohms between message center switch module and message center indicator, and greater than 10,000 ohms between the message center switch module and ground?**

→ **Yes**
GO to B3 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

B3 CHECK CIRCUIT 715 (LG) FOR AN OPEN OR SHORT

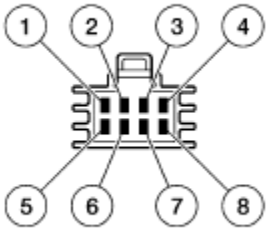
1

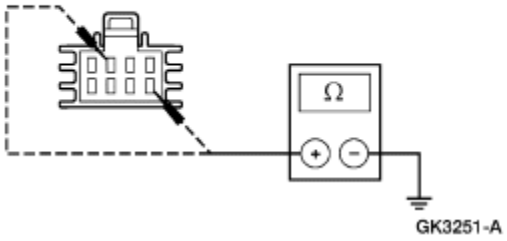


GK3249-A

1 Measure the resistance between message center switch module C2007 Pin 4, Circuit 715 (LG), harness side and message center indicator C2008 Pin 1, Circuit 715 (LG), harness side; and between the message center switch module C2007 Pin 4, Circuit 715 (LG), harness side and ground.

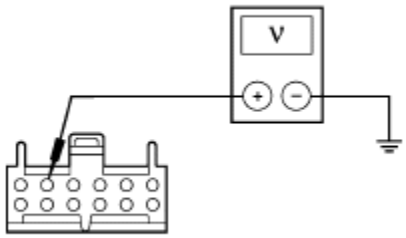
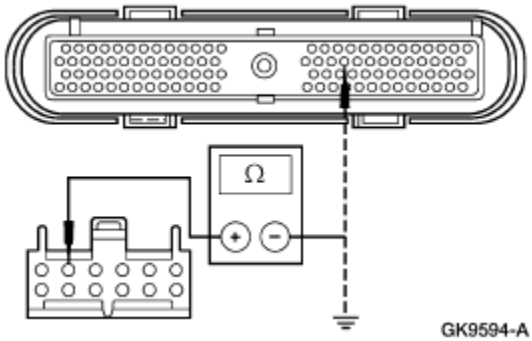
- **Is the resistance less than 5 ohms between message center switch module and message center indicator, and greater than 10,000 ohms between the**

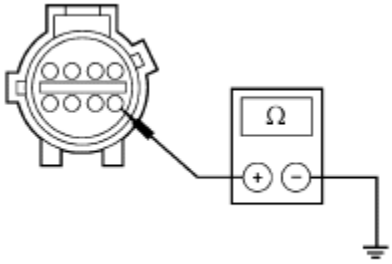
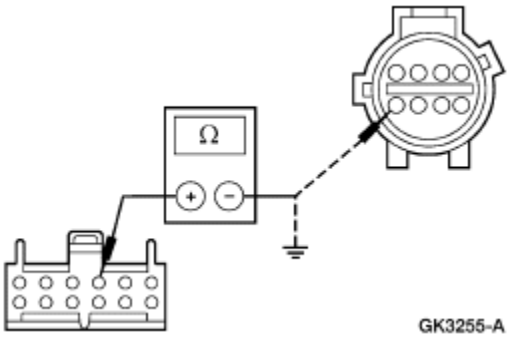
	message center switch module and ground? → **Yes** INSTALL a new message center indicator. REFER to Message Center Assembly . TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.
B4 CHECK THE MESSAGE CENTER SWITCH	
1  2  GK3250-A	2 Measure the resistance between the following switch terminals: **Switch Depressed** / **Switch Bank 1 Resistance Between Terminals 1 and 3** / **Switch Bank 2 Resistance Between Terminals 3 and 4** — / between 4374 and 5376 ohms / between 3645 and 4455 ohms ENGLISH METRIC / between 1313 and 1606 ohms / between 3645 and 4455 ohms RANGE / between 4374 and 5376 ohms / between 270 and 330 ohms STATUS / between 4374 and 5376 ohms / between 567 and 693 ohms ECON / between 4374 and 5376 ohms / between 1026 and 1254 ohms RESET / between 4374 and 5376 ohms / between 1845 and 2255 ohms SYSTEM CHECK / between 486 and 594 ohms / between 3645 and 4455 ohms OIL CHANGE RESET / between 810 and 990 ohms / between 3645 and 4455 ohms • **Are all resistance values within**

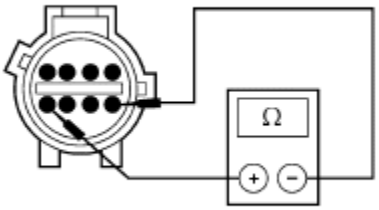
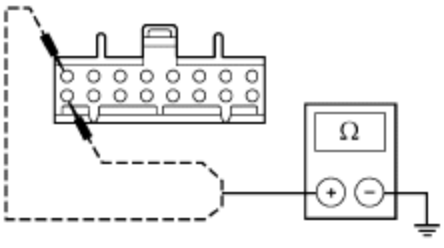
	specification? → **Yes** GO to B5 . → **No** INSTALL a new message center switch module. REFER to Switch . TEST the system for normal operation.
B5 CHECK CIRCUITS 57 (BK) AND 570 (BK/WH)	
1  	1 Measure the resistance between message center switch module C2007 Pin 5, Circuit 57 (BK), harness side and ground; and between the message center switch module C2007 Pin 3, Circuit 570 (BK/WH), harness side and ground. • **Are the resistances less than 5 ohms?** → **Yes** INSTALL a new message center indicator. REFER to Message Center Assembly . TEST the system for normal operation. → **No** REPAIR the circuit(s) in question. TEST the system for normal operation.

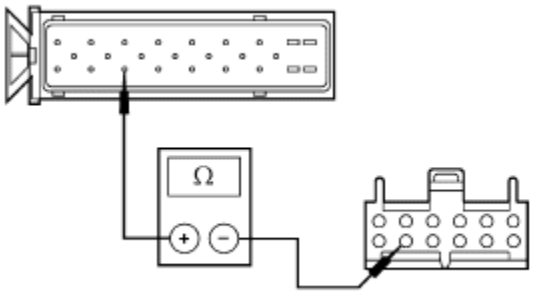
PINPOINT TEST C: THE FUEL COMPUTER RANGE IS INCORRECT

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 CHECK THE POWERTRAIN CONTROL MODULE (PCM) OUTPUT	
CAUTION: Use correct probe adapter(s) when making measurements. Failure to use correct probe adapter(s) may damage the connector.	
1  2 	

Message Center Indicator 3  GK3252-A	3 Measure the voltage between message center indicator C2008 Pin 5, Circuit 305 (LB/PK), harness side and ground while starting the engine. • **Is the voltage greater than 10 volts when the engine is being started and drops to about 2 volts at idle?** → **Yes** GO to C3 . → **No** GO to C2 .
C2 CHECK CIRCUIT 305 (LB/PK)	
1  2  PCM C202 3  GK9594-A	3 Measure the resistance between message center indicator C2008 Pin 5, Circuit 305 (LB/PK), harness side and PCM C202 Pin 43, Circuit 305 (LB/PK), harness side; and between message center indicator C2008 Pin 5, Circuit 305 (LB/PK), harness side and ground. • **Is the resistance less than 5 ohms between the message center indicator and the PCM; and greater than 10,000 ohms between the message center indicator and ground?**

	→ **Yes** INSTALL a new PCM. TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.
C3 CHECK CIRCUIT 651 (BK/YE) FOR AN OPEN	
1  2  Fuel Level Sensor and Pump C311 3  GK3254-A	3 Measure the resistance between the fuel level sensor and pump C311 Pin 5, Circuit 651 (BK/YE), harness side and ground. • **Is the resistance less than 5 ohms ?** → **Yes** GO to C4 . → **No** REPAIR the circuit. TEST the system for normal operation.
C4 CHECK CIRCUIT 29 (YE/WH)	
1  GK3255-A	1 Measure the resistance between message center indicator C2008 Pin 3, Circuit 29 (YE/WH), harness side and fuel level sensor and pump C311 Pin 8, Circuit 29 (YE/WH), harness side; and between message center indicator C2008 Pin 3, Circuit 29 (YE/WH), harness side and ground.

	• **Is the resistance less than 5 ohms between message center indicator and fuel level sensor and pump; and greater than 10,000 ohms between message center indicator and ground?** → **Yes** GO to C5 . → **No** REPAIR the circuit. TEST the system for normal operation.
C5 CHECK THE FUEL LEVEL SENDER	
1  GK3256-A	1 Measure the resistance between fuel level sensor and pump Pin 5 (component side) and Pin 8 (component side). • **Is the resistance between 15 and 160 ohms?** → **Yes** GO to C6 . → **No** INSTALL a new fuel level sender. TEST the system for normal operation.
C6 CHECK GROUND CIRCUITS 570 (BK/WH) AND 57 (BK)	
1  GK3244-A	1 Measure the resistance between message center indicator C2009 Pin 28, Circuit 570 (BK/WH), harness side and ground; and between message center indicator C2009 Pin 36, Circuit 57 (BK), harness side and ground. • **Are the resistances less than 5 ohms?**

	→ **Yes** GO to C7 . → **No** REPAIR the circuit(s) in question. TEST the system for normal operation.
C7 CHECK CIRCUIT 679 (GY/BK)	
1  4WABS Module C186 2  GK9595-A	2 Measure the resistance between message center indicator C2008 Pin 11, Circuit 679 (GY/BK), harness side and 4WABS module C186 Pin 19, Circuit 679 (GY/BK), harness side. • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new message center indicator. REFER to Message Center Assembly . TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.

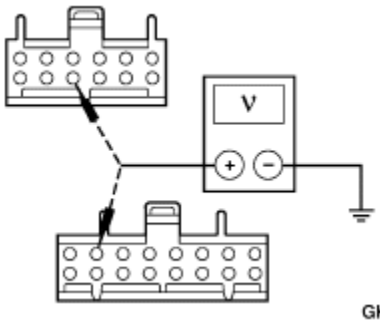
PINPOINT TEST D: THE CHARGING SYSTEM WARNING IS INCORRECT

CONDITIONS	DETAILS/RESULTS/ACTIONS
D1 CHECK FOR VOLTAGE TO THE MESSAGE CENTER	
1  2 	

Message Center Indicator

3

4



4 Measure the voltage between message center indicator C2008 Pin 10, Circuit 1003 (GY/YE), harness side and ground; and between message center indicator C2009 Pin 27, Circuit 54 (LG/YE), harness side and ground.

- **Are the voltages greater than 10 volts?**

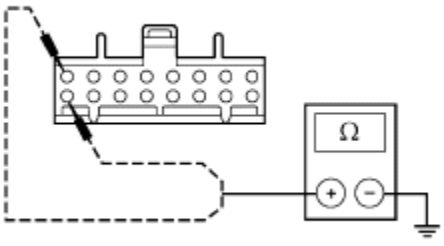
→ **Yes**
GO to D2 .

→ **No**
REPAIR the circuit(s) in question. TEST the system for normal operation.

D2 CHECK GROUND CIRCUIT 570 (BK/WH) AND CIRCUIT 57 (BK)

1

2



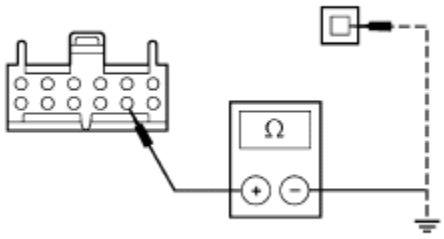
2 Measure the resistance between message center indicator C2009 Pin 28, Circuit 570 (BK/WH), harness side and ground; and between message center indicator C2009 Pin 36, Circuit 57 (BK), harness side and ground.

- **Are the resistances less than 5 ohms?**

→ **Yes**
INSTALL a new message center indicator. REFER to Message Center Assembly . TEST the system for normal operation.

	→ **No** REPAIR the circuit(s) in question. TEST the system for normal operation.

PINPOINT TEST E: THE ENGINE COOLANT TEMPERATURE WARNING IS NOT OPERATING CORRECTLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
E1 CHECK CIRCUIT 39 (RD/WH)	
1  2  Message Center Indicator C2008 3  Water Temperature Sender Unit C104 4  GK3263-A	4 Measure the resistance between message center indicator C2008 Pin 8, Circuit 39 (RD/WH), harness side and water temperature sender unit C104 Pin 1, Circuit 39 (RD/WH), harness side; and between message center indicator C2008 Pin 8, Circuit 39 (RD/WH), harness side and ground. • **Is the resistance less than 5 ohms between the message center indicator and water temperature sender unit; and greater than 10,000 ohms between the message center indicator and ground?** → **Yes** RECONNECT the message center indicator. GO to E2 . → **No** REPAIR the circuit. TEST the system for normal operation.

E2 CHECK THE MESSAGE CENTER INDICATOR

1 	2 Check the message center indicator for the engine coolant temperature warning error. • **Does the error exist?** → **Yes** INSTALL a new message center indicator. REFER to Message Center Assembly . TEST the system for normal operation. → **No** GO to E3 .

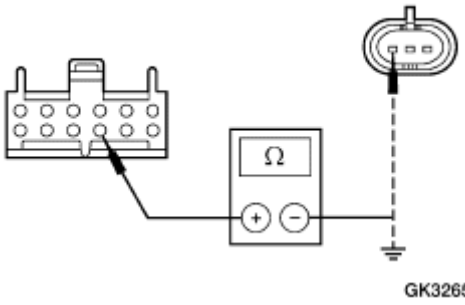
E3 CHECK THE MESSAGE CENTER INDICATOR FOR ERROR

1  2  GK3264-A 3 	2 Short to ground Circuit 39 (RD/WH) through a 9.7 ohm resistor between engine coolant temperature sender C104 Pin 1, harness side, and ground. 4 Check the message center indicator for the engine coolant temperature warning error. • **Does the error exist?** → **Yes** INSTALL a new water temperature sender unit. TEST the system for normal operation. → **No** INSTALL a new message center indicator.

	TEST the system for normal operation.

PINPOINT TEST F: THE OIL LIFE WARNING IS INCORRECT — OIL TEMP SIGNAL ERROR

CONDITIONS	DETAILS/RESULTS/ACTIONS
F1 VERIFY THE LOW OIL LEVEL SENSOR CONNECTOR IS SECURELY SEATED	
CAUTION: Use correct probe adapter(s) when making measurements. Failure to use correct probe adapter(s) may damage the connector.	
	1 Verify low oil level sensor C174 is securely seated. • **Is low oil level sensor C174 securely seated?** → **Yes** GO to F2 . → **No** REPAIR as necessary. TEST the system for normal operation.
F2 CHECK CIRCUIT 254 (DG/WH)	
1  2  Low Oil Level Sensor C174 3  Message Center Indicator C2008 4	4 Measure the resistance between message center indicator C2008 Pin 9, Circuit 254 (DG/WH), harness side and low oil level sensor C174 Pin 1, Circuit 254 (DG/WH), harness side; and between message center indicator C2008 Pin 9, Circuit 254 (DG/WH), harness side and ground.



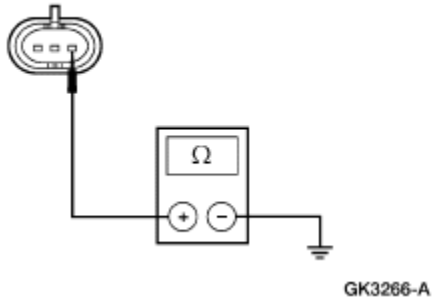
- **Is the resistance less than 5 ohms between message center indicator and low oil level sensor; and greater than 10,000 ohms between the message center indicator and ground?**

→ **Yes**
GO to F3 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

F3 CHECK GROUND CIRCUIT 570 (BK/WH)

1



1 Measure the resistance between low oil level sensor C174 Pin 3, Circuit 570 (BK/WH), harness side and ground.

- **Is the resistance less than 5 ohms?**

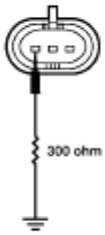
→ **Yes**
RECONNECT message center indicator C2008. GO to F4 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

F4 CHECK THE LOW OIL LEVEL SENSOR

1

1 Short to ground Circuit 254 (DG/WH) through a 300 ohm resistor between low oil level sensor C174 Pin 1, harness side, and ground.



GK3267-A

2

- **Does the message center indicator read OIL TEMP SIGNAL ERROR during system check?**

→ **Yes**
GO to F5 .

→ **No**
INSTALL a new low oil level sensor. TEST the system for normal operation.

F5 CHECK CIRCUIT 679 (GY/BK)

1

2

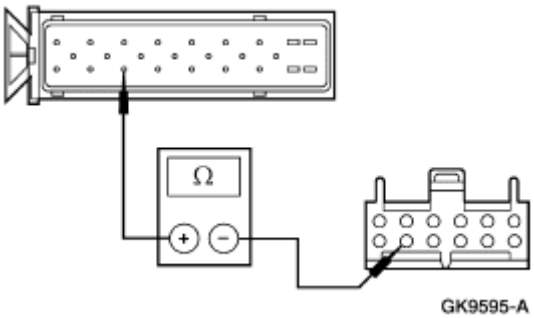
4WABS Module C186

3

Message Center Indicator C2008

4

4 Measure the resistance between message center indicator C2008 Pin 11 , Circuit 679 (GY/BK), harness side and 4WABS module C186 Pin 19, Circuit 679 (GY/BK), harness side.



- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to F6 .

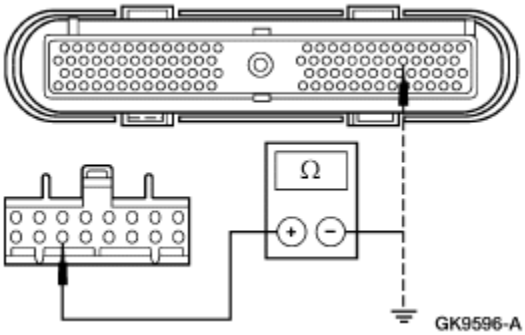
→ **No**
REPAIR the circuit. TEST the system for normal operation.

F6 CHECK CIRCUIT 11 (TN/YE)

1

PCM

2



2 Measure the resistance between message center indicator C2009 Pin 34, Circuit 11 (TN/YE), harness side and PCM C202 Pin 48, Circuit 11 (TN/YE), harness side; and between message center indicator C2009 Pin 34, Circuit 11 (TN/YE), harness side and ground.

- **Is the resistance less than 5 ohms between the message center indicator and the PCM; and greater than 10,000 ohms between the message center indicator and ground?**

→ **Yes**
GO to F7 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

F7 CHECK TACH SIGNAL

NOTE: Carry out the TACH CHECK procedure in on-board diagnostic mode with engine running.	
	1 Press RANGE and SYSTEM CHECK switches simultaneously while turning the ignition switch to RUN and starting the engine. 2 Press RANGE switch to advance the message center indicator until TACH CHECK is displayed. • **Is the TACH SIGNAL OK message displayed?** → **Yes** INSTALL a new message center indicator. REFER to Message Center Assembly . TEST the system for normal operation. → **No** INSTALL a new PCM. TEST the system for normal operation.

PINPOINT TEST G: THE OIL LEVEL WARNING IS NOT OPERATING CORRECTLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
G1 VERIFY THE LOW OIL LEVEL SENSOR CONNECTOR IS SECURELY SEATED	
	1 Verify low oil level sensor C174 is securely seated. • **Is low oil level sensor C174 securely seated?** → **Yes** GO to G2 . → **No** REPAIR as necessary. TEST the system for normal operation.
G2 CHECK THE ENGINE OIL LEVEL	
	1 Check the engine oil level. • **Is the engine oil level in correct range?** → **Yes** GO to G3 . → **No** REFILL as necessary. TEST the system for normal operation.

G3 CHECK CIRCUIT 258 (WH/PK)

1

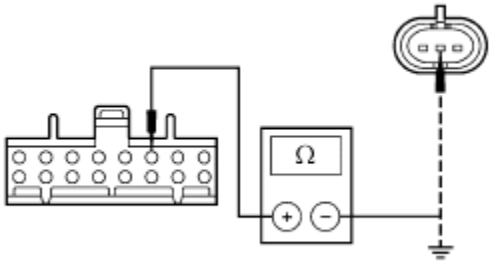
2

Low Oil Level Sensor C174

3

Message Center Indicator C2009

4



GK3271-A

4 Measure the resistance between message center indicator C2009 Pin 23, Circuit 258 (WH/PK), harness side and low oil level sensor C174 Pin 2, Circuit 258 (WH/PK), harness side; and between message center indicator C2009 Pin 23, Circuit 258 (WH/PK), harness side and ground.

- **Is the resistance less than 5 ohms between message center indicator and low oil level sensor; and greater than 10,000 ohms between message center indicator and ground?**

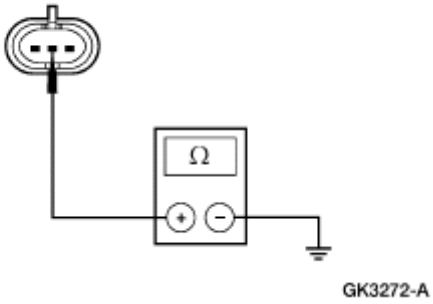
→ **Yes**
GO to G4 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

G4 CHECK THE LOW OIL LEVEL SENSOR

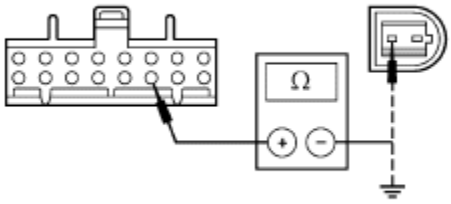
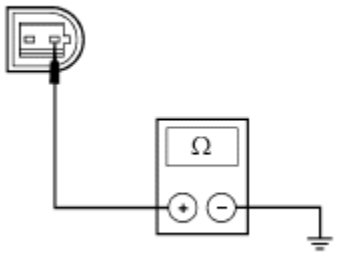
1

1 Measure the resistance between the low oil level sensor terminal 2 (component side) and ground.

	• **Is the resistance greater than 10,000 ohms?** → **Yes** INSTALL a new message center indicator. REFER to Message Center Assembly . TEST the system for normal operation. → **No** INSTALL a new low oil level sensor. TEST the system for normal operation.

PINPOINT TEST H: THE WASHER FLUID LEVEL WARNING IS NOT OPERATING CORRECTLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
H1 CHECK THE WINDSHIELD WASHER RESERVOIR FLUID LEVEL	
	1 Check the windshield washer reservoir level. • **Is the windshield washer reservoir level in correct range?** → **Yes** GO to H2 . → **No** REFILL as necessary. TEST the system for normal operation.
H2 CHECK CIRCUIT 82 (PK/YE)	
1  2 	

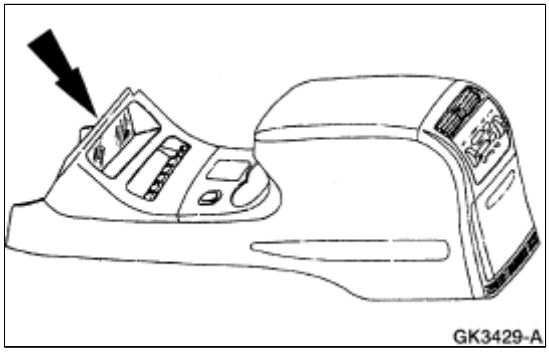
Message Center Indicator C2009 3  Windshield Washer Reservoir Fluid Level Sensor C197 4  GK3273-A	4 Measure the resistance between message center indicator C2009 Pin 31, Circuit 82 (PK/YE), harness side and windshield washer reservoir fluid level sensor C197 Pin 1, Circuit 82 (PK/YE), harness side; and between message center indicator C2009 Pin 31, Circuit 82 (PK/YE), harness side and ground. • **Is the resistance less than 5 ohms between message center indicator and windshield washer reservoir fluid level sensor; and greater than 10,000 ohms between message center indicator and ground?** → **Yes** GO to H3 . → **No** REPAIR the circuit. TEST the system for normal operation.
H3 CHECK CIRCUIT 57 (BK)	
1  GK3274-A	1 Measure the resistance between windshield washer reservoir fluid level sensor C197 Pin 2, Circuit 57 (BK), harness side and ground. • **Is the resistance less than 5 ohms?** → **Yes** GO to H4 . → **No**

	REPAIR the circuit. TEST the system for normal operation.
H4 CHECK THE WINDSHIELD WASHER RESERVOIR FLUID LEVEL SENSOR	
1  GK3275-A	1 Measure the resistance between windshield washer reservoir fluid level sensor terminal 1 (component side) and terminal 2 (component side). • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new message center indicator. REFER to Message Center Assembly . TEST the system for normal operation. → **No** INSTALL a new windshield washer reservoir fluid level sensor. TEST the system for normal operation.

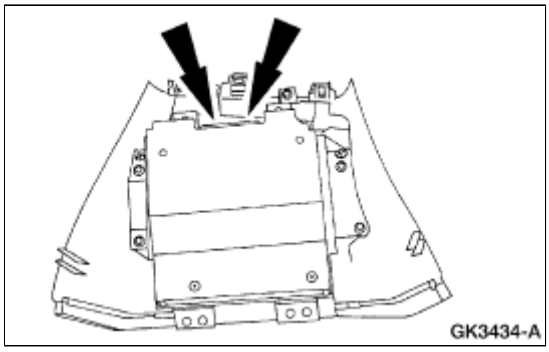
Message Center Assembly

Removal

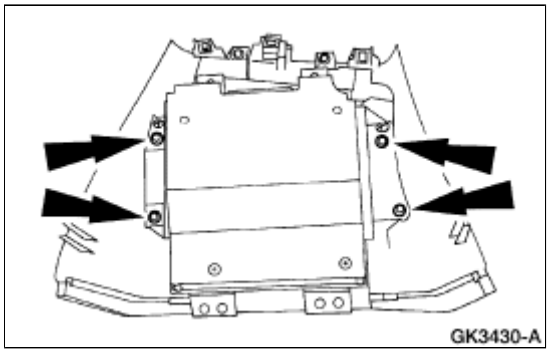
1. Remove the message center console.
    - Grasp the front of the console and lift upward.



2. Disconnect the electrical connectors from the message center indicator (10D898).



3. Remove the screws retaining the message center indicator.



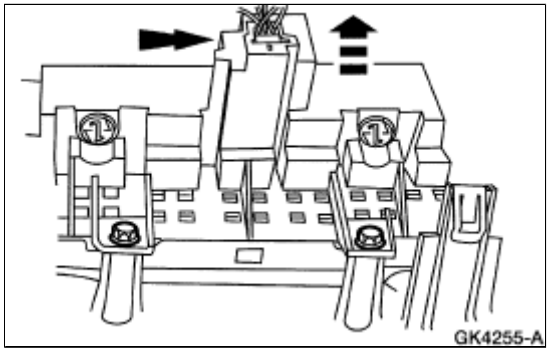
Installation

1. To install, reverse the removal procedure.

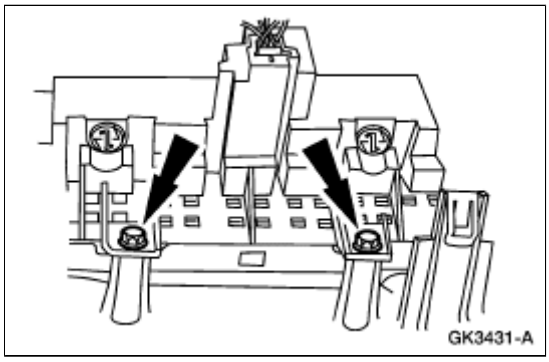
Switch

Removal

1. Remove the message center indicator (10D898). Refer to Message Center Assembly .
2. Disconnect the electrical connector.



3. Remove the message center switch module screws and remove the module.

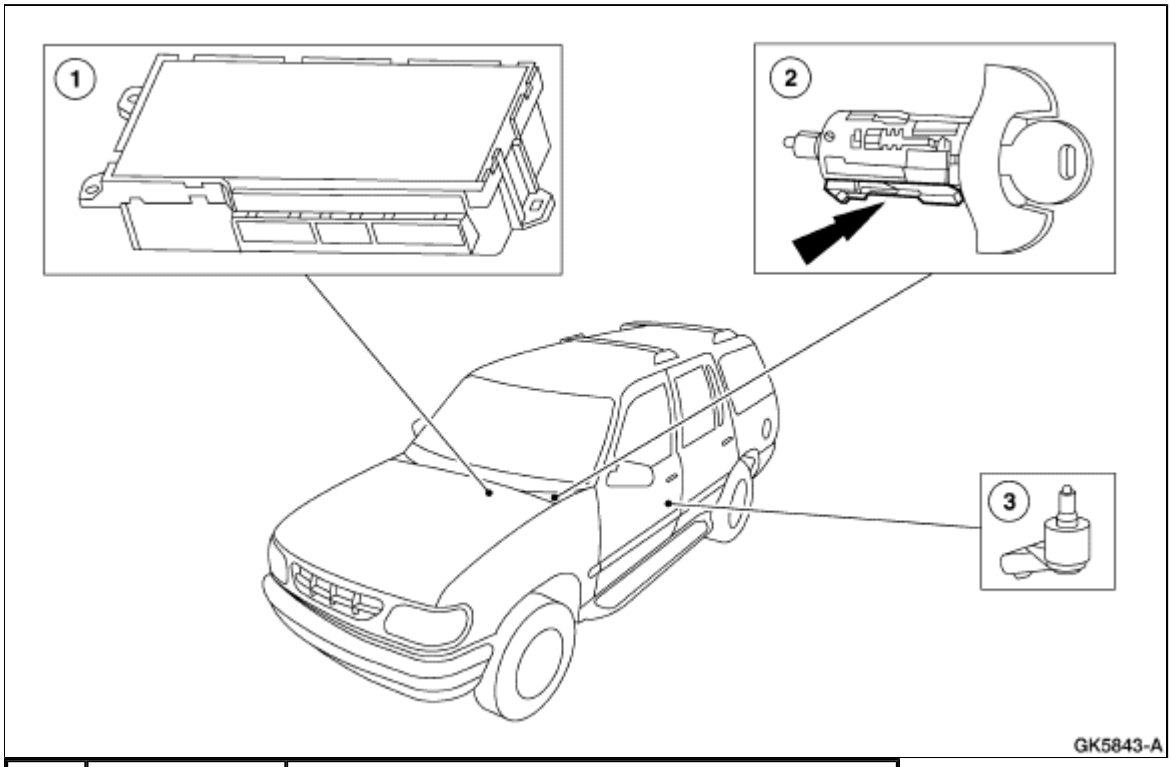


Installation

1. To install, reverse the removal procedure.

Warning Devices

Warning Devices



Item	Part Number	Description
1	—	Generic Electronic Module (GEM) (Optional)
2	—	Ignition Warning Switch
3	—	Door Open Warning Lamp Switch

NOTE: The generic electronic module/central timer module (GEM/CTM) is connected to the ISO link and is diagnosed through the data link connector (DLC) with a scan tool.

There are five warning chimes and lamps the GEM/CTM controls: headlamps operating without the ignition on (chime only), door ajar (chime and lamp), key-in-ignition (chime only), driver seat belt warning (chime and lamp), and message center.

Audible Warnings

Warning Condition	Lamp Duration	Audible Duration	Audible Output
Safety Belt	60 Seconds	6 Seconds	Chime, 60/Min. 740 Hz
Key In Ignition	—	Continuous	Chime, 120/Min. 740 Hz
Headlamps On	—	Continuous	Chime, 240/Min. 740 Hz

Door Ajar	Continuous	1 Second	Single Tone, 1000 Hz
Message Center (Tone Request)	—	1 Second	Single Tone, 1000 Hz

When the is turned to RUN or START from OFF or ACC, the chime will sound for six seconds or until the safety belt is buckled.

The will turn on for 60 seconds or until the driver safety belt is fastened. Both the chime and the lamp turn on at the same time.

If the safety belt is buckled before the ignition switch is turned to RUN or START, from OFF or ACC, neither the chime nor lamp will be activated.

Anytime the is changed to RUN from START while the safety belt warning indicator is activated, the safety belt warning indicator will remain activated until either the timing sequence has been executed or the safety belt is buckled.

When at least one door is ajar and the key is in the RUN position, the door ajar cluster lamp is activated and remains on until all doors are closed. A warning tone will sound once any time the key is in the ignition switch and any door is open.

The key-in-ignition warning will sound when the driver side is opened with the key in the and the in OFF or ACC. It will continue to sound until the key is removed, the is closed, or the is in RUN or START.

The headlamp-on reminder chime will be activated if the headlamps or parking lamps are on, the key is not in the ignition switch, and the driver door is opened.

A single tone will be provided each time a ground signal is received from the message center. A one-second tone will sound for warning indications from the message center. A 100 milli-second tone will sound for each message center button depressed.

Gauges and Warning Devices

Refer to Wiring Diagrams Cell 59 , Generic Electronic Module for schematic and connector information.

Refer to Wiring Diagrams Cell 62 , Instrument Cluster for schematic and connector information.

Refer to Wiring Diagrams Cell 66 , Warning Chime for schematic and connector information.

Special Tool(s)

 ST1137-A	73III Automotive Meter or equivalent 105-R0057
 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent scan tool

Inspection and Verification

1. **NOTE:** The generic electronic module (GEM)/central timer module (CTM) must be reconfigured upon replacement. Refer to the scan tool help screen on the configuration card to program the tire size and axle ratio.

   The warning lamps are a GEM/CTM controlled system; refer to Section 419-10 .

2. Verify the customer concern by operating the system in question.

3. Visually inspect for the following obvious signs of mechanical and electrical damage.

   Visual Inspection Chart

Mechanical	Electrical
• Switch(es)	• Fuse(s) • Damaged wiring harness • Loose or corroded connections • Circuitry • Bulb

4. If the concern remains after the inspection, connect the scan tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the scan tool menu. If the scan tool does not communicate with the vehicle:

- check that the program card is properly installed.
- check the connections to the vehicle.
- check the ignition switch position.

5. If the scan tool still does not communicate with the vehicle, refer to the New Generation STAR Tester manual.

6. Perform the DATA LINK DIAGNOSTIC TEST. If scan tool Tester responds with:
   - CKT914, CKT915 or CKT70 = ALL ECUS NO RESP/NOT EQUIP, refer to Section 418-00 .
   - NO RESP/NOT EQUIP for GEM/CTM, go to Pinpoint Test E.
   - SYSTEM PASSED, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and perform self-test diagnostics for the GEM/CTM.

7. If the DTCs retrieved are related to the concern, go to the GEM/CTM Diagnostic Trouble Code (DTC) Index to continue diagnostics.

8. If no DTCs related to the concern are retrieved, proceed to Symptom Chart to continue diagnostics.

GEM/CTM Diagnostic Trouble Code (DTC) Index

GEM/CTM Diagnostic Trouble Code (DTC) Index

DTC	Description	DTC Caused By	Action
P0500	Vehicle Speed Signal Circuit Failure	GEM	REFER to Section 308-07A .
B1302	Accessory Delay Relay Coil Circuit Failure	GEM	REFER to Section 501-11 .
B1304	Accessory Delay Relay Coil Circuit Short to Battery	GEM	REFER to Section 501-11 .
B1313	Battery Saver Relay Coil Circuit Failure	GEM/CTM	REFER to Section 417-02 .
B1315	Battery Saver Relay Coil Circuit Short to Battery	GEM/CTM	REFER to Section 417-02 .
B1317	Battery Voltage HIGH	GEM/CTM	REFER to Section 414-00 .
B1318	Battery Voltage LOW	GEM/CTM	REFER to Section 414-00 .
B1322	Door Ajar Driver Circuit Short to Ground	GEM/CTM	REFER to Section 417-02 .
B1323	Door Ajar Lamp Circuit Failure	GEM/CTM	REFER to Section 413-01 .
B1325	Door Ajar Lamp Circuit Short to Battery	GEM/CTM	REFER to Section 413-01 .
B1330	Door Ajar RF Circuit Short to Ground	GEM/CTM	REFER to Section 417-02 .
B1334	Decklid Ajar Rear Door	GEM/CTM	REFER to Section 417-02 .

	Circuit Short to Ground		
B1338	RR Door Ajar Circuit Short to Ground	GEM/CTM	REFER to Section 417-02 .
B1340	Chime Input Request Circuit Short to Ground	GEM/CTM	GO to Pinpoint Test C .
B1342	GEM/CTM is Defective	GEM/CTM	CLEAR the DTCs. RETRIEVE the DTCs. If DTC B1342 is retrieved, REPLACE the GEM/CTM; REFER to Section 419-10 . TEST the system for normal operation.
B1345	Heated Backlite Input Circuit Short to Ground	GEM	REFER to Section 501-11 .
B1347	Heated Backlite Relay Circuit Failure	GEM	REFER to Section 501-11 .
B1349	Heated Backlite Relay Circuit Short to Battery	GEM	REFER to Section 501-11 .
B1352	Ignition Key-In Circuit Failure	GEM/CTM	GO to Pinpoint Test D .
B1355	Ignition RUN Circuit Failure	GEM/CTM	REFER to Section 211-05 , Symptom Chart.
B1359	Ignition RUN/ACC Circuit Failure	GEM/CTM	REFER to Section 211-05 , Symptom Chart.
B1371	Illuminated Entry Relay Circuit Failure	GEM/CTM	REFER to Section 417-02 .
B1373	Interior Lamp Relay Coil Circuit Short to Battery	GEM/CTM	REFER to Section 417-02 .
B1398	Power Window Driver One-Touch Window Relay Circuit Failure	GEM	REFER to Section 501-11 .
B1400	Power Window Driver One-Touch Window Relay Coil Circuit Short to Battery	GEM	REFER to Section 501-11 .
B1404	Power Window Driver Down Circuit Open	GEM	REFER to Section 501-11 .
B1405	Driver Power Window Down Circuit to Battery	GEM	REFER to Section 501-11 .
B1410	Power Window Driver Motor Circuit Failure	GEM	REFER to Section 501-11 .
B1426	Seat Belt Lamp Circuit Short to Battery	GEM/CTM	REFER to Section 413-01 .
B1428	Seat Belt Lamp Circuit Failure	GEM/CTM	REFER to Section 413-01 .
B1431	Wiper Brake/Run Relay — Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1432	Wiper Brake/Run Relay Short to Battery	GEM/CTM	REFER to Section 501-16 .
B1434	Wiper Hi/Lo Speed Relay — Circuit Failure	GEM/CTM	REFER to Section 501-16 .

B1436	Wiper Hi/Lo Speed Relay Circuit Short to Battery	GEM/CTM	REFER to Section 501-16 .
B1438	Wiper Mode Select Switch Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1441	Wiper Mode Select Switch Input Short to Ground	GEM/CTM	REFER to Section 501-16 .
B1446	Wiper Park Sense Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1450	Wiper/Washer Interval Delay Switch Input Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1453	Wiper/Washer Interval Delay Switch Input Short to Ground	GEM/CTM	REFER to Section 501-16 .
B1458	Wiper/Washer Pump Motor Relay Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1460	Wiper/Washer Pump Motor Relay Coil Short to Battery	GEM/CTM	REFER to Section 501-16 .
B1462	Seat Belt Switch Circuit Failure	GEM/CTM	GO to Pinpoint Test A .
B1466	Wiper Hi/Lo Speed Not Switching	GEM/CTM	REFER to Section 501-16 .
B1467	Wiper Hi/Lo Speed Circuit Motor Short to Battery	GEM/CTM	REFER to Section 501-16 .
B1473	Wiper Low Speed Circuit Motor Failure	GEM/CTM	REFER to Section 501-16 .
B1475	Accessory Delayed Relay Contacts Short to Battery	GEM/CTM	REFER to Section 501-11 .
B1476	Wiper High Speed Circuit Motor Failure	GEM/CTM	REFER to Section 501-16 .
B1483	Brake Pedal Input Circuit Failure	GEM	REFER to Section 308-07A .
B1485	Brake Pedal Input Short Circuit to Battery	GEM	REFER to Section 308-07A .
B1574	LR Door Ajar Circuit Short to Ground	GEM/CTM	REFER to Section 417-02 .
B1577	Lamp Park Input Short Circuit to Battery	GEM/CTM	GO to Pinpoint Test B .
B1610	Illuminated Entry Input (From RAP Module) Circuit Short to Ground	GEM	REFER to Section 417-02 .
B1611	Wiper Rear Mode Select Switch Circuit	GEM	REFER to Section 501-16 .

	Failure		
B1614	Wiper Rear Mode Select Switch Circuit Short to Ground	GEM	REFER to Section 501-16 .
B1814	Wiper Rear Motor Down Relay Circuit Failure	GEM	REFER to Section 501-16 .
B1816	Wiper Rear Motor Down Relay Coil Circuit Short to Battery	GEM	REFER to Section 501-16 .
B1818	Wiper Rear Motor Up Relay Coil Circuit Failure	GEM	REFER to Section 501-16 .
B1820	Rear Wiper Motor Up Relay Circuit Short to Battery	GEM	REFER to Section 501-16 .
B1833	Door Unlock Switch Circuit Short to Ground	GEM	REFER to Section 501-14B .
B1834	Door Unlock Disarm Output Circuit Failure	GEM	REFER to Section 501-14B .
B1836	Door Unlock Disarm Output Circuit Short to Battery	GEM	REFER to Section 501-14B .
B1839	Wiper Rear Motor Circuit Failure	GEM	REFER to Section 501-16 .
B1840	Wiper Front Power Circuit Failure	GEM/CTM	REFER to Section 501-16 .
B1894	Wiper Rear Motor Speed Sense Circuit Failure	GEM	REFER to Section 501-16 .
B2105	Throttle Position Input (TPI) Signal Out of Range Low	GEM	REFER to Section 308-07A .
B2106	Throttle Position Input (TPI) Signal Out of Range High	GEM	REFER to Section 308-07A .
B2141	NVM Configuration Failure	GEM/CTM	Vehicle speed calibration data is not programmed into the GEM/CTM. REFER to the scan tool help screen on the configuration card to program the tire size ratio. TEST the system for normal operation. If DTC B2141 is still present, REPLACE the GEM/CTM. REFER to Section 419-10 . TEST the system for normal operation.
P1763	Transmission Neutral InTow Indicator Circuit Short to Battery	GEM	GO to Pinpoint Test F .
P1764	Transmission Neutral InTow Indicator Circuit Fault	GEM	GO to Pinpoint Test F .
P1804	4WD High Indicator Circuit Failure	GEM	REFER to Section 308-07A .

P1806	4WD High Indicator Short Circuit to Battery	GEM	REFER to Section 308-07A .
P1808	4WD Low Indicator Circuit Failure	GEM	REFER to Section 308-07A .
P1810	4WD Low Indicator Short Circuit to Battery	GEM	REFER to Section 308-07A .
P1812	4WD Mode Select Circuit Failure	GEM	REFER to Section 308-07A .
P1815	4WD Mode Select Short Circuit to Ground	GEM	REFER to Section 308-07A .
P1820	Transfer Case CW Shift Relay Coil Circuit Failure	GEM	REFER to Section 308-07A .
P1822	Transfer Case CW Shift Relay Coil Short to Power	GEM	REFER to Section 308-07A .
P1824	4WD Electric Clutch Relay Circuit Failure	GEM	REFER to Section 308-07A .
P1826	4WD LOW Clutch Relay Short to Battery	GEM	REFER to Section 308-07A .
P1828	Transfer Case CCW Shift Relay Circuit Failure	GEM	REFER to Section 308-07A .
P1830	Transfer Case CCW Shift Relay Coil Short to Battery	GEM	REFER to Section 308-07A .
P1836	Transfer Case Front Shaft Speed Sensor Circuit Failure	GEM	REFER to Section 308-07A .
P1837	Transfer Case Rear Shaft Speed Sensor Circuit Failure	GEM	REFER to Section 308-07A .
P1838	Transfer Case Shift Motor Circuit Failure	GEM	REFER to Section 308-07A .
P1846	Transfer Case CONTACT PLATE "A" Circuit Failure	GEM	REFER to Section 308-07A .
P1850	Transfer Case CONTACT PLATE "B" Circuit Failure	GEM	REFER to Section 308-07A .
P1854	Transfer Case CONTACT PLATE "C" Circuit Failure	GEM	REFER to Section 308-07A .
P1858	Transfer Case CONTACT PLATE "D" Circuit Failure	GEM	REFER to Section 308-07A .
P1866	Transfer Case System Concern	GEM	REFER to Section 308-07A .
P1867	Transfer Case Contact	GEM	REFER to Section 308-07A .

	Plate General Circuit Failure		
P1874	Automatic Hall Effect Sensor Power Circuit Failure	GEM	REFER to Section 308-07A .
P1875	Automatic Hall Effect Sensor Power Circuit Short to Battery	GEM	REFER to Section 308-07A .
P1891	Transfer Case Contact Plate Ground Return Open Circuit	GEM	REFER to Section 308-07A .

GEM/CTM Parameter Identification (PID) Index

GEM/CTM Parameter Identification (PID) Index

PID	Description	Expected Values
VSS_GEM	Vehicle Speed Input	0 - 255 KPH
PARK_SW	External Access Ajar Switch Status	OFF, ON
D_DR_SW	Driver Door Ajar Switch Status	CLOSED, AJAR
DR_DSRM	Door Disarm Switch Status	L_DOOR, R_DOOR, LIFT_G, OFF
DR_UNLK	All Doors Unlock Output State	ON---, OFF---, ON-B-, OFFO-G
P_DR_SW	Passenger Door Ajar Switch Status	CLOSED, AJAR
IGN_KEY	Key-In-Ignition Status	IN, OUT
IGN_GEM	Ignition Switch Status	START, RUN, OFF, ACCY
BATSAV	Battery Saver Relay Circuit	ON---, OFF---, ON-B-, OFFO-G
VBATGEM	Battery Voltage	0.0 VDC - 14.3 VDC
LGATESW	Liftgate Ajar Switch Status	CLOSED - AJAR
LRDR_SW	Left Rear Door Ajar Switch Status	CLOSED - AJAR
RRDR_SW	Right Rear Door Ajar Switch Status	CLOSED - AJAR
INTLMP	Illuminated Entry Relay Circuit	ON---, OFF---, ON-B-, OFFO-G
CLTCHSW	Transmission Clutch Interlock Switch (GEM Only)	ENGAGED, NOT ENGAGED
NTRL_SW	Neutral Safety Switch Input (GEM Only)	NTRL, not NTRL
MTR_CCW	Transmission Transfer CCW Motor Output (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
MTR_CW	CW Shift Relay Coil Status (GEM Only)	OFF---, ON---, ON-B-, OFFO-G
4WD_SW	4WD Switch Status (GEM Only)	AUTO, 4WDLOW, 4WDHIGH
4WDELCL	4WD Electric Clutch	ON---, OFF---, ON-B-, OFFO-G
TRANSGR	Transmission Gear Status	REV, notREV
4WDCLCH	4WD Electronic Clutch Output Status (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
4WDLOW	4WD Low Indicator Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
4WDHIGH	4WD High Indicator Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G

PLATE_A	Transfer Case Contact Plate Switch A (GEM Only)	OPEN, CLOSED
PLATE_B	Transfer Case Contact Plate Switch B (GEM Only)	OPEN, CLOSED
PLATE_C	Transfer Case Contact Plate Switch C (GEM Only)	OPEN, CLOSED
PLATE_D	Transfer Case Contact Plate Switch D (GEM Only)	OPEN, CLOSED
BOO_GEM	Brake Pedal Position (BPP) Switch Input (GEM Only)	ON, OFF
HALLPWR	Hall Effect Speed Sensor Power (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
4WDCLST	4WD Clutch PWM Output Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
TRA_RSP	Rear Shaft Speed (GEM Only)	0-255 mph
TRA_FSP	Front Shaft Speed (GEM Only)	0-225 mph
PLATEPW	Contact Plate Ground Output (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
PWR_RLY	ABS Active Input	ON, OFF
NTF	Neutral Tow Function (GEM Only)	ON, OFF
NTF_LMP	Neutral Tow Light (GEM Only)	ON, OFF
D_SBELT	Driver Seat Belt Status	OUT, IN
IPCHIME	External Chime Request	ON, OFF
SBLTMP	Seat Belt Indicator Status	OFF, ON, OFFO-G, ON-B-
DRAJR_L	Door Ajar Warning Lamp Circuit	OFF, ON
D_PWRLY	One Touch Down Relay Coil Circuit Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
D_ PWAMP	Driver Power Window Regulator Electric Drive Current (GEM Only)	0.25 amp increments
D_PWPK	Driver Power Window Regulator Electric Drive Peak Current (GEM Only)	0.25 amp increments
ACCDLY	Accessory Delay Relay Coil Circuit (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
RDEF_ SW	Rear Defrost Control Switch Status	ON, OFF
RDEFRLY	Rear Window Defrost Relay Coil Circuit	ON---, OFF---, ON-B-, OFFO-G
WASHRLY	Washer Relay Status	ON---, OFF---, ON-B-, OFFO-G
WPPK_PK	Wiper Park-to-Park Time	0 - 65 Seconds
WPMODE	Wiper Control Mode Status	WASH, OPEN, INVLD, OFF, INTVL 1-7, LOW, HIGH
WPPRKSW	Wiper Motor Status	PARKED, notPRK
WPRUN	Wiper Mode Run Relay	ON---, OFF---, ON-B-, OFFO-G
WPHISP	Windshield Wiper HI/LO Relay Status	ON---, OFF---, ON-B-, OFFO-G
WASH_SW	Washer Pump Relay Switch Status	OFF, ON, ON-B-, OFFO-G
R_WP_UP	Rear Wiper Up Relay Status (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
R_WP_DN	Rear Wiper Down Relay Status (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
R_WP_SW	Rear Wiper Input Switch Status (GEM Only)	WPLOW, OFF, WPHIGH
R_WP_MD	Rear Wiper Mode Switch Status (GEM Only)	OFF, INTVL 1-2, LOW WASH
R_WP_PK	Rear Wiper Park Status (GEM Only)	PARKED, notPRK

GEM/CTM Active Command Index

GEM/CTM Active Command Index

Active Command	Display	Action
PID LATCH	PID LATCH	ON, OFF
FRONT WIPER	WIPER RLY	ON, OFF
FRONT WIPER	SPEED RLY	ON, OFF
FRONT WIPER	WASH RLY	ON, OFF
WARNING LAMPS AND CHIME	SBLT LAMP	ON, OFF
WARNING LAMPS AND CHIME	CHIME	ON, OFF
WARNING LAMPS AND CHIME	AJAR LAMP	ON, OFF
BATTERY SAVER	BATT SAVR	ON, OFF
INTERIOR COURTESY LAMPS	INT LAMPS	ON, OFF
ONE TOUCH DOWN AND ACCY DELAY (GEM Only)	ACCY RLY	ON, OFF
ONE TOUCH DOWN AND ACCY DELAY (GEM Only)	ONE TOUCH	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	CW/CCW	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	HIGH LAMP	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	LOW LAMP	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	PLATE PWR	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	SHFT CLCH	ON, OFF
SHIFT CLUTCH CONTROL	CLUTCH SOL	ANALOG %
NEUTRAL IN TOW LAMP	NTFLAMP	ON, OFF
REAR WIPER (GEM Only)	UP RELAY	ON, OFF
REAR WIPER (GEM Only)	DWN RELAY	ON, OFF
HEATED BACKLIGHT	RLY CNTRL	ON, OFF
DOOR LOCK CONTROL	DD UNLOCK	ON, OFF

GEM/CTM Wiggle Test Diagnostic Trouble Code (DTC) Index

GEM/CTM Wiggle Test Diagnostic Trouble Code (DTC) Index

DTC	Description	DTC Caused By
B1317	Battery Voltage HIGH	GEM/CTM
B1318	Battery Voltage LOW	GEM/CTM
B1322	Door Ajar Driver Circuit Short to Ground	GEM/CTM
B1330	Door Ajar Passenger Circuit Short to Ground	GEM/CTM
B1352	Ignition Key-In Circuit Failure	GEM/CTM

B1410	Power Window LF Motor Circuit Failure	GEM
B1438	Wiper Mode Select Switch Circuit Failure	GEM/CTM
B1441	Wiper Mode Select Switch Input Short to Ground	GEM/CTM
B1446	Wiper Park Sense Circuit Failure	GEM/CTM
B1450	Wiper/Washer Interval Delay Switch Input Circuit Failure	GEM/CTM
B1453	Wiper/Washer Interval Delay Switch Input Short to Ground	GEM/CTM
B1462	Seat Belt Switch Circuit Failure	GEM/CTM
B1577	Lamp Park Input Short Circuit to Battery	GEM/CTM
B1610	Illuminated Entry Input (From RAP Module) Circuit Short to Ground	GEM
B1833	Door Unlock Disarm Switch Circuit Short to Ground	GEM

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• The Door Ajar Warning Indicator Does Not Operate Properly	• Door ajar warning indicator bulb. • Instrument cluster. • Circuitry. • GEM/CTM. • DTC B1322. • DTC B1323. • DTC B1325. • DTC B1330. • DTC B1334. • DTC B1338. • DTC B1342. • DTC B1574.	• REFER to Section 413-01 .
• The Safety Belt Warning Indicator Does Not Operate Properly	• Instrument cluster. • Safety belt warning indicator bulb. • Safety belt warning indicator switch. • Circuitry. • GEM/CTM. • DTC B1342. • DTC B1426. • DTC B1428. • DTC B1462.	• REFER to Section 413-01 .
• The Safety Belt Warning Chime Does Not Operate Properly	• Safety belt warning indicator switch (10B924). • Circuit(s). • GEM/CTM. • DTC B1342. • DTC B1462.	• GO to Pinpoint Test A .
• The Headlamp On Reminder Chime Does Not Operate Properly	• Headlamp switch (11654).	• GO to Pinpoint Test

	• Circuitry. • LF door open warning switch. • GEM/CTM. • DTC B1322. • DTC B1342. • DTC B1577.	B .
• A Chime Is Inoperative — I/P Chime Does Not Sound When Message Center Keys Are Activated	• Circuitry. • Message center indicator. • GEM. • DTC B1340. • DTC B1342.	• GO to Pinpoint Test C .
• The Key-In-Ignition Chime Does Not Operate Properly	• Key-in-ignition warning switch. • Circuitry. • GEM/CTM. • DTC B1342. • DTC B1352.	• GO to Pinpoint Test D .
• No Communication With the Module — Generic Electronic Module/Central Timer Module	• Circuitry. • Fuse(s). • GEM/CTM.	• GO to Pinpoint Test E .
• An Indicator Is Inoperative — The Neutral In Tow Indicator Is Inoperative	• Circuitry. • GEM. • DTC P1763. • DTC P1764. • Data link connector (DLC).	• GO to Pinpoint Test F .

Pinpoint Tests

CAUTION: Before removing and installing the GEM or its connectors, disconnect the battery. Failure to follow this caution will result in the GEM storing many erroneous DTCs, and it may exhibit erratic operation after installation.

CAUTION: Be careful when probing the fuse junction panel, power distribution box or any connectors. Damage will result to the connector receptacle if the probe or terminal being used is too large.

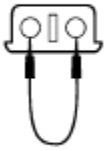
CAUTION: Electronic modules are sensitive to static discharges. If exposed to these charges, damage may result.

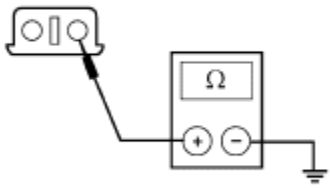
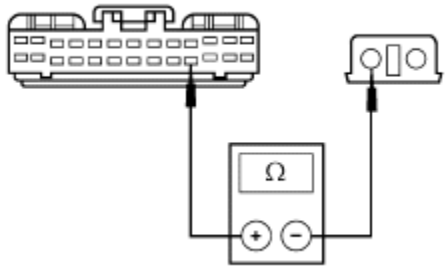
NOTE: If continuous DTCs are recorded and the symptom is not present when performing the pinpoint tests, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

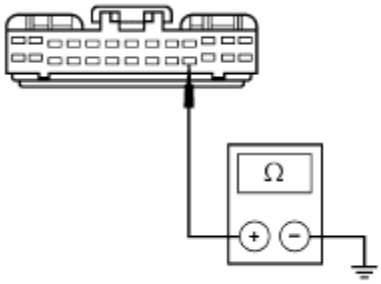
Complete the entire pinpoint test related to the symptom before replacing the GEM.

PINPOINT TEST A: THE SAFETY BELT WARNING CHIME DOES NOT OPERATE PROPERLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK THE IGNITION STATES — MONITOR THE GEM/CTM PID IGN_GEM	
1  2  Scan Tool 3 	4 **NOTE:** If the vehicle is equipped with a manual transmission, depress the clutch while turning the ignition switch to start. Monitor the GEM/CTM PID IGN_GEM while turning the ignition switch through the START, RUN, OFF, and ACC positions. • **Do the PID values agree with the ignition switch states?** → **Yes** GO to A2 . → **No** REFER to Section 417-02 .
A2 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCs)	
1  2  Clear Continuous DTCs 3  GEM/CTM On-Demand Self-Test	1 Retrieve and document continuous DTCs.

	• **Are any DTCs recorded?** → **Yes** If DTC B1462, GO to A3 . If DTC B1342, REPLACE the GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to A3 .
A3 CHECK THE SAFETY BELT WARNING INDICATOR SWITCH — MONITOR THE GEM/CTM PID D_SBELT	
1  2  Safety Belt Warning Indicator Switch C324 3  4  5  GK3454-A	4 Monitor the GEM/CTM PID D_SBELT. 5 Connect, then remove a jumper wire between safety belt warning indicator switch C324, circuit 85 (BR/LB), and C324, circuit 57 (BK). • **Does the GEM/CTM PID D_SBELT indicate OUT when connected and IN when removed?** → **Yes** REPLACE the safety belt warning indicator

	switch. CLEAR the DTCs. TEST the system for normal operation. → **No** GO to A4 .
A4 CHECK THE GROUND TO THE SAFETY BELT WARNING INDICATOR SWITCH FOR OPEN — CIRCUIT 57 (BK)	
1  2  GK3455-A	2 Measure the resistance between safety belt warning indicator switch C324, circuit 57 (BK), and ground. • **Is the resistance less than 5 ohms?** → **Yes** GO to A5 . → **No** REPAIR circuit 57 (BK). CLEAR the DTCs. TEST the system for normal operation.
A5 CHECK THE CIRCUIT BETWEEN GEM/CTM C280 AND SAFETY BELT WARNING INDICATOR SWITCH FOR OPEN — CIRCUIT 85 (BR/LB)	
1  GEM/CTM C280 2  GK6058-A	2 Measure the resistance between GEM/CTM C280-23, circuit 85 (BR/LB), and safety belt warning indicator switch C324, circuit 85 (BR/LB).

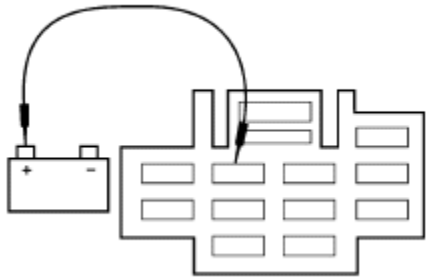
	• **Is the resistance less than 5 ohms?** → **Yes** GO to A6 . → **No** REPAIR circuit 85 (BR/LB). CLEAR the DTCs. TEST the system for normal operation.
A6 CHECK CIRCUIT 85 (BR/LB) FOR SHORT TO GROUND	
1  GK6059-A	1 Measure the resistance between GEM/CTM C280-23, circuit 85 (BR/LB), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** REPLACE the GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR circuit 85 (BR/LB). CLEAR the DTCs. TEST the system for normal operation.

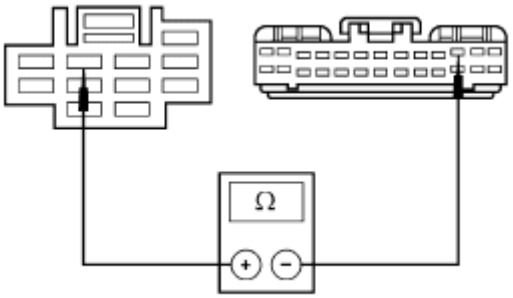
PINPOINT TEST B: THE HEADLAMP ON REMINDER CHIME DOES NOT OPERATE PROPERLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CHECK THE IGNITION STATES — MONITOR THE GEM/CTM PID IGN_GEM	
1  2  Scan Tool 3	3 **NOTE:** If the vehicle is equipped with a

	manual transmission, depress the clutch while turning the ignition switch to start. Monitor the GEM/CTM PID IGN_GEM while turning the ignition switch through the START, RUN, OFF, and ACC positions. • **Do the PID values agree with the ignition switch states?** → **Yes** GO to B2 . → **No** REFER to Section 417-02 .
B2 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCS)	
1  2  Clear Continuous DTCs 3  GEM/CTM On-Demand Self-Test	1 Retrieve and document continuous DTCs. • **Are any DTCs recorded?** → **Yes** If DTC B1322, REFER to Section 417-02 , Pinpoint Test C . If DTC B1577, GO to B8 . If DTC B1342, REPLACE the GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to B3 .
B3 VERIFY THE INTERIOR LAMPS OPERATE BY OPENING THE LF DOOR	
	1 Open the driver door. • **Do the interior lamps illuminate?**

	→ **Yes** GO to B4 . → **No** REFER to Section 417-02 .
B4 VERIFY THE PARK/TURN LAMPS OPERATE	
	1 Verify the park/turn lamps operate. • **Do the park/turn lamps operate?** → **Yes** GO to B5 . → **No** REFER to Section 417-01 .
B5 CHECK THE HEADLAMP SWITCH — MONITOR THE GEM/CTM PID PARK_SW	
1 	1 Monitor the GEM/CTM PID PARK_SW. 2 Place the headlamp switch in the PARK and ON positions. • **Does the GEM/CTM PID PARK_SW indicate ON when the headlamp switch is in the ON or PARK position and OFF when the headlamp switch is in the OFF position?** → **Yes** REPLACE the GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to B6 .
B6 CHECK THE SIGNAL INPUT FROM CIRCUIT 1032 (W/BK) TO THE GEM/CTM — MONITOR THE GEM/CTM PID PARK_SW	
1  2  Headlamp Switch C216	

3  4  5  GK4319-A	4 Monitor the GEM/CTM PID PARK_SW. 5 Connect a jumper wire between headlamp switch C216-3, circuit 1032 (W/BK), and the positive battery terminal. • **Does the GEM/CTM PID PARK_SW indicate OFF?** → **Yes** GO to B7 . → **No** GO to B8 .
B7 CHECK CIRCUIT 1032 (W/BK) FOR OPEN	
1  2  GEM/CTM C280 3	3 Measure the resistance between GEM/CTM C280-11, circuit 1032 (W/BK), and headlamp switch C216-3, circuit 1032 (W/BK).



GK6060-A

- **Is the resistance less than 5 ohms?**

→ **Yes**
REPLACE the GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

→ **No**
REPAIR circuit 1032 (W/BK). CLEAR the DTCs. TEST the system for normal operation.

B8 CHECK THE HEADLAMP SWITCH — MONITOR THE GEM/CTM PID PARK_SW

1

2

Headlamp Switch C216

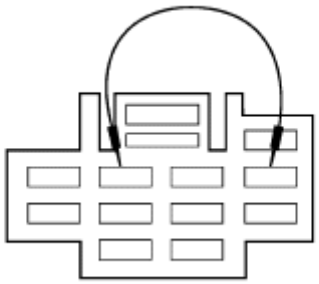
3

4

5

4 Monitor the GEM/CTM PID PARK_SW.

5 Connect a jumper wire between headlamp switch C216-5, circuit 195 (T/W), and C216-3, circuit 1032 (W/BK).



GK3460-A

- **Does the GEM/CTM PID PARK_SW indicate ON when the jumper wire is connected and OFF when the wire is removed?**

→ **Yes**
REPLACE the headlamp switch; REFER to Section 417-01 . CLEAR the DTCs. TEST the system for normal operation.

→ **No**
GO to B9 .

B9 CHECK CIRCUIT 1032 (W/BK) FOR SHORT TO POWER

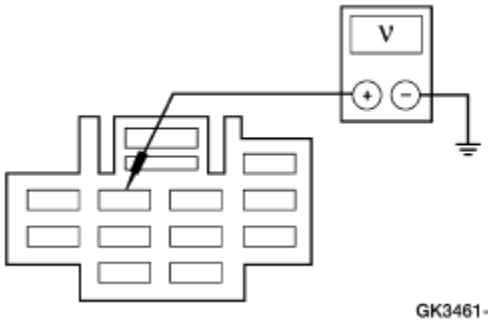
1

GEM/CTM C280

2

3 Measure the voltage between headlamp switch C216-3, circuit 1032 (W/BK), and ground.

3



GK3461-A

- **Is any voltage indicated?**

→ **Yes**
REPAIR circuit 1032 (W/BK). CLEAR the

	DTCs. TEST the system for normal operation. → **No** REPLACE the GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST C: A CHIME IS INOPERATIVE — I/P CHIME DOES NOT SOUND WHEN MESSAGE CENTER KEYS ARE ACTIVATED

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCs)	
1  2  Scan Tool 3  4  Clear Continuous DTCs 5  GEM On-Demand Self-Test	3 Retrieve and document continuous DTCs. • **Are any DTCs recorded?** → **Yes** If DTC B1340, GO to C2 . If DTC B1342, REPLACE the GEM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to C2 .

C2 CHECK THE GEM PID IPCHIME TRIGGERING THE GEM ACTIVE COMMAND CHIME ON AND OFF

1

1 Monitor the GEM PID IPCHIME while triggering the active command CHIME, ON and OFF.

- **Does the GEM PID IPCHIME agree with the active command?**

→ **Yes**
REPLACE the GEM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

→ **No**
GO to C3 .

C3 CHECK THE GEM FOR CHIME OPERATION — GROUND MESSAGE CENTER C2009-25

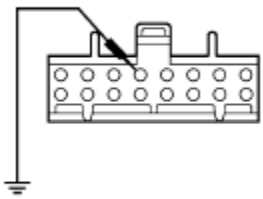
1

2

Message Center C2009

3

4

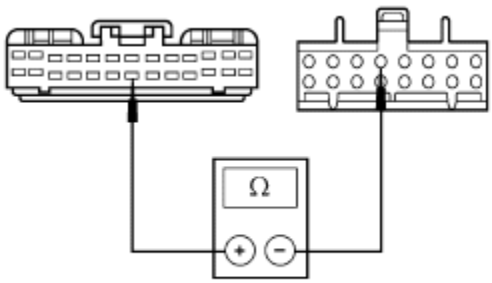
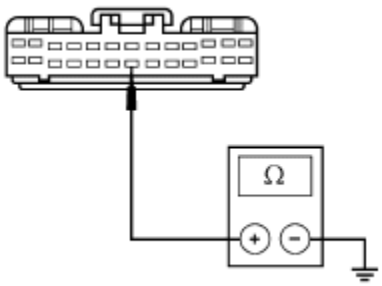


GK3282-A

4 Connect a jumper wire between message center C2009-25, circuit 183 (T/Y), and ground.

- **Does the chime operate?**

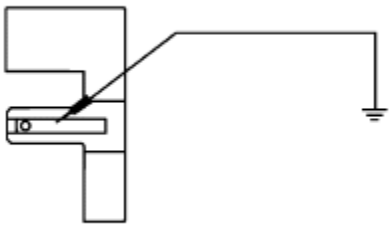
→ **Yes**
REPLACE the message center; REFER to Section 413-08 . CLEAR the DTCs. TEST the

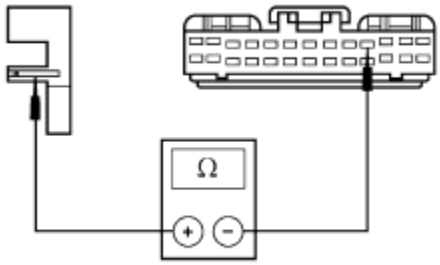
	system for normal operation. → **No** GO to C4 .
C4 CHECK CIRCUIT 183 (T/Y) FOR OPEN	
1  2  GEM C280 3  GK6069-A	3 Measure the resistance between GEM C280-20, circuit 183 (T/Y), and message center C2009-25, circuit 183 (T/Y). • **Is the resistance less than 5 ohms?** → **Yes** GO to C5 . → **No** REPAIR circuit 183 (T/Y). CLEAR the DTCs. TEST the system for normal operation.
C5 CHECK CIRCUIT 183 (T/Y) FOR SHORT TO GROUND	
1  GK6061-A	1 Measure the resistance between GEM C280-20, circuit 183 (T/Y), and ground. • **Is the resistance greater than 10,000 ohms?**

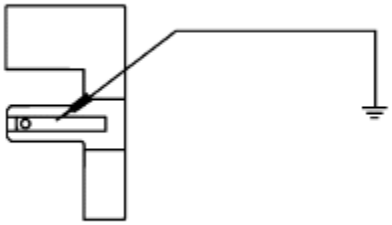
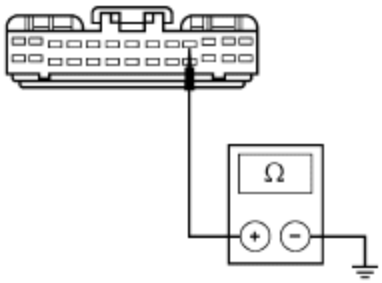
	→ **Yes** REPLACE the GEM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR circuit 183 (T/Y). CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST D: THE KEY IN IGNITION WARNING CHIME DOES NOT OPERATE PROPERLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
D1 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCs)	
1  2  Scan Tool 3  4  Clear Continuous DTCs 5  GEM/CTM On-Demand Self-Test	3 Retrieve and document continuous DTCs. • **Are any DTCs recorded?** → **Yes** If DTC B1352, GO to D2 . If DTC B1342, REPLACE the GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

	→ **No** GO to D2 .
D2 CHECK THE GEM/CTM PID IGN_KEY WITH THE KEY IN AND OUT OF THE IGNITION	
1 	1 Monitor the GEM/CTM PID IGN_KEY with the key in the ignition switch and the key out of the ignition switch. • **Does the GEM/CTM PID IGN_KEY indicate IN with the key in the ignition switch and OUT with the key removed from the ignition switch.** → **Yes** REPLACE the GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** If the GEM/CTM PID IGN_KEY continuously indicates OUT, GO to D3 . If the GEM/CTM PID IGN_KEY continuously indicates IN, GO to D5 .
D3 CHECK THE GEM/CTM FOR CHIME OPERATION	
1  3  4  GK3084-A	2 Remove the ignition switch lock cylinder; refer to Section 211-04 . 4 Momentarily connect a jumper wire between key-in-ignition warning switch, circuit 158 (BK/PK), and ground. • **Does the chime operate?**

	→ **Yes** REPLACE the key-in-ignition warning switch; REFER to Switch— Key-In-Ignition Warning . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to D4 .
D4 CHECK CIRCUIT 158 (BK/PK) FOR OPEN	
1  2  GEM/CTM C280 3  GK6062-A	3 Measure the resistance between GEM/CTM C280-10, circuit 158 (BK/PK), and key in ignition warning switch, circuit 158 (BK/PK). • **Is the resistance less than 5 ohms?** → **Yes** REPLACE the GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR circuit 158 (BK/PK). CLEAR the DTC. TEST the system for normal operation.
D5 CHECK THE GEM/CTM FOR CHIME OPERATION	
1  3	2 Remove the ignition switch lock cylinder; refer to Section 211-04 .

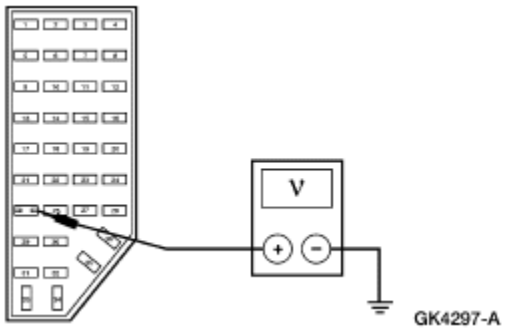
 4  GK3084-A	4 Momentarily connect a jumper wire between key-in-ignition warning switch, circuit 158 (BK/PK), and ground. • **Does the chime operate?** → **Yes** REPLACE the key-in-ignition warning switch; REFER to Switch— Key-In-Ignition Warning . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to D6 .
D6 CHECK CIRCUIT 158 (BK/PK) FOR SHORT TO GROUND	
1  2  GEM/CTM C280 3  GK6063-A	3 Measure the resistance between GEM/CTM C280-10, circuit 158 (BK/PK), and ground. • **Is the resistance greater than 10,000 ohms?**

	→ **Yes** REPLACE the GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR circuit 158 (BK/PK). CLEAR the DTC. TEST the system for normal operation.

PINPOINT TEST E: NO COMMUNICATION WITH THE MODULE — GENERIC ELECTRONIC MODULE/CENTRAL TIMER MODULE

CONDITIONS	DETAILS/RESULTS/ACTIONS
E1 CHECK POWER DISTRIBUTION BOX MAXI-FUSE 1 (50A)	
1  Fuse 1 (50A)	• **Is the fuse OK?** → **Yes** GO to E2 . → **No** REPLACE the fuse. CLEAR the DTCs. TEST the system for normal operation. If the fuse fails again, CHECK circuit 1052 (T/BK) for a short to ground. REPAIR as necessary.
E2 CHECK FUSE JUNCTION PANEL FUSE 25 (7.5A)	
1  Fuse 25 (7.5A)	• **Is the fuse OK?** → **Yes** GO to E3 . → **No** REPLACE the fuse. CLEAR the DTCs. TEST the system for normal operation. If the fuse fails again, CHECK circuit 1001 (W/Y) for a short to ground. REPAIR as necessary.
E3 CHECK CIRCUIT 1052 (T/BK) FOR VOLTAGE	

1



1 Measure the voltage between fuse junction panel fuse 25 (7.5A) pin 2, circuit 1052 (T/BK), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to E4 .

→ **No**
REPAIR circuit 1052 (T/BK). CLEAR the DTCs. TEST the system for normal operation.

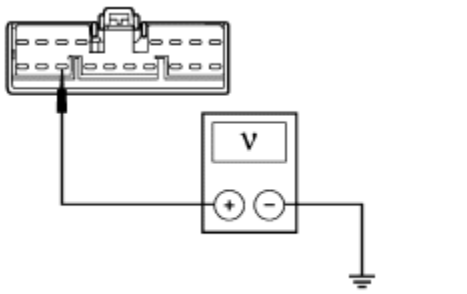
E4 CHECK THE VOLTAGE TO THE GEM/CTM — CIRCUIT 1001 (W/Y)

1

2

GEM/CTM C283

3

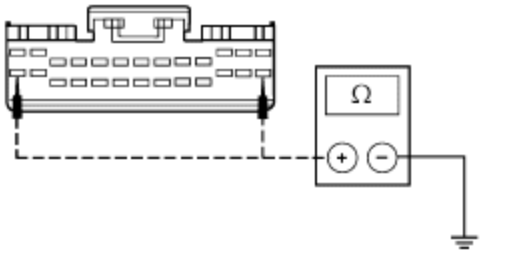


3 Measure the voltage between GEM/CTM C283-11, circuit 1001 (W/Y), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to E5 .

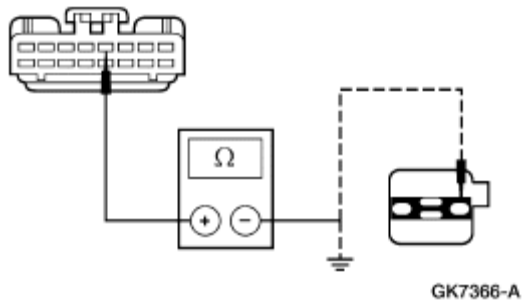
→ **No**
REPAIR circuit 1001 (W/Y). CLEAR the DTCs.

	TEST the system for normal operation.
E5 CHECK CIRCUIT 570 (BK/W) FOR OPEN	
1  GEM/CTM C280 2  GC1770-A	2 Measure the resistance between GEM/CTM C280-14, circuit 570 (BK/W), and ground; and between GEM/CTM C280-26, circuit 570 (BK/W), and ground. • **Are the resistances less than 5 ohms?** → **Yes** REFER to Section 418-00 . → **No** REPAIR circuit 570 (BK/W). CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST F: AN INDICATOR IS INOPERATIVE — THE NEUTRAL IN TOW INDICATOR IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
F1 CHECK THE NEUTRAL IN TOW STATUS — MONITOR THE GEM PID NTF	
1  2  Scan Tool 3 	3 Monitor the GEM PID NTF.

	• **Does the GEM PID NTF indicate OFF?** → **Yes** ENABLE the neutral in-tow function using SBDS. CLEAR the DTCs. TEST the system for normal operation. → **No** GO to F2 .
F2 CHECK THE NEUTRAL IN TOW INDICATOR — GEM ACTIVE COMMAND NEUTRAL IN TOW LAMP ON AND OFF	
1 	1 Trigger the GEM active command NEUTRAL IN TOW LAMP NTFLAMP ON and OFF • **Does the neutral in tow indicator turn on and off ?** → **Yes** CHECK the ignition switch, brake switch and PRNDL inputs to the GEM. CLEAR the DTCs. TEST the system for normal operation. → **No** GO to F3 .
F3 CHECK CIRCUIT 323 (LB/Y) FOR OPEN AND SHORT TO GROUND	
1  2  GEM C281 3  Neutral Tow C207 4	4 Measure the resistance between GEM C381-5, circuit 323 (LB/Y), and neutral tow C207, circuit 323 (LB/Y); and between GEM C281-5, circuit 323 (LB/Y), and ground.



- **Is the resistance less than 5 ohms between the two connectors and greater than 10, 000 ohms between the GEM and ground.**

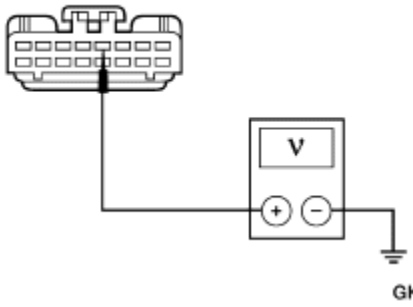
→ **Yes**
GO to F4 .

→ **No**
REPAIR circuit 323 (LB/Y). CLEAR the DTCs. TEST the system for normal operation.

F4 CHECK CIRCUIT 323 (LB/Y) FOR SHORT TO POWER

1

2



2 Measure the voltage between GEM C281-5, circuit 323 (LB/Y), and ground.

- **Is any voltage indicated?**

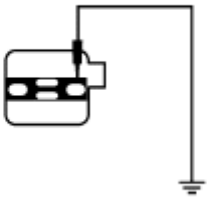
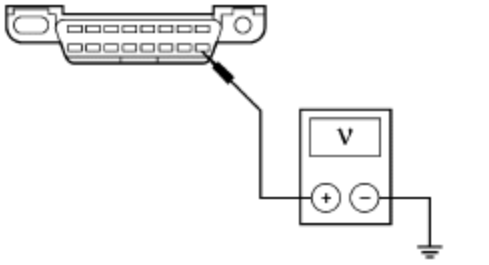
→ **Yes**
REPAIR circuit 323 (LB/Y). CLEAR the DTCs. TEST the system for normal operation.

→ **No**
GO to F5 .

F5 CHECK THE NEUTRAL IN TOW INDICATOR FOR PROPER OPERATION

1

1 Connect a jumper wire between neutral tow

 GK7368-A	C207, circuit 323 (LB/Y), and ground. • **Does the neutral tow indicator illuminate?** → **Yes** GO to F7 . → **No** GO to F6 .
F6 CHECK FOR VOLTAGE TO THE NEUTRAL TOW INDICATOR — CIRCUIT 693 (O)	
1  GK2634-A	1 Measure the voltage between DLC C291-16, circuit 693 (O), and ground. • **Is the voltage greater than 10 volts?** → **Yes** REPLACE the neutral in tow indicator. CLEAR the DTCs. TEST the system for normal operation. → **No** DIAGNOSE the module communication network; REFER to Section 418-00 .
F7 CHECK THE TRANSFER CASE SHIFT CAPABILITY	
1  GEM C281 2	

 3	3 Place the 4WD mode switch in the 4WD HIGH position.
 GC1175-A	
4	4 Place the 4WD mode switch in the 4WD LOW position.
 GC1176-A	
5	5 Place the 4WD mode switch in the AUTO position.
 GC1174-A	
	• **Does the vehicle shift into all 4WD positions properly?** → **Yes** REPLACE the GEM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** DIAGNOSE the transfer case; REFER to Section 308-07A .

Module —Generic Electronic (GEM)/Central Timer (CTM)

Removal and Installation

For additional information, refer to Section 419-10 .

Switch —Door Ajar

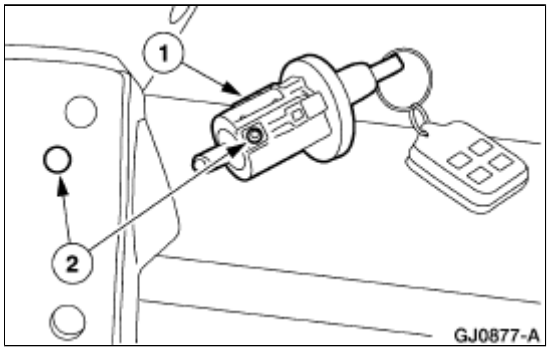
Removal and Installation

For additional information, refer to Section 501-14A .

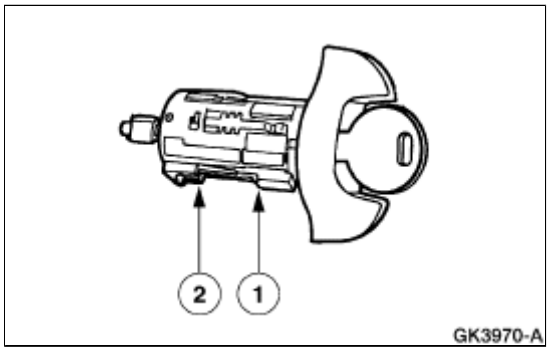
Switch — Key-In-Ignition Warning

Removal

1. Remove the ignition switch lock cylinder.
    1. Insert the ignition key and turn to the RUN position.
    2. Insert a punch in the access hole of the steering column and press the release tab while pulling out the ignition switch lock cylinder.

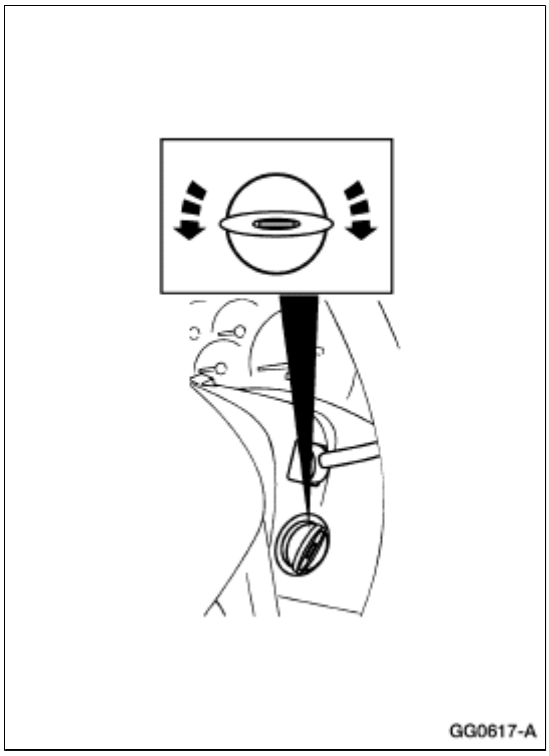


2. Remove the key-in-ignition warning switch.
    1. Pry the clip down.
    2. Push the key-in-ignition warning switch off the rear of the ignition switch lock cylinder.



Installation

1. To install, reverse the removal procedure.
    - Verify ignition switch lock cylinder operation.


GG0617-A

General Specifications

Item	Specification
Azimuth system check object position 1 (P1) and position 5 (P5) , distance from sensor	90 cm (35 in)
Azimuth system check object position 2 (P2), 3 (P3) and position 4 (P4) , distance from sensor	160 cm (63 in)

Torque Specifications

Description	Nm	lb-in
Instrument panel steering column opening cover reinforcement screws	7	63

Parking Aid —Reverse Sensing System

The parking aid system consists of the following:

- four sensors located in the rear bumper (sensors snap into rear bumper retaining ring holes)
- speaker-audible tone (located behind the LH C-pillar trim panel)
- parking aid module (PAM) (located behind the jack storage panel)
- parking aid disable assist switch (located in the instrument panel)
- International Standards Organization (ISO) 9141 diagnostics

Parking Aid —Reverse Sensing System

Refer to Wiring Diagrams Cell 66 , Warning Chimes for schematic and connector information.

Special Tool(s)

 ST1137-A	73III Automotive Meter 105-R0057 or equivalent
 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent scan tool

Principles of Operation

NOTE: The liftgate must be closed for correct operation of the parking aid system.

The parking aid system detects objects behind the vehicle when the vehicle is in reverse. The parking aid does this by calculating the distance to an object by the use of four ultrasonic sensors mounted in the rear bumper. The ultrasonic field is emitted in a semicircular area around the rear of the vehicle. The sensors can detect objects approximately 1.8 m (5.9 ft) to the rear of the vehicle, 50 cm (1.6 ft) to the rear side of the vehicle, and 16 cm (6 in) above ground. A 750 Hz variable warning tone is generated from a speaker located behind the LH C-pillar trim panel. The speaker increases its warning tone rate as the vehicle gets closer to an obstacle. When an object is detected within 25 cm (10 in) of the sensors, the warning tone becomes continuous.

The parking aid system is enabled when the vehicle ignition is in RUN and reverse (R) gear is selected. The parking aid disabled indicator will illuminate for three seconds when the ignition is turned to RUN. The system can be disabled by pressing the parking aid switch on the instrument panel. The parking aid system will indicate it is disabled by illuminating the parking aid disabled indicator. The system will always enable when the ignition is transitioned to RUN and entry into reverse (R).

The parking aid system will be disabled if a fault is detected in any of the four sensors, the parking aid speaker or the parking aid module. This will be indicated by the parking aid disabled indicator being illuminated. The parking aid is on the International Standards Organization (ISO) 9141 network and can be diagnosed with a scan tool.

Inspection and Verification

1. Verify the customer concern by operating the system.

2. Visually inspect the following for obvious signs of electrical damage.

Visual Inspection Chart

Electrical
• Central junction box Fuse 27 (15A) • Damaged wiring harness • Loose or corroded connectors • Parking aid module • Fuse junction panel • Relays • Parking aid sensors • Parking aid disable switch and LED • Parking aid speaker • Reversing lamps

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4. If the scan tool does not power up, refer to the scan tool manual.

5. Carry out the DATA LINK DIAGNOSTICS test. If the scan tool responds with:
   - CKT 914, CKT 915 or CKT 70 — ALL ECUS NO RESP/NOT EQUIP, refer to Section 418-00.
   - NO RESP/NOT EQUIP for parking aid, GO to Pinpoint Test A.
   - System passed, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and carry out self-test diagnostics for the parking aid module (PAM).

6. If the DTCs retrieved are related to the concern, go to the Parking Aid Diagnostic Trouble Code (DTC) Index to continue diagnostics.

7. If no DTCs related to the concern are retrieved, proceed to the Symptom Chart to continue diagnostics.

Parking Aid Diagnostic Trouble Code (DTC) Index

Parking Aid Diagnostic Trouble Code (DTC) Index

DTC	Description	Source	Action
B1299	Power supply sensor circuit short to ground	Parking aid	GO to Pinpoint Test A .
B1342	ECU is defective	Parking aid	CLEAR the DTCs. REPEAT the PAM self-test. RETRIEVE the DTCs. If DTC B1342 is retrieved again, INSTALL a new parking aid; REFER to Parking Aid Module in this section.
B2373	LED #1 circuit short to battery	Parking aid	GO to Pinpoint Test B .
B2477	Module configuration failure	Parking aid	REFER to Section 418-01 .
C1699	Left rear sensor circuit short to Vbat	Parking aid	GO to Pinpoint Test B .
C1700	Left rear sensor circuit failure	Parking aid	GO to Pinpoint Test B .

C1701	Left rear sensor circuit fault	Parking aid	GO to Pinpoint Test B .
C1702	Right rear sensor circuit short to Vbat	Parking aid	GO to Pinpoint Test B .
C1703	Right rear sensor circuit failure	Parking aid	GO to Pinpoint Test B .
C1704	Right rear sensor circuit fault	Parking aid	GO to Pinpoint Test B .
C1705	Left rear center sensor circuit short to Vbat	Parking aid	GO to Pinpoint Test B .
C1706	Left rear center sensor circuit failure	Parking aid	GO to Pinpoint Test B .
C1707	Left rear center sensor fault	Parking aid	GO to Pinpoint Test B .
C1708	Right rear center sensor circuit short to Vbat	Parking aid	GO to Pinpoint Test B .
C1709	Right rear center sensor circuit failure	Parking aid	GO to Pinpoint Test B .
C1710	Right rear center sensor fault	Parking aid	GO to Pinpoint Test B .
C1742	Rear sounder circuit failure	Parking aid	GO to Pinpoint Test B .
C1743	Rear sounder circuit short to Vbat	Parking aid	GO to Pinpoint Test B .
C1748	Switch input circuit short to ground	Parking aid	GO to Pinpoint Test B .
C1920	LED #1 circuit failure	Parking aid	GO to Pinpoint Test B .

Symptom Chart

Symptom Chart

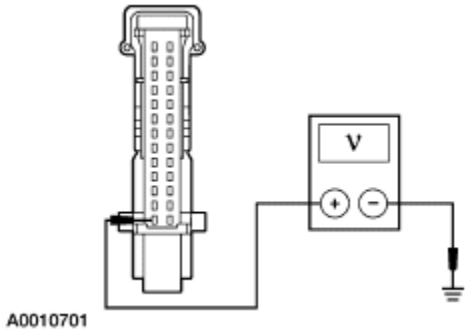
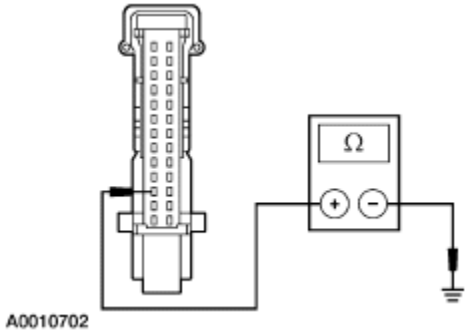
Condition	Possible Sources	Action
• No communication with the parking aid module (PAM)	• Circuit(s). • Fuse junction panel Fuse 27 (15A). • PAM.	• GO to Pinpoint Test A .
• Parking aid is inoperative	• Circuitry. • Parking aid sensor. • Parking aid speaker. • Parking aid disable switch. • Parking aid	• GO to Pinpoint Test B .

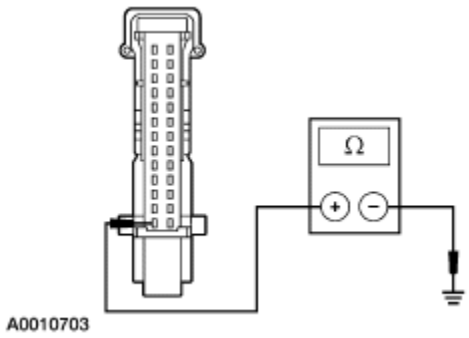
	module (PAM).	
• Continuous or intermittent tone when no obstacles or fault codes are present (certain obstacles may appear "stealthy" to the system, depending on geometric shape, size and material).	• Dirty or iced over parking aid sensor (s).	• CLEAN the rear bumper and sensors with high-pressure water.
	• Parking aid sensor bezel(s) or Parking aid sensors locked into the rear bumper incorrectly.	• RELOCK the parking aid sensor bezels into the rear bumper. RELOCK the parking aid sensors into the parking aid sensor bezels.
	• Parking aid sensors are not aligned correctly.	• CARRY OUT the azimuth check. REFER to Azimuth System Check in this section. CHECK minimum detectable object verification.

Pinpoint Tests

PINPOINT TEST A: NO COMMUNICATION WITH THE PARKING AID MODULE (PAM)

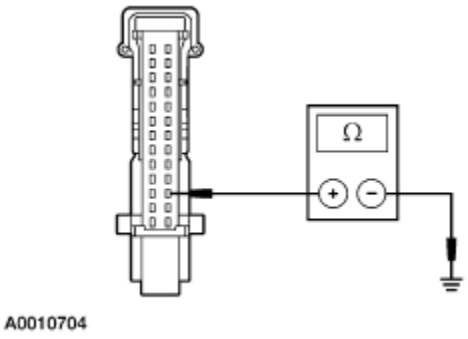
CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 USE DIAGNOSTIC TROUBLE CODES (DTCS) FROM PAM MODULE SELF-TEST	
	1 Use the recorded results from PAM self-test. • **Is DTC B1299 retrieved?** → **Yes** GO to A4 . → **No** GO to A2 .
A2 CHECK PAM CIRCUIT 298 (VT/OG) FOR VOLTAGE	
1  2 	

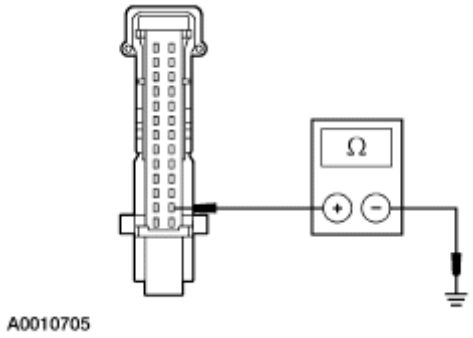
PAM C440 3  4  A0010701	4 Measure the voltage between PAM C440 pin 1, circuit 298 (VT/OG), harness side and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to A3 . → **No** REPAIR the circuit. TEST the system for normal operation.
A3 CHECK CIRCUIT 57 (BK) FOR AN OPEN	
1  2  A0010702	2 Measure the resistance between PAM C440 pin 3, circuit 57 (BK), harness side and ground. • **Is the resistance less than 5 ohms?** → **Yes** REFER to Section 418-00 . → **No**

	REPAIR the circuit. TEST the system for normal operation.
A4 CHECK CIRCUIT 298 (VT/OG)	
1  2  PAM C440 3  A0010703	3 Measure the resistance between PAM C440 pin 1, circuit 298 (VT/OG), harness side and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** GO to A2 . → **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

PINPOINT TEST B: PARKING AID IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 USE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM PAM SELF-TEST	
	1 Use the recorded results from PAM self-test. • **Are any DTCs recorded?** → **Yes** If DTC C1700, C1703, C1706 or C1709, GO to B2 . If DTC C1699, C1702, C1705 or C1708, GO to

	B8 . If DTC C1701, C1704, C1707 or C1710, GO to B2 . If DTC C1742, GO to B11 . If DTC C1743, GO to B17 . If DTC C1920, GO to B19 . If DTC B2373, GO to B23 . If DTC C1748, GO to B27 . → **No** GO to B24 .
B2 CHECK CIRCUIT 1440 (DG/YE) FOR A SHORT TO GROUND	
2  PAM C440 3 	1 Disconnect the parking aid sensor in question. 3 Measure the resistance between PAM C440 pin 16, circuit 1440 (DG/YE), harness side and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** GO to B3 . → **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
B3 CHECK CIRCUIT 1439 (BN/PK) FOR A SHORT TO GROUND	
1	1 Measure the resistance between PAM C440 pin 15, circuit 1439 (BN/PK), harness side and ground.



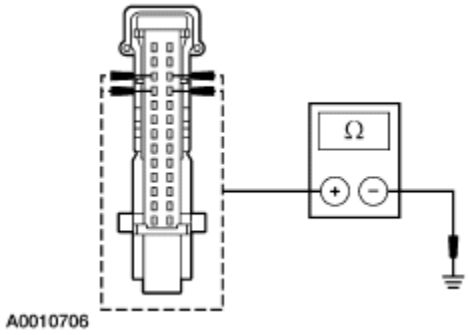
- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
GO to B4 .

→ **No**
REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

B4 CHECK THE CIRCUIT IN QUESTION FOR SHORT TO GROUND

1



1 Measure the resistance between PAM C440 pin, harness side and ground; refer to the following chart.

Connector Pin	Circuit
C440 pin 10	1442 (DG/WH)
C440 pin 11	1441 (WH/LG)
C440 pin 23	1443 (WH/LB)
C440 pin 24	1444 (DB/YE)

- **Are the resistances greater than 10,000 ohms?**

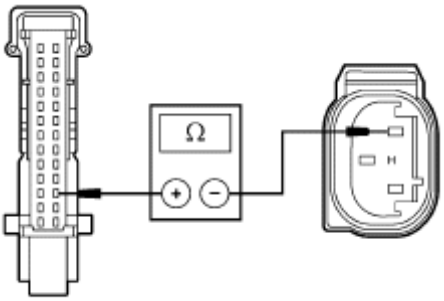
→ **Yes**
GO to B5 .

→ **No**
REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

B5 CHECK CIRCUIT 1440 (DG/YE) FOR AN OPEN

1

1 Measure the resistance between PAM C440 pin 16, circuit 1440 (DG/YE), harness side and parking aid sensor, circuit 1440 (DG/YE), harness side.



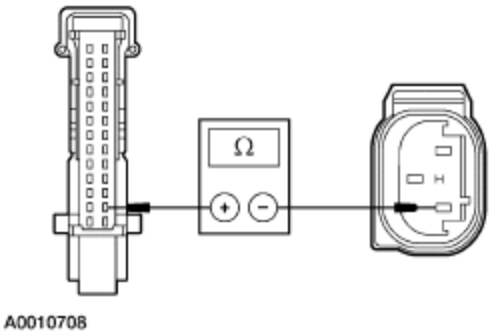
- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to B6 .

→ **No**
REPAIR the circuit. CLEAR the DTCs.
REPEAT the self-test.

B6 CHECK CIRCUIT 1439 (BN/PK) FOR AN OPEN

1



1 Measure the resistance between PAM C440 pin 15, circuit 1439 (BN/PK), harness side and parking aid sensor, circuit 1439 (BR/PK), harness side.

- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to B7 .

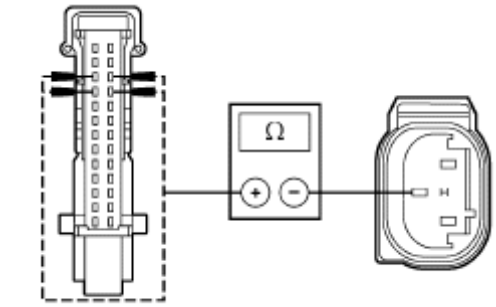
→ **No**
REPAIR the circuit. CLEAR the DTCs.
REPEAT the self-test.

B7 CHECK CIRCUIT IN QUESTION FOR AN OPEN

1

1 Measure the resistance between PAM C440 pin, harness side and parking aid sensor pin, harness side; refer to the following chart.

PAM Connector Pin	Parking Aid Sensor Connector Pin	Circuit
C440 pin 10	C444 pin 2	1442



		(DG/WH)
C440 pin 11	C443 pin 2	1441 (WH/LG)
C440 pin 23	C445 pin 2	1443 (WH/LB)
C440 pin 24	C446 pin 2	1444 (DB/YE)

- **Are the resistances less than 5 ohms?**

→ **Yes**
If all four parking aid sensors recorded DTCs, INSTALL a new PAM. For additional information, REFER to Parking Aid Module in this section. CLEAR the DTCs. REPEAT the self-test.

If all four parking aid sensors did not record DTCs, INSTALL a new sensor(s) for the one in question. For additional information, REFER to Parking Aid Sensor in this section. CLEAR the DTCs. REPEAT the self-test.

→ **No**
REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

B8 CHECK CIRCUIT 1440 (DG/YE) FOR A SHORT TO VOLTAGE

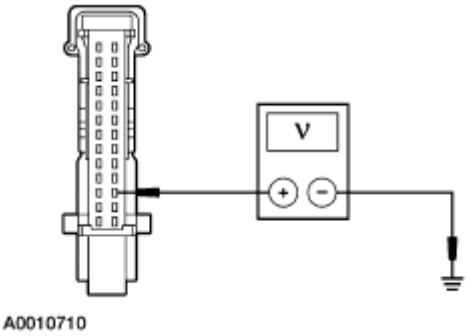
1 Disconnect the parking aid sensor in question.

2

PAM C440

3

4 Measure the voltage between PAM C440 pin 16, circuit 1440 (DG/YE), harness side and ground.



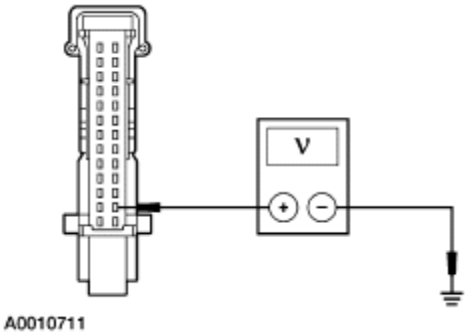
- **Is any voltage indicated?**

→ **Yes**
REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

→ **No**
GO to B9 .

B9 CHECK CIRCUIT 1439 (BN/PK) FOR A SHORT TO VOLTAGE

1



1 Measure the voltage between PAM C440 pin 15, circuit 1439 (BN/PK), harness side and ground.

- **Is any voltage indicated?**

→ **Yes**
REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.

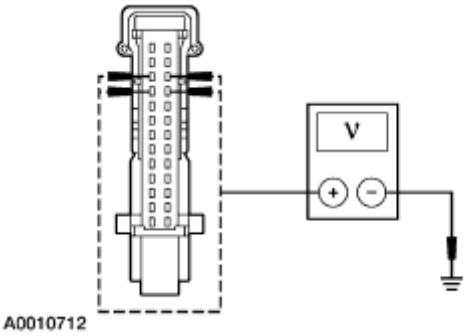
→ **No**
GO to B10 .

B10 CHECK CIRCUIT IN QUESTION FOR SHORT TO VOLTAGE

1

1 Measure the voltage between PAM C440 pin, harness side and ground; refer to the following chart.

Connector Pin	Circuit
C440 pin 10	1442 (DG/WH)
C440 pin 11	1441 (WH/LG)



C440 pin 23	1443 (WH/LB)
C440 pin 24	1444 (DB/YE)

- **Is any voltage indicated?**

→ **Yes**
REPAIR the circuit in question. CLEAR the DTCs. REPEAT the self-test.

→ **No**
If all four parking aid sensors recorded DTCs, INSTALL a new PAM. For additional information, REFER to Parking Aid Module in this section. CLEAR the DTCs. REPEAT the self-test.

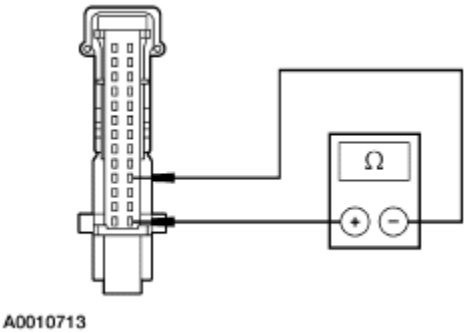
If all four parking aid sensors did not record DTCs, INSTALL a new sensor(s) for the one in question. For additional information, REFER to Parking Aid Sensor in this section. CLEAR the DTCs. REPEAT the self-test.

B11 CHECK CIRCUIT 1437 (BK/PK) AND CIRCUIT 1438 (DG) FOR AN OPEN

1

PAM C440

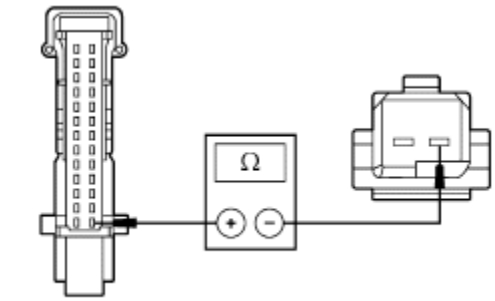
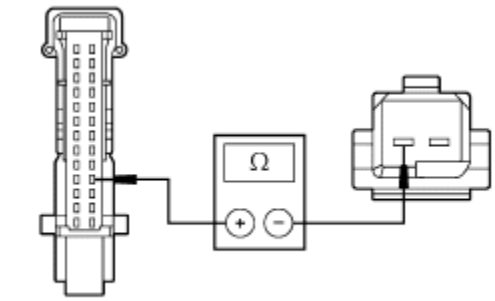
2

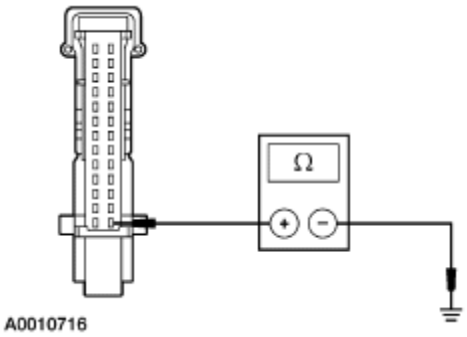
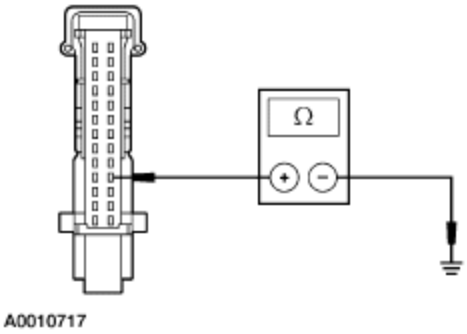


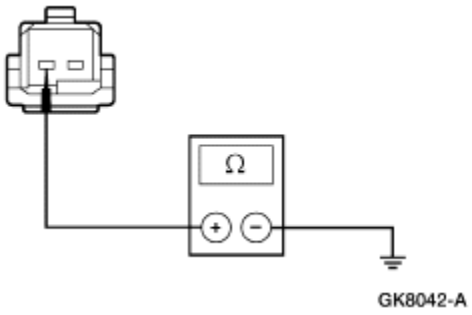
2 Measure the resistance between PAM C440 pin 14, circuit 1437 (BK/PK), harness side and C440 pin 17, circuit 1438 (DG), harness side.

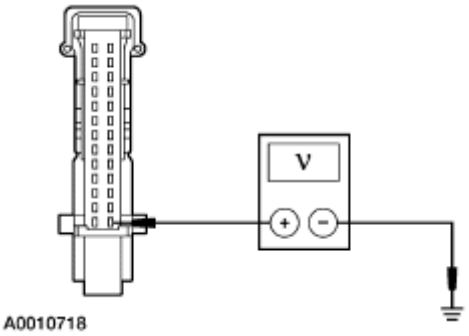
- **Is the resistance greater than 60 ohms?**

→ **Yes**

	GO to B12 . → **No** GO to B14 .
B12 CHECK CIRCUIT 1437 (BK/PK) FOR AN OPEN	
1  Parking Aid Speaker C441 2  A0010714	2 Measure the resistance between PAM C440 pin 14, circuit 1437 (BK/PK), harness side and parking aid speaker C441 pin 1, circuit 1437 (BK/PK), harness side. • **Is the resistance less than 5 ohms?** → **Yes** GO to B13 . → **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
B13 CHECK CIRCUIT 1438 (DG) FOR AN OPEN	
1  A0010715	1 Measure the resistance between PAM C440 pin 17, circuit 1438 (DG), harness side and parking aid speaker C441 pin 2, circuit 1438 (DG), harness side. • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new parking aid speaker. For additional information, REFER to Parking Aid Speaker in this section. CLEAR the DTCs.

	REPEAT the self-test. → **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
B14 CHECK CIRCUIT 1437 (BK/PK) FOR A SHORT TO GROUND	
1  PAM Speaker C441 2  A0010716	2 Measure the resistance between PAM C440 pin 14, circuit 1437 (BK/PK), harness side and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** GO to B15 . → **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
B15 CHECK CIRCUIT 1438 (DG) FOR A SHORT TO GROUND	
1  A0010717	1 Measure the resistance between PAM C440 pin 17, harness side and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes**

	GO to B16 . → **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
B16 CHECK PARKING AID SPEAKER FOR A SHORT TO GROUND	
1  GK8042-A	1 Measure the resistance between parking aid speaker C441 pin 1, component side and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** INSTALL a new PAM. For additional information, REFER to Parking Aid Module in this section. CLEAR the DTCs. REPEAT the self-test. → **No** INSTALL a new parking aid speaker. For additional information, REFER to Parking Aid Speaker in this section. CLEAR the DTCs. REPEAT the self-test.
B17 CHECK CIRCUIT 1437 (BK/PK) AND CIRCUIT 1438 (DG) FOR A SHORT TO VOLTAGE	
1  PAM C440 2  3	3 Measure the voltage between PAM C440 pin 14, circuit 1437 (BK/PK), harness side and ground.



- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to B18 .

→ **No**
INSTALL a new PAM. For additional information, REFER to Parking Aid Module in this section. CLEAR the DTCs. REPEAT the self-test.

B18 CHECK CIRCUIT 1437 (BK/PK) FOR A SHORT TO VOLTAGE

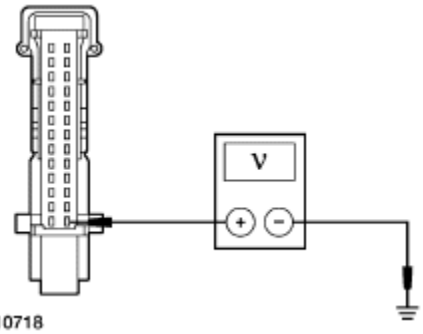
1

2

Parking Aid Speaker C441

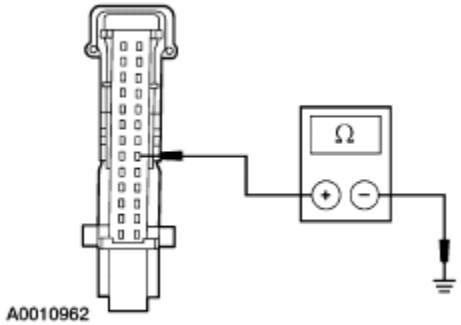
3

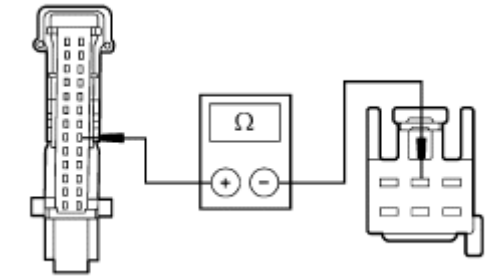
4



4 Measure the voltage between PAM C440 pin 14, circuit 1437 (BK/PK), harness side and ground.

- **Is the voltage greater than 10 volts?**

	→ **Yes** REPAIR circuit 1437 (BK/PK). CLEAR the DTCs. REPEAT the self-test. → **No** REPAIR circuit 1438 (DG). CLEAR the DTCs. REPEAT the self-test.
B19 CHECK CIRCUIT 1436 (VT/OG) FOR A SHORT TO GROUND	
1  PAM C440 2  	2 Measure the resistance between PAM C440 pin 19, circuit 1436 (VT/OG), harness side and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** GO to B20 . → **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
B20 CHECK CIRCUIT 1436 (VT/OG) FOR AN OPEN	
1  Parking Aid Disable Switch C2015 2	2 Measure the resistance between PAM C440 pin 19, circuit 1436 (VT/OG), harness side and parking aid switch C2015 pin 2, circuit 1436 (VT/OG).



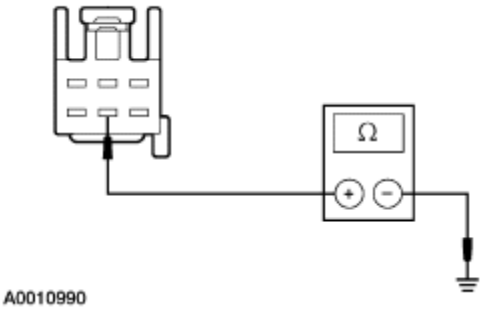
- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to B21 .

→ **No**
REPAIR the circuit. CLEAR the DTCs.
REPEAT the self-test.

B21 CHECK CIRCUIT 57 (BK) FOR AN OPEN

1



1 Measure the resistance between parking aid switch C2015 pin 5, circuit 57 (BK), harness side and ground.

- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to B22 .

→ **No**
REPAIR the circuit. CLEAR the DTCs.
REPEAT the self-test.

B22 CHECK PARKING AID DISABLED INDICATOR DIODE

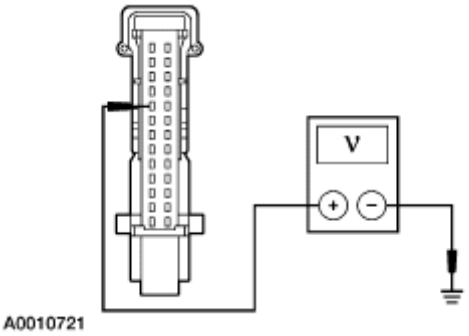
1 Check the parking aid disabled indicator diode.

- **Is the parking aid disabled indicator OK?**

→ **Yes**
INSTALL a new PAM. For additional information, REFER to Parking Aid Module in

	this section. CLEAR the DTCs. REPEAT the self-test. → **No** INSTALL a new parking aid switch. For additional information, REFER to Parking Aid Switch in this section. CLEAR the DTCs. REPEAT the self-test.
B23 CHECK CIRCUIT 1436 (VT/OG) FOR A SHORT TO VOLTAGE	
1  PAM C440 2 	• **Is the parking aid disabled indicator illuminated?** → **Yes** REPAIR circuit 1436 (VT/OG). CLEAR the DTCs. REPEAT the self-test. → **No** INSTALL a new PAM. For additional information, REFER to Parking Aid Module in this section. CLEAR the DTCs. REPEAT the self-test.
B24 CHECK PARKING AID SENSORS FOR PROPER ALIGNMENT	
NOTE: If the vehicle has been in an accident, the PAM sensors may not be aligned correctly.	
	1 Check the bumper for correct alignment, refer to Elevation System Check—No Ground Reflection Verification Check in this section. 2 Check the parking aid sensors and holders for correct adjustment. Refer to Azimuth System Check (Minimum Detectable Object Verification). • **Are the bumper and parking aid sensors correctly aligned?** → **Yes** GO to B25. → **No** INSTALL a new bumper. For additional information, REFER to Section 501-19. If the

	vehicle has been in an accident, further body work may be required to bring the parking aid sensors into correct alignment.
B25 CHECK REVERSING LAMPS OPERATION	
2  3 	1 Engage the parking brake. 4 Check the reversing lamps operation. • **Does the RH reversing lamp illuminate?** → **Yes** GO to B26 . → **No** REFER to Section 417-01 .
B26 CHECK CIRCUIT 140 (BK/PK) FOR VOLTAGE	
1  2  PAM C440 3  4	4 Measure the voltage between PAM C440 pin 9, circuit 140 (BK/PK), harness side and ground.



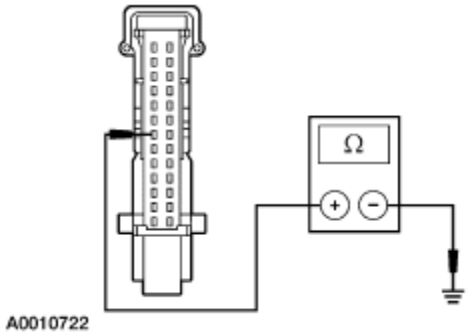
- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to B27 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

B27 CHECK CIRCUIT 1435 (DG/VT) FOR A SHORT TO GROUND

1



1 Measure the resistance between PAM C440 pin 7, circuit 1435 (DG/VT), harness side and ground.

- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
GO to B29 .

→ **No**
GO to B28 .

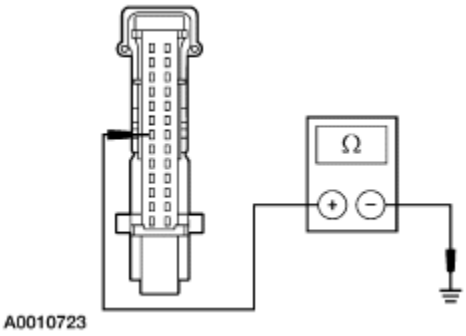
B28 CHECK CIRCUIT 1435 (DG/VT) FOR A SHORT TO GROUND — PARKING AID SWITCH DISCONNECTED

1

2

Parking Aid Switch C2015

3



3 Measure the resistance between PAM C440 pin 7, circuit 1435 (DG/VT), harness side and ground.

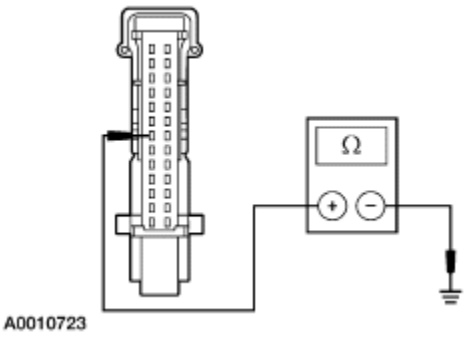
- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
INSTALL a new parking aid switch. For additional information, REFER to Parking Aid Switch in this section.TEST the system for normal operation.

→ **No**
REPAIR the circuit. TEST the system for normal operation.

B29 CHECK CIRCUIT 1435 (DG/VT) FOR AN OPEN

1

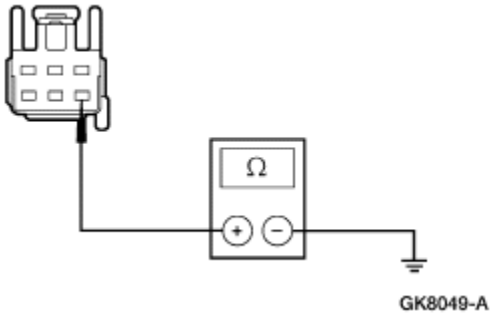
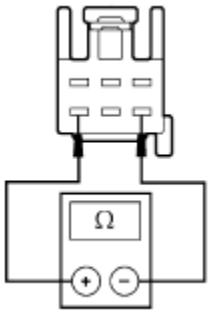


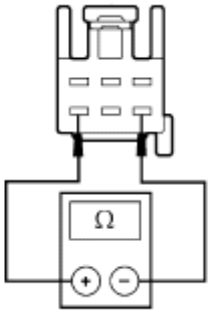
1 While depressing the parking aid switch, measure the resistance between PAM C440 pin 7, circuit 1435 (DG/VT), harness side and ground.

- **Is the resistance less than 5 ohms?**

→ **Yes**
INSTALL a new PAM. For additional information, REFER to Parking Aid Module in this section. CLEAR the DTCs. REPEAT the self-test.

→ **No**

	GO to B30 .
B30 CHECK CIRCUIT 57 (BK) FOR AN OPEN	
1  Parking Aid Switch C2015 2  GK8049-A	2 Measure the resistance between parking aid switch C2015 pin 4, circuit 57 (BK), harness side and ground. • **Is the resistance less than 5 ohms?** → **Yes** GO to B31 . → **No** REPAIR the circuit. TEST the system for normal operation.
B31 CHECK THE PARKING AID SWITCH	
1  A0010991 2	1 Measure the resistance between parking aid switch pin 6 and pin 4. 2 While pressing the parking aid switch, measure the resistance between parking aid switch pin 6 and pin 4.



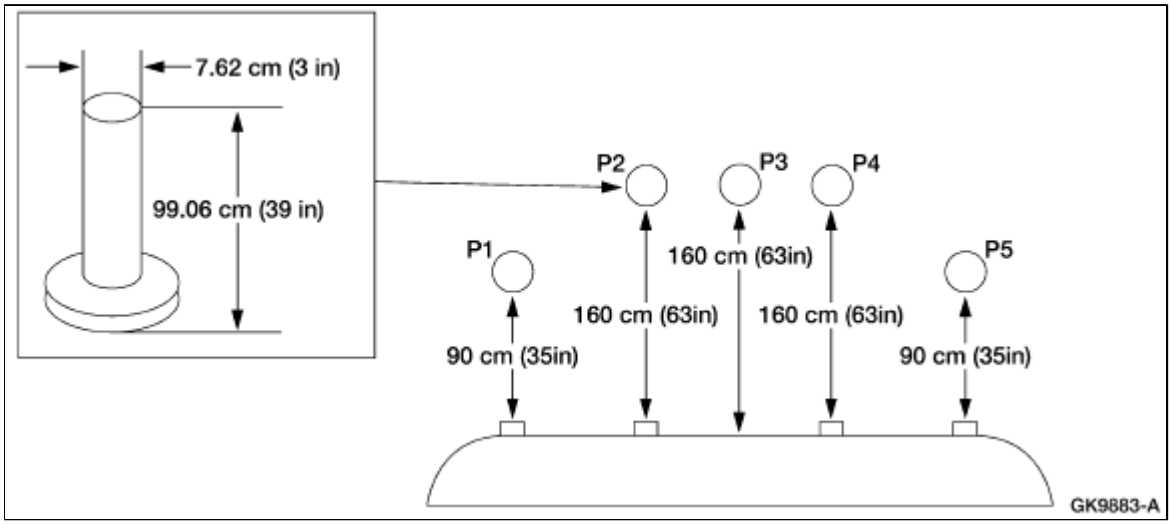
- **Is the resistance greater than 10,000 ohms with the parking aid switch not pressed and less than 35 ohms with the parking aid switch pressed?**

→ **Yes**
INSTALL a new PAM. For additional information, REFER to Parking Aid Module in this section. CLEAR the DTCs. REPEAT the self-test.

→ **No**
INSTALL a new parking aid switch. TEST the system for normal operation.

Azimuth System Check

Maximum Detectable Object Locations



1. **NOTE:** The object used in this system check can be fabricated from 7.62 cm (3 in) diameter pipe 99.06 cm (39 in) length.

   NOTE: The following system check should be carried out with the vehicle on a level surface.

   NOTE: The parking aid system will default to on when the ignition key is cycled from off to on.

   Turn the ignition to the ON position, engine off.

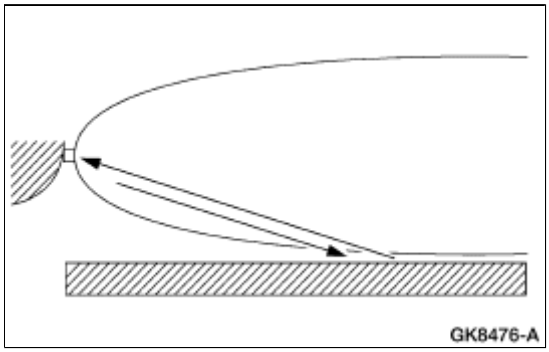
2. Set the parking brake on.

3. Place the gear shift in REVERSE.

4. Verify that the parking aid system detects the specified object when placed in the five specified locations (P1, P2, P3, P4, P5).

Elevation System Check —No Ground Reflection Verification Check

1. Ground reflection verification and sensor coverage pattern.



2. The parking aid system must be checked to assure that the system does not see signals from ground reflections.

3. The following system check should be carried out with the vehicle on a 3.0 meters wide by 4.5 meters deep (15 feet wide by 10 feet deep) smooth concrete surface, free of all obstacles and noise from fan and pneumatic tools.

4. Turn the ignition to the on position, engine off.

5. Set the parking brake on.

6. Place the gear shift in reverse.

7. **NOTE:** No audible alerts should be heard. If audible alerts are heard, check to make sure the bumper is properly installed and is not tilted downward so that the sensor is pointing at the ground.

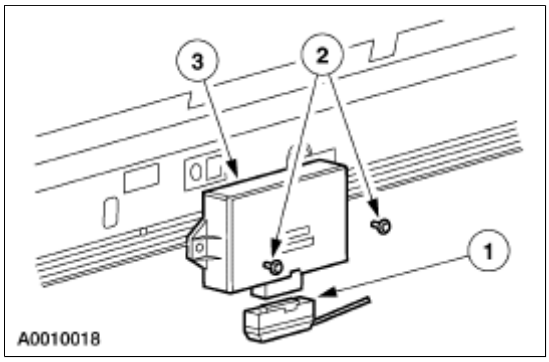
   Verify that no audible alerts are heard.

Parking Aid Module

Removal and Installation

1. Remove the jack storage panel.

2. Remove the parking aid module.
    1. Disconnect the electrical connector.
    2. Remove the screws.
    3. Remove the parking aid module.



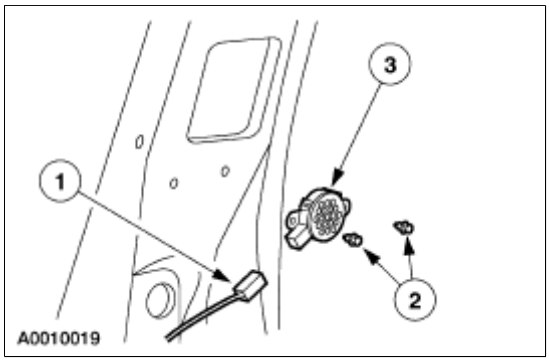
3. To install, reverse the removal procedure.

Parking Aid Speaker

Removal and Installation

1. Remove the LH quarter trim panel. For additional information, refer to Section 501-05 .

2. Remove the parking aid speaker.
    1. Disconnect the electrical connector.
    2. Remove the pin-type retainers.
    3. Remove the parking aid speaker.



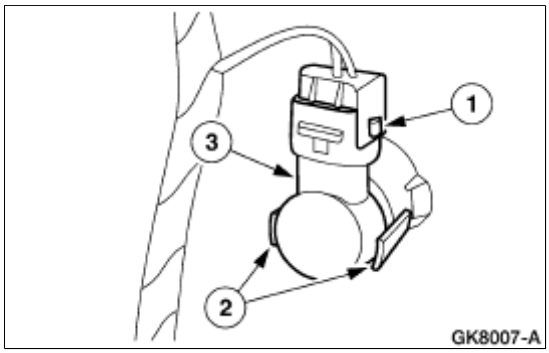
3. To install, reverse the removal procedure.

Parking Aid Sensor

Removal and Installation

1. Remove the rear bumper. For additional information, refer to Section 501-19 .

2. Remove the parking aid sensor.
    1. Disconnect the electrical connecter.
    2. Release the tabs.
    3. Remove the parking aid sensor.

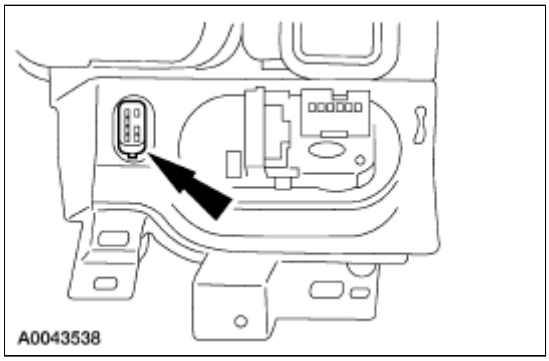


3. To install, reverse the removal procedure.

Parking Aid Switch

Removal and Installation

1. Remove the audio unit. For additional information, refer to Section 415-01 .
2. Remove the instrument cluster finish panels. For additional information, refer to Section 501-12 .
3. Remove the parking aid switch.



4. To install, reverse the removal procedure.

SPECIFICATIONS

General Specifications

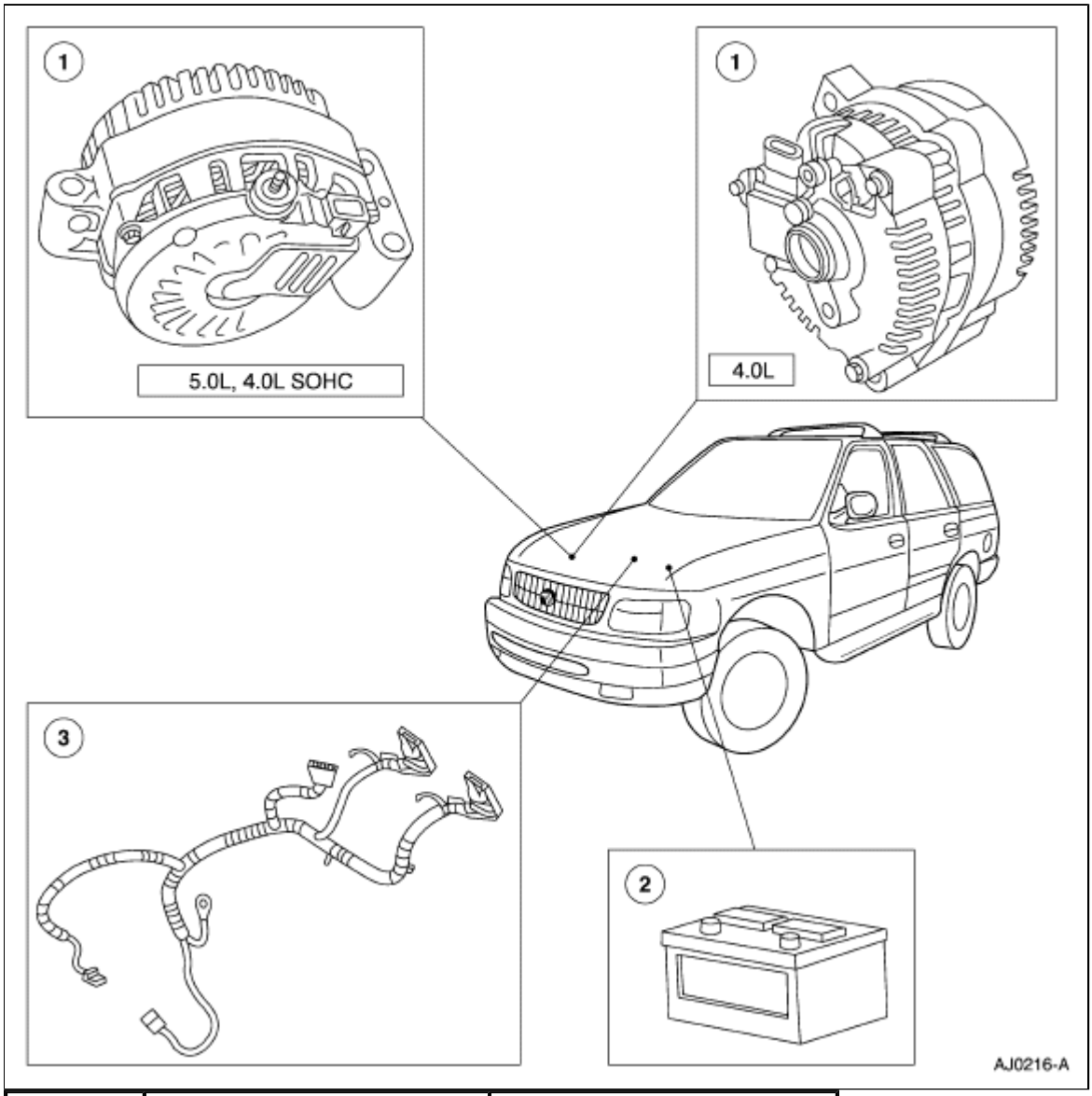
Item	Specification
Battery	72/amp/hr
58/120 Generator	65/amp
45/110 Generator	60/amp
35/90 Generator	45/amp

Torque Specifications

Description	Nm	lb-ft	lb-in
Brush Holder Screws	2.8-4.0	—	25-35

Charging System

Component Location



Item	Part Number	Description
1	10300	Generator
2	10655	Battery
3	—	Wire Harness

Charging System

Refer to Wiring Diagrams Cell 12 , Charging System for schematic and connector information.

Special Tool(s)

 ST1137-A	73III Automotive Meter 105-R0057 or equivalent
 ST1179-A	SABRE Premium Electrical System Tester 010-00736 or equivalent

Inspection and Verification

WARNING: Batteries contain sulfuric acid. Avoid contact with skin, eyes, or clothing. Also, shield your eyes when working near batteries to protect against possible splashing of the acid solution. In case of acid contact with skin or eyes, flush immediately with water for a minimum of 15 minutes and get prompt medical attention. If acid is swallowed, call a physician immediately.

WARNING: Batteries normally produce explosive gases which can cause personal injury. Therefore, do not allow flames, sparks or lighted substances to come near the battery. When charging or working near a battery, always shield your face and protect your eyes. Always provide ventilation.

WARNING: When lifting a plastic-cased battery, excessive pressure on the end walls could cause acid to spew through the vent caps resulting in personal injury or damage to the vehicle or to the battery. Lift with a battery carrier or with your hands on opposite corners.

1. Verify the customer's concern by operating the vehicle to duplicate the concern.
2. Inspect to determine if one of the following mechanical or electrical concerns apply:

Visual Inspection Chart

Mechanical	Electrical
• Battery	• Battery charge

• Generator drive belt • Generator pulley	• Fuse(s) power distribution box: 24 (30A); fuse junction panel: Fuse 15 (7.5A) • Electrical connectors • Electrical connections • Battery charge warning indicator • Other electrical systems malfunctions

3. If the inspection reveals obvious concern(s) that can be readily identified, service as required.

4. Measure the open circuit battery voltage. If the battery voltage is less than 12.0 volts, test and recharge the battery before continuing with diagnosis.

5. Observe charging system warning indicator status under the following conditions:
    1. The charging system warning indicator will illuminate with the ignition switch in RUN and the engine OFF.
    2. The charging system warning indicator will be OFF with the engine running.
    3. The charging system warning indicator will be OFF with the ignition switch OFF.

6. Check the battery voltage before and after starting the engine to determine if the battery voltage increases. Refer to the Normal Charging System Voltages chart.

Normal Charging System Voltages

Terminal	A	S	I	Alt B+	Batt	Eng to Bat Gnd
Key OFF	12V	0V	0V	12V	12V	0V
Key On - Engine Off	12V	0V	1-3V	12V	12V	0V
Engine Running	12V-15V	6-8V	12V-15V	12V-15V	12V-15V	0V

7. If the concern(s) remains after the inspection determine the symptom(s) and go to the Symptom Chart.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• The Charging System Warning Indicator is ON with the Engine Running (The Battery Voltage Does Not Increase) 4.0L	• A Circuit 36 (Y/W). • A Circuit mini-fuse. • B+ Circuit 38 (BK/O). • B+ fuse link. • I Circuit 904 (LG/R) • Voltage regulator. • Generator	• GO to Pinpoint Test A .
• The Charging System Warning Indicator is OFF with the Ignition Switch in the RUN Position and the Engine OFF (Battery Voltage Does Not Increase) 4.0L	• Voltage regulator connector. • I Circuit 904 (LG/R). • Fuse 15 (7.5A). • Voltage regulator. • Loose or damaged generator.	• GO to Pinpoint Test B .

	• Harness connector.	
• The Charging System Warning Indicator is ON with the Engine Running and the Battery Voltage Increases 4.0L	• S Circuit 4 (W/BK). • Generator. • Voltage regulator.	• GO to Pinpoint Test C .
• The Charging System Warning Indicator is OFF with the Ignition Switch in the RUN Position and the Engine OFF (Battery Voltage Increases) 4.0L	• Charging system warning indicator lamp bulb. • Instrument cluster. • S Circuit 4 (W/BK). • Generator. • Voltage regulator.	• GO to Pinpoint Test D .
• The Charging System Warning Indicator Operates Correctly but the Battery Voltage Does Not Increase 4.0L	• B+ Circuit 38 (BK/O). • B+ fuse link. • Loose or damaged harness connector. • Battery cables. • Generator. • Voltage regulator.	• GO to Pinpoint Test E .
• The Battery is Dead or Will Not Stay Charged or Low Battery or Generator Voltage 4.0L	• Corroded terminal(s). • Loose connection(s). • High key-off load. • Generator. • Voltage regulator.	• GO to Pinpoint Test F .
• The Charging System Warning Indicator Flickers/Is Intermittent 4.0L	• Loose connection(s). • Mini-fuse A Circuit loose. • Fuse 15 (7.5A) I Circuit loose. • Generator. • Voltage regulator.	• GO to Pinpoint Test G .
• The System Overcharges (Battery Voltage Greater Than 15.5 Volts) 4.0L	• A Circuit 36 (Y/W). • Generator (low output). • Voltage regulator. • I Circuit 904 (LG/R).	• GO to Pinpoint Test H .
• Battery Leakage or Damage 4.0L	• A Circuit 36 (Y/W). • Generator. • Voltage regulator. • Battery.	• GO to Pinpoint Test J .
• The Voltage Gauge Reads High or Low 4.0L	• Generator (low output) • Voltage regulator. • Voltage gauge. • Instrument cluster/wiring.	• GO to Pinpoint Test K .
• The Generator is Noisy	• Loose bolts/brackets. • Drive belt. • Generator/Pulley.	• GO to Pinpoint Test L .
• Radio Interference	• Generator. • Wiring/routing. • In-vehicle entertainment system.	• GO to Pinpoint Test M .

• The Charging System Warning Indicator is ON with the Engine Running (The Battery Voltage Does Not Increase) 4.0L (SOHC), 5.0L	• A Circuit 36 (Y/W). • A Circuit mini-fuse. • B+ Circuit 38 (BK/O). • B+ fuse link. • I Circuit 904 (LG/R) • Voltage regulator. • Generator	• GO to Pinpoint Test N .
• The Charging System Warning Indicator is OFF with the Ignition Switch in the RUN Position and the Engine OFF (Battery Voltage Does Not Increase) 4.0L (SOHC), 5.0L	• Voltage regulator connector. • I Circuit 904 (LG/R). • Fuse 15 (7.5A). • Voltage regulator. • Loose or damaged generator. • Harness connector.	• GO to Pinpoint Test P .
• The Charging System Warning Indicator is ON with the Engine Running and the Battery Voltage Increases 4.0L (SOHC), 5.0L	• Generator. • Voltage regulator.	• GO to Pinpoint Test Q .
• The Charging System Warning Indicator is OFF with the Ignition Switch in the RUN Position and the Engine OFF (Battery Voltage Increases) 4.0L (SOHC), 5.0L	• Charging system warning indicator lamp bulb. • Instrument cluster. • Generator. • Voltage regulator.	• GO to Pinpoint Test R .
• The Charging System Warning Indicator Operates Correctly but the Battery Voltage Does Not Increase 4.0L SOHC, 5.0L	• B+ Circuit 38 (BK/O). • B+ fuse link. • Loose or damaged harness connector. • Battery cables. • Generator. • Voltage regulator.	• GO to Pinpoint Test S .
• The Battery is Dead or Will Not Stay Charged or Low Battery or Generator Voltage 4.0L SOHC, 5.0L	• Corroded terminal(s). • Loose connection(s). • High key-off load. • Generator. • Voltage regulator.	• GO to Pinpoint Test T .
• The Charging System Warning Indicator Flickers/Is Intermittent 4.0L SOHC, 5.0L	• Loose connection(s). • Mini-fuse A Circuit loose. • Fuse 15 (7.5A) I Circuit loose. • Generator. • Voltage regulator.	• GO to Pinpoint Test U .
• The System Overcharges (Battery Voltage Greater Than 15.5 Volts) 4.0L SOHC, 5.0L	• A Circuit 36 (Y/W). • Generator (low output). • Voltage regulator. • I Circuit 904 (LG/R).	• GO to Pinpoint Test V .
• Battery Leakage or Damage 4.0L SOHC, 5.0L	• A Circuit 36 (Y/W). • Generator. • Voltage regulator. • Battery.	• GO to Pinpoint Test W .
• The Voltage Gauge Reads High or Low	• Generator (low	• GO to

4.0L SOHC, 5.0L	output) • Voltage regulator. • Voltage gauge. • Instrument cluster/wiring.	Pinpoint Test X .

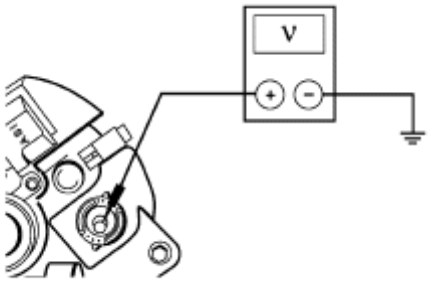
Pinpoint Tests

CAUTION: Do not make jumper connections except as directed. Improper connections may damage the voltage regulator test terminals.

CAUTION: Do not allow any metal object to come in contact with the generator housing and internal diode cooling fins.

PINPOINT TEST A: THE CHARGING SYSTEM WARNING INDICATOR IS ON WITH THE ENGINE RUNNING (THE BATTERY VOLTAGE DOES NOT INCREASE) — 4.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK THE A CIRCUIT MINI-FUSE 24 (15A)	
1  2  In-line Mini-fuse (15A)	2 Check A circuit Mini-fuse 24 (15A) in power distribution box. • **Is the fuse OK?** → **Yes** GO to A2 . → **No** INSTALL a new Mini-fuse 24 (15A). TEST the system for normal operation.
A2 CHECK CIRCUIT 38 (BK/O)	
1	1 Measure the voltage between the B+ terminal on the generator, circuit 38 (BK/O).



GJ0432-A

- **Is the voltage equal to battery positive voltage (B+)?**

→ **Yes**
GO to A3 .

→ **No**
REPAIR circuit 38 (BK/O). TEST the system for normal operation.

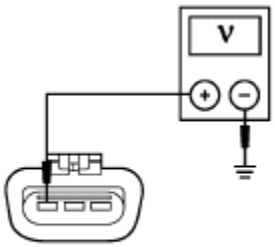
A3 CHECK CIRCUIT 36 (Y/W)

1

2

Generator Connector C121

3



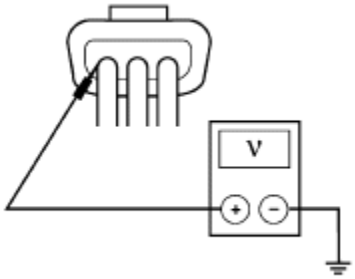
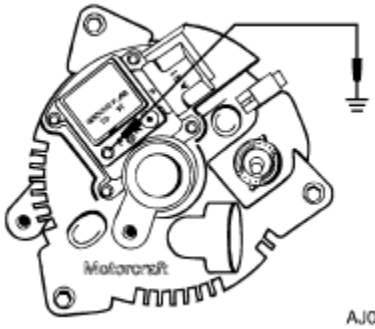
AJ0202-A

3 Measure the voltage between generator connector pin C-121-A circuit 36 (Y/W) and ground.

- **Is the voltage equal to battery positive voltage (B+)?**

→ **Yes**
GO to A4 .

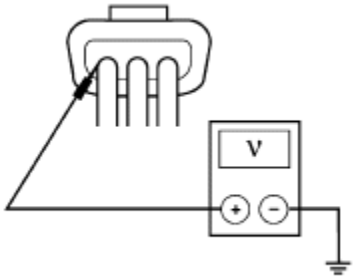
→ **No**

	REPAIR circuit 36 (Y/W). TEST the system for normal operation.
A4 CHECK I CIRCUIT 904 (LG/R) FOR AN OPEN	
1  Generator Connector C121 2  3  GJ0440-A	3 **NOTE:** The voltage regulator (VR) (10316) must be connected to the wiring harness for this test. Measure the voltage between the generator I-terminal, circuit 904 (LG/R) and ground. • **Is the voltage greater than 1 volt?** → **Yes** GO to A5 . → **No** REPAIR circuit 904 (LG/R) for an open or short. TEST the system for normal operation.
A5 CHECK THE GENERATOR OUTPUT	
1  2  AJ0204-A	2 With the engine running, ground the F pin on the generator/regulator.

	• **Does the battery voltage increase and the charging system warning indicator turn off?** → **Yes** INSTALL a new voltage regulator. TEST the system for normal operation. → **No** INSTALL a new generator (GEN) (10300). TEST the system for normal operation.

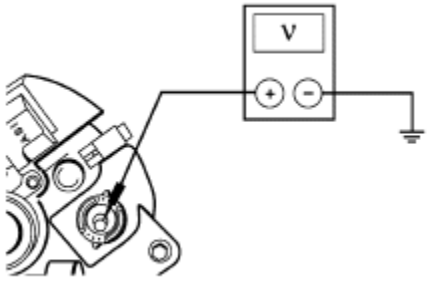
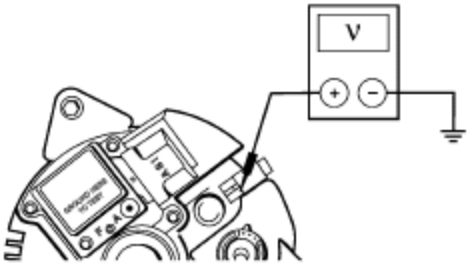
PINPOINT TEST B: THE CHARGING SYSTEM WARNING INDICATOR IS OFF WITH THE IGNITION SWITCH IN THE RUN POSITION AND THE ENGINE OFF (BATTERY VOLTAGE DOES NOT INCREASE)—4.0L

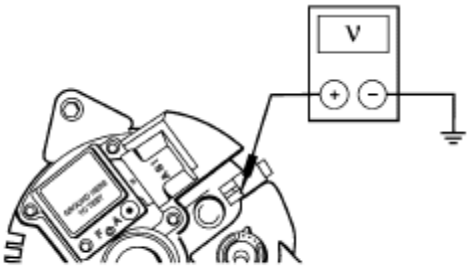
CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 INSPECT GENERATOR CONNECTOR C121	
1  Generator Connector C121	2 Check generator connector C121 for bent, or damaged pins. • **Is the connector OK?** → **Yes** GO to B2 . → **No** REPAIR connector C121 as necessary. TEST the system for normal operation.
B2 CHECK THE GENERATOR GROUNDS	
	1 Check all ground connections between the generator, voltage regulator and the battery. • **Are the ground connections OK?** → **Yes** GO to B3 . → **No** REPAIR connections as necessary. TEST the system for normal operation.
B3 CHECK THE VOLTAGE AT I CIRCUIT 904 (LG/R)	

1  Generator Connector C121 2  3  GJ0440-A	3 **NOTE:** The generator connector C121 must be connected to the generator for this test. Measure the voltage between the generator I terminal, circuit 904 (LG/R) and ground. • **Is the voltage greater than 1 volt?** → **Yes** INSTALL a new voltage regulator. → **No** REPAIR circuit 904 (LG/R) for open circuit. TEST the system for normal operation.

PINPOINT TEST C: THE CHARGING SYSTEM WARNING INDICATOR IS ON WITH THE ENGINE RUNNING AND THE BATTERY VOLTAGE INCREASES—4.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 CHECK CONNECTOR C120	
1  Generator Connector C120	2 Make sure that connector C120 is correctly mated to the generator and making contact. • **Is the connection OK?** → **Yes** GO to C2 .

	→ **No** REPAIR connector C120 as necessary. TEST the system for normal operation.
C2 CHECK THE GENERATOR OUTPUT VOLTAGE	
1  2  GJ0432-A	2 With the engine running at 2000 rpm, measure the voltage output at the generator B+ terminal. • **Is the voltage output less than 16 volts?** → **Yes** GO to C3 . → **No** GO to Pinpoint Test H .
C3 CHECK THE GENERATOR FOR LOW VOLTAGE	
1  2  GJ0431-A	2 With the engine running at 2000 rpm, measure the voltage output at the generator one-way connector C121, S circuit. • **Is the voltage output less than 5 volts?** → **Yes**

	INSTALL a new voltage regulator. TEST the system for normal operation. → **No** GO to C4 .
C4 CHECK CIRCUIT 4 (W/BK) VOLTAGE	
1  2  Generator Connector C121 3  4  GJ0431-A	4 With the engine running, check the voltage at the generator S terminal. • **Is the voltage greater than 5 volts?** → **Yes** REPAIR circuit 4 (W/BK) as necessary. TEST the system for normal operation. → **No** INSTALL a new generator. TEST the system for normal operation.

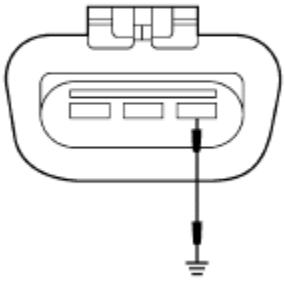
PINPOINT TEST D: THE CHARGING SYSTEM WARNING INDICATOR IS OFF WITH THE IGNITION SWITCH IN THE RUN POSITION AND THE ENGINE OFF (BATTERY VOLTAGE INCREASES)—4.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
D1 CHECK THE CHARGING SYSTEM WARNING INDICATOR OPERATION	
1	

2

Generator Connector C121

3



AJ0206-A

3 Ground the generator connector C121 I circuit with the ignition switch in the RUN position and the engine OFF.

- **Is the warning indicator on?**

→ **Yes**
GO to D2 .

→ **No**
REPAIR connector C121, I circuit 904 (LG/R) as necessary. TEST the system for normal operation.

D2 CHECK THE GENERATOR S CIRCUIT 4 (W/BK)

1

Generator Connector C121

2

Generator Connector C120

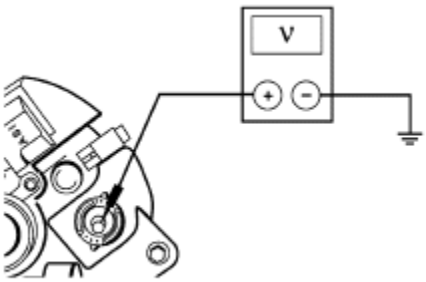
3 Observe the warning indicator.

- **Is the warning indicator on?**

→ **Yes**
INSTALL a new generator. TEST the system for normal operation.

	→ **No** INSTALL a new voltage regulator. TEST the system for normal operation.

PINPOINT TEST E: THE CHARGING SYSTEM WARNING INDICATOR OPERATES CORRECTLY BUT THE BATTERY VOLTAGE DOES NOT INCREASE—4.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
E1 CHECK CIRCUIT 38 (BK/O) VOLTAGE	
1  2  GJ0432-A	2 Check for voltage at generator B+ connector with the ignition switch in the RUN position and the engine OFF. • **Is the voltage equal to battery positive voltage (B+)?** → **Yes** GO to E2 . → **No** REPAIR circuit 38 (BK/O) as necessary. TEST the system for normal operation.
E2 CHECK THE GENERATOR CONNECTORS	
1  Generator Connector C121	2 Check the battery terminals and generator connectors C121 and C120 for corrosion and tightness. • **Are all the connectors clean and tight?**

	→ **Yes** CARRY OUT the Generator On-Vehicle Tests. REFER to Component Tests in this section. → **No** REPAIR the connectors as necessary. TEST the system for normal operation.

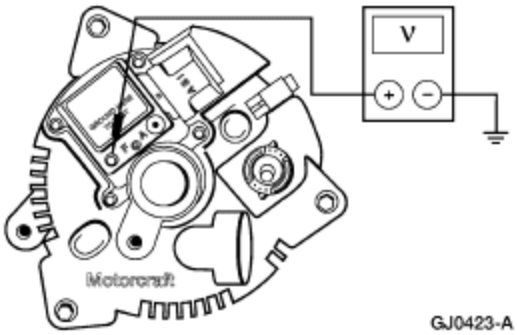
PINPOINT TEST F: THE BATTERY IS DEAD OR WILL NOT STAY CHARGED OR LOW BATTERY OR GENERATOR VOLTAGE—4.0L

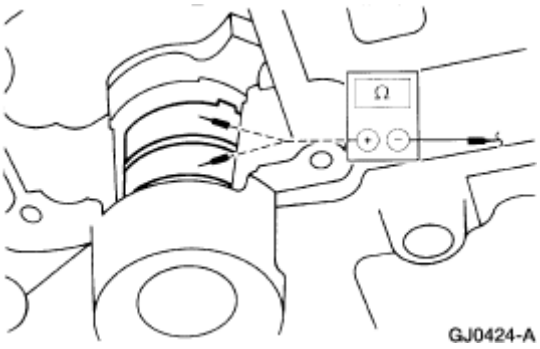
CONDITIONS	DETAILS/RESULTS/ACTIONS
F1 CHECK THE BATTERY DRAIN	
1 	2 Make sure that all interior lamps and switches are off. 3 Check the battery drain. • **Is the drain greater than 0.5 amps?** → **Yes** CARRY OUT the Battery — Drain Testing. REFER to Component Tests in this section. → **No** GO to F2 .
F2 CHECK THE GENERATOR OUTPUT	
	1 Check the generator output. Carry out the Generator On-Vehicle Tests. Refer to Component Tests in this section. • **Is the generator OK?** → **Yes** GO to F3 . → **No** INSTALL a new generator. TEST the system for normal operation.
F3 CHECK THE BATTERY CONDITION	
	1 Carry out the Battery — Condition Test to determine if the battery can hold a charge and is OK for use. Refer to Section 414-01 • **Is the battery OK?** → **Yes**

	GO to F4 . → **No** INSTALL a new battery (10655). TEST the system for normal operation.
F4 CHECK OTHER ELECTRICAL SYSTEMS FOR DRAINS	
	1 Check the drains from electronic modules. Carry out the test for Battery — Electronic Drains Which Shut Off When the Battery Cable is Disconnected. Refer to Component Tests in this section. • **Are electronic modules OK?** → **Yes** RECHARGE the battery. TEST the system for normal operation. → **No** INSTALL a new module or REPAIR the circuit causing the electrical drain as necessary. TEST the system for normal operation.

PINPOINT TEST G: THE CHARGING SYSTEM WARNING INDICATOR FLICKERS/IS INTERMITTENT — 4.0L

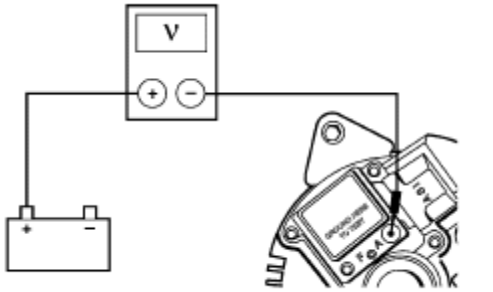
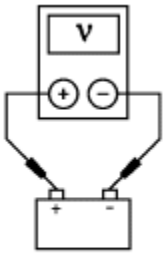
CONDITIONS	DETAILS/RESULTS/ACTIONS
G1 CHECK THE POWER TO CIRCUITS 36 (Y/W) AND 904 (LG/R)	
1  2  Mini-fuse 24 (15A) 3  Fuse 15 (7.5A)	3 Check Fuse 15 (7.5A) and the Mini-fuse 24 (15A). • **Are the fuses OK?** → **Yes** GO to G2 . → **No** INSTALL a new fuse(s) as necessary. TEST the system for normal operation.
G2 CHECK THE FIELD CIRCUIT	

1  2  GJ0423-A	2 Measure the voltage at test point F at the rear of the generator. • **Is the voltage equal to the battery voltage?** → **Yes** GO to G4 . → **No** GO to G3 .
G3 CHECK FOR A GROUNDED SLIP RING	
1  2  Generator Connector C121 3  Generator Connector C120 4	4 Remove the voltage regulator from the generator. Measure the resistance from both generator slip rings to ground.

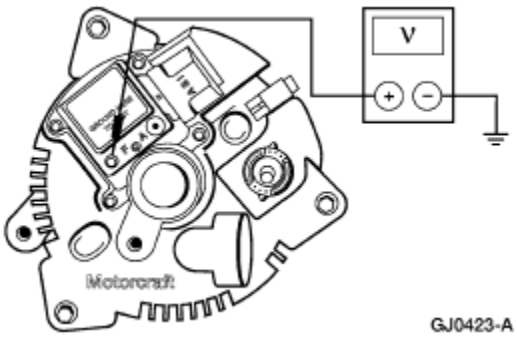
	• **Is the resistance greater than 1 K ohms?** → **Yes** INSTALL a new generator. TEST the system for normal operation. → **No** INSTALL a new voltage regulator. TEST the system for normal operation.
G4 CHECK THE WARNING SYSTEM INDICATOR OPERATION	
1 	2 With the engine running, increase the engine speed, check the indicator operation and check for a battery voltage increase. • **Does the battery voltage increase above 15 volts or does the indicator flicker?** → **Yes** REPAIR circuit 904 (LG/R) as necessary. TEST the system for normal operation. → **No** INSTALL a new generator. TEST the system for normal operation.

PINPOINT TEST H: THE SYSTEM OVERCHARGES (BATTERY VOLTAGE GREATER THAN 15.5 VOLTS) — 4.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
H1 CHECK FOR A VOLTAGE DROP	
1	

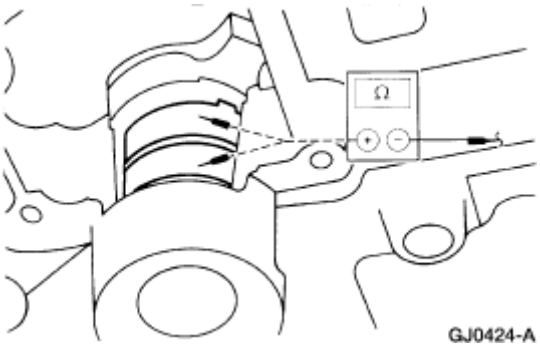
 2  GJ0421-A	2 Check for voltage drop from the battery positive post and the voltage regulator A terminal. • **Is the voltage drop less than 0.5 volts?** → **Yes** GO to H2 . → **No** REPAIR circuit 36 (Y/W) for high resistance as necessary. TEST the system for normal operation.
H2 CHECK THE BATTERY VOLTAGE	
1  2  AJ0210-A	2 With the engine running, turn off all accessories. Increase the engine speed and monitor the voltage at the battery. • **Does the battery voltage remain less than 15 volts?** → **Yes** GO to H3 . → **No** GO to H6 .

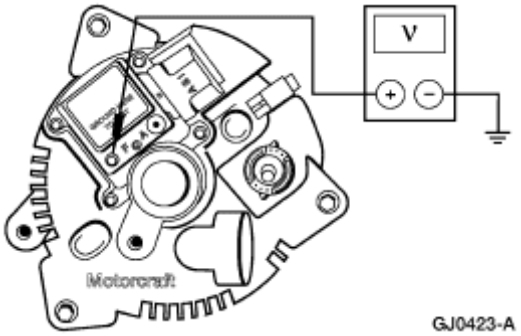
H3 CHECK THE GENERATOR FOR LOW VOLTAGE

1 	
2 	2 With the ignition switch OFF, measure the voltage at the voltage regulator F terminal. • **Does the voltage equal battery voltage?** → **Yes** GO to H5 . → **No** GO to H4 .

H4 CHECK FOR A GROUNDED SLIP RING

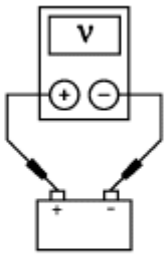
1 	
2  Generator Connector C121	
3  Generator Connector C120	
4	4 Remove the voltage regulator from the generator. Measure the resistance from both generator slip rings to ground.

	• **Is the resistance greater than 1 K ohms?** → **Yes** INSTALL a new voltage regulator. TEST the system for normal operation. → **No** INSTALL a new generator. TEST the system for normal operation.
H5 CHECK THE WARNING SYSTEM INDICATOR OPERATION	
1 	2 With the engine running, increase the engine speed, check the indicator operation and check for a battery voltage increase. • **Does the battery voltage increase above 15 volts or does the indicator flicker?** → **Yes** REPAIR circuit 904 (LG/R) as necessary. TEST the system for normal operation. → **No** INSTALL a new generator. TEST the system for normal operation.
H6 CHECK THE VOLTAGE REGULATOR OPERATION	
1	1 With the engine running, monitor the voltage at the F pin while increasing the engine speed.

	• **Does the voltage at pin F increase with higher engine speed?** → **Yes** INSTALL a new generator. TEST the system for normal operation. → **No** INSTALL a new voltage regulator. TEST the system for normal operation.

PINPOINT TEST J: BATTERY LEAKAGE OR DAMAGE — 4.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
J1 CHECK FOR ACID LEAKAGE AND DAMAGE	
	1 Check for acid damage to the vehicle harnesses and to the body. • **Is there acid damage?** → **Yes** REPAIR damaged areas as necessary. → **No** GO to J2 .
J2 CHECK THE CHARGING SYSTEM FOR OVERCHARGING	
1  2	2 With the engine running turn off all accessories. Increase the engine speed and monitor the voltage at the battery.



AJ0210-A

- **Does battery voltage increase more than 15 volts?**

→ **Yes**
GO to Pinpoint Test H .

→ **No**
GO to J3 .

J3 CHECK THE BATTERY MOUNTING

1 Make sure the battery is properly mounted and level in the battery tray.

- **Is the battery properly mounted?**

→ **Yes**
GO to J4 .

→ **No**
INSTALL the battery. TEST the system for normal operation.

J4 CHECK FOR BATTERY CONTACT

1 Make sure that there are no fasteners or other parts contacting the battery case causing excess pressure.

- **Is there anything contacting the battery case?**

→ **Yes**
REMOVE or REPOSITION these items as necessary. TEST the system for normal operation.

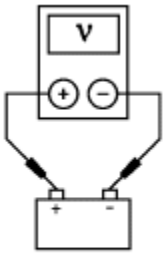
→ **No**
GO to J5 .

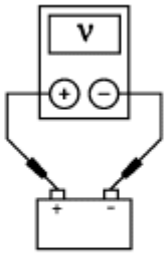
J5 CHECK THE BATTERY CASE FOR DAMAGE

1 Check the battery case for damage such as cracks or poor seals.

	• **Is the battery OK?** → **Yes** The charging system is OK. TEST the system for normal operation. → **No** INSTALL a new battery. TEST the system for normal operation.

PINPOINT TEST K: THE VOLTAGE GAUGE READS HIGH OR LOW — 4.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
K1 CHECK THE BATTERY VOLTAGE	
1  2  AJ0210-A	2 With the engine running, turn off all accessories. Increase the engine speed and monitor the voltage at the battery. • **Is the battery voltage more than 15 volts?** → **Yes** GO to Pinpoint Test H . → **No** GO to K2 .
K2 CHECK THE VOLTAGE GAUGE OPERATION	
1	1 With the engine running monitor the voltage gauge reading and the battery voltage.

 AJ0210-A	• **Are the voltage readings consistent?** → **Yes** The charging system is operating normally. → **No** GO to Section 413-01 to continue diagnostics.

PINPOINT TEST L: THE GENERATOR IS NOISY

CONDITIONS	DETAILS/RESULTS/ACTIONS
L1 CHECK FOR ACCESSORY DRIVE NOISE	
	1 Check the drive belt for damage and to verify installation. Refer to Section 303-05 . 2 Check the accessory mounting brackets for loose bolts or misalignment. 3 Check for a bent generator pulley. • **Is the accessory drive OK?** → **Yes** GO to L2 . → **No** REFER to Section 303-05 for diagnosis and testing of the accessory drive system.
L2 SUBSTITUTE A KNOWN GOOD GENERATOR	
1  2  Generator Connector	

C121 4 	3 Install a known good generator. • **Is the noise present with a known good generator?** → **Yes** INSTALL the original generator and CHECK other accessories to FIND the cause of the noise. → **No** INSTALL a new generator. RETEST the system for normal operation.

PINPOINT TEST M: RADIO INTERFERENCE

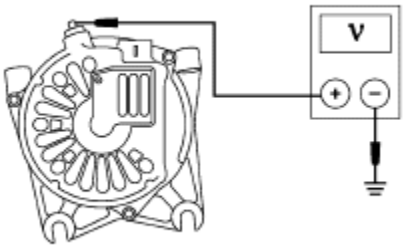
CONDITIONS	DETAILS/RESULTS/ACTIONS
M1 VERIFY THERE IS RADIO INTERFERENCE	
1 	
	2 Tune the radio to a station where the interference is present.
3 	
4  Generator Connector C121	4 Disconnect the generator connector C121.
5 	
	• **Is the interference present with the generator disconnected?** → **Yes** REFER to Section 415-00 for diagnosis and testing of the in-vehicle entertainment system.

	→ **No** GO to M2 .
M2 SUBSTITUTE A KNOWN GOOD GENERATOR	
1  3 	2 Install a known good generator (GEN) (10346). • **Is there radio interference present with a known good generator ?** → **Yes** INSTALL the original generator and REFER to Section 415-00 for diagnosis and testing of the in-vehicle entertainment system. → **No** INSTALL a new generator. RETEST the system.

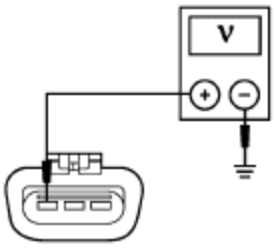
PINPOINT TEST N: THE CHARGING SYSTEM WARNING INDICATOR IS ON WITH THE ENGINE RUNNING (THE BATTERY VOLTAGE DOES NOT INCREASE) — 4.0L SOHC, 5.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
N1 CHECK THE A CIRCUIT FUSE LINK (18 GA)	
1  2  Fuse 15 (15A)	2 Check the A circuit Fuse 24 (15A) in Power Distribution Box. • **Is the fuse OK?** → **Yes** GO to N2 . → **No** INSTALL a new Fuse 24 (15A). TEST the system for normal operation.

N2 CHECK CIRCUIT 38 (BK/O)

1  AJ0213-A	1 Measure the voltage between the B+ terminal on the generator, circuit 38 (BK/O). • **Is the voltage equal to battery positive voltage (B+)?** → **Yes** GO to N3 . → **No** REPAIR circuit 38 (BK/O). TEST the system for normal operation.

N3 CHECK CIRCUIT 36 (Y/W)

1  Generator Connector C121 2  AJ0202-A	2 Measure the voltage between generator connector pin C-121-A circuit 36 (Y/W) and ground. • **Is the voltage equal to battery positive voltage (B+)?** → **Yes** GO to N4 . → **No** REPAIR circuit 36 (Y/W). TEST the system for normal operation.

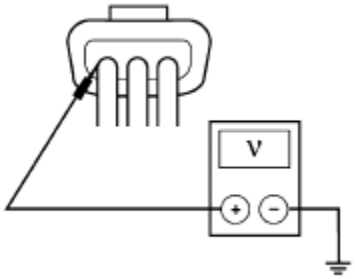
N4 CHECK I CIRCUIT 904 (LG/R) FOR AN OPEN

1

Generator Connector C121

2

3



GJ0440-A

3 **NOTE:** The voltage regulator must be connected to the wiring harness for this test.

Measure the voltage between the generator I-terminal, circuit 904 (LG/R) and ground.

- **Is the voltage greater than 1 volt?**

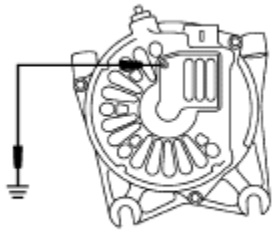
→ **Yes**
GO to N5 .

→ **No**
REPAIR circuit 904 (LG/R)as necessary. TEST the system for normal operation.

N5 CHECK THE GENERATOR OUTPUT

1

2



AJ0212-A

2 With the engine running, ground the F pin on the generator/regulator.

- **Does the battery voltage increase and**

	the charging system warning indicator turn off? → **Yes** INSTALL a new generator. TEST the system for normal operation. → **No** INSTALL a new generator. TEST the system for normal operation.

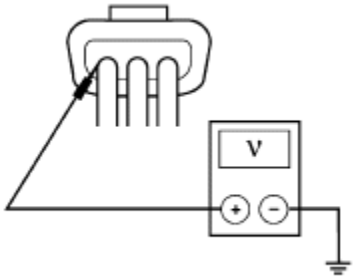
PINPOINT TEST P: THE CHARGING SYSTEM WARNING INDICATOR IS OFF WITH THE IGNITION SWITCH IN THE RUN POSITION AND THE ENGINE OFF (BATTERY VOLTAGE DOES NOT INCREASE) — 4.0L SOHC, 5.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
P1 CHECK GENERATOR CONNECTOR C121	
1  Generator Connector C121	2 Check generator connector C121 for bent, or damaged pins. • **Is the connector OK?** → **Yes** GO to P2 . → **No** REPAIR connector C121 as necessary. TEST the system for normal operation.
P2 CHECK THE GENERATOR GROUNDS	
	1 Check all ground connections between the generator, voltage regulator and the battery. • **Are the ground connections OK?** → **Yes** GO to P3 . → **No** REPAIR connections as necessary. TEST the system for normal operation.
P3 CHECK THE VOLTAGE AT I CIRCUIT 904 (LG/R)	
1	

Generator Connector C121

2

3



GJ0440-A

3 **NOTE:** The generator connector C121 must be connected to the generator for this test.

Measure the voltage between the generator I terminal, circuit 904 (LG/R) and ground.

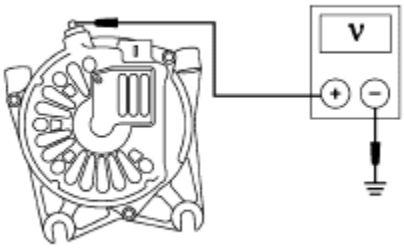
- **Is the voltage greater than 1 volt?**

→ **Yes**
INSTALL a new generator.

→ **No**
REPAIR circuit 904 (LG/R) for open circuit.
TEST the system for normal operation.

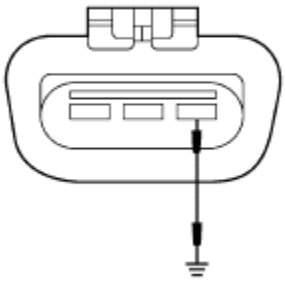
PINPOINT TEST Q: THE CHARGING SYSTEM WARNING INDICATOR IS ON WITH THE ENGINE RUNNING AND THE BATTERY VOLTAGE INCREASES — 4.0L SOHC, 5.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
Q1 CHECK CONNECTOR C121	
1  Generator Connector C121	2 Make sure that connector C121 is correctly mated to the generator and making contact. • **Is the connection OK?** → **Yes** GO to Q2 .

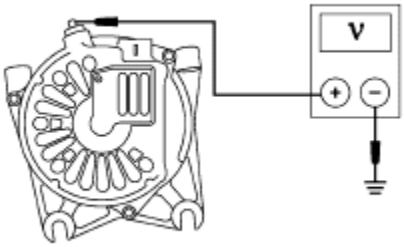
	→ **No** REPAIR connector C121 as necessary. TEST the system for normal operation.
Q2 CHECK THE GENERATOR OUTPUT VOLTAGE	
1  2  AJ0213-A	2 With the engine running at 2000 rpm, measure the voltage output at the generator B+ terminal. • **Is the voltage output less than 16 volts?** → **Yes** GO to Q3 . → **No** GO to Pinpoint Test V .
Q3 CHECK THE WARNING INDICATOR OPERATION	
1  2  Generator Connector C121 3 	4 With the engine running at idle, check the Warning Indicator. • **Is the Warning Indicator on?**

	→ **Yes** REPAIR connector C121, I circuit 904 (LG/R) as necessary. TEST the system for normal operation. → **No** GO to Pinpoint Test R .

PINPOINT TEST R: THE CHARGING SYSTEM WARNING INDICATOR IS OFF WITH THE IGNITION SWITCH IN THE RUN POSITION AND THE ENGINE OFF (BATTERY VOLTAGE INCREASES) — 4.0L SOHC, 5.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
R1 CHECK THE CHARGING SYSTEM WARNING INDICATOR OPERATION	
1  2  Generator Connector C121 3  AJ0206-A	3 Ground the generator connector C121 I circuit with the key ON and the engine OFF. • **Is the warning indicator on?** → **Yes** INSTALL a new generator. TEST the system for normal operation. → **No** REPAIR connector C121, I circuit 904 (LG/R) as necessary. TEST the system for normal operation.

PINPOINT TEST S: THE CHARGING SYSTEM WARNING INDICATOR OPERATES CORRECTLY BUT THE BATTERY VOLTAGE DOES NOT INCREASE — 4.0L SOHC, 5.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
S1 CHECK CIRCUIT 38 (BK/O) VOLTAGE	
1  2  	2 Check for voltage at generator B+ connector with the key ON and the engine OFF. • **Is the voltage equal to battery positive voltage (B+)?** → **Yes** GO to S2 . → **No** REPAIR circuit 38 (BK/O) as necessary. TEST the system for normal operation.
S2 CHECK THE GENERATOR CONNECTORS	
1  Generator Connector C121	2 Check the battery and generator connector C121 for corrosion and tightness. • **Are the connectors clean and tight?** → **Yes** REFER to Generator On-Vehicle Tests. → **No** REPAIR the connectors as necessary. TEST the system for normal operation.

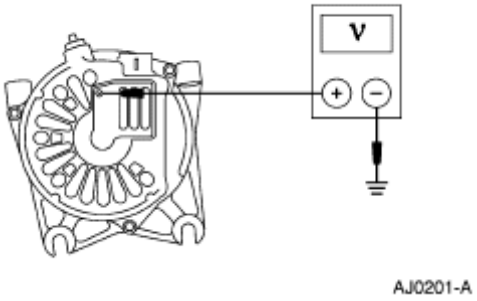
PINPOINT TEST T: THE BATTERY IS DEAD OR WILL NOT STAY CHARGED OR LOW BATTERY OR GENERATOR VOLTAGE — 4.0L SOHC, 5.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
T1 CHECK THE BATTERY DRAIN	
1 	2 Make sure that all interior lights and switches are off and all doors are closed. Carry out Battery — Drain Test. Refer to Component Tests in this section. • **Is the drain greater than 0.5 amps?** → **Yes** GO to Component Tests, Battery—Drain Testing. → **No** GO to T2 .
T2 CHECK THE GENERATOR OUTPUT	
	1 Check the generator output. Refer to Generator On-Vehicle Tests. • **Is the generator OK?** → **Yes** GO to T3 . → **No** INSTALL a new generator. TEST the system for normal operation.
T3 CHECK THE BATTERY CONDITION	
	1 Carry out the Battery — Condition Test to determine if the battery can hold a charge and is OK for use. Refer to Section 414-01 . • **Is the battery OK?** → **Yes** GO to T4 . → **No** INSTALL a new battery. TEST the system for normal operation.
T4 CHECK OTHER SYSTEMS FOR DRAINS	
	1 Check for drains from electronic modules. Refer to Component Tests, Battery — Electronic Drains Which Shut Off When the Battery Cable is Disconnected. • **Are electronic modules OK?** → **Yes** RECHARGE the battery. TEST the system for normal operation.

	→ **No** INSTALL a new module as necessary. TEST the system for normal operation.

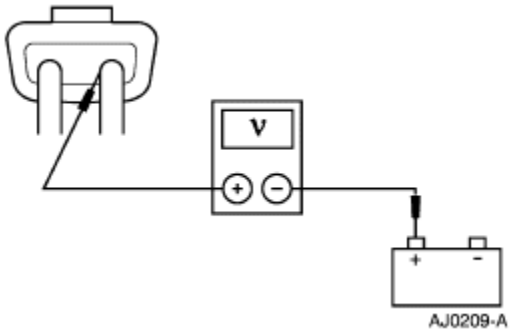
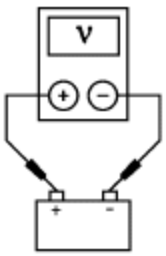
PINPOINT TEST U: THE CHARGING SYSTEM WARNING INDICATOR FLICKERS/IS INTERMITTENT — 4.0L SOHC, 5.0L

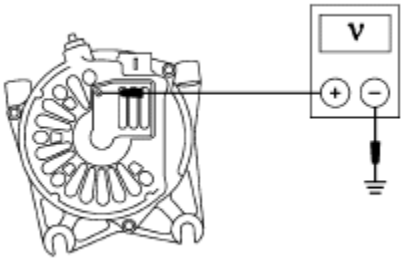
CONDITIONS	DETAILS/RESULTS/ACTIONS
U1 CHECK THE POWER TO CIRCUITS 36 (Y/W) AND 904 (LG/R)	
1  2  Fuse 24 (15A) 3  Fuse 15 (7.5A)	3 Check Fuse 15 (7.5A) and Fuse 24 (15A). • **Are the fuses OK?** → **Yes** GO to U2 . → **No** REPAIR as necessary. TEST the system for normal operation.
U2 CHECK THE FIELD CIRCUIT	
1  2	2 Using an insulated probe, measure voltage at test point F at rear of Generator.

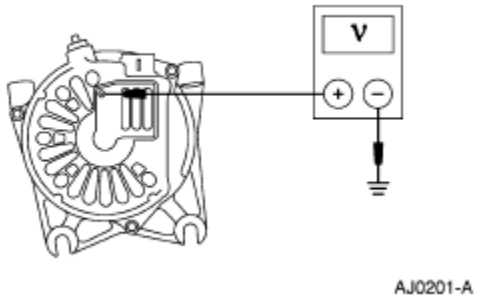
 AJ0201-A	• **Is the voltage equal to the battery voltage?** → **Yes** GO to U3 . → **No** INSTALL a new generator. TEST the system for normal operation
U3 CHECK THE WARNING SYSTEM INDICATOR OPERATION	
1 	2 With the engine running, increase the engine speed, check the indicator operation and check for a battery voltage increase. • **Does the battery voltage increase above 15 volts or does the indicator flicker?** → **Yes** REPAIR circuit 904 (LG/R) as necessary. TEST the system for normal operation. → **No** INSTALL a new generator. TEST the system for normal operation.

PINPOINT TEST V: THE SYSTEM OVERCHARGES (BATTERY VOLTAGE GREATER THAN 15.5 VOLTS) — 4.0L SOHC, 5.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
V1 CHECK FOR VOLTAGE DROP	
1	

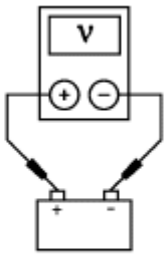
2  AJ0209-A	3 Check for voltage drop from the battery positive post and the voltage regulator A circuit at connector C121. • **Is the voltage drop less than 0.5 volts?** → **Yes** GO to V2 . → **No** REPAIR circuit 36 (Y/W) for high resistance as necessary. TEST the system for normal operation.
V2 CHECK BATTERY VOLTAGE	
1  2  AJ0210-A	2 With the engine running, turn off all accessories. Increase the engine speed and monitor the voltage at the battery. • **Does the battery voltage remain less than 15 volts?** → **Yes**

	GO to V3 . → **No** GO to V5 .
V3 CHECK THE GENERATOR FOR LOW VOLTAGE	
1  2  	2 With the ignition switch OFF, use an insulated probe to measure the voltage at the voltage regulator F terminal. • **Does the voltage equal battery voltage?** → **Yes** GO to V4 . → **No** INSTALL a new generator. TEST the system for normal operation.
V4 CHECK THE WARNING SYSTEM INDICATOR OPERATION	
1 	2 With the engine running, increase the engine speed and check the indicator operation for a battery voltage increase. • **Does the battery voltage increase above 15 volts or does the indicator flicker?** → **Yes** REPAIR circuit 904 (LG/R) as necessary. TEST the system for normal operation. → **No** INSTALL a new generator. TEST the system for normal operation.

V5 CHECK VOLTAGE REGULATOR OPERATION	
1  AJ0201-A	1 With the engine running, use an insulated probe to monitor the voltage at the F pin while increasing the engine speed. • **Does the voltage at pin F increase with higher engine speed?** → **Yes** INSTALL a new voltage regulator. TEST the system for normal operation. → **No** INSTALL a new generator. TEST the system for normal operation.

PINPOINT TEST W: BATTERY LEAKAGE OR DAMAGE — 4.0L SOHC, 5.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
W1 CHECK FOR ACID LEAKAGE AND DAMAGE	
	1 Check for acid damage to the vehicle harnesses and to the body. • **Is there acid damage?** → **Yes** REPAIR damaged areas as necessary. → **No** GO to W2 .
W2 CHECK CHARGING SYSTEM FOR OVERCHARGING	
1  2	2 With the engine running, turn off all accessories. Increase the engine speed and monitor the voltage at the battery.



AJ0210-A

- **Does battery voltage increase more than 15 volts?**

→ **Yes**
GO to Pinpoint Test V .

→ **No**
GO to W3 .

W3 CHECK BATTERY MOUNTING

1 Make sure the battery is properly mounted and level in the battery tray.

- **Is the battery properly mounted?**

→ **Yes**
GO to W4 .

→ **No**
REPAIR as necessary. TEST the system for normal operation.

W4 CHECK FOR BATTERY CONTACT

1 Make sure that there are no fasteners or other parts contacting the battery case causing excess pressure.

- **Is there anything contacting the battery case?**

→ **Yes**
REPAIR as necessary. TEST the system for normal operation.

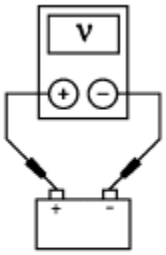
→ **No**
GO to W5 .

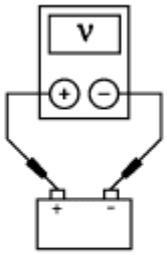
W5 CHECK BATTERY CASE FOR DAMAGE

1 Check the battery case for damage such as cracks or poor seals.

	• **Is the battery OK?** → **Yes** SYSTEM is OK. TEST the system for normal operation. → **No** INSTALL a new battery. TEST the system for normal operation.

PINPOINT TEST X: THE VOLTAGE GAUGE READS HIGH OR LOW — 4.0L SOHC, 5.0L

CONDITIONS	DETAILS/RESULTS/ACTIONS
X1 CHECK BATTERY VOLTAGE	
1  2  AJ0210-A	2 With the engine running, turn off all accessories. Increase the engine speed and monitor the voltage at the battery. • **Is the battery voltage more than 15 volts?** → **Yes** GO to Pinpoint Test H . → **No** GO to X2 .
X2 CHECK VOLTAGE GAUGE OPERATION	
1	1 With the engine running monitor the voltage gauge reading and the battery voltage.

 AJ0210-A	• **Are the voltage readings consistent?** → **Yes** SYSTEM is operating normally. → **No** REFER to Section 413-01 to continue diagnostics.

Component Tests

Battery — Drain Testing

1. Check for current drains on the battery in excess of 50 milliamps with all the electrical accessories off and the vehicle at rest. Current drains can be tested with the following procedure.

WARNING: Do not attempt this test on a lead-acid battery that has recently been recharged. Explosive gases can cause personal injury.

CAUTION: To prevent damage to the meter, do not crank the engine or operate accessories that draw more than 10A.

NOTE: Many computers draw 10 mA or more continuously.

NOTE: Use an in-line ammeter between the battery positive or negative post and its respective cable.

2. Turn the switch to mA/A dc.

3. Disconnect the battery terminal and touch the probes.

4. Isolate the circuit causing the current drain by pulling out one fuse after another from the fuse junction panel while reading the display.
   The current reading will drop when the fuse on the bad circuit is pulled.

5. Reinstall the fuse and test the components (including connectors) of that circuit to find defective component(s).

The current reading (current drain) should be less than 0.05 amp. If current drain exceeds 0.05 amp, a constant current drain is present (Underhood, glove compartment and luggage compartment lamps that do

not shut off properly are all possible sources of current drain).

- If the drain is not caused by a vehicle lamp, remove the fuses from the interior fuse junction panel one at a time, until the cause of the drain is located.
- If the drain is still undetermined, remove the fuses one at a time at the power distribution box to find the problem circuit.

Battery — Electronic Drains Which Shut Off When the Battery Cable Is Disconnected

1. Repeat the steps of the battery drain testing.

2. Without starting the engine, turn the ignition switch to RUN for a moment and then OFF. Wait one minute for the illuminated entry lamps to turn off if equipped.

3. Connect the voltmeter and read the voltage.

The current reading (current drain) should be less than 0.05 amp. If current drain exceeds 0.05 amp after a few minutes, and if this drain did not show in previous tests, the drain is most likely caused by a malfunctioning electronic component. As in previous tests, remove the fuses in the fuse junction panel one at a time to locate the problem circuit.

Generator On-Vehicle Tests

CAUTION: To prevent damage to the generator, do not make jumper wire connections except as directed.

CAUTION: Do not allow any metal object to come in contact with the housing and the internal diode cooling fins with key on or off. A short circuit will result and burn out the diodes.

NOTE: Battery posts and cable clamps must be clean and tight for accurate meter indications.

NOTE: Refer to the battery tester manual for complete directions on checking out the charging system.

1. Turn OFF all lamps and electrical components.

2. Place the vehicle in transmission range NEUTRAL and apply the parking brake.

3. Carry out Load Test and No-Load Test according to the following component tests.

Generator On-Vehicle Test — Load Test

4. Switch the tester to the ammeter function.

5. Connect the positive and negative leads of the tester to the corresponding battery terminals.

6. Connect the current probe to the generator B+ output lead, circuit 38 (BK/O).

7. With the engine running at 2000 rpm, adjust the tester load bank to determine the output of the generator. Refer to the Symptom Chart in this section for diagnostic procedures.

8. With the engine running, turn the A/C on, the blower motor on high speed and the headlamps on high beam.

9. Increase the engine speed to approximately 2,000 rpm. The voltage should increase a minimum of 0.5 volt above the base voltage.
    - If the voltage does not increase as specified, carry out the Generator On-Vehicle Tests in this section.
    - If the voltage increases as specified, the charging system is operating normally.

Generator On-Vehicle Test — No-Load Test

1. Switch the tester to the voltmeter function.

2. Connect the voltmeter positive lead to the generator B+ terminal and the negative lead to ground.

3. Turn all electrical accessories off.

4. With the engine running at 2000 rpm, check the generator output voltage. The voltage should be between 13.0 and 15.0 volts. If not, refer to the Symptom Chart for diagnostic procedures.

Torque Specifications

Description	Nm	lb-ft	lb-in
Battery Cable Bolts	7-10	—	62-89
Battery Ground Cable to Engine Block Stud Nut (5.0L)	11-20	8-15	—
Battery Ground Cable to Frame Bolt	11-13	8-10	—
Battery Ground Cable to Radiator Support Nut	11-13	8-10	—
Battery Ground Cable to Starter Motor Stud Nut (4.0L)	23-32	17-24	—
Battery Hold-Down Bracket Bolt	10-14	7-10	—
Battery Tray Bolts	26-34	19-25	—
Starter Motor Nut	9-14	—	80-123
Starter Motor Solenoid Relay Switch Cable Nuts	5-11	—	44-98
Chassis Ground Cable Nut	11-13	8-10	—

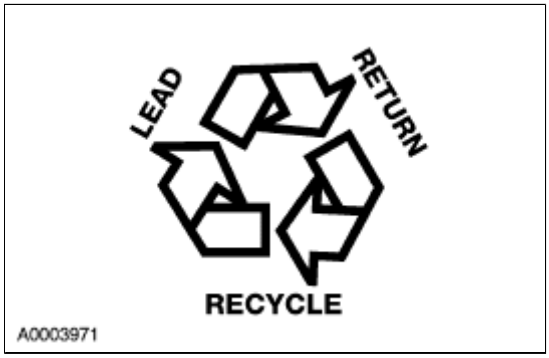
Battery and Cables

Vehicles are equipped with a 12 volt maintenance-free battery.

The battery and cable system consists of the following components:

- battery
- battery cable assembly
- battery tray

Ford Motor Company strongly recommends that lead-acid batteries be returned to an authorized recycling facility for disposal.



Battery

Special Tool(s)

 ST2442-A	Micro 490 Digital Battery Analyzer 162-00004

Inspection and Verification

1. Verify the customer concern by operating the system.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Battery • Battery mounting	• Battery cables • Battery posts

3. If an obvious cause for a concern is found, correct the cause before proceeding to the next step.
4. If the fault is not visually evident, proceed to the pinpoint test.

Pinpoint Tests

PINPOINT TEST A: BATTERY CONDITION TEST

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 TEST BATTERY CONDITION	
NOTE: No battery with a red test-eye should be replaced. The red eye only means the battery is discharged, not necessarily defective. **NOTE:** Failure to fully charge the battery before retesting may cause false readings.	
	1 Verify the battery condition using the Battery Analyzer. • **Is the battery OK?** → **Yes**

	Does the meter read, GOOD BATTERY? RETURN the battery to service. REFER to Section 414-00 . Does the meter read, GOOD-RECHARGE? CHARGE the battery and RETURN to service. REFER to Section 414-00 . Does the meter read, CHARGE & RETEST? Fully CHARGE the battery and RETEST. → **No** Does the meter read, REPLACE BATTERY? INSTALL a new battery. Does the meter read, BAD CELL-REPLACE? INSTALL a new battery.

Battery Disconnect

WARNING: Batteries normally produce explosive gases which can cause personal injury. Therefore, do not allow flames, sparks or lighted substances to come near the battery, always shield your face and protect your eyes. Always provide ventilation. Failure to follow these instructions may result in personal injury.

WARNING: To avoid accidental deployment and possible injury, the backup power supply must be depleted before repairing or installing any front or side air bag supplemental restraint system (SRS) components and before repairing, installing, adjusting or striking components near the front or side air bag sensors, such as doors, instrument panel, console, door latches, strikers, seats and hood latches. Failure to follow these procedures may result in personal injury.

Refer to the appropriate vehicle shop manual to determine location of the front air bag sensors.

To deplete the backup power supply energy, disconnect the battery ground cable and wait at least one minute. Be sure to disconnect auxiliary batteries and power supplies (if equipped). Failure to follow these instructions may result in personal injury.

WARNING: When lifting a battery, excessive pressure on the end walls could cause acid to spew through the vent caps, resulting in personal injury. Lift with a battery carrier or with your hands on opposite corners. Failure to follow these instructions may result in personal injury.

WARNING: Keep out of the reach of children. Batteries contain sulfuric acid. Avoid contact with skin, eyes or clothing. Also, shield your eyes when working near the battery to protect against possible splashing of the acid solution. In case of acid contact with the skin or eyes, flush immediately with water for a minimum of 15 minutes and get prompt medical attention. If acid is swallowed, call a physician immediately. Failure to follow these instructions may result in personal injury.

1. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven to relearn its strategy.

   Disconnect the battery ground cable.

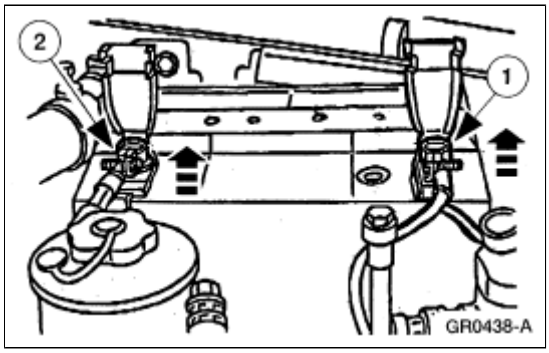
2. Disconnect the positive battery cable.

3. To install, reverse the removal procedure.

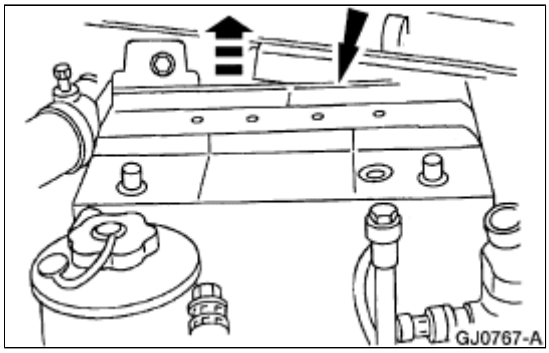
Battery

Removal

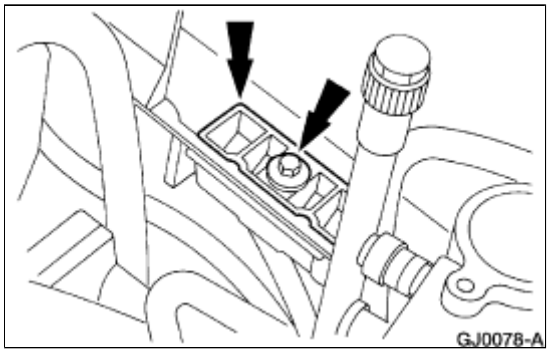
1. Disconnect the battery cables.
    1. Disconnect the battery ground cable (14301).
    2. Disconnect the battery to starter relay cable (14300).



2. Remove the battery heat shield (10A682).



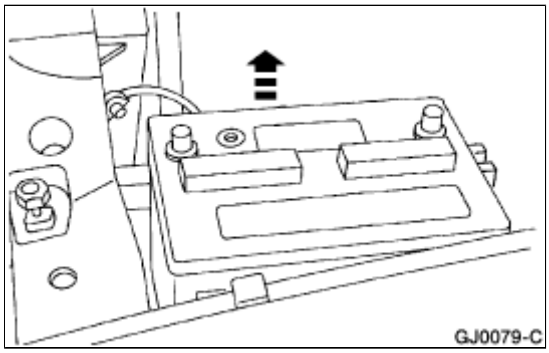
3. Remove the bolt and the battery hold down clamp.



4. **WARNING: When lifting a battery (10655) , excessive pressure on the end walls could cause acid to spew through the vent caps, resulting in personal injury. Lift with a battery**

carrier or with your hands on opposite corners.

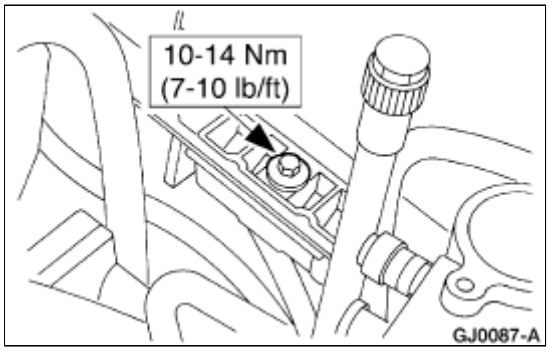
Remove the battery.

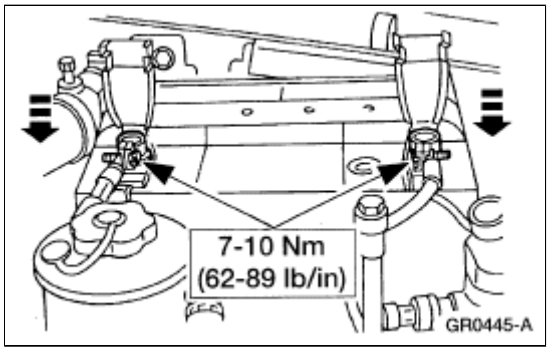


Installation

1. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven to relearn the strategy.

   Follow the removal procedure in reverse order.

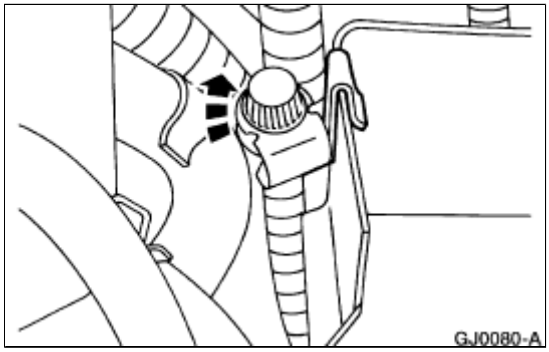




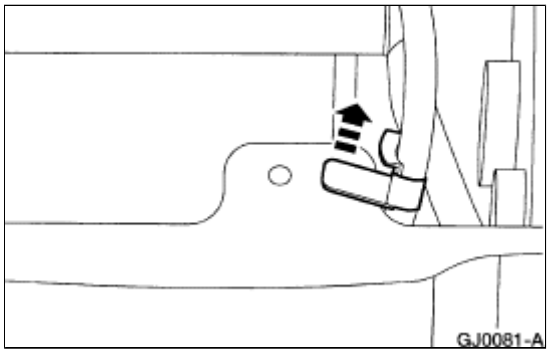
Battery Tray

Removal

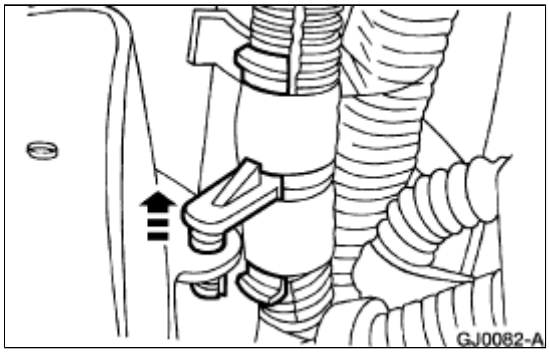
1. Remove the battery (10655); refer to Battery in this section.
2. Remove the evaporative emissions service port from the battery tray (10732).



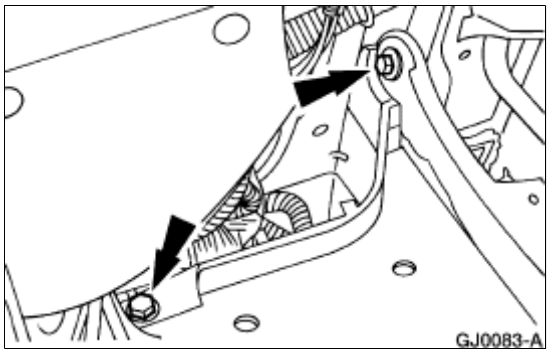
3. Remove the battery ground cable (14301) to battery tray pushpin.



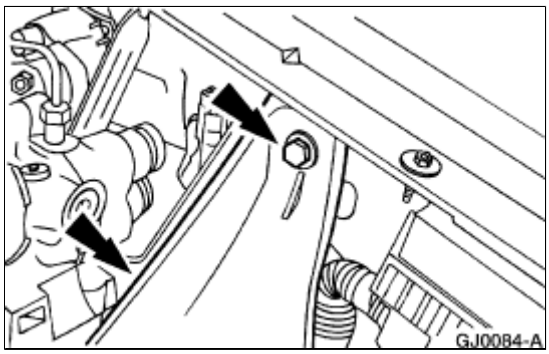
4. Remove the battery to starter relay cable (14300) to battery tray pushpin.



5. Remove the bolts.



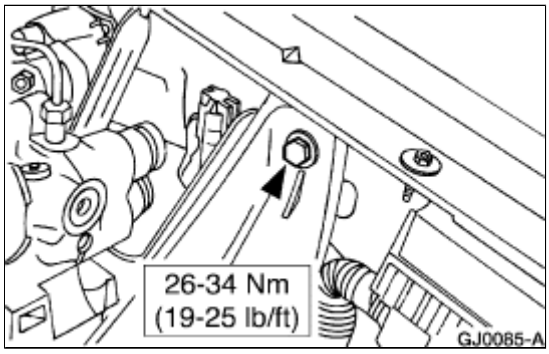
6. Remove the bolt and the battery tray.

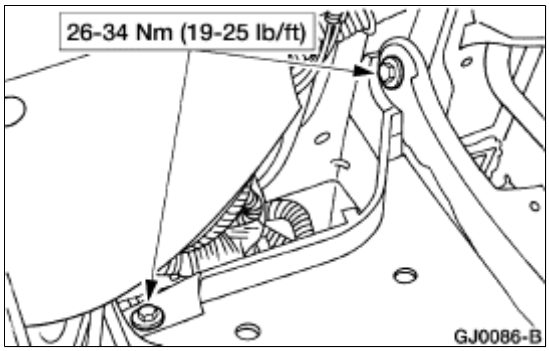


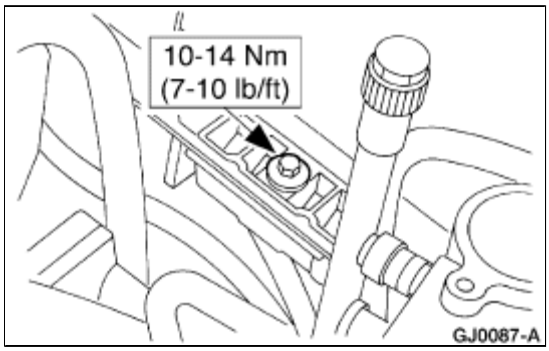
Installation

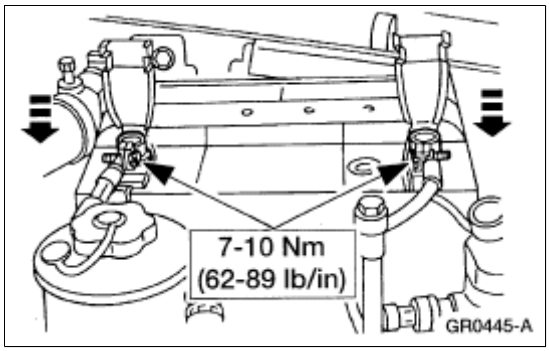
1. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   Follow the removal procedure in reverse order.




26-34 Nm (19-25 lb/ft)
GJ0086-B

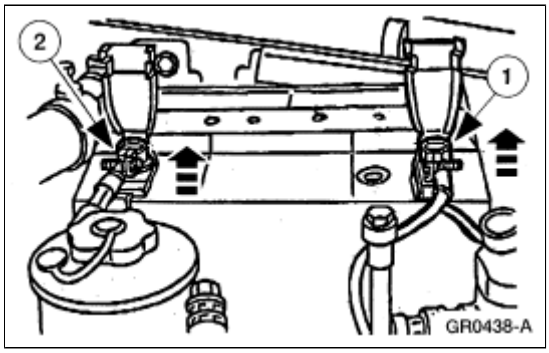

10-14 Nm
(7-10 lb/ft)
GJ0087-A


7-10 Nm
(62-89 lb/in)
GR0445-A

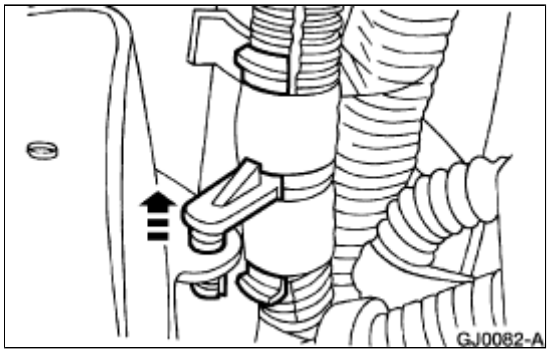
Battery Cables —4.0L

Removal

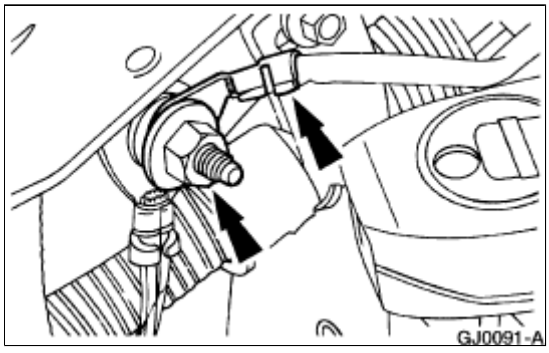
1. Disconnect the battery cables.
    1. Disconnect the battery ground cable (14301).
    2. Disconnect the battery to starter relay cable (14300).



2. Remove the three battery cable wire harness pushpins.

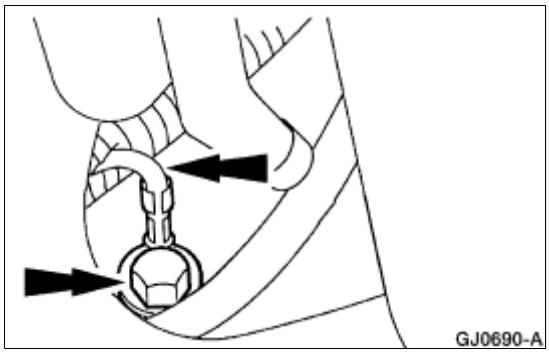


3. Remove the nut and the chassis ground cable.

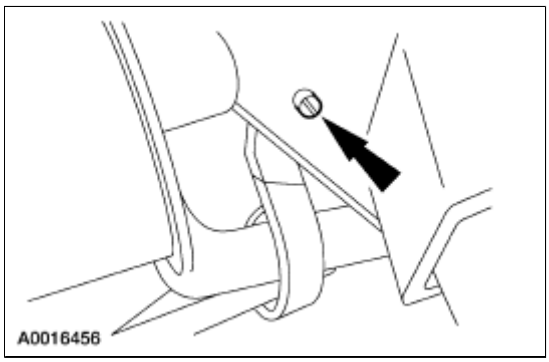


4. Raise and support the vehicle; refer to Section 100-02 .

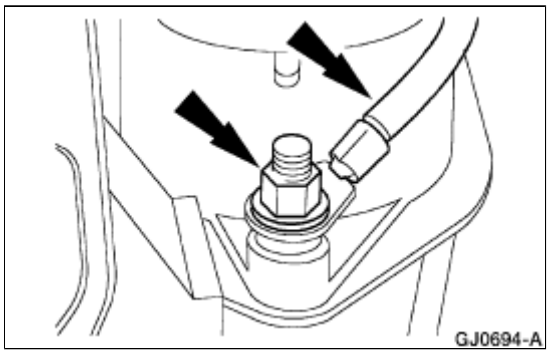
5. Remove the bolt, the frame ground cable, and the bracket.



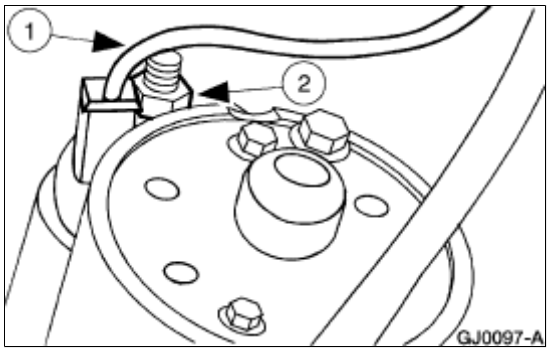
6. Remove the bolt from the battery cable bracket.



7. Remove the battery ground cable nut from the starter motor stud and remove the battery ground cable.

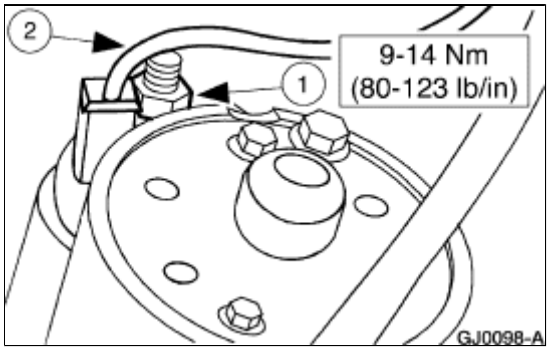


8. Remove the starter motor wiring harness.
    1. Remove the push-on electrical connector.
    2. Remove the starter motor wiring harness to starter motor nut and wire.
        - Remove battery cable wiring harness.

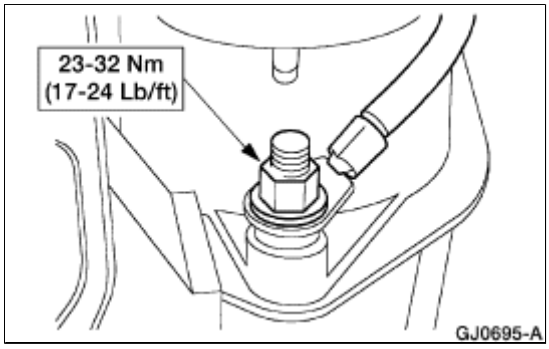


Installation

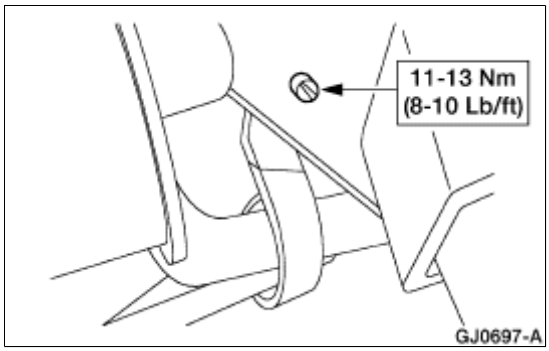
1. Install the starter motor wiring harness.
    1. Install the starter motor wiring harness to starter motor wire and nut.
    2. Install the push-on electrical connector.



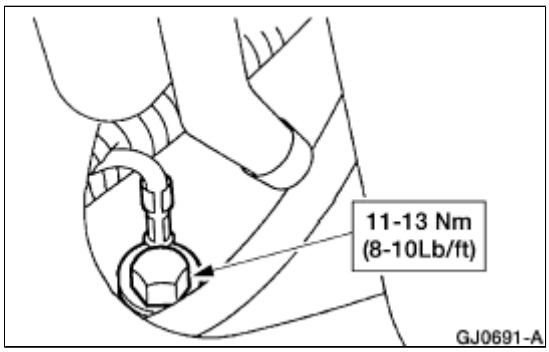
2. Install the battery ground cable to the starter motor stud and install the nut.



3. Install the battery cable bracket and the bolt.

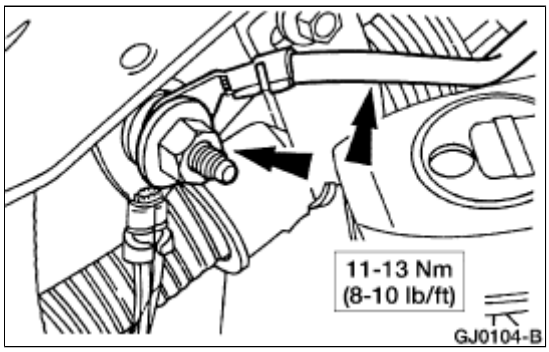


4. Position the frame ground cable, bracket and install the bolt.

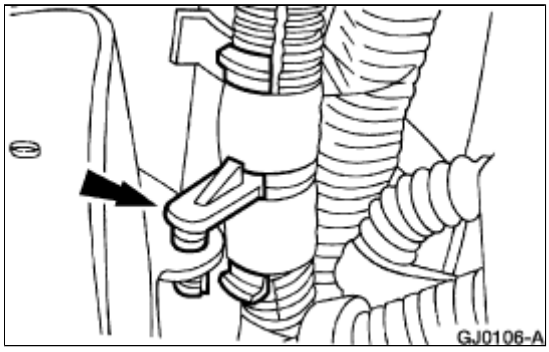


5. Lower the vehicle.

6. Install the chassis ground cable and the nut.

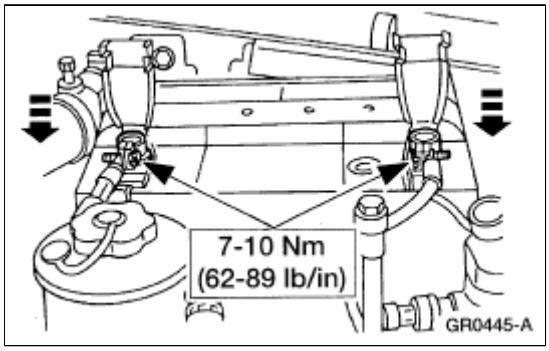


7. Install the three battery cable wire harness pushpins.



8. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven to relearn the strategy.

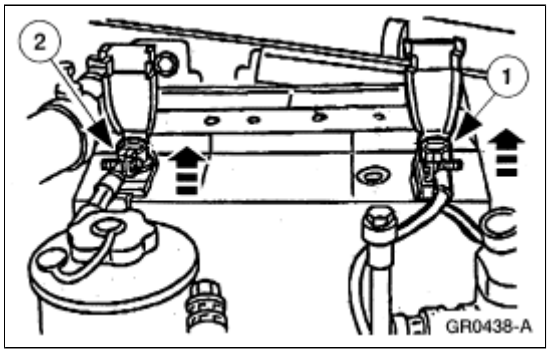
   Connect the battery to starter relay cable and then connect the battery ground cable.



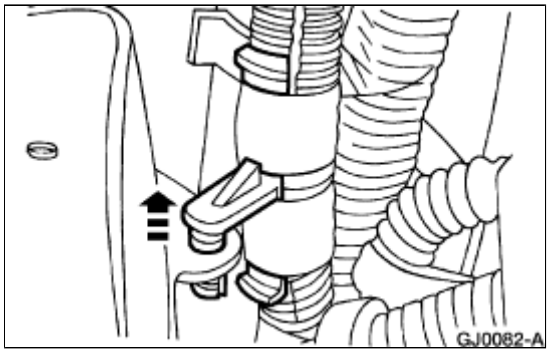
Battery Cables —5.0L

Removal

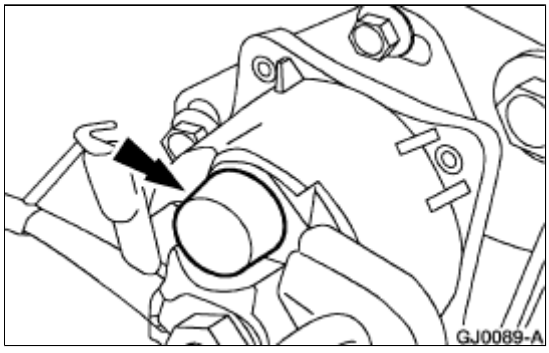
1. Disconnect the battery cables.
    1. Disconnect the battery ground cable (14301).
    2. Disconnect the battery to starter relay cable (14300).



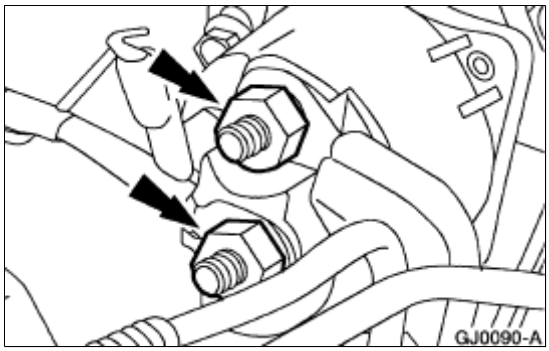
2. Remove the battery cable to battery tray pushpins.



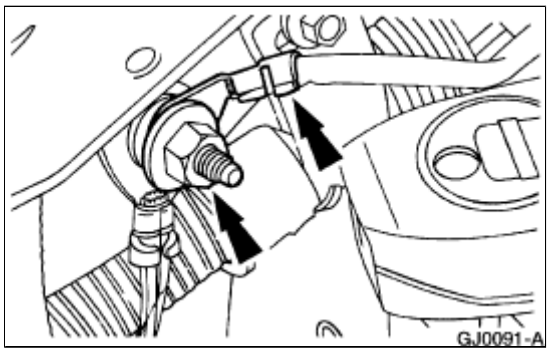
3. Remove the starter motor solenoid top nut insulator.



4. Remove the two starter motor solenoid relay switch cable nuts and the starter motor solenoid relay switch cable.

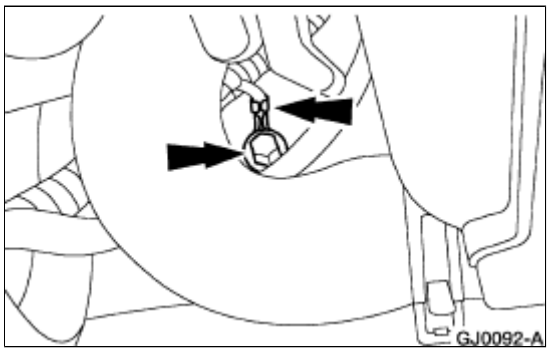


5. Remove the nut and the chassis ground cable.

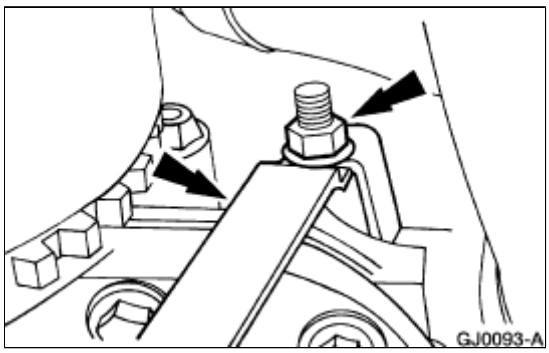


6. Raise and support the vehicle; refer to Section 100-02 .

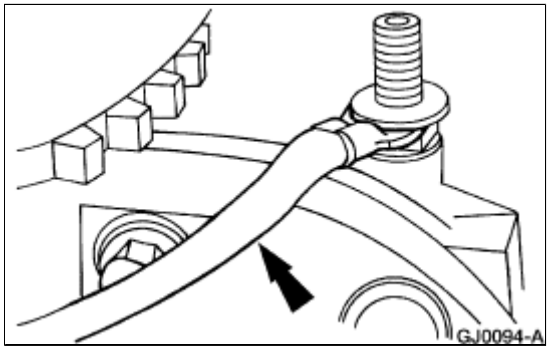
7. Remove the screw and the frame ground cable.



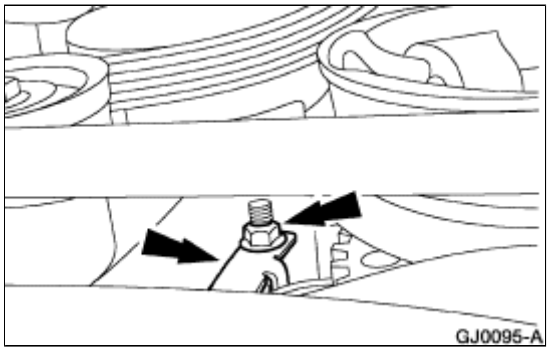
8. Remove the nut and the battery cable bracket.



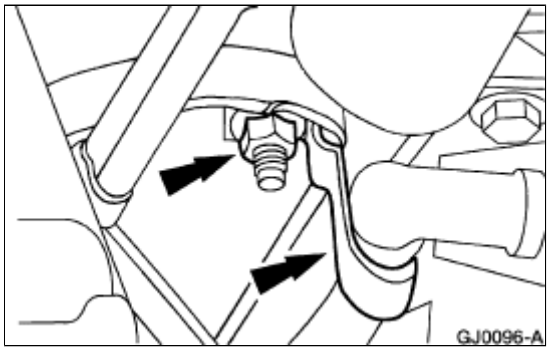
9. Remove the battery ground cable from the engine block stud.



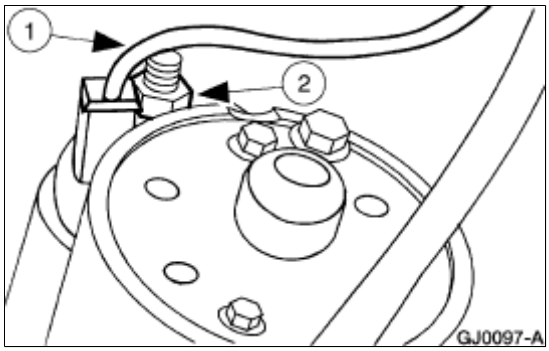
10. Remove the nut and the battery cable bracket.



11. Remove the nut and the battery cable bracket.

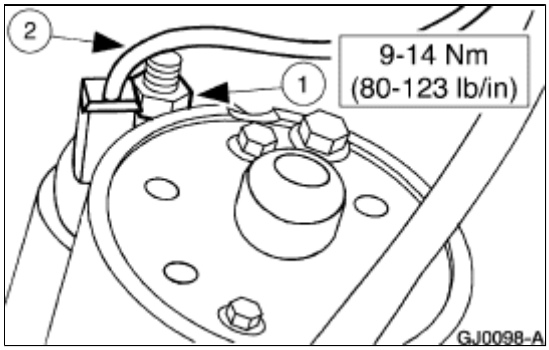


12. Remove the starter motor wiring harness.
    1. Remove the push-on electrical connector.
    2. Remove the starter motor wiring harness to starter motor nut and wire.
        - Remove battery cable wiring harness.

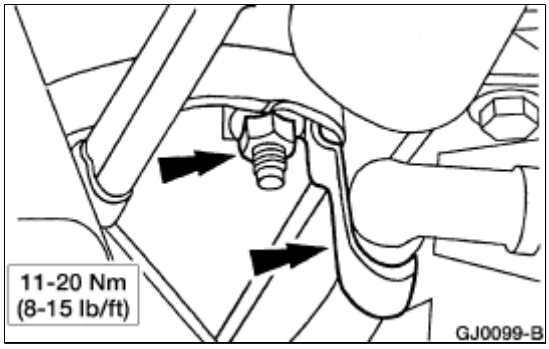


Installation

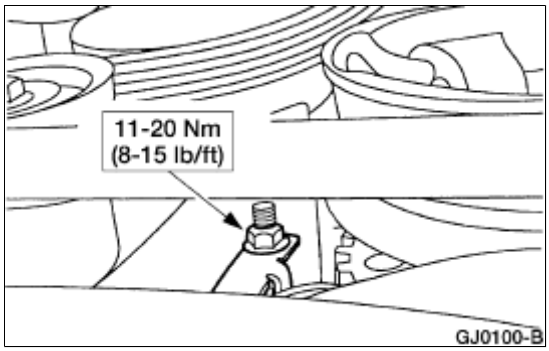
1. Install the starter motor wiring harness.
    1. Install the starter motor wiring harness to starter motor wire and nut.
    2. Install the push-on electrical connector.



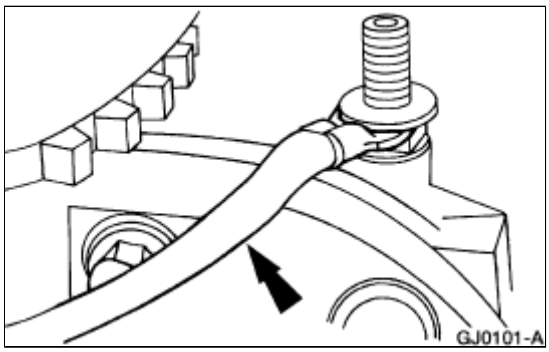
2. Install the battery cable bracket and the nut.



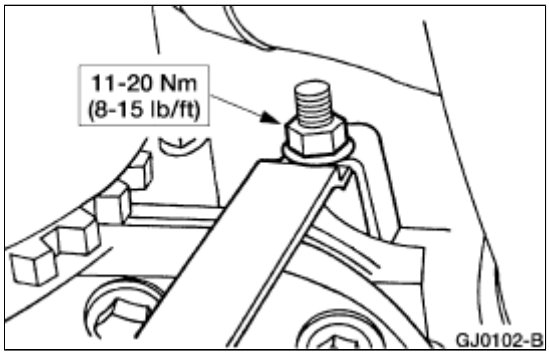
3. Install the battery cable bracket and the nut.



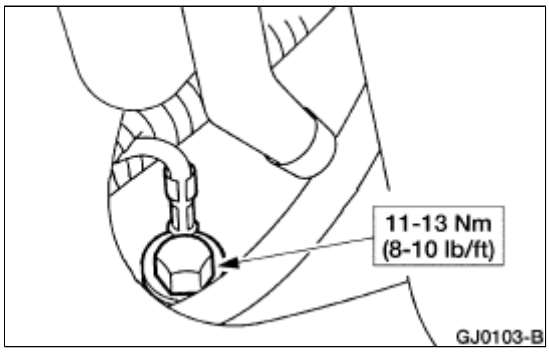
4. Install the battery ground cable on the engine block stud.



5. Install the battery cable bracket and the nut.

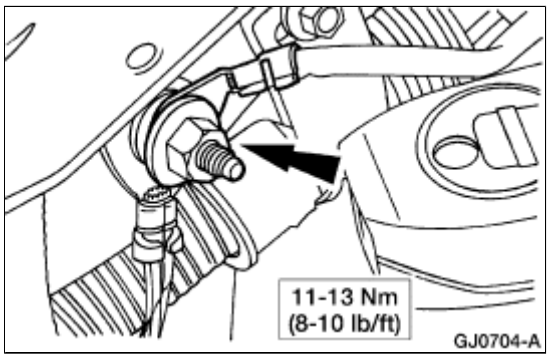


6. Position the frame ground cable and install the bolt.

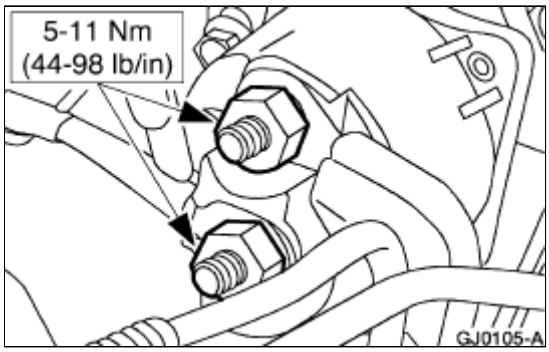


7. Lower the vehicle.

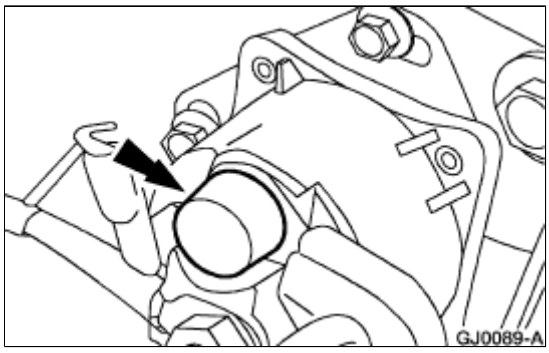
8. Install the chassis ground cable and the nut.



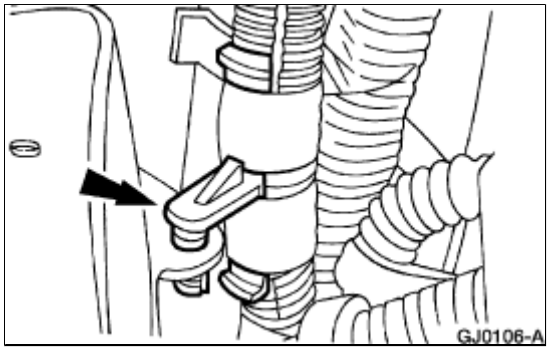
9. Install the starter motor solenoid relay switch cable and the two starter motor solenoid relay switch cable nuts.



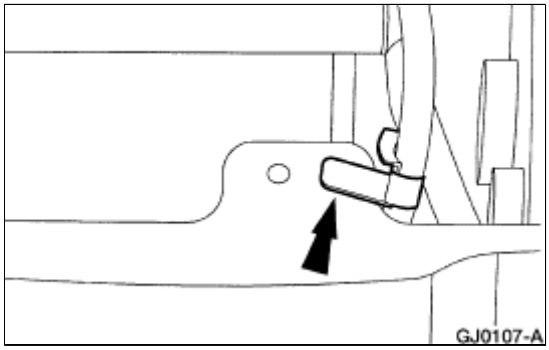
10. Install the starter motor solenoid top nut insulator.



11. Install the positive battery cable to battery tray pushpin.

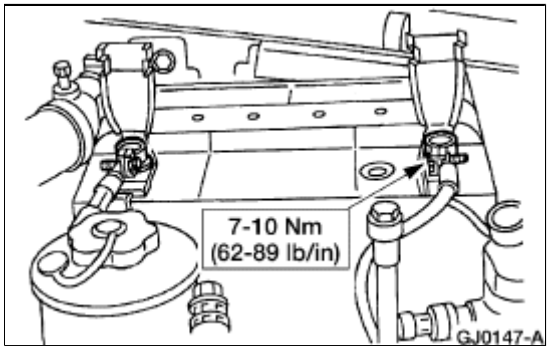


12. Install the battery ground cable to battery tray pushpin.



13. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

    Connect the battery to starter relay cable and then connect the battery ground cable.



General Specifications

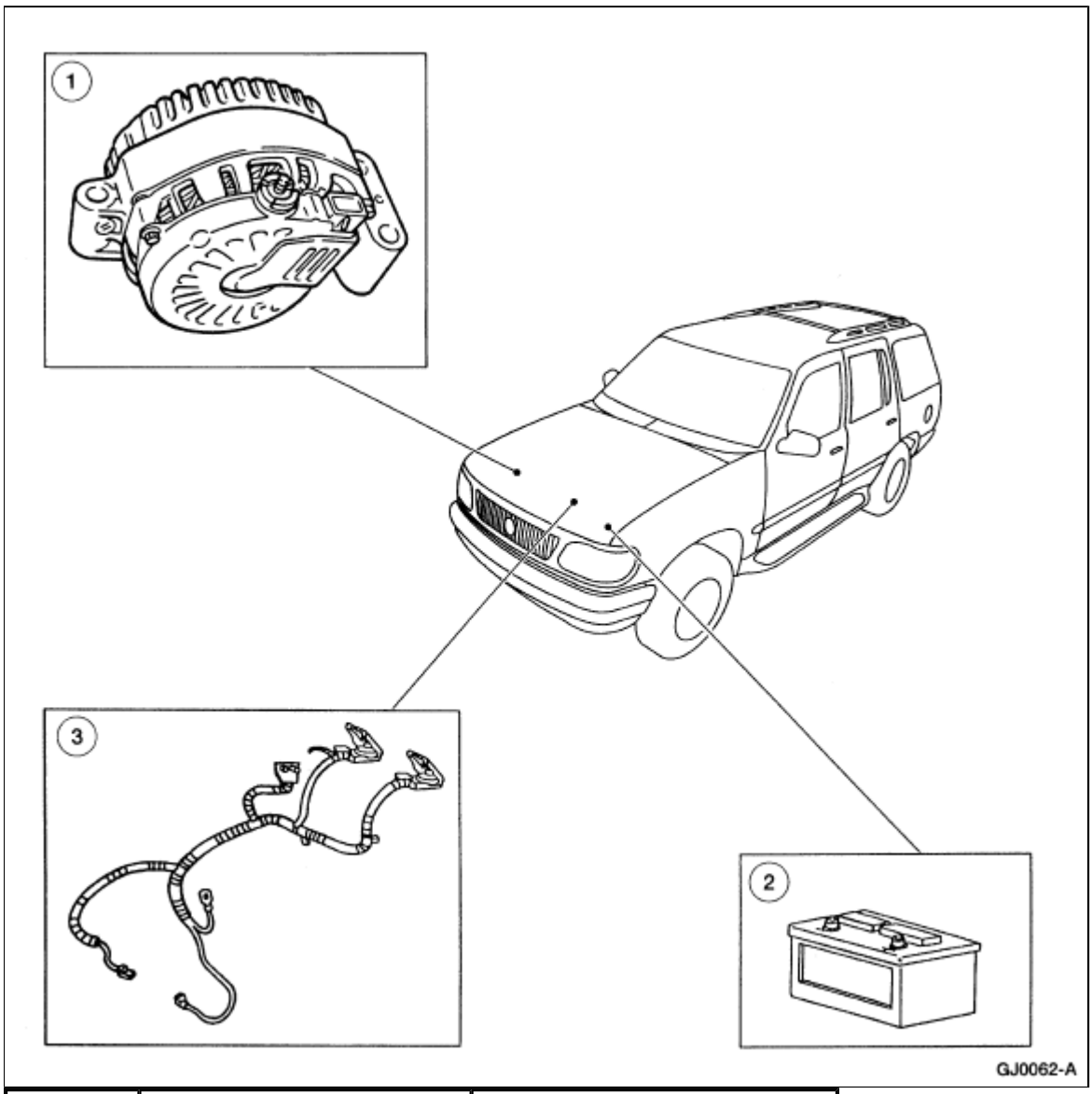
Item	Specification
Battery	72 amp/hr
58/120 Generator	65 amp
45/110 Generator	60 amp
35/90 Generator	45 amp

Torque Specifications

Description	Nm	lb-ft	lb-in
Generator to bracket bolts	40-55	30-40	—
Generator to bracket stud bolt	40-55	30-40	—
A/C manifold and tube bracket nut	15-22	11-16	—
B+ terminal nut	9-12	—	80-106
Generator pulley nut	82-135	61-99	—
Voltage regulator/brush holder screws	2.3-3.4	—	21-30

Generator

Component Location



Item	Part Number	Description
1	10300	Generator
2	10655	Battery
3	—	Wiring harness

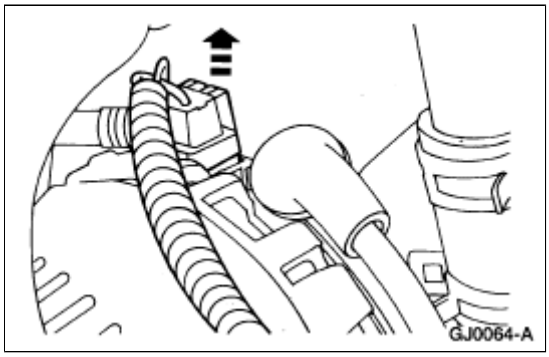
Generator

Refer to Section 414-00 .

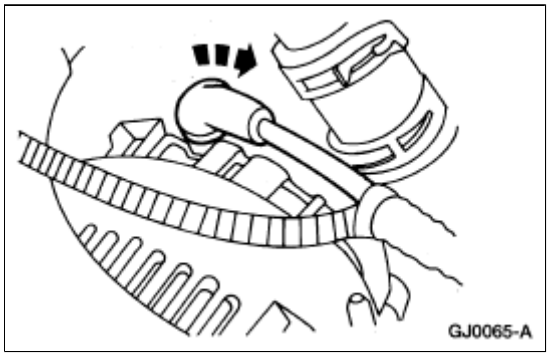
Generator —4.0L (SOHC) and 5.0L

Removal

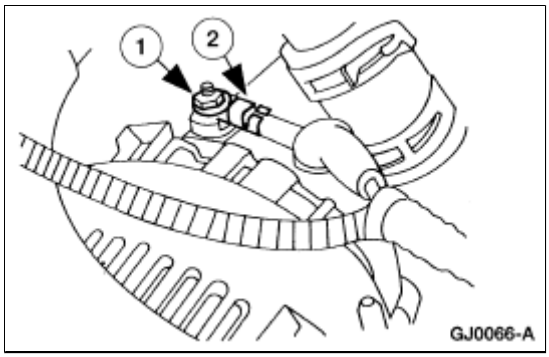
1. Disconnect the battery (14301). For additional information, refer to Section 414-01 .
2. Remove the air cleaner outlet tube (9B659). For additional information, refer to Section 303-12 .
3. Remove the drive belt (8620). For additional information, refer to Section 303-05 .
4. Disconnect the wiring harness to voltage regulator electrical connector.



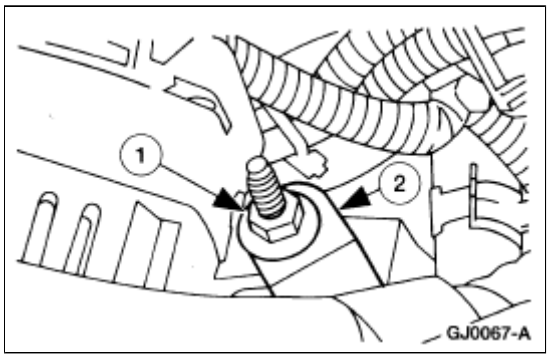
5. Remove the B+ terminal cover.



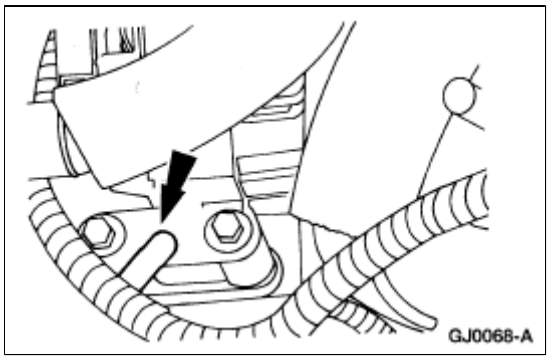
6. Remove the B+ terminal electrical connector.
    1. Remove the B+ terminal nut.
    2. Disconnect the B+ terminal electrical connector.



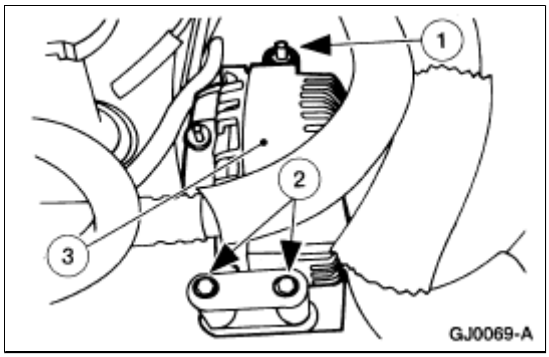
7. On vehicles equipped with 5.0L engine, position the A/C manifold and tube bracket aside.
    1. Remove the nut.
    2. Position the A/C manifold and tube bracket aside.



8. Remove the wiring harness-to-generator pin-type retainer.

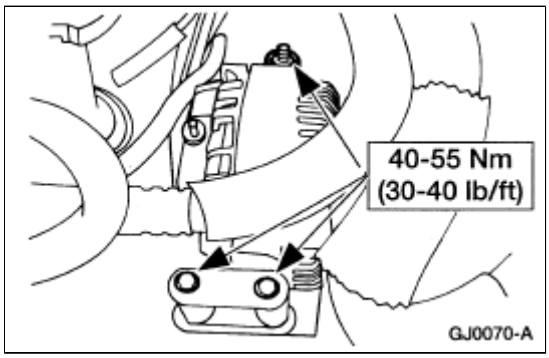


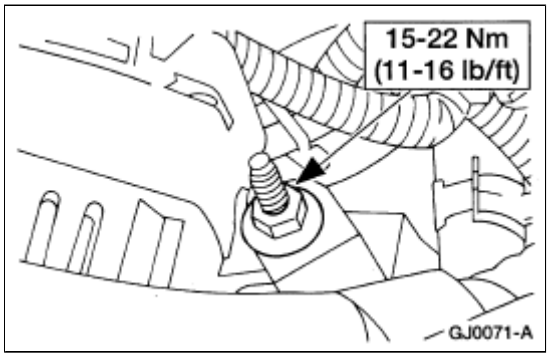
9. Remove the generator (GEN) (10300).
    1. Remove the stud bolt.
    2. Remove the bolts.
    3. Remove the generator.

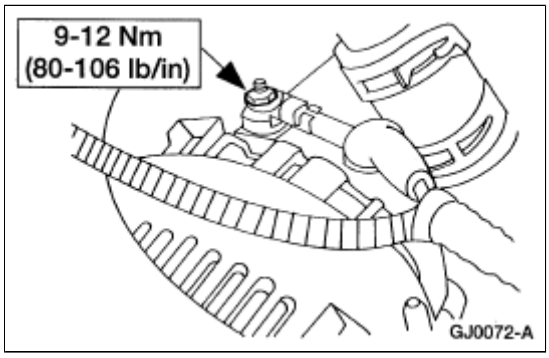


Installation

1. To install, reverse the removal procedure.

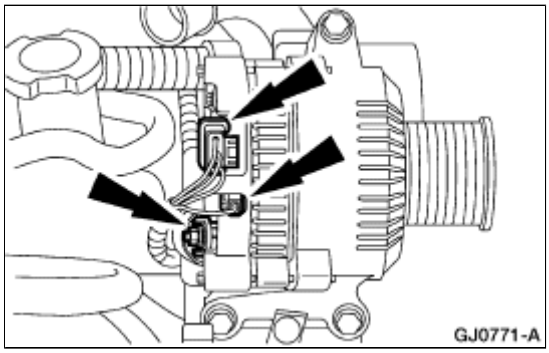




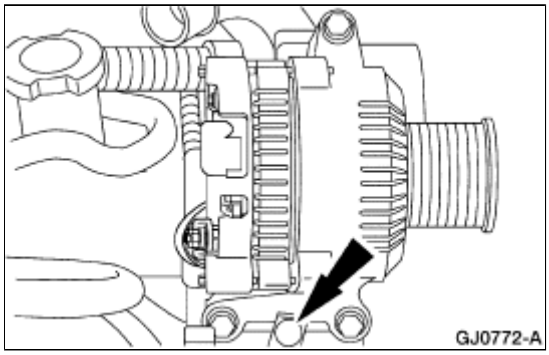


Generator —4.0L (Push Rod)

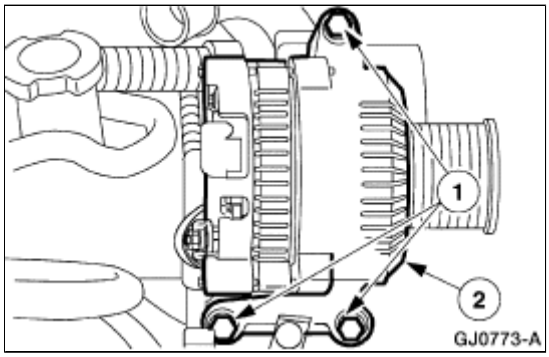
1. Disconnect the battery (14301). For additional information, refer to Section 414-01 .
2. Remove the air cleaner outlet tube (9B659). For additional information, refer to Section 303-12 .
3. Remove the drive belt (8620). For additional information, refer to Section 303-05 .
4. Disconnect the electrical connectors.



5. Remove the wiring harness-to-generator pin-type retainer.

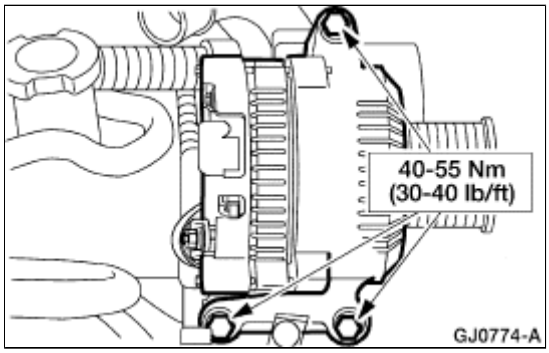


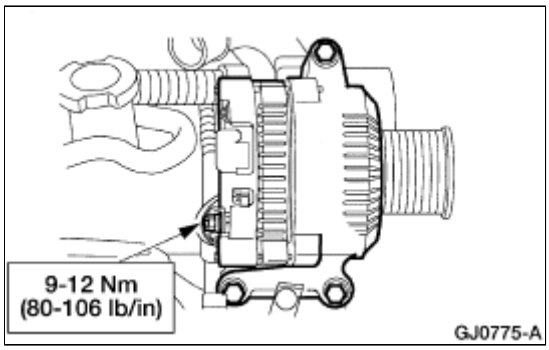
6. Remove the generator (GEN) (10300).
    1. Remove the bolts.
    2. Remove the generator.



Installation

1. To install, reverse the removal procedure.



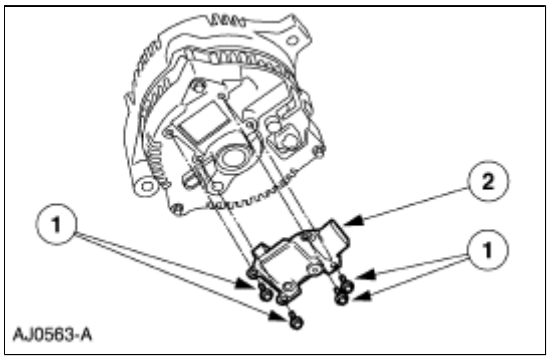


Voltage Regulator —Brush Holder

Removal

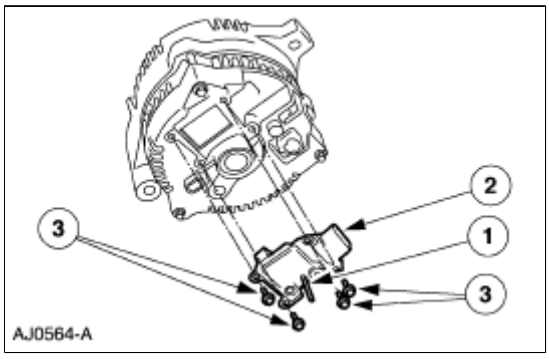
1. Remove the generator. For additional information, refer to Generator—4.0L (Push Rod) in this section.

2. Remove the voltage regulator/brush holder assembly.
    1. Remove the screws.
    2. Remove the voltage regulator/brush holder assembly.



Installation

1. Install the voltage regulator/brush holder assembly.
    1. Depress the brushes and insert a wire to hold brushes during installation.
    2. Install the voltage regulator/brush holder assembly.
    3. Install the screws and remove the wire.

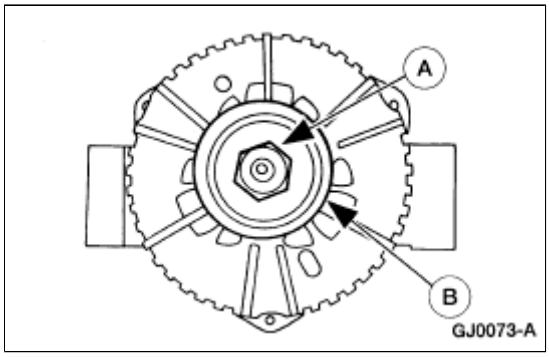


2. Install the generator. For additional information, refer to Generator—4.0L (Push Rod) in this section.

Generator Pulley

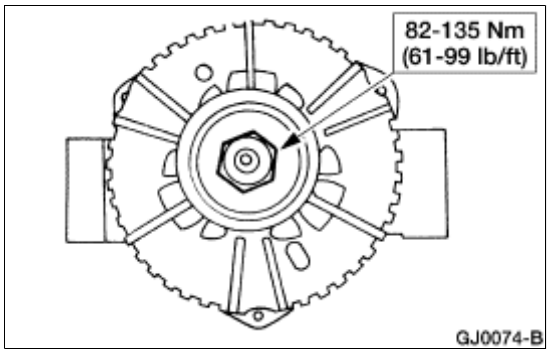
Removal

1. Disconnect the battery (14301). For additional information, refer to Section 414-01 .
2. Remove the generator (GEN) (10300). For additional information, refer to Generator—4.0L (Push Rod) or Generator—4.0L (SOHC) and 5.0L in this section.
3. Remove the (A) nut and the (B) generator pulley (10344).



Installation

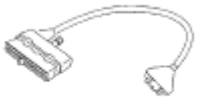
1. To install, reverse the removal procedure.



Audio System

Refer to Wiring Diagrams Cell 130 , Audio for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051
 ST1684-A	ABS Breakout Box Adapter 418-063 (T97P-50-ALA)
 ST1449-A	EEC-IV 60-Pin Breakout Box or equivalent 418-005 (014-00322)

Inspection and Verification

1. Verify the customer concern by operating the electronic audio system with the engine running and the vehicle in and out of motion.

2. Visually inspect for obvious signs of mechanical and electrical damage; refer to the following chart:

Visual Inspection Chart

Mechanical	Electrical
• Audio unit physically damaged, misaligned or any controls inoperative • Antenna or antenna cable physically damaged or misaligned • Radio speakers mounting/speaker cones physically damaged or misaligned • Radio ignition interference capacitor, radio frequency interference suppression bond or radio receiver hood bonding strap misaligned, corroded or loose	• Blown central junction box (CJB) Fuse 1 (7.5A), Fuse 20 (7.5A), Fuse 28 (7.5A), and Fuse 29 (25A) • Damaged connectors • Damaged ignition switch (11572) • Damaged circuitry • Damaged audio unit

3. If the fault is not visually evident, proceed to Speaker Walk-Around Test, DM100i Self-Diagnostic Mode, or T100i DM Self-Diagnostic Mode.

Speaker Walk-Around Test and T100i DM Self-Diagnostic Mode

NOTE: The audio unit must be turned ON and in radio tuner mode (AM/FM) to enter the Speaker Walk-Around Test or the T100i DM self-diagnostic mode.

The T100i DM self-diagnostic mode tests can only be entered while in the Speaker Walk-Around Test.

4. To enter the Speaker Walk-Around Test, press Preset Buttons 3 and 6 simultaneously, hold for approximately three seconds and then release.

5. The Speaker Walk-Around Test stops at each speaker and applies tone to each speaker for approximately 1-2 seconds. Each speaker is tested and shown on the display in the following sequence: SPEAKER RF, SPEAKER LF, SPEAKER LR, SPEAKER RR, ANTENNA, SUBWOOFER I.

6. The Speaker Walk-Around Test automatically continues and tests if the CD/DJ is present and responding. NO CD/DJ is displayed if the CD/DJ is not present or not responding.

7. To exit Speaker Walk-Around Test turn the ignition key OFF or turn the audio unit OFF.

8. The T100i DM self-diagnostic mode has five manual tests available:
   - Preset button 1 = Audio internal/external SELF TEST. This test is an on-demand self-test. If diagnostic trouble codes (DTCs) are retrieved, press TUNE > to scroll view the DTCs stored. Refer to the T100i DM Diagnostic Trouble Code (DTC) Index. If system is OK, NO DTCS is displayed.
   - Preset button 2 = View/Clear continuous DTCS (historical DTCS) (early production). On late production, preset button 2 will have no self-test function. NO DTCS is displayed if no DTCs are retrieved. Press TUNE > button to view if any DTCs are stored. Refer to the T100i DM Diagnostic Trouble Code (DTC) Index. To clear all DTCs press the EJ (eject) button. DTCS CLEAR is displayed.
   - **NOTE:** Always DOCUMENT, CLEAR, and CARRY OUT the T100i DM On-Demand Self-Test again.

     Preset button 3 = SIGNAL TEST. This test measures the average strength at the current tuner setting.
   - Preset button 4 = Software configuration level. This test queries each radio system controller for their software configuration level. SOFT LEVELS will be displayed upon completion of the query.
   - Preset button 5 = DISPLAY TEST. This test will light all the T100i DM display segments for 5 seconds then turn all segments OFF. When the test is complete DISPLAY TEST is displayed on the bezel.

9. To enter these tests, press the preset button desired while in the Speaker Walk-Around Test or still in the T100i DM self-diagnostic mode.

10. To exit the T100i DM self-diagnostic mode, turn the ignition switch OFF or the T100i DM OFF.

11. If the concern remains and the fault is not detected, proceed to Symptom Chart to continue diagnostics.

Speaker Walk-Around Test and DM100i Self-Diagnostic Mode

NOTE: The audio unit must be turned ON and in radio tuner mode (AM/FM) to enter the Speaker Walk-Around Test or the DM100i self-diagnostic mode.

The DM100i self-diagnostic mode can only be entered while in the Speaker Walk-Around Test.

1. To enter the Speaker Walk-Around Test, press Preset Buttons 3 and 6 simultaneously, hold approximately three seconds and release.

2. The Speaker Walk-Around Test stops at each speaker and applies sound to each speaker for about one to two seconds. Each speaker is tested and shown on the display in the following sequence: RF, LF, LR, RR.

3. To exit Speaker Walk-Around Test, turn the ignition switch OFF, turn the audio unit OFF, or preset button 1 for "DIA".

4. **NOTE:** Always DOCUMENT, CLEAR, and CARRY OUT the DM100i Self-Test again.

   The DM100i Self-Diagnostic Mode has six manual tests available:
   - Preset button 1 = ENTER DIAGNOSTICS. This test enters diagnostics from the Speaker Walk-Around Test. Metrics are available with SEL and ON buttons indicating time played in AM/FM, Media, number of buttons pressed, etc.
   - Preset button 2 = EEPROM BLOCK STATUS. This test shows validity of memory to calibrate clock and seek sensitivity.
   - Preset button 3 = EXIT DIAGNOSTICS.
   - Preset button 4 = Software configuration level. This test queries each radio system controller for its software configuration level.
   - Preset button 5 = DISPLAY TEST. This test lights all the DM100i display segments for five seconds and then turns all segments off.
   - Preset button 6 = RAM CONTENTS READOUT. To enter these tests, press Preset Button 1 while in the Speaker Walk-Around Test, then the desired preset button.

5. To exit the DM100i Self-Diagnostic Mode, turn the ignition switch OFF or the DM100i OFF.

6. If the concern remains and the fault is not detected, proceed to the Symptom Chart to continue diagnostics.

T100i DM Diagnostic Trouble Code (DTC) Index

T100i DM Diagnostic Trouble Code (DTC) Index

DTC	Description	DTC Caused By	Action
9342	ECU Is Defective	T100i DM	CLEAR and DOCUMENT the DTCs. CARRY OUT the self-test. REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility if DTC 9342 is retrieved again.
A401	Audio Tape Deck Mechanism Fault	T100i DM	VERIFY that no tape is inserted in the T100i DM. CLEAR and DOCUMENT the DTCs. CARRY OUT the T100i DM self-test. If DTC A401 is retrieved again, REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility.

A402	Audio CD/DJ Thermal Shutdown Fault	T100i DM	GO to Pinpoint Test B .
A403	Audio CD/DJ Internal Fault	T100i DM	GO to Pinpoint Test B .
A404	Audio Steering Wheel Switch Circuit Fault	T100i DM	CLEAR and DOCUMENT the DTCs. CARRY OUT the T100i DM Self-Test. If DTC A404 is retrieved again, GO to Pinpoint Test N .
A405	Audio Single-Disc CD Player Thermal Shutdown Fault	T100i DM	CLEAR and Document the DTCs. CARRY OUT the T100i DM Self-Test. If DTC A405 is retrieved again, REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility.
A406	Audio Single-Disc CD Player Internal Fault	T100i DM	CLEAR and Document the DTCs. CARRY OUT the T100i DM Self-Test. If DTC A405 is retrieved again, REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility.
E003	Audio Compact Disc/Disc Jockey (CD/DJ) Is Not Responding	T100i DM	If equipped with CD/DJ, GO to Pinpoint Test B .
E005	Audio Rear Integrated Control Panel Unit Is Not Responding	T100i DM	**NOTE:** U2005 is retrieved if RICP is not present, disconnected or inoperative. VERIFY if the vehicle is equipped with RICP/RSC. GO to Pinpoint Test K .
E008	Audio Phone Is Not Responding	T100i DM	Not applicable. Vehicle is not equipped with cellular phone.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• The audio unit is inoperative — does not operate correctly	• CJB Fuse 20 (7.5A), Fuse 28 (7.5A), and Fuse 29 (25A). • Circuitry. • Audio unit. • Ignition switch.	• GO to Pinpoint Test A .
• The audio unit display blank — audio unit operates	• Audio unit.	• REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation.
• The audio unit/tape player display is blank — the audio unit/tape player operates	• Audio unit.	• REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system after the repair.
• The cassette player only	• Audio unit.	• REMOVE the audio unit and

is inoperative		SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation.
• The CD changer is inoperative/does not operate correctly	• CJB Fuse 29 (25A). • Circuitry. • Audio unit. • CD changer. • Ignition switch.	• GO to Pinpoint Test B .
• Noisy reception	• Antenna connections. • Noise suppression equipment. • Audio unit.	• GO to Pinpoint Test C .
• Noisy reception — FM only	• FM signal.	• INFORM the customer of methods for obtaining the best reception.
• No sound from one or more of the speakers — not all speakers	• Speaker(s). • Circuitry. • Audio unit.	• GO to Pinpoint Test D .
• No sound from all of the speakers	• Audio unit. • Circuitry.	• GO to Pinpoint Test E .
• Poor quality sound from one or more speakers (not all speakers)	• Speaker(s). • Circuitry. • Audio unit.	• GO to Pinpoint Test F .
• Poor quality sound from all speakers	• Speaker(s). • Circuitry. • Audio unit.	• GO to Pinpoint Test G .
• During CD mode, the audio unit display shows: CDE1	• CDDJ mechanism error.	• A mechanical failure has occurred. TRY to EJECT the magazine, as this may clear the error condition. If the magazine will not eject, REMOVE the digital audio compact disc changer and SEND it to an authorized Ford audio systems repair facility. • TURNING power off than on may clear CDE1 error.
• During CD mode, the audio unit display shows: CDE2	• Laser focus error.	• Focus error — probably bad, dirty or scratched disc. TRY a known good disc. REMOVE the digital audio compact disc changer and SEND it to an authorized Ford audio systems repair facility.
• During CD mode, the audio unit display shows: TOO HOT	• Thermal shutdown.	• Digital audio compact disc changer thermal shutdown protection mode; if temperature exceeds 60°C (140°F), changer will shut down to preserve laser life.

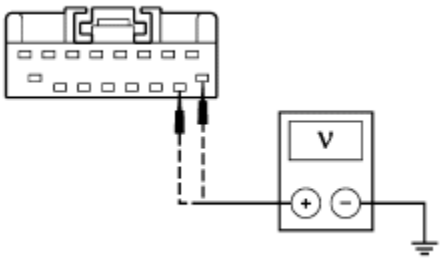
		ALLOW audio unit to cool down.
• During CD mode, the audio unit display shows: BAD CD	• Unreadable CD.	• CHECK all discs. If problem occurs on one disc, CHECK that disc. If problem occurs on all discs, VERIFY that discs are installed labeled-side up in the magazine. If discs are not scratched, dirty or inserted upside down, REMOVE the digital audio compact disc changer and SEND it to an authorized Ford audio systems repair facility.
• During CD mode, the audio unit display shows: NO CD	• No CD found.	• NO CD is displayed when a CD is not found in a slot.
• Loud pops when cycling the ignition switch	• Circuitry. • Subwoofer.	• GO to Pinpoint Test H .
• One or more audio control buttons (such as volume, seek, tune and scan) is not functional in either radio, tape or CDDJ mode or all modes — audio unit display functions correctly	• Audio unit.	• REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation.
• When the headlamp switch is in park or headlamp position, there is no front audio unit back lighting — all other backlighting functions are normal	• Circuitry. • Audio unit.	• REFER to Section 413-00 .
• The power antenna is inoperative	• Power antenna motor. • Power antenna module. • CJB Fuse 1 (7.5A). • Antenna cable. • Antenna mast. • Audio unit.	• GO to Pinpoint Test I .
• The audio unit is inoperative/does not operate correctly — response time between pressing any of the audio control buttons and system response is more than two seconds	• CDDJ. • Rear integrated control panel (RICP). • Audio unit.	• GO to Pinpoint Test J .
• No rear integrated control panel (RICP) backlighting	• RICP. • Circuitry.	• REFER to Section 413-00 .
• The auxiliary audio	• RICP.	• GO to Pinpoint Test K .

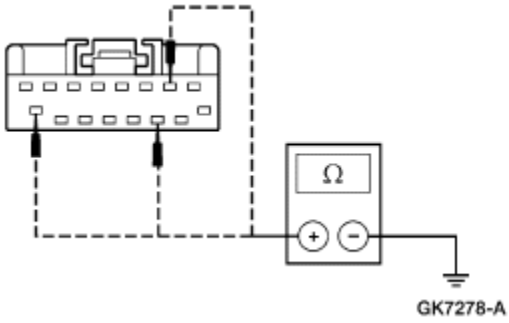
buttons are inoperative — rear integrated control panel (RICP)	• CJB Fuse 29 (25A). • Headphones. • Circuitry.	
• No auxiliary headphone audio	• Headphones. • RICP. • Circuitry.	• GO to Pinpoint Test L .
• The auxiliary audio buttons are inoperative — steering wheel control switch(es)	• Circuitry. • Steering wheel control switch (es). • Audio unit.	• GO to Pinpoint Test M .
• The subwoofer is inoperative	• Circuitry. • Subwoofer. • Audio unit.	• GO to Pinpoint Test N .
• The audio unit does not operate correctly — speed sensitive volume (SSV)	• Circuitry. • Audio unit.	• GO to Pinpoint Test O .

Pinpoint Tests

PINPOINT TEST A: THE AUDIO UNIT IS INOPERATIVE — DOES NOT OPERATE CORRECTLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK OPERATION OF THE AUDIO UNIT	
1 	2 Turn on the radio. • **Is the audio unit display illuminated?** → **Yes** GO to A2 . → **No** GO to A4 .
A2 CHECK FOR SOUND COMING FROM THE RADIO SPEAKERS	
	1 Verify that sound is coming from the radio speakers. • **Is there sound coming from the radio speakers?**

	→ **Yes** GO to A3 . → **No** GO to Pinpoint Test D .
A3 CHECK THE AUDIO UNIT CONTROLS AND FEATURES	
	1 Refer to the owner literature for audio system controls. 2 Verify that the controls and features operate correctly. • **Do the controls and features operate correctly?** → **Yes** System operation normal at this time. → **No** If the controls and features are all inoperative, GO to A4 . If the controls and features are only partially inoperative, REMOVE the audio unit and SEND it to an authorized Ford audio system facility. TEST the system for normal operation.
A4 CHECK VOLTAGE AT THE AUDIO UNIT	
1  Audio Unit C256 2  3  GK9986-A	3 Measure the voltage between: ▪ audio unit C256 Pin 9, Circuit 797 (LG/VT), and ground. ▪ audio unit C256 Pin 10, Circuit 137 (YE/BK), and ground. • **Are the voltages greater than 10 volts?**

	→ **Yes** GO to A5 . → **No** REPAIR the circuit(s) in question. TEST the system for normal operation.
A5 CHECK THE GROUND CIRCUITS TO THE AUDIO UNIT	
1  2  	2 Measure the resistance between: ■ audio unit C256 Pin 2, Circuit 57 (BK), and ground. ■ audio unit C256 Pin 11, Circuit 694 (BK/LG), and ground. ■ audio unit C256 Pin 16, Circuit 694 (BK/LG), and ground. • **Are the resistances less than 5 ohms?** → **Yes** REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation. → **No** REPAIR the circuit(s) in question. TEST the system for normal operation.

PINPOINT TEST B: THE CD CHANGER IS INOPERATIVE/DOES NOT OPERATE CORRECTLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CARRY OUT THE SPEAKER WALK-AROUND TEST — CHECK FOR CD/DJ	
1 	2 Turn on the radio. 3 Carry out the Speaker Walk-Around Test by pressing Preset Buttons 3 and 6 simultaneously.

	• **Is NO CD/DJ displayed?** → **Yes** GO to B4 . → **No** GO to B2 .
B2 CHECK OPERATION OF CD CHANGER	
1 	2 Verify the audio unit controls and features are operating correctly. Refer to the owner literature. 3 Verify that the CD changer powerloading function is operating correctly. Refer to the owner literature. • **Does the audio unit display CD?** → **Yes** GO to B3 . → **No** GO to B4 .
B3 CHECK FOR SOUND COMING FROM THE RADIO SPEAKERS	
	1 Load a known good CD and press the CD button. • **Is sound coming from the speakers?** → **Yes** GO to B4 . → **No** GO to Pinpoint Test E .
B4 CHECK CIRCUITS BETWEEN THE COMPONENTS FOR OPEN — CIRCUITS 690 (GY), 798 (LG/RD), 799 (OG/BK), 856 (VT), 1068 (LG/BK), 833 (TN), 832 (LB/PK)	
1  2 	

CD Changer C2005

3

Audio Unit C228

4

RICP C2003

5 Measure the resistances of the circuits between CD changer C2005, audio unit C228, and rear integrated control panel (RICP) C2003 as follows:

Audio Unit C228	CD Changer C2005	RICP C2003
Pin 17	Pin 1	—
Pin 20	Pin 8	—
Pin 18	Pin 7	—
Pin 19	Pin 2	—
Pin 5	Pin 11	Pin 15
Pin 7	Pin 12	Pin 13
Pin 6	Pin 6	Pin 12

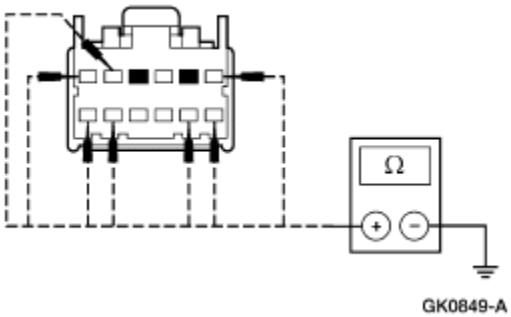
- **Are the resistances less than 5 ohms?**

→ **Yes**
GO to B5 .

→ **No**
REPAIR the circuit(s) in question. TEST the system for normal operation.

B5 CHECK CIRCUITS BETWEEN THE COMPONENTS FOR SHORT TO GROUND

1



1 Measure the resistances between the CD changer C2005 and ground as follows:

CD Changer C2005	Circuit
Pin 1	690 (GY)
Pin 2	856 (VT)
Pin 6	832 (LB/PK)
Pin 7	799 (OG/BK)
Pin 8	798 (LG/RD)

Pin 11	1068 (LG/BK)
Pin 12	833 (TN)

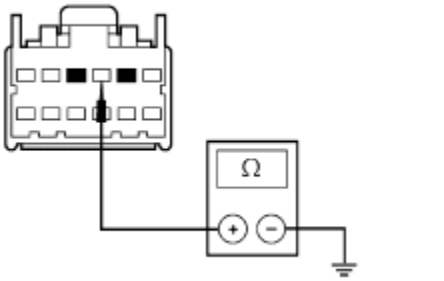
- **Are the resistances greater than 10,000 ohms?**

→ **Yes**
GO to B6 .

→ **No**
REPAIR the circuits(s) in question. TEST the system for normal operation.

B6 CHECK GROUND AT CD CHANGER

1



1 Measure the resistance between CD changer C2005 Pin 4, Circuit 694 (BK/LG), harness side and ground.

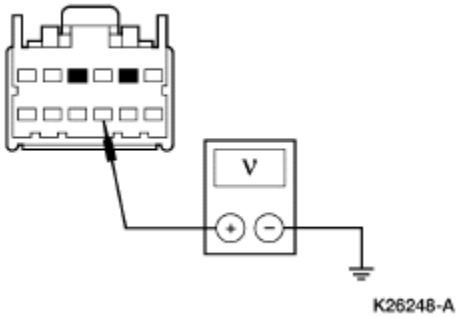
- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to B7 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

B7 CHECK VOLTAGE TO CD CHANGER

1



1 Measure the voltage between CD changer C2005 Pin 10, Circuit 797 (LG/VT), harness side and ground.

- **Is the voltage greater than 10 volts?**

	→ **Yes** REMOVE the CD changer and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST C: NOISY RECEPTION

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 CHECK ANTENNA GROUND	
	1 Measure the resistance between antenna base and the battery ground cable. • **Is the resistance less than 5 ohms?** → **Yes** GO to C3 . → **No** GO to C2 .
C2 CHECK ANTENNA CABLE CONNECTIONS	
1 	1 Check the antenna connections including the extension cable. 2 Check to make sure the antenna is securely mounted to the vehicle body at ground points. • **Are the connections clean, secure and in metal-to-metal contact?** → **Yes** GO to C3 . → **No** CLEAN and SECURE the antenna connections as needed. TEST the system for normal operation. If equipped with power antenna, GO to Pinpoint Test J .
C3 CHECK SUPPRESSION EQUIPMENT/MOUNTING AND CONNECTING CIRCUITS	
	1 Check all required suppression equipment and the radio frequency interference suppression bond. Refer to Section 415-01 . 2 Check the radio receiver hood bonding strap for integrity, cleanliness and metal-to-metal contact. 3 **NOTE:** The capacitor mounting points are used to complete the electrical circuit and must be mounted securely to clean surfaces.

	Check the mounting and connecting circuits of the radio ignition interference capacitor for integrity, cleanliness and metal-to-metal contact. • **Are the connections clean, secure and in metal-to-metal contact?** → **Yes** GO to C4 . → **No** CLEAN, SECURE and INSTALL new suppression equipment as necessary. TEST the system for normal operation.
C4 CHECK RADIO IGNITION INTERFERENCE CAPACITOR	
1  2 Check the operation of the radio ignition interference capacitor by replacing it with a known good component. 3  4 Turn the radio on and check the radio reception. • **Is the noise eliminated?** → **Yes** INSTALL a new radio ignition interference capacitor. TEST the system for normal operation. → **No** GO to C5 .
C5 CHECK GENERATOR	
1  2 Check the generator by disconnecting the wiring harness from the voltage regulator. 3  4 Turn the radio on and check the radio reception. • **Is the noise eliminated?**

→ **Yes**
INSTALL a new generator. REFER to Section 414-02 . TEST the system for normal operation.

→ **No**
GO to C6 .

C6 CHECK IGNITION CIRCUITS

1

2 Check the ignition circuits for correct routing, grounding and integrity of connections.

3 Check the spark plugs and the spark plug wires.

- **Are the ignition components OK?**

→ **Yes**
GO to C7 .

→ **No**
REPAIR the ignition system as required. TEST the system for normal operation.

C7 SUBSTITUTE ANTENNA

1 Substitute a known good antenna. Ground the antenna base to an unpainted metal surface on the vehicle.

2

3 Verify the operation of the audio unit.

- **Is the noise eliminated?**

→ **Yes**
INSTALL a new antenna. TEST the system for normal operation.

→ **No**
GO to C8 .

C8 SUBSTITUTE ANTENNA EXTENSION CABLE

1

2 Substitute a known good antenna extension cable.

3

4 Verify the operation of the audio unit.

- **Is the noise eliminated?**

→ **Yes**
INSTALL a new antenna extension cable. TEST the system for normal operation.

→ **No**
GO to C9 .

C9 SUBSTITUTE AUDIO UNIT

1

2 Substitute a known good audio unit.

3

4 Verify the operation of the audio unit.

- **Is the noise eliminated?**

→ **Yes**
REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation.

→ **No**
GO to C10 .

C10 REPOSITION COMPONENTS

1

2 Determine if the noise can be eliminated by repositioning the antenna extension cable, radio speaker circuits or radio power feed circuits away from other circuits and/or brackets.

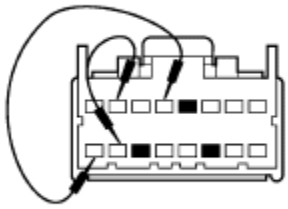
3

4 Verify the operation of the audio unit.

	• **Is the noise eliminated?** → **Yes** Permanently REPOSITION the components as needed. TEST the system for normal operation. → **No** GROUND various parts of the vehicle to the frame using a jumper cable. (For example: engine, fenders, quarter panels, stone deflectors, body sheet metal.) When noise is eliminated, PROVIDE a permanent ground where required. TEST the system for normal operation.

PINPOINT TEST D: NO SOUND FROM ONE OR MORE OF THE SPEAKERS — NOT ALL SPEAKERS

CONDITIONS	DETAILS/RESULTS/ACTIONS
D1 CARRY OUT SPEAKER WALK-AROUND TEST — ISOLATE INOPERATIVE SPEAKER	
1 	2 Turn on the radio. 3 Carry out the Speaker Walk-Around Test by pressing Preset Buttons 3 and 6 simultaneously. • **Are all speakers without sound?** → **Yes** GO to Pinpoint Test E . → **No** GO to D2 .
D2 CHECK RADIO SPEAKER — SUBSTITUTE WITH A KNOWN GOOD SPEAKER	
1  3 	2 Substitute affected speaker with a known good component. 4 Turn on the radio.

	• **Is the radio speaker operational?** → **Yes** INSTALL a new radio speaker. TEST the system for normal operation. → **No** If rear speaker is inoperative and the vehicle is equipped with RICP, GO to D3 . If front speaker is inoperative or if the vehicle is not equipped with RICP, GO to D6 .
D3 CHECK RICP — BYPASS THE RICP	
1  2  RICP C2003 3  GK0577-A 4 	3 Connect a 10A fused jumper wire between RICP C2003 Pin 4, Circuit 802 (OG/RD), and RICP C2003 Pin 9, Circuit 825 (TN/LG); and between RICP C2003 Pin 2, Circuit 800 (GY/LB), and RICP C2003 Pin 10, Circuit 827 (TN/WH). • **Is the affected radio speaker operational?** → **Yes** INSTALL a new RICP. TEST the system for normal operation. → **No** GO to D4 .
D4 CHECK CIRCUITS BETWEEN AUDIO UNIT AND RICP	

1

Audio Unit

2

3 Measure the resistances between audio unit C256 and RICP C2003; and between audio unit C256 and ground as follows:

Circuit	Audio Unit C256 Pin	RICP C2003 Pin
800 (GY/LB)	12	2
801 (TN/YE)	13	1
802 (OG/RD)	5	4
803 (BN/PK)	6	3

- **Are the resistances less than 5 ohms between the audio unit and the RICP, and greater than 10,000 ohms between the audio unit and ground?**

→ **Yes**
GO to D5 .

→ **No**
REPAIR the circuit(s) in question. TEST the system for normal operation.

D5 CHECK CIRCUITS BETWEEN RICP AND SPEAKER(S)

1 Measure the resistances between the affected speaker(s) and RICP C2003; and between RICP C2003 and ground as follows:

RICP C2003 Pin	Speaker
9	RR
10	LR
1	LR
3	RR

- **Are the resistances less than 5 ohms between radio speaker(s) and the RICP, and greater than 10,000 ohms between the RICP and ground?**

→ **Yes**
REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation.

→ **No**
REPAIR the circuit(s) in question. TEST the system for normal operation.

D6 CHECK CIRCUITS BETWEEN AUDIO UNIT AND AFFECTED SPEAKER(S)

1 Measure the resistances between audio unit C256 and affected speakers; and between audio unit C256 and ground as follows:

Front Speakers

Audio Unit C256 Pin	Speaker
7	RF
8	RF
14	LF
15	LF

Rear Speakers (Without RICP)

Audio Unit C256 Pin	Speaker
5	RR
6	RR
12	LR
15	LR

- **Are the resistances less than 5 ohms between the radio speaker(s) and audio unit, and greater than 10,000 ohms between the audio unit and ground?**

→ **Yes**
REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation.

→ **No**
REPAIR the circuit(s) in question. TEST the system for normal operation.

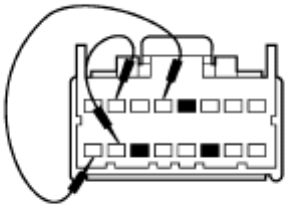
PINPOINT TEST E: NO SOUND FROM ALL OF THE SPEAKERS

CONDITIONS	DETAILS/RESULTS/ACTIONS
E1 CHECK FOR AUDIO UNIT OPERATION	
1 	2 Turn the audio unit on. • **Does the audio unit display illuminate?** → **Yes** GO to E2 . → **No** GO to Pinpoint Test A .
E2 CHECK THE SPEAKER OPERATION	
	1 CARRY OUT the Speaker Walk-Around Test. • **Are all radio speakers inoperative?** → **Yes** REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation. → **No** GO to Pinpoint Test D .

PINPOINT TEST F: POOR QUALITY SOUND FROM ONE OR MORE SPEAKERS (NOT ALL SPEAKERS)

CONDITIONS	DETAILS/RESULTS/ACTIONS
F1 CHECK SOUND QUALITY	
1 	2 Turn on the radio. 3 Carry out the Speaker Walk-Around Test by pressing Preset Buttons 3 and 6 simultaneously. • **Do all radio speakers have poor sound quality?**

	→ **Yes** REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation. → **No** GO to F2.
F2 TEST SPEAKER	
1  3 	2 Substitute the affected radio speaker with a known good component. 4 Turn on the radio. • **Is the radio speaker sound quality OK?** → **Yes** INSTALL a new radio speaker. TEST the system for normal operation. → **No** If rear speaker is distorted and the vehicle is equipped with RICP, GO to F3. If front speaker is distorted or if the vehicle is not equipped with RICP, GO to F6.
F3 CHECK RICP	
1  2  RICP C2003 3	3 Connect a 10A fused jumper wire between RICP C2003 Pin 4, Circuit 802 (OG/RD), and RICP C2003 Pin 9, Circuit 825 (TN/LG); and between RICP C2003 Pin 2, Circuit 800 (GY/LB), and RICP C2003 Pin 10, Circuit 827 (TN/WH).



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4

- **Is the affected radio speaker quality OK?**

→ **Yes**
INSTALL a new RICP; REFER to Section 415-01 . TEST the system for normal operation.

→ **No**
GO to F4 .

F4 CHECK CIRCUITS BETWEEN AUDIO UNIT AND RICP

1

2

Audio Unit

3 Measure the resistances between audio unit C256 and RICP C2003; and between audio unit C256 and ground as follows:

Circuit	Audio Unit C256 Pin	RICP C2003 Pin
800 (GY/LB)	12	2
801 (TN/YE)	13	1
802 (OG/RD)	5	4
803 (BN/PK)	6	3

- **Are the resistances less than 5 ohms between the audio unit and RICP and greater than 10,000 ohms between the audio unit and ground?**

→ **Yes**
GO to F5 .

→ **No**
REPAIR the circuit(s) in question. TEST the system for normal operation.

F5 CHECK CIRCUITS BETWEEN RICP AND SPEAKER(S)

1 Measure the resistances between the affected radio speaker(s) and RICP C2003; and between RICP C2003 and ground as follows:

RICP C2003 Pin	Radio Speaker
9	RR
10	LR
1	LR
3	RR

- **Are the resistances less than 5 ohms between the radio speaker(s) and the RICP and greater than 10,000 ohms between the RICP and ground?**

→ **Yes**
REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation.

→ **No**
REPAIR the circuit(s) in question. TEST the system for normal operation.

F6 CHECK CIRCUITS BETWEEN AUDIO UNIT AND AFFECTED SPEAKER(S)

1 Measure the resistances between audio unit C256 and affected radio speakers; and between audio unit C256 and ground as follows:

Front radio speakers

Audio Unit C256 Pin	Radio Speaker
7	RF
8	RF
14	LF

15	LF

Rear Radio Speakers (Without RICP)

Audio Unit	Radio Speaker
5	RR
6	RR
12	LR
15	LR

- **Are the resistances less than 5 ohms between the radio speaker(s) and the audio unit and greater than 10,000 ohms between the audio unit and ground?**

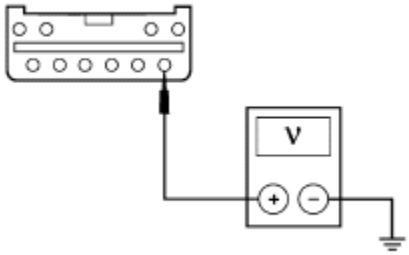
→ **Yes**
REMOVE the audio unit and SEND it to an authorized Ford Audio System repair facility. TEST the system for normal operation.

→ **No**
REPAIR the circuit(s) in question. TEST the system for normal operation.

PINPOINT TEST G: POOR QUALITY/DISTORTED SOUND FROM ALL SPEAKERS

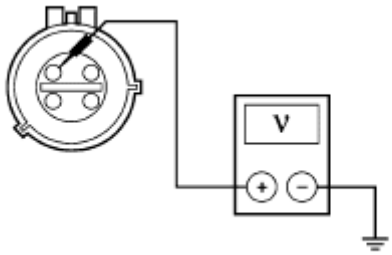
CONDITIONS	DETAILS/RESULTS/ACTIONS
G1 CHECK POOR SOUND QUALITY IN ALL SPEAKERS	
1 	2 Turn on the radio. 3 Carry out the Speaker Walk-Around Test by pressing Preset Buttons 3 and 6 simultaneously. • **Is there poor quality or distortion in all radio speakers?** → **Yes** REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation. → **No** GO to Pinpoint Test F .

PINPOINT TEST H: LOUD POPS WHEN CYCLING THE IGNITION SWITCH

CONDITIONS	DETAILS/RESULTS/ACTIONS
H1 CHECK SUBWOOFER ENABLE LINE — CIRCUIT 173 (DG/VT) FOR SHORT TO BATTERY POWER	
1  Subwoofer Amplifier C333	
2  GK5296-A	2 Measure the voltage between subwoofer amplifier C333 Pin 1, Circuit 173 (DG/VT), harness side and ground. • **Is voltage present?** → **Yes** REPAIR the circuit. TEST the system for normal operation. → **No** REMOVE the subwoofer amplifier and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation.

PINPOINT TEST I: THE POWER ANTENNA IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
I1 CHECK CIRCUIT 451 (LB/YE)	
1  Antenna C362	
2 	
3	3 Measure the voltage between antenna C362



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Pin 1, Circuit 451 (LB/YE), harness side and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to I2 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

I2 CHECK CIRCUIT 1000 (RD/BK)

1

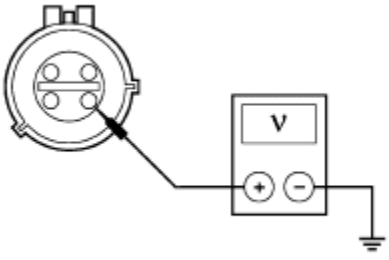
2

Starter Relay C127

3

3 Hold the ignition switch in the START position.

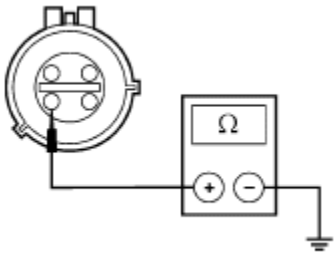
4

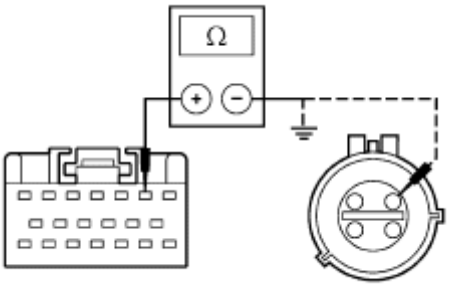


GK5293-A

4 Measure the voltage between antenna C362 Pin 4, Circuit 1000 (RD/BK), harness side and ground.

5

Starter Relay C127	• **Is the voltage greater than 10 volts?** → **Yes** GO to I3 . → **No** REPAIR the circuit. TEST the system for normal operation.
I3 CHECK GROUND CIRCUIT 57 (BK)	
1  2  GK5294-A	2 Measure the resistance between antenna C362 Pin 3, Circuit 57 (BK), harness side and ground. • **Is the resistance less than 5 ohms?** → **Yes** GO to I4 . → **No** REPAIR the circuit. TEST the system for normal operation.
I4 CHECK CIRCUIT 747 (OG/LB)	
1  Audio Unit C228 2	2 Measure the resistance between audio unit C228 Pin 2, Circuit 747 (OG/LB), harness side and antenna C362 Pin 2, Circuit 747 (OG/LB), harness side; and between audio unit C228 Pin 2, Circuit 747 (OG/LB), harness side and ground.



GK7147-A

- **Is the resistance less than 5 ohms between the audio unit and the antenna and greater than 10,000 ohms between the audio unit and ground?**

→ **Yes**
GO to I5 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

I5 CHECK THE AUDIO UNIT

1 Substitute the audio unit with a known good component.

2

Antenna C362

3

Audio Unit C228

4

5 Turn the radio on for 10 seconds, and then off.

- **Is the antenna operational?**

→ **Yes**
REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation.

	→ **No** INSTALL a new power antenna; REFER to Section 415-02 . TEST the system for normal operation.

PINPOINT TEST J: THE AUDIO UNIT IS INOPERATIVE/DOES NOT OPERATE CORRECTLY — RESPONSE TIME BETWEEN PRESSING ANY OF THE AUDIO CONTROL BUTTONS AND SYSTEM RESPONSE IS MORE THAN TWO SECONDS

CONDITIONS	DETAILS/RESULTS/ACTIONS
J1 DETERMINE IF REAR INTEGRATED CONTROL PANEL (RICP) IS LOCKING UP THE NETWORK	
1  2  RICP C2003 3 	4 Rotate the front control unit volume knob. • **Is the time between when the volume knob is rotated and the response (sound is louder) greater than two seconds?** → **Yes** GO to J2 . → **No** INSTALL a new RICP; REFER to Section 415-01 . TEST the system for normal operation.
J2 DETERMINE IF DIGITAL AUDIO COMPACT DISC CHANGER IS LOCKING UP THE NETWORK	
1  2  CD Changer	

C2005 3 	4 Rotate the front control unit volume knob. • **Is the time between when the volume knob is rotated and the response (sound is louder) greater than two seconds?** → **Yes** REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation. → **No** REMOVE the CD changer and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation.

PINPOINT TEST K: THE AUXILIARY AUDIO BUTTONS ARE INOPERATIVE — REAR INTEGRATED CONTROL PANEL (RICP)

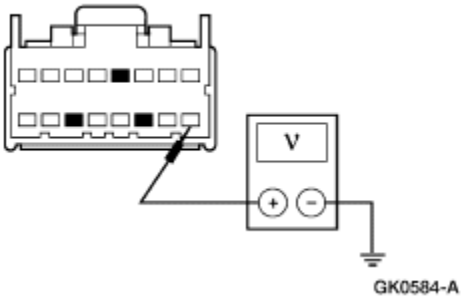
CONDITIONS	DETAILS/RESULTS/ACTIONS
K1 CHECK THAT THE RICP IS ENABLED	
1 	2 Turn the audio unit on. 3 Press Preset Buttons 3 and 5 simultaneously to enable the RICP. The headphone symbol should be shown on the audio unit display. 4 Operate the audio unit from the RICP. • **Does the RICP operate correctly?** → **Yes** The system is operating OK. INFORM the customer of the RICP enable/disable feature by pressing Preset Buttons 3 and 5 simultaneously. → **No** GO to K2 .
K2 CHECK POWER FEED TO RICP — CIRCUIT 797 (LG/VT)	
1	

2

RICP C2003

3

4



4 Measure the voltage between RICP C2003 Pin 16, Circuit 797 (LG/VT), harness side and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to K3 .

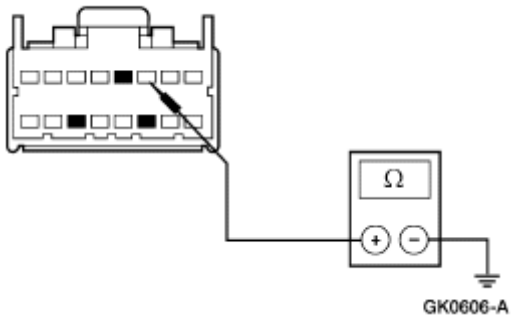
→ **No**
REPAIR the circuit. TEST the system for normal operation.

K3 CHECK CIRCUIT 694 (BK/LG) FOR OPEN

1

2

2 Measure the resistance between RICP C2003 Pin 6, Circuit 694 (BK/LG), harness side and ground.



- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to K4 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

K4 CHECK CIRCUIT 1068 (LG/BK) FOR OPEN

1

2

Audio Unit

3

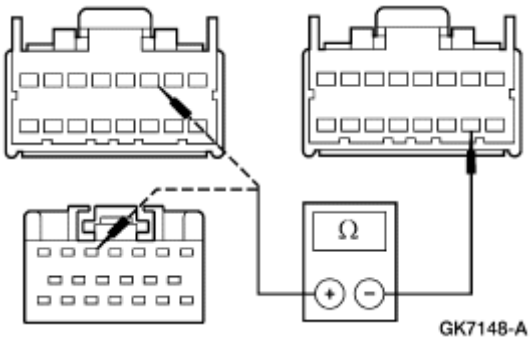
CD Changer C2005

4

RICP C2003

5

5 Measure the resistance between audio unit C228 Pin 5, Circuit 1068 (LG/BK), harness side and RICP C2003 Pin 15, Circuit 1068 (LG/BK), harness side.



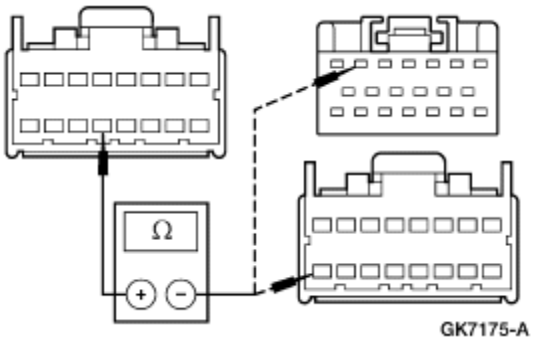
- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to K5 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

K5 CHECK CIRCUIT 832 (LB/PK) FOR OPEN

1



1 Measure the resistance between audio unit C228 Pin 6, Circuit 832 (LB/PK), harness side and RICP C2003 Pin 12, Circuit 832 (LB/PK), harness side.

- **Is the resistance less than 5 ohms?**

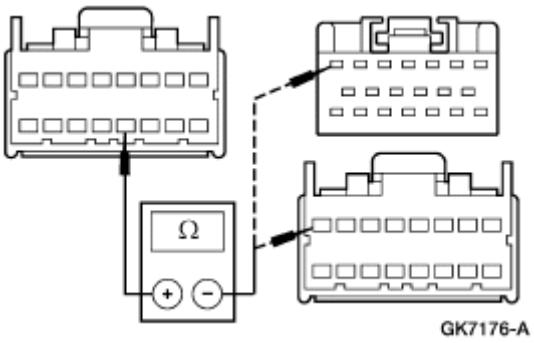
→ **Yes**
GO to K6 .

→ **No**
REPAIR the circuit. TEST the system for normal operation.

K6 CHECK CIRCUIT 833 (TN) FOR OPEN

1

1 Measure the resistance between audio unit C228 Pin 7, Circuit 833 (TN), harness side and RICP C2003 Pin 13, Circuit 833 (TN), harness side.

	• **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new RICP; REFER to Section 415-01 . TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST L: NO AUXILIARY HEADPHONE AUDIO

CONDITIONS	DETAILS/RESULTS/ACTIONS
L1 CHECK THE AUXILIARY HEADPHONE OPERATION	
1 	2 Turn the audio unit on. 3 Press Preset Buttons 3 and 5 simultaneously to enable the RICP. The headphone symbol should be shown on the audio unit display. 4 Plug a known good headphone into the headphone jack and press the speaker ON/OFF button. Refer to the owner literature. • **Does the headphone operate correctly?** → **Yes** The system is operating OK. INFORM the customer of the speaker ON/OFF button on the RICP. REFER to the Owner's/Audio Guide. → **No** GO to L2 .
L2 CHECK REAR SPEAKERS	
1	

2 Turn on the audio unit.

3 Carry out the Speaker Walk-Around Test by pressing Preset Buttons 3 and 6 simultaneously.

- **Do the rear speakers operate correctly?**

→ **Yes**
INSTALL a new RICP; REFER to Section 415-01 . TEST the system for normal operation.

→ **No**
GO to Pinpoint Test D .

PINPOINT TEST M: THE AUXILIARY AUDIO BUTTONS ARE INOPERATIVE — STEERING WHEEL CONTROL SWITCH(ES)

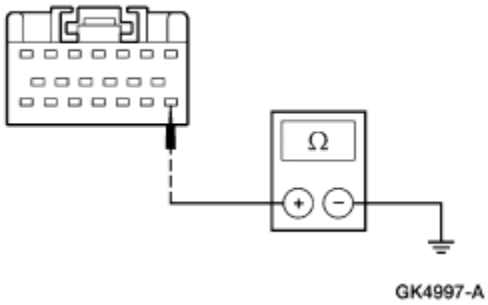
CONDITIONS	DETAILS/RESULTS/ACTIONS
M1 CHECK THE STEERING WHEEL CONTROL SWITCH CIRCUITS	

1

2

Audio Unit

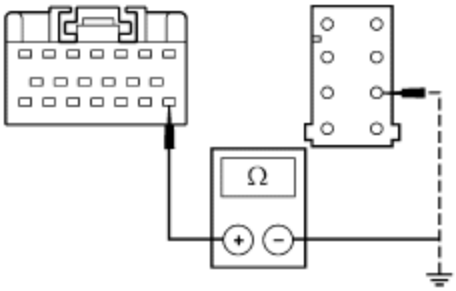
3

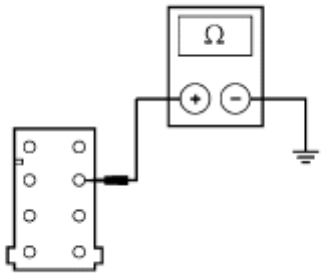


3 Measure the resistance between audio unit C228 Pin 14, Circuit 595 (LB/RD), harness side and ground while pressing the steering wheel control switches as follows:

Switch	Resistance Range
VOL Down	69.27-77.38 ohms
VOL Up	198.5-217.61 ohms
NEXT	419.4-467.5 ohms
MODE	848.1-945.1 ohms
No Buttons Pressed	4,560-5,080 ohms

- **Are the resistances within specification?**

	→ **Yes** REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system after the repair. → **No** GO to M2.
M2 CHECK CIRCUIT 595 (LB/RD) FOR OPEN OR SHORT TO GROUND	
1  Air Bag Sliding Contact C220 2  Audio Unit 3  GK5790-A	3 Measure the resistances between audio unit C228 Pin 14, Circuit 595(LB/RD), harness side and air bag sliding contact C220 Pin 6, Circuit 595 (LB/RD), harness side; and between audio unit C228 Pin 14, Circuit 595 (LB/RD), harness side and ground. • **Is the resistance less than 5 ohms between the audio unit and the air bag sliding contact and greater than 10,000 ohms between the audio unit and ground?** → **Yes** GO to M3. → **No** REPAIR the circuit. TEST the system for normal operation.
M3 CHECK GROUND CIRCUIT 848 (DG/OG)	
1	1 Measure the resistance between air bag sliding contact C220 Pin 4, Circuit 848 (DG/OG), harness side and ground.



- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to M4 .

→ **No**
GO to M7 .

M4 CHECK THE SIGNAL CIRCUIT IN STEERING WHEEL CONTROL SWITCH HARNESS

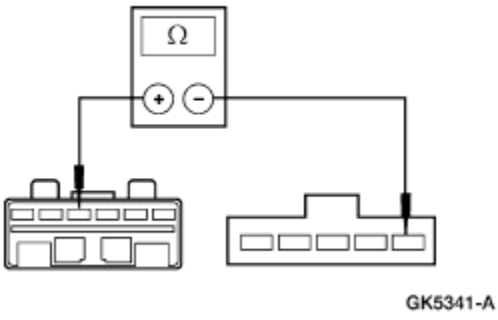
1 Deactivate the air bag system; refer to Section 501-20B .

2

Steering Wheel Control Switch Harness

3 Measure the resistance between steering wheel control switch connector Pin 5 (YE) and steering wheel control switch harness connector Pin 3 (YE).

3



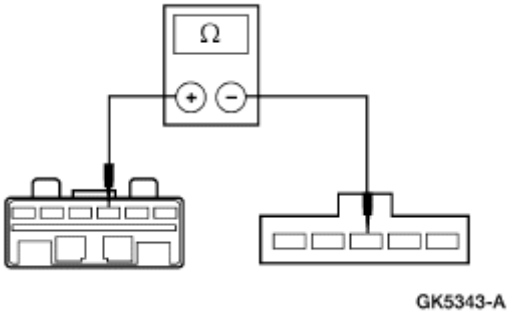
- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to M5 .

→ **No**
INSTALL a new steering wheel control switch harness. TEST the system for normal operation.

M5 CHECK GROUND CIRCUIT IN STEERING WHEEL CONTROL SWITCH HARNESS

1 Measure the resistance between steering



wheel control switch connector Pin 3 (BK) and steering wheel control switch harness connector Pin 4 (BK).

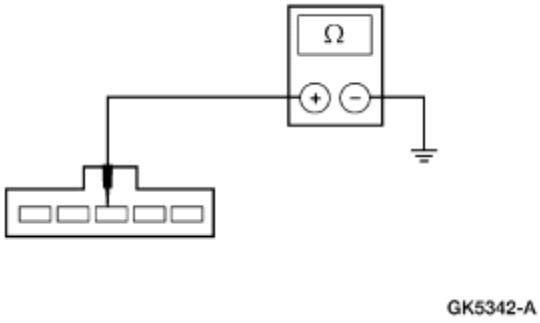
- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to M6 .

→ **No**
INSTALL a new steering wheel control switch harness. TEST the system for normal operation.

M6 CHECK GROUND THROUGH THE AIR BAG SLIDING CONTACT

2



1 Reconnect the steering wheel control switch harness to the air bag sliding contact (14A664).

2 Measure the resistance between steering wheel control switch harness connector Pin 3 (BK) and ground.

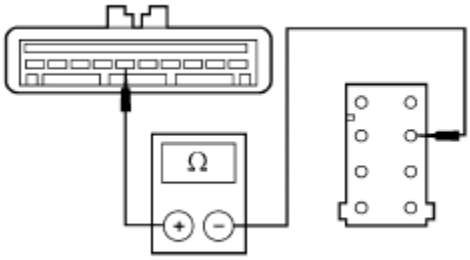
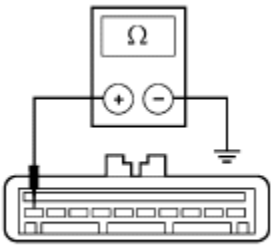
- **Is the resistance less than 5 ohms?**

→ **Yes**
INSTALL a new steering wheel control switch (es). TEST the system for normal operation.

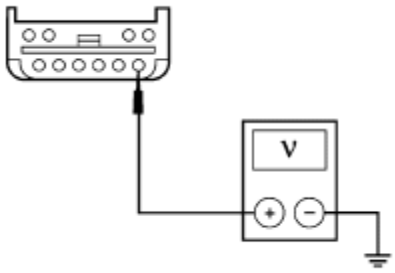
→ **No**
INSTALL a new air bag sliding contact; REFER to Section 501-20B . TEST the system for normal operation.

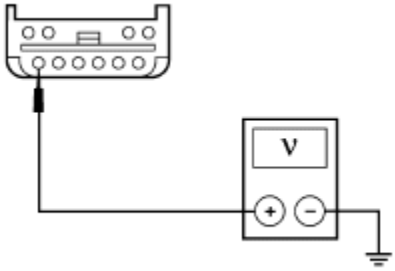
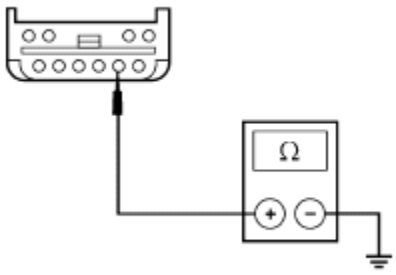
M7 CHECK GROUND CIRCUIT 848 (DG/OG)

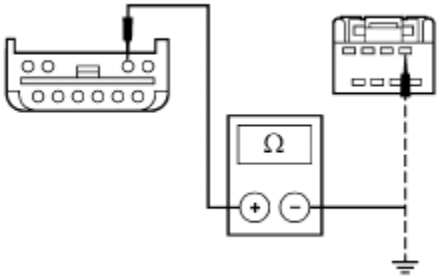
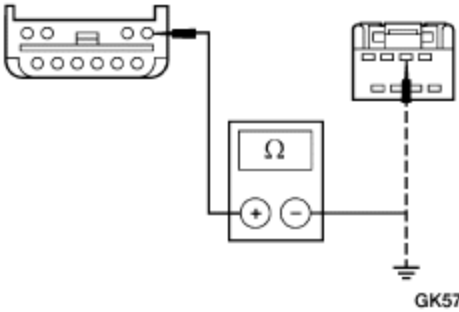
1

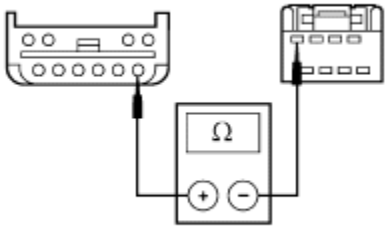
 Speed Control Servo C171 2  GK5792-A	2 Measure the resistance between air bag sliding contact C220 Pin 4, Circuit 848 (DG/OG), harness side and speed control servo C171 Pin 6, Circuit 848 (DG/OG), harness side. • **Is the resistance less than 5 ohms?** → **Yes** GO to M8 . → **No** REPAIR the circuit. TEST the system for normal operation.
M8 CHECK GROUND TO SERVO	
1  GK6978-A	1 Measure the resistance between speed control servo C171 Pin 1, Circuit 57 (BK), harness side and ground. • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new speed control servo (9C735); REFER to Section 310-03 . TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST N: THE SUBWOOFER IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
N1 CARRY OUT THE SPEAKER WALK-AROUND TEST — CHECK SUBWOOFER OPERATION	
1 	2 Turn on the audio unit. 3 Carry out the Speaker Walk-Around Test by pressing Preset Buttons 3 and 6 simultaneously. • **Does the subwoofer sound operate correctly?** → **Yes** The system is operating OK. → **No** GO to N2 .
N2 CHECK CIRCUIT 173 (DG/VT)	
1  2  Subwoofer Amplifier C333 3  4  GK4985-A	4 Measure the voltage between subwoofer amplifier C333 Pin 1, Circuit 173 (DG/VT), harness side and ground. • **Is the voltage greater than 4.1 volts?**

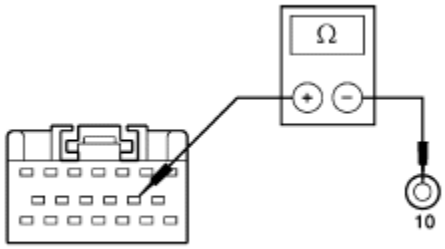
	→ **Yes** GO to N3 . → **No** GO to N7 .
N3 CHECK CIRCUIT 797 (LG/VT)	
1  2  GK5793-A	2 Measure the voltage between subwoofer amplifier C333 Pin 1, Circuit 797 (LG/VT), harness side and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to N4 . → **No** REPAIR the circuit. TEST the system for normal operation.
N4 CHECK CIRCUIT 694 (BK/LG)	
1  GK5794-A	1 Measure the resistance between subwoofer amplifier C333 Pin 5, Circuit 694 (BK/LG), harness side and ground. • **Is the resistance less than 5 ohms?** → **Yes** GO to N5 . → **No**

	REPAIR the circuit. TEST the system for normal operation.
N5 CHECK CIRCUIT 167 (OG/BN)	
1  Audio Unit C215 2  	2 Measure the resistances between subwoofer amplifier C333 Pin 8, Circuit 167 (OG/BN), harness side and audio unit C215 Pin 2, Circuit 167 (OG/BN), harness side; and between subwoofer amplifier C333 Pin 8, Circuit 167 (OG/BN), harness side and ground. • **Is the resistance less than 5 ohms between the subwoofer amplifier and the audio unit and greater than 10,000 ohms between the subwoofer amplifier and ground?** → **Yes** GO to N6 . → **No** REPAIR the circuit. TEST the system for normal operation.
N6 CHECK CIRCUIT 168 (RD/BK)	
1  	1 Measure the resistances between subwoofer amplifier C333 Pin 7, Circuit 168 (RD/BK), harness side and audio unit C215 Pin 1, Circuit 168 (RD/BK), harness side; and between subwoofer amplifier C333 Pin 7, Circuit 168 (RD/BK), harness side and ground. • **Is the resistance less than 5 ohms between the subwoofer amplifier and the audio unit and greater than 10,000 ohms between the subwoofer amplifier and ground?**

	→ **Yes** REMOVE the subwoofer amplifier and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.
N7 CHECK CIRCUIT 173 (DG/VT) FOR OPEN	
1  GK6979-A	1 Measure the resistance between subwoofer amplifier C333 Pin 1, Circuit 173 (DG/VT), harness side and audio unit C215 Pin 4, Circuit 173 (DG/VT), harness side. • **Is the resistance less than 5 ohms?** → **Yes** REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST O: THE AUDIO UNIT DOES NOT OPERATE CORRECTLY — SPEED SENSITIVE VOLUME (SSV)

CONDITIONS	DETAILS/RESULTS/ACTIONS
O1 CHECK VEHICLE SPEEDOMETER	
1 	2 Turn on the audio unit. 3 Press the volume control button for three seconds, then release. Speed sensitive volume (SSV) setting should be displayed. To change the SSV setting, press select button < or >. Set the SSV setting to 7 (maximum). 4 Drive the vehicle and observe the vehicle

	speedometer. • **Does the speedometer operate correctly?** → **Yes** GO to O2 . → **No** REFER to Section 413-01 .
O2 CHECK SSV SPEED SIGNAL CIRCUIT 679 (GY/BK)	
1  2  Audio Unit C228 3  Anti-Lock Brake Module C186 5  GK7188-A	4 Connect the ABS Breakout Box Adapter between the anti-lock brake module C186 and the EEC-IV 60-Pin Breakout Box. 5 Measure the resistance between audio unit C228 Pin 9, Circuit 679 (GY/BK), harness side and the EEC-IV 60-Pin Breakout Box Pin 10, Circuit 679 (GY/BK). • **Is the resistance less than 5 ohms?** → **Yes** REMOVE the audio unit and SEND it to an authorized Ford audio system repair facility. TEST the system for normal operation. → **No**

	REPAIR the circuit. TEST the system for normal operation.

Torque Specifications

Description	Nm	lb-in
Console Compartment Trim Panel Screw	2-3	17-26
Console Glove Compartment Door Hinge Screw	2-3	17-26
Console Rear Panel Screw	1.2-1.8	11-16
Intake Manifold Ground Strap Nut	7-9	62-80
Radio Amplifier Bracket Bolt	10-14	88-124
Radio Amplifier Bracket Nut	7-9	62-80
Radio Amplifier Bracket Screw	7-10	62-88
Radio Amplifier Mounting Screw	7-10	62-88
Radio Chassis Rear Support Nut	3.5-4	31-35
Rear Integrated Control Panel Screws	2-3	17-26
Wiper Motor Stud Ground Strap Nut	7-9	62-80
Rear Radio Chassis Support	3.5-4	31-35
Battery Ground Cable Screw	7-10	62-89
Cylinder Head Ground Strap Bolt	8.9-12.1	79-107

Audio System

The audio system consists if the following components.

- Rear integrated control panel (RICP)
- Steering wheel controls (SWC)
- Audio unit
- Digital audio compact disc player (18D806)

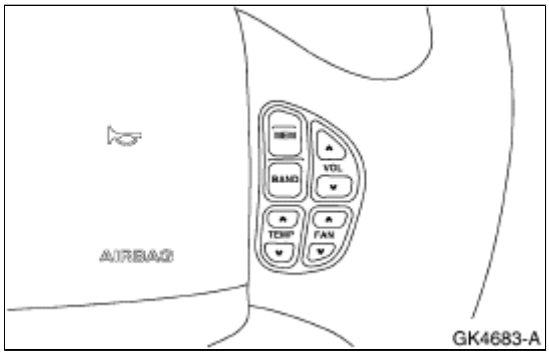
There are four audio systems available:

- the M100 AM/FM cassette radio.
- the M100 AM/FM/CD.
- the DM100i AM/FM/Cassette/CD (premium).
- the T100i DM AM/FM/Cassette/CD (premium/audiophile).

The RICP audio controls are activated and deactivated by pressing the front chassis radio memory buttons "3" and "5" simultaneously.

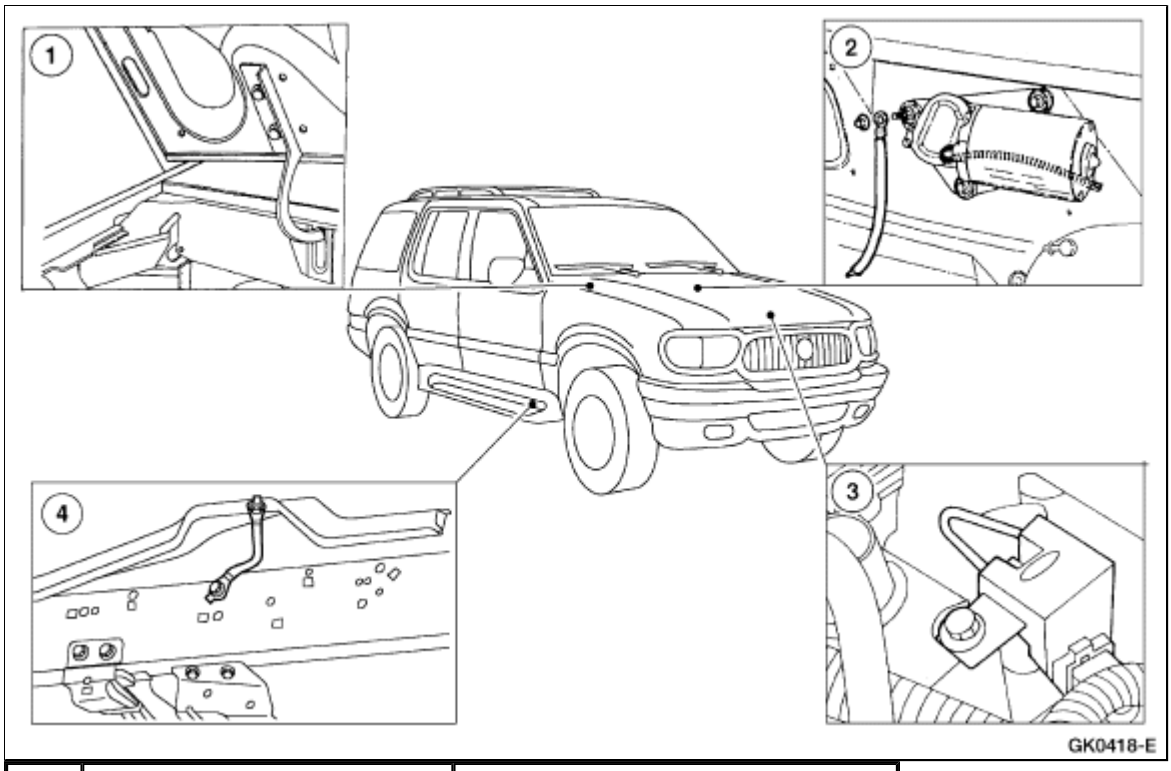
The audio controls of the RICP allow the rear passengers to control volume, station, mode, front chassis radio memory presets, and speaker or headphone selection. The mini-headphone jacks are also located on the panel. Refer to the Audio Guide for more information.

Steering Wheel Integrated Audio Controls



The audio controls on the steering wheel allow the driver to control volume, AM/FM band, and memory presets. The audio controls are located on the right side of the steering wheel.

Radio Frequency Interference Suppression Equipment



Item	Part Number	Description
1	—	Ground strap (part of hood hinge)
2	14303 (4.0L) 19A095 (5.0L)	Ground strap-bulkhead to engine
3	18801	Capacitor
4	19A095	Ground strap-body to frame

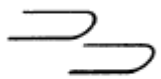
The radio suppression equipment reduces interference transmitted through the radio speakers by the engine ignition and electrical systems.

Audio System

Refer to Section 415-00 .

Audio Unit

Special Tool(s)

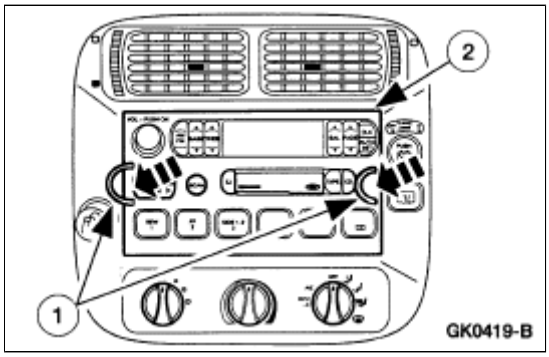
 ST1445-A	Radio Removing Tool 415-001 (T87P-19061-A)

Removal

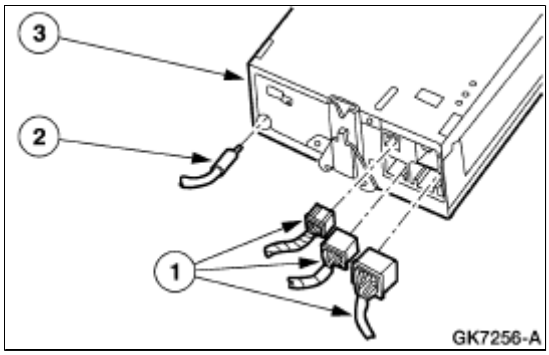
1. **NOTE:** The removal and installation procedures apply to all original equipment instrument panel (04320) mounted radio chassis (18806).

   Disconnect the battery ground cable (14301).

2. Remove the radio chassis.
   1. Insert Radio Removing Tool into the radio face plate and release the radio retaining clips.
   2. Pull outward on Radio Removing Tool to remove the radio chassis from the instrument panel.



3. Remove the radio.
   1. Disconnect the electrical connectors.
   2. Disconnect the radio antenna lead in cable.
   3. Remove the radio.



Installation

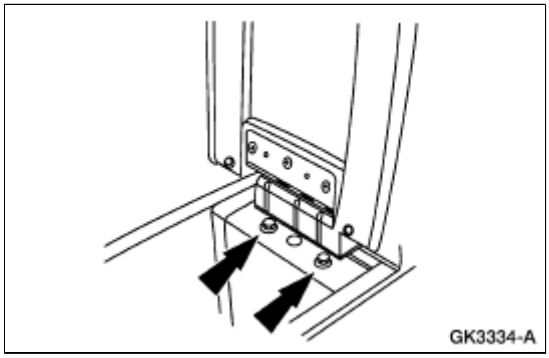
1. **NOTE:** When the battery (10655) is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   To install, reverse the removal procedure.

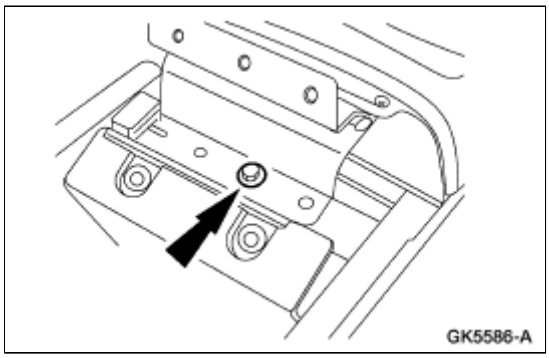
Auxiliary Control —Rear Integrated Control Panel

Removal

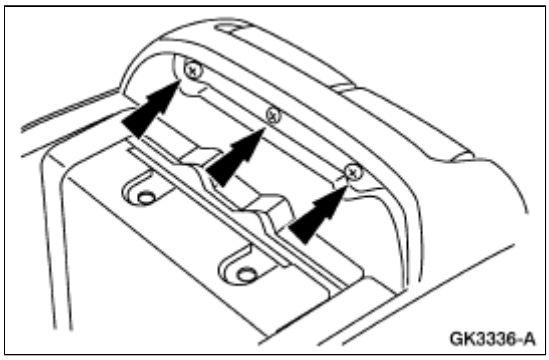
1. Disconnect the battery ground cable (14301).
2. Remove the console compartment trim panel screws.



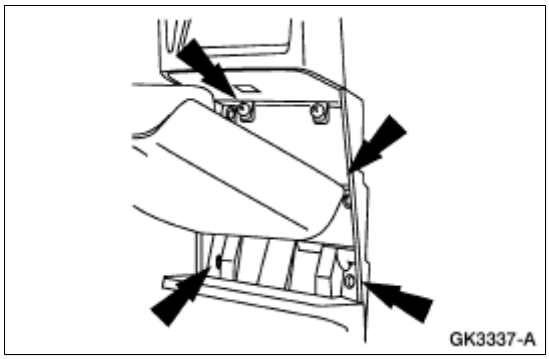
3. Remove the console compartment door hinge screw.



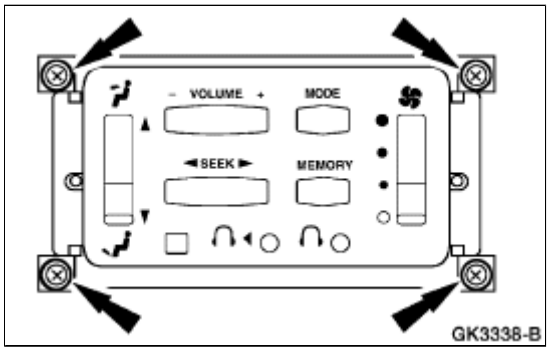
4. Remove the console rear panel screws at the top of the panel.



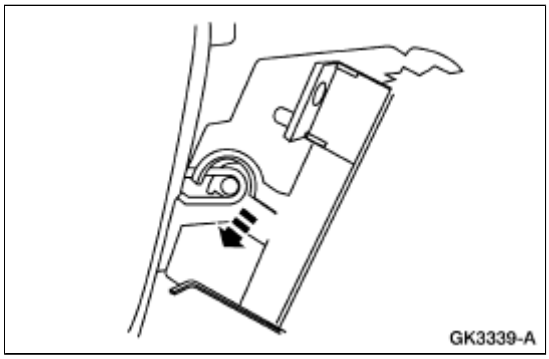
5. Remove the console rear panel screws at the cupholder.



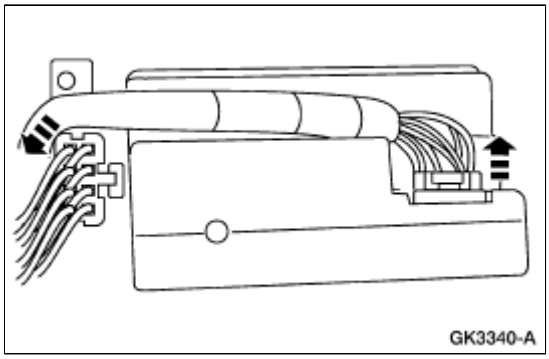
6. Remove the rear integrated control panel screws.



7. Disconnect the floor/panel control arm at the control head.



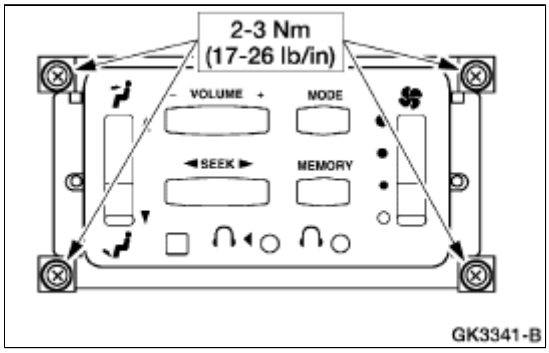
8. Disconnect the rear blower motor control and rear radio controls electrical connectors.

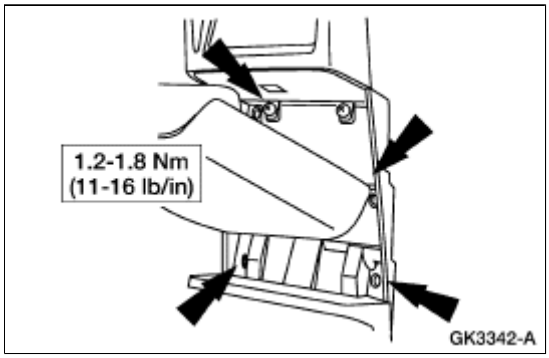


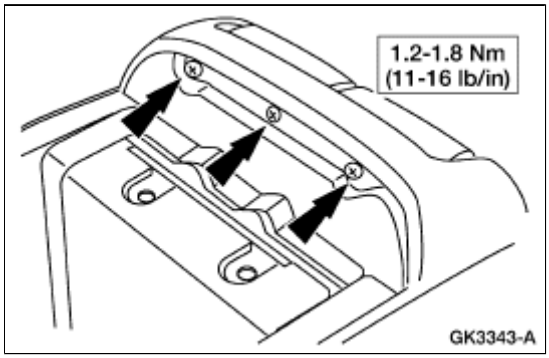
Installation

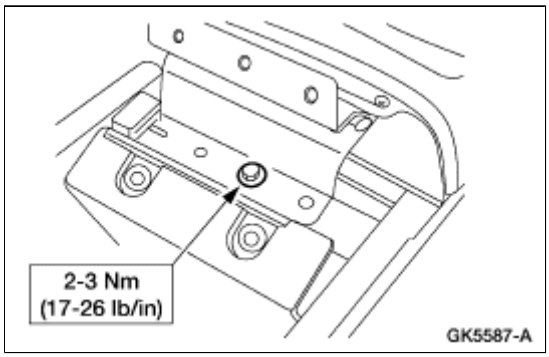
1. **NOTE:** When the battery (10655) is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

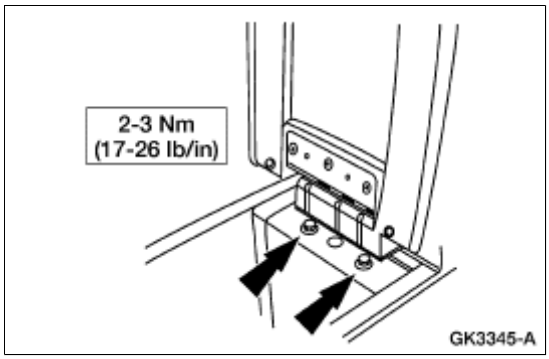
   To install, reverse the removal procedure.










2-3 Nm
(17-26 lb/in)
GK3345-A

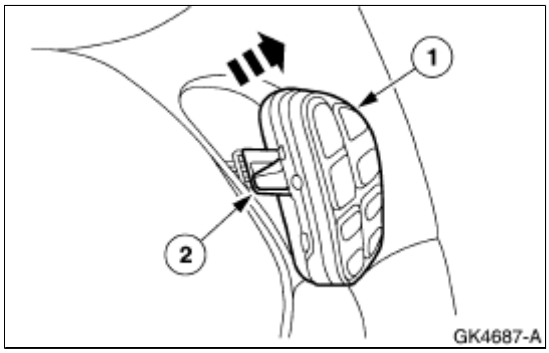
Auxiliary Control —Steering Wheel Controls

Removal

1. Disconnect the battery ground cable.

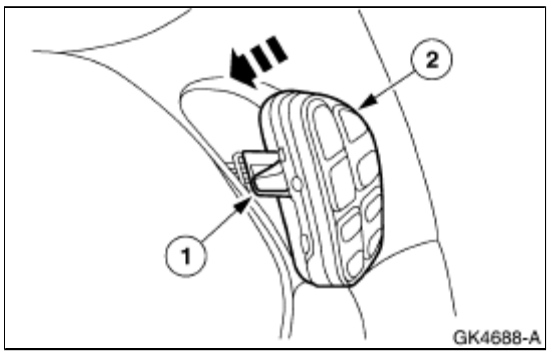
2. **NOTE:** The steering wheel is leather wrapped and should be protected when removing the steering wheel controls.

   Remove the steering wheel controls.
   1. Carefully remove the steering wheel controls.
   2. Disconnect the steering wheel controls.



Installation

1. Install the steering wheel controls.
   1. Connect the steering wheel controls.
   2. Install the steering wheel controls.



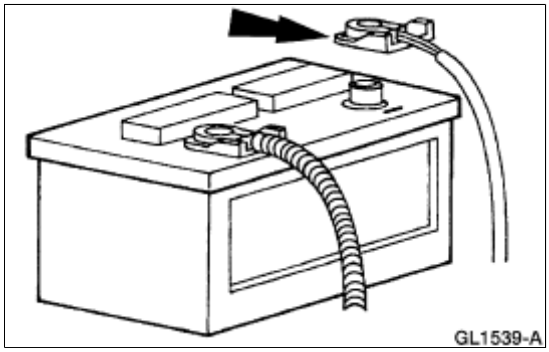
2. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   Connect the battery ground cable.

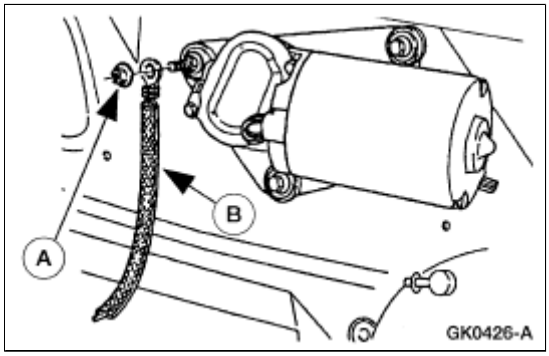
Ground Strap

Removal

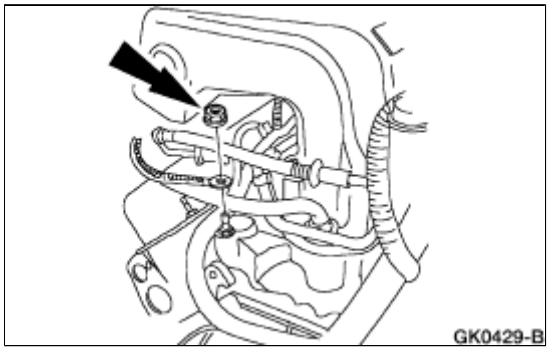
1. Disconnect the battery ground cable (14301).



2. Remove the nut and washer (A) attaching the ground strap (B) to the stud.



3. Remove the fastener from the rear of the intake manifold on 5.0L (shown), rear of the left cylinder head on 4.0L (push rod), or rear of the right cylinder head on 4.0L (SOHC), and ensure that the mounting surfaces of the studs are free of dirt and corrosion.

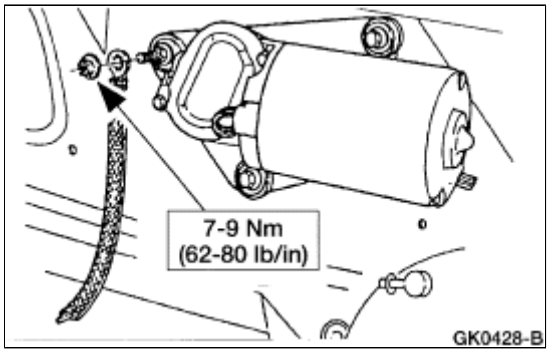


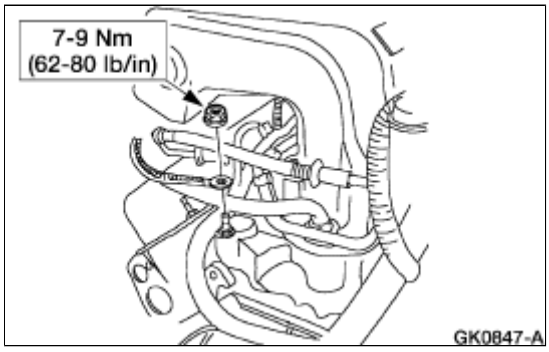
Installation

1. **NOTE:** When the battery (10655) is disconnected and reconnected, some abnormal drive symptoms

may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

To install, reverse the removal procedure.



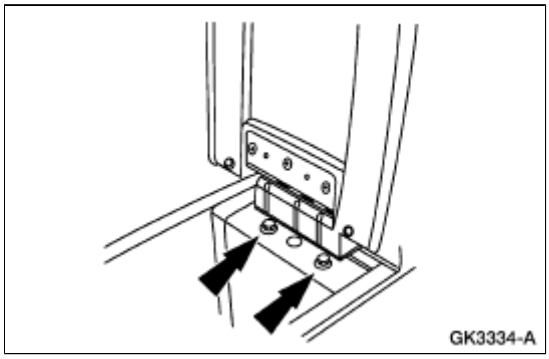


Compact Disc (CD) Changer

Removal

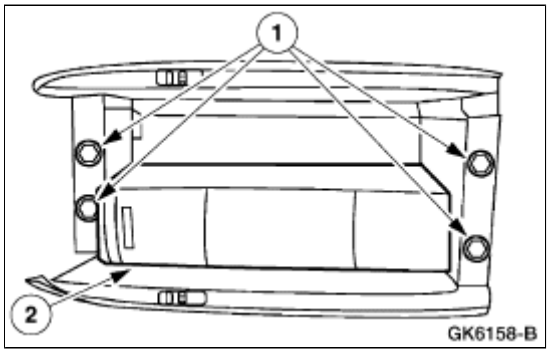
1. Disconnect the battery ground cable.

2. Remove the console compartment trim panel.
   - Remove the screws.
   - Remove the console compartment trim panel.

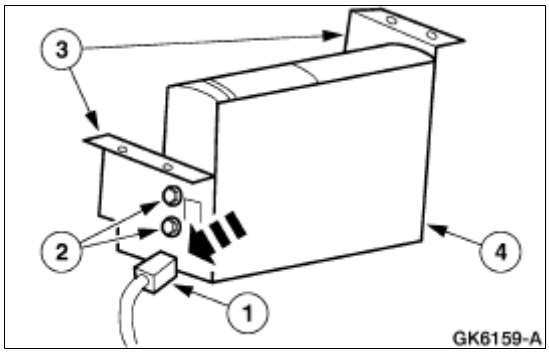


3. Remove the coin holder/tissue box holder.

4. Position the CD changer (18C830) aside.
   1. Remove the screws.
   2. Position aside the CD changer.

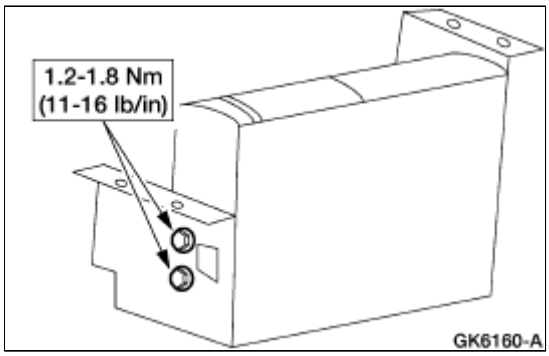


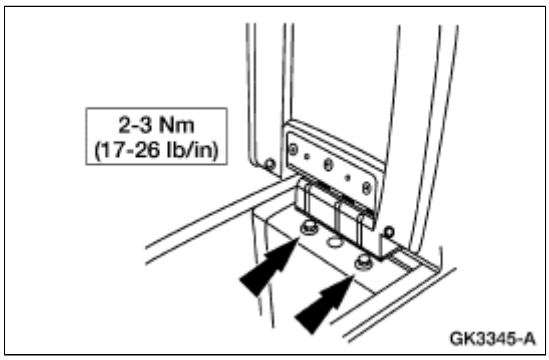
5. Remove the CD changer.
   1. Disconnect the connector.
   2. Remove the screws.
   3. Remove the CD changer brackets.
   4. Remove the CD changer.



Installation

1. To install, reverse the removal procedure.





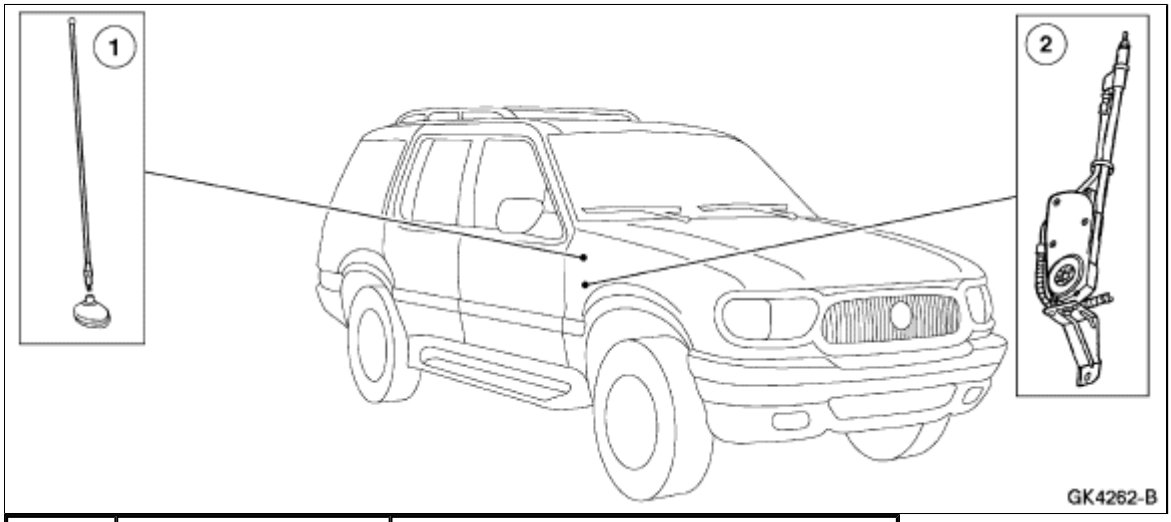
Torque Specifications

Description	Nm	lb-ft	lb-in
Radio Antenna Nut	9.5-10.5	—	84-93
Lower Antenna Mounting Screw	4.5-6.3	—	40-56
Radio Antenna Mast	3.4-3.6	—	30-31
Battery Ground Cable	7-10	—	62-89
Front Fender Apron Bolts	12	9	—

Antenna

All vehicles are equipped with a standard antenna. A power antenna is optional with the audiophile system.

Antenna



Item	Part Number	Description
1	—	Fixed mast antenna
2	18850	Electric antenna (optional)

Antenna

Refer to Section 415-00 .

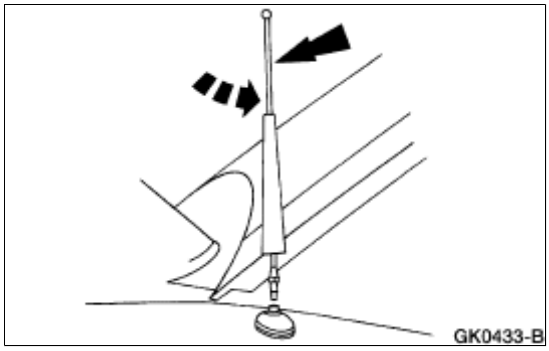
Cable —Fixed Antenna

Removal

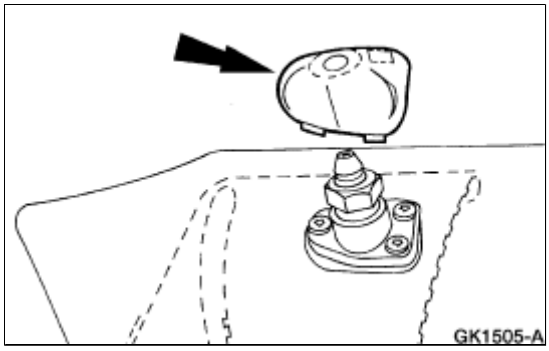
NOTE: The antenna base and the antenna cable are removed as an assembly.

1. Disconnect the battery ground cable (14301).

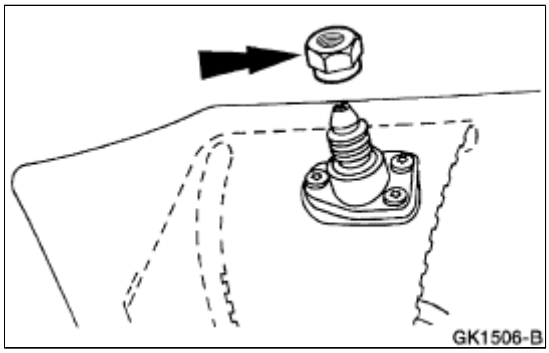
2. Remove the radio antenna mast (18A886).
   - Slide the wind deflector up.
   - Remove the radio antenna mast by turning it counterclockwise.



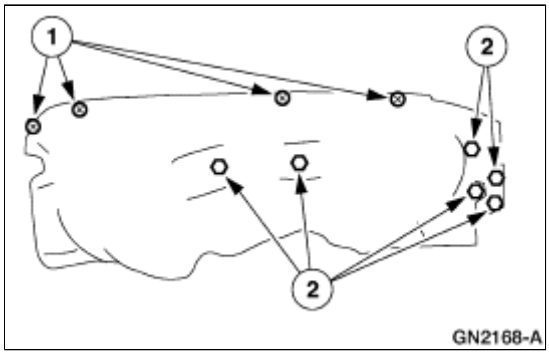
3. Unsnap the radio antenna base cap (18A927).



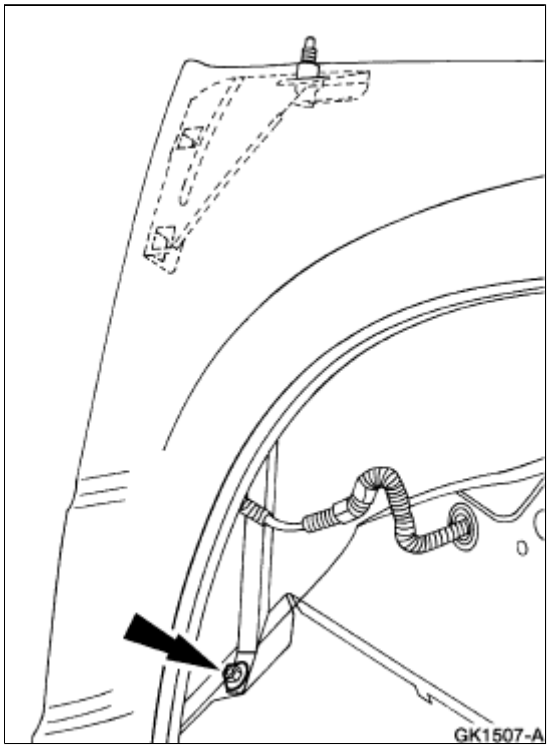
4. Remove the radio antenna nut.



5. Remove the front fender apron.
    1. Remove the screws.
    2. Remove the bolts.



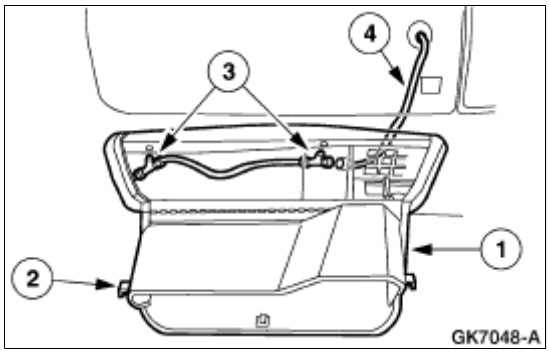
6. Remove the lower antenna mounting screw.



7. Remove the RH cowl side trim panel. For additional information, refer to Section 501-05 .

8. Remove the audio unit. For additional information, refer to Section 415-01 .

9. Position the antenna lead-in cable into the engine compartment.
    1. Open the glove compartment door.
    2. Release the tabs and lower the glove compartment to the full open position.
    3. Release the antenna lead-in cable locators.
    4. Push the antenna lead-in cable into the engine compartment.



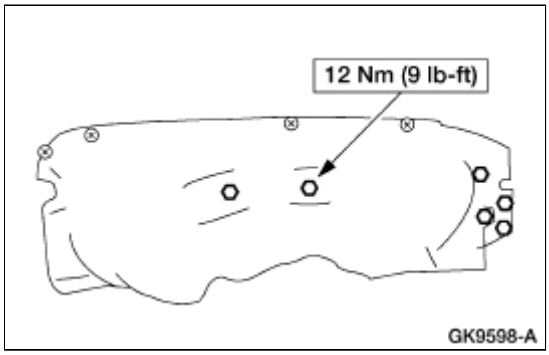
10. Remove the antenna base and the antenna lead-in cable.

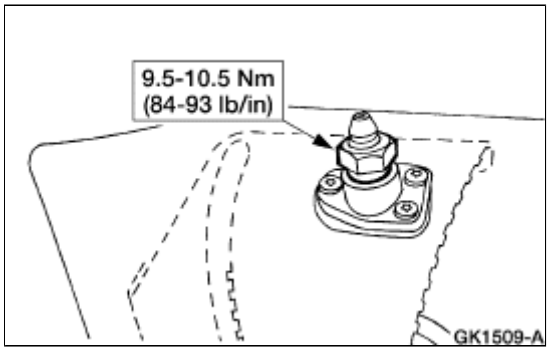
Installation

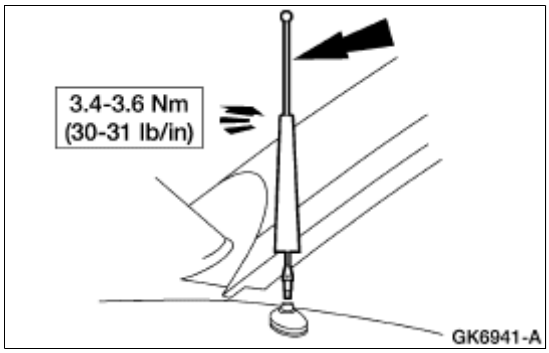
NOTE: The antenna base and the antenna cable are installed as an assembly.

1. **NOTE:** When the battery (10655) is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   To install, reverse the removal procedure.





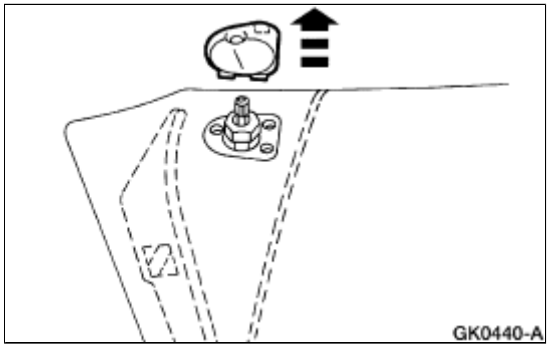

3.4-3.6 Nm
(30-31 lb/in)
GK6941-A

Cable —Power Antenna

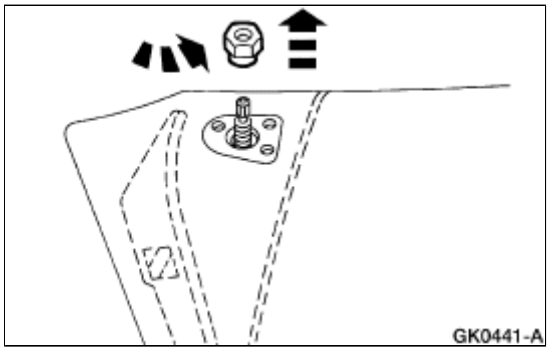
Removal

NOTE: The power antenna cable and the antenna mast are removed as an assembly.

1. Unsnap the radio antenna base cap (18A927).



2. Remove the radio antenna nut (18865).



3. Remove the antenna mast and cable.
   - Turn the ignition switch (11572) to the ACC position.
   - Turn the radio chassis (18806) ON/OFF switch to ON.
   - Firmly pull the antenna mast and cable out of the electric antenna motor.

Installation

NOTE: The power antenna cable and antenna mast are installed as an assembly.

1. **NOTE:** Check the end of the plastic antenna drive cable for a slight taper. If the drive cable is broken, a section of cable may be inside the electric antenna motor. Remove the broken cable. Refer to Antenna—Motor .

   Position the cable so the teeth are facing the front of the vehicle.

2. Insert the antenna.

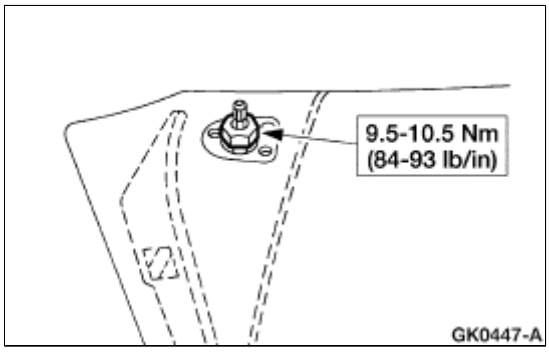
- Manually extend the antenna.
- Insert the cable until resistance is felt.
- Turn the cable slightly left and right to fully engage the cable into the motor gear.

3. Have an assistant turn the ignition switch to ACC and turn the radio chassis ON/OFF switch from ON to OFF.

4. Apply light downward pressure to the antenna as the electric antenna motor starts retracting the cable.

5. Guide the antenna in as the motor winds the cable into the drive unit and retracts the antenna sections.

6. Install the radio antenna nut.



7. Install the radio antenna base cap.

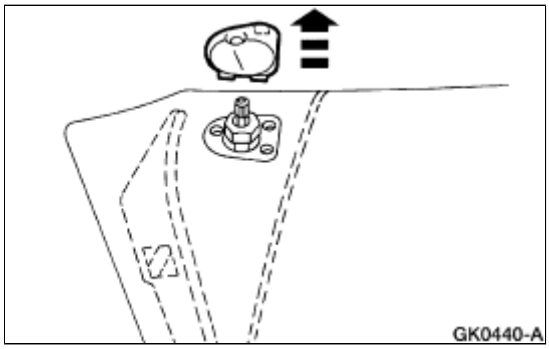
8. Cycle the electric antenna motor several times to ensure the antenna is extending and retracting correctly.

Antenna —Motor

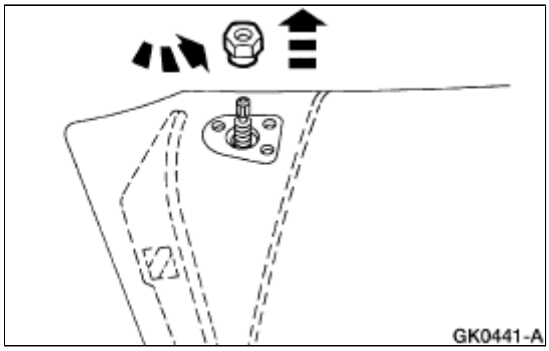
Removal

NOTE: The antenna motor and the antenna cable is removed as an assembly.

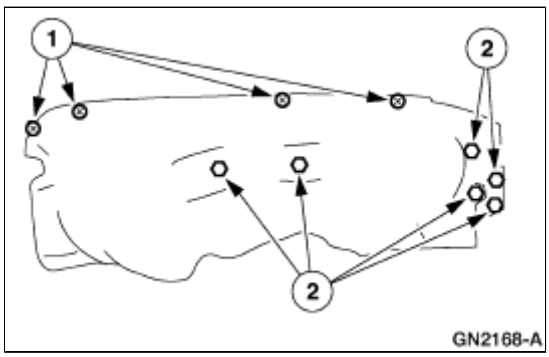
1. Disconnect the battery ground cable (14301).
2. Unsnap the radio antenna base cap (18A927).



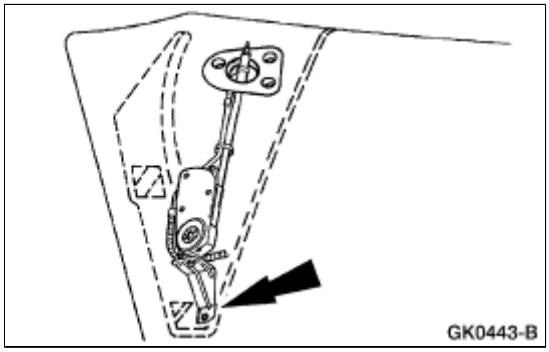
3. Remove the radio antenna nut.



4. Remove the front fender apron.
    1. Remove the screws.
    2. Remove the bolts.

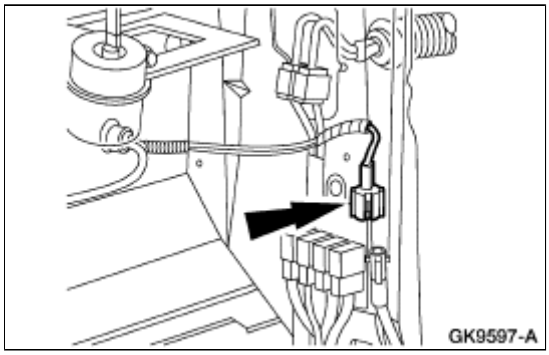


5. Remove lower antenna mounting screw.



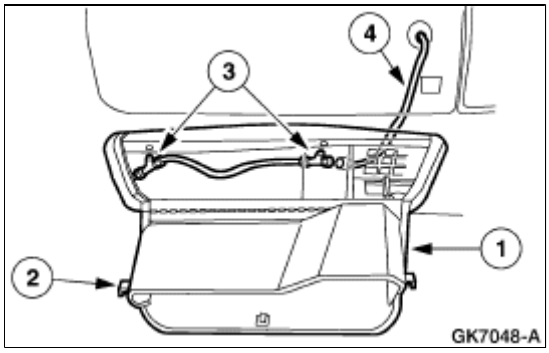
6. Remove the RH cowl side trim panel. For additional information, refer to Section 501-05 .

7. Disconnect the antenna motor electrical connector.

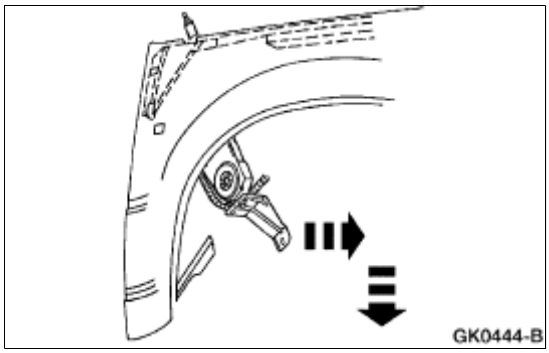


8. Remove the audio unit. For additional information, refer to Section 415-01 .

9. Position the antenna lead in cable into the engine compartment.
    1. Open the glove compartment door.
    2. Release the tabs and lower the glove compartment to the full open position.
    3. Release the antenna lead in cable wire locators.
    4. Push the antenna lead in cable into the engine compartment.



10. Move the electric antenna motor forward and down to remove.



11. If necessary, to remove a broken section of plastic antenna drive cable, remove the cover and drive mechanism.

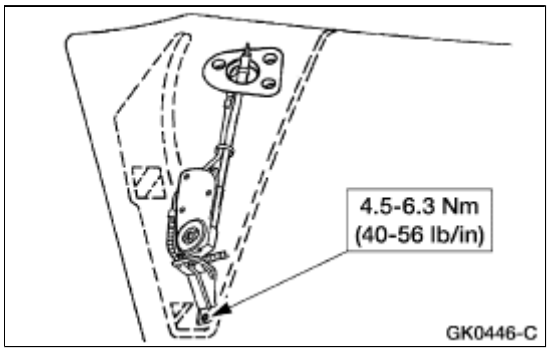
12. Locate and remove the broken piece of drive cable.

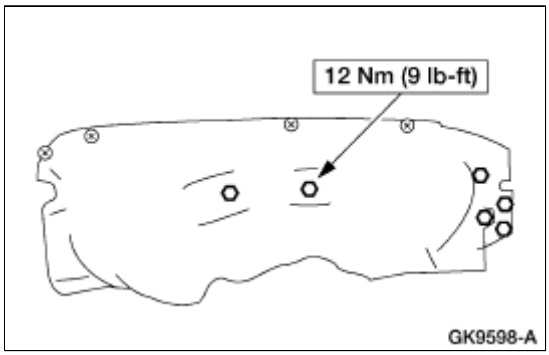
Installation

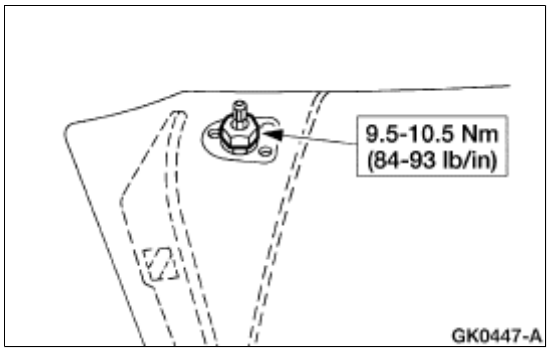
NOTE: The antenna motor and antenna cable are installed as an assembly.

1. **NOTE:** When the battery (10655) is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   To install, reverse the removal procedure.






9.5-10.5 Nm
(84-93 lb/in)
GK0447-A

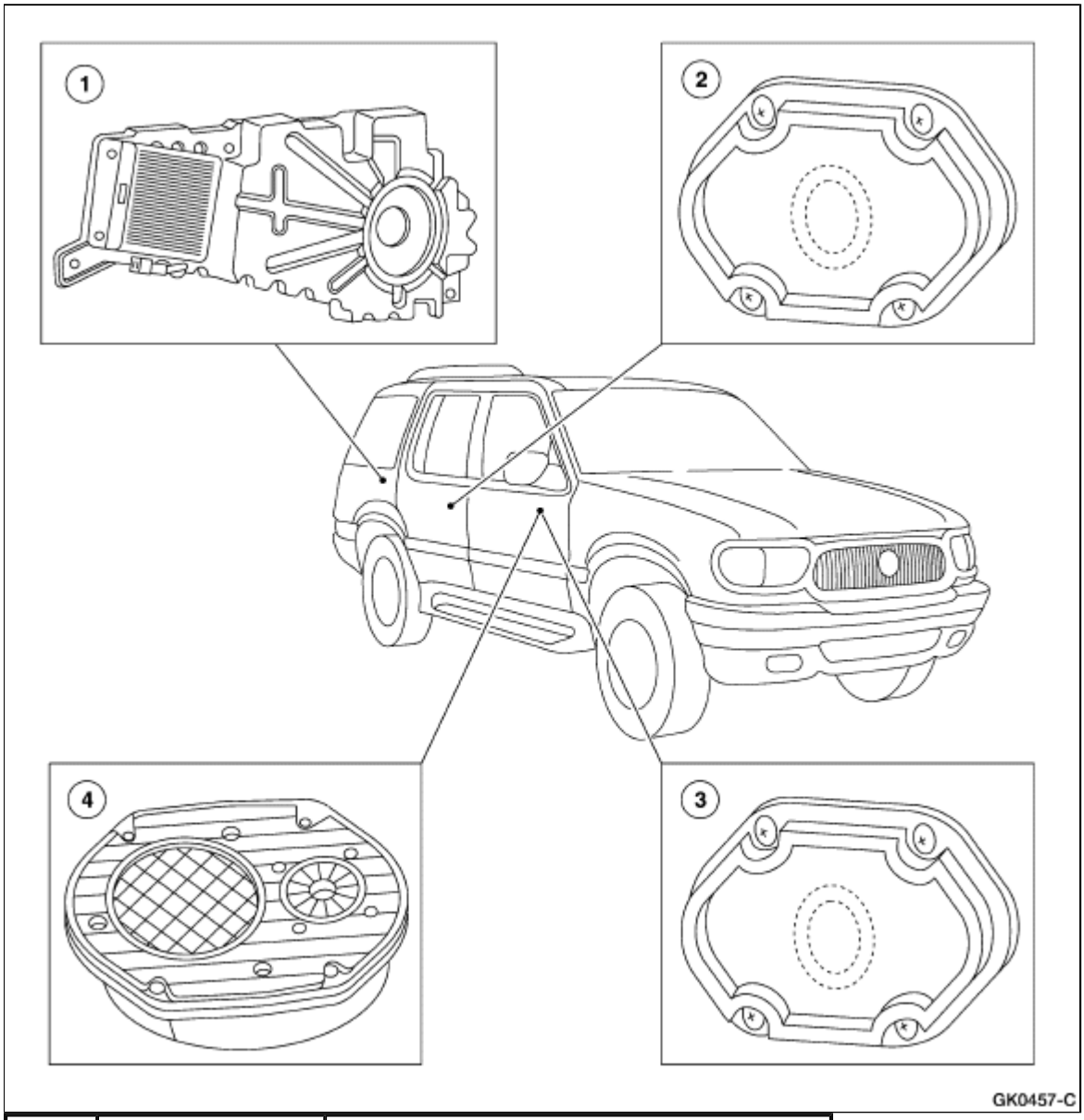
Torque Specifications

Description	Nm	lb-in
Battery Ground Cable	10	89
Speaker Screws	2	18
Subwoofer Screws	6.8-9.2	61-82

Speakers

The Explorer and Mountaineer are equipped with four premium radio speakers and an optional subwoofer. Rear radio speakers are mounted in the rear doors in four-door models or in the quarter panel in two-door models. Front radio speakers are mounted in the front doors. The optional MACH sound system replaces the front door premium radio speakers with audiophile radio speakers.

Radio Speaker System (4-door shown, 2-door similar)



Item	Part Number	Description
1	18C804	Optional subwoofer
2	18808-A	Rear door speaker (Premium)

3	18808-A	Front door speaker (Premium)
4	18808-C	Front door speaker (Audiophile)

Speakers

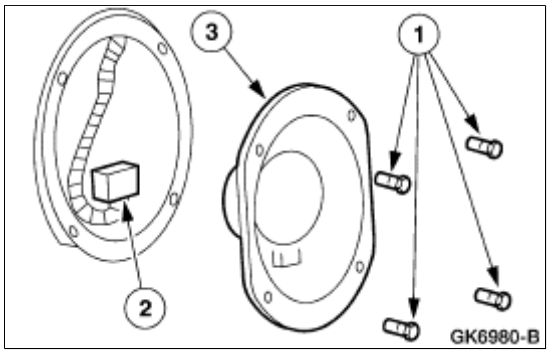
Refer to Section 415-00 .

Speakers —Door Mounted

Removal

1. Remove the front door trim panels (239420). For additional information, refer to Section 501-05 .

2. Remove the speakers (18808).
    1. Remove the screws.
    2. Disconnect the electrical connectors.
    3. Remove the speakers.



Installation

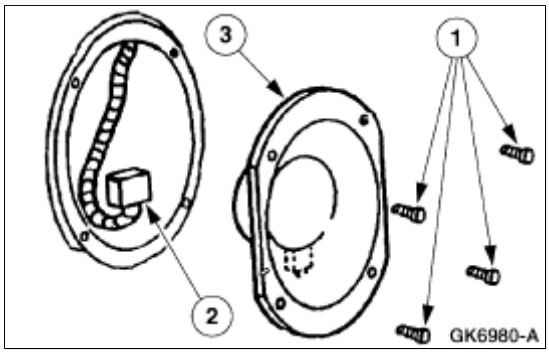
1. To install, reverse the removal procedure.

Speaker —Rear (2 Door)

Removal

1. Remove the quarter trim panel; refer to Section 501-05 .

2. Remove the speaker.
    1. Remove the screws.
    2. Disconnect the electrical connector.
    3. Remove the speaker.



Installation

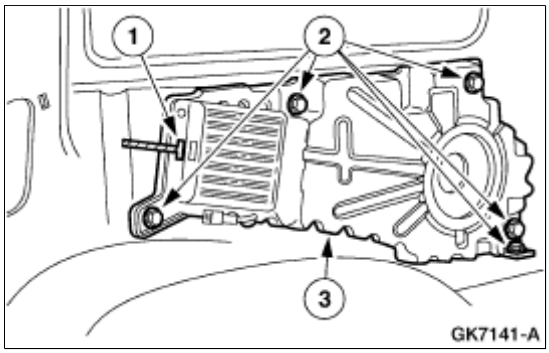
1. To install, reverse the removal procedure.

Speaker —Subwoofer

Removal

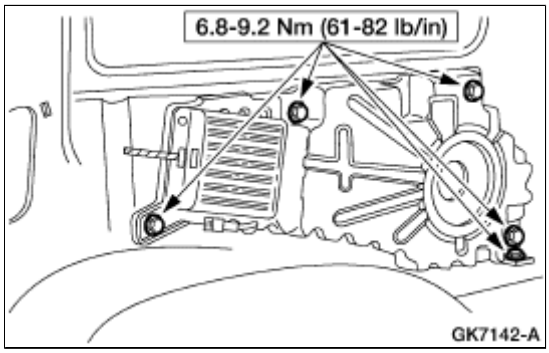
1. Remove the quarter trim panel; refer to Section 501-05 .

2. Remove the subwoofer.
    1. Disconnect the electrical connector.
    2. Remove the screws.
    3. Remove the subwoofer.



Installation

1. To install, reverse the removal procedure.



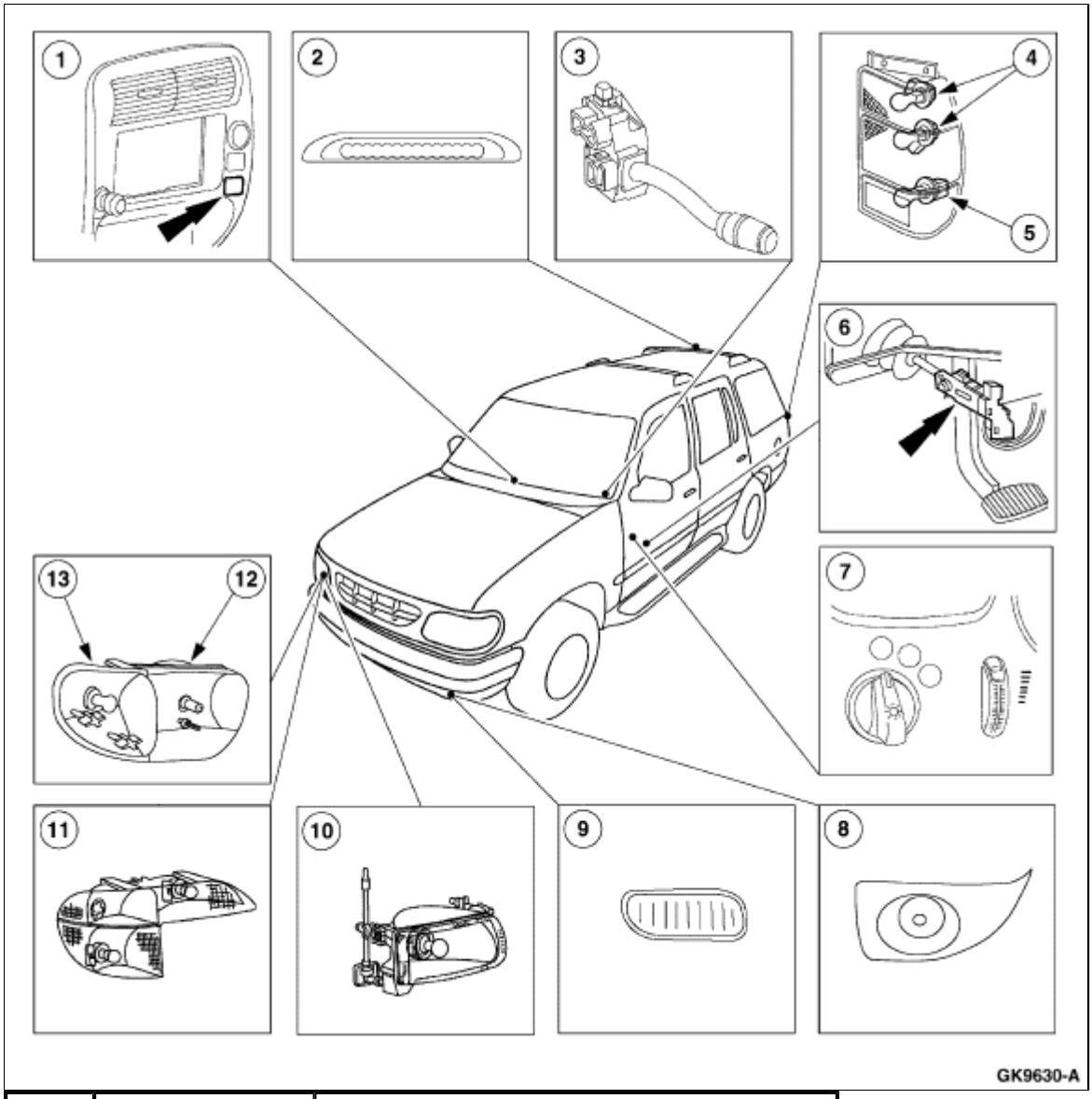
Torque Specifications

Description	Nm	lb-ft	lb-in
Backup lamp switch	25-35	18-26	—
Battery ground cable nut	7-10	—	62-88
Bumper cover strut bolt	12	9	—
Center instrument panel finish panel screws	2-3	—	18-26
Fog lamp bolts (Explorer)	34	25	—
Fog lamp bolts (Mountaineer)	12	9	—
Fog lamp switch mounting bezel screws	2-3	—	18-26
Headlamp switch screws	2-3	—	18-26
High-mounted stoplamp nuts	2.7-3.7	—	24-34
Hood release screws	2.7-3.7	—	25-33
Instrument cluster finish panel screws	2-3	—	18-26
Instrument panel steering column cover screws	2.1-2.9	—	19-25
Instrument panel steering column opening cover reinforcement bolts	7.6-10.4	—	67-92
Parking brake release screws	2.7-3.7	—	25-33
Parking lamp assembly screws (Explorer)	1.7-2.1	—	15-18
Parking lamp assembly screw (Mountaineer)	2.2-3.0	—	19.5-26.5
Rear lamp assembly screws	1.6-2.2	—	14-19

Exterior Lighting

The exterior lighting system consists of:

Exterior Lighting System Components



Item	Part Number	Description
1	15A214	Fog lamp switch
2	13A613	High-mounted stoplamp
3	13K359	Multi-function switch
4	13404	Rear lamp
5	15500	Reversing lamp

6	13480	Brake pedal position (BPP) switch
7	11654	Headlamp switch
8	15200	Fog lamp (Explorer only)
9	—	Fog lamp (Mountaineer only)
10	13008	Headlamp (Explorer only)
11	13200	Parking lamp—(Explorer only)
12	—	Headlamp (Mountaineer only)
13	—	Parking Lamp (Mountaineer only)

The headlamp switch (11654) is a three position switch that controls the headlamps and the exterior lamps.

The multi-function switch (13K359) controls the turn signals, high beams, and hazard lamps.

The brake pedal position (BPP) switch controls the brake lamps and the high-mounted stoplamp.

The optional autolamp system provides light sensitive automatic on-off control of the exterior lamps normally controlled by the headlamp switch. The autolamp system keeps the lamps on for a preselected period of time after the ignition switch (11572) is turned off. The pre-selected time lapse is adjustable up to approximately three minutes.

The fog lamps (15200) are controlled by the fog lamp switch (15A214). The fog lamps can only be operated with the headlamp switch in the ON position and the multi-function switch lever in the low beam position.

Headlamps

Refer to Wiring Diagrams Cell 85 , Headlamps for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Inspection and Verification

1. Verify the customer concern by operating the headlamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged switch(es)	• Fuse(s) • Damaged wiring harness • Loose or corroded connections

3. If the fault is not visually evident, determine the symptom and proceed to Symptom Chart.

Symptom Chart

Symptom Chart

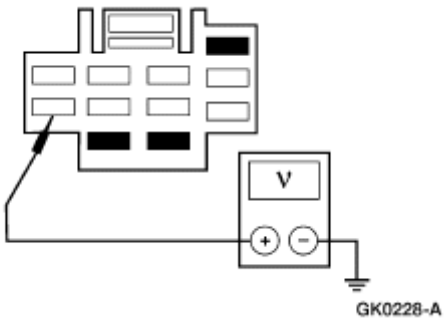
Condition	Possible Sources	Action
• Both Headlamps Are Inoperative	• Fuse(s). • Headlamp switch (11654). • Circuitry. • Multi-function switch (13K359).	• GO to Pinpoint Test A .
• The Low Beams Are Inoperative	• Circuitry. • Multi-function switch.	• GO to Pinpoint Test B .
• The High Beams Are Inoperative	• Fuse(s). • Circuitry. • Multi-function switch.	• GO to Pinpoint Test C .

• One Low Beam Headlamp Is Inoperative	• Fuse(s). • Headlamp bulb (13007). • Circuitry.	• GO to Pinpoint Test D .
• One High Beam Headlamp Is Inoperative	• Headlamp bulb. • Circuitry.	• GO to Pinpoint Test E .
• The Headlamps Are On Continuously	• Headlamp switch. • Multi-function switch.	• GO to Pinpoint Test F .
• The Flash-to-Pass Feature Is Inoperative	• Multi-function switch.	• REPLACE the multi-function switch.

Pinpoint Tests

PINPOINT TEST A: BOTH HEADLAMPS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK POWER DISTRIBUTION BOX MINI-FUSE 12 (30A)	
1  2  Power Distribution Box Mini-Fuse 12 (30A)	• **Is the fuse OK?** → **Yes** REINSTALL the fuse. GO to A2 . → **No** REPLACE the fuse. TEST the system for normal operation. If the fuse fails again, GO to A5 .
A2 CHECK THE VOLTAGE TO THE HEADLAMP SWITCH	
1  Headlamp Switch C216 2	2 Measure the voltage between headlamp switch C216-6, circuit 196 (DB/OG), and ground.



- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to A3 .

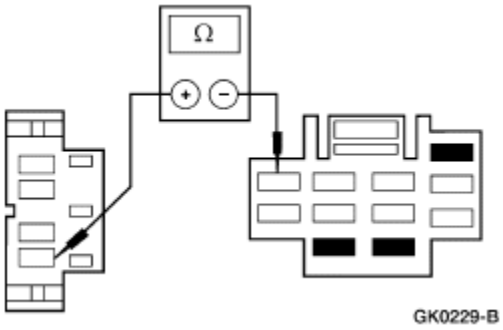
→ **No**
REPAIR circuit 196 (DB/OG). TEST the system for normal operation.

A3 CHECK CIRCUIT 15 (RD/YE) FOR OPEN

1

Multi-Function Switch C210

2



2 Measure the resistance between headlamp switch C216-2, circuit 15 (RD/YE), and multi-function switch C210-15, circuit 15 (RD/YE).

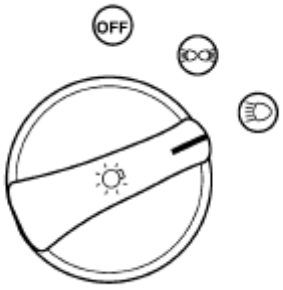
- **Is the resistance less than 5 ohms?**

→ **Yes**
RECONNECT the headlamp switch; GO to A4 .

→ **No**
REPAIR circuit 15 (RD/YE). TEST the system for normal operation.

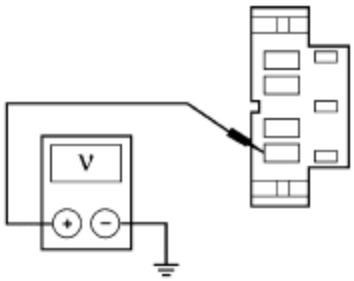
A4 CHECK THE VOLTAGE TO THE MULTI-FUNCTION SWITCH

1 Place the headlamp switch in the ON position.



K26996-A

2



GK0230-B

2 Measure the voltage between multi-function switch C210-15, circuit 15 (RD/YE), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
REPLACE the multi-function switch. TEST the system for normal operation.

→ **No**
REPLACE the headlamp switch. TEST the system for normal operation.

A5 CHECK CIRCUIT 196 (DB/OG) FOR SHORT TO GROUND

1

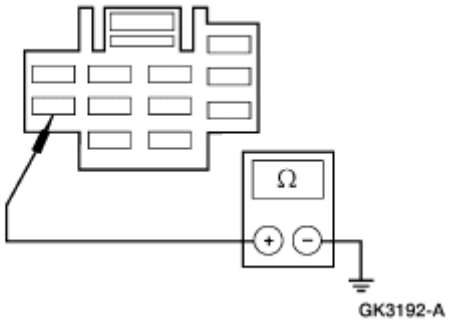
Headlamp Switch C216

2

Multi-Function Switch C210

3

3 Measure the resistance between headlamp switch C216-6, circuit 196 (DB/OG), and ground.



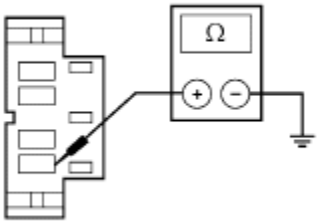
- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
GO to A6 .

→ **No**
REPAIR circuit 196 (DB/OG). TEST the system for normal operation.

A6 CHECK CIRCUIT 15 (RD/YE) FOR SHORT TO GROUND

1



1 Measure the resistance between multi-function switch C210-15, circuit 15 (RD/YE), and ground.

- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
RECONNECT the headlamp switch. REPLACE power distribution box mini-fuse 12 (30A). GO to A7 .

→ **No**
REPAIR circuit 15 (RD/YE). TEST the system for normal operation.

A7 RECHECK POWER DISTRIBUTION BOX MINI-FUSE 12 (30A)

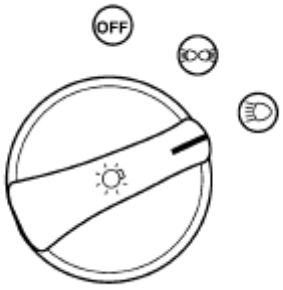
1

Power Distribution Box Mini-Fuse 12 (30A)

	• **Is the fuse OK?** → **Yes** REPLACE the multi-function switch. TEST the system for normal operation. → **No** REPLACE the headlamp switch. TEST the system for normal operation.

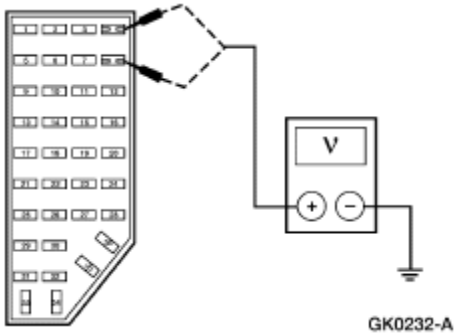
PINPOINT TEST B: THE LOW BEAMS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CHECK THE FUSE(S)	
1  Fuse Junction Panel Fuse 4 (10A) 2  Fuse Junction Panel Fuse 8 (10A)	• **Are fuses OK?** → **Yes** GO to B2 . → **No** GO to B4 .
B2 CHECK THE VOLTAGE TO FUSE JUNCTION PANEL FUSE 4 (10A) AND FUSE JUNCTION PANEL FUSE 8 (10A)	
1  2	2 Place the headlamp switch in the ON position.



K26996-A

3



GK0232-A

3 Measure the voltage between I/P fuse panel fuse 4, pin 2, and ground; and between I/P fuse panel fuse 8, pin 2, and ground.

- **Are the voltages greater than 10 volts?**

→ **Yes**
Place the headlamp switch in the OFF position.
GO to B4 .

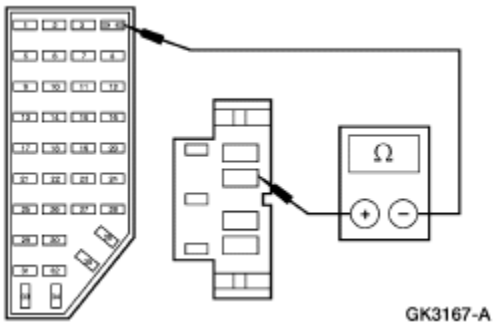
→ **No**
GO to B3 .

B3 CHECK CIRCUIT 13 (RD/BK) FOR OPEN

1

Multi-Function Switch C210

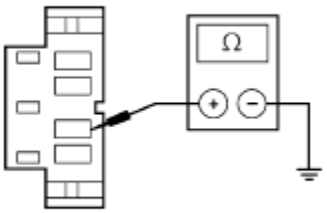
2



GK3167-A

2 Measure the resistance between multi-function switch C210-507, circuit 13 (RD/BK), and I/P fuse panel fuse 4, pin 2, circuit 13 (RD/BK).

- **Is the resistance less than 5 ohms?**

	→ **Yes** REPLACE the multi-function switch. TEST the system for normal operation. → **No** REPAIR circuit 13 (RD/BK). TEST the system for normal operation.
B4 CHECK CIRCUIT 13 (RD/BK) FOR SHORT TO GROUND	
1  Multi-Function Switch C210 2  GK3168-A	2 Measure the resistance between multi-function switch C210-507, circuit 13 (RD/BK), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** REPLACE the multi-function switch. TEST the system for normal operation. → **No** REPAIR circuit 13 (RD/BK). TEST the system for normal operation.

PINPOINT TEST C: THE HIGH BEAMS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 CHECK THE FUSE	
1  2	

Fuse Junction Panel Fuse 33 (15A)

- **Is the fuse OK?**

→ **Yes**
GO to C2 .

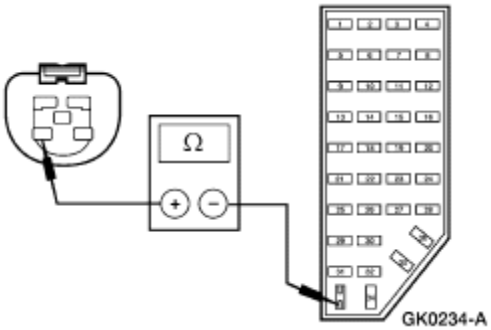
→ **No**
REPLACE the fuse. If the fuse fails again, GO to C5 .

C2 CHECK CIRCUIT 12 (LG/BK) FOR OPEN

1

LH Headlamp C136

2



2 Measure the resistance between LH headlamp C136-2, circuit 12 (LG/BK), and I/P fuse panel fuse 33, pin 2.

- **Is the resistance less than 5 ohms?**

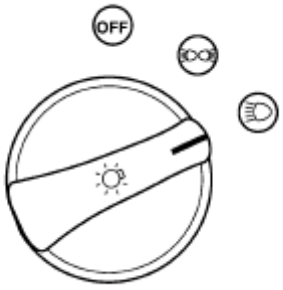
→ **Yes**
RECONNECT the LH headlamp. GO to C3 .

→ **No**
REPAIR circuit 12 (LG/BK). TEST the system for normal operation.

C3 CHECK THE VOLTAGE TO FUSE JUNCTION PANEL FUSE 33 (15A)

1

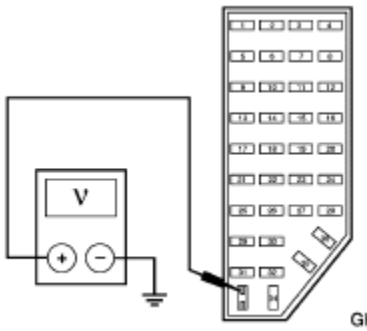
1 Place the headlamp switch in the ON position.



K26996-A

2 Verify the multi-function switch is in the high beam position.

3



GK0235-A

3 Measure the voltage between I/P fuse panel fuse 33, pin 1, and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
REPLACE the headlamp bulbs. TEST the system for normal operation.

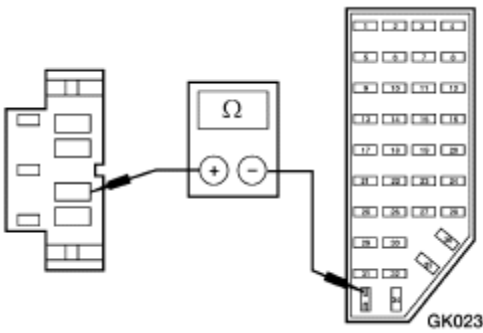
→ **No**
GO to C4 .

C4 CHECK CIRCUIT 632 (GY/OG)

1

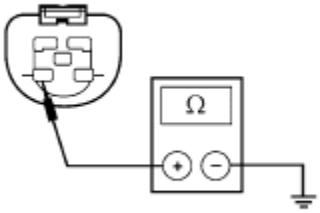

Multi-Function Switch C210

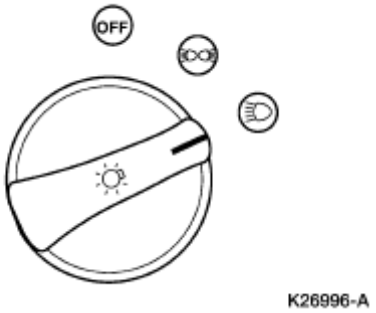
2



GK0236-A

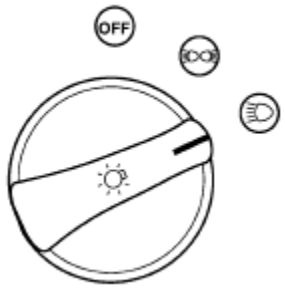
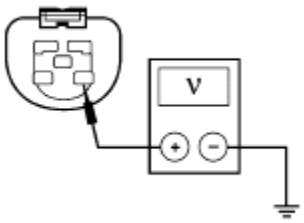
2 Measure the resistance between multi-function switch C210-12, circuit 632 (GY/OG), and I/P fuse panel fuse 33, pin 1.

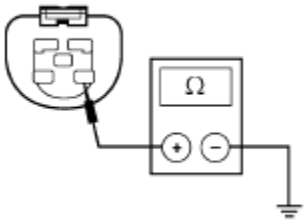
	• **Is the resistance less than 5 ohms?** → **Yes** REPLACE the multi-function switch. TEST the system for normal operation. → **No** REPAIR circuit 632 (GY/OG). TEST the system for normal operation.
C5 CHECK CIRCUIT 12 (LG/BK) FOR SHORT TO GROUND	
1  LH Headlamp C136 2  RH Headlamp C131 3  GK3169-A	3 Measure the resistance between LH headlamp C136-2, circuit 12 (LG/BK), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** RECONNECT the LH headlamp bulb. REPLACE fuse junction panel fuse 33 (15A). GO to C6 . → **No** REPAIR circuit 12 (LG/BK). TEST the system for normal operation.
C6 RECHECK THE FUSE	
1	1 Place the headlamp switch in the ON position.

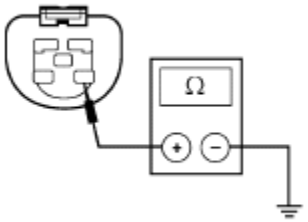
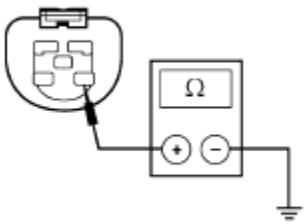
 K26996-A 2  Fuse Junction Panel Fuse 33 (15A)	• **Is the fuse OK?** → **Yes** REPLACE the RH headlamp bulb. TEST the system for normal operation. → **No** REPLACE the LH headlamp bulb. TEST the system for normal operation.

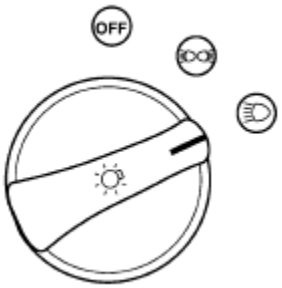
PINPOINT TEST D: ONE LOW BEAM HEADLAMP IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
D1 CHECK THE FUSE(S)	
1  2  Fuse Junction Panel Fuse 4 (10A) 3  Fuse Junction Panel Fuse 8 (10A)	• **Are the fuse(s) OK?**

	→ **Yes** REINSTALL the fuse(s). GO to D2 . → **No** REPLACE the fuse. If fuse junction panel fuse 4 (10A) fails again, GO to D3 . If fuse junction panel fuse 8 (10A) fails again and the vehicle is not equipped with DRL, GO to D4 . If the vehicle is equipped with DRL, GO to D5 .
D2 CHECK THE VOLTAGE TO THE INOPERATIVE HEADLAMP BULB	
1  K26996-A	1 Place the headlamp switch in the ON position.
2	Verify the headlamps are in low beam.
3  Inoperative Headlamp	
4  GK0237-A	4 Measure the voltage between RH headlamp C131-3, circuit 1056 (DB/LG), and ground; or between LH headlamp C136-3, circuit 1055 (WH/LG), and ground. • **Is the voltage greater than 10 volts?** → **Yes** REPLACE the headlamp (13008). TEST the system for normal operation.

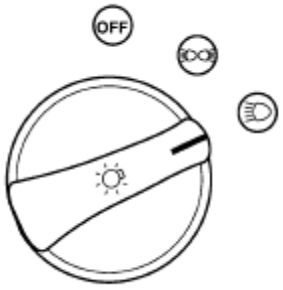
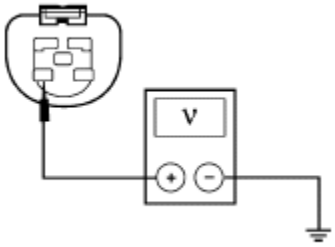
	→ **No** REPAIR circuit 1056 (DB/LG) and/or circuit 1055 (WH/LG). TEST the system for normal operation.
D3 CHECK CIRCUIT 1055 (WH/LG) FOR SHORT TO GROUND	
1  LH Headlamp C136 2  Fuse Junction Panel Fuse 4 (10A) 3  GK3171-A	3 Measure the resistance between LH headlamp C136-3, circuit 1055 (WH/LG), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** REPLACE the LH headlamp bulb. TEST the system for normal operation. → **No** REPAIR circuit 160 (DB/WH) or circuit 1055 (WH/LG). TEST the system for normal operation.
D4 CHECK CIRCUIT 1056 (DB/LG) AND CIRCUIT 161 (DG/OG) FOR SHORT TO GROUND	
1  RH Headlamp C131 2 	

Fog Lamp Relay (If Equipped) 3  GK3171-A	3 Measure the resistance between RH headlamp C131-3, circuit 1056 (DB/LG), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** REPLACE the RH headlamp bulb. TEST the system for normal operation. → **No** REPAIR circuit 1056 (DB/LG) or circuit 161 (DG/OG). TEST the system for normal operation.
D5 CHECK CIRCUIT 1056 (DB/LG) FOR SHORT TO GROUND (DRL)	
1  RH Headlamp C131 2  DRL Module 3  GK3171-A	3 Measure the resistance between RH headlamp C131-3, circuit 1056 (DB/LG), and ground. • **Is the resistance greater than 10,000 ohms?**

	→ **Yes** RECONNECT the DRL module. REPLACE fuse junction panel fuse 8 (10A). GO to D6 . → **No** REPAIR circuit 1056 (DB/LG). TEST the system for normal operation.
D6 RECHECK THE FUSE	
1  K26996-A 2  Fuse Junction Panel Fuse 8 (10A)	1 Place the headlamp switch in the ON position. • **Is the fuse OK?** → **Yes** REPLACE the RH headlamp bulb. TEST the system for normal operation. → **No** . REPLACE the DRL control (if equipped). If not equipped with DRL, REPAIR circuit 161 (DG/OG) or circuit 1056 (DB/LG). TEST the system for normal operation.

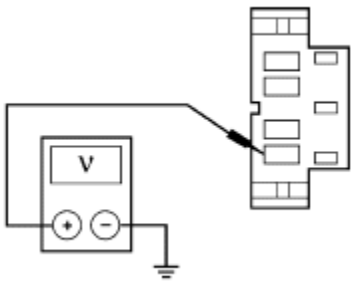
PINPOINT TEST E: ONE HIGH BEAM HEADLAMP IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
E1 CHECK THE VOLTAGE TO THE INOPERATIVE HEADLAMP BULB	
1 	

2  K26996-A	2 Place the headlamp switch in the ON position.
	3 Verify the headlamps are in high beam.
4  Inoperative Headlamp	
5  GK0240-A	5 Measure the voltage between RH headlamp C131-2, circuit 12 (LG/BK), and ground; or between LH headlamp C136-2, circuit 12 (LG/BK), and ground.
	• **Is the voltage greater than 10 volts?** → **Yes** REPLACE the headlamp bulb. TEST the system for normal operation. → **No** REPAIR circuit 12 (LG/BK). TEST the system for normal operation.

PINPOINT TEST F: THE HEADLAMPS ARE ON CONTINUOUSLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
F1 CHECK THE HEADLAMP SWITCH	
1 	

2  Headlamp Switch C216	• **Are the headlamps illuminated?** → **Yes** GO to F2 . → **No** REPLACE the headlamp switch. TEST the system for normal operation.
F2 CHECK THE MULTI-FUNCTION SWITCH	
1  Multi-Function Switch C210	• **Are the headlamps illuminated?** → **Yes** GO to F4 . → **No** GO to F3 .
F3 CHECK CIRCUIT 15 (RD/YE) FOR SHORT TO POWER	
1  GK0230-B	1 Measure the voltage between multi-function switch C210-15, circuit 15 (RD/YE), and ground. • **Is voltage present?** → **Yes** REPAIR circuit 15 (RD/YE). TEST the system for normal operation. → **No** REPLACE the multi-function switch. TEST the

	system for normal operation.
F4 CHECK CIRCUIT 13 (RD/BK)	
	1 Verify the high beams are illuminated. • **Are the headlamp high beams illuminated?** → **Yes** GO to F5 . → **No** REPAIR circuit 13 (RD/BK). TEST the system for normal operation.
F5 CHECK CIRCUIT 632 (GY/OG) AND CIRCUIT 12 (LG/BK) FOR SHORT TO POWER	
1  Fuse Junction Panel Fuse 33 (15A)	• **Are the headlamps illuminated?** → **Yes** If equipped with daytime running lamps (DRL), GO to F6 . If not equipped with DRL, REPAIR circuit 12 (LG/BK). TEST the system for normal operation. → **No** REPAIR circuit 632 (GY/OG). TEST the system for normal operation.
F6 RECHECK CIRCUIT 12 (LG/BK)	
1  DRL Module C134	• **Are the headlamps illuminated?** → **Yes** REPAIR circuit 12 (LG/BK). TEST the system for normal operation. → **No** REPLACE the DRL module. TEST the system for normal operation.

Autolamps

Refer to Wiring Diagrams Cell 87 , Autolamps for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter 105-R0051 or equivalent

Inspection and Verification

1. Verify the customer concern by operating the autolamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged switch(es)	• Fuse(s) • Damaged wiring harness • Loose or corroded connections • Relay(s)

3. If the fault is not visually evident, determine the symptom and proceed to Symptom Chart.

Symptom Chart

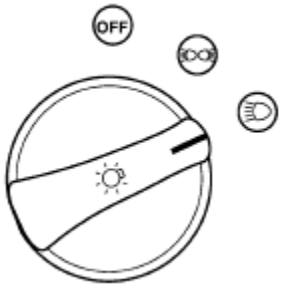
Symptom Chart

Condition	Possible Sources	Action
• The Autolamps Are Inoperative	• Headlamp switch. • Fuse(s). • Headlamp relay. • Circuitry. • Light sensor amplifier.	• Go To Pinpoint Test G .
• The Autolamps Are On Continuously	• Circuitry. • Headlamp relay. • Light sensor	• Go To Pinpoint Test H .

	amplifier.	
• The Autolamp Time Delay Is Inoperative	• Fuse(s). • Light sensor amplifier. • Headlamp switch. • Circuitry.	• VERIFY parking lamp operation. If OK, REPLACE the light sensor amplifier. If any parking lamp concerns exist, Parking, Rear and License Lamps REFER to Parking, Rear or License Lamps.

Pinpoint Tests

PINPOINT TEST G: THE AUTOLAMPS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
G1 CHECK MANUAL HEADLAMP SWITCH	
1  2  K26996-A	2 Place the headlamp switch in the ON position. • **Did the headlamps illuminate?** → **Yes** GO to G2 . → **No** Go To Pinpoint Test A .
G2 CHECK THE FUSES	
1  Power Distribution Box Fuse 11 (15A) 2	

Fuse Junction Panel Fuse 11 (7.5A)

3

Fuse Junction Panel Fuse 36 (7.5A)

- **Are the fuse(s) OK?**

→ **Yes**
GO to G3 .

→ **No**
REPLACE the failed fuse(s).

If fuse junction panel fuse 36 (7.5A) failed, GO to G11 .

If fuse junction panel fuse 11 (7.5A) failed, GO to G12 .

If power distribution box fuse 11 (15A) failed, REPAIR circuit 195 (TN/WH). TEST the system for normal operation.

G3 COMPONENT TEST OF HEADLAMP RELAY

1

Headlamp Relay

2 Perform the Relay Component Test; refer to Component Test.

- **Is the relay OK?**

→ **Yes**
GO to G4 .

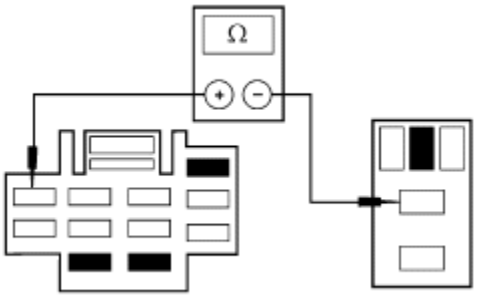
→ **No**
REPLACE the headlamp relay. TEST the system for normal operation.

G4 CHECK CIRCUIT 15 (RD/YE) FOR OPEN

1

Headlamp Switch C216

2



2 Measure the resistance between headlamp relay connector pin 5, circuit 15 (RD/YE), and headlamp switch C216-2, circuit 15 (RD/YE).

- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to G5 .

→ **No**
REPAIR circuit 15 (RD/YE). TEST the system for normal operation.

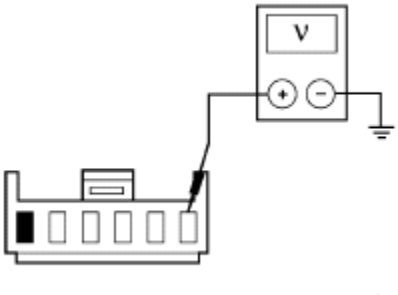
G5 CHECK CIRCUIT 640 (RD/YE) FOR VOLTAGE

1

Light Sensor Amplifier C341

2

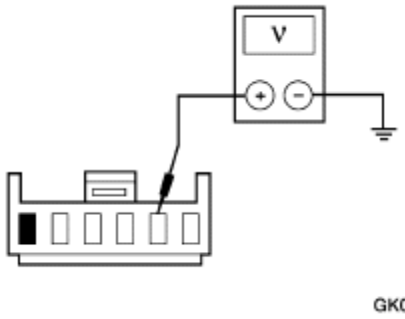
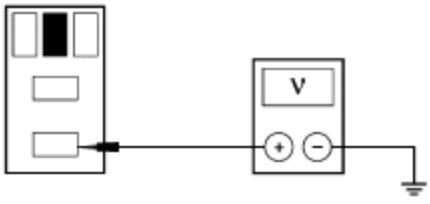
3

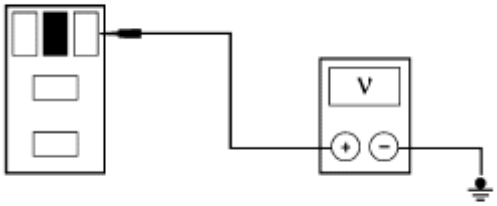
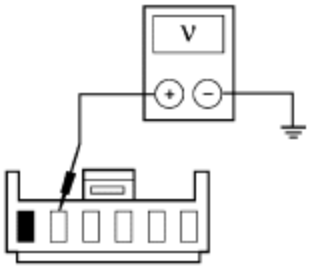


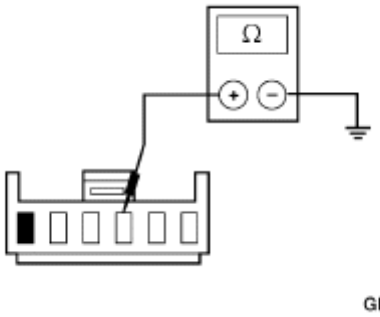
3 Measure the voltage between light sensor amplifier C341-6, circuit 640 (RD/YE), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to G6 .

	→ **No** REPAIR circuit 640 (RD/YE). TEST the system for normal operation.
G6 CHECK CIRCUIT 54 (LG/YE) FOR VOLTAGE	
1  GK0243-A	1 Measure the voltage between light sensor amplifier C341-5, circuit 54 (LG/YE), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to G7 . → **No** REPAIR circuit 54 (LG/YE). TEST the system for normal operation.
G7 CHECK CIRCUIT 196 (DB/OG) FOR VOLTAGE	
1  GK0110-A	1 Measure the voltage between headlamp relay connector pin 3, circuit 196 (DB/OG), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to G8 . → **No** REPAIR circuit 196 (DB/OG). TEST the system for normal operation.
G8 CHECK CIRCUIT 195 (TN/WH) FOR VOLTAGE	
1	1 Measure the voltage between headlamp relay connector pin 1, circuit 195 (TN/WH), and ground.

 GK0105-A	• **Is the voltage greater than 10 volts?** → **Yes** RECONNECT the headlamp relay. GO to G9 . → **No** REPAIR circuit 195 (TN/WH). TEST the system for normal operation.
G9 CHECK CIRCUIT 218 (WH/VT) FOR VOLTAGE	
1  GK0246-A	1 Measure the voltage between light sensor amplifier C341-2, circuit 218 (WH/VT), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to G10 . → **No** REPAIR circuit 218 (WH/VT). TEST the system for normal operation.
G10 CHECK CIRCUIT 57 (BK) FOR OPEN	
1	1 Measure the resistance between light sensor amplifier C341-4, circuit 57 (BK), and ground.



- **Is the resistance less than 5 ohms?**

→ **Yes**
REPLACE the light sensor amplifier. TEST the system for normal operation.

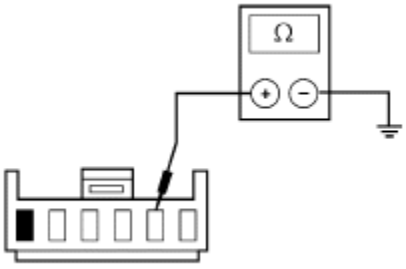
→ **No**
REPAIR circuit 57 (BK). TEST the system for normal operation.

G11 CHECK CIRCUIT 54 (LG/YE) FOR SHORT TO GROUND

1

Light Sensor Amplifier C341

2



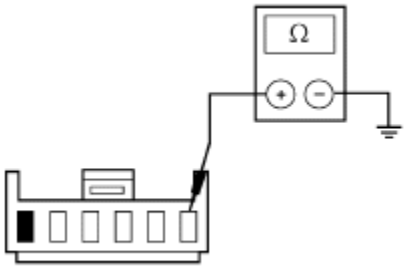
2 Measure the resistance between light sensor amplifier C341-5, circuit 54 (LG/Y), and ground.

- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
REPLACE the light sensor amplifier. TEST the system for normal operation.

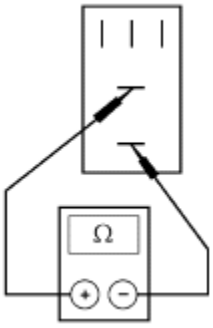
→ **No**
REPAIR circuit 54 (LG/YE). TEST the system for normal operation.

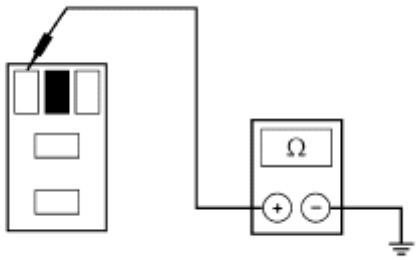
G12 CHECK CIRCUIT 640 (RD/YE) FOR SHORT TO GROUND

1  Light Sensor Amplifier C341 2  	2 Measure the resistance between light sensor amplifier C341-6, circuit 640 (RD/YE), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** REPLACE the light sensor amplifier. TEST the system for normal operation. → **No** REPAIR circuit 640 (RD/YE). TEST the system for normal operation.

PINPOINT TEST H: THE AUTOLAMPS ARE ON CONTINUOUSLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
H1 CHECK THE HEADLAMP SWITCH FOR PROPER OPERATION	
1  2  Headlamp Switch C216	3 Place the autolamp time delay switch in the OFF position. • **Are the headlamps off?** → **Yes**

	REPLACE the headlamp switch. TEST the system for normal operation. → **No** GO to H2 .
H2 CHECK THE HEADLAMP RELAY	
1  Headlamp Relay 2  GK0251-A	2 Measure the resistance between headlamp relay terminal 3 and terminal 5. • **Is the resistance greater than 10,000 ohms?** → **Yes** GO to H3 . → **No** REPLACE the headlamp relay. TEST the system for normal operation.
H3 CHECK CIRCUIT 218 (WH/VT) FOR SHORT TO GROUND	
1  Light Sensor Amplifier C341 2  Parking Lamp Relay 3	3 Measure the resistance between headlamp relay connector pin 2, circuit 218 (WH/VT), and ground.



GK0096-A

- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
REPLACE the light sensor amplifier. TEST the system for normal operation.

→ **No**
REPAIR circuit 218 (WH/VT). TEST the system for normal operation.

Stoplamps

Refer to Wiring Diagrams Cell 90 , Turn/Stop/Hazard Lamps for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Inspection and Verification

1. Verify the customer concern by operating the stoplamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged switch(es)	• Fuse(s) • Damaged wiring harness • Loose or corroded connections • Bulb(s)

3. If the fault is not visually evident, determine the symptom and proceed to Symptom Chart.

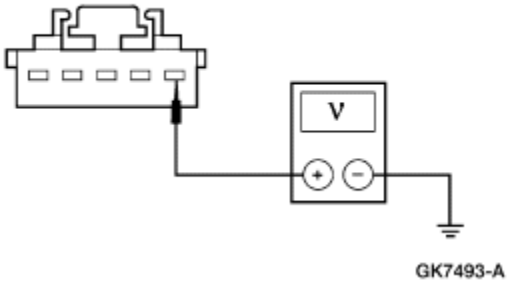
Symptom Chart

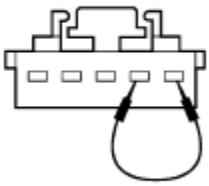
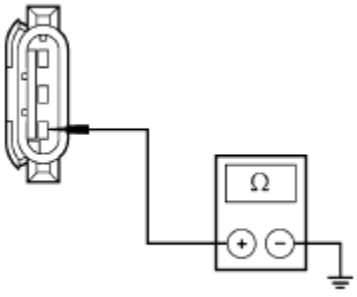
Symptom Chart

Condition	Possible Sources	Action
• The Stoplamps Are Inoperative	• Fuse(s). • Brake pedal position (BPP) switch. • Circuitry. • Lamp outage module (if equipped).	• GO to Pinpoint Test J .
• One or More Stoplamps Are Inoperative	• Stoplamp bulb. • Circuitry.	• GO to Pinpoint Test K .
• The Stoplamps Are On Continuously	• BPP switch.	• REPLACE the brake pedal position (BPP) switch.

Pinpoint Tests

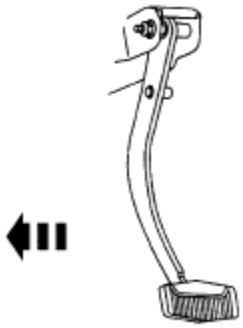
PINPOINT TEST J: THE STOPLAMPS ARE INOPERATIVE

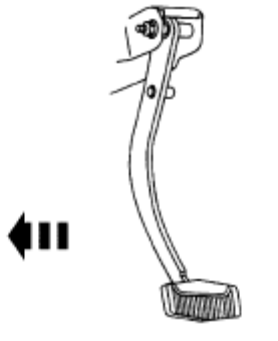
CONDITIONS	DETAILS/RESULTS/ACTIONS
J1 CHECK THE FUSE	
1  2  Fuse Junction Panel Fuse 13 (20A)	• **Is the fuse OK?** → **Yes** REINSTALL the fuse. GO to J2 . → **No** REPLACE the fuse. TEST the system for normal operation. If the fuse fails again, CHECK the system for short to ground. REPAIR as necessary.
J2 CHECK THE VOLTAGE TO THE BRAKE PEDAL POSITION (BPP) SWITCH	
1  BPP Switch C224 2  GK7493-A	2 Measure the voltage between BPP switch C224-5, circuit 10 (LG/RD), and ground.

	• **Is the voltage greater than 10 volts?** → **Yes** GO to J3 . → **No** REPAIR circuit 10 (LG/RD). TEST the system for normal operation.
J3 CHECK THE BPP SWITCH OPERATION	
1  GK7494-A	1 Connect a jumper wire between BPP switch C224-5, circuit 10 (LG/RD), and BPP switch C224-4, circuit 511 (LG). • **Do the stoplamps illuminate?** → **Yes** REPLACE the BPP switch. TEST the system for normal operation. → **No** GO to J4 .
J4 CHECK CIRCUIT 57 (BK) FOR OPEN	
1  LH Rear Stop/Park Lamp C400	
2  GK0278-A	2 Measure the resistance between LH rear stop/park lamp C400, circuit 57 (BK), and ground. • **Is the resistance less than 5 ohms?**

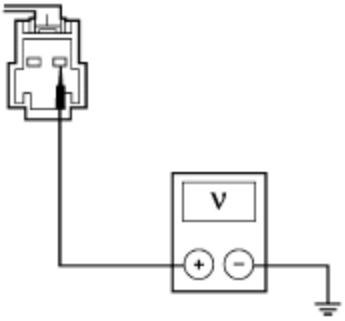
	→ **Yes** REPAIR circuit 511 (LG). TEST the system for normal operation. → **No** REPAIR circuit 57 (BK). TEST the system for normal operation.

PINPOINT TEST K: ONE OR MORE STOPLAMPS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
K1 DETERMINE THE INOPERATIVE STOPLAMP	
1  GF0022-A	1 Apply the brake.
	2 Verify which stoplamp is inoperative. • **Is the rear hi-mount lamp (13A613) inoperative?** → **Yes** GO to K2 . → **No** GO to K4 .
K2 CHECK THE VOLTAGE AT THE LAMP CONNECTOR	
1  Hi-Mount Stoplamp C410 2	2 Apply the brake.


GF0022-A

3



GK9648-A

3 Measure the voltage between hi-mount stoplamp C410, circuit 569 (DG), and ground.

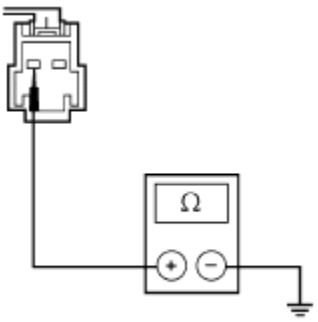
- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to K3 .

→ **No**
REPAIR circuit 569 (DG). TEST the system for normal operation.

K3 CHECK CIRCUIT 57 (BK) FOR OPEN

1



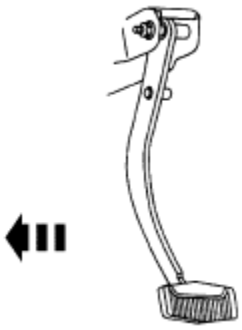
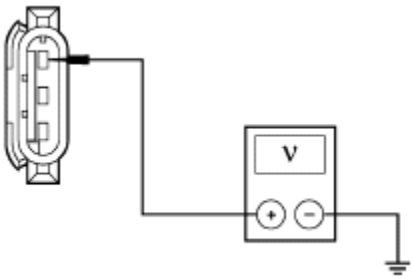
GK9649-A

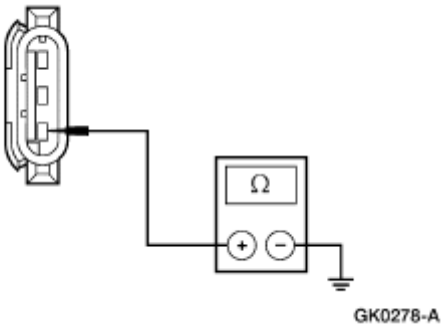
1 Measure the resistance between hi-mount lamp C410, circuit 57 (BK), and ground.

- **Is the resistance less than 5 ohms?**

→ **Yes**
REPLACE the hi-mount stoplamp bulb. TEST the system for normal operation.

→ **No**

	REPAIR circuit 57 (BK). TEST the system for normal operation.
K4 CHECK THE RH OR LH REAR STOP/PARK LAMP FOR VOLTAGE	
1  2  Inoperative Rear Stop/Park Lamp 3  GF0022-A 4  GK0264-A	3 Apply the brake. 4 Measure the voltage between inoperative rear stop/park lamp C400 (LH) or C415 (RH), circuit 511 (LG), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to K5 . → **No** REPAIR circuit 511 (LG). TEST the system for normal operation.
K5 CHECK CIRCUIT 57 (BK) FOR OPEN	
1	1 Measure the resistance between inoperative rear stop/park lamp C400 (LH) or C415 (RH), circuit 57 (BK), and ground.



- **Is the resistance less than 5 ohms?**

→ **Yes**
REPLACE the inoperative rear stop/park lamp bulb. TEST the system for normal operation.

→ **No**
REPAIR circuit 57 (BK). TEST the system for normal operation.

Turn Signal and Hazard Lamps

Refer to Wiring Diagrams Cell 90 , Turn/Stop/Hazard Lamps for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Inspection and Verification

1. Verify the customer concern by operating the turn signal/hazard flasher lamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged switch(es)	• Fuse(s) • Damaged wiring harness • Loose or corroded connections

3. If the fault is not visually evident, determine the symptom and proceed to Symptom Chart.

Symptom Chart

Symptom Chart

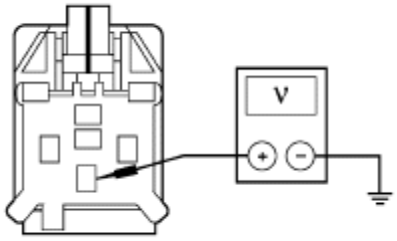
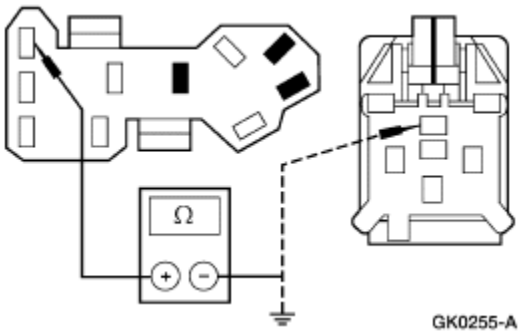
Condition	Possible Sources	Action
• The Turn Signal Lamps Are Never On	• Fuse(s). • Circuitry. • Multi-function switch (13K359). • Indicator flasher (13350).	• GO to Pinpoint Test L .
• The Hazard Flasher Lamps Are Never On	• Fuse(s). • Circuitry. • Multi-function switch. • Indicator flasher.	• GO to Pinpoint Test M .

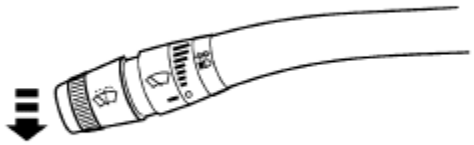
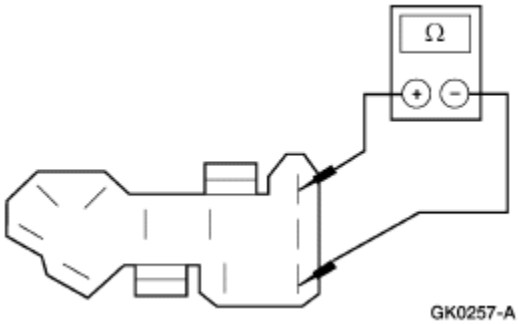
• One Turn Signal/Hazard Lamp Is Never On	• Turn signal/hazard flasher lamp. • Circuitry.	• GO to Pinpoint Test N .
• The Turn Signal Lamps Are Always On	• Multi-function switch.	• REPLACE the multi-function switch.
• The Hazard Flasher Lamps Are Always On	• Multi-function switch.	• REPLACE the multi-function switch.

Pinpoint Tests

PINPOINT TEST L: THE TURN SIGNAL LAMPS ARE NEVER ON

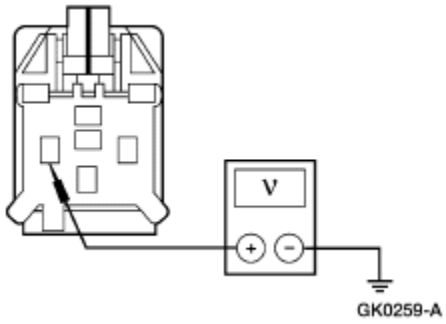
CONDITIONS	DETAILS/RESULTS/ACTIONS
L1 CHECK THE FUSE	
1  2  Fuse Junction Panel Fuse 21 (15A)	• **Is the fuse OK?** → **Yes** REINSTALL the fuse. GO to L2 . → **No** REPLACE the fuse. TEST the system for normal operation. If the fuse fails again, CHECK for short to ground. REPAIR as necessary.
L2 CHECK THE VOLTAGE TO THE INDICATOR FLASHER	
1  Indicator Flasher C214 2 	

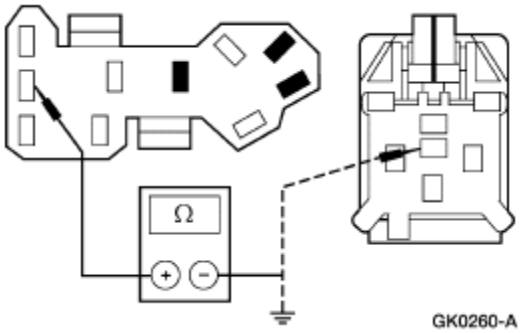
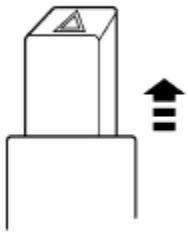
3  GK0254-A	3 Measure the voltage between indicator flasher C214-5, circuit 8 (OG/YE), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to L3 . → **No** REPAIR circuit 8 (OG/YE). TEST the system for normal operation.
L3 CHECK CIRCUIT 44 (LB) FOR SHORT AND OPEN	
1  2  Multi-Function Switch C217 3  GK0255-A	3 Measure the resistance between multi-function switch C217-44, circuit 44 (LB), and indicator flasher C214-1, circuit 44 (LB); and between multi-function switch C217-44, circuit 44 (LB), and ground. • **Is the resistance less than 5 ohms between the multi-function switch and the indicator flasher, and greater than 10,000 ohms between the multi-function switch and ground?** → **Yes**

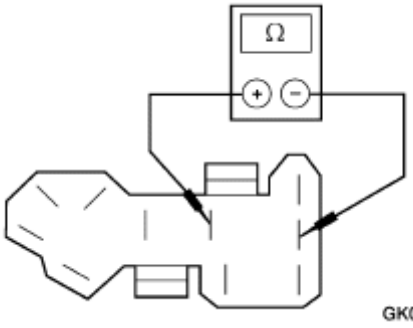
	GO to L4 . → **No** REPAIR circuit 44 (LB). TEST the system for normal operation.
L4 CHECK THE MULTI-FUNCTION SWITCH CONTINUITY	
1  GK0256-A	1 Place the multi-function switch in the left turn position.
2  GK0257-A	2 Measure the resistance between multi-function switch terminal 3 and terminal 44 (component side). • **Is the resistance less than 5 ohms?** → **Yes** REPLACE the indicator flasher. TEST the system for normal operation. → **No** REPLACE the multi-function switch. TEST the system for normal operation.

PINPOINT TEST M: THE HAZARD FLASHER LAMPS ARE NEVER ON

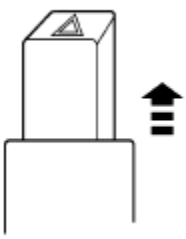
CONDITIONS	DETAILS/RESULTS/ACTIONS
M1 CHECK THE FUSE	
1 	

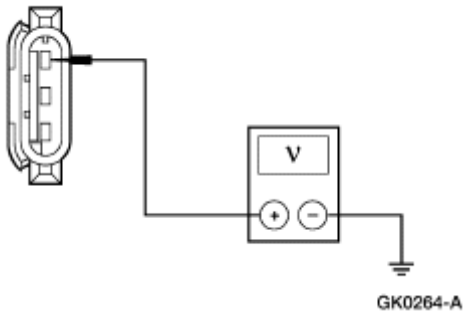
2  Fuse Junction Panel Fuse 21 (15A)	• **Is the fuse OK?** → **Yes** REINSTALL the fuse. GO to M2 . → **No** REPLACE fuse junction panel fuse 21 (15A). TEST the system for normal operation. If the fuse fails again, CHECK for short to ground. REPAIR as necessary.
M2 CHECK THE VOLTAGE TO THE INDICATOR FLASHER	
1  Indicator Flasher C214	
2  GK0259-A	2 Measure the voltage between indicator flasher C214-2, circuit 383 (RD/WH), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to M3 . → **No** REPAIR circuit 383 (RD/WH). TEST the system for normal operation.
M3 CHECK CIRCUIT 385 (WH/RD) FOR SHORT AND OPEN	
1  Multi-Function Switch C217	

2  	2 Measure the resistance between multi-function switch C217-385, circuit 385 (WH/RD), and indicator flasher C214-3, circuit 385 (WH/RD); and between multi-function switch C217-385, circuit 385 (WH/RD), and ground. • **Is the resistance less than 5 ohms between the multi-function switch and the indicator flasher, and greater than 10,000 ohms between the multi-function switch and ground?** → **Yes** GO to M4 . → **No** REPAIR circuit 385 (WH/RD). TEST the system for normal operation.
M4 CHECK THE MULTI-FUNCTION SWITCH CONTINUITY	
1  2  3	2 Place the hazard switch in the ON position. 3 Measure the resistance between multi-function switch terminal 2 and terminal 385 (component side).

 GK0261-A	• **Is the resistance less than 5 ohms?** → **Yes** REPLACE the indicator flasher. TEST the system for normal operation. → **No** REPLACE the multi-function switch. TEST the system for normal operation.

PINPOINT TEST N: ONE TURN SIGNAL/HAZARD LAMP IS NEVER ON

CONDITIONS	DETAILS/RESULTS/ACTIONS
N1 CHECK THE VOLTAGE TO THE INOPERATIVE LAMP	
1 	
2  Inoperative Turn Signal/Hazard Lamp	
3  GK0262-A	3 Place the hazard switch in the ON position.
4	4 Measure the voltage between the following lamp connectors and ground:



- LH front circuit 3 (LG/WH).
- LH side circuit 3 (LG/WH).
- RH front circuit 2 (WH/LB).
- RH side circuit 2 (WH/LB).
- LR circuit 9 (LG/OG).
- RR circuit 5 (OG/LB).

- **Is the voltage greater than 10 volts?**

→ **Yes**
REPLACE the turn signal/hazard lamp in question. TEST the system for normal operation.

→ **No**
REPAIR the circuit(s) in question. TEST the system for normal operation.

Parking, Rear and License Lamps

Refer to Wiring Diagrams Cell 92 , Exterior Lamps for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Inspection and Verification

1. Verify the customer concern by operating the parking lamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged switch(es)	• Fuse(s) • Damaged wiring harness • Loose or corroded connections • Relay(s)

3. If the fault is not visually evident, determine the symptom and proceed to Symptom Chart.

Symptom Chart

Symptom Chart

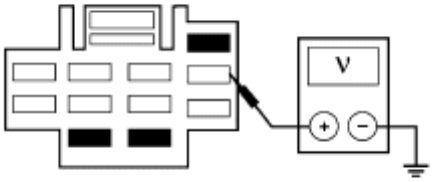
Condition	Possible Sources	Action
• The Parking, Rear or License Lamps Are Inoperative	• Fuse(s). • Circuitry. • Headlamp switch (11654).	• GO to Pinpoint Test P .
• The Autolamps Operate, but Parking, Rear or License Lamps Are Inoperative	• Fuse(s). • Parking lamp relay. • Circuitry.	• GO to Pinpoint Test Q .

• One or More Parking, Rear or License Lamps Is Inoperative	• Parking, rear or license lamp. • Circuitry.	• GO to Pinpoint Test R .
• The Parking, Rear or License Lamps Are On Continuously	• Headlamp switch. • Parking lamp relay.	• GO to Pinpoint Test S .
• The Parking, Rear or License Lamps Are Inoperative — Rear Stop/Tail Lamps Inoperative	• Stop/Tail Lamps. • Circuitry.	• GO to Pinpoint Test T .

Pinpoint Tests

PINPOINT TEST P: THE PARKING, REAR OR LICENSE LAMPS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
P1 CHECK THE FUSE	
1  2  Fuse Junction Panel Fuse 3 (15A)	• **Is the fuse OK?** → **Yes** REINSTALL the fuse. GO to P2 . → **No** REPLACE the fuse. TEST the system for normal operation. If the fuse fails again, CHECK for short to ground. REPAIR as necessary.
P2 CHECK THE VOLTAGE TO THE HEADLAMP SWITCH	
1  Headlamp Switch C216 2	2 Measure the voltage between headlamp switch C216-5, circuit 195 (TN/WH), and



GK0268-A

ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
RECONNECT the headlamp switch. If equipped with anti-theft, GO to P3 .

If not equipped with anti-theft, GO to P6 .

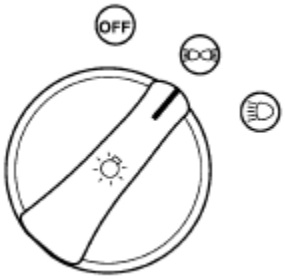
→ **No**
REPAIR circuit 195 (TN/WH). TEST the system for normal operation.

P3 CHECK THE VOLTAGE TO THE PARKING LAMP RELAY

1

Parking Lamp Relay

2

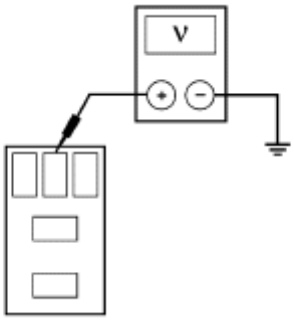


GK0272-A

2 Place the headlamp switch in the ON position.

3

3 Measure the voltage between the parking lamp relay connector pin 4, circuit 1032 (WH/BK), and ground.



- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to P5 .

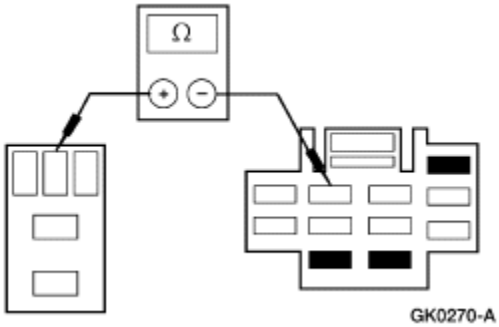
→ **No**
GO to P4 .

P4 CHECK CIRCUIT 1032 (WH/BK) FOR OPEN

1

Headlamp Switch C216

2



2 Measure the resistance between headlamp switch C216-3, circuit 1032 (WH/BK), and parking lamp relay connector pin 4, circuit 1032 (WH/BK).

- **Is the resistance less than 5 ohms?**

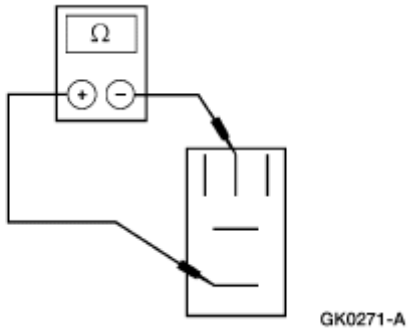
→ **Yes**
REPLACE the headlamp switch. TEST the system for normal operation.

→ **No**
REPAIR circuit 1032 (WH/BK). TEST the system for normal operation.

P5 CHECK THE PARKING LAMP RELAY FOR OPEN

1

1 Measure the resistance between parking lamp relay terminal 4 and terminal 3.



- **Is the resistance less than 5 ohms?**

→ **Yes**
REPAIR circuit 14 (BN). TEST the system for normal operation.

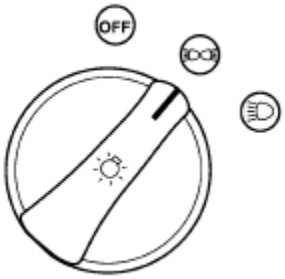
→ **No**
REPLACE the parking lamp relay. TEST the system for normal operation.

P6 CHECK VOLTAGE TO THE INOPERATIVE LAMP

1

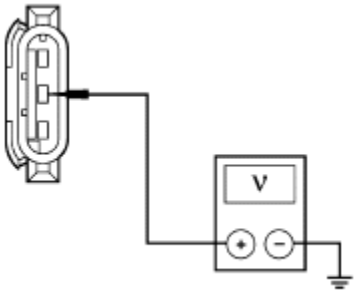
Inoperative Lamp

2

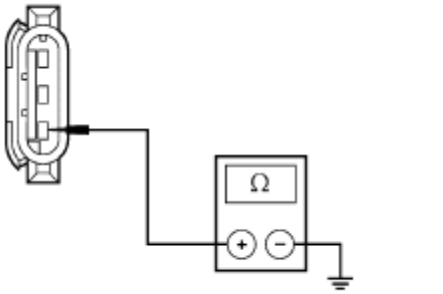


2 Place the headlamp switch in the ON position.

3

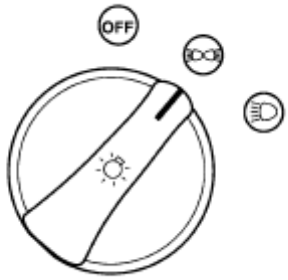


3 Measure the voltage between inoperative lamp, circuit 14 (BN), and ground.

	• **Is the voltage greater than 10 volts?** → **Yes** GO to P7 . → **No** REPAIR circuit 14 (BN). TEST the system for normal operation.
P7 CHECK CIRCUIT 57 (BK)	
1  GK0278-A	1 Measure the resistance between inoperative lamp, circuit 57 (BK), and ground. • **Is the resistance less than 5 ohms?** → **Yes** REPLACE the inoperative lamp bulb. TEST the system for normal operation. → **No** REPAIR circuit 57 (BK). TEST the system for normal operation.

PINPOINT TEST Q: THE AUTOLAMPS OPERATE, BUT PARKING, REAR OR LICENSE LAMPS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
Q1 CHECK PARKING LAMPS MANUALLY	
1 	
2	2 Place the headlamp switch in the parking lamps ON position.



GK0272-A

- **Do the parking lamps illuminate?**

→ **Yes**
GO to Q2 .

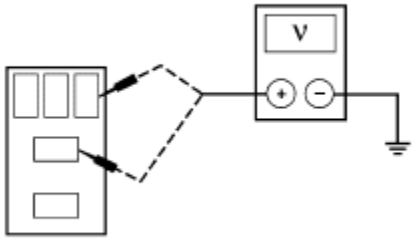
→ **No**
GO to Pinpoint Test P .

Q2 CHECK THE VOLTAGE TO THE PARKING LAMP RELAY

1

Parking Lamp Relay

2



GK0275-A

2 Measure the voltage between parking lamp relay connector pin 1, circuit 195 (TN/WH), and ground; and between parking lamp relay connector pin 5, circuit 195 (TN/WH), and ground.

- **Are the voltages greater than 10 volts?**

→ **Yes**
GO to Q3 .

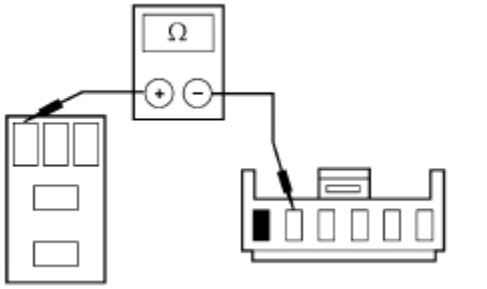
→ **No**
REPAIR circuit 195 (TN/WH). TEST the system for normal operation.

Q3 CHECK THE CONTINUITY OF CIRCUIT 218 (WH/VT)

1

Light Sensor Amplifier C341

2



2 Measure the resistance between light sensor amplifier C341-2, circuit 218 (WH/VT), and parking lamp relay connector pin 2, circuit 218 (WH/VT).

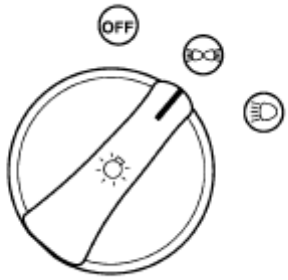
- **Is the resistance less than 5 ohms?**

→ **Yes**
REPLACE the parking lamp relay. TEST the system for normal operation.

→ **No**
REPAIR circuit 218 (WH/VT). TEST the system for normal operation.

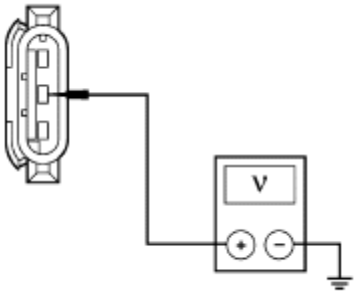
PINPOINT TEST R: ONE OR MORE PARKING, REAR OR LICENSE LAMPS IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
R1 CHECK THE VOLTAGE TO THE INOPERATIVE LAMP(S)	
1 	
2  Inoperative Lamp(s)	
3	3 Place the headlamp switch in the parking lamps ON position.



GK0272-A

4



GK0277-A

4 Measure the voltage between inoperative lamp connector, circuit 14 (BN), and ground.

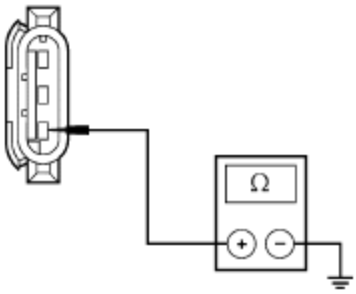
- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to R2 .

→ **No**
REPAIR circuit 14 (BN). TEST the system for normal operation.

R2 CHECK CIRCUIT 57 (BK) FOR OPEN

1



GK0278-A

1 Measure the resistance between inoperative rear lamp, circuit 57 (BK), and ground.

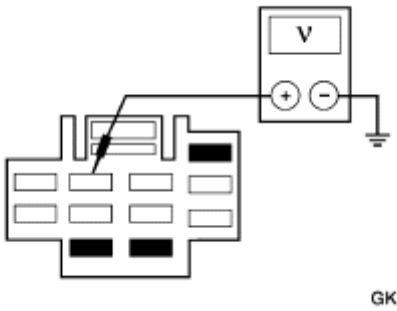
- **Is the resistance less than 5 ohms?**

→ **Yes**
REPLACE the inoperative parking, rear or license lamp bulb. TEST the system for normal operation.

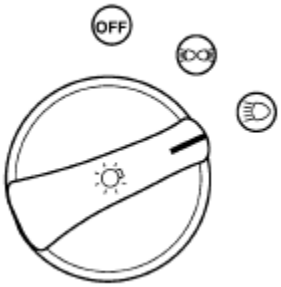
	→ **No** REPAIR circuit 57 (BK). TEST the system for normal operation.

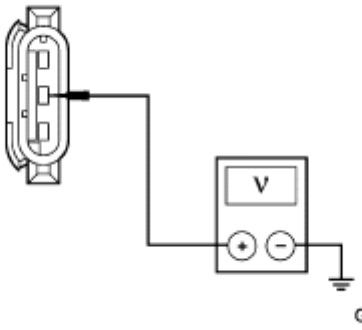
PINPOINT TEST S: THE PARKING, REAR OR LICENSE LAMPS ARE ON CONTINUOUSLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
S1 CHECK CIRCUIT 14 (BN)	
1  2  Headlamp Switch	1 • **Are the parking lamps illuminated?** → **Yes** If equipped with anti-theft, GO to S2 . If not equipped with anti-theft, REPAIR circuit 14 (BN). TEST the system for normal operation. → **No** REPLACE the headlamp switch. TEST the system for normal operation.
S2 CHECK CIRCUIT 14 (BN) FOR SHORT	
1  Parking Lamp Relay	• **Are the parking lamps illuminated?** → **Yes** REPAIR circuit 14 (BN). TEST the system for normal operation. → **No** GO to S3 .
S3 CHECK CIRCUIT 1032 (WH/BK) FOR VOLTAGE	
1	1 Measure the voltage between headlamp

 GK0279-A	switch C216-3, circuit 1032 (WH/BK), and ground. • **Is voltage indicated?** → **Yes** REPAIR circuit 1032 (WH/BK). TEST the system for normal operation. → **No** REPLACE the parking lamp relay. TEST the system for normal operation.

PINPOINT TEST T: THE PARKING, REAR OR LICENSE LAMPS ARE INOPERATIVE — REAR STOP/TAIL LAMPS

CONDITIONS	DETAILS/RESULTS/ACTIONS
T1 CHECK THE VOLTAGE TO THE INOPERATIVE LAMP	
1  Inoperative Lamp	
2  K26996-A	2 Place the headlamp switch in the ON position.
3	3 Measure the voltage between the inoperative lamp, circuit 14 (BN), and ground.



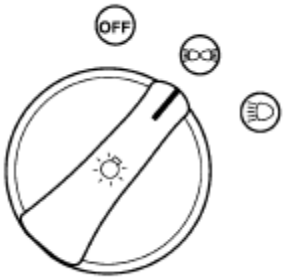
- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to T2 .

→ **No**
REPAIR circuit 14 (BN). TEST the system for normal operation.

T2 CHECK CIRCUIT 57 (BK)

1



1 Measure the resistance between inoperative lamp, circuit 57 (BK), and ground.

- **Is the resistance less than 5 ohms?**

→ **Yes**
REPLACE the inoperative lamp bulb. TEST the system for normal operation.

→ **No**
REPAIR circuit 57 (BK). TEST the system for normal operation.

Fog Lamps

Refer to Wiring Diagrams Cell 86 , Fog Lamps for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Inspection and Verification

1. Verify the customer concern by operating the fog lamps.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged fog lamp switch	• Central junction box (CJB) Fuse 33 (15A) • CJB Fuse 4 (15A) • Damaged wiring harness • Loose or corroded connections • Damaged relay(s)

3. If the fault is not visually evident, determine the symptom and proceed to Symptom Chart.

Symptom Chart

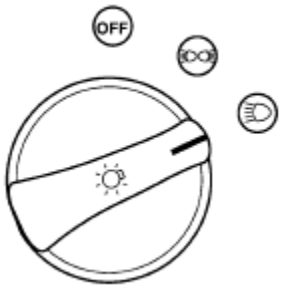
Symptom Chart

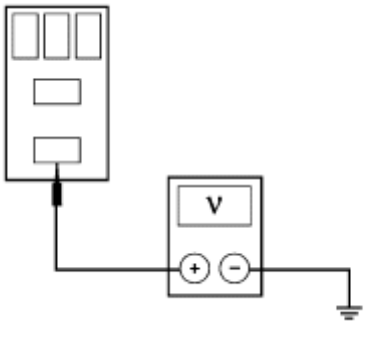
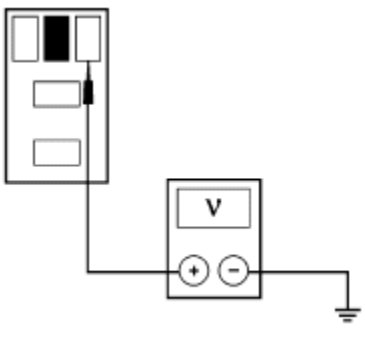
Condition	Possible Sources	Action
• The Fog Lamps Are Inoperative	• CJB Fuse 4 (15A). • CJB Fuse 33 (15A) • Bulbs. • Circuitry. • Fog lamp relay. • Fog lamp isolation relay. • Fog lamp switch.	• GO to Pinpoint Test U .

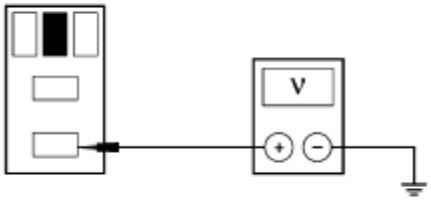
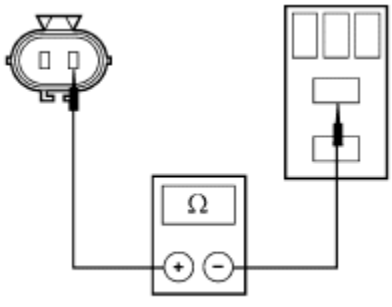
• The Individual Fog Lamp Is Inoperative	• Bulb. • Circuitry.	• GO to Pinpoint Test V .
• The Fog Lamps Are On Continuously	• Fog lamp relay. • Fog lamp switch. • Circuitry.	• GO to Pinpoint Test W .

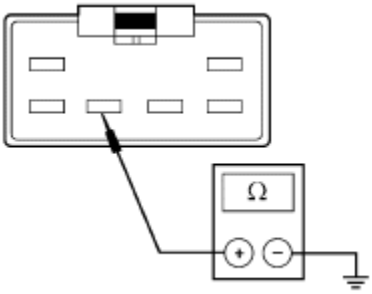
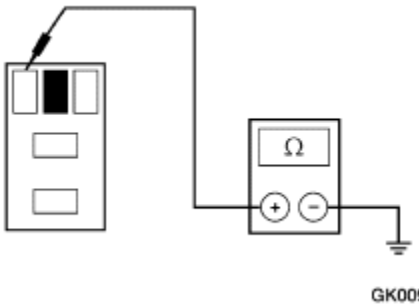
Pinpoint Tests

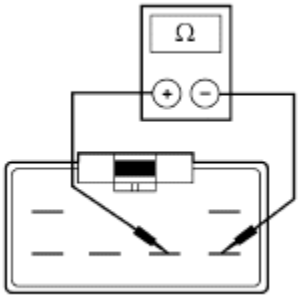
PINPOINT TEST U: THE FOG LAMPS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
U1 CHECK THE HEADLAMPS MANUALLY	
1  2  K26996-A	2 Place the headlamp switch (11654) in the ON position. 3 Verify that the headlamps are in low beam. • **Do the headlamps illuminate?** → **Yes** GO to U2 . → **No** REFER to Headlamps
U2 CHECK THE VOLTAGE TO THE FOG LAMP ISOLATION RELAY	
1  Fog Lamp Isolation Relay 2	2 Measure the voltage between fog lamp isolation relay connector pin 3, circuit 1032

	(WH/BK), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to U3 . → **No** REPAIR the circuit. TEST the system for normal operation.
U3 CHECK THE FOG LAMP ISOLATION RELAY	
	1 Check the fog lamp isolation relay. Refer to Component Test. • **Is the relay OK?** → **Yes** REINSTALL the fog lamp isolation relay.GO to U4 . → **No** REPLACE the fog lamp isolation relay. TEST the system for normal operation.
U4 CHECK THE VOLTAGE TO THE FOG LAMP RELAY COIL SIDE	
1  Fog Lamp Relay	
2 	2 Measure the voltage between the fog lamp relay connector pin 1, circuit 474 (LG/OG), and ground.

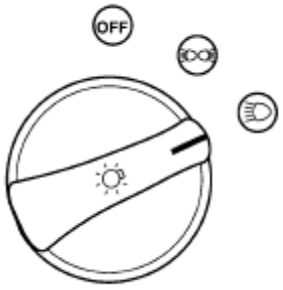
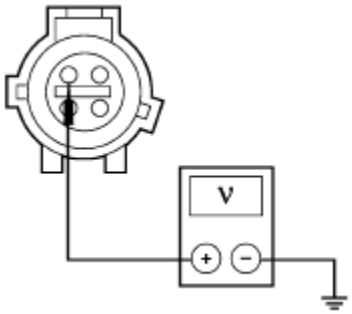
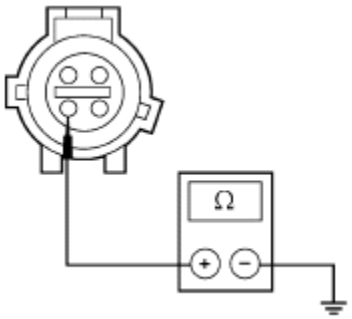
	• **Is the voltage greater than 10 volts?** → **Yes** GO to U5 . → **No** REPAIR the circuit. TEST the system for normal operation.
U5 CHECK THE VOLTAGE TO THE FOG LAMP RELAY	
1  GK0110-A	1 Measure the voltage between fog lamp relay connector pin 3, circuit 175 (BK/YE), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to U6 . → **No** REPAIR the circuit. TEST the system for normal operation.
U6 CHECK CIRCUIT 478 (TN/OG) FOR OPEN	
1  Fog Lamps 2  GK9664-A	2 Measure the resistance between fog lamp relay connector pin 5, circuit 478 (TN/OG), and LH fog lamp C192, circuit 478 (TN/OG); and between fog lamp relay connector pin 5, circuit 478 (TN/OG), and RH fog lamp C193, circuit 478 (TN/OG). • **Are the resistances less than 5 ohms?**

	→ **Yes** GO to U7 . → **No** REPAIR the circuit. TEST the system for normal operation.
U7 CHECK FOG LAMP SWITCH GROUND CIRCUIT 57 (BK) FOR OPEN	
1  Fog Lamp Switch C268 2  GK3191-A	2 Measure the resistance between fog lamp switch C268 Pin 4, circuit 57 (BK), and ground. • **Is the resistance less than 5 ohms?** → **Yes** RECONNECT the fog lamp switch. GO to U8 . → **No** REPAIR the circuit. TEST the system for normal operation.
U8 CHECK CIRCUIT 477 (LB/BK) CONTINUITY	
2  GK0096-A	1 Place the fog lamp switch in the ON position. 2 Measure the resistance between fog lamp relay pin 2, circuit 477 (LB/BK), and ground. • **Is the resistance less than 5 ohms?**

	→ **Yes** REPLACE the fog lamp relay. TEST the system for normal operation. → **No** GO to U9 .
U9 CHECK THE CONTINUITY OF THE FOG LAMP SWITCH	
1  Fog Lamp Switch C268 2  GK0284-A	2 Measure the resistance between fog lamp switch terminal 3 (component side) and terminal 4 (component side). • **Is the resistance less than 5 ohms?** → **Yes** REPAIR circuit 477 (LB/BK). TEST the system for normal operation. → **No** REPLACE the fog lamp switch. TEST the system for normal operation.

PINPOINT TEST V: THE INDIVIDUAL FOG LAMP IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
V1 CHECK THE VOLTAGE TO THE FOG LAMP	
1  2  Inoperative Fog Lamp	

3  K26996-A	3 Place the headlamp switch in the ON position.
	4 Verify the headlamps are in the low beam position. 5 Place the fog lamp switch in the ON position.
6  GK9651-A	6 Measure the voltage between inoperative fog lamp C192 or C193, circuit 478 (TN/OG), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to V2 . → **No** REPAIR the circuit. TEST the system for normal operation.
V2 CHECK CIRCUIT 57 (BK) FOR OPEN	
1  GK9652-A	1 Measure the resistance between inoperative fog lamp C192 or C193, circuit 57 (BK), and ground. • **Is the resistance less than 5 ohms?**

	→ **Yes** REPLACE the inoperative fog lamp bulb. TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST W: THE FOG LAMPS ARE ON CONTINUOUSLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
W1 CHECK CIRCUIT 478 (TN/OG) FOR SHORT TO BATTERY	
1  2  Fog Lamp Relay	• **Are the fog lamps illuminated?** → **Yes** REPAIR circuit 478 (TN/OG). TEST the system for normal operation. → **No** REINSTALL the fog lamp relay. GO to W2 .
W2 CHECK FOG LAMP SWITCH	
1  Fog Lamp Switch	• **Are the fog lamps illuminated?** → **Yes** GO to W3 . → **No** REPLACE the fog lamp switch. TEST the system for normal operation.
W3 CHECK THE FOG LAMP RELAY	
	1 Check the fog lamp relay. Refer to Component Test.

	• **Is the relay OK?** → **Yes** REPAIR circuit 477 (LB/BK). TEST the system for normal operation. → **No** REPLACE the fog lamp relay. TEST the system for normal operation.

Reversing Lamps

Refer to Wiring Diagrams Cell 93 , Backup Lamps for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Inspection and Verification

1. Verify the customer concern by operating the backup lamps.
2. Visually inspect for obvious signs of electrical damage.

Visual Inspection Chart

Electrical
• Fuse(s) • Damaged wiring harness • Loose or corroded connections • Bulb(s)

3. If the fault is not visually evident, determine the symptom and proceed to Symptom Chart.

Symptom Chart

Symptom Chart

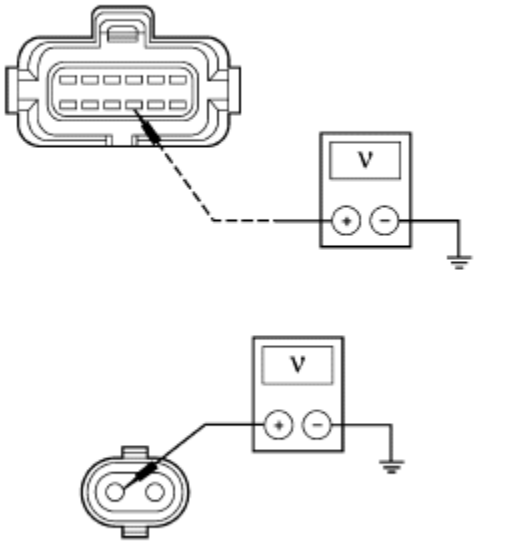
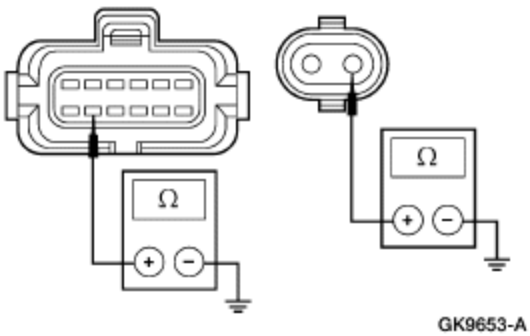
Condition	Possible Sources	Action
• The Backup Lamps Are Inoperative	• Fuse(s). • Circuitry. • Digital transmission range (DTR) sensor (A/T). • Backup lamp switch (M/T).	• GO to Pinpoint Test X .
• The Individual Backup Lamp Is Inoperative	• Backup lamp. • Circuitry.	• GO to Pinpoint Test Y .
• The Backup Lamps Are On	• Circuitry.	• GO to Pinpoint

Continuously	• Digital transmission range (DTR) sensor (A/T). • Backup lamp switch (M/T).	Test Z .

Pinpoint Tests

PINPOINT TEST X: THE BACKUP LAMPS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
X1 CHECK THE FUSE	
1  Fuse Junction Panel Fuse 27 (15A)	• **Is the fuse OK?** → **Yes** REINSTALL the fuse. GO to X2 . → **No** REPLACE the fuse. TEST the system for normal operation. If the fuse fails again, GO to X4 .
X2 CHECK CIRCUIT 298 (VT/OG) FOR OPEN	
1  2  DTR Sensor (A/T) 3  Backup Lamp Switch (M/T) 4 	

5  GK5850-A	5 Measure the voltage between DTR sensor C112-9, circuit 298 (VT/OG) (A/T), and ground; or between backup lamp switch C172, circuit 298 (VT/OG) (M/T), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to X3 . → **No** REPAIR circuit 298 (VT/OG). TEST the system for normal operation.
X3 CHECK CIRCUIT 140 (BK/PK) CONTINUITY	
1  2  GK9653-A	2 Measure the resistance between DTR sensor C112-11, circuit 140 (BK/PK) (A/T), and ground; or between backup lamp switch C172, circuit 140 (BK/PK) (M/T), and ground. • **Is the resistance less than 5 ohms?**

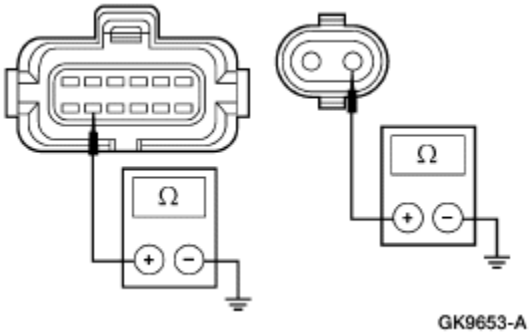
	→ **Yes** REPLACE the DTR (A/T) or backup lamp switch (M/T). TEST the system for normal operation. → **No** REPAIR circuit 140 (BK/PK). TEST the system for normal operation.
X4 CHECK CIRCUIT 298 (VT/OG) FOR SHORT TO GROUND	
1  DTR Sensor (A/T) 2  Backup Lamp Switch (M/T) 4  5  Fuse Junction Panel Fuse 27 (15A)	3 Replace fuse junction panel fuse 27 (15A). • **Is the fuse OK?** → **Yes** GO to X5 . → **No** REPAIR circuit 298 (VT/OG). TEST the system for normal operation.
X5 CHECK CIRCUIT 140 (BK/PK) FOR SHORT TO GROUND	
1  2	

LH Backup Lamp

3

RH Backup Lamp

4



GK9653-A

4 Measure the resistance between DTR sensor C112-11, circuit 140 (BK/PK) (A/T), and ground; or between backup lamp switch C172, circuit 140 (BK/PK) (M/T), and ground.

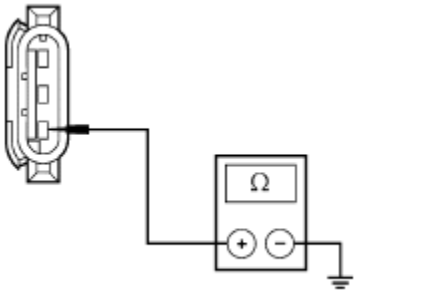
- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
GO to X6 .

→ **No**
REPAIR circuit 140 (BK/PK). TEST the system for normal operation.

X6 CHECK CIRCUIT 57 (BK) FOR SHORT TO GROUND

1



GK0278-A

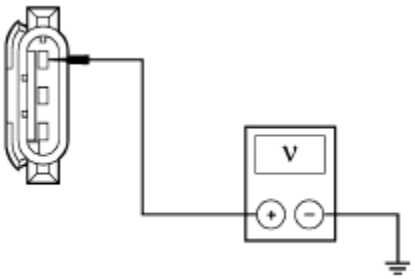
1 Measure the resistance between LH backup lamp C401, circuit 57 (BK), and ground.

- **Is the resistance less than 5 ohms?**

→ **Yes**
REPLACE the DTR sensor (A/T) or backup lamp switch (M/T). TEST the system for normal operation.

	→ **No** REPAIR circuit 57 (BK). TEST the system for normal operation.

PINPOINT TEST Y: THE INDIVIDUAL BACKUP LAMP IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
Y1 CHECK THE VOLTAGE AT THE INOPERATIVE LAMP	
1  2  Inoperative Backup Lamp 3  5  GK0264-A	4 Place the transmission in REVERSE. 5 Measure the voltage between inoperative backup lamp C401 (LH) or C416 (RH), circuit 140 (BK/PK), and ground.
	• **Is the voltage greater than 10 volts?** → **Yes** REPLACE the inoperative backup lamp. TEST the system for normal operation. → **No** REPAIR circuit 140 (BK/PK). TEST the system for normal operation.

PINPOINT TEST Z: THE BACKUP LAMPS ARE ON CONTINUOUSLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
Z1 CHECK THE DTR SENSOR (A/T) OR BACKUP LAMP SWITCH (M/T)	
1  2  DTR Sensor (A/T) 3  Backup Lamp Switch (M/T)	• **Are the backup lamps illuminated?** → **Yes** REPAIR circuit 140 (BK/PK). TEST the system for normal operation. → **No** REPLACE the DTR sensor (A/T) or backup lamp switch (M/T). TEST the system for normal operation.

Trailer Lamps

Refer to Wiring Diagrams Cell 95 , Trailer/Camper Adapter for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Inspection and Verification

1. Verify the customer concern by operating the trailer tow lights.
2. Verify the exterior lighting system of the vehicle is operating properly. If not, refer to the appropriate pinpoint test in this section.
3. Visually inspect for obvious signs of electrical damage.

Visual Inspection Chart

Electrical
• Central junction box (CJB) Fuse 3 (7.5A) • CJB Fuse 7 (7.5A) • CJB Fuse 30 (15A) • Loose or corroded connections • Damaged circuity • Damaged relays • Failed bulb(s)

4. If the fault is not visually evident, determine the symptom and proceed to Symptom Chart.

Symptom Chart

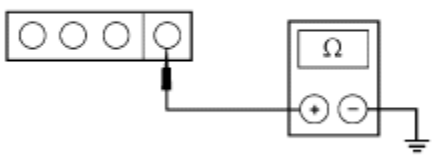
Symptom Chart

Condition	Possible Sources	Action
• The Trailer Lamps Are Inoperative	• Fuse. • Circuitry.	• GO to Pinpoint Test AA .
• The Trailer Lamps Are Inoperative — Both	• Circuitry.	• GO to

Trailer Turn Signals/Stoplamps/Hazard Lamps		Pinpoint Test AB .
• The Trailer Lamps Are Inoperative — RH Trailer Turn Signals/Stoplamps/Hazard Lamps	• Circuitry.	• GO to Pinpoint Test AC .
• The Trailer Lamps Are Inoperative — LH Trailer Turn Signals/Stoplamps/Hazard Lamps	• Circuitry.	• GO to Pinpoint Test AD .
• The Trailer Lamps Are Inoperative — Parking Lamps	• Circuitry. • Relay.	• GO to Pinpoint Test AE .

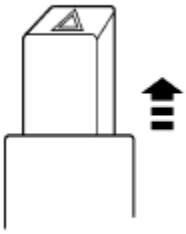
Pinpoint Tests

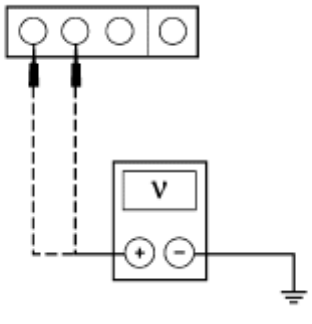
PINPOINT TEST AA: THE TRAILER LAMPS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
AA1 CHECK THE FUSE	
1  CJB Fuse 30 (15A)	• **Is the fuse OK?** → **Yes** GO to AA2 . → **No** REPLACE the fuse. If the fuse fails again, CHECK for short to ground. REPAIR as necessary. TEST the system for normal operation.
AA2 CHECK TRAILER TOW GROUND	
1  GK0450-A	1 Measure the resistance between trailer tow C408-4, circuit 206 (WH), and ground.

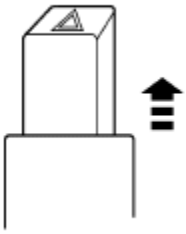
	• **Is the resistance less than 5 ohms?** → **Yes** The vehicle is operating properly. HAVE the trailer repaired by an authorized camper/trailer repair center. → **No** REPAIR circuit 206 (WH). TEST the system for normal operation.

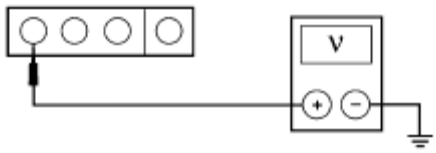
PINPOINT TEST AB: THE TRAILER LAMPS ARE INOPERATIVE — BOTH TRAILER TURN SIGNALS/STOPLAMPS/HAZARD LAMPS

CONDITIONS	DETAILS/RESULTS/ACTIONS
AB1 CHECK VEHICLE	
1  Trailer Tow C408	1 Check vehicle turn signals, stop lamps, and hazard lamps. • **Do the lamps operate correctly?** → **Yes** GO to AB2 . → **No** REFER to Turn Signal and Hazard Lamps Stoplamps
AB2 CHECK VOLTAGE TO THE TRAILER TOW CONNECTOR.	
1  GK0262-A	1 Place the hazard lamp switch in the ON position.
2	2 Check the voltage between trailer tow C408 Pin 1 circuit 64 (DG) and ground; and trailer tow C408 Pin 2 circuit 52 (YE) and ground

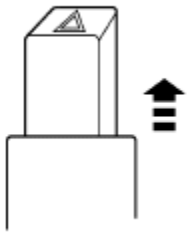
 GK9665-A	• **Does the voltage alternate between 0 volts and greater than 10 volts on each circuit?** → **Yes** The vehicle is operating properly. HAVE the trailer repaired by an authorized camper/trailer repair center. → **No** REPAIR the circuits in question. TEST the system for normal operation.

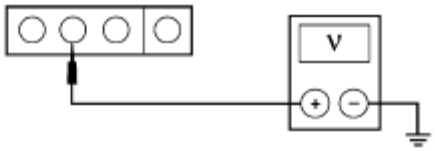
PINPOINT TEST AC: THE TRAILER LAMPS ARE INOPERATIVE — RH TRAILER TURN SIGNALS/STOPLAMPS/HAZARD LAMPS

CONDITIONS	DETAILS/RESULTS/ACTIONS
AC1 CHECK VOLTAGE TO RH TURN, STOP AND HAZARD TRAILER TOW CONNECTOR	
1  Trailer Tow C408	
2  GK0262-A	2 Place the hazard lamp switch in the ON position.
3	3 Measure the voltage between trailer tow C408 Pin 1, circuit 64 (DG), and ground.

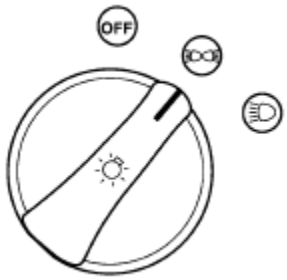
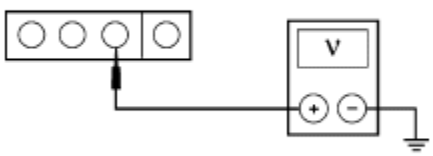
 GK0451-A	• **Does the voltage alternate between 0 volts and greater than 10 volts?** → **Yes** The vehicle is operating properly. HAVE the trailer repaired by an authorized camper/trailer repair center. → **No** REPAIR the circuit. TEST the system for normal operation.

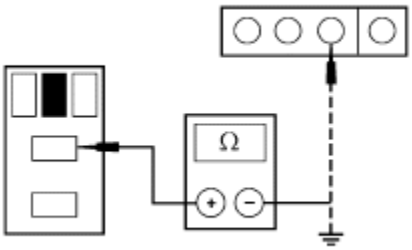
PINPOINT TEST AD: THE TRAILER LAMPS ARE INOPERATIVE — LH TRAILER TURN SIGNALS/STOPLAMPS/HAZARD LAMPS

CONDITIONS	DETAILS/RESULTS/ACTIONS
AD1 CHECK VOLTAGE TO LH TURN, STOP AND HAZARD TRAILER TOW CONNECTOR	
1  GK0262-A	1 Place the hazard lamp switch in the ON position.
2	2 Measure the voltage between trailer tow C408 Pin 2, circuit 52 (YE), and ground.

 GK0453-A	• **Does the voltage alternate between 0 volts and greater than 10 volts?** → **Yes** The vehicle is operating properly. HAVE the trailer repaired by an authorized camper/trailer repair center. → **No** REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST AE: THE TRAILER LAMPS ARE INOPERATIVE — PARKING LAMPS

CONDITIONS	DETAILS/RESULTS/ACTIONS
AE1 CHECK VOLTAGE TO PARK LAMPS TRAILER TOW CONNECTOR	
1  GK0272-A	1 Place the headlamp switch (11654) in the ON position.
2  GK0455-A	2 Measure the voltage between trailer tow C408 Pin 3, circuit 962 (BR/WH), and ground.

	• **Is the voltage greater than 10 volts?** → **Yes** The vehicle is operating properly. HAVE the trailer repaired by an authorized camper/trailer repair center. → **No** PLACE the headlamp switch in the OFF position. GO to AE2 .
AE2 CHECK CIRCUIT 962 (BR/WH) FOR OPEN AND SHORT	
1  Trailer Park Lamps Relay 2  GK0456-A	2 Measure the resistance between trailer park lamps relay connector pin 5, circuit 962 (BR/WH), and trailer tow C408 Pin 3, circuit 962 (BR/WH); and between trailer park lamps relay connector pin 5, circuit 962 (BR/WH), and ground. • **Is the resistance less than 5 ohms between the trailer park lamps relay connector and the trailer tow connector and greater than 10,000 ohms between the trailer park lamps relay connector and chassis ground?** → **Yes** REPLACE the trailer park lamps relay. TEST the system for normal operation. → **No** REPAIR the circuit . TEST the system for normal operation.

Component Test

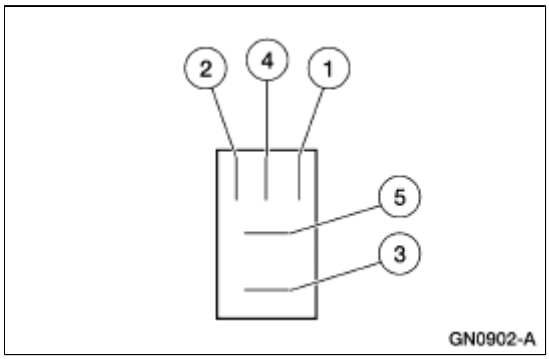
Relay

Testing an ISO relay can be accomplished through the use of three No. 10 (or larger gauge) jumper wires and 73 Digital Multimeter. Remove the relay to be tested from the power distribution box, fuse junction panel or individual connector.

Micro ISO Relay

Use 73 Digital Multimeter to check for continuity between terminal 2 and all other terminals. If resistance is 5 ohms or less between terminal 2 and any other terminal, replace the relay. If resistance is greater than 5 ohms, continue the test. Use two jumper wires to connect relay terminals 1 and 3 directly to the positive battery terminal. Set 73 Digital Multimeter in volts position and check for voltage at terminal 4. If battery voltage is not indicated, replace the relay. If battery voltage is indicated, connect the third jumper wire to terminal 2, and ground the jumper wire to chassis ground. Check for voltage at terminal 5. If battery voltage is not indicated, replace the relay.

Relay Pin Layout Micro ISO Bottom View



Headlamp Adjustment

Headlamp Aiming

1. The headlamp aiming procedure depends on the type of beam pattern the headlamp is equipped with. Vehicles may come equipped with visual optical right (VOR), visual optical left (VOL), or SAE only (includes sealed beam type) headlamps. To identify the headlamp beam pattern, look on the headlamp lens. Molded in small letters on the headlamp lens is one of the following:
    - SAE
    - VOR or SAE
    - VOL or SAE

2. Once the headlamp beam pattern is identified, aim the headlamps using one of the following methods as applicable.
    - Photometric aimers can aim SAE, VOR and VOL type headlamps. This is the preferred method of headlamp aiming.
    - Visual or screen method aiming can be used to aim SAE, VOR and VOL type headlamps.
    - Mechanical aimers can be used only with SAE type headlamps. Lamps that can be aimed mechanically will have three nibs molded into the lens of the lamp.

Photometric Aiming

1. For the photometric aiming procedure, refer to the appropriate photometric headlamp aimer instruction manual.

Screen Method Aiming

All headlamp types

NOTE: Horizontal aim is not necessary for VOR or VOL headlamps.

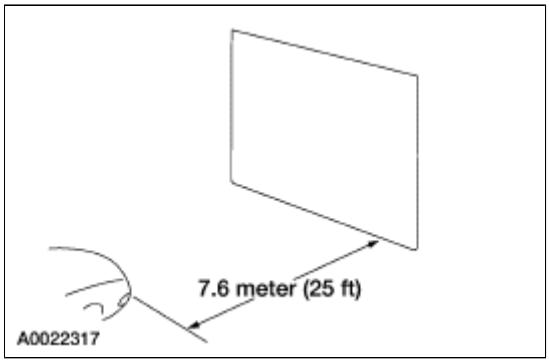
NOTE: Consult your state vehicle inspection manual for recommended tolerance ranges for visual aiming.

NOTE: The sight shield may need to be positioned or removed for access to the adjusters.

1. Before starting headlamp adjustment:
    - Check the tire inflation.
    - Check that no other load is in the vehicle other than a half tank of fuel.
    - Check that the headlamps are clean.
    - Check for correct headlamp operation.
    - Check that the vehicle is on level ground.
    - If the vehicle is equipped with air suspension, make sure that the switch is on.

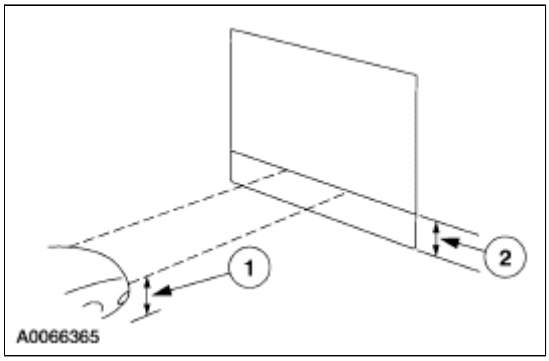
2. **NOTE:** The vertical wall or screen must be a minimum of 2.4 meters (8 feet) wide.

   Park the vehicle on a level surface approximately 7.6 meters (25 feet) from the vertical wall or screen directly in front of it.



3. **NOTE:** The center of the lamp is marked by a 3 mm (0.12 in) circle on the headlamp lens.

   Mark a horizontal reference line on the vertical wall or screen.
   1. Measure the center of the headlamp height to ground and record.
   2. Make a 2.4 meter (8 foot) horizontal mark (masking tape) on the vertical wall or screen at the same distance from the ground as previously recorded.



4. **NOTE:** This procedure should be done in a dark environment to effectively see the headlamp beam pattern.

   Turn on the low beam headlamps to illuminate the wall or screen and open the hood.

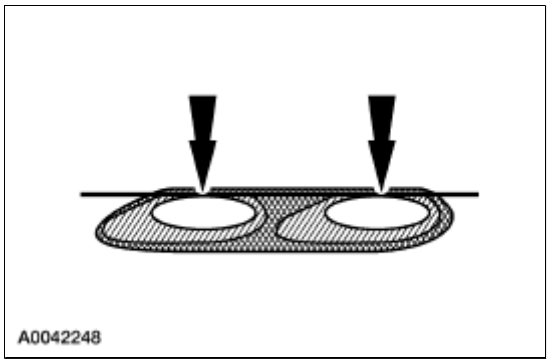
5. **NOTE:** For SAE type headlamps, the appearance of the beam pattern may vary between vehicles.

   On the wall or screen, locate the high intensity area of the beam pattern. Place the top edge of the high intensity zone even with the horizontal reference line.

VOR type headlamps

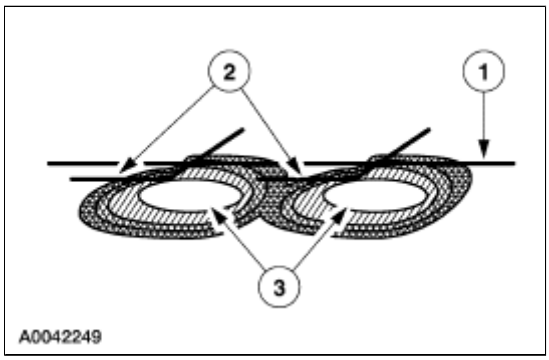
6. **NOTE:** The appearance of the VOR beam pattern may vary between vehicles.

   Identify at the top edge of this high intensity area a distinct horizontal cutoff in the beam pattern. If the top edge of this cutoff is not even with the horizontal reference line, the headlamp beam will need to be adjusted.



VOL type headlamps

7. For VOL type headlamps, there will be a distinct cutoff in the left portion of the beam pattern. The edge of this cutoff should be positioned 50.2 mm (2 in) below the horizontal reference line.
    1. Horizontal reference line.
    2. Top edge of the beam pattern.
    3. High intensity zone.



Mechanical Aiming

1. For the mechanical aiming procedure, refer to the appropriate mechanical headlamp aimer instruction manual.

Bulb —Headlamp

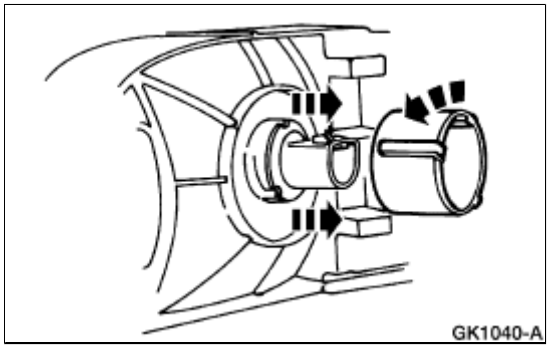
Removal

WARNING: The halogen bulb contains gas under pressure. The bulb may shatter if the glass envelope is scratched or if the bulb is dropped. Handle the bulb carefully. Grasp the bulb only by its base. Avoid touching the glass envelope.

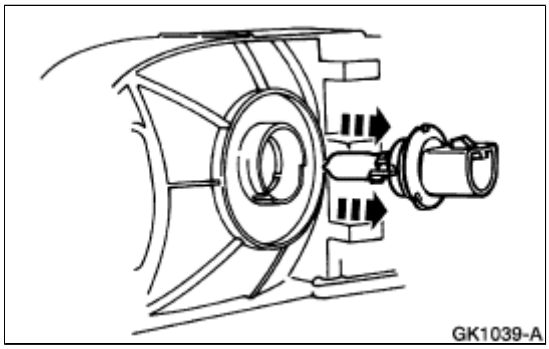
NOTE: The headlamp bulb should not be removed from the headlamp until just before a replacement bulb is installed. Removing the bulb for an extended period of time may affect headlamp bulb performance. Contaminants may enter the headlamp where they can settle on the lens and reflector. Never turn the headlamps on with the bulb removed.

1. Remove the headlamp assembly. Refer to Lamp Assembly—Headlamp (Explorer) or Lamp Assembly—Headlamp (Mountaineer) .

2. Rotate the headlamp bulb retainer counterclockwise and remove.



3. Remove the headlamp bulb.



Installation

1. **WARNING: The halogen bulb contains gas under pressure. The bulb may shatter if the glass envelope is scratched or if the bulb is dropped. Handle the bulb carefully. Grasp the bulb only by its base. Avoid touching the glass envelope.**

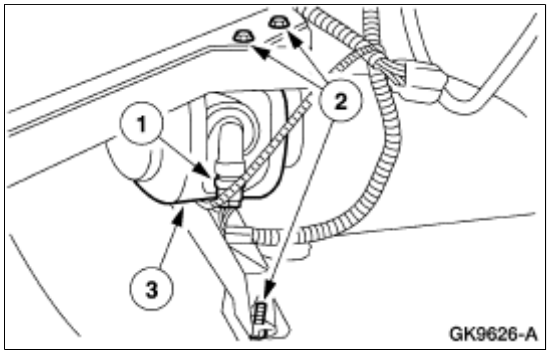
NOTE: Never turn the headlamps on with the bulb removed.

To install, reverse the removal procedure.

Lamp Assembly —Fog Lamp (Explorer)

Removal

1. Remove the fog lamp assembly.
    1. Disconnect the fog lamp bulb electrical connector.
    2. Remove the bolts.
    3. Remove the fog lamp assembly.
        - If necessary, transfer the fog lamp bulb to the new fog lamp assembly.



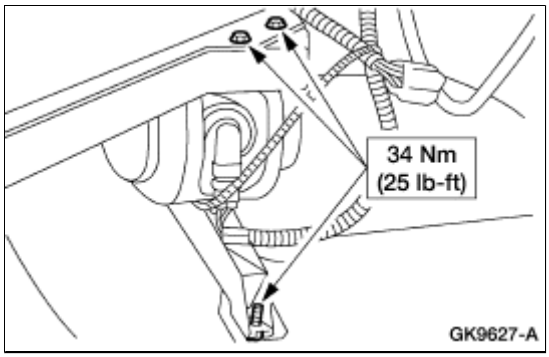
Installation

WARNING: The halogen bulb contains gas under pressure. The bulb may shatter if the glass envelope is scratched or if the bulb is dropped. Handle the bulb only by its base. Avoid touching the glass envelope.

NOTE: The fog lamp bulb should not be removed from the fog lamp until just before a replacement bulb is installed. Removing the bulb for an extended period of time may affect fog lamp bulb performance. Contaminants may enter the fog lamp where they can settle on the lens and reflector. Never turn on the fog lamps with the bulb removed.

1. **WARNING: The halogen bulb contains gas under pressure. The bulb may shatter if the glass envelope is scratched or if the bulb is dropped. Handle the bulb only by its base. Avoid touching the glass envelope.**

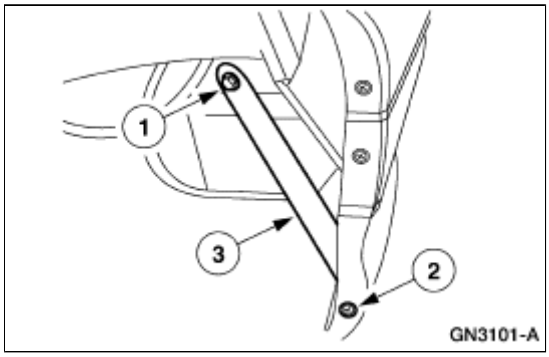
   To install, reverse the removal procedure.


34 Nm
(25 lb-ft)
GK9627-A

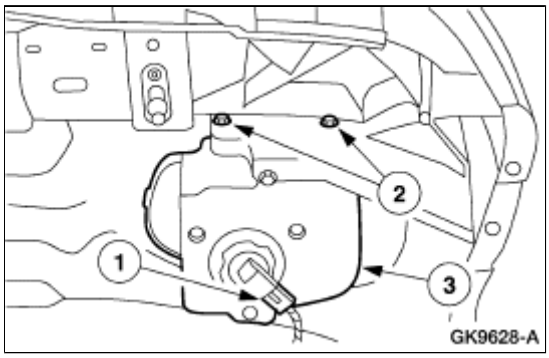
Lamp Assembly —Fog Lamp (Mountaineer)

Removal

1. Remove the bumper cover strut.
    1. Remove the bolt.
    2. Remove the screw.
    3. Remove the bumper cover strut.



2. Remove the fog lamp assembly.
    1. Disconnect the electrical connector.
    2. Remove the bolts.
    3. Remove the fog lamp assembly.
        - If necessary, transfer the fog lamp bulb to the new fog lamp assembly.

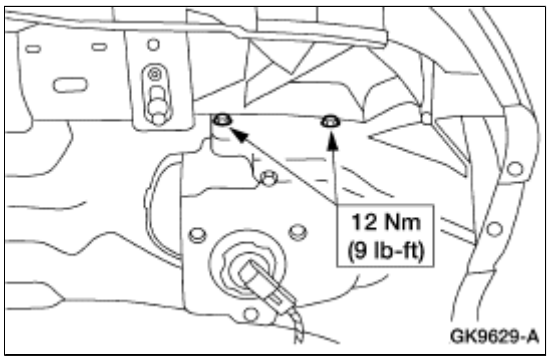


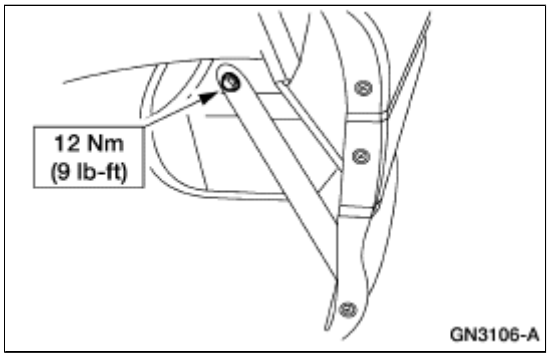
Installation

WARNING: The halogen bulb contains gas under pressure. The bulb may shatter if the glass envelope is scratched or if the bulb is dropped. Handle the bulb only by its base. Avoid touching the glass envelope.

NOTE: The fog lamp bulb should not be removed from the fog lamp until just before a replacement bulb is installed. Removing the bulb for an extended period of time may affect fog lamp bulb performance. Contaminants may enter the fog lamp where they can settle on the lens and reflector. Never turn on the fog lamps with the bulb removed.

1. To install, reverse the removal procedure.





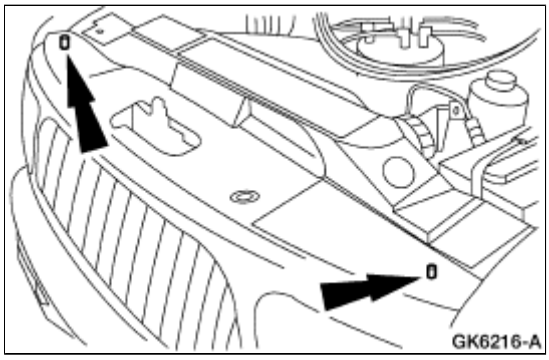
Lamp Assembly —Parking (Explorer)

Removal

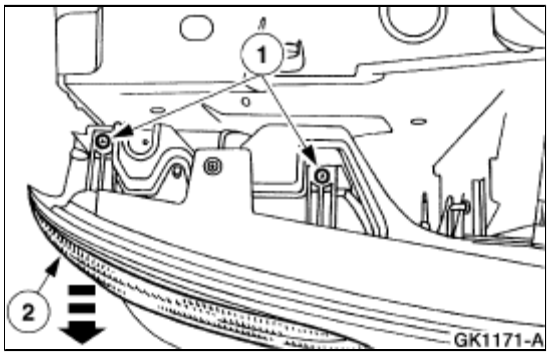
1. **NOTE:** Make sure that the headlamps switch and the ignition switch are in the OFF position.

   Raise and support the hood.

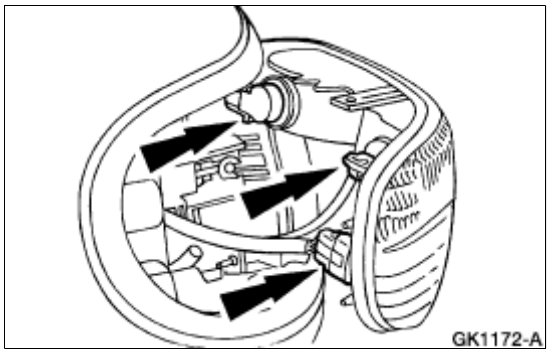
2. Depress the locking tab and open the radiator sight shield access door.



3. Remove the parking lamp assembly.
   1. Remove the screws.
   2. Remove the parking lamp assembly.

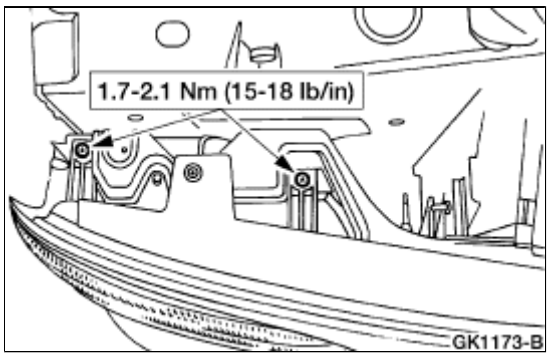


4. Disconnect the electrical connectors.
   - If necessary, transfer the parking lamp bulbs to the new parking lamp assembly.



Installation

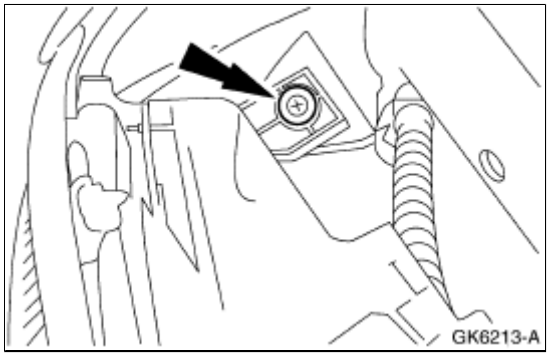
1. To install, reverse the removal procedure.
    - If necessary, adjust the headlamps. For additional information, refer to Headlamp Adjustment in this section.



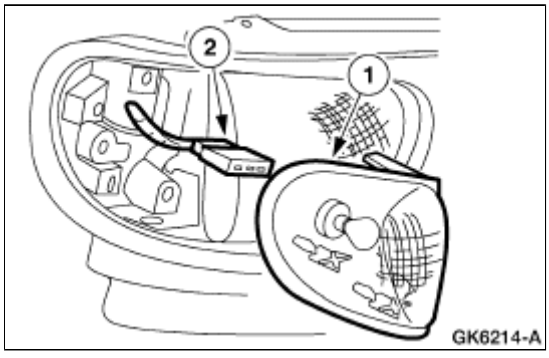
Lamp Assembly —Parking (Mountaineer)

Removal

1. Remove the parking lamp assembly screw.

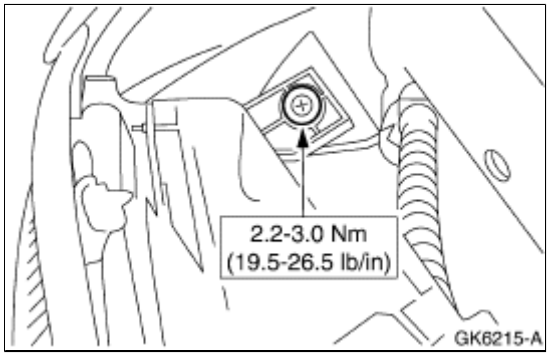


2. Remove the parking lamp assembly.
    1. Pull the lamp assembly forward just enough to expose the electrical connector.
    2. Disconnect the connector and remove the parking lamp assembly.



Installation

1. To install, reverse the removal procedure.



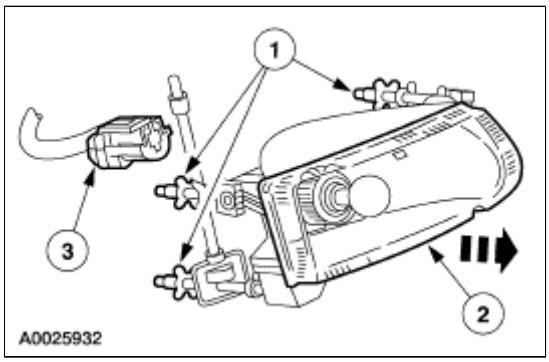
Lamp Assembly —Headlamp (Explorer)

Removal

1. **NOTE:** Make sure that the headlamp switch and the ignition switch are in the OFF position.

   Remove the parking lamp assembly. Refer to Lamp Assembly—Parking (Explorer) or Lamp Assembly—Parking (Mountaineer) .

2. Remove the headlamp assembly.
   1. Compress the self-locking tabs.
   2. Remove the headlamp assembly.
   3. Disconnect the electrical connector.



Installation

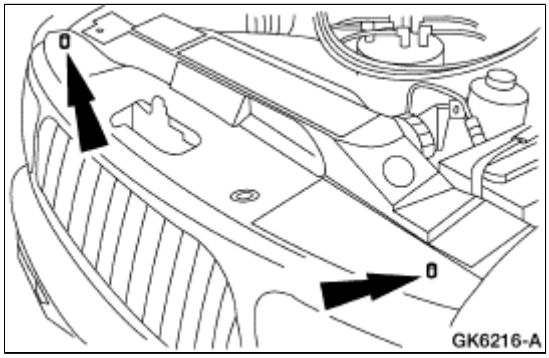
1. To install, reverse the removal procedure.
   - If necessary, adjust the headlamps. For additional information, refer to Headlamp Adjustment in this section.

Lamp Assembly —Headlamp (Mountaineer)

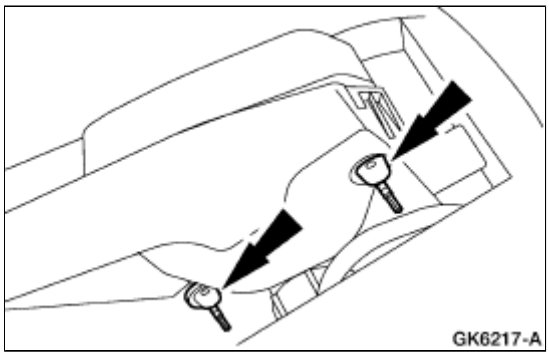
Removal

1. **NOTE:** Make sure that the headlamp switch and the ignition switch are in the OFF position.

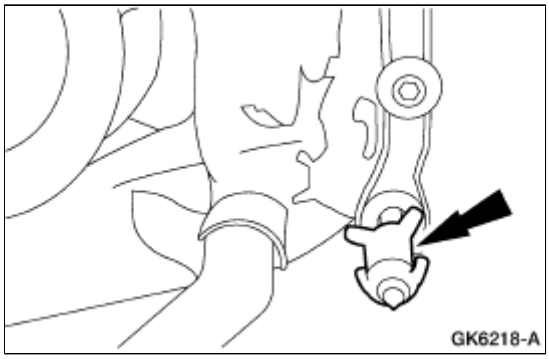
   Depress the locking tab and open the upper radiator sight shield access door.



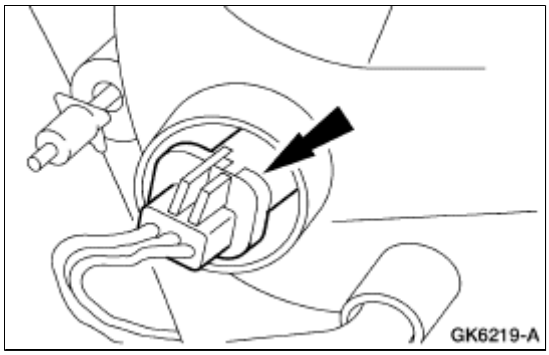
2. Remove the headlamp assembly clips.



3. Use a 14 mm quarter-drive, deep well socket to release the headlamp assembly retaining clip.



4. Remove the headlamp assembly.
   - Disconnect the electrical connector.



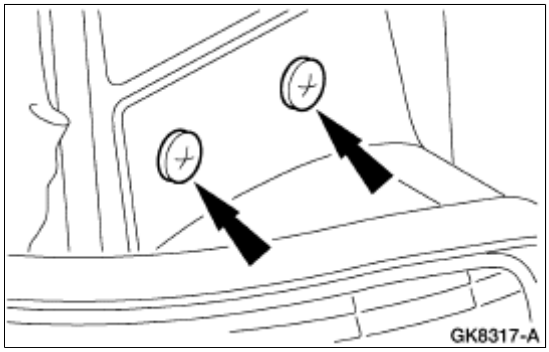
Installation

1. To install, reverse the removal procedure.
    - If necessary, adjust the headlamps. For additional information, refer to Headlamp Adjustment in this section.

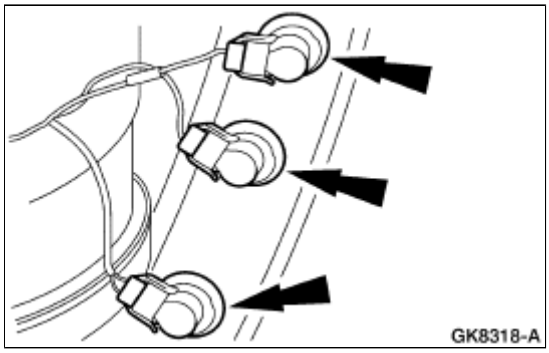
Lamp Assembly —Rear

Removal

1. Raise the liftgate and remove the rear lamp screws.

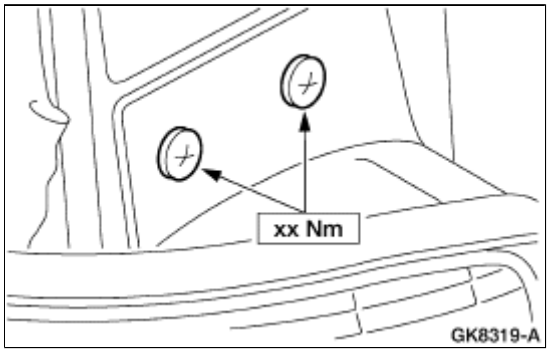


2. Remove the rear lamp.
   - Disconnect the electrical connectors.



Installation

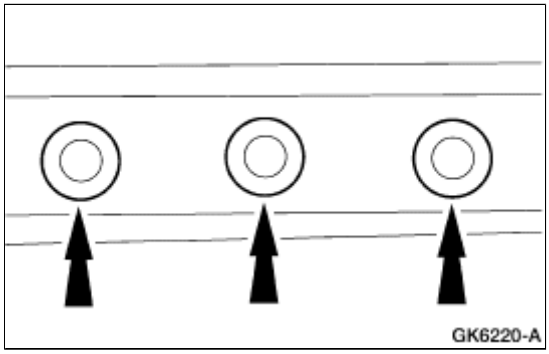
1. To install, reverse the removal procedure.



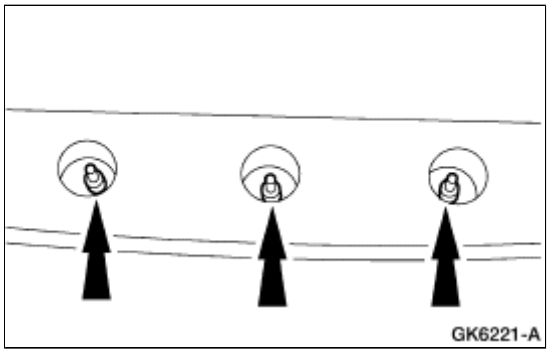
Lamp Assembly —High Mounted Stoplamp

Removal

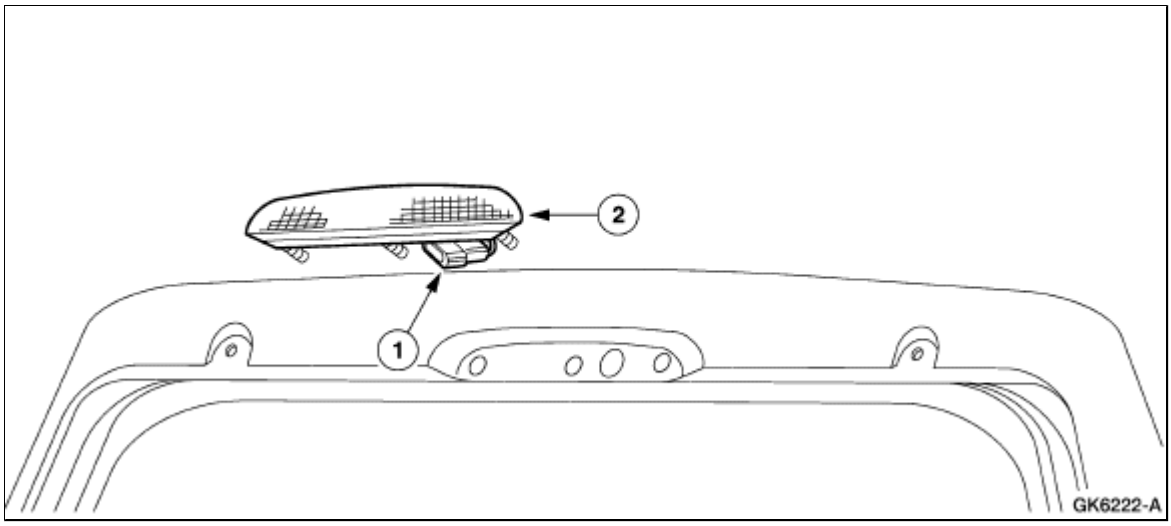
1. Remove the liftgate glass. Refer to Section 501-11 .
2. Remove the plugs.



3. Remove the nuts.

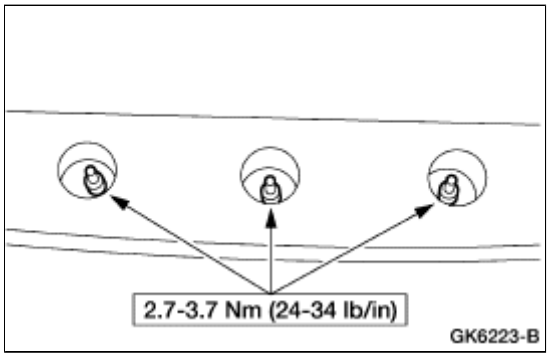


4. Remove the high-mounted stoplamp.
    1. Disconnect the electrical connector.
    2. Remove the high-mounted stoplamp.



Installation

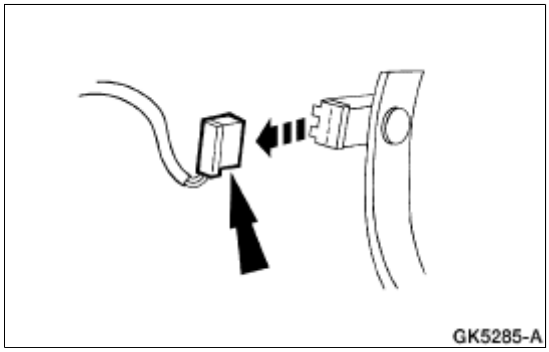
1. To install, reverse the removal procedure.



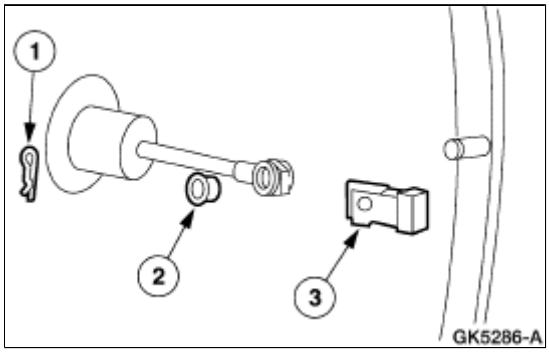
Lamp Switch —Brake Pedal Position (BPP)

Removal

1. Disconnect the brake pedal position (BPP) switch connector.



2. Remove the BPP switch
    1. Remove the self-locking pin.
    2. Remove the spacer.
    3. Remove the BPP switch.



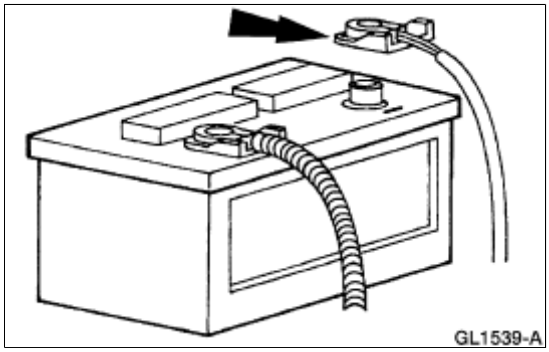
Installation

1. To install, reverse the removal procedure.

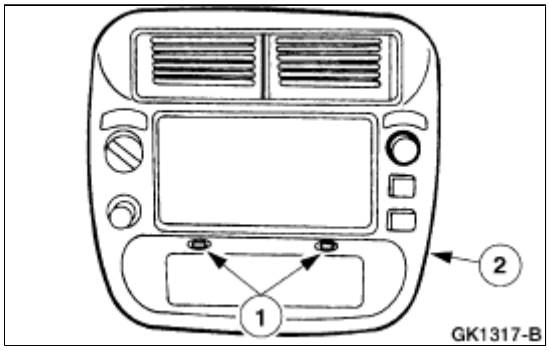
Lamp Switch —Fog

Removal

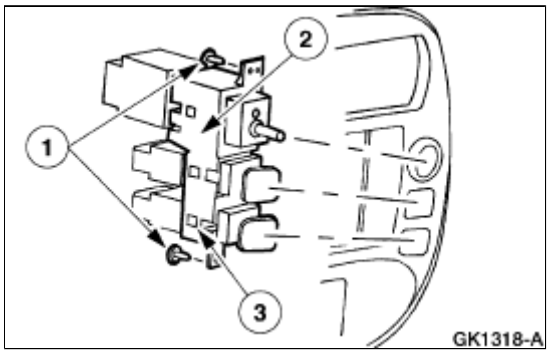
1. Disconnect the battery ground cable (14301).



2. Remove the instrument panel finish panel (044D70).
    1. Remove the screws.
    2. Remove the center instrument panel finish panel.
        - Disconnect the electrical connectors.



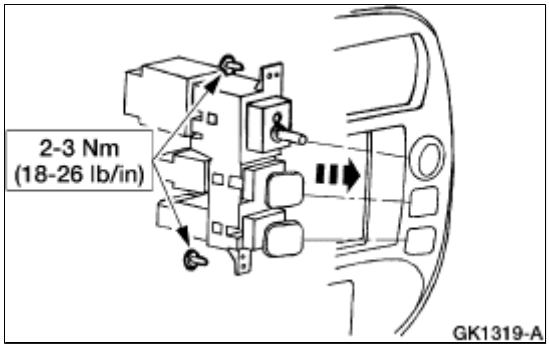
3. Remove the fog lamp switch (15A214).
    1. Remove the screws.
    2. Remove the mounting bezel.
    3. Release the two tabs and remove the fog lamp switch.

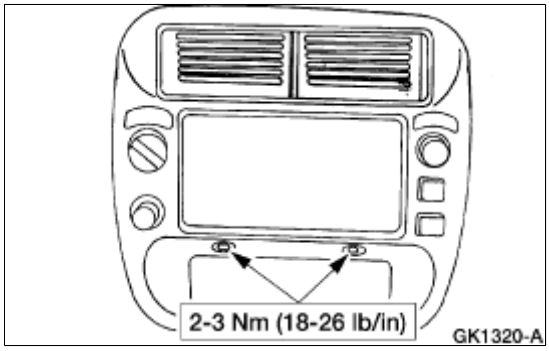


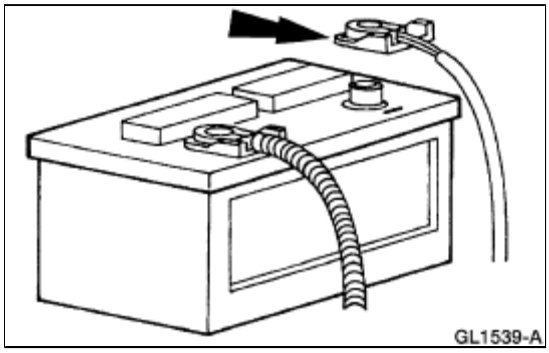
Installation

1. **NOTE:** When the battery (10655) is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   To install, reverse the removal procedure.







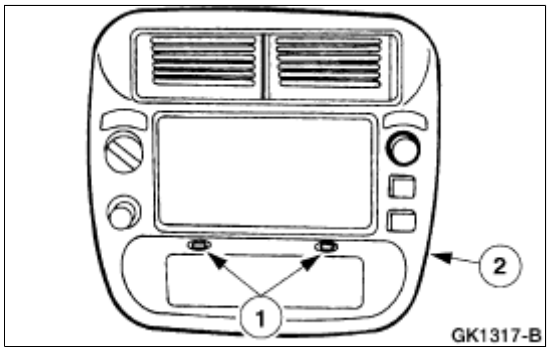
Lamp Switch —Headlamp

Removal

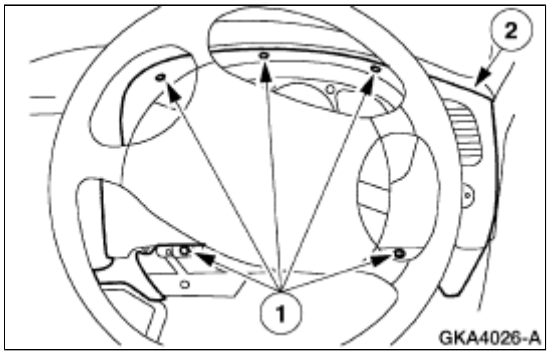
1. Disconnect the battery ground cable (14301).

2. Remove the instrument panel steering column opening cover reinforcement (04502) ; refer to Section 501-12 .

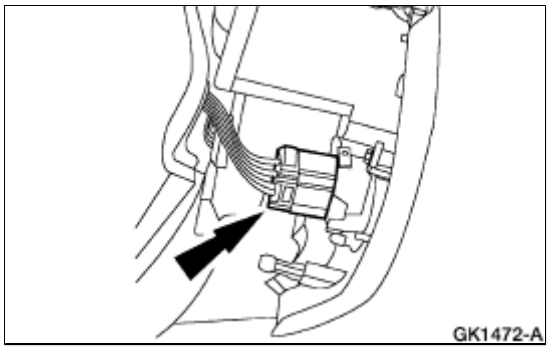
3. Remove the center instrument panel finish panel (04338).
   1. Remove the screws.
   2. Remove the instrument panel finish panel.



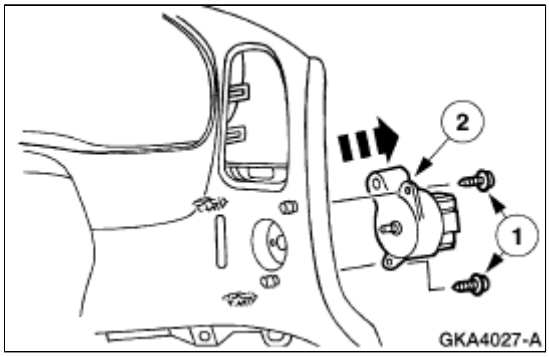
4. Remove the instrument cluster finish panel.
   1. Remove the screws.
   2. Remove the cluster instrument panel finish panel (044D70).



5. Disconnect the headlamp switch electrical connectors and remove the headlamp switch knob.



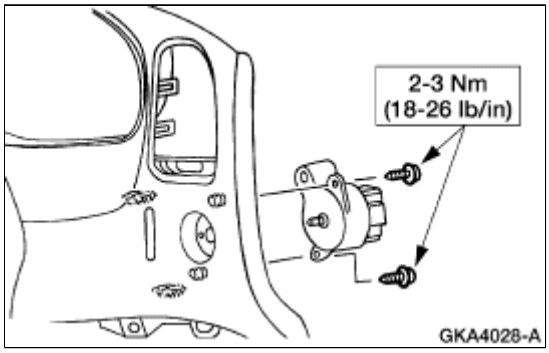
6. Remove the headlamp switch (11654).
    1. Remove the screws.
    2. Remove the headlamp switch.

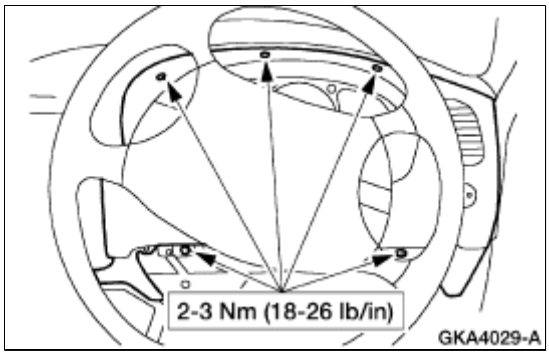


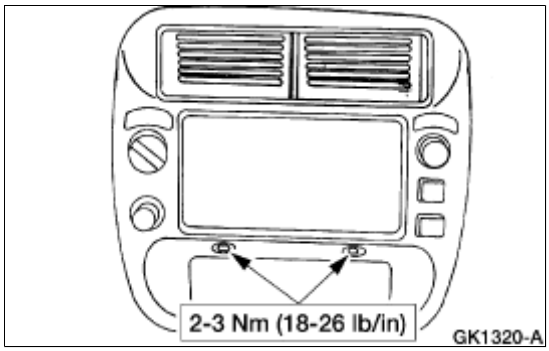
Installation

1. **NOTE:** When the battery (10655) is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

    To install, reverse the removal procedure.



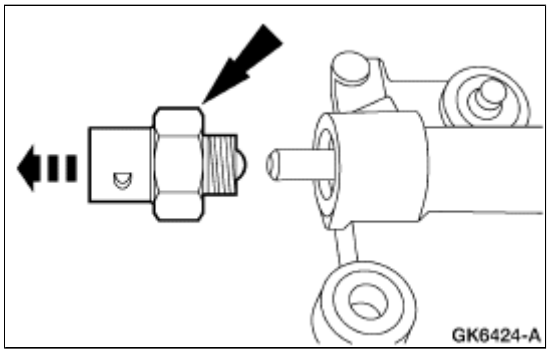

2-3 Nm (18-26 lb/in)
GKA4029-A


2-3 Nm (18-26 lb/in)
GK1320-A

Lamp Switch —Backup (Manual Transmission)

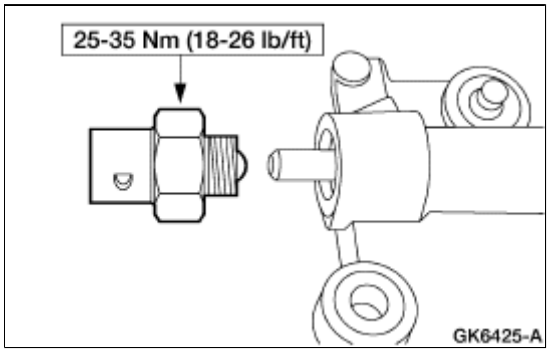
Removal

1. Raise and support the vehicle; refer to Section 100-02 .
2. Disconnect the backup lamp switch electrical connector.
3. Remove the backup lamp switch (15520).



Installation

1. To install, reverse the removal procedure.



Lamp Switch —Backup (Automatic Transmission)

Removal and Installation

For additional information, refer to Section 307-01B .For additional information, refer to Section 307-01A .

Torque Specifications

Description	Nm	lb-in
Battery ground cable nut	7-10	62-89
Dome/map lamp screw	1.5-1.9	14-16
Sun visor screw	0.9-1.3	8-11

Interior Lighting

The interior lighting system consists of the following:

- dome/map lamp
- rear dome/cargo lamp
- overhead console/map lamp
- RH/LH vanity mirror
- ash receptacle lamp
- puddle lamps
- interior lamp switches
- interior lamp relay
- dimmer module
- battery saver relay
- generic electronic module (GEM)

Generic Electronic Module (GEM)/Central Timer Module (CTM) Controlled Functions

The generic electronic module (GEM) is equipped on four-wheel drive vehicles with power windows. The central timer module (CTM) is equipped only on two-wheel drive vehicles without power windows.

NOTE: GEM/CTM diagnostics are compatible with the scan tool.

The GEM/CTM incorporates the functions of several different modules into one, and offers diagnostics to easily locate and repair concerns affecting the subsystems that it controls.

The GEM/CTM constantly monitors the systems it controls and reports a concern in the form of a diagnostic trouble code (DTC). A DTC can be retrieved with the scan tool through the communication link.

The scan tool is a menu-driven tester that allows the user to run specific tests. The scan tool can isolate faults in the GEM/CTM subsystems through a symptom-driven diagnostic procedure. Connecting the scan tool to the GEM/CTM communication link will not alert the GEM/CTM. If the GEM/CTM is "asleep" when the diagnostic connector is plugged in, the GEM/CTM must be "awakened". If the communication link cannot be established, turn the ignition to RUN.

NOTE: The GEM/CTM has a sleep function to minimize battery consumption. During the sleep mode, the GEM/CTM turns off all outputs and monitors only the following:

- door ajar (driver door, passenger door, liftgate, LH rear and RH rear doors).
- key-in-ignition.
- key in RUN or ACC.
- two-step unlock switch (unarm switch).
- digital TR sensor.
- illuminated entry request (remote anti-theft personality [RAP] module).

If a change of status occurs at one of these inputs while the GEM/CTM is "asleep", the GEM/CTM will "wake

up." When the GEM/CTM awakens, it carries out an internal self-test, and begins normal operation. At this point, the GEM/CTM will have all of its functions operational.

The GEM/CTM will go into the sleep mode immediately after both of the following conditions have been met:

- key in OFF or key not in ignition.
- after 45 minutes with no change in any wake-up input.

The GEM/CTM control system has two modes of operation; the normal operating mode and the tester-dependent diagnostics mode.

Normal operation of the GEM/CTM can detect errors. An integral part of normal GEM/CTM operation is continuous diagnostic capability. Continuous diagnostics detects errors and changes the GEM/CTM control strategy. There is no warning lamp for the GEM/CTM; therefore, a DTC concern will direct you to the GEM/CTM. Examples of faults that may be detected during normal operation include:

NOTE: The GEM/CTM can only detect open circuit/short to GRD faults when the GEM/CTM is not energizing a load, and short to battery faults when the GEM/CTM is attempting to energize a load.

- GEM/CTM continuous self-test (RAM, ROM, EEPROM, A/D checking).
- output driver monitoring (open circuit/short to ground [GRD], short to power).

- illogical combinations of input signals.

Interior Lighting

Refer to Wiring Diagrams Cell 59 , Generic Electronic Module for schematic and connector information.

Refer to Wiring Diagrams Cell 89 , Courtesy Lamps for schematic and connector information.

Special Tool(s)

 ST1137-A	73III Automotive Meter 105-R0057
 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent diagnostic tool

Inspection and Verification

1. **NOTE:** The generic electronic module (GEM)/central timer module (CTM) must be reconfigured upon replacement. Refer to the diagnostic tool help screen on the configuration card to program the tire size and axle ratio; refer to Section 418-01 .

   The interior lighting system is a GEM/CTM controlled system; refer to Section 419-10 .

2. Verify the customer concern by operating the system in question.

3. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Switch(es)	• Fuse(s) 1 (60A), 25 (7.5A), 26 (10A), and 10 (7.5A) • Damaged wiring harness • Loose or corroded connections • Lamp(s) • Circuitry

4. If the concern remains after the inspection, connect the diagnostic tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the diagnostic

tool menu. If the diagnostic tool does not communicate with the vehicle:
- check that the program card is correctly installed.
- check the connections to the vehicle.
- check the ignition switch position.

5. If the diagnostic tool still does not communicate with the vehicle, refer to the diagnostic tool manual.

6. Carry out the DATA LINK DIAGNOSTIC test. If the diagnostic tool responds with:
   - CKT914, CKT915 or CKT70 = ALL ECUS NO RESP/NOT EQUIP, refer to Section 418-00 .
   - NO RESP/NOT EQUIP for GEM/CTM, go to Pinpoint Test A.
   - SYSTEM PASSED, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and carry out self-test diagnostics for the GEM/CTM.

7. If the DTCs retrieved are related to the concern, go to the GEM/CTM Diagnostic Trouble Code (DTC) Index to continue diagnostics.

8. If no DTCs related to the concern are retrieved, proceed to the Symptom Chart to continue diagnostics.

GEM/CTM Diagnostic Trouble Code (DTC) Index

GEM/CTM Diagnostic Trouble Code (DTC) Index

DTC	Description	DTC Caused By	Action
P0500	Vehicle speed signal circuit failure	GEM	REFER to Section 308-07A .
B1302	Accessory delay relay coil circuit failure	GEM	REFER to Section 501-11 .
B1304	Accessory delay relay coil circuit short to battery	GEM	REFER to Section 501-11 .
B1313	Battery saver relay coil circuit failure	GEM/CTM	GO to Pinpoint Test F .
B1315	Battery saver relay coil circuit short to battery	GEM/CTM	GO to Pinpoint Test B .
B1317	Battery voltage HIGH	GEM/CTM	REFER to Section 414-00 .
B1318	Battery voltage LOW	GEM/CTM	REFER to Section 414-00 .
B1322	Door ajar LF circuit short to ground	GEM/CTM	GO to Pinpoint Test D .
B1323	Door ajar lamp circuit failure	GEM/CTM	REFER to Section 413-01 .
B1325	Door ajar lamp circuit short to battery	GEM/CTM	REFER to Section 413-01 .
B1330	Door ajar RF circuit short to ground	GEM/CTM	GO to Pinpoint Test D .

B1334	Decklid ajar rear door circuit short to ground	GEM/CTM	GO to Pinpoint Test D .
B1338	RR door ajar circuit short to ground	GEM/CTM	GO to Pinpoint Test D .
B1340	Chime input request circuit short to ground	GEM/CTM	REFER to Section 413-09 .
B1342	GEM/CTM is defective	GEM/CTM	CLEAR the DTCs. RETRIEVE the DTCs. If DTC B1342 is retrieved, INSTALL a new GEM/CTM; REFER to Section 419-10 . TEST the system for normal operation.
B1345	Heated backlite input circuit short to ground	GEM	REFER to Section 501-11 .
B1347	Heated backlite relay circuit failure	GEM	REFER to Section 501-11 .
B1349	Heated backlite relay circuit short to battery	GEM	REFER to Section 501-11 .
B1352	Ignition Key-In circuit failure	GEM/CTM	REFER to Section 413-09 .
B1355	Ignition RUN circuit failure	GEM/CTM	REFER to Section 211-05 , Symptom Chart.
B1359	Ignition RUN/ACC circuit failure	GEM/CTM	REFER to Section 211-05 , Symptom Chart.
B1371	Illuminated entry relay circuit failure	GEM/CTM	GO to Symptom Chart.
B1373	Interior lamp relay coil circuit short to battery	GEM/CTM	GO to Pinpoint Test B .
B1398	Power window driver one-touch window relay circuit failure	GEM	REFER to Section 501-11 .
B1400	Power window driver one-touch window relay coil circuit short to battery	GEM	REFER to Section 501-11 .
B1404	Power window driver down circuit open	GEM	REFER to Section 501-11 .
B1405	Driver power window down circuit to battery	GEM	REFER to Section 501-11 .
B1410	Power window driver motor circuit failure	GEM	REFER to Section 501-11 .
B1426	Seat belt lamp circuit short to battery	GEM/CTM	REFER to Section 413-01 .
B1428	Safety belt lamp output failure	GEM/CTM	REFER to Section 413-01 .
B1431	Wiper brake/run relay — circuit failure	GEM/CTM	REFER to Section 501-16 .
B1432	Wiper brake/run relay short to battery	GEM/CTM	REFER to Section 501-16 .
B1434	Wiper Hi/Lo speed relay — circuit failure	GEM/CTM	REFER to Section 501-16 .

B1436	Wiper Hi/Lo speed relay circuit short to battery	GEM/CTM	REFER to Section 501-16 .
B1438	Wiper mode select switch circuit failure	GEM/CTM	REFER to Section 501-16 .
B1441	Wiper mode select switch input short to ground	GEM/CTM	REFER to Section 501-16 .
B1446	Wiper park sense circuit failure	GEM/CTM	REFER to Section 501-16 .
B1450	Wiper/washer interval delay switch input circuit failure	GEM/CTM	REFER to Section 501-16 .
B1453	Wiper/washer interval delay switch input short to ground	GEM/CTM	REFER to Section 501-16 .
B1458	Wiper/washer pump motor relay circuit failure	GEM/CTM	REFER to Section 501-16 .
B1460	Wiper/washer pump motor relay coil short to battery	GEM/CTM	REFER to Section 501-16 .
B1462	Seat belt switch circuit failure	GEM/CTM	REFER to Section 413-09 .
B1466	Wiper Hi/Lo speed not switching	GEM/CTM	REFER to Section 501-16 .
B1467	Wiper Hi/Lo speed circuit motor short to battery	GEM/CTM	REFER to Section 501-16 .
B1473	Wiper low speed circuit motor failure	GEM/CTM	REFER to Section 501-16 .
B1475	Accessory delayed relay contacts short to battery	GEM/CTM	REFER to Section 501-11 .
B1476	Wiper high speed circuit motor failure	GEM/CTM	REFER to Section 501-16 .
B1483	Brake pedal input circuit failure	GEM	REFER to Section 308-07A .
B1485	Brake pedal input short circuit to battery	GEM	REFER to Section 308-07A .
B1574	LR door ajar circuit short to ground	GEM/CTM	GO to Pinpoint Test D .
B1577	Lamp/park input short circuit to battery	GEM/CTM	REFER to Section 413-09 .
B1610	Illuminated entry input (from RAP module) circuit short to ground	GEM	GO to Pinpoint Test D .
B1611	Wiper rear mode select switch circuit	GEM	REFER to Section 501-16 .

	failure		
B1614	Wiper rear mode select switch circuit short to ground	GEM	REFER to Section 501-16 .
B1814	Wiper rear motor down relay circuit failure	GEM	REFER to Section 501-16 .
B1816	Wiper rear motor down relay coil circuit short to battery	GEM	REFER to Section 501-16 .
B1818	Wiper rear motor up relay coil circuit failure	GEM	REFER to Section 501-16 .
B1820	Rear wiper motor up relay circuit short to battery	GEM	REFER to Section 501-16 .
B1833	Door unlock switch circuit short to ground	GEM	REFER to Section 501-14B .
B1834	Door unlock disarm output circuit failure	GEM	REFER to Section 501-14B .
B1836	Door unlock disarm output circuit short to battery	GEM	REFER to Section 501-14B .
B1839	Wiper rear rear motor circuit failure	GEM	REFER to Section 501-16 .
B1840	Wiper front power circuit failure	GEM/CTM	REFER to Section 501-16 .
B1894	Wiper rear motor speed sense circuit failure	GEM	REFER to Section 501-16 .
B2105	Throttle position input (TPI) signal out of range low	GEM	REFER to Section 308-07A .
B2106	Throttle position input (TPI) signal out of range high	GEM	REFER to Section 308-07A .
B2141	NVM configuration failure	GEM/CTM	Vehicle speed calibration data is not programmed into the GEM/CTM. REFER to the diagnostic tool help screen on the configuration card to program the tire size and axle ratio; Section 418-01 . TEST the system for normal operation. If DTC B2141 is still present, REPLACE the GEM/CTM. REFER to Section 419-10 . TEST the system for normal operation.
B2554	Dome lamp relay coil open circuit or short to ground	GEM	GO to Pinpint Test H.
P1763	Transmission neutral in tow indicator circuit short to battery	GEM	REFER to Section 413-09 .
P1764	Transmission neutral in tow indicator circuit	GEM	REFER to Section 413-09 .

	fault		
P1804	4WD high indicator circuit failure	GEM	REFER to Section 308-07A .
P1806	4WD high indicator short circuit to battery	GEM	REFER to Section 308-07A .
P1808	4WD low indicator circuit failure	GEM	REFER to Section 308-07A .
P1810	4WD low indicator short circuit to battery	GEM	REFER to Section 308-07A .
P1812	4WD mode select circuit failure	GEM	REFER to Section 308-07A .
P1815	4WD mode select short circuit to ground	GEM	REFER to Section 308-07A .
P1820	Transfer case CW shift relay coil circuit failure	GEM	REFER to Section 308-07A .
P1822	Transfer case CW shift relay coil short to power	GEM	REFER to Section 308-07A .
P1824	4WD electric clutch relay circuit failure	GEM	REFER to Section 308-07A .
P1826	4WD low clutch relay short to battery	GEM	REFER to Section 308-07A .
P1828	Transfer case CCW shift relay circuit failure	GEM	REFER to Section 308-07A .
P1830	Transfer case shift relay coil short to battery	GEM	REFER to Section 308-07A .
P1836	Transfer case front shaft speed sensor circuit failure	GEM	REFER to Section 308-07A .
P1837	Transfer case rear shaft speed sensor circuit failure	GEM	REFER to Section 308-07A .
P1838	Transfer case shift motor circuit failure	GEM	REFER to Section 308-07A .
P1846	Transfer case CONTACT PLATE "A" circuit failure	GEM	REFER to Section 308-07A .
P1850	Transfer case CONTACT PLATE "B" circuit failure	GEM	REFER to Section 308-07A .
P1854	Transfer case CONTACT PLATE "C" circuit failure	GEM	REFER to Section 308-07A .
P1858	Transfer case CONTACT PLATE "D" circuit failure	GEM	REFER to Section 308-07A .

P1866	Transfer case system concern	GEM	REFER to Section 308-07A .
P1867	Transfer case contact plate general circuit failure	GEM	REFER to Section 308-07A .
P1874	Automatic hall effect sensor power circuit failure	GEM	REFER to Section 308-07A .
P1875	Automatic hall effect sensor power circuit short to battery	GEM	REFER to Section 308-07A .
P1891	Transfer case contact plate ground return open circuit	GEM	REFER to Section 308-07A .

GEM/CTM Parameter Identification (PID) Index

GEM/CTM Parameter Identification (PID) Index

PID	Description	Expected Values
VSS_GEM	Vehicle Speed Input	0 - 255 KPH
PARK_SW	External Access Ajar Switch Status	OFF, ON
D_DR_SW	Left Front Door Ajar Switch Status	CLOSED, AJAR
DR_DSRM	Door Disarm Switch Status	L_DOOR, R_DOOR, LIFT_G, OFF
DR_UNLK	All Doors Unlock Output State	ON---, OFF---, ON-B-, OFFO-G
P_DR_SW	Right Passenger Door Ajar Switch Status	CLOSED, AJAR
IGN_KEY	Key-In-Ignition Status	IN, OUT
IGN_GEM	Ignition Switch Status	START, RUN, OFF, ACCY
BATSAV	Battery Saver Relay Circuit	ON---, OFF---, ON-B-, OFFO-G
VBATGEM	Battery Voltage	0.0 VDC - 14.3 VDC
LGATESW	Liftgate Ajar Switch Status	CLOSED - AJAR
LRDR_SW	Left Rear Door Ajar Switch Status	CLOSED - AJAR
RRDR_SW	Right Rear Door Ajar Switch Status	CLOSED - AJAR
INTLMP	Illuminated Entry Relay Circuit	ON---, OFF---, ON-B-, OFFO-G
CLTCHSW	Transmission Clutch Interlock Switch (GEM Only)	ENGAGED, NOT ENGAGED
NTRL_SW	Neutral Safety Switch Input (GEM Only)	NTRL, not NTRL
MTR_CCW	Transmission Transfer CCW Motor Output (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
MTR_CW	CW Shift Relay Coil Status (GEM Only)	OFF---, ON---, ON-B-, OFFO-G
4WD_SW	4WD Switch Status (GEM Only)	AUTO, 4WDLOW, 4WDHIGH
4WDELCL	4WD Electric Clutch	ON---, OFF---, ON-B-, OFFO-G
TRANSGR	Transmission Gear Status	REV, notREV

4WDCLCH	4WD Electronic Clutch Output Status (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
4WDLOW	4WD Low Indicator Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
4WDHIGH	4WD High Indicator Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
PLATE_A	Transfer Case Contact Plate Switch A (GEM Only)	OPEN, CLOSED
PLATE_B	Transfer Case Contact Plate Switch B (GEM Only)	OPEN, CLOSED
PLATE_C	Transfer Case Contact Plate Switch C (GEM Only)	OPEN, CLOSED
PLATE_D	Transfer Case Contact Plate Switch D (GEM Only)	OPEN, CLOSED
BOO_GEM	Brake Pedal Position (BPP) Switch Input (GEM Only)	ON, OFF
HALLPWR	Hall Effect Speed Sensor Power (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
4WDCLST	FWD Clutch PWM Output Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
TRA_RSP	Rear Shaft Speed (GEM Only)	0-255 mph
TRA_FSP	Front Shaft Speed (GEM Only)	0-225 mph
PLATEPW	Contact Plate Ground Output (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
PWR_RLY	ABS Active Input	ON, OFF
NTF	Neutral Tow Function (GEM Only)	ON, OFF
NTF_LMP	Neutral Tow Light (GEM Only)	ON, OFF
D_SBELT	Driver Seat Belt Status	OUT, IN
IPCHIME	External Chime Request	ON, OFF
SBLTMP	Seat Belt Indicator Status	OFF, ON, OFFO-G, ON-B-
DRAJR_L	Door Ajar Warning Lamp Circuit	OFF, ON
D_PWRLY	One-Touch Down Relay Coil Circuit Status (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
D_ PWAMP	Driver Power Window Regulator Electric Drive Current (GEM Only)	0.25 amp increments
D_PWPK	Driver Power Window Regulator Electric Drive Peak Current (GEM Only)	0.25 amp increments
ACCDLY	Accessory Delay Relay Coil Circuit (GEM Only)	ON---, OFF---, ON-B-, OFFO-G
RDEF_ SW	Rear Defrost Control Switch Status	ON, OFF
RDEFRLY	Rear Window Defrost Relay Coil Circuit	ON---, OFF---, ON-B-, OFFO-G
WASHRLY	Washer Relay Status	ON---, OFF---, ON-B-, OFFO-G
WPPK_PK	Wiper Park-to-Park Time	0 - 65 Seconds
WPMODE	Wiper Control Mode Status	WASH, OPEN, INVLD, OFF, INTVL 1-7, LOW, HIGH
WPPRKSW	Wiper Motor Status	PARKED, notPRK
WPRUN	Wiper Mode Run Relay	ON---, OFF---, ON-B-, OFFO-G
WPHISP	Windshield Wiper HI/LO Relay Status	ON---, OFF---, ON-B-, OFFO-G
WASH_SW	Washer Pump Relay Switch Status	OFF, ON, ON-B-, OFFO-G
R_WP_UP	Rear Wiper Up Relay Status (GEM Only)	ON---, OFF---, OFFO-G, ON-B-
R_WP_DN	Rear Wiper Down Relay Status (GEM Only)	ON---, OFF---, OFFO-G, ON-B-

R_WP_SW	Rear Wiper Input Switch Status (GEM Only)	WPLOW, OFF, WPHIGH
R_WP_MD	Rear Wiper Mode Switch Status (GEM Only)	OFF, INTVL 1-2, LOW WASH
R_WP_PK	Rear Wiper Park Status (GEM Only)	PARKED, notPRK

GEM/CTM Active Command Index

GEM/CTM Active Command Index

Active Command	Display	Action
PID LATCH	PID LATCH	ON, OFF
FRONT WIPER	WIPER RLY	ON, OFF
FRONT WIPER	SPEED RLY	ON, OFF
FRONT WIPER	WASH RLY	ON, OFF
WARNING LAMPS AND CHIME	SBLT LAMP	ON, OFF
WARNING LAMPS AND CHIME	CHIME	ON, OFF
WARNING LAMPS AND CHIME	AJAR LAMP	ON, OFF
BATTERY SAVER	BATT SAVR	ON, OFF
INTERIOR COURTESY LAMPS	INT LAMPS	ON, OFF
ONE-TOUCH DOWN AND ACCY DELAY (GEM Only)	ACCY RLY	ON, OFF
ONE-TOUCH DOWN AND ACCY DELAY (GEM Only)	ONE TOUCH	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	CW/CCW	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	HIGH LAMP	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	LOW LAMP	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	PLATE PWR	ON, OFF
4-WHEEL ELECTRONIC SHIFT (GEM Only)	SHFT CLCH	ON, OFF
SHIFT CLUTCH CONTROL	CLUTCH SOL	ANALOG %
NEUTRAL IN TOW LAMP	NTFLAMP	ON, OFF
REAR WIPER (GEM Only)	UP RELAY	ON, OFF
REAR WIPER (GEM Only)	DWN RELAY	ON, OFF
HEATED BACKLIGHT	RLY CNTRL	ON, OFF
DOOR LOCK CONTROL	DD UNLOCK	ON, OFF

GEM/CTM Wiggle Test Diagnostic Trouble Code (DTC) Index

GEM/CTM Wiggle Test Diagnostic Trouble Code (DTC) Index

DTC	Description	DTC Caused By
B1317	Battery voltage HIGH	GEM/CTM
B1318	Battery voltage LOW	GEM/CTM

B1322	Door ajar LF circuit short to ground	GEM/CTM
B1330	Door ajar RF circuit short to ground	GEM/CTM
B1352	Ignition key-in circuit failure	GEM/CTM
B1410	Power window LF motor circuit failure	GEM
B1438	Wiper mode select switch circuit failure	GEM/CTM
B1441	Wiper mode select switch input short to ground	GEM/CTM
B1446	Wiper park sense circuit failure	GEM/CTM
B1450	Wiper/washer interval delay switch input circuit failure	GEM/CTM
B1453	Wiper/washer interval delay switch input short to ground	GEM/CTM
B1462	Seat belt switch circuit failure	GEM/CTM
B1577	Lamp/park input short circuit to battery	GEM/CTM
B1610	Illuminated entry input (from RAP module) circuit short to ground	GEM
B1833	Door unlock disarm switch circuit short to ground	GEM
B1614	Wiper rear mode select switch circuit short to ground	GEM

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• No communication with the module — generic electronic module/central timer module	• GEM/CTM. • Fuse(s) 1 (60A) and 25 (7.5A). • Circuitry.	• GO to Pinpoint Test A .
• The courtesy lamps are inoperative	• Fuse 26 (10A). • Circuitry. • GEM/CTM. • Battery saver relay. • Interior lamp relay. • DTC B1315. • DTC B1371. • DTC B1373.	• GO to Pinpoint Test B .
• The courtesy lamps do not turn on with one door open	• Circuitry. • GEM/CTM. • Door ajar switch.	• GO to Pinpoint Test C .
• The courtesy lamps stay on continuously	• Circuitry. • GEM/CTM. • Ignition switch. • Interior lamp relay. • Dimmer module. • Door ajar switch. • DTC B1322. • DTC B1330. • DTC B1334. • DTC B1338. • DTC B1371. • DTC B1574.	• GO to Pinpoint Test D .

	• DTC B1610.	
• The illuminated entry is inoperative when using the remote transmitter	• Circuitry. • GEM. • Remote anti-theft personality (RAP) module.	• GO to Pinpoint Test E.
• The battery saver does not deactivate after timeout	• Circuitry. • Ignition switch. • GEM/CTM. • Battery saver relay.	• GO to Pinpoint Test F.
• An individual demand lighting lamp is inoperative	• Circuitry. • Switch.	• GO to Pinpoint Test G.
• An individual courtesy lamp is inoperative	• Circuitry. • Courtesy lamp.	• GO to Pinpoint Test H.
• The courtesy lamps are inoperative — when the liftgate is open	• Circuitry. • Switch. • GEM/CTM.	• GO to Pinpoint Test J.
• The illumination entry is inoperative when using the key cylinder	• Door disarm switch. • GEM. • RAP module. • Circuitry. • DTC B1833. • DTC B1834. • DTC B1836.	• REFER to Section 501-14B.
• The courtesy lamps are inoperative — when the liftgate glass is open	• Circuitry. • Switch. • GEM/CTM.	• GO to Pinpoint Test K.

Pinpoint Tests

CAUTION: Before removing and installing the GEM/CTM or its connectors, disconnect the battery. Failure to follow this caution will result in the GEM/CTM storing many erroneous DTCs and may result in the GEM/CTM exhibiting erratic operation after installation.

CAUTION: Be careful when probing the fuse junction panel, battery junction box or any connectors. Damage will result to the connector receptacle if the probe or terminal being used is too large.

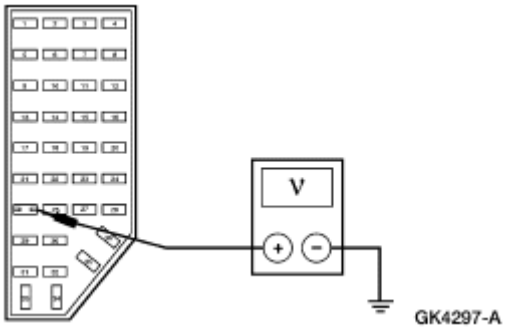
CAUTION: Electronic modules are sensitive to electrical charges. If exposed to these charges, damage may result.

NOTE: If continuous DTCs are recorded and the symptom is not present when carrying out the Pinpoint Tests, an intermittent concern may be the cause. Always check for loose connections and corroded pins.

NOTE: Complete the entire Pinpoint Test related to the symptom before replacing the GEM/CTM.

PINPOINT TEST A: NO COMMUNICATION WITH THE MODULE — GENERIC ELECTRONIC MODULE/CENTRAL TIMER MODULE

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK BATTERY JUNCTION BOX MAXI FUSE 1 (60A)	
1  Fuse 1 (60A)	• **Is the fuse OK?** → **Yes** GO to A2. → **No** INSTALL a new fuse. CLEAR the DTCs. TEST the system for normal operation. If the fuse fails again, CHECK Circuit 1052 (TN/BK) for a short to ground. REPAIR as necessary.
A2 CHECK FUSE JUNCTION PANEL FUSE 25 (7.5A)	
1  Fuse 25 (7.5A)	• **Is the fuse OK?** → **Yes** GO to A3. → **No** INSTALL a new fuse. CLEAR the DTCs. TEST the system for normal operation. If the fuse fails again, CHECK Circuit 1001 (WH/YE) for a short to ground. REPAIR as necessary.
A3 CHECK CIRCUIT 1052 (TN/BK) FOR VOLTAGE	
1	1 Measure the voltage between fuse junction panel Fuse 25 (7.5A), Pin 2, Circuit 1052 (TN/BK), and ground.



- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to A4 .

→ **No**
REPAIR Circuit 1052 (TN/BK). CLEAR the DTCs. TEST the system for normal operation.

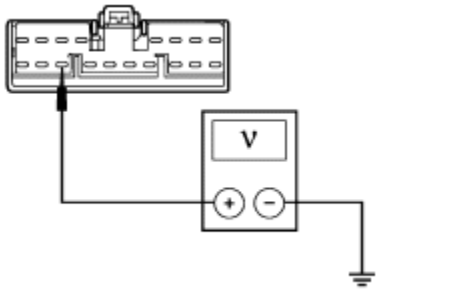
A4 CHECK THE VOLTAGE TO THE GEM/CTM — CIRCUIT 1001 (WH/YE)

1

2

GEM/CTM C283

3

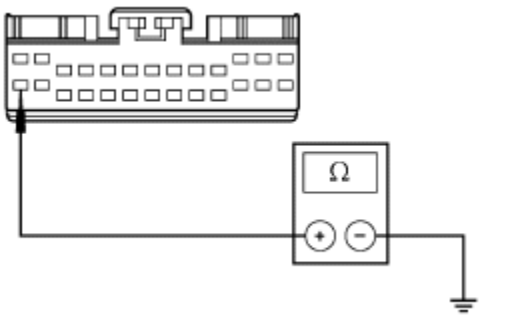


3 Measure the voltage between GEM/CTM C283-11, Circuit 1001 (WH/YE), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to A5 .

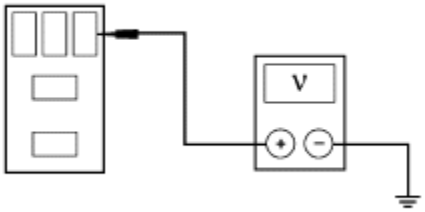
→ **No**
REPAIR Circuit 1001 (WH/YE). CLEAR the DTCs. TEST the system for normal operation.

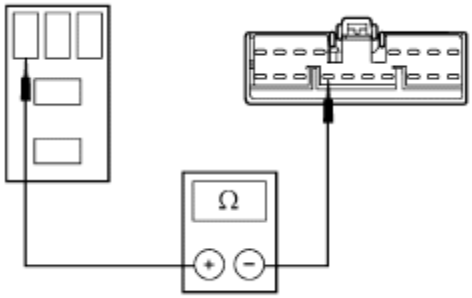
A5 CHECK CIRCUIT 570 (BK/WH) FOR OPEN	
1  GEM/CTM C280 2  	2 Measure the resistance between GEM/CTM C280-14, Circuit 570 (BK/WH), and ground. • **Are the resistances less than 5 ohms?** → **Yes** REFER to Section 418-00 . → **No** REPAIR Circuit 570 (BK/WH). CLEAR the DTCs. TEST the system for normal operation.

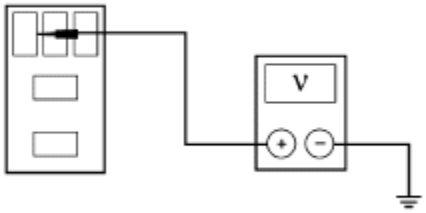
PINPOINT TEST B: THE COURTESY LAMPS ARE INOPERATIVE

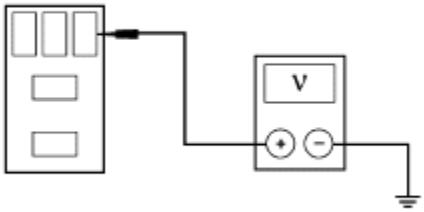
CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CHECK THE IGNITION STATES — MONITOR THE GEM/CTM PID IGN_GEM	
1  2  Diagnostic Tool 3 	3 **NOTE:** If the vehicle is equipped with a manual transmission, depress the clutch while turning the ignition switch to START. Monitor the GEM/CTM PID IGN_GEM while turning the ignition switch through the START, RUN, OFF and ACC positions.

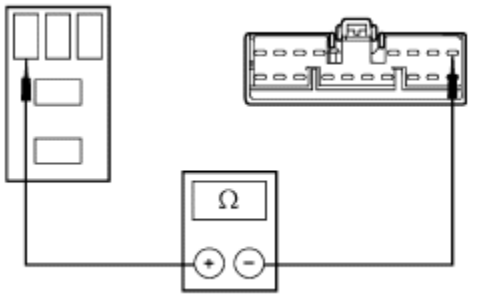
	• **Do the PID values agree with the ignition switch positions?** → **Yes** GO to B2 . → **No** GO to Pinpoint Test C .
B2 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCS)	
1  2  Clear Continuous DTCs 3  GEM/CTM On-Demand Self-Test	1 Retrieve and document continuous DTCs. • **Are any DTCs recorded?** → **Yes** If DTC B1315, GO to B9 . If DTC B1371, GO to B3 . If DTC B1373, GO to B3 . If DTC B1342, INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to B3 .
B3 CHECK THE INTERIOR LAMP RELAY COIL CIRCUIT — MONITOR THE GEM/CTM PID INTLMP	
1 	1 **NOTE:** The battery saver relay must be activated ON when carrying out this step. Monitor the GEM/CTM PID INTLMP while triggering the GEM/CTM active command INT LAMPS ON and OFF.

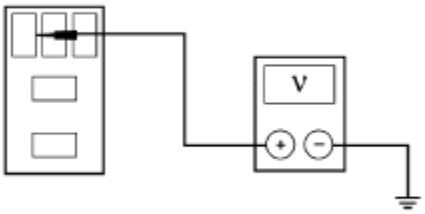
	• **Does the GEM/CTM PID INTLMP value agree with the command mode?** → **Yes** GO to B9 . → **No** If the GEM/CTM PID INTLMP displays OFFO-G, GO to B4 . If the GEM/CTM PID INTLMP displays ON-B-, GO to B7 .
B4 CHECK THE VOLTAGE TO THE INTERIOR LAMP RELAY COIL — CIRCUIT 402 (OG/LG)	
1  2  Interior Lamp Relay 3  GN1458-A	3 **NOTE:** The battery saver relay must be activated ON and the panel dimmer switch must be in the normal (mid-range) position when carrying out this step. Measure the voltage between interior lamp relay connector Pin 1, Circuit 402 (OG/LG), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to B5 . → **No** GO to B17 .
B5 CHECK THE INTERIOR LAMP RELAY	
	1 Check the interior lamp relay; refer to Wiring Diagrams cell 149. • **Is the interior lamp relay OK?** → **Yes**

	GO to B6 . → **No** INSTALL a new interior lamp relay. CLEAR the DTCs. TEST the system for normal operation.
B6 CHECK CIRCUIT 1008 (LG/OG) FOR OPEN	
1  GEM/CTM C283 2  GK6025-A	2 Measure the resistance between interior lamp relay connector Pin 2, Circuit 1008 (LG/OG), and GEM/CTM C283-12, Circuit 1008 (LG/OG). • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 1008 (LG/OG). CLEAR the DTCs. TEST the system for normal operation.
B7 CHECK THE INTERIOR LAMP RELAY	
1  2  Interior Lamp Relay	3 Check the interior lamp relay; refer to Wiring Diagrams cell 149. • **Is the interior lamp relay OK?**

	→ **Yes** GO to B8 . → **No** INSTALL a new interior lamp relay. CLEAR the DTCs. TEST the system for normal operation.
B8 CHECK CIRCUIT 1008 (LG/OG) FOR SHORT TO POWER	
1  GEM/CTM C283 2  3  GN1460-A	3 Measure the voltage between interior lamp relay connector Pin 2, Circuit 1008 (LG/OG), and ground. • **Is any voltage indicated?** → **Yes** REPAIR Circuit 1008 (LG/OG). CLEAR the DTCs. TEST the system for normal operation. → **No** INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.
B9 CHECK THE BATTERY SAVER RELAY COIL CIRCUIT — MONITOR THE GEM/CTM PID BATSAV	
1  2 	2 Monitor the GEM/CTM PID BATSAV while triggering the GEM active command BATT SAVR ON and OFF.

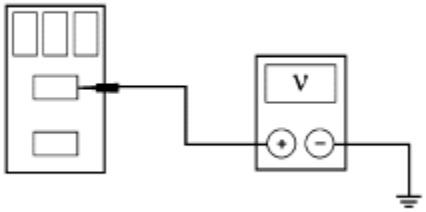
	• **Does the GEM/CTM PID BATSAV value agree with the command mode?** → **Yes** GO to B15 . → **No** If the GEM/CTM PID BATSAV displays OFFO-G, GO to B10 . If the GEM/CTM PID BATSAV displays ON-B-, GO to B13 .
B10 CHECK THE VOLTAGE TO THE BATTERY SAVER COIL — CIRCUIT 792 (TN/YE)	
1  2  Battery Saver Relay 3  GN1458-A	3 Measure the voltage between battery saver relay connector Pin 1, Circuit 792 (TN/YE), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to B11 . → **No** REPAIR Circuit 792 (TE/YE). CLEAR the DTCs. TEST the system for normal operation.
B11 CHECK THE BATTERY SAVER RELAY	
	1 Check the battery saver relay; refer to Wiring Diagrams cell 149. • **Is the battery saver relay OK?**

	→ **Yes** GO to B12 . → **No** INSTALL a new battery saver relay. CLEAR the DTCs. TEST the system for normal operation.
B12 CHECK CIRCUIT 1005 (VT/OG) FOR OPEN	
1  GEM/CTM C283 2  GK6026-A	2 Measure the resistance between battery saver relay connector Pin 2, Circuit 1005 (VT/OG), and GEM/CTM C283-8, Circuit 1005 (VT/OG). • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 1005 (VT/OG). CLEAR the DTCs. TEST the system for normal operation.
B13 CHECK THE BATTERY SAVER RELAY	
1  2  Battery Saver Relay	3 Check the battery saver relay; refer to Wiring Diagrams cell 149.

	• **Is the battery saver relay OK?** → **Yes** GO to B14 . → **No** INSTALL a new battery saver relay. CLEAR the DTCs. TEST the system for normal operation.
B14 CHECK CIRCUIT 1005 (VT/OG) FOR SHORT TO POWER	
1  GEM/CTM C283 2  3  GN1460-A	3 Measure the voltage between battery saver relay connector Pin 2, Circuit 1005 (VT/OG), and ground. • **Is any voltage indicated?** → **Yes** REPAIR Circuit 1005 (VT/OG). CLEAR the DTCs. TEST the system for normal operation. → **No** INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.
B15 CHECK THE VOLTAGE TO THE INTERIOR LAMP RELAY SWITCH — CIRCUIT 705 (LG/OG)	
1  2	

Interior Lamp Relay

3



GN1457-A

3 Measure the voltage between interior lamp relay connector Pin 5, Circuit 705 (LG/OG), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to B16 .

→ **No**
REPAIR Circuit 705 (LG/OG). CLEAR the DTCs. TEST the system for normal operation.

B16 CHECK THE INTERIOR LAMP RELAY

1 Check the interior lamp relay; refer to Wiring Diagrams cell 149.

- **Is the interior lamp relay OK?**

→ **Yes**
REPAIR Circuit 53 (BK/LB). CLEAR the DTCs. TEST the system for normal operation.

→ **No**
INSTALL a new interior lamp relay. CLEAR the DTCs. TEST the system for normal operation.

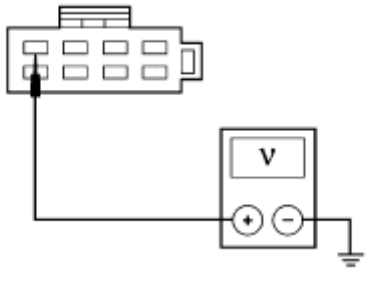
B17 CHECK THE VOLTAGE INPUT TO THE DIMMER MODULE — CIRCUIT 705 (LG/OG)

1

Dimmer Module C219

2

3



3 Measure the voltage between dimmer module C219-1, Circuit 705 (LG/OG), and ground.

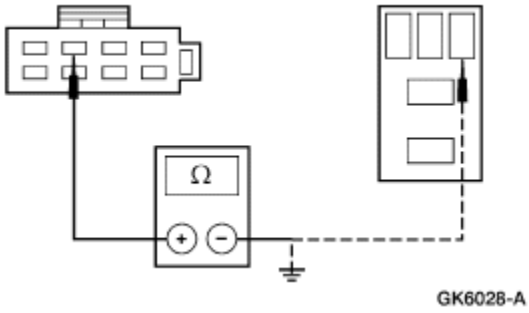
- **Is the voltage greater than 10 volts?**

→ **Yes**
GO to B18 .

→ **No**
GO to B19 .

B18 CHECK CIRCUIT 402 (OG/LG) FOR OPEN AND SHORT TO GROUND

1



1 Measure the resistance between dimmer module C219-2, Circuit 402 (OG/LG), and interior lamp relay connector Pin 1, Circuit 402 (OG/LG); and between dimmer module C219-2, Circuit 402 (OG/LG), and ground.

- **Is the resistance less than 5 ohms between the two connectors and greater than 10,000 ohms between the dimmer module connector and ground?**

→ **Yes**
INSTALL a new dimmer module. CLEAR the DTCs. TEST the system for normal operation.

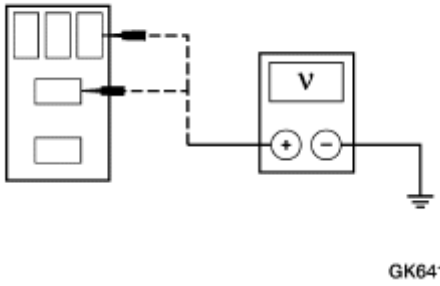
→ **No**
REPAIR Circuit 402 (OG/LG). CLEAR the DTCs. TEST the system for normal operation.

B19 CHECK THE VOLTAGE TO THE BATTERY SAVER RELAY — CIRCUIT 792 (TN/YE)

1

Battery Saver Relay

2

 GK6416-A	2 Measure the voltage between battery saver relay connector Pin 1, Circuit 792 (TN/YE), and ground; and between battery saver relay connector Pin 5, Circuit 792 (TN/YE), and ground. • **Are the voltages greater than 10 volts?** → **Yes** GO to B20 . → **No** CHECK Fuse 26 (10A). If Fuse 26 (10A) is OK, REPAIR Circuit 792 (TN/YE). If Fuse 26 (10A) is not OK, REPLACE Fuse 26 (10A). CLEAR the DTCs. TEST the system for normal operation. If the fuse fails again, CHECK for a short to ground. REPAIR as necessary.
B20 CHECK THE BATTERY SAVER RELAY	
	1 Check the battery saver relay; refer to Wiring Diagrams cell 149. • **Is the battery saver relay OK?** → **Yes** REPAIR Circuit 705 (LG/OG). CLEAR the DTCs. TEST the system for normal operation. → **No** INSTALL a new battery saver relay. CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST C: THE COURTESY LAMPS DO NOT TURN ON WITH ONE DOOR OPEN

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 CHECK THE GEM/CTM DOOR AJAR PIDS	
1  2	

Diagnostic Tool

3

3 Monitor the following GEM/CTM PIDs:

- P_DR_SW while opening and closing the RF door.
- RRDR_SW while opening and closing the RR door.
- LRDR_SW while opening and closing the LR door.
- D_DR_SW while opening and closing the LF door.

- **Do the GEM/CTM PID values indicate AJAR when the door is open and CLOSED when the door is closed?**

→ **Yes**
INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

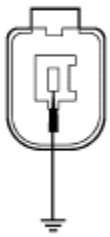
→ **No**
GO to C2 .

C2 CHECK THE INOPERATIVE DOOR AJAR SWITCH

1

Inoperative Door Ajar Switch

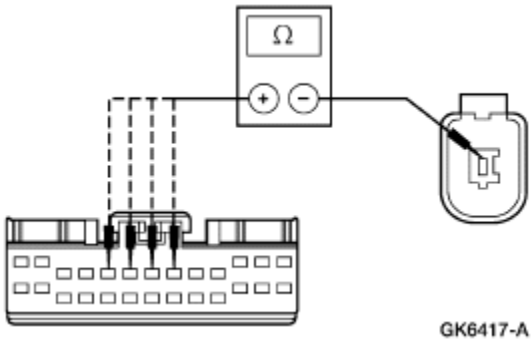
2



GK0092-A

2 Connect a jumper wire between the inoperative door ajar switch connector and ground.

	Door Ajar Switch	Circuit
Driver	C512	765 (YE/BK)
Passenger	C612	761 (GY/RD)
LR	C712	759 (LG/YE)
RR	C812	760 (PK/LB)

	• **Do the courtesy lamps illuminate?** → **Yes** INSTALL a new door ajar switch in question; REFER to Section 501-14A . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to C3 .
C3 CHECK THE CIRCUIT BETWEEN THE INOPERATIVE DOOR AJAR SWITCH AND THE GEM/CTM	
1  GEM/CTM C280 2  	2 Measure the resistance between inoperative door ajar switch and GEM/CTM C280. • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR the circuit in question. CLEAR the DTCs. TEST the system for normal operation.

	Inoperative Door Ajar Switch	GEM	Circuit
Driver	C512	C280-8	765 (YE/BK)
Passenger	C612	C280-7	761 (GY/RD)
LR	C712	C280-5	759 (LG/YE)
RR	C812	C280-6	760 (PK/LB)

PINPOINT TEST D: THE COURTESY LAMPS STAY ON CONTINUOUSLY

CONDITIONS	DETAILS/RESULTS/ACTIONS
D1 CHECK THE IGNITION STATES — MONITOR THE GEM/CTM PID IGN_GEM	

1  2  NGS 3 	3 **NOTE:** If the vehicle is equipped with a manual transmission, depress the clutch while turning the ignition switch to START. Monitor the GEM/CTM PID IGN_GEM while turning the ignition switch through the START, RUN, OFF and ACC positions. • **Do the PID values agree with the ignition switch positions?** → **Yes** GO to D2 . → **No** REFER to Section 211-05 .
D2 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCs)	
1 	1 Retrieve and document continuous DTCs. • **Are any DTCs recorded?** → **Yes** If DTC B1322, GO to D4 . If DTC B1330, GO to D6 . If DTC B1334, GO to D8 . If DTC B1338, GO to D10 . If DTC B1371, GO to D14 . If DTC B1574, GO to D12 . If DTC B1610, GO to D17 . → **No** GO to D3 .

D3 CHECK ALL DOOR AND DECKLID AJAR PID'S

1 Make sure every door and decklid is closed.

2 Monitor the following GEM/CTM PID's

- D_DR_SW
- P_DR_SW
- LRDR_SW
- RRDR_SW
- LGATESW

3 View the PID's and record readings

- **Does any GEM/CTM PID indicate AJAR?**

→ **Yes**
If D_DR_SW is ajar, GO to D4 .

If P_DR_SW is ajar,GO to D6 .

If LRDR_SW is ajar,GO to D12 .

If RRDR_SW is ajar,GO to D10 .

If LGATESW is ajar,GO to D8 .

→ **No**
GO to D14 .

D4 CHECK THE DRIVER DOOR AJAR SWITCH — MONITOR THE GEM/CTM PID D_DR_SW

1

2

Driver Door Ajar Switch C512

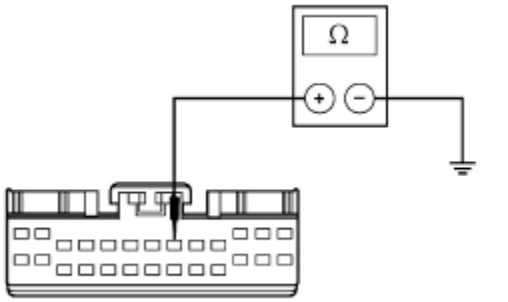
3

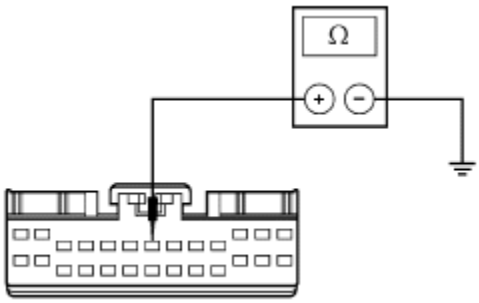
3 Monitor the GEM/CTM PID D_DR_SW.

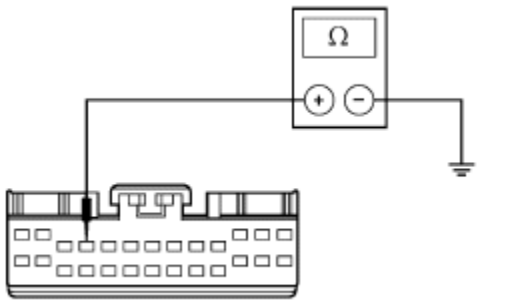
- **Does the GEM/CTM PID D_DR_SW indicate AJAR?**

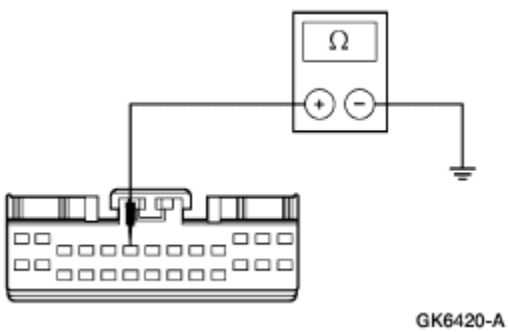
→ **Yes**
GO to D5 .

→ **No**
INSTALL a new driver door ajar switch; REFER

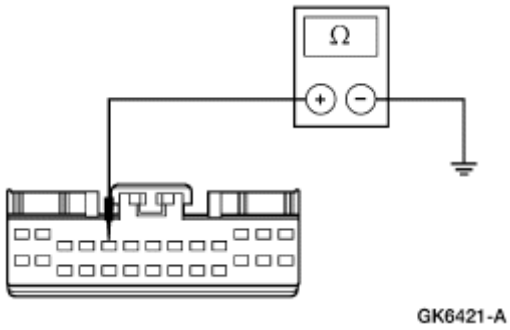
	to Section 501-14A . CLEAR the DTCs. TEST the system for normal operation.
D5 CHECK CIRCUIT 765 (YE/BK) FOR SHORT TO GROUND	
1  GEM/CTM C280	
2  GK6418-A	2 Measure the resistance between GEM/CTM C280-8, Circuit 765 (YE/BK), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** INSTALL a new GEM/CTM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 765 (YE/BK). CLEAR the DTCs. TEST the system for normal operation.
D6 CHECK THE PASSENGER DOOR AJAR SWITCH — MONITOR THE GEM/CTM PID P_DR_SW	
1 	
2  Passenger Door Ajar Switch C612	
3 	3 Monitor the GEM/CTM PID P_DR_SW. • **Does the GEM/CTM PID P_DR_SW**

	indicate AJAR? → **Yes** GO to D7 . → **No** INSTALL a new passenger door ajar switch; REFER to Section 501-14A . CLEAR the DTCs. TEST the system for normal operation.
D7 CHECK CIRCUIT 761 (GY/RD) FOR SHORT TO GROUND	
1  GEM/CTM C280 2  GK6419-A	2 Measure the resistance between GEM/CTM C280-7, Circuit 761 (GY/RD), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** INSTALL a new GEM/CT. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 761 (GY/RD). CLEAR the DTCs. TEST the system for normal operation.
D8 CHECK THE LIFTGATE WARNING SWITCH(S) — MONITOR THE GEM/CTM PID LGATESW	
1  2  LH Liftgate Ajar Switch C438	

3  RH Liftgate Ajar Switch C439 4  Liftgate Wiper Disable Switch C419 5 	5 Monitor the GEM/CTM PID LGATESW. • **Does the GEM/CTM PID LGATESW indicate AJAR?** → **Yes** GO to D9 . → **No** GO to D20 .
D9 CHECK CIRCUIT 700 (WH/VT) FOR SHORT TO GROUND	
1  GEM/CTM C280 2  GK6423-A	2 Measure the resistance between GEM/CTM C280-4, Circuit 700 (WH/VT), and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** INSTALL a new GEM/CTM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

	→ **No** REPAIR Circuit 700 (WH/VT). CLEAR the DTCs. TEST the system for normal operation.
D10 CHECK THE RR DOOR AJAR SWITCH — MONITOR THE GEM/CTM PID RRDR_SW	
1  2  RR Door Ajar C812 3 	3 Monitor the GEM/CTM PID RRDR_SW. • **Does the GEM/CTM PID RRDR_SW indicate AJAR?** → **Yes** GO to D11 . → **No** INSTALL a new RR door ajar switch. REFER to Section 501-14A . CLEAR the DTCs. TEST the system for normal operation.
D11 CHECK CIRCUIT 760 (PK/LB) FOR SHORT TO GROUND	
1  GEM/CTM C280 2  GK6420-A	2 Measure the resistance between GEM/CTM C280-6, Circuit 760 (PK/LB), and ground. • **Is the resistance greater than 10,000**

	ohms? → **Yes** INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 760 (PK/LB). CLEAR the DTCs. TEST the system for normal operation.
D12 CHECK THE LR DOOR AJAR SWITCH — MONITOR THE GEM/CTM PID LRDR_SW	
1  2  LR Door Ajar Switch C712 3 	3 Monitor the GEM/CTM PID LRDR_SW. • **Does the GEM/CTM PID LRDR_SW indicate AJAR?** → **Yes** GO to D13 . → **No** INSTALL a new LR door ajar switch; REFER to Section 501-14A . CLEAR the DTCs. TEST the system for normal operation.
D13 CHECK CIRCUIT 759 (LG/YE) FOR SHORT TO GROUND	
1  GEM/CTM C280 2	2 Measure the resistance between GEM/CTM C280-5, Circuit 759 (LG/YE), and ground.



- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
INSTALL a new GEM/CTM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

→ **No**
REPAIR Circuit 759 (LG/YE). CLEAR the DTCs. TEST the system for normal operation.

D14 CHECK THE INTERIOR LAMP RELAY

1

2

Interior Lamp Relay

3 Check the interior lamp relay. Refer to Wiring Diagrams Cell 149.

- **Is the interior lamp relay OK?**

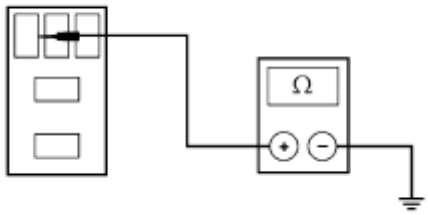
→ **Yes**
GO to D15 .

→ **No**
INSTALL a new interior lamp relay. CLEAR the DTCs. TEST the system for normal operation.

D15 CHECK FOR A FAULTY GEM

1

1 Measure the resistance between interior lamp relay Pin 2, Circuit 1008 (LG/OG), and ground.



- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
GO to D17 .

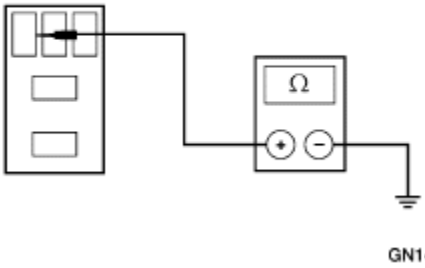
→ **No**
GO to D16 .

D16 CHECK CIRCUIT 1008 (LG/OG) FOR SHORT TO GROUND

1

GEM/CTM C283

2



2 Measure the resistance between interior lamp relay connector Pin 2, Circuit 1008 (LG/OG), and ground.

- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
INSTALL a new GEM/CTM. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

→ **No**
REPAIR Circuit 1008 (LG/OG). CLEAR the DTCs. TEST the system for normal operation.

D17 CHECK THE RAP MODULE FOR SHORT TO GROUND

1

2

RAP Module C338

- **Do the courtesy lamps turn off?**

→ **Yes**
INSTALL a new RAP module. REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation.

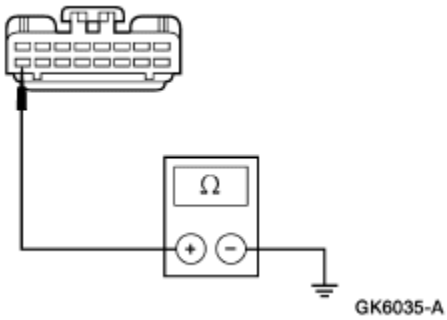
→ **No**
GO to D18 .

D18 CHECK CIRCUIT 1013 (BN/LG) FOR SHORT TO GROUND

1

GEM/CTM C281

2



2 Measure the resistance between GEM/CTM C281-9, Circuit 1013 (BN/LG), and ground.

- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
GO to D19 .

→ **No**
REPAIR Circuit 1013 (BN/LG). CLEAR the DTCs. With the ignition switch in the OFF position or the key out of the ignition, TEST the system for normal operation.

D19 CHECK THE DIMMER MODULE

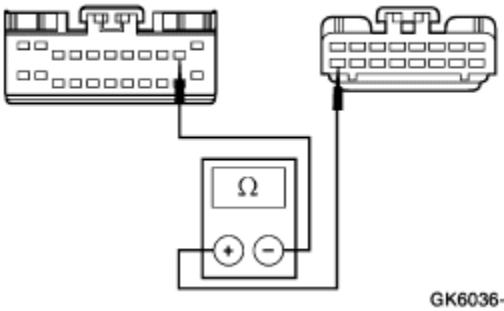
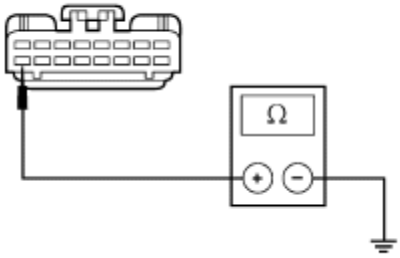
1  Dimmer Module C219	• **Do the courtesy lamps turn off?** → **Yes** INSTALL a new dimmer module. REFER to Section 413-00 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 53 (BK/LB). CLEAR the DTCs. TEST the system for normal operation.
D20 CHECK THE LIFTGATE WIPER DISABLE SWITCH — MONITOR THE GEM/CTM PID LGATESW	
1  Liftgate Wiper Disable Switch C419 2 	2 Monitor the GEM/CTM PID LGATESW. • **Does the GEM/CTM PID LGATESW indicate AJAR?** → **Yes** INSTALL a new liftgate wiper disable switch. REFER to Section 501-14A . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to D21 .
D21 CHECK THE LH LIFTGATE DOOR AJAR SWITCH — MONITOR THE GEM/CTM PID LGATESW	
1  LH Liftgate Ajar Switch C438 2	2 Monitor the GEM/CTM PID LGATESW.

	• **Does the GEM/CTM PID LGATESW indicate AJAR?** → **Yes** INSTALL a new LH liftgate ajar switch. REFER to Section 501-14A . CLEAR the DTCs. TEST the system for normal operation. → **No** INSTALL a new RH liftgate ajar switch. REFER to Section 501-14A . CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST E: THE ILLUMINATED ENTRY IS INOPERATIVE WHEN USING THE REMOTE TRANSMITTER

CONDITIONS	DETAILS/RESULTS/ACTIONS
E1 CHECK THE IGNITION STATES — MONITOR THE GEM/CTM PID IGN_GEM	
1  2  Diagnostic Tool 3 	3 **NOTE:** If the vehicle is equipped with a manual transmission, depress the clutch while turning the ignition switch to START. Monitor the GEM/CTM PID IGN_GEM while turning the ignition switch through the START, RUN, OFF and ACC positions. • **Do the PID values agree with the ignition switch positions?** → **Yes** GO to E2 . → **No** GO to Pinpoint Test C .
E2 MEASURE GEM ILLUMINATED ENTRY INPUT VOLTAGE	

1  2  GEM C281 3  Diagnostic Tool 4 	3 Do not disconnect scan tool power supply. Disconnect scan tool from the DLC only. 4 Digital Measurement, Voltmeter, Auto Range, REC. 5 **NOTE:** Do not disconnect the RAP module. Use scan tool to capture the RAP module illuminated entry request voltage between GEM C281-9, Circuit 1013 (BN/LG), and ground, while pressing the UNLOCK button on the keyless entry remote transmitter. • **Was the MIN voltage captured when the pulse was transmitted less than 1.3 volts?** → **Yes** GO to E3 . → **No** CLEAR MIN voltage and REPEAT E2 to confirm high voltage. If the voltage is still high, INSTALL a new RAP module; REFER to Section 419-10 . TEST the system for normal operation.
E3 MEASURE GEM ILLUMINATED ENTRY PULSE WIDTHS	
1 	1 Digital Measurement, Pulse Width Meter, Low Level. 2 Press the unlock button on the keyless entry remote transmitter. • **Is the PULSE WIDTH captured between**

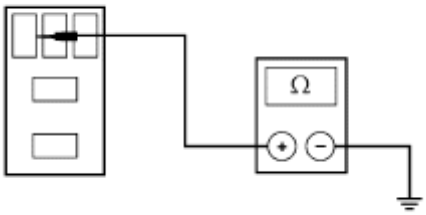
	190 and 210 m? → **Yes** GO to E4 . → **No** INSTALL a new RAP module; REFER to Section 419-10 . TEST the system for normal operation.
E4 CHECK GEM/CTM ILLUMINATED ENTRY REQUEST CIRCUIT 1013 (BN/LG) FOR OPEN AND SHORT TO GROUND	
1  RAP C338	
2  GK6036-A	2 Measure the resistance between GEM C281-9, Circuit 1013 (BN/LG), and RAP module C338-10, Circuit 1013 (BN/LG).
3  GK6128-A	3 Measure the resistance between GEM C281-9, Circuit 1013 (BN/LG), and ground. • **Is the resistance less than 5 ohms between GEM and RAP module, and greater than 10,000 ohms between the GEM and ground?** → **Yes** INSTALL a new GEM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 1013 (BN/LG). TEST the

	system for normal operation.

PINPOINT TEST F: THE BATTERY SAVER DOES NOT DEACTIVATE AFTER TIMEOUT

CONDITIONS	DETAILS/RESULTS/ACTIONS
F1 CHECK THE IGNITION STATES — MONITOR THE GEM/CTM PID IGN_GEM	
1  2  Diagnostic Tool 3 	3 **NOTE:** If the vehicle is equipped with a manual transmission, depress the clutch while turning the ignition switch to START. Monitor the GEM/CTM PID IGN_GEM while turning the ignition switch through the START, RUN, OFF and ACC positions. • **Do the PID values agree with the ignition switch positions?** → **Yes** GO to F2 . → **No** GO to Pinpoint Test D .
F2 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCS)	
1  2  Clear Continuous DTCs 3  GEM/CTM On-Demand Self-Test	1 Retrieve and document continuous DTCs.

	• **Are any DTCs recorded?** → **Yes** If DTC B1342, INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. For any other DTCs refer to the DTC Chart. → **No** GO to F3 .
F3 CHECK THE BATTERY SAVER RELAY	
1  2  Battery Saver Relay	3 Check the battery saver relay; refer to Wiring Diagrams cell 149. • **Is the battery saver relay OK?** → **Yes** GO to F4 . → **No** INSTALL a new battery saver relay. TEST the system for normal operation.
F4 CHECK CIRCUIT 1005 (VT/OG) FOR SHORT TO GROUND	
1  GEM/CTM C283 2	2 Measure the resistance between battery saver relay connector Pin 2, Circuit 1005 (VT/OG), and ground.



GN1455-A

- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
GO to F5 .

→ **No**
REPAIR Circuit 1005 (VT/OG). TEST the system for normal operation.

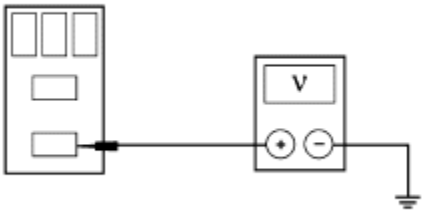
F5 CHECK CIRCUIT 705 (LG/OG) FOR SHORT TO POWER

1

Dimmer Module C219

2

3



GN1456-A

3 Measure the voltage between battery saver relay connector Pin 3, Circuit 705 (LG/OG), and ground.

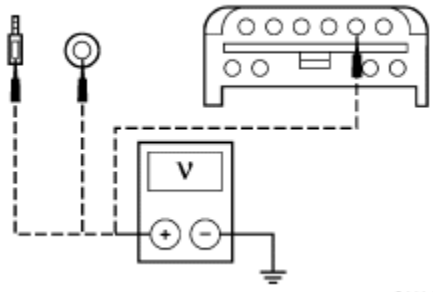
- **Is any voltage indicated?**

→ **Yes**
REPAIR Circuit 705 (LG/OG). TEST the system for normal operation.

→ **No**

	INSTALL a new GEM/CTM; REFER to Section 419-10 . TEST the system for normal operation.

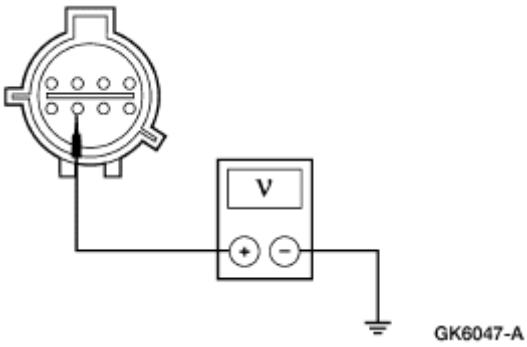
PINPOINT TEST G: AN INDIVIDUAL DEMAND LIGHTING LAMP IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
G1 CHECK THE DEMAND LIGHTING FOR PROPER OPERATION	
	1 **NOTE:** The battery saver relay must be activated on and the panel dimmer switch must be in the normal (mid-range) position. Activate all demand lights to the ON position. • **Do all demand lights operate properly?** → **Yes** System is OK. → **No** GO to G2 .
G2 CHECK VOLTAGE TO THE INOPERATIVE LAMP — CIRCUIT 705 (LG/OG)	
1  2  Inoperative Lamp 3  	2 Disconnect the inoperative lamp (driver vanity mirror C304, passenger vanity mirror C303, front map lamp C305, rear map lamp C367 or compass/outside air temperature module C342 [if equipped]). 3 Measure the voltage between the inoperative demand lighting lamp connector Pin, Circuit 705 (LG/OG), and ground. • **Is the voltage greater than 10 volts?** → **Yes**

	If the compass/outside air temperature module courtesy lamp is inoperative, REFER to Section 419-11 . If any other lamp is inoperative, INSTALL a new lamp assembly. CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 705 (LG/OG). CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST H: AN INDIVIDUAL COURTESY LAMP IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
H1 CHECK THE COURTESY LIGHTING FOR PROPER OPERATION	
	1 **NOTE:** The battery saver relay must be activated on and the panel dimmer switch must be in the normal (mid-range) position. Open the driver door to activate the courtesy lamps. • **Do all courtesy lamps illuminate?** → **Yes** System is OK. → **No** If the puddle lamps are inoperative, GO to H2 . If any other courtesy lamp is inoperative, GO to H4 .
H2 CHECK CIRCUIT 55 (BK/PK) FOR VOLTAGE	
1  2  Inoperative Power/Heated Mirror 3  4	4 **NOTE:** The battery saver relay must be activated on and the panel dimmer switch must be in the normal (mid-range) position.



Measure the voltage between driver power/heated mirror C509-7, Circuit 55 (BK/PK), and ground; or between passenger power/heated mirror C606-7, Circuit 55 (BK/PK), and ground.

- **Is the voltage greater than 10 volts?**

→ **Yes**
CHECK the power/heated mirror for proper operation. If OK, INSTALL a new lamp assembly. If not OK, REFER to Section 501-09 .

→ **No**
GO to H3 .

H3 CHECK CIRCUIT 53 (BK/LB) FOR VOLTAGE

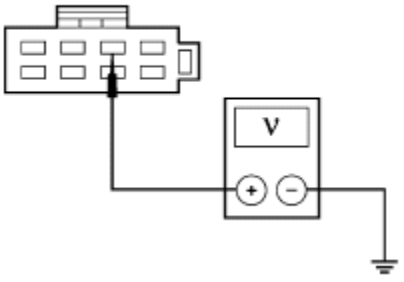
1

2

Dimmer Module C219

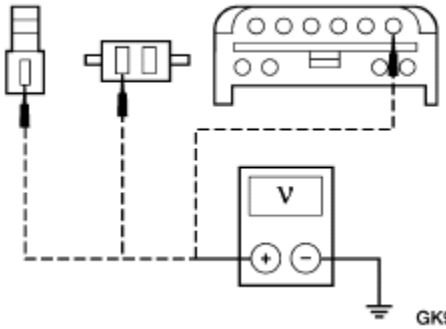
3

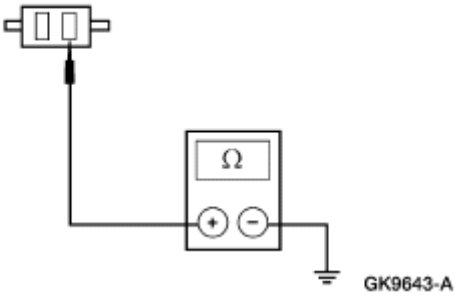
4



4 Measure the voltage between dimmer module C219-3, Circuit 53 (BK/LB), and ground.

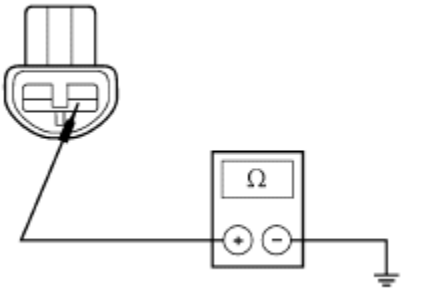
- **Is the voltage greater than 10 volts?**

	→ **Yes** INSTALL a new dimmer module. REFER to Section 413-00 . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 53 (BK/LB). CLEAR the DTCs. TEST the system for normal operation.
H4 CHECK VOLTAGE TO THE INOPERATIVE COURTESY LAMP — CIRCUIT 53 (BK/LB)	
1  2  Inoperative Lamp 3  	2 Disconnect the inoperative lamp (driver door courtesy lamp C503, passenger door courtesy lamp C603, cargo lamp C319, compass/outside air temperature module C342 [if equipped], dome lamp C334 [if equipped], or rear dome lamp). 3 **NOTE:** The battery saver relay must be activated on and the panel dimmer switch must be in the normal (mid-range) position. Measure the voltage between the inoperative courtesy lamp connector Pin, Circuit 53 (BK/LB), and ground. • **Is the voltage greater than 10 volts?** → **Yes** If the front or rear dome courtesy lamp is inoperative, INSTALL a new lamp assembly. CLEAR the DTCs. TEST the system for normal operation. If the compass/outside air temperature module courtesy lamp is inoperative, REFER to Section 419-11 . If any other courtesy lamp is inoperative, GO to H5 . → **No** REPAIR Circuit 53 (BK/LB). CLEAR the DTCs. TEST the system for normal operation.
H5 CHECK CIRCUIT 57 (BK) FOR OPEN	
1	1 Measure the resistance between the inoperative courtesy lamp connector Pin, Circuit 57 (BK), and ground.

	• **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new inoperative lamp assembly. CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 57 (BK). CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST J: THE COURTESY LAMPS ARE INOPERATIVE — WHEN THE LIFTGATE IS OPEN

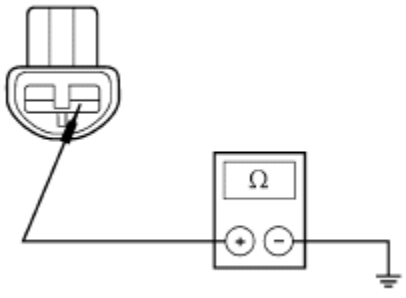
CONDITIONS	DETAILS/RESULTS/ACTIONS
J1 CHECK THE GEM/CTM — MONITOR THE GEM/CTM PID LGATESW	
1  2  Diagnostic Tool 3 	3 Monitor the GEM/CTM PID LGATESW. 4 Open the liftgate. • **Does the GEM/CTM PID LGATESW indicate AJAR?** → **Yes** INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system

	for normal operation. → **No** GO to J2 .
J2 CHECK THE GROUNDS TO THE LIFTGATE AJAR SWITCHES FOR OPEN — CIRCUIT 57 (BK)	
1  2  LH Liftgate Ajar Switch C438 3  RH Liftgate Ajar Switch C439 4  GK3226-A	4 Measure the resistance between LH liftgate ajar switch C438, Circuit 57 (BK), and ground; and between RH liftgate ajar switch C439, Circuit 57 (BK), and ground. • **Are the resistances less than 5 ohms?** → **Yes** GO to J3 . → **No** REPAIR Circuit 57 (BK). CLEAR the DTCs. TEST the system for normal operation.
J3 CHECK THE LH LIFTGATE AJAR SWITCH	
1	1 Connect a jumper wire between LH liftgate ajar switch C438, Circuit 700 (WH/VT), and ground.

 GK4357-A	• **Do the courtesy lamps illuminate?** → **Yes** INSTALL a new LH liftgate ajar switch. CLEAR the DTCs. TEST the system for normal operation. → **No** GO to J4 .
J4 CHECK THE RH LIFTGATE AJAR SWITCH	
1  GK4357-A	1 Connect a jumper wire between RH liftgate ajar switch C439, Circuit 700 (WH/VT), and ground. • **Do the courtesy lamps illuminate?** → **Yes** INSTALL a new RH liftgate ajar switch. CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 700 (WH/VT). CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST K: THE COURTESY LAMPS ARE INOPERATIVE — WHEN THE LIFTGATE GLASS IS OPEN

CONDITIONS	DETAILS/RESULTS/ACTIONS
K1 CHECK THE GEM/CTM — MONITOR THE GEM/CTM PID LGATESW	

1  2  Diagnostic Tool 3 	3 Monitor the GEM/CTM PID LGATESW. 4 Open the liftgate glass. • **Does the GEM/CTM PID LGATESW indicate AJAR?** → **Yes** INSTALL a new GEM/CTM; REFER to Section 419-10 . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to K2 .
K2 CHECK THE GROUND TO THE LIFTGATE WIPER DISABLE SWITCH — CIRCUIT 57 (BK)	
1  2  Liftgate Wiper Disable Switch C419 3  GK3226-A	3 Measure the resistance between liftgate wiper disable switch C419, Circuit 57 (BK), and ground.

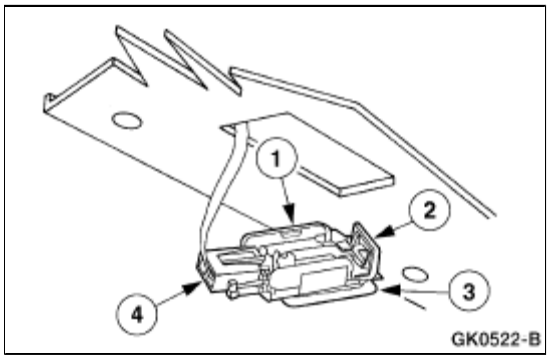
	• **Is the resistance less than 5 ohms?** → **Yes** GO to K3 . → **No** REPAIR Circuit 57 (BK). CLEAR the DTCs. TEST the system for normal operation.
K3 CHECK THE LIFTGATE WIPER DISABLE SWITCH	
1  GK4357-A	1 Connect a jumper wire between liftgate wiper disable switch C419, Circuit 700 (WH/VT), and ground. • **Do the courtesy lamps illuminate?** → **Yes** INSTALL a new liftgate wiper disable switch; REFER to Section 501-14A . CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit 700 (WH/VT). CLEAR the DTCs. TEST the system for normal operation.

Lamp Assembly —Rear Dome/Cargo

Removal

1. Disconnect the battery ground cable (14301).

2. Remove the lamp assembly.
    1. Use a thin bladed tool to carefully pry the lamp assembly to the left.
    2. Press the locking tab inward.
    3. Lower the lamp assembly.
    4. Disconnect electrical connector.



Installation

1. **NOTE:** When the battery (10655) is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

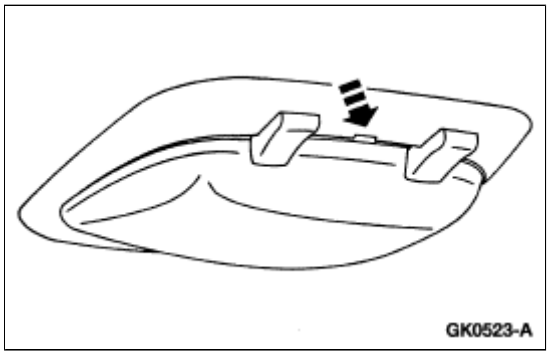
    To install, reverse the removal procedure.

Lamp Assembly —Front Dome/Map

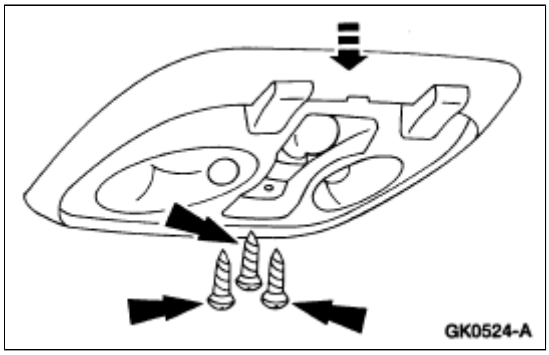
Removal

1. Disconnect the battery ground cable (14301).

2. Use a thin bladed tool to carefully pry the dome lamp lens out.
   - Replace the bulb if necessary.



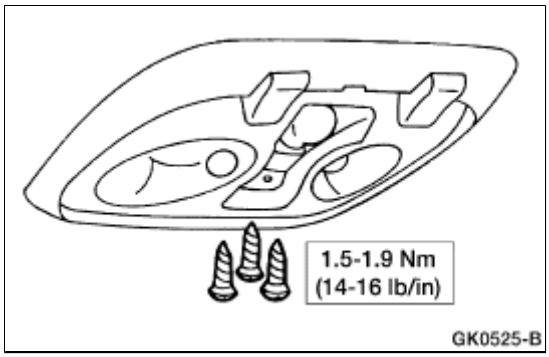
3. Remove the screws and lower the lamp assembly.



Installation

1. **NOTE:** When the battery (10655) is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   To install, reverse the removal procedure.

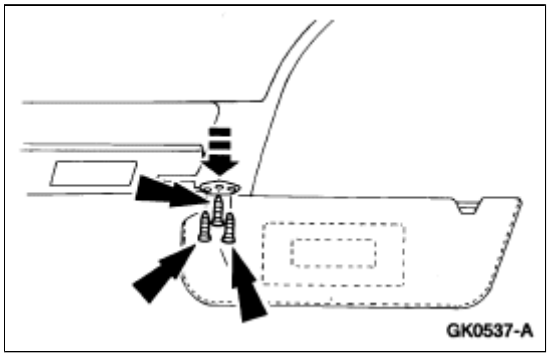

1.5-1.9 Nm
(14-16 lb/in)
GK0525-B

Lamp Assembly —Vanity Mirror/Sun Visor

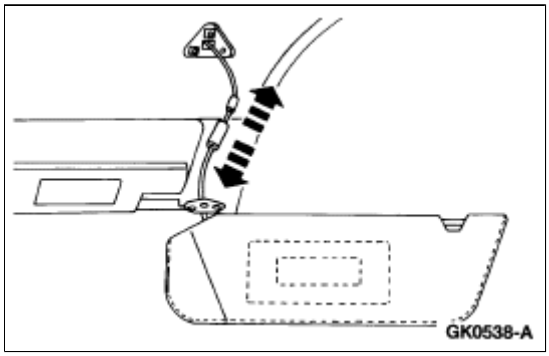
Removal

1. Disconnect the battery ground cable (14301).

2. Remove the sun visor.
   - Position the sun visor as necessary.
   - Remove the sun visor screws.



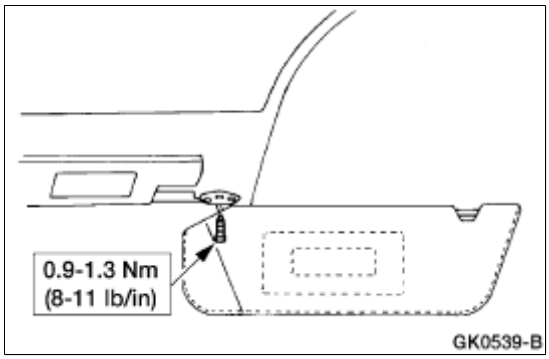
3. Lower the sun visor and disconnect the electrical connector.



Installation

1. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   To install, reverse the removal procedure.

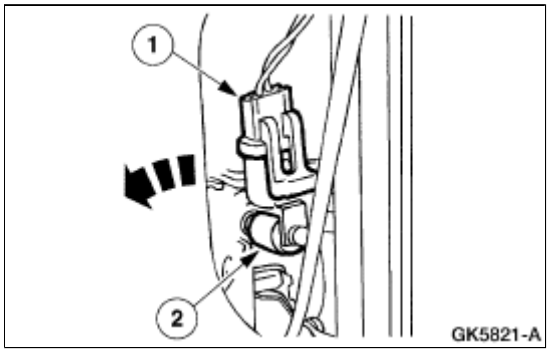

0.9-1.3 Nm
(8-11 lb/in)
GK0539-B

Switch —Interior Lamp (Door)

Removal

1. Remove the front door trim panel; refer to Section 501-05 .

2. Remove the interior lamp switch.
    1. Disconnect the interior lamp switch electrical connector.
    2. Remove the interior lamp switch.
        - Push inward; rotate counterclockwise.



Installation

1. To install, reverse the removal procedure.

Torque Specifications

Description	Nm	lb-in
Daytime running lamps control module bolts	3	27

Daytime Running Lamps (DRL)

The daytime running lamps (DRL) system consists of a DRL module that is located behind the front bumper and is mounted to the radiator support.

Daytime Running Lamps (DRL)

Refer to Wiring Diagrams Cell 97 , Daytime Running Lamps for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Principles of Operation

Daytime Running Lamps (DRL)

The daytime running lamps (DRL) system operates the low beam headlamps at a reduced intensity. The DRL module (15A270) supplies pulse width modulated (PWM) voltage, approximately 75%-92% of battery voltage, to the lowbeam headlamps when the following conditions are met:

- The parking brake control is released.
- The high beam headlamps are disabled.
- The ignition switch (11572) is in the RUN position.

The DRL module remains enabled when the low beam headlamps are turned on.

Inspection and Verification

1. Verify the customer concern by operating the system.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged DRL module • Damaged parking brake signal switch and bracket (15A851)	• Blown battery junction box (BJB) Mini-Fuse 4 (15A) • Damaged wiring harness • Loose or corroded connection • Damaged DRL module • Damaged parking brake signal switch and bracket

3. Verify the headlamps are operating correctly. Correct any concerns before proceeding to the next step. For additional information, refer to Section 417-01 .

4. Verify the parking brake control is fully released.

5. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

6. If the concern is not visually evident, verify the symptom and refer to the Symptom Chart.

Symptom Chart

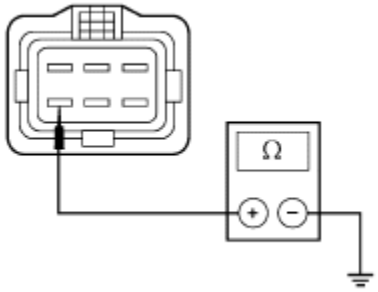
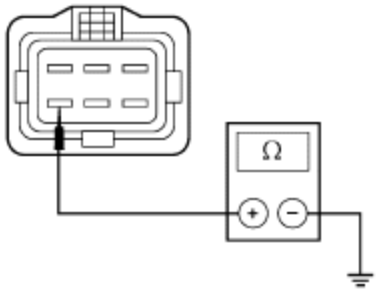
Symptom Chart

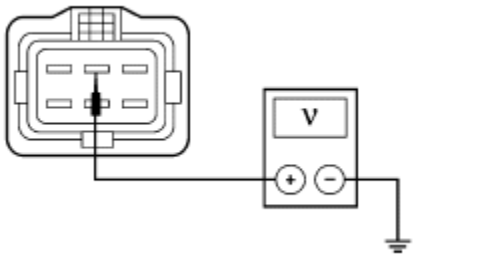
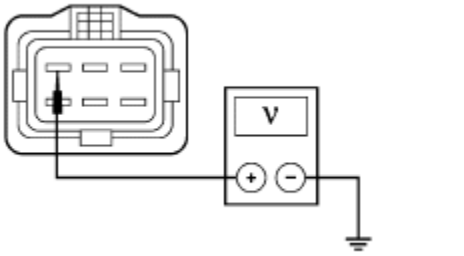
Condition	Possible Sources	Action
• The daytime running lamps are inoperative	• BJB Mini-Fuse 4 (15A). • Circuitry. • Parking brake signal switch and bracket. • DRL module.	• GO to Pinpoint Test A .
• The daytime running lamps are on with the parking brake set	• Circuitry. • Parking brake signal switch and bracket. • DRL module.	• GO to Pinpoint Test B .
• The daytime running lamps are on with the ignition switch off	• Circuitry. • Ignition switch. • DRL module.	• GO to Pinpoint Test C .
• The low beam headlamps are on at full intensity in DRL mode	• Circuitry. • Headlamp switch. • DRL module.	• GO to Pinpoint Test D .
• The low beam headlamps are on at reduced intensity with the headlamp switch on	• Circuitry. • Headlamp switch.	• REFER to Section 417-01 .

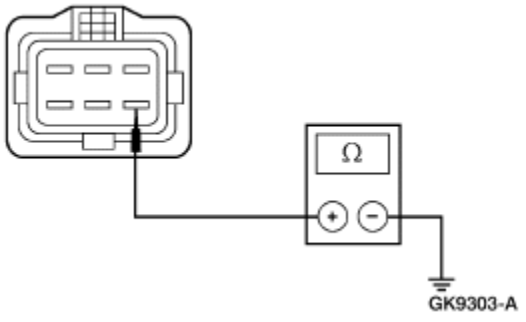
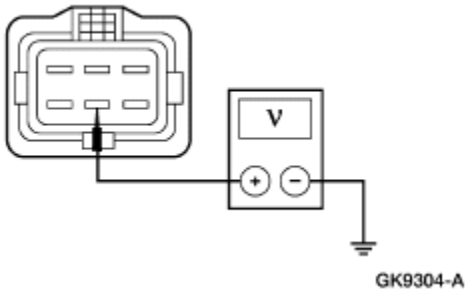
Pinpoint Tests

PINPOINT TEST A: THE DAYTIME RUNNING LAMPS ARE INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK THE PARKING BRAKE SWITCH SIGNAL CIRCUIT TO THE DRL MODULE FOR SHORT TO GROUND	
NOTE: Verify the parking brake control is fully released for this step.	
1	

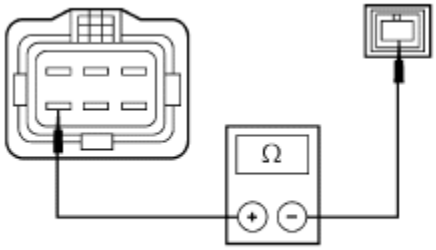
 2  DRL Module C134 3  GK9107-A	3 Measure the resistance between DRL module C134 Pin 6, Circuit 977 (VT/WH), harness side and ground. • **Is the resistance greater than 10,000 ohms?** → **Yes** GO to A3 . → **No** GO to A2 .
A2 CHECK THE PARKING BRAKE SWITCH	
1  Parking Brake Switch C211 2  GK9107-A	2 Measure the resistance between DRL module C134 Pin 6, Circuit 977 (VT/WH), harness side and ground. • **Is the resistance greater than 10,000 ohms?**

	→ **Yes** INSTALL a new parking brake signal switch and bracket. TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.
A3 CHECK VOLTAGE TO THE DRL MODULE	
1  GK9108-A	1 Measure the voltage between DRL module C134 Pin 2, Circuit 54 (LG/YE), harness side and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to A4 . → **No** REPAIR the circuit. TEST the system for normal operation.
A4 CHECK IGNITION SENSE INPUT	
1 	
2  GK9109-A	2 Measure the voltage between DRL module C134 Pin 3, Circuit 298 (VT/OG), harness side and ground. • **Is the voltage greater than 10 volts?** → **Yes**

	GO to A5 . → **No** REPAIR the circuit. TEST the system for normal operation.
A5 CHECK THE DRL MODULE GROUND — CIRCUIT 57 (BK)	
1  	1 Measure the resistance between DRL module C134 Pin 4, Circuit 57 (BK), harness side and ground. • **Is the resistance less than 5 ohms?** → **Yes** GO to A6 . → **No** REPAIR the circuit. TEST the system for normal operation.
A6 CHECK THE HIGH BEAM DISABLE INPUT CIRCUIT FOR SHORT TO BATTERY — CIRCUIT 12 (LG/BK)	
1  	1 Measure the voltage between DRL module C134 Pin 5, Circuit 12 (LG/BK), harness side and ground. • **Is voltage indicated?** → **Yes** REPAIR the circuit. TEST the system for normal operation. → **No** INSTALL a new DRL module. REFER to Module—Daytime Running Lamps (DRL) . TEST the system for normal operation.

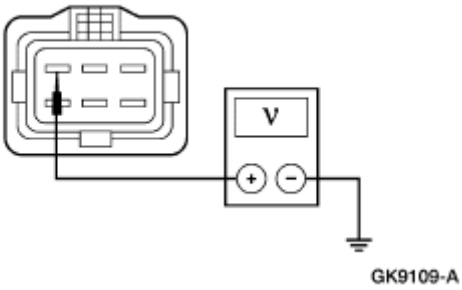
PINPOINT TEST B: THE DAYTIME RUNNING LAMPS ARE ON WITH THE PARKING BRAKE SET

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CHECK THE PARKING BRAKE SWITCH	
1  2  Parking Brake Switch C211 3  GK9110-A 4 	3 Connect a 10A fused jumper wire between parking brake switch C211, Circuit 162 (LG/RD), harness side and ground. • **Do the DRL turn off?** → **Yes** INSTALL a new parking brake signal switch and bracket. TEST the system for normal operation. → **No** GO to B2 .
B2 CHECK THE PARKING BRAKE SWITCH SIGNAL CIRCUIT	
1  2	

 DRL Module C134 3  GK9111-A	3 Measure the resistance between parking brake switch C211, Circuit 162 (LG/RD), harness side and DRL module C134 Pin 6, Circuit 977 (VT/WH), harness side. • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new DRL module. REFER to Module—Daytime Running Lamps (DRL) . TEST the system for normal operation. → **No** REPAIR the circuit. TEST the system for normal operation.

PINPOINT TEST C: THE DAYTIME RUNNING LAMPS ARE ON WITH THE IGNITION SWITCH OFF

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 CHECK THE IGNITION SWITCH INPUT TO THE DRL MODULE FOR VOLTAGE	
1  2  DRL Module C134 3	3 Measure the voltage between DRL module C134 Pin 3, Circuit 298 (VT/OG), harness side and ground.

	• **Is voltage indicated?** → **Yes** GO to C2 . → **No** INSTALL a new DRL module. REFER to Module—Daytime Running Lamps (DRL) . TEST the system for normal operation.
C2 CHECK THE IGNITION SWITCH	
	1 Check the ignition switch; refer to the Wiring Diagrams Cell 149. • **Is the ignition switch OK?** → **Yes** REPAIR Circuit 298 (VT/OG) for short to battery. TEST the system for normal operation. → **No** INSTALL a new ignition switch. REFER to Section 211-05 . TEST the system for normal operation.

PINPOINT TEST D: THE LOW BEAM HEADLAMPS ARE ON AT FULL INTENSITY IN DRL MODE

CONDITIONS	DETAILS/RESULTS/ACTIONS
D1 CHECK THE LOW BEAM HEADLAMPS INPUT	
1  DRL Module C134	• **Are the low beam headlamps still on at full intensity?**

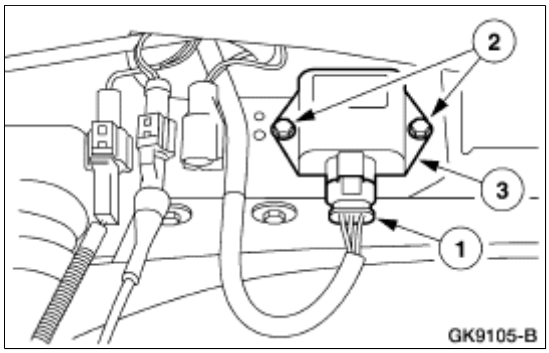
	→ **Yes** REFER to Section 417-01 . → **No** INSTALL a new DRL module. REFER to Module—Daytime Running Lamps (DRL) . TEST the system for normal operation.

Module —Daytime Running Lamps (DRL)

Removal

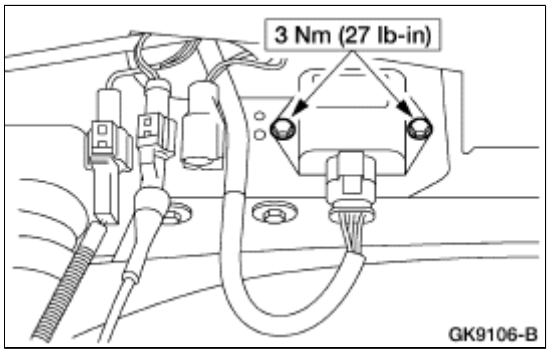
1. Disconnect the battery ground cable (14301). For additional information, refer to Section 414-01 .

2. Remove the daytime running lamps (DRL) control module.
    1. Disconnect the electrical connector.
    2. Remove the bolts.
    3. Remove the DRL control module.



Installation

1. To install, reverse the removal procedure.

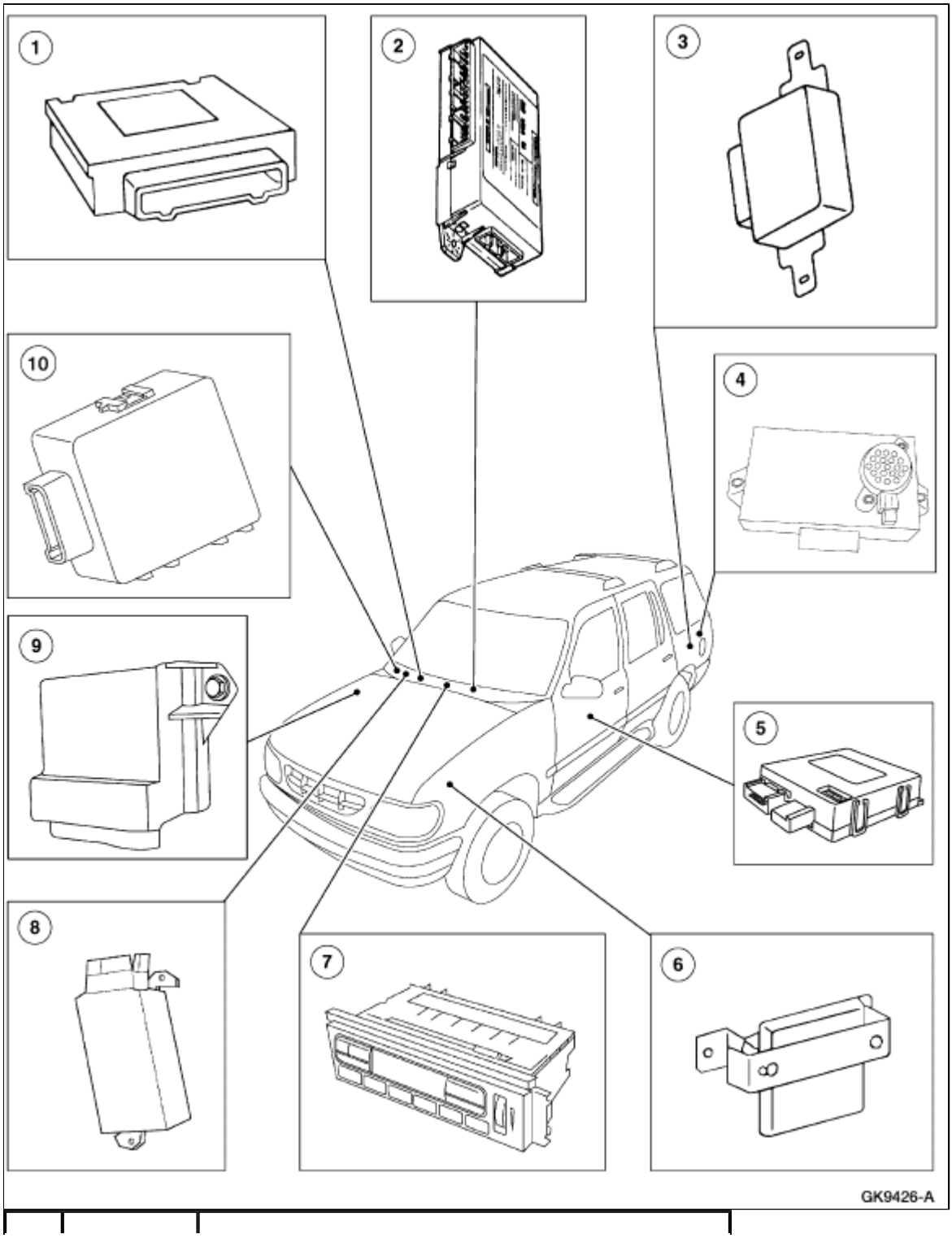


General Specifications

Item	Specification
Heat shrink tube overlap mm (inch)	12.7 (0.5)
Wire insulation removal length (twist side) mm (inch)	37.2 (1.5)
Wire insulation removal length (receiving side) mm (inch)	19.5 (0.75)
Raychem SCT® Heat Shrink Tubing, Motorcraft part number WT-5627	ESB-M99D56-A2

Communications Network

Module Communication Network Components



Item	Part Number	Description
1	12A650	Powertrain control module (PCM)
2	14B205	Generic electronic module (GEM)/central timer module (CTM)
3	15K600	Remote anti-theft personality (RAP) module
4	—	Parking aid module (PAM)
5	—	Driver seat module (DSM)
6	2C018	4-Wheel anti-lock brake control module
7	19880	Electronic automatic temperature control (EATC) module
8	5A919	Air suspension control module
9	—	Restraint control module (RCM)
10	—	Passive anti-theft system (PATS) module

The vehicle has two separate module communication networks. The standard corporate protocol (SCP) which is an unshielded twisted pair cable (data bus plus, circuit 914 [T/O] and data bus minus, circuit 915 [P/LB]) and the International Standards Organization (ISO) 9141 Network via a single wire (circuit 70 [LB/W]). Both networks can be connected to scan tool at one connector called the data link connector (DLC). This makes troubleshooting these systems easier by allowing one smart tester to be able to diagnose and control any module on the two networks from one connector. The DLC can be found under the instrument panel between the steering column and the radio.

The ISO 9141 communication network does not permit inter-module communication. When the scan tool communicates to modules on the ISO 9141 communication network, the scan tool must ask for all information; the modules cannot initiate communications.

The SCP will remain operational even with the severing of one of the bus wires. Communications will also continue if one of the bus wires is shorted to ground or battery positive voltage (B+) or a termination resistor is lost. This faulted condition is detected and reported to the host by the module's network bus interface circuits.

Unlike the SCP, the ISO 9141 communication network will not function if the wire is shorted to ground or battery positive voltage (B+). Also, if one of the modules on the ISO 9141 communication network loses power or shorts internally, communications to that module will fail.

There are three modules linked to the SCP communication network and seven modules linked to the ISO 9141 communication network.

SCP Communication Network

The powertrain control module (PCM) (12A650) is on the SCP communication network. The PCM controls the engine for better fuel economy, emissions control and failure mode detection and storage. For additional information, refer to Powertrain Control/Emissions Diagnosis (PC/ED) manual Section 3 for diagnosis and testing.

The passive anti-theft system (PATS) module is on the SCP communication network. The PATS module contains circuitry to connect the vehicle electrical system, the transceiver module, the vehicle module communications network and the vehicle theft indicator located in the instrument cluster (10849). The PATS

module uses a microprocessor to control the system functions. The PATS module microprocessor stores the ignition key codes in non-volatile memory. The PATS module can be diagnosed through the data link connector. For additional information, refer to Section 419-01 .

The electronic automatic temperature control (EATC) module is linked to the SCP communication network. The EATC module controls automatic climate functions that maintain the interior at a constant temperature setting. For additional information, refer to Section 412-00 .

ISO 9141 Communication Network

The restraint control module (RCM) module is on the ISO 9141 communication network. The RCM controls the deployment of the air bags based on sensor input. For additional information, refer to Section 501-20B .

The parking aid module (PAM) is on the ISO 9141 communication network. The PAM controls the parking aid system For additional information, refer to Section 413-13 .

The generic electronic module (GEM)/central timer module (CTM) is on the ISO 9141 communication network. The GEM is equipped on vehicles with four-wheel drive or vehicles with power windows. The CTM is equipped on vehicles with two-wheel drive or vehicles without power windows. The GEM controls a variety of systems:

- 4x4
- Windshield wipers
- Courtesy lamps
- One touch down power windows, etc
- Warning chimes/lamps

For additional information, refer to Section 419-10 .

The remote anti-theft personality (RAP) module is on the ISO 9141 communication network. The RAP module controls the keyless remote entry and active anti-theft of the vehicle. For additional information, refer to Section 501-14B and Section 419-01 .

The 4-wheel anti-lock brake control module is on the ISO 9141 communication network. The 4-wheel anti-lock brake control module controls the brake pressure to the four wheels to keep the vehicle under control while braking. For additional information, refer to Section 206-09 .

The air suspension system is a computer controlled suspension system. The rear shock absorber contains an integrated air spring. The rear air springs provide automatic load leveling and a ride adjustment with a total span of 50 mm (2 in).

The air suspension control module programming has a time delay compensation for normal suspension travel over rough roads so the air suspension system will not attempt to continuously adjust vehicle ride height.

There is one height sensor mounted in the rear of the vehicle. The height sensors have a total travel range of 80 mm (3 in). For additional information, refer to Section 204-05 .

The driver seat module (DSM) is connected on the SCP communication network. The DSM controls the power seat and memory functions. For additional information, refer to Section 501-10 .

Communications Network

Refer to Wiring Diagrams Cell 14 , Multiplex Communication Network for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051
 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent scan tool

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of electrical damage.

Visual Inspection Chart

Electrical
• Central junction box (CJB) Fuse 5 (10A) • Damaged wiring harness • Loose or corroded connectors • 4-wheel anti-lock brake control module • Restraint control module (RCM) • Generic electronic module (GEM)/central timer module (CTM) • Powertrain control module (PCM) • Parking aid module (PAM) (optional) • Remote anti-theft personality (RAP) module (optional) • Air suspension control module (optional) • Passive anti-theft system (PATS) module • Driver seat module (DSM) (optional) • Electronic automatic temperature control (EATC) module (optional)

3. If the concern remains after the inspection, connect the scan tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the scan tool menu. If

the scan tool does not communicate with the vehicle:

- check that the program card is properly installed.
- check the connections to the vehicle.
- check the ignition switch position is in RUN.

If the scan tool still does not communicate with the vehicle, go to Pinpoint Test M.

4. Go to Pinpoint Test PC.

System Precheck

PINPOINT TEST PC: DATA LINK DIAGNOSTICS NETWORK TEST

CONDITIONS	DETAILS/RESULTS/ACTIONS
PC1 DATA LINK DIAGNOSTICS NETWORK TEST	
1 	2 Run the Data Link Diagnostics Network Test. • **Is SYSTEM PASSED obtained?** → **Yes** Test PASSED. RETURN to the Symptom Chart of the section for the module in question. → **No** If no response from the scan tool, GO to Pinpoint Test M . If CKT70, CKT914, or CKT915 = SOME ECUS NO RESP/NOT EQUIP, REFER to the Symptom Chart. If CKT70 = ALL ECUS NO RESP/NOT EQUIP, GO to Pinpoint Test K. If CKT914 = ALL ECUS NO RESP/NOT EQUIP, GO to Pinpoint Test L . If CKT915 = ALL ECUS NO RESP/NOT EQUIP, GO to Pinpoint Test L . If module in question is NO RESPONSE/NOT EQUIPPED, REFER to the Symptom Chart. If module in question is NO RESPONSE ON CKT914 (BUS+) or NO RESPONSE ON CKT915 (BUS-), REFER to Symptom Chart.

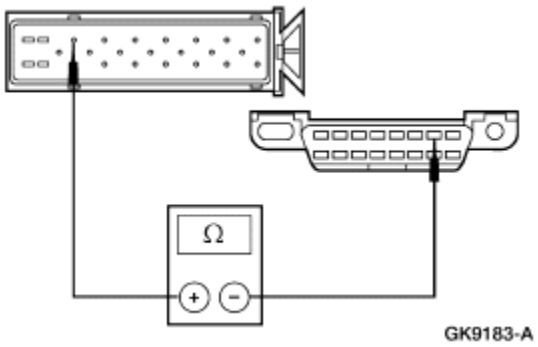
Symptom Chart

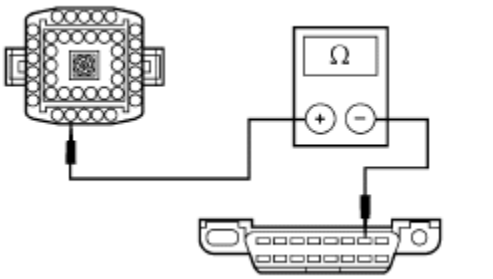
Symptom Chart

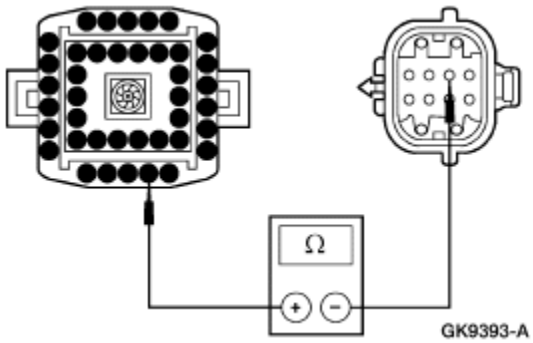
Condition	Possible Sources	Action
• The module does not respond to the scan tool — 4-wheel anti-lock brake control module	• Circuit or connection in International Standards Organization (ISO) 9141 network. • 4-wheel anti-lock brake control module.	• GO to Pinpoint Test A .
• The module does not respond to the scan tool — generic electronic module (GEM)/central timer module (CTM)	• Circuit or connection in ISO 9141 network. • GEM/CTM.	• GO to Pinpoint Test B .
• The module does not respond to the scan tool — restraint control module (RCM)	• Circuit or connection in ISO 9141 network. • RCM.	• GO to Pinpoint Test C .
• The module does not respond to the scan tool — remote anti-theft personality (RAP) module	• Circuit or connection in ISO 9141 network. • RAP module (optional).	• GO to Pinpoint Test D .
• The module does not respond to the scan tool — powertrain control module (PCM)	• Circuit or connection in Standard Corporate Protocol (SCP) network. • PCM.	• GO to Pinpoint Test E .
• The module does not respond to the scan tool — air suspension control module	• Circuit or connection in ISO 9141 network. • Air suspension control module (optional).	• GO to Pinpoint Test F .
• The module does not respond to the scan tool — electronic automatic temperature control (EATC) module	• Circuit or connection in SCP network. • EATC module (optional).	• GO to Pinpoint Test G .
• The module does not respond to the scan tool — driver seat module (DSM)	• Circuit or connection in ISO 9141 network. • DSM (optional).	• GO to Pinpoint Test H .
• The module does not respond to the scan tool — parking aid module (PAM)	• Circuit or connection in ISO 9141 network. • PAM (optional).	• GO to Pinpoint Test I .
• The module does not respond to the scan tool — passive anti-theft system (PATS) module	• Circuit or connection in SCP network. • PATS module.	• GO to Pinpoint Test J .
• No module/network communication — ISO 9141 network	• Circuit or connection in ISO 9141 network. • ISO 9141 networked modules.	• GO to Pinpoint Test K .
• No module/network communication — SCP network	• Circuit or connection in SCP network. • SCP networked modules.	• GO to Pinpoint Test L .
• No module/network communication — no power to the scan tool	• DLC. • CJB Fuse 5 (10A). • Circuitry. • Scan tool.	• GO to Pinpoint Test M .

Pinpoint Tests

PINPOINT TEST A: THE MODULE DOES NOT RESPOND TO THE SCAN TOOL — 4-WHEEL ANTI-LOCK BRAKE CONTROL MODULE

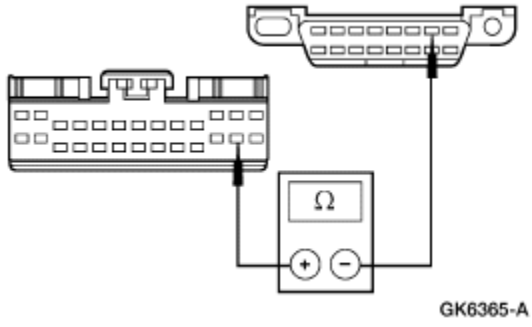
CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK CIRCUIT 70 (LB/WH) AT 4-WHEEL ANTI-LOCK BRAKE CONTROL MODULE C186-23 FOR DAMAGE	
1  2  4-Wheel Anti-Lock Brake Control Module C186	3 Inspect 4-wheel anti-lock brake control module C186 for damage. • **Is the 4-wheel anti-lock brake control module C186 OK?** → **Yes** GO to A2 . → **No** REPAIR the 4-wheel anti-lock brake control module C186. TEST the system for normal operation.
A2 CHECK CIRCUIT 70 (LB/WH) BETWEEN DLC C291 AND 4-WHEEL ANTI-LOCK BRAKE CONTROL MODULE C186 FOR OPEN	
1  GK9183-A	1 Measure the resistance between 4-wheel anti-lock brake control module C186-23, circuit 70 (LB/WH), and DLC C291-7, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new 4-wheel anti-lock brake control module. For additional information, REFER to

	Section 206-09 . TEST the system for normal operation. → **No** GO to A3 .
A3 CHECK IN-LINE C148 FOR DAMAGE	
1  In-Line C148	2 Inspect in-line C148M and C148F for damage. • **Is the in-line C148M and C148F OK?** → **Yes** GO to A4 . → **No** REPAIR the damaged in-line C148. TEST the system for normal operation.
A4 CHECK CIRCUIT 70 (LB/WH) BETWEEN IN-LINE C148F and DLC C291 FOR OPEN	
1  GK6363-A	1 Measure the resistance between in-line C148F-16, circuit 70 (LB/WH), and DLC C291-7, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** GO to A5 . → **No** REPAIR circuit 70 (LB/WH) between DLC C291 and in-line C148F. TEST the system for normal operation.
A5 CHECK IN-LINE C140 FOR DAMAGE	
1 	

In-Line C140	2 Inspect in-line C140M and C140F for damage. • **Is the in-line C140M and C140F OK?** → **Yes** GO to A6 . → **No** REPAIR the damaged in-line C140. TEST the system for normal operation.
A6 CHECK CIRCUIT 70 (LB/WH) BETWEEN IN-LINE C148M AND IN-LINE C140F FOR OPEN	
1  	1 Measure the resistance between in-line C148M-16, circuit 70 (LB/WH), and in-line C140F-8, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** REPAIR circuit 70 (LB/WH) between in-line C140F and 4-wheel anti-lock brake control module C186. TEST the system for normal operation. → **No** REPAIR circuit 70 (LB/WH) between in-line C148M and in-line C140F. TEST the system for normal operation.

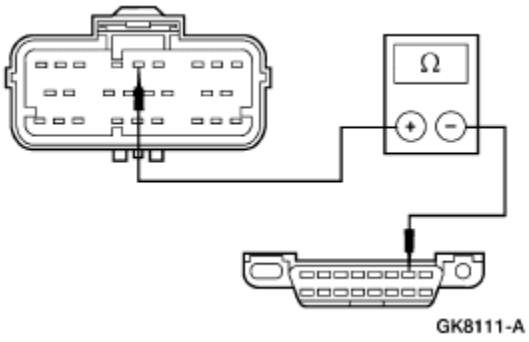
PINPOINT TEST B: THE MODULE DOES NOT RESPOND TO THE SCAN TOOL — GENERIC ELECTRONIC MODULE (GEM)/CENTRAL TIMER MODULE (CTM)

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CHECK GEM/CTM C280 FOR DAMAGE	
1  2	

 GEM/CTM C280	3 Inspect GEM/CTM C280 for damage. • **Is the GEM/CTM C280 OK?** → **Yes** GO to B2 . → **No** REPAIR the GEM/CTM C280. TEST the system for normal operation.
B2 CHECK CIRCUIT 70 (LB/WH) BETWEEN DLC C291 AND GEM/CTM C280 FOR OPEN	
1  GK6365-A	1 Measure the resistance between GEM/CTM C280-25, circuit 70 (LB/WH), and DLC C291-7, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new GEM/CTM. For additional information, REFER to Section 419-10 . TEST the system for normal operation. → **No** REPAIR circuit 70 (LB/WH). TEST the system for normal operation.

PINPOINT TEST C: THE MODULE DOES NOT RESPOND TO THE SCAN TOOL — RESTRAINT CONTROL MODULE (RCM)

CONDITIONS	DETAILS/RESULTS/ACTIONS
C1 CHECK RCM C232 FOR DAMAGE	
1 	

3  RCM C232	2 Deactivate the air bag system; REFER to Section 501-20B . 4 Inspect RCM C232 for damage. • **Is the RCM C232 OK?** → **Yes** GO to C2 . → **No** REPAIR the RCM C232. TEST the system for normal operation.
C2 CHECK CIRCUIT 70 (LB/WH) BETWEEN DLC C291-7 AND RCM C232-5 FOR OPEN	
1  GK8111-A	1 Measure the resistance between RCM C232-5, circuit 70 (LB/WH), and DLC C291-7, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new RCM; REFER to Section 501-20B . TEST the system for normal operation. → **No** REPAIR circuit 70 (LB/WH). TEST the system for normal operation.

PINPOINT TEST D: THE MODULE DOES NOT RESPOND TO THE SCAN TOOL — REMOTE ANTI-THEFT PERSONALITY (RAP) MODULE

CONDITIONS	DETAILS/RESULTS/ACTIONS
D1 CHECK RAP MODULE C336 FOR DAMAGE	
1	

2

RAP Module C336

3 Inspect RAP module C336 for damage.

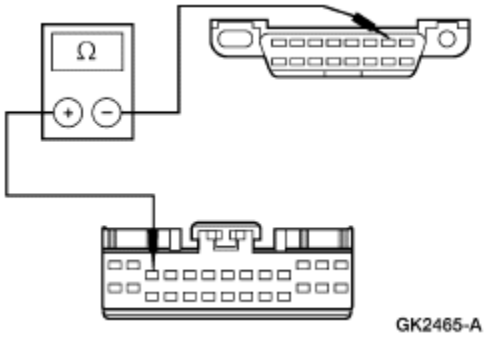
- **Is the RAP module C336 OK?**

→ **Yes**
GO to D2 .

→ **No**
REPAIR the RAP module C336. TEST the system for normal operation.

D2 CHECK CIRCUIT 70 (LB/WH) BETWEEN DLC C291-7 AND RAP MODULE C336-3 FOR OPEN

1



1 Measure the resistance between RAP module C336-3, circuit 70 (LB/WH), and DLC C291-7, circuit 70 (LB/WH).

- **Is the resistance less than 5 ohms?**

→ **Yes**
INSTALL a new RAP module. For additional information, REFER to Section 419-10 . TEST the system for normal operation.

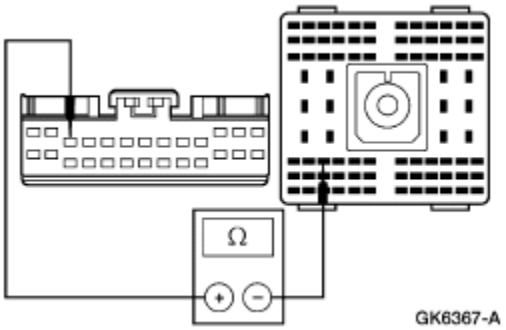
→ **No**
GO to D3 .

D3 CHECK IN-LINE C212 FOR DAMAGE

1

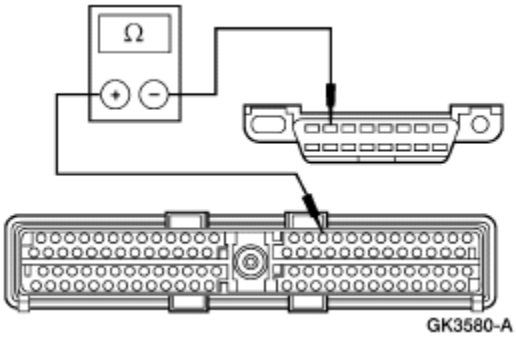
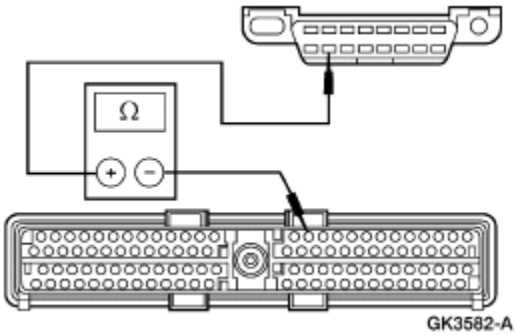
In-Line C212

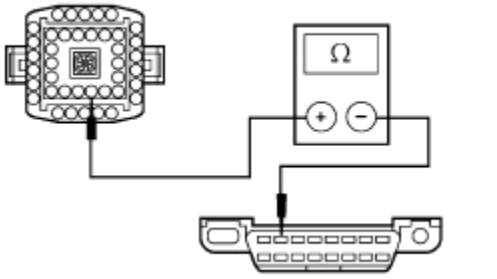
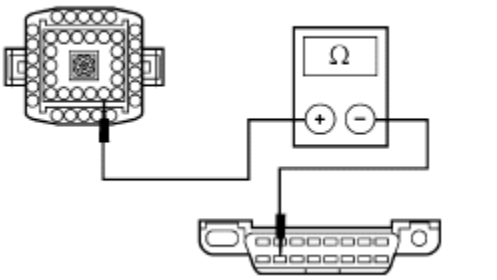
2 Inspect in-line C212M and C212F for damage.

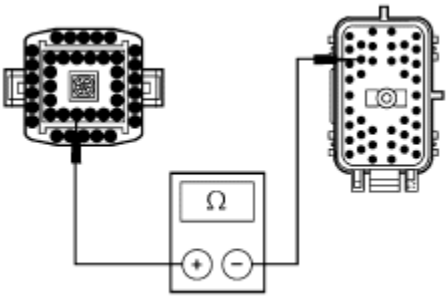
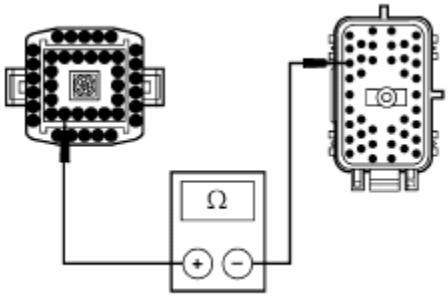
	• **Is the in-line C212M and C212F OK?** → **Yes** GO to D4 . → **No** REPAIR the damaged in-line C212. TEST the system for normal operation.
D4 CHECK CIRCUIT 70 (LB/WH) BETWEEN IN-LINE C212M AND RAP MODULE C336 FOR OPEN	
1  	1 Measure the resistance between RAP module C336-3, circuit 70 (LB/WH), and in-line C212M-51, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** REPAIR circuit 70 (LB/WH) between in-line C212F and DLC C291. TEST the system for normal operation. → **No** REPAIR circuit 70 (LB/WH) between in-line C212M and RAP module C336. TEST the system for normal operation.

PINPOINT TEST E: THE MODULE DOES NOT RESPOND TO THE SCAN TOOL — POWERTRAIN CONTROL MODULE (PCM)

CONDITIONS	DETAILS/RESULTS/ACTIONS
E1 CHECK PCM C202-15 AND C202-16	
1  2 	

PCM C202	3 Inspect PCM C202-15 and C202-16 for damage. • **Is the PCM C202 OK?** → **Yes** GO to E2 . → **No** REPAIR PCM C202. TEST the system for normal operation.
E2 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) BETWEEN THE PCM C202 AND THE DLC C291 FOR OPEN	
1  2  PCM C202 3  4  	3 Measure the resistance between PCM C202-16, circuit 914 (TN/OG), and DLC C291-2, circuit 914 (TN/OG). 4 Measure the resistance between PCM C202-15, circuit 915 (PK/LB), and DLC C291-10, circuit 915 (PK/LB). • **Are the resistances less than 5 ohms?**

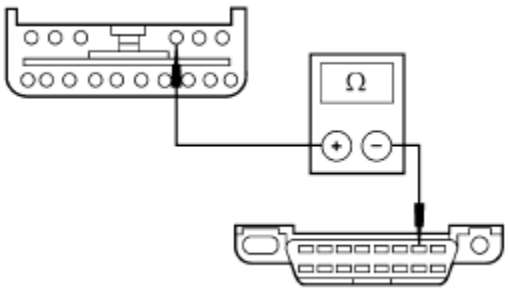
	→ **Yes** REFER to Powertrain Control/Emissions Diagnosis (PC/ED) manual Section 3 for diagnosis and testing. → **No** GO to E3.
E3 CHECK IN-LINE C147 FOR DAMAGE	
1  In-Line C147	2 Inspect in-line C147M and C147F for damage. • **Is the in-line C147M and C147F OK?** → **Yes** GO to E4. → **No** REPAIR the damaged in-line C147. TEST the system for normal operation.
E4 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) BETWEEN IN-LINE C147F and DLC C291 FOR OPEN	
1  GK6368-A	1 Measure the resistance between in-line C147F-21, circuit 914 (TN/OG), and DLC C291-2, circuit 914 (TN/OG).
2  GK6369-A	2 Measure the resistance between in-line C147F-25 circuit 915 (PK/LB), and DLC C291-10, circuit 915 (PK/LB). • **Are the resistances less than 5 ohms?**

	→ **Yes** GO to E5 . → **No** REPAIR the circuit in question between in-line C147F and DLC C291. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.
E5 CHECK IN-LINE C115 FOR DAMAGE	
1  In-Line C115	2 Inspect in-line C115M and C115F for damage. • **Is the in-line C115M and C115F OK?** → **Yes** GO to E6 . → **No** REPAIR the damaged in-line C115. TEST the system for normal operation.
E6 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) BETWEEN IN-LINE C147F AND IN-LINE C115M FOR OPEN	
1  GK6370-A	1 Measure the resistance between in-line C147M-21, circuit 914 (TN/OG), and in-line C115M-11, circuit 914 (TN/OG).
2  GK6371-A	2 Measure the resistance between in-line C147M-25, circuit 915 (PK/LB), and in-line C115M-3, circuit 915 (PK/LB).

	• **Are the resistances less than 5 ohms?** → **Yes** REPAIR the circuit in question between PCM C202 and in-line C115F. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation. → **No** REPAIR the circuit in question between in-line C147M and in-line C115M. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.

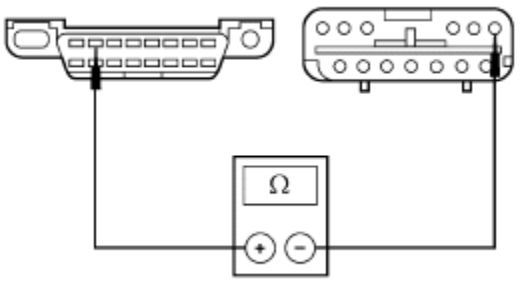
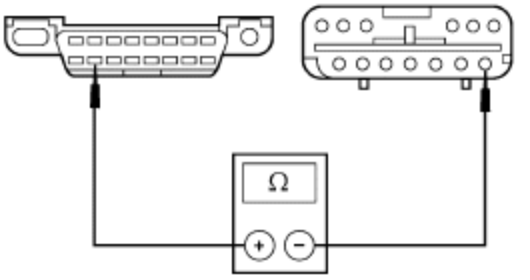
PINPOINT TEST F: THE MODULE DOES NOT RESPOND TO THE SCAN TOOL — AIR SUSPENSION CONTROL MODULE

CONDITIONS	DETAILS/RESULTS/ACTIONS
F1 CHECK THE AIR SUSPENSION CONTROL MODULE C2000 FOR DAMAGE	
1  2  Air Suspension Control Module C2000	3 Inspect air suspension control module C2000 for damage. • **Is the air suspension control module C2000 OK?** → **Yes** GO to F2 . → **No** REPAIR air suspension control module C2000. TEST the system for normal operation.
F2 CHECK THE RESISTANCE BETWEEN DLC C291 AND AIR SUSPENSION CONTROL MODULE C2000 — CIRCUIT 70 (LB/WH)	
1	

 2  Air Suspension Control Module C2000 3  GK6488-A	3 Measure the resistance between air suspension control module C2000-29, circuit 70 (LB/WH), and DLC C291-7, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new air suspension control module. For additional information, REFER to Section 204-05 . TEST the system for normal operation. → **No** REPAIR circuit 70 (LB/WH). TEST the system for normal operation.

PINPOINT TEST G: THE MODULE DOES NOT RESPOND TO THE SCAN TOOL —ELECTRONIC AUTOMATIC TEMPERATURE CONTROL (EATC) MODULE

CONDITIONS	DETAILS/RESULTS/ACTIONS
G1 CHECK EATC C297 FOR DAMAGE	
1  2  EATC Module C297	3 Inspect EATC module C297 for damage.

	• **Is the EATC module C297 OK?** → **Yes** GO to G2 . → **No** REPAIR EATC C297. TEST the system for normal operation.
G2 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) FOR OPEN	
1  GK6489-A	1 Measure the resistance between DLC C291-2, circuit 914 (TN/OG), and EATC module C297-15, circuit 914 (TN/OG).
2  GK6490-A	2 Measure the resistance between DLC C291-10, circuit 915 (PK/LB), and EATC module C297-1, circuit 915 (PK/LB).
	• **Are the resistances less than 5 ohms?** → **Yes** INSTALL a new EATC module. REFER to Section 412-00 . TEST the system for normal operation. → **No** REPAIR the circuit in question. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.

PINPOINT TEST H: THE MODULE DOES NOT RESPOND TO THE SCAN TOOL — DRIVER SEAT MODULE (DSM)

CONDITIONS	DETAILS/RESULTS/ACTIONS

H1 CHECK DSM C337 FOR DAMAGE

1

2

DSM C337

3 Inspect DSM C337 for damage.

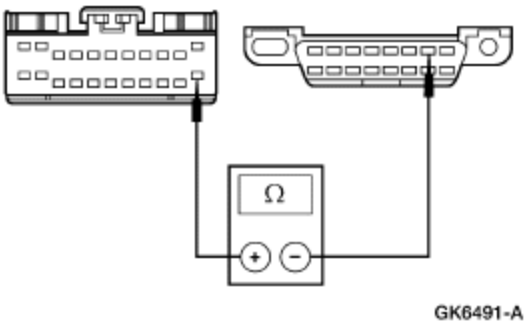
- **Is the DSM C337 OK?**

→ **Yes**
GO to H2 .

→ **No**
REPAIR the DSM C337. TEST the system for normal operation.

H2 CHECK CIRCUIT 70 (LB/WH) BETWEEN DLC C291-7 AND DSM C337-22 FOR OPEN

1



GK6491-A

1 Measure the resistance between DSM C337-22, circuit 70 (LB/WH), and DLC C291-7, circuit 70 (LB/WH).

- **Is the resistance less than 5 ohms?**

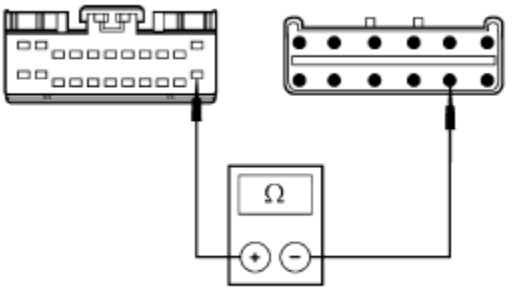
→ **Yes**
INSTALL a new DSM. For additional information, REFER to Section 501-10 . TEST the system for normal operation.

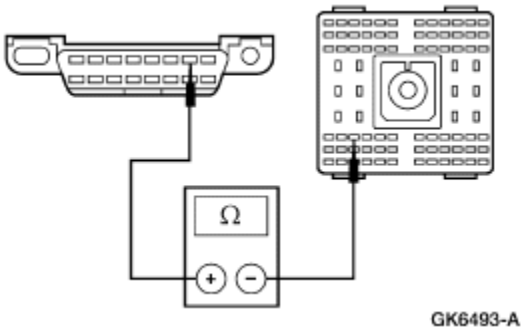
→ **No**
GO to H3 .

H3 CHECK IN-LINE C346 FOR DAMAGE

1

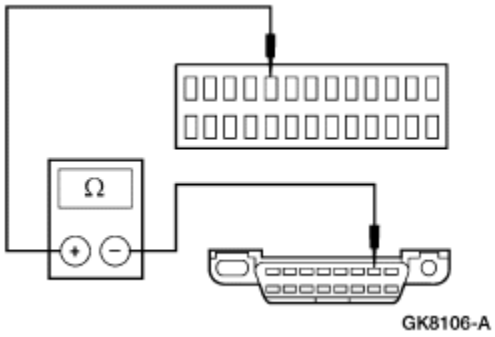
In-Line C346

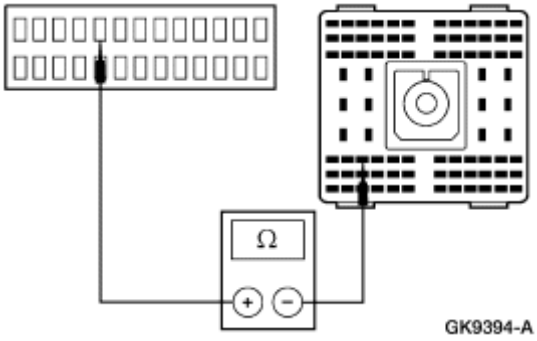
	2 Inspect in-line C346M and C346F for damage. • **Is the in-line C346M and C346F OK?** → **Yes** GO to H4 . → **No** REPAIR the damaged in-line C346. TEST the system for normal operation.
H4 CHECK CIRCUIT 70 (LB/WH) BETWEEN IN-LINE C346M AND DSM C337 FOR OPEN	
1  	1 Measure the resistance between DSM C337-22, circuit 70 (LB/WH), and in-line C346M-11, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** GO to H5 . → **No** REPAIR circuit 70 (LB/WH) between in-line C346M and DSM C337. TEST the system for normal operation.
H5 CHECK IN-LINE C212 FOR DAMAGE	
1  In-Line C212	2 Inspect in-line C212M and C212F for damage. • **Is the in-line C212M and C212F OK?** → **Yes** GO to H6 . → **No** REPAIR the damaged in-line C212. TEST the system for normal operation.

H6 CHECK CIRCUIT 70 (LB/WH) BETWEEN IN-LINE C212F AND DLC C291 FOR OPEN	
1  GK6493-A	1 Measure the resistance between DLC C291-7, circuit 70 (LB/WH), and in-line C212F-51, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** REPAIR circuit 70 (LB/WH) between in-line C212M and in-line C346F. TEST the system for normal operation. → **No** REPAIR circuit 70 (LB/WH) between in-line C212F and DLC C291. TEST the system for normal operation.

PINPOINT TEST I: THE MODULE DOES NOT RESPOND TO THE SCAN TOOL — PARKING AID MODULE (PAM)

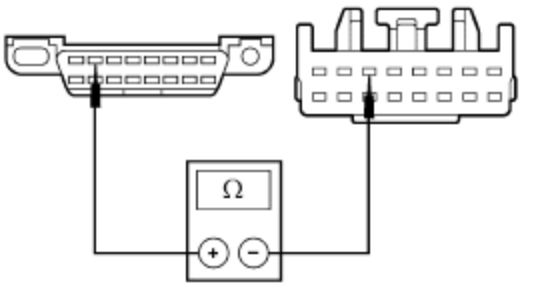
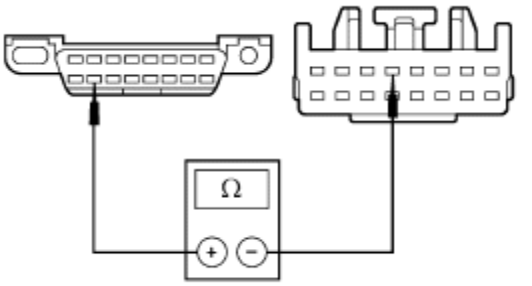
CONDITIONS	DETAILS/RESULTS/ACTIONS
I1 CHECK PAM C440 FOR DAMAGE	
1  2  PAM C440	3 Inspect PAM C440 for damage. • **Is the PAM C440 OK?** → **Yes** GO to I2 . → **No** REPAIR the PAM C440. TEST the system for

	normal operation.
I2 CHECK CIRCUIT 70 (LB/WH) BETWEEN DLC C291-7 AND PAM C440-5 FOR OPEN	
1  	1 Measure the resistance between PAM C440-5, circuit 70 (LB/WH), and DLC C291-7, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new PAM. For additional information, REFER to Section 413-13 . TEST the system for normal operation. → **No** GO to I3 .
I3 CHECK IN-LINE C212 FOR DAMAGE	
1  In-Line C212	2 Inspect in-line C212M and C212F for damage. • **Is the in-line C212M and C212F OK?** → **Yes** GO to I4 . → **No** REPAIR the damaged in-line C212. TEST the system for normal operation.
I4 CHECK CIRCUIT 70 (LB/WH) BETWEEN IN-LINE C212M AND PAM C440 FOR OPEN	
1	1 Measure the resistance between PAM C440-5, circuit 70 (LB/WH), and in-line C212M-51, circuit 70 (LB/WH).

	• **Is the resistance less than 5 ohms?** → **Yes** REPAIR circuit 70 (LB/WH) between in-line C212F and DLC C291. TEST the system for normal operation. → **No** REPAIR circuit 70 (LB/WH) between in-line C212M and PAM C440. TEST the system for normal operation.

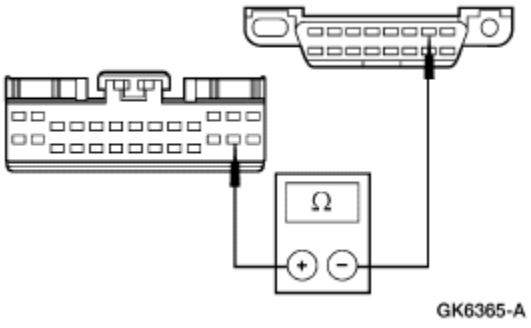
PINPOINT TEST J: THE MODULE DOES NOT RESPOND TO THE SCAN TOOL —PASSIVE ANTI-THEFT SYSTEM (PATS) MODULE

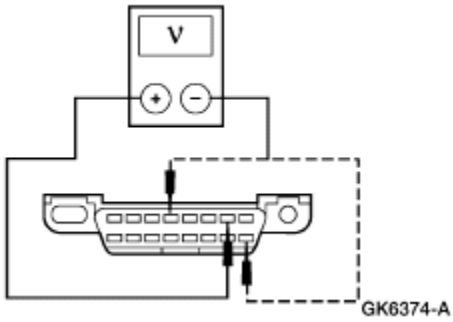
CONDITIONS	DETAILS/RESULTS/ACTIONS
J1 CHECK PATS C222 FOR DAMAGE	
1  2  PATS Module C222	3 Inspect PATS module C222 for damage. • **Is the PATS module C222 OK?** → **Yes** GO to J2 . → **No** REPAIR PATS C222. TEST the system for normal operation.
J2 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) FOR OPEN	

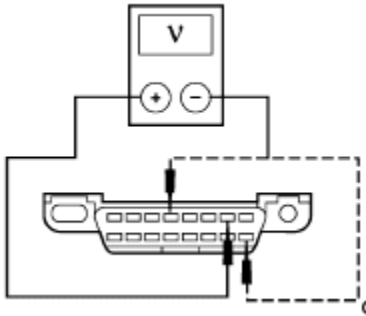
1  GK6494-A	1 Measure the resistance between PATS module C222-6, circuit 914 (TN/OG), and DLC C291-2, circuit 914 (TN/OG).
2  GK6495-A	2 Measure the resistance between PATS module C222-5, circuit 915 (PK/LB), and DLC C291-10, circuit 915 (PK/LB). • **Are the resistances less than 5 ohms?** → **Yes** INSTALL a new PATS module. For additional information, REFER to Section 419-01 . TEST the system for normal operation. → **No** REPAIR the circuit in question. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.

PINPOINT TEST K: NO MODULE / NETWORK COMMUNICATION— ISO 9141 NETWORK

CONDITIONS	DETAILS/RESULTS/ACTIONS
K1 CHECK THE SCAN TOOL FOR DAMAGE	
	1 Inspect scan tool pin 7 for damage. • **Is the scan tool OK?** → **Yes** GO to K2 . → **No** REPAIR the scan tool. TEST the system for

	normal operation.
K2 CHECK THE DLC C291 FOR DAMAGE	
1 	2 Inspect DLC C291 pin 7 and the wire (circuit 70 [LB/W]) leading to pin 7. • **Is DLC C291 OK?** → **Yes** GO to K3 . → **No** REPAIR the DLC C291. TEST the system for normal operation.
K3 CHECK CIRCUIT 70 (LB/WH) FOR OPEN	
1  GEM/CTM C280 2  GK6365-A	2 Measure the resistance between GEM/CTM C280-25, circuit 70 (LB/WH), and DLC C291-7, circuit 70 (LB/WH). • **Is the resistance less than 5 ohms?** → **Yes** CONNECT the GEM/CTM. GO to K4 . → **No** REPAIR circuit 70 (LB/WH) between the DLC C291 and GEM/CTM C280-25. TEST the system for normal operation.
K4 CHECK VEHICLE FOR THE RAP MODULE, PAM, OR THE DSM	
	1 Check the vehicle for a RAP module,PAM, or DSM.

	• **Is the vehicle equipped with the RAP module, PAM, or the DSM?** → **Yes** GO to K5. → **No** GO to K6.
K5 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH IN-LINE C212 DISCONNECTED	
1  2  In-Line C212 3  4  	4 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** GO to K6. → **No** If the vehicle is equipped with the RAP module only, GO to K18. If the vehicle is equipped with the PAM only, GO to K19. If the vehicle is equipped with the DSM only,

	GO to K20 . If equipped with a combination of the following modules: RAP module, PAM or DSM, GO to K11 .
K6 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH IN-LINE C148 DISCONNECTED	
1  2  In-Line C148 3  In-Line C212 4  5 	5 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** GO to K7 . → **No** GO to K22 .
K7 CHECK VEHICLE FOR AIR SUSPENSION CONTROL MODULE OPTION	
1	

2

In-Line C148

3 Check the vehicle for the air suspension control module.

- **Is the vehicle equipped with the air suspension control module?**

→ **Yes**
GO to K8.

→ **No**
GO to K9.

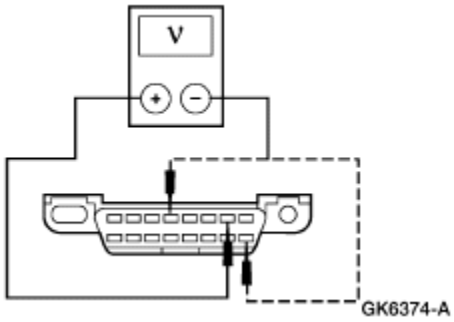
K8 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH AIR SUSPENSION CONTROL MODULE C2000 DISCONNECTED

1

Air Suspension Control Module C2000

2

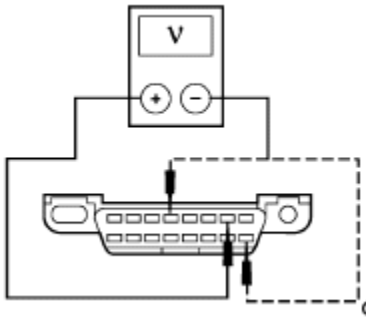
3

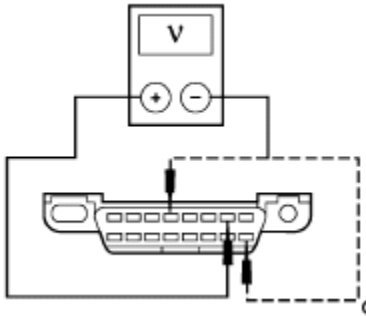


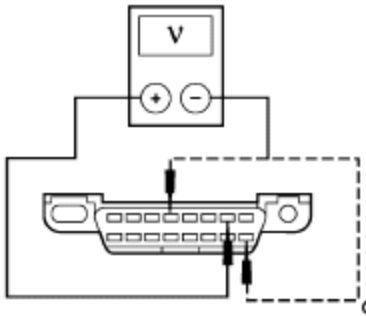
3 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK).

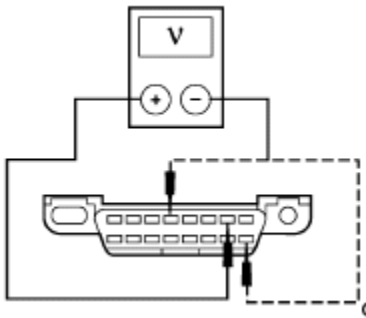
- **Is any voltage indicated for either measurement?**

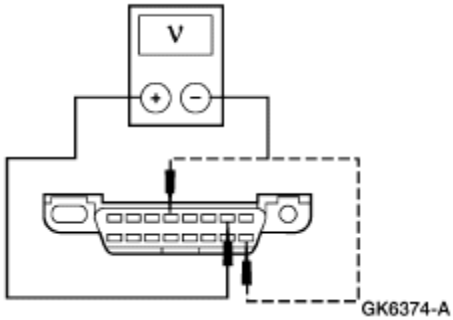
→ **Yes**
CONNECT the air suspension control module C2000, GO to K9.

	→ **No** INSTALL a new air suspension control module. For additional information, REFER to Section 204-05 . TEST the system for normal operation.
K9 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH THE GEM/CTM DISCONNECTED	
1  2  GEM/CTM C280 3  4  	4 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** CONNECT the GEM/CTM C280, GO to K10 . → **No** INSTALL a new GEM/CTM. For additional information, REFER to Section 419-10 . TEST the system for normal operation.
K10 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH THE RCM DISCONNECTED	
1	

 3  RCM C232 4  5  GK6374-A	2 Deactivate the air bag system; refer to Section 501-20B . 5 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** REPAIR circuit 70 (LB/WH). TEST the system for normal operation. → **No** INSTALL a new RCM. REFER to Section 501-20B . TEST the system for normal operation.
K11 CHECK THE VEHICLE FOR THE RAP MODULE	
1  2  In-Line C212	3 Check if the vehicle is equipped with the RAP

	module • **Is the vehicle equipped with a RAP module?** → **Yes** GO to K12 . → **No** GO to K13 .
K12 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH THE RAP MODULE DISCONNECTED	
1  RAP Module C336 2  3  	3 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** GO to K12 . → **No** INSTALL a new RAP module. For additional information, REFER to Section 419-10 . TEST the system for normal operation.
K13 CHECK THE VEHICLE FOR THE PAM	
	1 Check if the vehicle is equipped with the PAM • **Is the vehicle equipped with a PAM?**

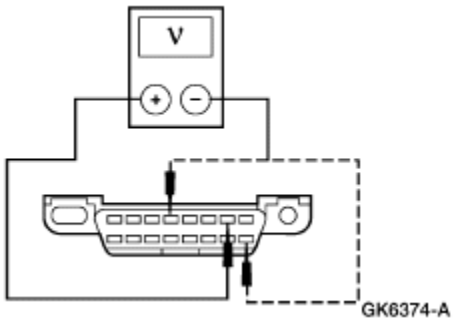
	→ **Yes** GO to K14 . → **No** GO to K15 .
K14 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH THE PAM DISCONNECTED	
1  2  PAM C440 3  4  	4 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** GO to K15 . → **No** INSTALL a new PAM. For additional information, REFER to Section 413-13 . TEST the system for normal operation.
K15 CHECK THE VEHICLE FOR THE DSM	
	1 Check if the vehicle is equipped with the DSM • **Is the vehicle equipped with a DSM?** → **Yes**

	GO to K16 . → **No** GO to K17 .
K16 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH THE DSM DISCONNECTED	
1  2  DSM C337 3  4  GK6374-A	4 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** GO to K17 . → **No** INSTALL a new DSM. For additional information, REFER to Section 501-10 . TEST the system for normal operation.
K17 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH IN-LINE C346 DISCONNECTED	
1  2	

In-Line C346

3

4



4 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK).

- **Is the voltage indicated for either measurement zero volts?**

→ **Yes**
REPAIR circuit 70 (LB/WH) between in-line C212, in-line C346 (if equipped with DSM), PAM C440 (if equipped) and the RAP module C336 (if equipped). TEST the system for normal operation.

→ **No**
REPAIR circuit 70 (LB/WH) between in-line C346 and DSM C337. TEST the system for normal operation.

K18 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH THE RAP MODULE DISCONNECTED

1

2

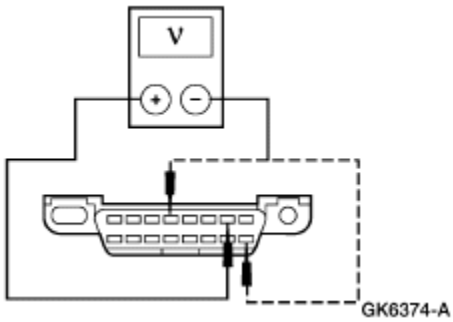
In-Line C212

3

RAP Module C336

4

5



5 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK).

- **Is the voltage indicated for either measurement zero volts?**

→ **Yes**
REPAIR circuit 70 (LB/WH) between in-line C212 and RAP module C336. TEST the system for normal operation.

→ **No**
INSTALL a new RAP module. For additional information, REFER to Section 419-10 . TEST the system for normal operation.

K19 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH THE PAM DISCONNECTED

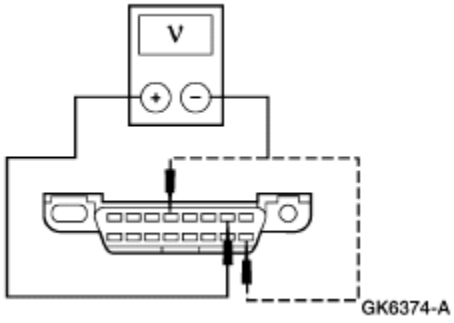
1

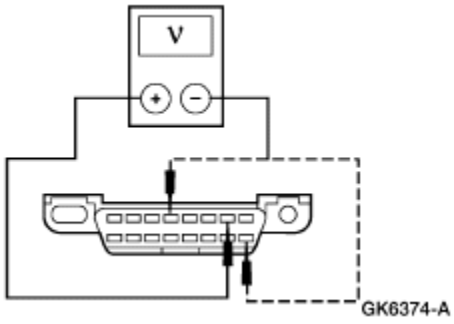
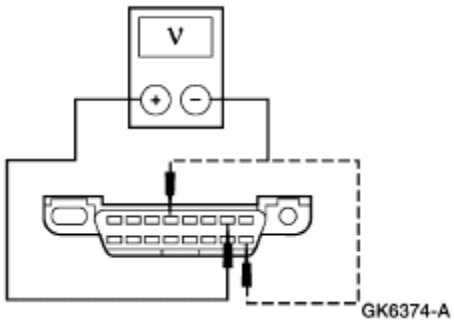
2

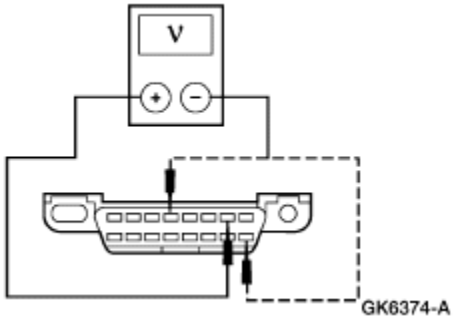
In-Line C212

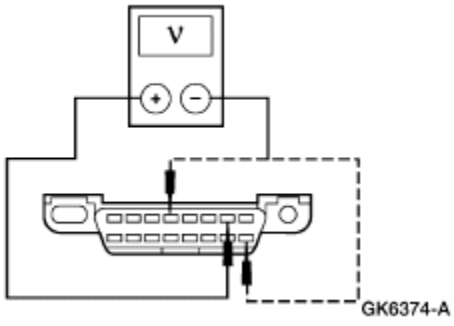
3

PAM C440

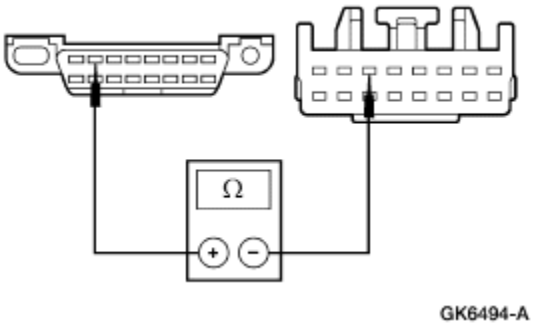
4  5  	5 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** REPAIR circuit 70 (LB/WH) between in-line C212 and PAM C440. TEST the system for normal operation. → **No** INSTALL a new PAM. For additional information, REFER to Section 413-13 . TEST the system for normal operation.
K20 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH THE DSM DISCONNECTED	
1  2  In-Line C212 3  DSM C337 4 	

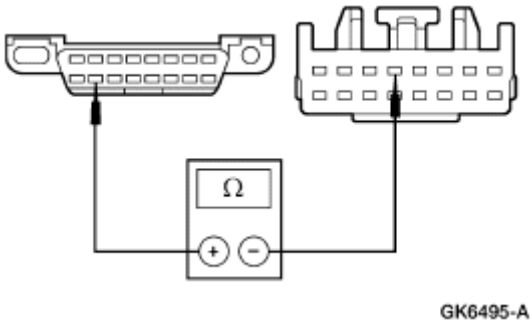
5  	5 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** GO to K21 . → **No** INSTALL a new DSM. For additional information, REFER to Section 501-10 . TEST the system for normal operation.
K21 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH IN-LINE C346 DISCONNECTED	
1  2  In-Line C346 3  4  	4 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK).

	• **Is the voltage indicated for either measurement zero volts?** → **Yes** REPAIR circuit 70 (LB/WH) between in-line C212 and in-line C346. TEST the system for normal operation. → **No** REPAIR circuit 70 (LB/WH) between in-line C346 and DSM C337. TEST the system for normal operation.
K22 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH THE 4-WHEEL ANTI-LOCK BRAKE CONTROL MODULE DISCONNECTED	
1  2  In-Line C148 3  4-Wheel Anti-Lock Brake Control Module C186 4  5  	5 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** GO to K23 .

	→ **No** INSTALL a new 4-wheel anti-lock brake control module. For additional information, REFER to Section 206-09 . TEST the system for normal operation.
K23 CHECK CIRCUIT 70 (LB/WH) FOR SHORT TO POWER AND SHORT TO GROUND WITH IN-LINE C140 DISCONNECTED	
1  2  In-Line C140 3  4  GK6374-A	4 Measure the voltage between DLC C291-7, circuit 70 (LB/WH), and DLC C291-16, circuit 693 (OG); and between DLC C291-7, circuit 70 (LB/WH), and DLC C291-4, circuit 57 (BK). • **Is the voltage indicated for either measurement zero volts?** → **Yes** REPAIR circuit 70 (LB/WH) between in-line C148 and in-line C140. TEST the system for normal operation. → **No** REPAIR circuit 70 (LB/WH) between in-line C140 and 4-wheel anti-lock brake control module C186. TEST the system for normal operation.

PINPOINT TEST L: NO MODULE / NETWORK COMMUNICATION— SCP NETWORK

CONDITIONS	DETAILS/RESULTS/ACTIONS
L1 CHECK SCAN TOOL PINS 2 AND 10 FOR DAMAGE	
	1 Inspect scan tool Pins 2 and 10 for damage. • **Is the scan tool OK?** → **Yes** GO to L2 . → **No** REPAIR scan tool. TEST the system for normal operation.
L2 CHECK DLC C291 PINS 2 AND 10 FOR DAMAGE	
1 	2 Inspect DLC C291 pins 2 and 10 and the wires leading to the pins for damage. • **Is the DLC C291 OK?** → **Yes** GO to L3 . → **No** REPAIR DLC C291. TEST the system for normal operation.
L3 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) FOR OPEN	
1  PATS C222 2  GK6494-A 3	2 Measure the resistance between PATS C222-6, circuit 914 (TN/OG), and DLC C291-2, circuit 914 (TN/OG). 3 Measure the resistance between PATS C222-5, circuit 915 (PK/LB), and DLC C291-10,



circuit 915 (PK/LB).

- **Are the resistances less than 5 ohms?**

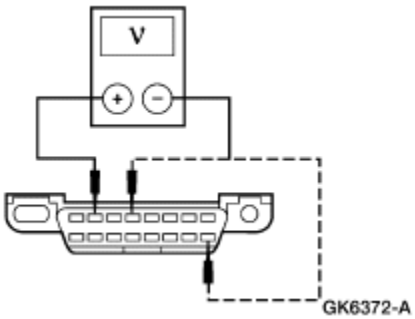
→ **Yes**
GO to L4 .

→ **No**
REPAIR the circuit in question between PATS C222 and DLC C291-10. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.

L4 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) FOR SHORT TO BATTERY AND SHORT TO GROUND WITH THE PATS MODULE DISCONNECTED

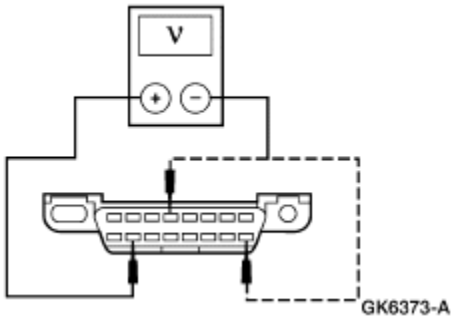
1

2

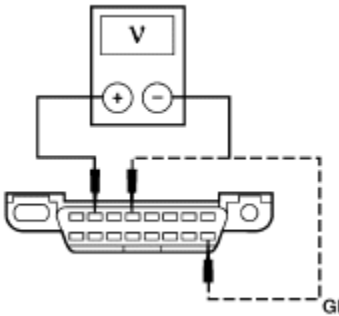
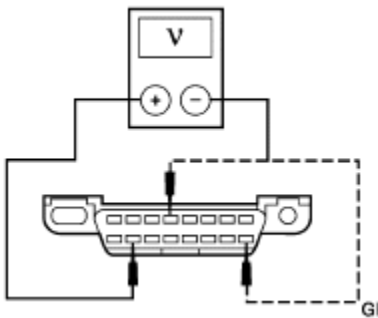


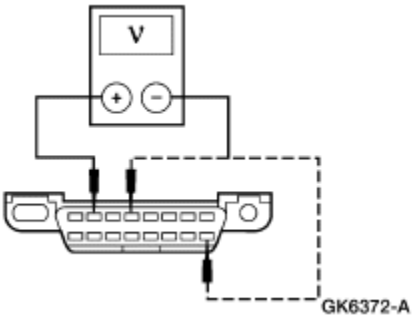
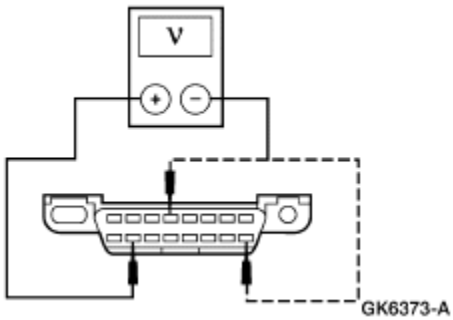
2 Measure the voltage between DLC C291-2, circuit 914 (TN/OG), and C291-4, circuit 57 (BK); and between DLC C291-2, circuit 914 (TN/OG), and C291-16, circuit 693 (OG).

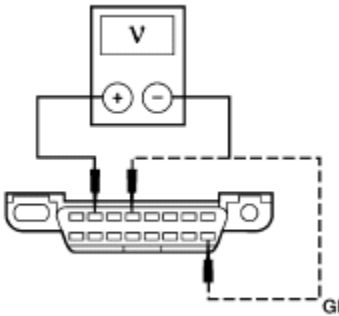
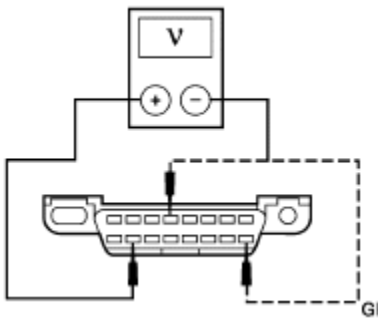
3

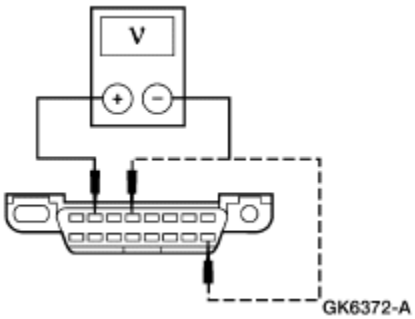


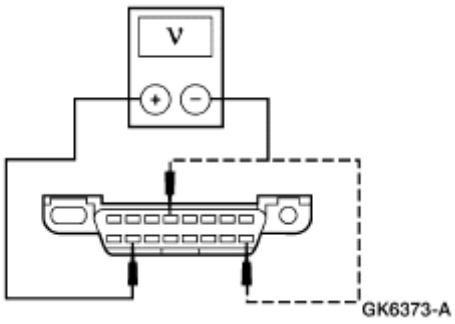
3 Measure the voltage between DLC C291-10, circuit 915 (PK/LB), and C291-4, circuit 57 (BK); and between DLC C291-10, circuit 915 (PK/LB), and C291-16, circuit 693 (OG).

	• **Is the voltage indicated in any measurement zero volts?** → **Yes** CONNECT the PATS module C222, GO to L5 . → **No** INSTALL a new PATS Module. For additional information, REFER to Section 419-01 . TEST the system for normal operation.
L5 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) FOR SHORT TO BATTERY AND SHORT TO GROUND WITH THE PCM DISCONNECTED	
1  2  PCM C202 3  4  GK6372-A 5  GK6373-A	4 Measure the voltage between DLC C291-2, circuit 914 (TN/OG), and C291-4, circuit 57 (BK); and between DLC C291-2, circuit 914 (TN/OG), and C291-16, circuit 693 (OG). 5 Measure the voltage between DLC C291-10, circuit 915 (PK/LB), and C291-4, circuit 57 (BK); and between DLC C291-10, circuit 915 (PK/LB), and C291-16, circuit 693 (OG).

	• **Is the voltage indicated in any measurement zero volts?** → **Yes** If the vehicle is equipped with the EATC module, GO to L6 . If the vehicle is not equipped with the EATC module, GO to L7 . → **No** REFER to Powertrain Control/Emissions Diagnosis (PC/ED) manual Section 3 for diagnosis and testing.
L6 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) FOR SHORT TO BATTERY AND SHORT TO GROUND WITH THE EATC MODULE DISCONNECTED	
1  2  EATC Module C297 3  4  GK6372-A 5  GK6373-A	4 Measure the voltage between DLC C291-2, circuit 914 (TN/OG), and C291-4, circuit 57 (BK); and between DLC C291-2, circuit 914 (TN/OG), and C291-16, circuit 693 (OG). 5 Measure the voltage between DLC C291-10, circuit 915 (PK/LB), and C291-4, circuit 57 (BK); and between DLC C291-10, circuit 915 (PK/LB), and C291-16, circuit 693 (OG).

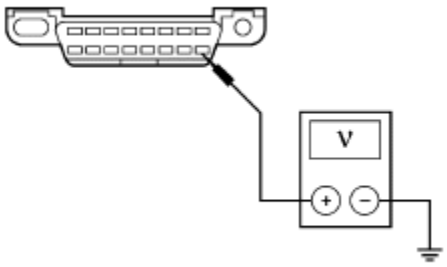
	• **Is the voltage indicated in any measurement zero volts?** → **Yes** GO to L7 . → **No** INSTALL a new EATC module. For additional information, REFER to Section 412-00 . TEST the system for normal operation.
L7 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) FOR SHORT TO BATTERY AND SHORT TO GROUND WITH THE IN-LINE C147 DISCONNECTED	
1  2  In-Line C147 3  4  GK6372-A 5  GK6373-A	4 Measure the voltage between DLC C291-2, circuit 914 (TN/OG), and C291-4, circuit 57 (BK); and between DLC C291-2, circuit 914 (TN/OG), and C291-16, circuit 693 (OG). 5 Measure the voltage between DLC C291-10, circuit 915 (PK/LB), and C291-4, circuit 57 (BK); and between DLC C291-10, circuit 915 (PK/LB), and C291-16, circuit 693 (OG).

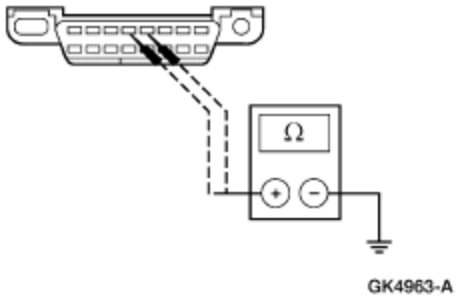
	• **Is the voltage indicated in any measurement zero volts?** → **Yes** REPAIR the circuit in question between in-line C147, DLC C291-2, PATS module C222, and EATC module C297 (if equipped). For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation. → **No** GO to L8 .
L8 CHECK CIRCUITS 914 (TN/OG) AND 915 (PK/LB) FOR SHORT TO BATTERY AND SHORT TO GROUND WITH THE IN-LINE C115 DISCONNECTED	
1  2  In-Line C147 3  In-Line C115 4  5  6	5 Measure the voltage between DLC C291-2, circuit 914 (TN/OG), and C291-4, circuit 57 (BK); and between DLC C291-2, circuit 914 (TN/OG), and C291-16, circuit 693 (OG). 6 Measure the voltage between DLC C291-10, circuit 915 (PK/LB), and C291-4, circuit 57 (BK); and between DLC C291-10, circuit 915 (PK/LB), and C291-16, circuit 693 (OG).

	• **Is the voltage indicated in any measurement zero volts?** → **Yes** REPAIR the circuit in question between in-line C147 and in-line C115. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation. → **No** REPAIR the circuit in question between in-line C115, and the PCM C202. For additional information, REFER to Communication Circuit Wiring Repair . TEST the system for normal operation.

PINPOINT TEST M: NO MODULE/NETWORK COMMUNICATION — NO POWER TO THE SCAN TOOL

CONDITIONS	DETAILS/RESULTS/ACTIONS
M1 CHECK SCAN TOOL CONNECTOR	
1 	1 Inspect scan tool pins for damage. • **Are the pins OK?** → **Yes** GO to M2 . → **No**

	REPAIR the scan tool connector. TEST the system for normal operation.
M2 CHECK DLC C291 FOR DAMAGE	
1  2  GK2633-A	2 Inspect DLC C291 pins for damage. • **Are the pins OK?** → **Yes** GO to M3 . → **No** REPAIR DLC C291. TEST the system for normal operation.
M3 CHECK VOLTAGE TO SCAN TOOL — CIRCUIT 693 (OG).	
1  GK2634-A	1 Measure the voltage between DLC C291-16, circuit 693 (OG), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to M4 . → **No** REPAIR circuit 693 (OG). TEST the system for normal operation.
M4 CHECK THE DLC GROUND — CIRCUIT 57 (BK) AND CIRCUIT 570 (BK/W)	

1  GK4963-A	1 Measure the resistance between DLC C291-4, circuit 57 (BK); C291-5, circuit 570 BK/W, and ground. • **Is the resistance less than 5 ohms?** → **Yes** REPAIR the scan tool. TEST the system for normal operation. → **No** REPAIR the circuit in question. TEST the system for normal operation.

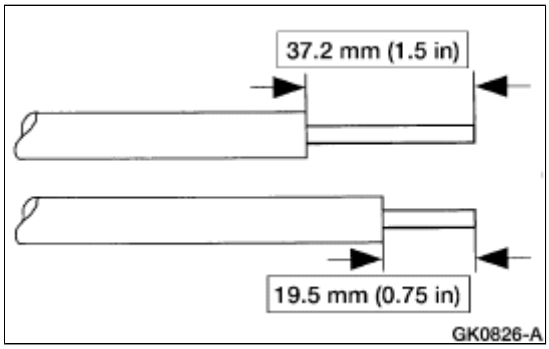
Communication Circuit Wiring Repair

Special Tool(s)

 ST1171-A	Heat Gun 107-R0300 or equivalent

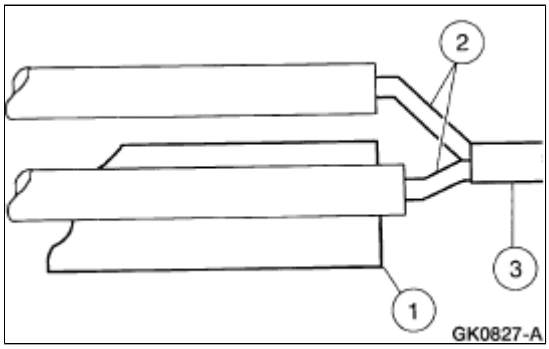
1. Disconnect the battery ground cable. For additional information, refer to Section 414-01.

2. Strip the wires.



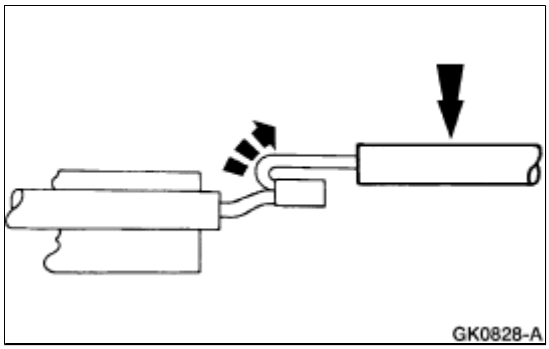
3. **NOTE:** Use rosin core mildly activated (RMA) solder, not acid core solder.

   Solder the wires.
   1. Install the heat shrink tube.
   2. Twist the wires together.
   3. Solder the wires together.

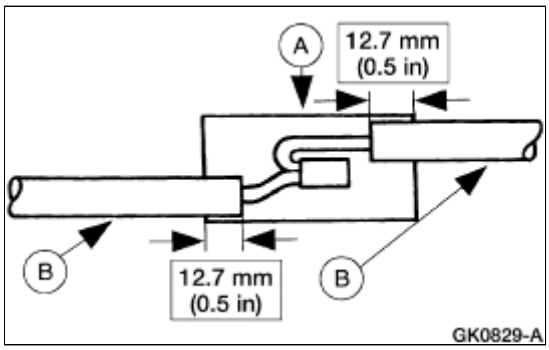


4. **NOTE:** Wait for the solder to cool before moving the wires.

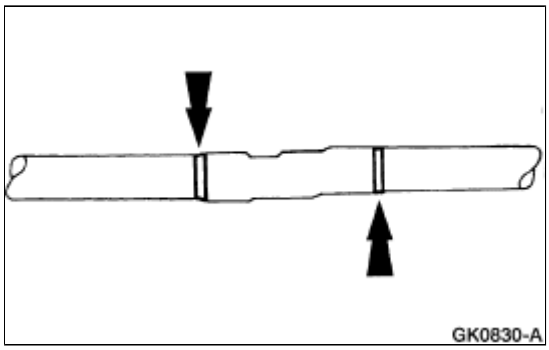
   Bend the wires back in a straight line.



5. Position the (A) heat shrink tube over the (B) wire repair.
    - Overlap the heat shrink tube on both wires.



6. Use the heat gun to heat the repaired area until adhesive flows out both ends of the heat shrink tube.



7. Reconnect the battery ground cable.

Module Configuration

Special Tool(s)

 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent scan tool
 ST1270-A	Flash Cable 418-F120 (007-00531) or equivalent

Principles of Operation

Some modules support the ability to change specified factory configuration settings and preset preference items. The process used to change the settings and customer preference items is module configuration. The methods of module configuration used on these vehicles are:

- Tire Size and Axle Ratio
- Operational Strategy (4x2/4x4)

Customer Preference Items

This method is used to enable or disable module-controlled items or systems to suit the preference of the customer. Not all features controlled by the module are listed in this configuration method. Refer to the Module Configuration Index in this section for a list of features per module.

Inspection and Verification

1. Visually inspect for obvious signs of electrical damage. Refer to the following chart:

Visual Inspection Chart

Electrical
• Damaged wiring harness • Loose or corroded connectors • 4-wheel anti-lock brake control module (4WABS) • Generic electronic module (GEM)

2. If the concern remains after inspection, connect the scan tool to the data link connector (DLC) located

beneath the instrument panel and select the vehicle to be tested from the scan tool menu. If the scan tool does not communicate with the vehicle:

- check that the program card is correctly installed.
- check the connections to the vehicle.
- check the ignition switch is in RUN position.

3. If the scan tool still does not communicate with the vehicle, refer to Section 418-00 .

4. Refer to the Symptom Chart.

Module Configuration Index

NOTE: Do not contact the As-Built Data Center unless the scan tool instructs you to do so. The scan tool will not allow you to use as-built data information unless the scan tool first prompts you for the As-Built Data Center information.

Module Configuration Index

Module	Configuration Method	Customer Preference Items	Manufacturer Options	As-Built Data Center
4WABS	Tire Size and Axle Ratio Operational Strategy (4x2/4x4 - Refer to Operational Strategy in this section.)	• Tire Size and Axle Ratio (Refer to the Tire Size and Axle Ratio Index in this section.)	—	Not Supported
GEM	Tire Size and Axle Ratio	• Tire Size and Axle Ratio (Refer to the Tire Size and Axle Ratio Index in this section.)	—	Not Supported

Scan Tool Message Index

Scan Tool Message Index

Scan Tool Message	Explanation	Action
Unable to Retrieve VIN from vehicle - Enter the VIN below.	PCM VIN area blank.	Enter VIN using scan tool.
This module has not been configured - Reinstall original module to retrieve config. data - If old module is not available, continue for backup data.	A new module was installed before retrieving configuration data from suspect module. DTC B2477 should be set.	Install the original module and retrieve configuration data. If original module is currently in the vehicle continue with the routine to retrieve backup data from the PCM. Continue with routine to extract backup data from the PCM.
Data previously stored for the	The scan tool has configuration	Make sure that data already stored on

following vehicle VIN# - Data will be lost if you continue - Press trigger to continue.	data stored for the same module that could be overwritten.	scan tool is not needed, then continue with routine to retrieve configuration data.
The module is not configurable - Refer to service manual for info	The module has no configuration information.	Make sure module supports Programmable Module Installation. Refer to Module Configuration Index.
Unable to retrieve (XXX) data from (XXX) module. Unable to locate (XXX) backup data in PCM. Call As-Built Data Center. PCM requires programming.	The suspect module returned DTC B2477 and the PCM did not have backup data.	Make sure module is listed on the Module Configuration Index and that it supports as-built data. Only if As-Built Data Center supports the module, contact the As-Built Data Center.
No data available for module - Select retrieve module config. to obtain vehicle data.	The restore routine was run without retrieving configuration data. The scan tool memory storing configuration data has expired.	Use Programmable Module Installation to retrieve module configuration data.
Unable to retrieve VIN from vehicle - Enter the last five characters of VIN below.	Scan tool was unable to extract VIN for verification.	Enter the last five characters of the VIN.
VIN mismatch for stored data. VIN ##### Current VIN ##### - If you continue, data may not match intended configuration.	The VIN was entered incorrectly. The VIN assigned to the data stored in the scan tool does not match the VIN number of the vehicle that is attempting to utilize the configuration data.	Exit the routine and attempt to retrieve module configuration data entering the correct VIN.
Entered data is not valid	Vehicle data was incorrectly entered. Module configuration data was incorrectly entered.	Refer to As-Built Data Center information and enter the correct module configuration.
Unable to verify download - Refer to service manual for info.	The module will not allow the scan tool to verify the correct information was configured.	Exit the routine and verify correct information manually.
Block data is not valid for the vehicle - Clear block 1 and re-enter.	Block data entered for the module is not correct.	Refer to As-Built Data Center information and enter correct data for each block.
Data is not valid for the entered VIN - Check VIN and re-enter.	The VIN was entered incorrectly.	Exit the routine and repeat the routine entering the correct VIN.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• Unable to configure the new module	• Module is not programmable. • Module. • Circuitry.	• Make sure the module is listed on the module configuration index. • GO to Pinpoint Test A .

Pinpoint Tests

PINPOINT TEST A: UNABLE TO CONFIGURE THE NEW MODULE

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 INITIATE DATA LINK DIAGNOSTICS	
1  2  3  4 	4 Carry out the DATA LINK DIAGNOSTICS test. • **Does the module in question appear on the results screen as no response/not equipped?** → **Yes** REFER to Section 418-00 . → **No** GO to A2 .
A2 CHECK FOR COMMUNICATION WITH THE MODULE	
1 	1 Carry out the suspect module self-test. • **Did the module self-test function correctly?** → **Yes** RECORD the DTCs and GO to A3 . → **No** For the GEM, REFER to Section 417-02 .

	For the 4WABS, REFER to Section 206-09 .
A3 VERIFY THE PROGRAMMABLE ITEM	
	1 Check for the item to be programmed on the module configuration index in this section. • **Does the item appear on the index under the module?** → **Yes** CARRY OUT the configuration method on the module in question and follow the text screens. REFER to the corresponding configuration method under General Procedures in this section. If the module does not accept configuration, INSTALL a different programmable module. → **No** The item is not configurable.

Customer Preference Items

Customer Preference Items

NOTE: If using the WDS, select Module Configuration and Programming, then follow the screen prompts.

NOTE: Make sure module is listed as supporting customer preference items and supports the specific item to be configured in the Module Configuration Index in this section.

1. Select Service Bay Functions on the scan tool.
2. Select the module that contains the customer preference item to be programmed. Refer to the Module Configuration Index in this section.
3. Select Customer Preference Items on the scan tool.
4. Select Module Option Content.
5. Select the item to be enabled or disabled.
6. Enable or disable the item as necessary to reflect the customer preference.

Tire Size and Axle Ratio

NOTE: If using the WDS, select Module Configuration and Programming, then follow the screen prompts.

NOTE: Make sure module is listed as supporting tire size and axle ratio configuration in the Module Configuration Index in this section.

1. Select Service Bay Functions on the scan tool.
2. Select the module that contains the Tire Size and Axle Ratio configuration.
3. Select Customer Preference Items.
4. Select Tire Size and Axle Ratio on the scan tool.
5. Select the vehicle.
6. Enter the correct value for the vehicle according to the following chart and finish the routine. If the tire size is not listed on the chart, Go to step 7.

Tire Size and Axle Ratio Index

Feature	Explorer/Mountaineer

Tire Size	P225/70R15SL BSW - ENTER - 00761 rev/mile P235/75R15SL A/T OWL - ENTER - 00721 rev/mile P255/70R16 A/T OWL - ENTER - 00690 rev/mile P255/70HR16 A/S BSW - ENTER - 00693 rev/mile P255/70R16 A/T OWL (SD) - ENTER - 00691 rev/mile
Tone Ring Size	8.8" AXLE - ENTER - 00108 teeth
Option	4-WHEEL ANTILOCK BRAKES - ENTER - $80
Vehicle	Explorer, Mountaineer

7. **NOTE:** The following steps will calculate tire revolutions per mile. This will provide the number that needs to be entered on the scan tool.

   Position the vehicle on level ground. Make sure the load weight is within the specific vehicle application.

8. **NOTE:** Tire pressure must be set when the tires are cold.

   Inflate the tires to the specified rating.

9. Measure the rear tire height from the ground to the top of the tire in inches.

10. Divide 20,168 by the tire height measurement. This is the revolutions per mile.

11. Enter the revolutions per mile (rev/mile) on the scan tool and finish the routine.

Operational Strategy

NOTE: If using the WDS, select Module Configuration and Programming, then follow the screen prompts.

NOTE: Make sure module is listed as supporting tire size and axle ratio configuration in the Module Configuration Index in this section.

1. Select Service Bay Functions on the scan tool.

2. Select the module that contains the Operational Strategy to be programmed. Refer to the Module Configuration Index in this section.

3. Select Operational Strategy.

4. Select the vehicle.

5. Select 4x4 for a 4x4 vehicle.
   Select 4x2 for a 4x2 vehicle.

Torque Specifications

Description	Nm	lb-in
Battery ground cable bolt	7-10	62-89
Hood latch release handle screws	2.7-3.7	25-33
Instrument panel steering column opening cover reinforcement screws	7.6-10.4	—
Passive anti-theft transceiver module screw	1.8-2.6	—

Anti-Theft —Passive Anti-Theft System (PATS)

The passive anti-theft system (PATS) contains the following components:

- theft indicator
- encoded ignition key
- transceiver module
- PATS control module (located behind the passenger side air bag module)
- powertrain control module (PCM)
- standard corporate protocol (SCP) communication network

The passive anti-theft system (PATS) uses radio frequency identification technology to deter a driveaway theft. Passive means that it does not require any activity from the user. This system is known as SecuriLock® in North America, Safeguard® in the U.K., and PATS in continental Europe. This information can be found in customer literature such as the Owners Guide.

The PATS uses a specially-encoded ignition key. Each encoded ignition key contains a permanently installed electronic device called a transponder. Each transponder contains a unique electronic identification code out of over 72 million billion combinations.

Each encoded ignition key must be programmed into a vehicle's PATS module before it can be used to start the engine. There are special diagnostic repair procedures outlined in this manual that must be performed if the encoded ignition keys need to be replaced.

The encoded key is larger than a traditional ignition key. The key does not require batteries and should last the life of the vehicle.

The transceiver module communicates with the encoded ignition key. This module is located behind the steering column shroud, and contains an antenna connected to a small electronics module. During each vehicle start sequence, the transceiver module reads the encoded ignition key identification code and sends the data to the PATS module.

The control functions are contained in the PATS module. This module performs all of the PATS functions such as receiving the identification code from the encoded ignition key and controlling engine enable. The PATS module initiates the key interrogation sequence when the vehicle ignition switch is turned to RUN or START.

PATS uses the p owertrain control module (PCM) to enable or disable the engine. The PATS module communicates with the PCM over the SCP communication network in order to enable engine operation. The PATS module and the PCM use sophisticated messages in order to prevent a theft. The PATS and the PCM share security data when first installed together, making them a matched pair. After this security data sharing, these modules will not function in other vehicles. The PCM shared security ID is remembered even if the battery is disconnected. The PATS module also stores the vehicle's key identification code, even if the battery is disconnected. There are special diagnostic repair procedures outlined in this workshop manual that may be carried out if either the PATS module or the PCM needs replacement.

All the elements of PATS must be functional before the engine is allowed to start. If any of the components are not working correctly, the vehicle will not start.

PATS uses a visual theft indicator. This indicator will prove out for three seconds when the ignition switch is turned to RUN or START under normal operation. If there is a PATS problem, this indicator will either flash

rapidly or glow steadily when the ignition switch is turned to RUN or START. PATS also "blips" the theft indicator every two seconds at ignition OFF to act as a visual theft deterrent.

PATS differs from the perimeter anti-theft system in that PATS enables and disables the engine from starting. If equipped, the perimeter anti-theft system protects the perimeter of the vehicle (doors, hood and trunk) and sounds an alarm.

The PATS is not compatible with aftermarket remote start systems, which allow the vehicle to be started from outside the vehicle. These systems may reduce the vehicle security level, and also may cause no-start issues. Remote start systems must be removed before investigation of PATS-related No Start issues.

The passive vehicle protection system will be activated and will disable the vehicle from starting if there is a:

- damaged encoded key.
- unprogrammed key.
- non-encoded key (key has no electronics).
- wiring concern.
- transceiver concern.
- PCM concern.
- module communications network concern.

Anti-Theft —Passive Anti-Theft System (PATS)

Refer to Wiring Diagrams Cell 112 , Anti-Theft (PATS) for schematic and connector information.

Refer to Wiring Diagrams Cell 62 , Instrument Cluster for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051
 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent scan tool

Inspection and Verification

NOTE: The PATS module must be reconfigured after replacement. Refer to Section 418-01 .

1. Verify the customer concern by duplicating the condition.
2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical

• Ignition lock cylinder
• Encoded ignition key (PATS key)
• Use of non-encoded ignition key (key without the molded plastic head, non-PATS key)
• Use of a non-programmed encoded ignition key
	• Fuse:
	  ▪ Fuse 24 (7.5A)
	  ▪ Fuse 25 (7.5A)
	  ▪ Fuse 19 (25A)
	• PATS transceiver module
	• Connectors
	• Ignition switch

3. If the concern remains after the inspection connect the scan tool to the data link connector (DLC) located beneath the instrument panel and select the vehicle to be tested from the scan tool menu. If the scan tool does not communicate with the vehicle:
   - check that the program card is correctly installed.

- check the connections to the vehicle.
- check the ignition switch position.

4. If the scan tool still does not communicate with the vehicle, refer to the scan tool manual.

5. Perform the DATA LINK DIAGNOSTIC TEST. If the scan tool responds with:
   - CKT914, CKT915 or CKT70 = ALL ECUS NO RESP/NOT EQUIP, refer to Section 418-00 .
   - NO RESP/NOT EQUIP for PATS module, go to Pinpoint Test A.
   - SYSTEM PASSED, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs and perform self-test diagnostics for the PATS module.

6. If the DTCs retrieved are related to the concern, go to PATS Diagnostic Trouble Code (DTC) Index to continue diagnostics.

7. If no DTCs related to the concern are retrieved, proceed to Symptom Chart to continue diagnostics.

PATS Diagnostic Trouble Code (DTC) Index

PATS Diagnostic Trouble Code (DTC) Index

DTC	Description	Action
B1213	Anti-Theft Number of Programmed Encoded Ignition Keys Below Minimum	GO to Pinpoint Test B1213 .
B2103 or B1232	Antenna Not Connected Defective Transceiver	GO to Pinpoint Test B2103 .
B1600	No Key Code Received — Damaged Encoded Ignition Key or Use of Non-PATS Encoded Ignition Key	GO to Pinpoint Test B1600 .
B1601	Unprogrammed Encoded Ignition Key (Keycode Format OK)	GO to Pinpoint Test B1601 .
B1602	Invalid Key Code Format From Encoded Ignition Key Transponder (Partial Key Read)	GO to Pinpoint Test B1602 .
B1681	PATS Transceiver Signal Is Not Received (Not Connected, Damaged, or Wiring)	GO to Pinpoint Test B1681 .
B2139	PCM ID Does Not Match Between PATS and PCM	GO to Pinpoint Test B2139 .
B2141	No Security ID Exchange Between PATS and PCM	GO to Pinpoint Test B2141 .
U1147	Faulty SCP Link or Incorrect PCM Calibration	GO to Pinpoint Test U1147 .
U1262	Missing SCP Message	REFER to Section 418-00 .

PATS Parameter Identification (PID) Index

PATS Parameter Identification (PID) Index

Display	Description	Expected Value
CCNTPATS	Number of Continuous DTCs On PATS	One Count Per DTC
IGN_PAT	Ignition Switch	RUN, OFF
NUMKEYS	Number of Encoded Ignition Key Codes Programmed	BCD (valid range 0-8)
M_KEY	Is This A Programmed Encoded Ignition Key	YES, NO
ENABL_S	Has PATS Enabled the Vehicle	ENABLED, DISABLED
ACCESS	Security Access Status	TIMED, CODED
MIN#KEY	Minimum Number of Programmed Keys Required to Start Vehicle	BCD (valid range 2-8)
ANTISCN	Time-Out for Unprogrammed PATS Key (Active Will Last Up to 20 Seconds)	ACTIVE, notACT
PCM_ID	Is PCM ID Stored in PATS Module	STORED, notSTR
SPARE_KY	Can Spare Encoded Ignition Keys Be Added With Two Programmed Encoded Ignition Keys	YES, NO
PCM_VFY	PCM ID Matches Between PCM and PATS Module	YES, NO

PATS Active Command Index

PATS Active Command Index

Active Command	Display	Action
PATS ANTI-THEFT INDICATOR	THEFT LAMP	ON, OFF
TRANSMIT SIGNAL COMMAND	TRANSMIT	ON, OFF

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• No communication with the module — PATS module	• Fuses. • Circuitry. • Passive anti-theft system module.	• GO to Pinpoint Test A .
• The anti-theft indicator is always/never on — no 3 second anti theft indicator prove out	• Passive anti-theft system module. • Circuitry. • Fuse. • Theft indicator.	• GO to Pinpoint Test B .
• The vehicle does not start — theft indicator proves out for 3 seconds as normal	• Less than two keys programmed to the system. • Transceiver not	• CARRY OUT VIC on-demand self-test. RETRIEVE DTCs. If DTCs are present, GO to VIC

	connected/defective. • Circuitry. • Transceiver internal antenna damaged. • NON-PATS key, damaged key or no code received. • Partial key read of PATS key. • Unprogrammed PATS key.	Diagnostics Trouble Code (DTC) Index. If no DTCs are retrieved, check for other possible No-Start causes.
	• No PCM ID stored in PATS. • PATS/PCM ID do not match. • Problem with SCP communication network.	• Clear the stored DTCs. Cycle the ignition key from OFF to RUN. Retrieve continuous DTCs. If DTCs are present, GO to VIC Diagnostics Trouble Code (DTC) Index. If no DTCs are retrieved, check for other possible causes.
• The alarm system does not operate correctly — the vehicle starts but flashes a fault code on theft indicator at key ON	• Incorrect PCM calibration.	• GO to Pinpoint Test U1147 .

Pinpoint Tests

PINPOINT TEST B1213: ANTI-THEFT NUMBER OF PROGRAMMED ENCODED IGNITION KEYS BELOW MINIMUM

CONDITIONS	DETAILS/RESULTS/ACTIONS
B12131 RETRIEVE THE DTCS	
1  2  Scan Tool 3 	3 Retrieve and document continuous DTCs.

4  Clear Continuous DTCs 5  PATS On-Demand Self-Test	• **Is DTC B1213 the only DTC retrieved?** → **Yes** GO to B12132 . → **No** REPAIR the other DTCs PATS retrieved. CLEAR the DTCs. REPEAT the PATS On-Demand Self Test. TEST the system for normal operation.
B12132 CHECK FOR PROGRAMMED ENCODED IGNITION KEYS—MONITOR THE PATS PID NUMKEYS	
1 	1 Monitor the PATS PID NUMKEYS. • **Does the PATS PID NUMKEYS display less than two encoded ignition keys programmed?** → **Yes** GO to B12133 . → **No** System is OK.
B12133 PROGRAM ENCODED IGNITION KEYS	
2 	1 **NOTE:** Two programmed encoded ignition keys must be available to start the vehicle. Cut a new encoded ignition key. 3 Program the new encoded ignition key. • **Does the theft indicator illuminate for three seconds and then go out?**

	→ **Yes** CLEAR the DTCs. CARRY OUT PATS On-Demand Self-Test to verify all codes have been cleared. TEST the system for normal operation. → **No** If the theft indicator is on continuously, REPEAT DTC B1213-3 with a second new encoded ignition key. If the theft indicator is flashing, RETRIEVE DTC stored for new fault and REPAIR the other DTCs retrieved.

PINPOINT TEST B2103: ANTENNA NOT CONNECTED — DEFECTIVE TRANSCEIVER

CONDITIONS	DETAILS/RESULTS/ACTIONS
B21031 INSPECT ANTENNA FOR CORRECT INSTALLATION	
1 	
	2 Verify the PATS transceiver is correctly installed; refer to Module—Passive Anti-Theft Transceiver .
3  Scan Tool	
4 	4 Retrieve and document continuous DTCs.
5  Clear Continuous DTCs	
6  PATS On-Demand Self Test	• **Is DTC B1232 or B2103 retrieved?** → **Yes** INSTALL a new PATS transceiver module; REFER to Module—Passive Anti-Theft Transceiver . CLEAR the DTCs. REPEAT the PATS On-Demand Self-

	Test. TEST the system for normal operation. → **No** System is OK.

PINPOINT TEST B1600: NO KEY CODE RECEIVED—DAMAGED ENCODED IGNITION KEY OR USE OF NONPATS KEY

CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: Large metallic objects or devices such as the Mobil Speedpass or a second ignition key on the same keyring as the PATS ignition key may cause vehicle starting problems and record this DTC under certain conditions. If a fault cannot be identified, examine the customer's keyring for such objects or devices. If present, inform the customer that they need to keep these objects from touching the PATS ignition key while starting the engine. These objects and devices cannot damage the PATS ignition key, but can cause a momentary problem if the are too close to the key during engine start. If a problem occurs, turn ignition off and restart the engine with all other objects on the keyring held away from the ignition key (encoded ignition keys from Rotunda, Ilco, Curtis, or Strattec are approved Ford encoded ignition keys).	
B16001 RETRIEVE THE DTCS	
1  2  Scan Tool 3  4  Clear Continuous DTCs 5  PATS On-Demand Self Test	3 Retrieve and document continuous DTCs. • **Is DTC B1600 retrieved?**

→ **Yes**
GO to B16002 .

→ **No**
If other DTCs are retrieved, REFER to PATS Module Diagnostic Trouble Code (DTC) Index. If no DTCs are retrieved, system is OK.

B16002 INSTALL A NEW ENCODED IGNITION KEY

1

2 **NOTE:** Check to make sure the customer and replacement encoded ignition keys are approved Ford encoded PATS ignition keys. Unapproved PATS keys do not always operate correctly over different temperature ranges (encoded ignition keys from Rotunda, Ilco, or Strattec are approved encoded ignition keys).

Cut a new encoded ignition key.

3

4 Program the new encoded ignition key; refer to Key Programming—Erase All Key Codes and Program Two Keys .

5

PATS On-Demand Self-Test

- **Is DTC B1600 still present?**

→ **Yes**
GO to B16003 .

→ **No**
If no other DTCs are retrieved, system is OK.

If other DTCs are retrieved, REFER to PATS Module Diagnostic Trouble Code (DTC) Index.

B16003 INSTALL A NEW PATS TRANSCEIVER

1

2 INSTALL a new PATS transceiver; refer to Module—Passive Anti-Theft Transceiver .

3  4  PATS On-Demand Self-test	4 **NOTE:** Use the customer original encoded ignition key, not the encoded ignition key that was cut in the previous step. • **Is DTC B1600 retrieved?** → **Yes** INSTALL a new PATS module; REFER to Module—Passive Anti-Theft System (PATS) . CYCLE the ignition to RUN using two encoded ignition keys. GO to Pinpoint Test B2139 . CLEAR the DTCs. TEST the system for normal operation. → **No** System is OK.

PINPOINT TEST B1601: UNPROGRAMMED ENCODED IGNITION KEY (KEYCODE FORMAT OK)

CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: Large metallic objects or devices such as the Mobil Speedpass or a second ignition key on the same keyring as the PATS ignition key may cause vehicle starting problems and record this DTC under certain conditions. If a fault cannot be identified, examine the customer's keyring for such objects or devices. If present, inform the customer that they need to keep these objects from touching the PATS ignition key while starting the engine. These objects and devices cannot damage the PATS ignition key, but can cause a momentary problem if the are too close to the key during engine start. If a problem occurs, turn ignition off and restart the engine with all other objects on the keyring held away from the ignition key (encoded ignition keys from Rotunda, Ilco, Curtis, or Strattec are approved Ford encoded ignition keys).	
B16011 RETRIEVE THE DTCS	
1  2  Scan Tool 3 	3 Retrieve and document continuous DTCs.

4  Clear Continuous DTCs 5  PATS On-Demand Self-Test	• **Is DTC B1601 retrieved?** → **Yes** GO to B16012 . → **No** System is OK. CHECK all customer encoded ignition keys with PATS On-Demand Self-Test to verify all other encoded ignition keys are programmed.
B16012 CHECK FOR PROGRAMMED ENCODED IGNITION KEYS—MONITOR THE PATS PID NUMKEYS	
1 	1 Monitor the PATS PID NUMKEYS. • **Does the PATS PID NUMKEYS display 8?** → **Yes** ERASE and REPROGRAM the key codes; REFER to Key Programming—Erase All Key Codes and Program Two Keys . CLEAR the DTCs. TEST the system for normal operation. → **No** GO to B16013 .
B16013 CHECK THE NUMBER OF PROGRAMMED ENCODED IGNITION KEYS AVAILABLE	
	1 Verify there are at least two currently programmed encoded ignition keys available with the vehicle. • **Are at least two currently programmed encoded ignition keys available with the vehicle?** → **Yes** GO to B16014 . → **No** CUT new encoded ignition key so that at least two encoded ignition keys are

	available. PROGRAM the encoded ignition keys; REFER to Key Programming—Erase All Key Codes and Program Two Keys . GO to B16014 .
B16014 VERIFY THE PATS PID SPARE_KY INDICATES ENABLE	
1 	1 Monitor the PATS PID SPARE_KY. • **Does the PATS PID SPARE_KY indicate ENABLE?** → **Yes** REFER to Key Programming—Erase All Key Codes and Program Two Keys . TEST the system for normal operation. GO to B16015 . → **No** REFER to Key Programming—Spare Key Programming Switch to enable the PATS PID SPARE KEY to enable. TEST the system for normal operation. Once completed, GO to B16015 .
B16015 CHECK THE ENCODED IGNITION KEYS FOR CORRECT OPERATION	
1 	
2 	2 Start the vehicle using the first encoded ignition key.
3 	
4 	4 Start the vehicle with the second ignition key.
5 	
	• **Does the vehicle start correctly using both encoded ignition keys?** → **Yes** System is OK. If there are additional keys that need to be programmed, REFER to Key Programming—Program a Key Using Two Programmed Keys . → **No**

	GO to B16016 .
B16016 RETRIEVE THE DTCS — CHECK FOR DTC B1601	
1  2  Clear Continuous DTCs 3 	1 Retrieve and document continuous DTCs. 3 Perform a self-test using both ignition keys from Step B1601-5. • **Is DTC B1601 retrieved?** → **Yes** INSTALL a new PATS module; REFER to Module—Passive Anti-Theft System (PATS) . CYCLE the ignition to RUN using two encoded ignition keys. GO to Pinpoint Test B2139 . CLEAR the DTCs. TEST the system for normal operation. → **No** System is OK. If other DTCs are retrieved, REFER to PATS Module Diagnostic Trouble Code (DTC) Index.

PINPOINT TEST B1602: INVALID KEY CODE FORMAT FROM ENCODED IGNITION KEY TRANSPONDER (PARTIAL KEY READ)

CONDITIONS	DETAILS/RESULTS/ACTIONS
NOTE: Large metallic objects or devices such as the Mobil Speedpass or a second ignition key on the same keyring as the PATS ignition key may cause vehicle starting problems and record this DTC under certain conditions. If a fault cannot be identified, examine the customer's keyring for such objects or devices. If present, inform the customer that they need to keep these objects from touching the PATS ignition key while starting the engine. These objects and devices cannot damage the PATS ignition key, but can cause a momentary problem if the are too close to the key during engine start. If a problem occurs, turn ignition off and restart the engine with all other objects on the keyring held away from the ignition key (encoded ignition keys from Rotunda, Ilco, Curtis, or Strattec are approved Ford encoded ignition keys).	
B16021 RETRIEVE THE DTCS	
1	

2

Scan Tool

3

4

Clear Continuous DTCs

5

PATS On-Demand Self-Test

3 Retrieve and document continuous DTCs.

- **Is DTC B1602 retrieved?**

→ **Yes**
GO to B16022 .

→ **No**
System is OK. CHECK all customer encoded ignition keys with PATS On-Demand Self-Test to verify all other keys are programmed.

B16022 INSTALL A NEW ENCODED IGNITION KEY

1

2 **NOTE:** Check to make sure the customer and replacement encoded ignition keys are approved Ford encoded PATS ignition keys. Unapproved PATS keys do not always operate correctly over different temperature ranges (encoded ignition keys from Rotunda, Ilco, Curtis, or Strattec are approved encoded ignition keys).

Cut a new encoded ignition key.

3

4 Program a new encoded ignition key; refer to Key Programming—Erase All Key Codes and Program Two Keys .

5

PATS On-Demand Self-Test

- **Is DTC B1602 retrieved?**

→ **Yes**
GO to B16023 .

→ **No**
System is OK. If the customer has any remaining encoded keys at home, instruct them to CARRY OUT Key Programming—Program a Key Using Two Programmed Keys on each remaining key. This procedure is detailed in the Owners Manual.

B16023 INSTALL A NEW PATS TRANSCEIVER

1

2 INSTALL a new PATS transceiver; refer to Module—Passive Anti-Theft Transceiver .

3

4

PATS On-Demand Self-Test

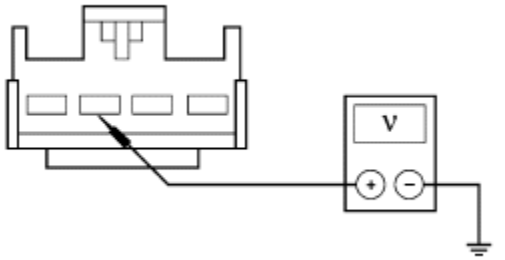
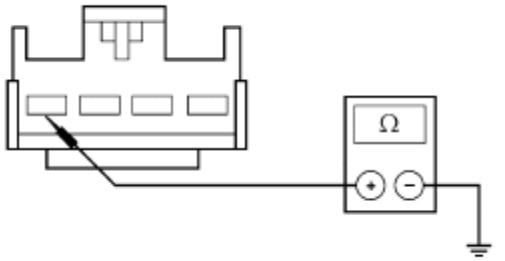
- **Are any DTCs retrieved?**

→ **Yes**
REFER to PATS Module Diagnostic Trouble Code (DTC) Index.

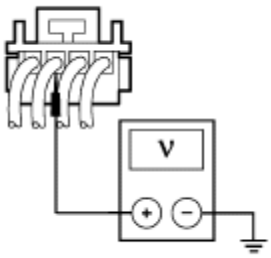
→ **No**
System is OK.

PINPOINT TEST B1681: PATS TRANSCEIVER SIGNAL IS NOT RECEIVED (NOT CONNECTED, DAMAGED, OR WIRING)

CONDITIONS	DETAILS/RESULTS/ACTIONS
B16811 RETRIEVE THE DTCS	
1  2  Scan Tool 3  4  Clear Continuous DTCs 5  PATS On-Demand Self-Test	3 Retrieve and document continuous DTCs. • **Is DTC B1681 retrieved?** → **Yes** GO to B16812 . → **No** System is OK.
B16812 CHECK THE PATS TRANSCEIVER FOR VOLTAGE — CIRCUIT 936 (DG/W)	
1  2  PATS Transceiver C221	

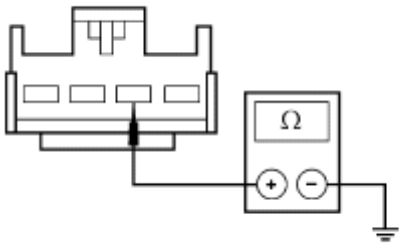
3  4  GK2493-A	4 Measure the voltage between PATS transceiver C221-2, Circuit 936 (DG/W), and ground. • **Is the voltage greater than 9 volts?** → **Yes** GO to B16813 . → **No** REPAIR Circuit 936 (DG/W). CLEAR the DTCs. TEST the system for normal operation.
B16813 CHECK THE PATS TRANSCEIVER GROUND — CIRCUIT 651 (BK/Y)	
1  2  GK2494-A	2 Measure the resistance between PATS transceiver C221-1, Circuit 651 (BK/Y), and ground. • **Is the resistance less than 5 ohms?** → **Yes** GO to B16814 . → **No** REPAIR Circuit 651 (BK/Y). CLEAR the DTCs. TEST the system for normal operation.

B16814 CHECK THE PATS TRANSCEIVER RECEIVE CIRCUIT FOR VOLTAGE — CIRCUIT 1216 (GY/O)

1  PATS Transceiver C221 2  3  GK6413-A	3 Measure the voltage by back probing between PATS transceiver C221-3, Circuit 1216 (GY/O), and ground. • **Is the voltage greater than 9 volts?** → **Yes** GO to B16816 . → **No** GO to B16815 .

B16815 CHECK THE PATS TRANSCEIVER RECEIVE CIRCUIT FOR SHORT — CIRCUIT 1216 (GY/O)

1  2  PATS Transceiver C221 3	3 Measure the resistance between PATS transceiver C221-3, Circuit 1216 (GY/O), and ground.



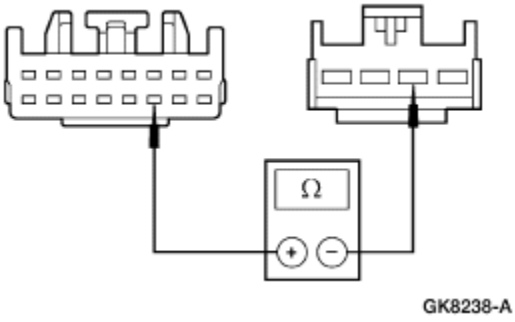
- **Is the resistance greater than 100 ohms?**

→ **Yes**
GO to B16816 .

→ **No**
CHECK Circuit 1216 (GY/O) for short to ground. If the circuit is OK, INSTALL a new PATS module; REFER to Module—Passive Anti-Theft System (PATS) . CYCLE the ignition to RUN using two encoded ignition keys. GO to Pinpoint Test B2139 . CLEAR the DTCs. TEST the system for normal operation. If the circuit is not OK, REPAIR Circuit 1216 (GY/O). CLEAR the DTCs. TEST the system for normal operation.

B16816 CHECK CIRCUIT 1216 (GY/O) FOR OPEN

1



1 Measure the resistance between PATS transceiver C221-3, Circuit 1216 (GY/O), and PATS C222-11, circuit 1216 (GY/O).

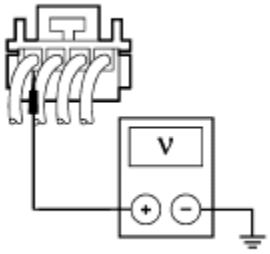
- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to B16817 .

→ **No**
REPAIR Circuit 1216 (GY/O). CLEAR the DTCs. TEST the system for normal operation.

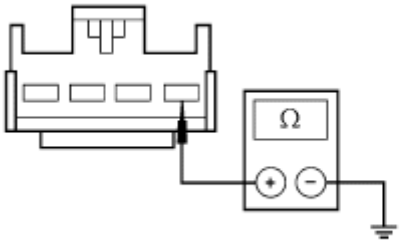
B16817 CHECK THE PATS TRANSCEIVER TRANSMIT CIRCUIT FOR VOLTAGE — CIRCUIT 1215 (W/LG)

1

 2  PATS Transceiver C221 3  4  GK6414-A	4 Measure the voltage by back probing between PATS transceiver C221-4, Circuit 1215 (W/LG), and ground. • **Is the voltage greater than 9 volts?** → **Yes** GO to B16819 . → **No** GO to B16818 .

B16818 CHECK THE PATS TRANSCEIVER TRANSMIT CIRCUIT FOR OPEN — CIRCUIT 1215 (W/LG)

1  2  PATS Transceiver C221 3	3 Measure the resistance between PATS transceiver C221-4, Circuit 1215 (W/LG), and ground.



GK6405-A

- **Is the resistance greater than 100 ohms?**

→ **Yes**
GO to B16819 .

→ **No**
CHECK Circuit 1215 (W/LG) for short to ground. If the circuit is OK, INSTALL a new PATS module; REFER to Module—Passive Anti-Theft System (PATS) . CYCLE the ignition to RUN using two encoded ignition keys. GO to Pinpoint Test B2139 . CLEAR the DTCs. TEST the system for normal operation. If the circuit is not OK, REPAIR Circuit 1215 (W/LG). CLEAR the DTCs. TEST the system for normal operation.

B16819 CHECK THE PATS TRANSMIT CIRCUIT FOR CORRECT OPERATION — CIRCUIT 1215 (W/LG)

1

PATS Transceiver C221

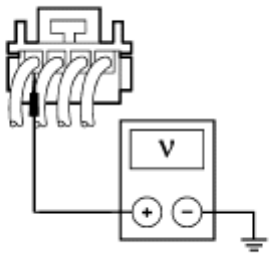
2

3

3 Trigger the PATS active command TRANSMIT SIGNAL COMMAND to ON.

4

4 Measure the voltage by back probing between PATS transceiver C221-4, Circuit 1215 (W/LG), and ground.



GK6414-A

- **Does the voltage drop from greater than 9 volts to less than 1 volt when the PATS active command is triggered on?**

→ **Yes**
GO to B168110 .

→ **No**
CHECK Circuit 1215 (W/LG) for continuity to PATS module C222-13. If the circuit is OK, INSTALL a new PATS module; REFER to Module—Passive Anti-Theft System (PATS) . CYCLE the ignition to RUN using two encoded ignition keys. GO to Pinpoint Test B2139 . CLEAR the DTCs. TEST the system for normal operation. If the circuit is not OK, REPAIR Circuit 1215 (W/LG). CLEAR the DTCs. TEST the system for normal operation.

B168110 CHECK THE PATS SYSTEM WITH NEW PATS TRANSCEIVER

1

2 INSTALL a new PATS transceiver; refer to Module—Passive Anti-Theft Transceiver .

3

4

PATS On-Demand Self-Test

- **Is DTC B1681 retrieved?**

→ **Yes**

	GO to B168111 . → **No** System is OK.
B168111 CHECK THE PATS SYSTEM WITH NEW PATS MODULE	
1  3  4  PATS On-Demand Self-Test	2 INSTALL a new PATS module; refer to Module—Passive Anti-Theft System (PATS) . CYCLE the ignition to RUN using two encoded ignition keys. GO to Pinpoint Test B2139. CLEAR the DTCs. TEST the system for normal operation. • **Is DTC B1681 retrieved?** → **Yes** REPAIR Circuit 651 (BK/Y), 936 (DG/W), 1215 (W/LG), and 1216 (GY/O). CLEAR the DTCs. TEST the system for normal operation. → **No** If no DTCs are retrieved, the system is OK. If other DTCs are retrieved, REFER to PATS Diagnostic Trouble Code (DTC) Index.

PINPOINT TEST B2139: PCM ID DOES NOT MATCH BETWEEN PATS AND PCM

CONDITIONS	DETAILS/RESULTS/ACTIONS
B21391 RETRIEVE THE DTCS	
1  2	

Scan Tool

3 

4 

Clear Continuous DTCs

5 

6 

7 

3 Retrieve and document continuous DTCs.

7 Retrieve continuous DTCs.

- **Is DTC B2139 retrieved?**

→ **Yes**
GO to B21392 .

→ **No**
System is OK.

B21392 CLEAR PCM ID FROM PATS MODULE AND PCM

1 Perform the security access procedure for the PATS Module; refer to Security Access—Procedure .

2 

2 **NOTE:** Do not perform ignition key code erase.

Select PARAMETER RESET command for PATS.

3 

3 Use diagnostic card for PCM Active Command Keep Alive Memory Reset.

4 	
5 	5 Turn the ignition switch to RUN for 30 seconds.
6 	6 Clear continuous DTCs.
7 	
8 	8 Retrieve continuous DTCs.
	• **Is DTC B2139 retrieved?** → **Yes** VERIFY PCM calibration is correct for the vehicle. If correct, repeat Step 2. If fault code persists, INSTALL a new PATS module; REFER to Module—Passive Anti-Theft System (PATS) . CYCLE the ignition to RUN using two encoded ignition keys. GO to Pinpoint Test B2139 . CLEAR the DTCs. TEST the system for normal operation. If DTC B2139 still exists, INSTALL a new PCM; GO to Pinpoint Test B2139 . CLEAR the DTCs. TEST the system for normal operation. → **No** System is OK. CHECK for any other DTCs. FOLLOW Diagnostic Trouble Code (DTC) Index.

PINPOINT TEST B2141: NO SECURITY ID EXCHANGE BETWEEN PATS AND PCM

CONDITIONS	DETAILS/RESULTS/ACTIONS
B21411 RETRIEVE THE DTCS	
1  2	

Scan Tool

3

4

Clear Continuous DTCs

5

3 Retrieve and document continuous DTCs.

5 Key OFF then key ON and retrieve continuous DTCs.

- **Are any DTCs retrieved?**

→ **Yes**
If DTC B2141 only is retrieved, GO to B21412 .

If DTC U1147 is retrieved with DTC B2141, GO to Pinpoint Test U1147 .

→ **No**
System is OK.

B21412 PERFORM KEEP ALIVE MEMORY RESET FROM PCM

1

2

3

4

1 Use diagnostic card for PCM Active Command Keep Alive Memory Reset.

3 Leave key on for 30 seconds.

4 Start vehicle.

	• **Does the vehicle start?** → **Yes** System is OK. → **No** GO to B21413 .
B21413 RETRIEVE THE PATS DTCS	
1  Clear Continuous DTCs 2  3  4  5  PATS On-Demand Self-Test	• **Is DTC B2141 retrieved?** → **Yes** REPEAT B2141-2. If the fault persists, verify the PCM calibration. If the calibration is OK, INSTALL a new PATS. REFER to Section 413-01 . Cycle the ignition key to run using two encoded ignition keys. GO to Pinpoint Test B2139 . CLEAR the DTCs. TEST the system for normal operation. → **No** REFER to the DTC index.

PINPOINT TEST U1147: FAULTY SCP LINK OR INCORRECT PCM CALIBRATION

CONDITIONS	DETAILS/RESULTS/ACTIONS

U11471 CHECK THE ANTI-THEFT INDICATOR FOR CORRECT OPERATION	
1 	2 Verify the theft indicator proves out correctly. • **Does the vehicle start once the theft indicator proves out?** → **Yes** If the vehicle starts, VERIFY correct PCM Calibration for vehicle. REFER to Section 3A in the Powertrain Control/Emissions Diagnosis (PC/ED) manual. → **No** GO to U11472 .
U11472 CHECK THE PCM DIAGNOSTIC CAPABILITY	
1  Scan Tool 2  3  Clear Continuous DTCs 4  PCM Self-Test	2 Retrieve and document continuous DTCs. • **Does scan tool communicate with the PCM?** → **Yes** GO to U11473 . → **No** DIAGNOSE the module communication network; REFER to Section 418-00 .
U11473 RETRIEVE THE PCM DTCS	
1	1 Retrieve and document continuous DTCs.

- **Is DTC P1260 retrieved?**

→ **Yes**
GO to U11474 .

→ **No**
VERIFY PCM power and ground. REFER to Section 3A in the Powertrain Control/Emissions Diagnosis (PC/ED) manual.

U11474 CHECK THE COMMUNICATION NETWORK

1 Repeat Inspection and Verification steps three through seven; refer to Inspection and Verification.

2

3

3 Retrieve and document continuous DTCs.

4

Clear Continuous DTCs

5

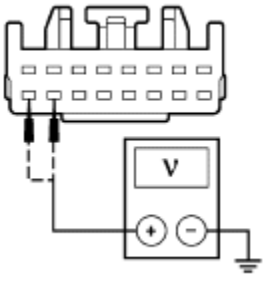
PATS On-Demand Self-Test

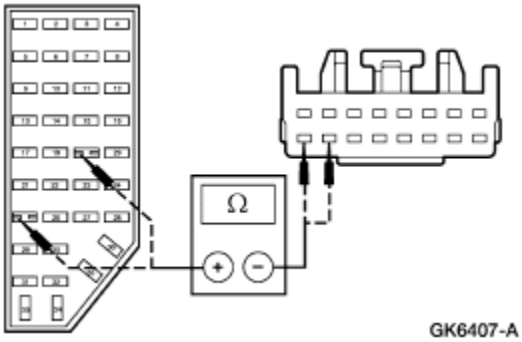
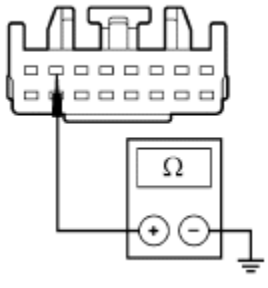
- **Is DTC U1147 retrieved?**

→ **Yes**
INSTALL a new PATS module; REFER to Module—Passive Anti-Theft System (PATS) . CYCLE the ignition to RUN using two encoded ignition keys. GO to Pinpoint Test B2139 . CLEAR the DTCs. TEST the system for normal operation. If DTC U1147 is still present, INSTALL a new PCM; GO to Pinpoint Test B2139 . CLEAR DTCs. TEST the system for normal operation.

→ **No**
System is OK.

PINPOINT TEST A: NO COMMUNICATION WITH THE MODULE

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK FUSE JUNCTION PANEL FUSES 25 (7.5A), FUSE 24 (7.5A) AND FUSE 19 (25A)	
	1 Check fuse junction panel Fuse 25 (7.5A), Fuse 24 (7.5A) and Fuse 19 (25A). • **Are the fuses OK?** → **Yes** GO to A2 . → **No** INSTALL a new fuse(s). TEST the system for normal operation. If the fuse(s) fail(s) again, CHECK for short to ground. REPAIR as necessary.
A2 CHECK THE PATS MODULE FOR VOLTAGE — CIRCUITS 16 (R/LG) AND 1002 (W/Y)	
1  2  PATS Module C222 3  4  GK6406-A	4 Measure the voltage between PATS module C222-15, Circuit 1001 (W/Y), and ground; and between PATS module C222-16, Circuit 16 (R/LG), and ground. • **Are the voltages greater than 10 volts?** → **Yes** GO to A4 .

	→ **No** GO to A3.
A3 CHECK CIRCUITS 16 (R/LG) AND 1001 (W/Y) FOR OPEN	
1  2  3  GK6407-A	1 Fuse junction panel Fuse 25 (7.5A). 2 Fuse junction panel Fuse 19 (25A). 3 Measure the resistance between PATS module C222-15, Circuit 1001 (W/Y), and fuse junction panel Fuse 25 (7.5A), pin 1; and between PATS module C222-16, Circuit 16 (R/LG), and fuse junction panel Fuse 19 (25A), pin 1. • **Are the resistances less than 5 ohms?** → **Yes** REPAIR Circuit(s) 1052 (T/BK) and/or 1050 (LG/P). CLEAR the DTCs. TEST the system for normal operation. → **No** REPAIR Circuit(s) 1001 (W/Y) and/or 16 (R/LG). CLEAR the DTCs. TEST the system for normal operation.
A4 CHECK CIRCUIT 570 (BK/W) FOR OPEN	
1  GK6408-A	1 Measure the resistance between PATS module C222-7, Circuit 570 (BK/W), and ground. • **Is the resistance less than 5 ohms?**

	→ **Yes** REFER to Section 418-00 . → **No** REPAIR Circuit 570 (BK/W). CLEAR the DTCs. TEST the system for normal operation.

PINPOINT TEST B: THE ANTI-THEFT IS ALWAYS/NEVER ON — NO 3 SECOND ANTI-THEFT INDICATOR PROVE OUT

CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CHECK THE THEFT LED FOR CORRECT PROVE OUT	
1  2 	3 Observe the theft LED for at least three seconds while turning the ignition switch to RUN. • **Does the LED fail to flash every two seconds when the ignition is off, but prove out normally (remain illuminated for three seconds) when the ignition is turned to RUN?** → **Yes** REPAIR Circuit 1001 (W/Y). TEST the system for normal operation. If the indicator still does not illuminate correctly, INSTALL a new PATS module. CYCLE the ignition to run using two encoded ignition keys. GO to Pinpoint Test B2139. → **No** GO to B2 .
B2 CHECK THE THEFT INDICATOR FOR ON CONTINUOUS	
	1 Turn the ignition to run and observe the theft indicator for at least 10 seconds. • **Does the theft indicator remain illuminated?** → **Yes**

	Perform the PATS on-demand self-test and CHECK for stored DTCs. If DTCs are retrieved, REFER to PATS DTC Index. If no DTCs are retrieved, GO to B3 . → **No** GO to B5 .
B3 CHECK THE THEFT INDICATOR CIRCUIT FOR SHORT TO BATTERY	
1  2  PATS C222 3 	• **Does the theft indicator remain illuminated?** → **Yes** CHECK Circuit 343 (DB/LG) for short to power. TEST the system for normal operation. → **No** GO to B4 .
B4 CHECK THE THEFT INDICATOR USING THE ACTIVE COMMAND THEFT LAMP	
1  2  PATS C222 3  4	4 Trigger the PATS active command THEFT LMP ON and OFF.

- **Does the theft indicator illuminate when the active command is triggered ON and go off when the active command is triggered OFF?**

→ **Yes**
CARRY OUT the PATS on-demand self-test and check for stored DTCs. If DTCs are retrieved, REFER to PATS DTC Index. If no DTCs are retrieved, INSTALL a new PATS module. REFER to Module—Passive Anti-Theft Transceiver .

→ **No**
INSTALL a new PATS module. REFER to Module—Passive Anti-Theft Transceiver . CYCLE the ignition to run. GO to Pinpoint Test B2139 .

B5 ENTER THE PATS ACTIVE COMMAND MODE

1

2

2 Enter the PATS active command mode.

- **Can the PATS active command mode be entered?**

→ **Yes**
GO to B6 .

→ **No**
GO to Pinpoint Test A .

B6 CHECK THE THEFT INDICATOR — TRIGGER THE PATS ACTIVE COMMAND THEFT LMP ON

1

2

2 Trigger the PATS active command THEFT LMP ON.

- **Does the theft indicator illuminate?**

→ **Yes**
System OK.

→ **No**
GO to B7 .

B7 CHECK PATS MODULE OUTPUT TO THE THEFT INDICATOR FOR VOLTAGE — CIRCUIT 343 (DB/BK)

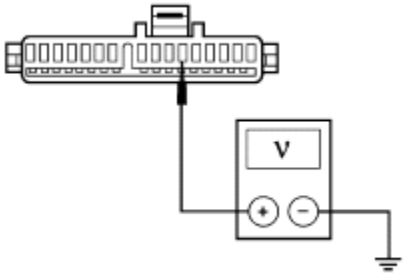
1

2

Instrument Cluster C286

3

4



GK6409-A

4 Measure the voltage between instrument cluster C286-6, Circuit 343 (DB/LG), and ground.

- **Is the voltage greater than 9 volts?**

→ **Yes**
GO to B11 .

→ **No**
GO to B8 .

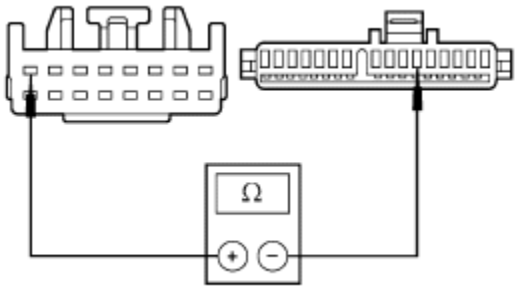
B8 CHECK FOR CONTINUITY BETWEEN THE THEFT INDICATOR AND PATS MODULE — CIRCUIT 343 (DB/LG)

1

2

PATS Module C222

3



GK8235-A

3 Measure the resistance between PATS module C222-8, Circuit 343 (DB/LG), and instrument cluster C286-6, Circuit 343 (DB/LG).

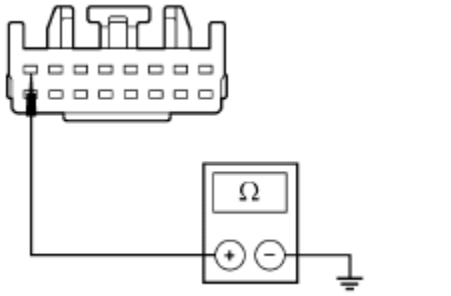
- **Is the resistance less than 5 ohms?**

→ **Yes**
GO to B9 .

→ **No**
REPAIR Circuit 343 (DB/LG). TEST the system for normal operation.

B9 CHECK FOR SHORT BETWEEN THE THEFT INDICATOR AND PATS MODULE — CIRCUIT 343 (DB/LG)

1

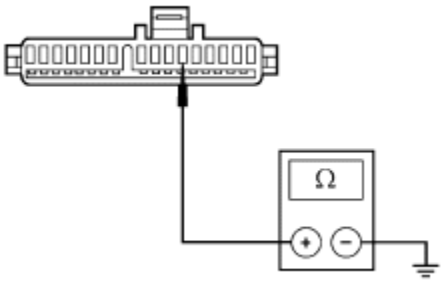


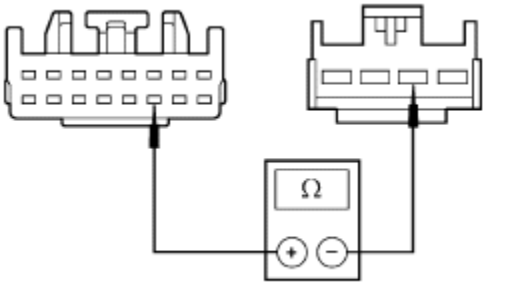
GK8236-A

1 Measure the resistance between PATS module C222-8, Circuit 343 (DB/LG), and ground.

- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
GO to B10 .

	→ **No** REPAIR Circuit 343 (DB/LG). TEST the system for normal operation.
B10 CHECK THE PATS MODULE FOR OUTPUT TO THE INDICATOR FOR VOLTAGE — CIRCUIT 343 (DB/LG)	
1  PATS C222 2  3  4  GK8237-A	3 Trigger the PATS active command THEFT LMP ON. 4 Measure the resistance between instrument cluster C286-6, Circuit 343 (DB/LG), and ground. • **Is the voltage greater than 9 volts?** → **Yes** GO to B11 . → **No** INSTALL a new PATS module. REFER to Module—Passive Anti-Theft Transceiver .
B11 CHECK THE THEFT INDICATOR GROUND FOR OPEN	
1  2 	

Theft Indicator 3  GK8238-A	3 Measure the resistance between instrument cluster C286, Pin 7, and theft indicator socket ground terminal. • **Is the resistance less than 5 ohms?** → **Yes** INSTALL a new THEFT LED. TEST the system for normal operation. → **No** REPAIR or INSTALL a new instrument cluster. REFER to Section 413-01 . TEST the system for normal operation.

Key Programming —Program a Key Using Two Programmed Keys

Special Tool(s)

 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent scan tool

NOTE: This procedure only works if two or more programmed ignition keys are available, and it is desired to program additional key(s). If two keys are not available, refer to Key Programming—Erase All Key Codes and Program Two Keys in this section.

NOTE: PID SPARE_ KY must be enabled for this procedure to operate. If this PID is not enabled, refer to Security Access—Procedure in this section. With scan tool, select Spare Key Programming Switch: Enabled.

NOTE: If the programming procedure is successful, the new key(s) will start the vehicle and the THEFT INDICATOR will illuminate for approximately three seconds.

NOTE: If the programming procedure is not successful, the new key(s) will not start the vehicle and the THEFT INDICATOR will flash. If the programming procedure was not successful, repeat the Key Programming procedure from Step 1. If the failure repeats, refer to Diagnosis and Testing in this section to review diagnostic trouble codes (DTCs) and perform pinpoint tests as required.

NOTE: A maximum of eight ignition keys can be programmed to a passive anti-theft system (PATS) equipped vehicle. Use PID NUMKEYS to determine how many keys are programmed to the vehicle.

NOTE: If the steps are not performed as outlined, the programming procedure will end.

NOTE: Ignition keys must have correct mechanical key cut for the vehicle and must be a PATS encoded key.

1. Insert the first programmed ignition key into the ignition lock cylinder and turn the ignition switch from OFF to RUN (maintain the ignition switch in RUN for one second).

2. Turn the ignition switch to OFF and remove the first key from the ignition lock cylinder.

3. Within five seconds of turning the ignition switch to OFF, insert the second programmed ignition key into the ignition lock cylinder and turn the ignition switch from OFF to RUN (maintain the ignition switch in RUN for one second).

4. Turn the ignition switch to OFF and remove the second key from the ignition lock cylinder.

5. Within 10 seconds of turning the ignition lock cylinder to OFF, insert the unprogrammed ignition key (new key) into the ignition lock cylinder and turn the ignition switch from OFF to RUN (maintain the ignition switch in RUN for 1 second).

6. If it is desired to program additional key(s), repeat the applicable key programming procedure from the beginning.

Key Programming —Erase All Key Codes and Program Two Keys

Special Tool(s)

 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent scan tool

NOTE: This procedure is used when a customer needs keys programmed into the system and does not have two programmed ignition keys available. This procedure is also useful when programmed ignition key (s) have been lost and/or the ignition switch assembly has been replaced, and it is desired to erase key(s) from the passive anti-theft system (PATS) memory.

NOTE: This procedure will erase all programmed ignition keys from the vehicle memory and the vehicle will not start until two keys have been reprogrammed to the vehicle.

NOTE: Two PATS encoded keys with the correct mechanical cut must be available to perform this procedure. One or both of them may be the customer's original keys.

NOTE: If additional keys are to be programmed, refer to Key Programming—Program a Key Using Two Programmed Keys . If the remaining keys are with the customer and are not available with the vehicle, then instruct the customer to refer to the Owner's Guide under the "Programming Spare [SecuriLock® (North America), Safeguard® (U.K.), or PATS for all other markets] Keys Procedure," for instructions on programming the remaining keys.

1. Turn the ignition switch from OFF to RUN.
2. Enter scan tool. Follow the SECURITY ACCESS PROCEDURE to obtain security access.
3. From scan tool menu, select IGNITION KEY CODE ERASE.
4. **NOTE:** DO NOT select any additional commands from this menu.

   Turn the ignition switch to OFF and disconnect scan tool.
5. Insert the first encoded key into the ignition lock cylinder and turn the switch to RUN for three seconds.
6. Insert the second encoded key into the ignition lock cylinder and turn the switch to RUN for three seconds.
7. The vehicle should now start with both ignition keys.

Key Programming —Spare Key Programming Switch

Special Tool(s)

 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent scan tool

NOTE: The Spare Key Programming Switch is a scan tool programmable switch that provides the capability to enable/disable the Spare Key Programming Procedure. This procedure is in the Owner's Guide Spare Key Programming Procedure or in this section under Key Programming—Program a Key Using Two Programmed Keys . This programmable switch is provided as a convenience for rental company fleets or other fleet purchasers who may not want the Spare Key Programming procedure available to the vehicle driver.

NOTE: The spare key programming switch state can be viewed by PATS PID SPARE_KY.

1. Insert a programmed ignition key into the ignition lock cylinder and turn the ignition switch to RUN.

2. Enter scan tool. Follow the SECURITY ACCESS PROCEDURE to obtain security access.

3. **NOTE:** The default setting on delivery of all new vehicles is <ENABLE>.

   From scan tool menu, select SPARE KEY PROGRAMMING SWITCH selection to desired setting:
   - <ENABLE> Spare Key Programming Procedure is accessible.
   - <DISABLE> Spare Key Programming Procedure is not accessible.

Key Programming —With Diagnostic Equipment

NOTE: This procedure is used when a customer needs to have an additional key programmed into the vehicle without erasing stored key codes, but does not have two programmed keys available. This procedure is also useful when attempting to determine if an ignition key is defective, as a new key can be installed without erasing keys or without having two programmed keys available.

NOTE: Before programming, the new key must have the correct mechanical cut for the ignition lock.

NOTE: If eight keys are already programmed, this procedure will not allow any further ignition keys to be programmed without erasing all stored key codes first. The number of keys programmed into the system can be determined using the PID NUMKEYS.

1. Turn the ignition switch from the OFF position to the RUN position using the new, unprogrammed ignition key.

2. Enter scan tool using the Ford Service Function (FSF) card and enter the appropriate instrument cluster. Follow Security Access to obtain security access. For additional information, refer to Security Access—Procedure in this section.

3. From the scan tool menu, select: IGNITION KEY CODE PROGRAM.

4. Turn the ignition switch to the OFF position and disconnect the scan tool.

5. Attempt to start the engine with the new ignition key. The vehicle engine should start and run normally.

Security Access —Procedure

Special Tool(s)

 ST2332-A	Worldwide Diagnostic System (WDS) 418-F224, New Generation STAR (NGS) Tester 418-F052, or equivalent scan tool

NOTE: The Security Access Procedure is utilized to obtain passive anti-theft system (PATS) security access. PATS security access must be granted to erase ignition keys, enable/disable the spare key programming switch (PID SPARE_KY) or perform a parameter reset for PATS, and may be required to program ignition keys. The Security Access Procedure invokes an inherent 10-minute time delay prior to granting security access during which scan tool must remain connected to the vehicle. Once security access has been granted, a security access command menu is displayed which offers various command options (refer to PATS Configuration Command Index).

NOTE: Select only the command required by the appropriate pinpoint test.

1. From scan tool: Using service card, select PATS. Enter SECURITY ACCESS PROCEDURE. This procedure will take 10 minutes to perform, during which the ignition switch must be in RUN and the scan tool must be connected to the vehicle.

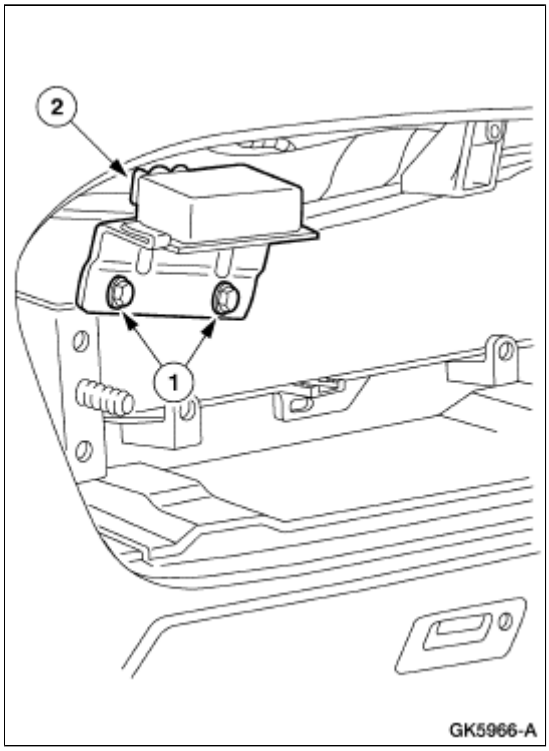
2. After the 10-minute security access procedure has been completed, a new menu will be displayed with command options. Select only those functions required before exiting out of this menu. Once exited out of this menu, the security access procedure must be performed again to perform additional commands.

Module —Passive Anti-Theft System (PATS)

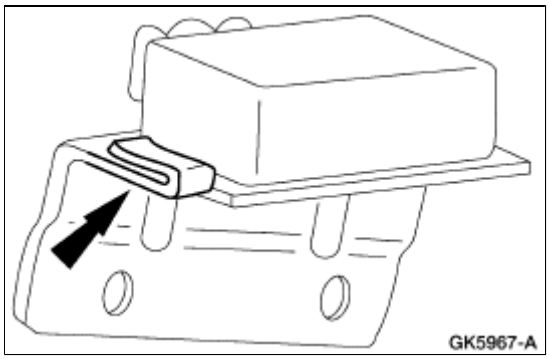
Removal

1. Remove the passenger side air bag module; refer to Section 501-20B .

2. Remove the passive anti-theft system (PATS) module and bracket.
    1. Remove the bolts.
    2. Disconnect the electrical connector.



3. Release the retainer tabs and remove the PATS module from the bracket.

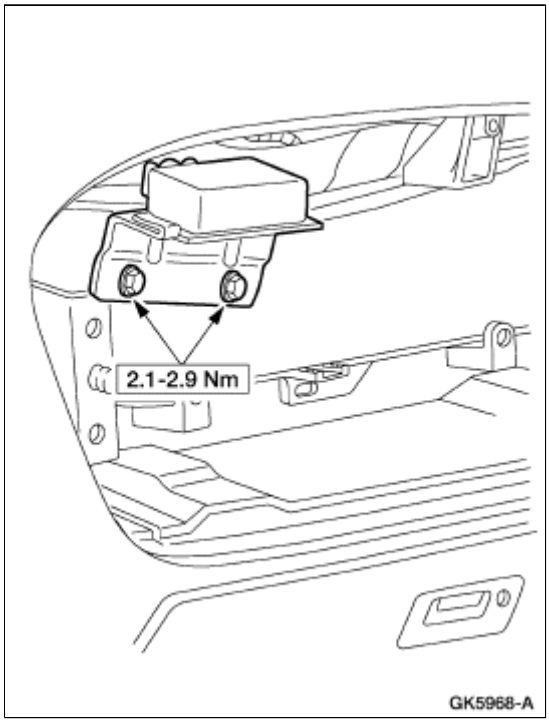


Installation

1. **NOTE:** Prior to starting the vehicle, check for PATS DTCs. Perform the appropriate pinpoint test.

   NOTE: When the PATS module is replaced, both ignition keys must be relearned and stored in memory. Insert each key in the ignition and turn to RUN for automatic programming.

   To install, reverse the removal procedure.



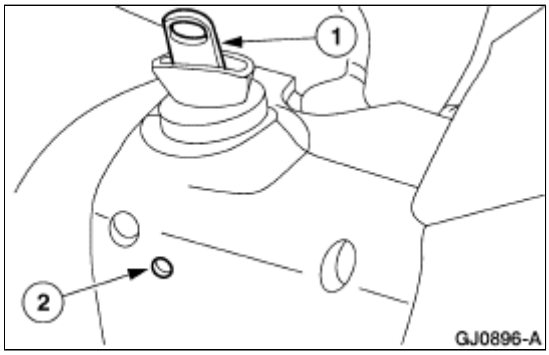
Module —Passive Anti-Theft Transceiver

Removal

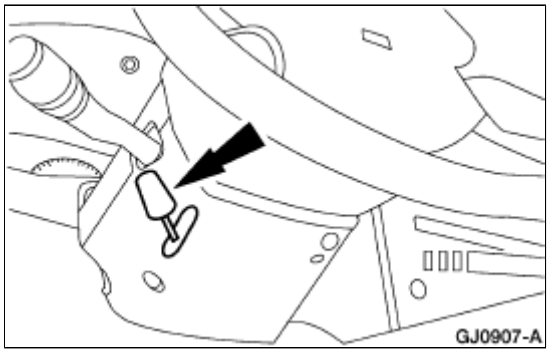
1. **CAUTION: Electronic modules are sensitive to electrical charges. If exposed to these charges, damage may result.**

   Disconnect the battery ground cable.

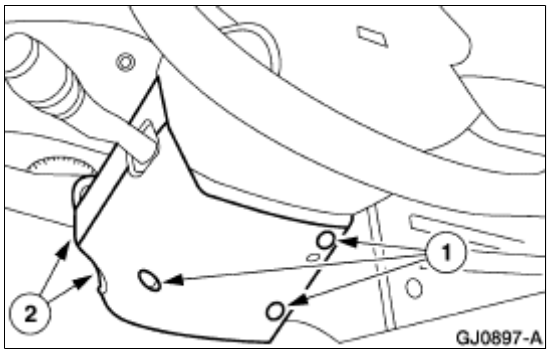
2. Remove the ignition switch lock cylinder (11582).
   1. Insert the ignition key into the ignition switch lock cylinder and turn to the RUN position.
   2. Push the ignition switch lock cylinder release tab with a punch while pulling out the ignition switch lock cylinder.



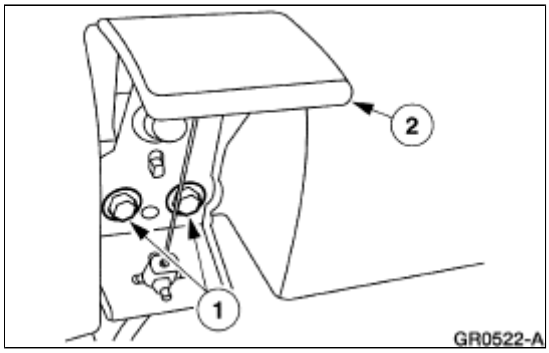
3. Twist the tilt wheel handle and shank (3F609) and remove.



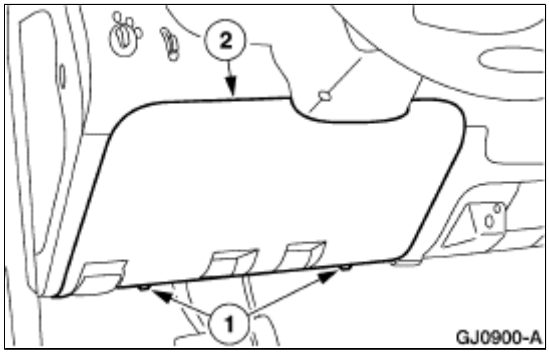
4. Remove the upper and lower steering column shrouds (3530).
   1. Remove the screws.
   2. Remove the upper and lower steering column shrouds.



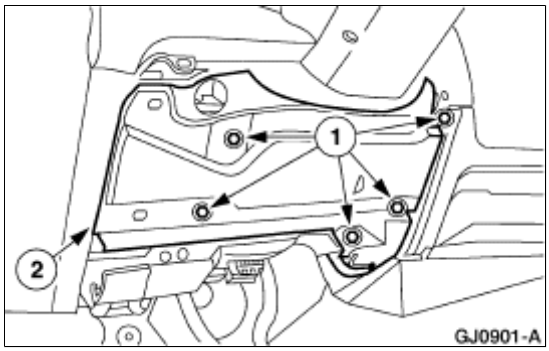
5. Remove the hood latch release handle.
    1. Remove the screws.
    2. Remove the hood latch release handle.



6. Remove the lower instrument panel steering column cover.
    1. Remove the screws.
    2. Remove the lower instrument panel steering column cover.



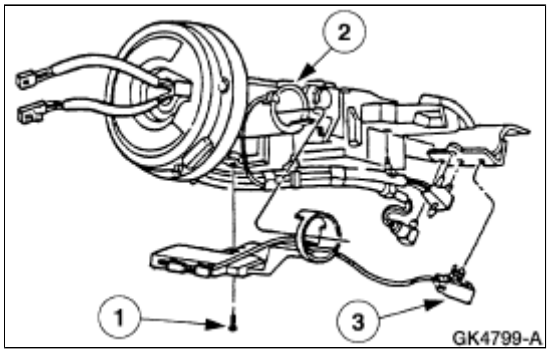
7. Remove the instrument panel steering column opening cover reinforcement (04502).
    1. Remove the screws.
    2. Remove the instrument panel steering column opening cover reinforcement.



8. **NOTE:** The steering wheel is shown removed for clarity.

   Remove the transceiver assembly.
   1. Remove the screw.
   2. **NOTE:** Only apply pressure or leverage below the key cylinder lower rib.

      Locate the rib on the steering column lock cylinder housing, and gently release the anti-theft transceiver over the rib.
   3. Disconnect the electrical connector.



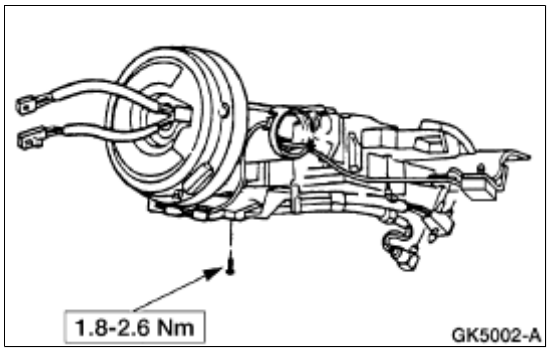
Installation

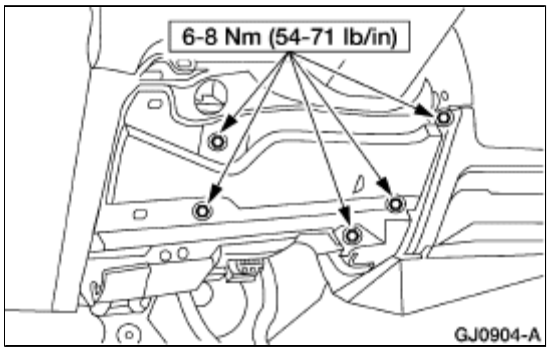
1. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   NOTE: No key replacement or re-initialization needs to occur with the removal or installation of a new PATS Transceiver.

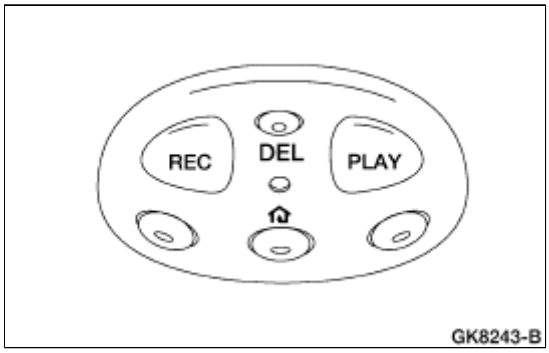
   NOTE: The steering wheel (3600) is shown removed for clarity.

   To install, reverse the removal procedure.


1.8-2.6 Nm
GK5002-A


6-8 Nm (54-71 lb/in)
GJ0904-A

Universal Transmitter



The HomeLink® with TravelNote ™ universal transmitter provides a convenient way to replace up to three hand-held transmitters with a single built-in device. The universal transmitter:

- will operate garage doors, gates and home/office lighting and security systems.
- will actually learn and transmit the radio frequency of up to three hand-held transmitters from any of the systems mentioned above.
- is an integral part of the left sun visor assembly and is powered by the vehicle battery and charging system.

In addition to the universal transmitter function, the HomeLink® with TravelNote ™ also provides a convenient built-in recording device to safely store information. For additional information, refer to the Owner's Guide.

Universal Transmitter

Refer to Wiring Diagrams Cell 89 , Courtesy Lamps for schematic and connector information.

Inspection and Verification

1. Verify the customer concern by operating the system.
2. Visually inspect for obvious signs of mechanical damage.

Visual Inspection Chart

Mechanical
• Damaged universal transmitter • Damaged receiver

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the fault is not visually evident, verify the symptom and refer to the Symptom Chart.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• The universal transmitter is inoperative	• Universal transmitter. • Receiver unit.	• GO to Pinpoint Test A .
• The TravelNote ™ is inoperative—universal transmitter is operative	• TravelNote ™ .	• INSTALL a new left sun visor assembly.

Pinpoint Tests

PINPOINT TEST A: THE UNIVERSAL TRANSMITTER IS INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK LEFT VANITY MIRROR OPERATION	

	1 Check the illumination of the left vanity mirror lamps. • **Do the left vanity mirror lamps illuminate?** → **Yes** GO to A2 . → **No** For additional information, REFER to Section 417-02 .
A2 PROGRAM HAND-HELD TRANSMITTER INTO UNIVERSAL TRANSMITTER	
	1 **NOTE:** If the garage door is equipped with rolling codes, refer to Training a Garage Door Opener Equipped With "Rolling Codes." Program the universal transmitter; for additional information, refer to Programming . • **Did the universal transmitter program successfully?** → **Yes** The universal transmitter is OK. VERIFY receiver operation. → **No** INSTALL a new left sun visor assembly. TEST the system for normal operation.

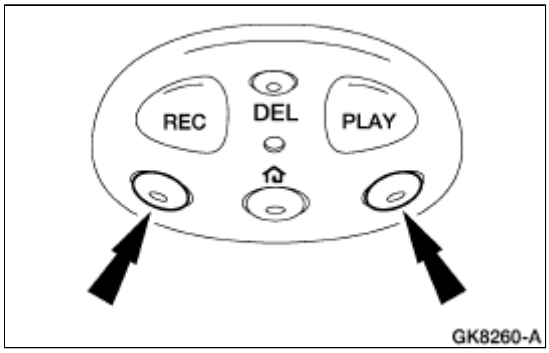
Programming

WARNING: A garage door opening system that cannot stop or reverse itself after detecting an object in its path does not meet current federal safety standards. To decrease the risk of serious injury or death, do not use this HomeLink® with TravelNote ™ transmitter with a door opening system that lacks stop and reverse features as required by federal standards. This includes any garage door opening system manufactured before April 1, 1982. For more information, call HomeLink® with TravelNote ™ customer assistance at 1-800-355-3515.

1. **CAUTION: During this procedure, the system that you are programming will be made to operate. Make sure that people or objects are clear of the garage door or gate being programmed.**

   Verify the hand-held transmitter is operative.

2. Prepare for programming the universal transmitter by erasing all three channels by holding down the two outside buttons until the red light begins to flash (20-30 seconds). Release both buttons.

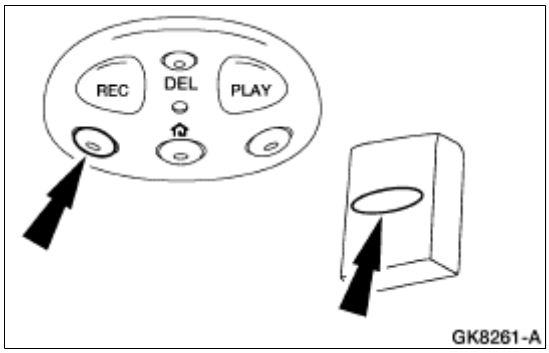


3. Select one of the three universal transmitter channels to be programmed by pressing the desired button.

4. Hold the end of the hand-held transmitter 25-51mm (1-2 in) from the front surface of the universal transmitter so that the red light can still be seen.

5. **NOTE:** During programming, the hand-held transmitter may automatically stop transmitting after two seconds, which may not be long enough to program the universal transmitter. If programming this type of hand-held transmitter, continue to hold the button on the universal transmitter while re-pressing the hand-held transmitter button every two seconds (Canada only).

   Use both hands to press the hand-held transmitter button and the desired button on the universal transmitter. Do not release either button.



6. Hold down both buttons until the red light on the universal transmitter flashes, first slowly and then rapidly. Release both buttons when the rapid flashing begins. The universal transmitter has successfully learned the new frequency signal and can be used in place of the hand-held transmitter (s).

7. **NOTE:** If the hand-held transmitter appears to program the universal transmitter but does not open the garage door, the garage door opener may have a "code protected" or "rolling code" feature.

   To operate, simply press the appropriate button on the universal transmitter. The red light is on while the signal is being transmitted.

Training a Garage Door Opener Equipped With "Rolling Codes"

8. Program the hand-held transmitter to the universal transmitter; for additional information, refer to Programming .

9. Train the garage door opener receiver to recognize the universal transmitter.
   1. Remove the cover panel from the garage door opener receiver.
   2. Locate the training button on the garage door opener receiver. Location and color of the button may vary by garage door opener manufacturer. Refer to the garage door opener instruction manual or call HomeLink® with TravelNote ™ customer assistance at 1-800-355-3515.
   3. Press the training button on the garage door opener receiver for 1-2 seconds.
   4. Press the programmed universal transmitter button for as long as the universal transmitter red light flashes (1-2 seconds). Release the button and re-press the button to confirm that the universal transmitter is trained to the receiver.
   5. The garage door opener should recognize the universal transmitter.

Erasing Channels

1. **NOTE:** Individual channels cannot be erased, but can be reprogrammed using the procedures for programming; for additional information, refer to Programming .

   To erase all three programmed channels, hold down the two outside buttons until the red light begins to flash (20-30 seconds). Release both buttons.

Torque Specifications

Description	Nm	lb-in
Battery Ground Cable Screw	7-10	62-89
GEM/CTM Screw	1.6-2	9-18
Remote Anti-Theft Personality (RAP) Module	2.3-3.3	21-29

Module Controlled Functions

The multifunction modules consist of the following:

- generic electronic module (GEM)/central timer module (CTM)
- remote anti-theft personality (RAP) module (15K602)

The remote anti-theft personality (RAP) module controls the keyless entry, and computer operated locks systems.

The GEM/CTM controls the following features:

- wiper/washer (front/rear)
- warning chime
- battery saver
- illuminated entry and courtesy lamps
- driver one touch down power window (GEM only)
- accessory delay
- 4 wheel drive (GEM only)

Multifunction Electronic Module

For 4-wheel drive concerns, refer to Section 308-07A .

For warning chime concerns, refer to Section 413-09 .

For courtesy lamps/illuminated entry and battery saver concerns, refer to Section 417-02 .

For one-touch window concerns, refer to Section 501-11 .

For wiper/washer control and interval timer concerns, refer to Section 501-16 .

For keyless entry concerns, refer to Section 501-14B .

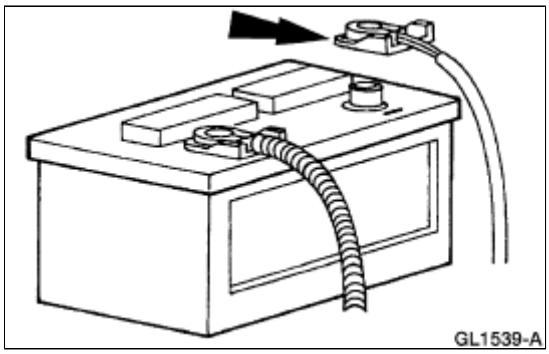
For passive anti-theft concerns, refer to Section 419-01 .

Module —Generic Electronic (GEM)/Central Timer (CTM)

Removal

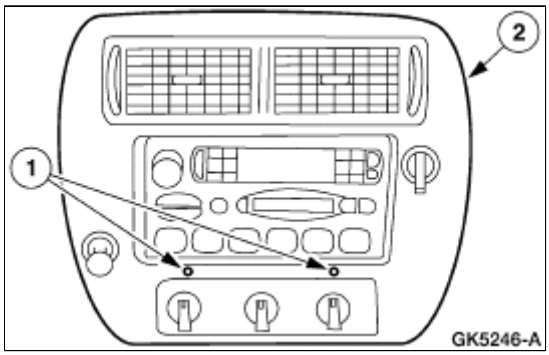
1. **CAUTION: Electronic modules are sensitive to static electrical charges. If exposed to these charges, damage may result.**

   Disconnect the battery ground cable (14301).

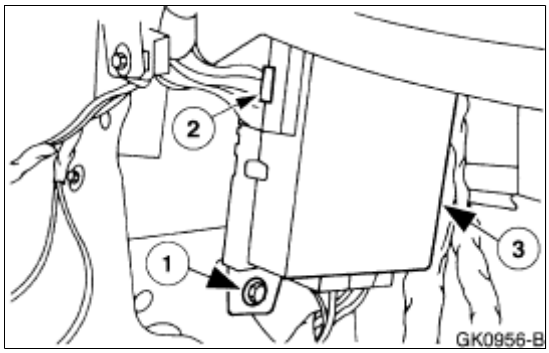


2. Remove the radio chassis (18806) ; refer to Section 415-01 .

3. Remove the center instrument panel finish panel.
   1. Remove the screws.
   2. Remove the center instrument panel finish panel.
      - Disconnect the electrical connectors.



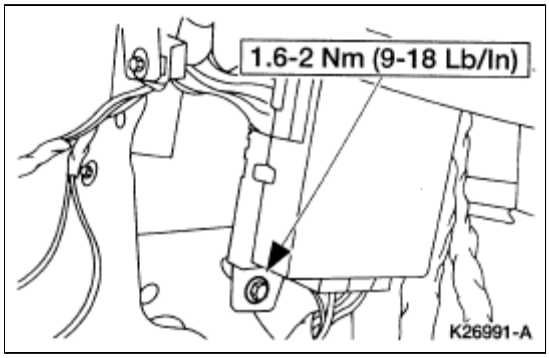
4. Remove the GEM/CTM.
   1. Remove the screw.
   2. Disconnect the four connectors from the GEM/CTM.
   3. Remove the GEM/CTM.



Installation

1. **NOTE:** When the battery (10655) i s disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   To install, reverse the removal procedure.

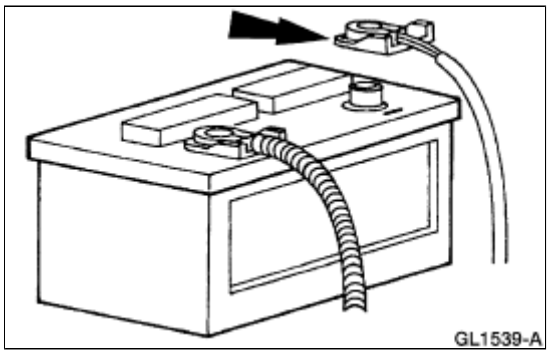


Module —Remote Anti-Theft Personality (RAP)

Removal

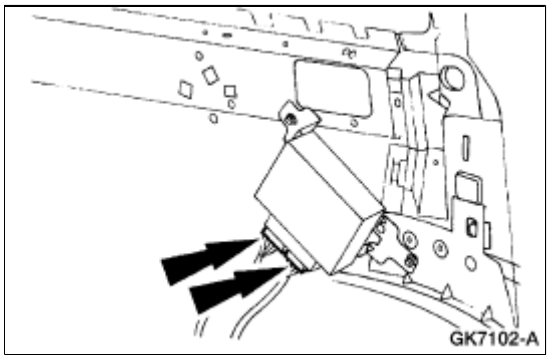
1. **CAUTION: Electronic modules are sensitive to electrical charges. If exposed to these static charges, damage may result.**

   Disconnect the battery ground cable.

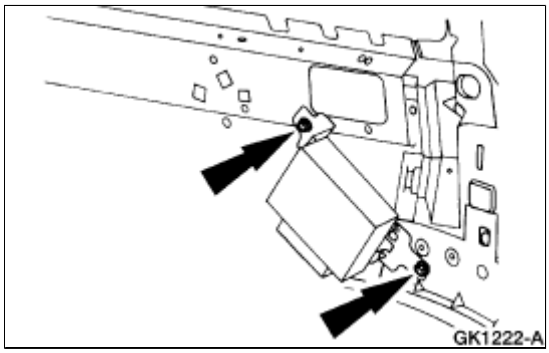


2. Remove the LH rear quarter trim panel; refer to Section 501-05 .

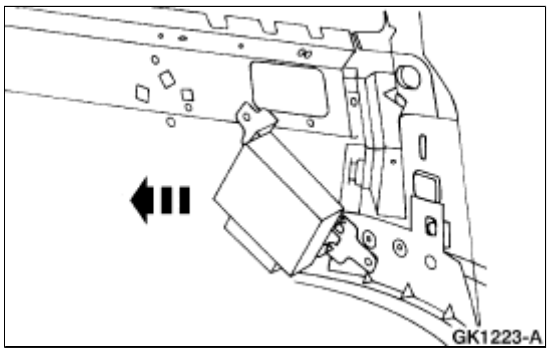
3. Disconnect the two remote anti-theft personality (RAP) module electrical connectors.



4. Remove the two RAP module fasteners.



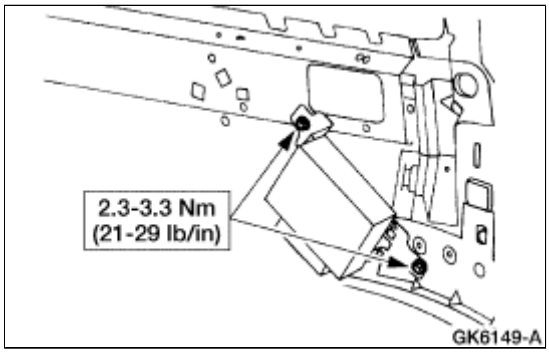
5. Remove the RAP module.



Installation

1. **NOTE:** When the battery is disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 mi) or more to relearn the strategy.

   To install, reverse the removal procedure.

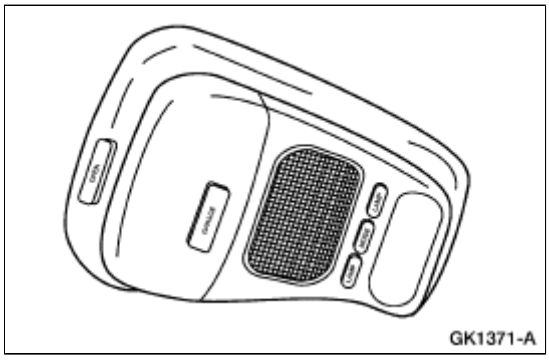


Electronic Compass

A compass and outside temperature display are contained in the overhead console.

The compass and temperature display can be turned off and on by pressing the MODE switch in the overhead console. The vehicle heading is displayed as one of N, NE, E, SE, S, SW, W, and NW.

Overhead Console



Compass Accuracy

Magnetic mounted devices like antennas and luggage racks should not be located on the front third of the vehicle roof. Placing these devices near the compass will cause inaccurate directional readings. If these devices must be used, accuracy may be improved by recalibrating the compass while the devices are installed on the vehicle.

Driving near power lines, or driving in the area of large iron or steel structures can temporarily change the compass' heading. If the compass remains inaccurate after driving near such objects, demagnetize the vehicle and recalibrate the compass.

Most geographic areas (zones) have a magnetic north compass point that varies slightly from the northerly direction on maps. This variation is four degrees between the adjacent zones and will become noticeable as the vehicle crosses multiple zones. A correct zone setting eliminates the error. Refer to Compass Zone Adjustment .

Temperature, Outside Air

The thermometer sensor (15A022) is attached to the radiator frame behind the grille. The temperature can be displayed in centigrade or Fahrenheit by pressing the MODE switch.

If the outside temperature falls below 3.3°C (38°F), the display will alternate from "ICE" to the outside temperature at a two second rate for one minute.

The outside air temperature reading can be affected by engine heat when the vehicle is idling or has been off for less than two hours. The compass and thermometer (19A548) will limit the increase of the displayed temperature to one degree per minute at very low speeds or immediately after the ignition is turned on. After two minutes at a sustained speed of at least 53 km/h (33 mph), effects of engine heat are minimal and the compass will display the current outside temperature reading. Temperature decreases are always updated immediately.

If the outside air temperature sensor is short or open circuited, then the display will show 60°C (140°F) or -40°C (-40°F) respectively in place of temperature.

Electronic Compass

Refer to Wiring Diagrams Cell 102 , Overhead Console for schematic and connector information.

Special Tool(s)

 ST1137-A	73 Digital Multimeter or equivalent 105-R0051

Inspection and Verification

1. Verify the customer concern by operating the compass and thermometer (19A548).
2. Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Damaged compass and thermometer • Damaged thermometer sensor	• Fuse • Damaged wiring harness • Loose or corroded connections

3. If inspection reveals an obvious concern(s) that can be readily identified, repair or replace as required.
4. If the fault is not visually evident, determine the symptom and proceed to Symptom Chart.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• The Compass Is Inaccurate/Inoperative	• Compass zone setting. • Compass calibration. • Vehicle magnetization. • Compass and thermometer.	• GO to Pinpoint Test A .
• The Display Does Not Light	• Compass and	• GO to

	thermometer. • Circuitry. • Panel dimmer switch.	Pinpoint Test A .
• The Display Is Locked In One Position	• Compass and thermometer. • Vehicle magnetization. • Compass calibration.	• GO to Pinpoint Test A .
• The Display Will Not Dim With the Instrument Panel Dimmer Switch	• Panel dimmer switch. • Circuitry.	• REFER to Section 413-00 .
• The Outside Air Temperature Is Inaccurate/Inoperative	• Compass and thermometer. • Thermometer sensor (15A022). • Circuitry.	• GO to Pinpoint Test B .

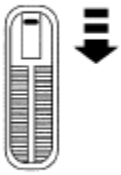
Pinpoint Tests

NOTE: Always set the zone, calibrate, and demagnetize a vehicle before replacing an inaccurate compass.

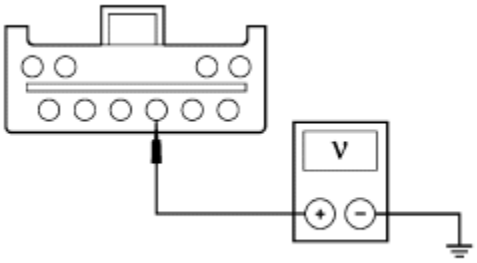
NOTE: After replacing the compass, always set the zone and calibrate.

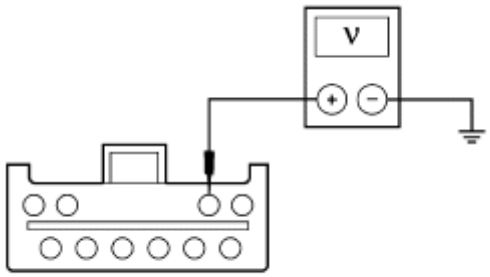
PINPOINT TEST A: THE COMPASS IS INACCURATE/INOPERATIVE

CONDITIONS	DETAILS/RESULTS/ACTIONS
A1 CHECK OVERHEAD COMPASS DISPLAY	
1 	• **Does the overhead compass display remain on after prove out?** → **Yes** GO to A3 . → **No** GO to A2 .
A2 CHECK COMPASS MODE	
	1 Press and release the MODE switch on the overhead console. • **Does the overhead compass display turn**

	on? → **Yes** If the compass display turns on properly, GO to A3 . If the compass display turns on but the heading is inoperative/inaccurate or display indicates VAR, GO to A4 . If the compass display turns on but it does not display all directions, GO to A5 . If the compass display turns on but indicates CAL, GO to A5 . → **No** GO to A8 .
A3 CHECK COMPASS DIMMING	
1  GK0182-A	1 Turn the headlamp switch to the parking lamps ON position.
2  GK4256-A	2 Rotate the panel dimmer switch. • **Does the compass display dim with the other instrumentation?** → **Yes** GO to A4 . → **No** GO to A9 .
A4 CHECK COMPASS ZONE SETTING	
	1 Set the compass to the correct zone for your location; refer to Compass Zone Adjustment . • **Could the zone be set?**

	→ **Yes** GO to A5 . → **No** REPLACE the compass and thermometer. SET the zone and CALIBRATE the compass.
A5 CALIBRATE THE COMPASS	
	1 Recalibrate the compass; refer to Calibration Adjustment . • **Could the compass be calibrated?** → **Yes** GO to A7 . → **No** GO to A6 .
A6 DEMAGNETIZE THE VEHICLE	
1 	2 Demagnetize the vehicle; refer to Vehicle Demagnetizing . 3 Recalibrate the compass; refer to Calibration Adjustment . • **Could the compass be calibrated?** → **Yes** GO to A7 . → **No** REPLACE the compass and thermometer. SET the zone and CALIBRATE the compass. TEST the system for normal operation.
A7 CHECK COMPASS ACCURACY	
	1 Position the vehicle at each of the eight directions (N, NE, E, SE, S, SW, W, NW) and verify that the displayed heading is accurate. The vehicle must be stationary for at least 10 seconds at each direction. • **Is the compass display accurate in each direction?** → **Yes** The compass is OK. REVIEW the operation of

	the compass with the customer. → **No** REPLACE the compass and thermometer. SET the zone; refer to Compass Zone Adjustment . CALIBRATE the compass; refer to Calibration Adjustment . TEST the system for normal operation.
A8 CHECK POWER SUPPLY TO COMPASS AND THERMOMETER	
1  2  Compass and Thermometer 3  4  GK6891-A	4 Measure the voltage between compass and thermometer C342-3, circuit 1003 (GY/Y), and ground. • **Is the voltage greater than 10 volts?** → **Yes** GO to A10 . → **No** REPAIR circuit 1003 (GY/Y) and/or BK wire to compass and thermometer. TEST the system for normal operation.
A9 CHECK DIMMING CIRCUIT	
1	1 Measure the voltage between compass and thermometer C342-8, circuit 19 (LB/R), and ground, while rotating the panel dimmer switch.



GK6892-A

- **Does the voltage vary as the switch is rotated?**

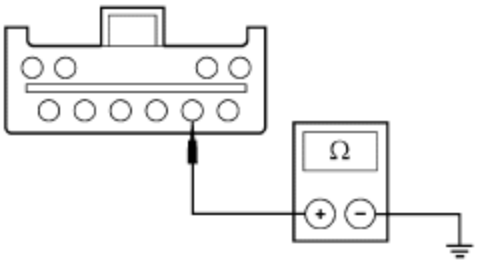
→ **Yes**
GO to A10 .

→ **No**
REFER to Section 413-00 .

A10 CHECK CIRCUIT 57 (BK) FOR OPEN

1

2



GK6893-A

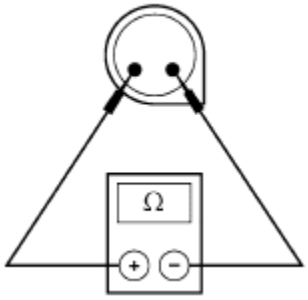
2 Measure the resistance between compass and thermometer C342-2, circuit 57 (BK), and ground.

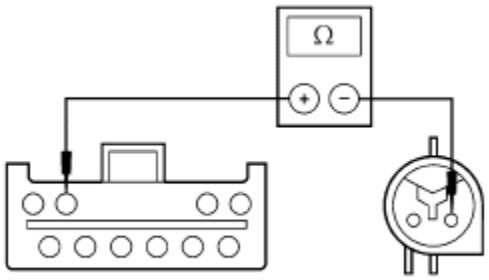
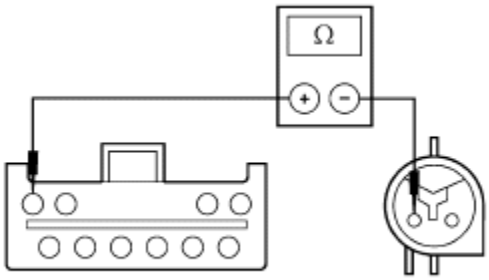
- **Is the resistance less than 5 ohms?**

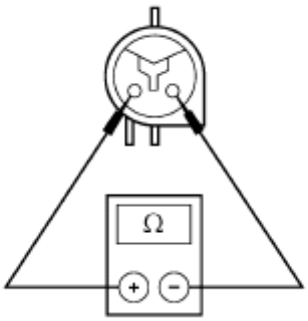
→ **Yes**
REPLACE the compass and thermometer. SET the zone; REFER to Compass Zone Adjustment . CALIBRATE the compass; refer to Calibration Adjustment .

→ **No**
REPAIR circuit 57 (BK) and/or BK wire to compass and thermometer. TEST the system for normal operation.

PINPOINT TEST B: THE OUTSIDE AIR TEMPERATURE IS INACCURATE/INOPERATIVE

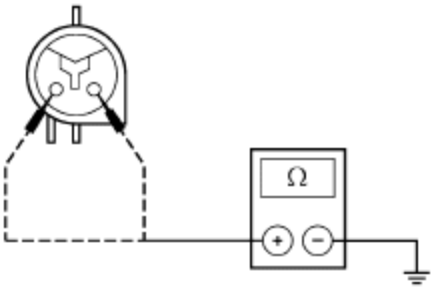
CONDITIONS	DETAILS/RESULTS/ACTIONS
B1 CHECK FOR PROPERLY INSTALLED SENSOR	
1 	2 Verify the thermometer sensor is properly installed and fully connected. • **Is the thermometer sensor properly installed and fully connected?** → **Yes** GO to B2 . → **No** REINSTALL or RECONNECT the thermometer sensor. TEST the system for normal operation.
B2 CHECK THERMOMETER SENSOR FUNCTION	
2  GK6894-A	1 Remove the thermometer sensor. 2 Measure the resistance between thermometer sensor terminal 1 and terminal 2 at an ambient temperature of 18°-29.5°C (65°-85° F). Check for intermittent readings. • **Is the resistance between 8,000 ohms and 14,000 ohms?** → **Yes** GO to B3 . → **No** REPLACE the thermometer sensor. TEST the system for normal operation.
B3 CHECK SENSOR CIRCUIT FEED FOR OPEN	
1 	

Compass And Thermometer C902 2  GK6895-A	2 Measure the resistance between compass and thermometer C342-9, circuit 233 (DB/Y), and thermometer sensor C194-1, circuit 233 (DB/Y). • **Is the resistance less than 5 ohms?** → **Yes** GO to B4 . → **No** REPAIR circuit 233 (DB/Y) and/or BK wire to compass and thermometer C902-5. TEST the system for normal operation.
B4 CHECK SENSOR CIRCUIT RETURN FOR OPEN	
1  GK6896-A	1 Measure the resistance between compass and thermometer C342-10, circuit 234 (DB/W), and thermometer sensor C194-2, circuit 234 (DB/W). • **Is the resistance less than 5 ohms?** → **Yes** GO to B5 . → **No** REPAIR circuit 234 (DB/W) and/or BK wire to compass and thermometer C902-6. TEST the system for normal operation.
B5 CHECK SENSOR CIRCUITS FOR SHORT	
1	1 Measure the resistance between thermometer sensor C194-1, circuit 233 (DB/Y), and C194-2, circuit 234 (DB/W).



GK6897-A

2



GK6898-A

2 Measure the resistance between thermometer sensor C194-1, circuit 233 (DB/Y), and ground; and between thermometer sensor C194-2, circuit 234 (DB/W), and ground.

- **Is the resistance greater than 10,000 ohms?**

→ **Yes**
RECONNECT the thermometer sensor. GO to B6 .

→ **No**
REPAIR circuit(s) 233 (DB/Y) and/or 234 (DB/W). TEST the system for normal operation.

B6 CHECK TEMPERATURE ACCURACY

1 Drive the vehicle for three minutes above 56 km/h (35 mph) (sustained).

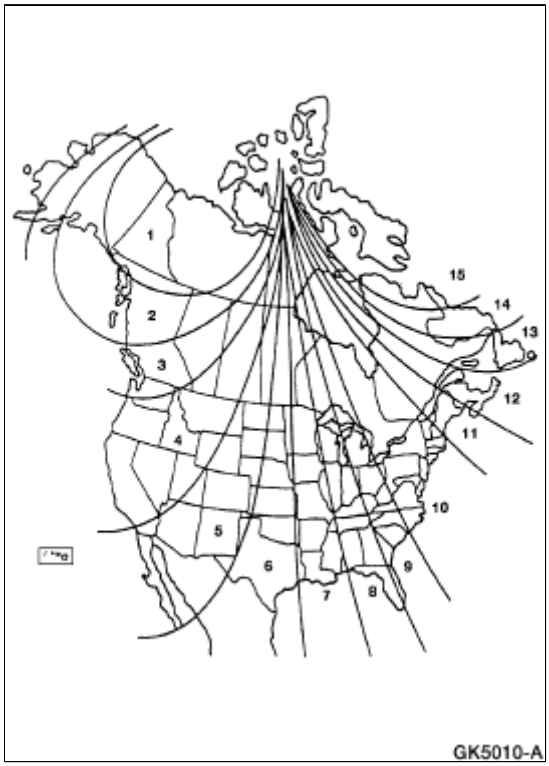
- **Does the display show the proper outside air temperature?**

→ **Yes**
Outside air temperature function is OK.

→ **No**
REPLACE the compass and thermometer. SET the zone; REFER to Compass Zone Adjustment . CALIBRATE the compass; REFER to Calibration Adjustment . TEST the system for normal operation.

Compass Zone Adjustment

1. Determine the zone in which the vehicle is located.



2. Press and hold the MODE button until VAR appears on the display. Release the MODE button.
3. **NOTE:** After a few seconds, the compass will exit the VAR mode if the button is no longer pressed.

   Momentarily press the MODE button to increment the zone by one. Set the zone according to the map.

Calibration Adjustment

1. **NOTE:** For optimum calibration, drive to an open, level location away from large metallic objects or structures. Switch off all non-essential electrical accessories (rear window defrost, heater A/C, map lamps, wipers, etc.) and make sure all doors are closed.

   Start the vehicle.

2. **NOTE:** To exit CAL mode before performing a compass adjustment, turn the ignition switch to the OFF position.

   Locate the electronic compass/temperature display on the overhead console, press and hold the MODE button until CAL appears in the display, then release the MODE button.

3. **NOTE:** If the CAL indicator does not turn off after the vehicle has been driven in a circle no more than five times, demagnetize the vehicle and repeat the procedure.

   Drive the vehicle slowly (less than 5 km/h [3 mph]) in complete circles until CAL disappears from the display.

Vehicle Demagnetizing

CAUTION: During demagnetizing, the demagnetizer coil will be pulled toward the vehicle. Place a cloth over the vehicle roof to protect the vehicle surface if contact occurs. Make sure the cloth covers the front third and the entire width of the roof.

NOTE: The demagnetizing process requires the use of a demagnetizing coil commonly used by television repair technicians to demagnetize television tubes.

NOTE: To demagnetize, use a constant circular motion over the vehicle roof. Do not turn off the demagnetizer while sweeping the vehicle roof to prevent remagnitizing ferrous materials contained in the vehicle.

NOTE: During the demagnetizing process, make sure the phenolic surface of the tool (the side opposite the handle) is closest to the vehicle surface.

1. Demagnetize the front third of the vehicle roof.
    1. Turn on the demagnetizer at least 1 m (3 ft) away from the vehicle.
    2. Holding the demagnetizer no more than 2.5 cm (1 in) from the vehicle roof and starting on the passenger side, demagnetize the front third of the vehicle roof closest to the windshield using a constant circular motion. Keep the circle radius within 30 cm (12 in) while sweeping across the entire surface of the vehicle roof closest to the windshield. Continue the circular motion four times.
    3. After the fourth pass and without stopping, move the demagnetizer at least 1 m (3 ft) away from the vehicle.
    4. Turn the demagnetizer off.

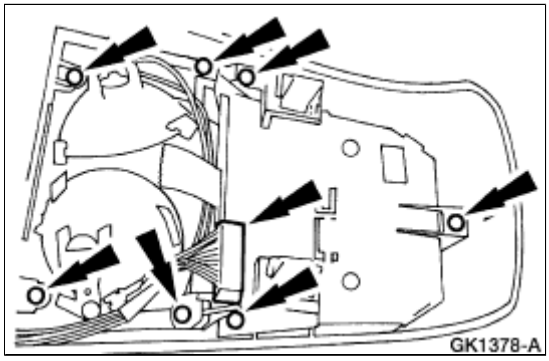
2. Perform the Compass Zone Adjustment procedure; refer to Compass Zone Adjustment .

3. Perform the Compass Calibration Adjustment procedure; refer to Calibration Adjustment .

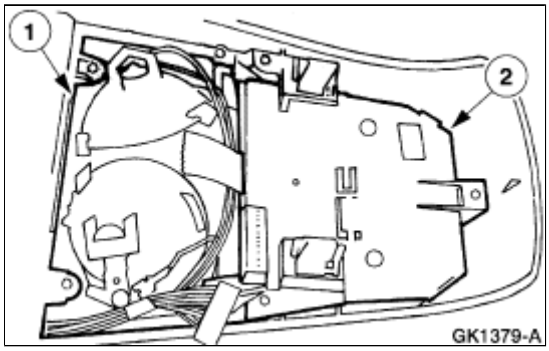
Display

Removal

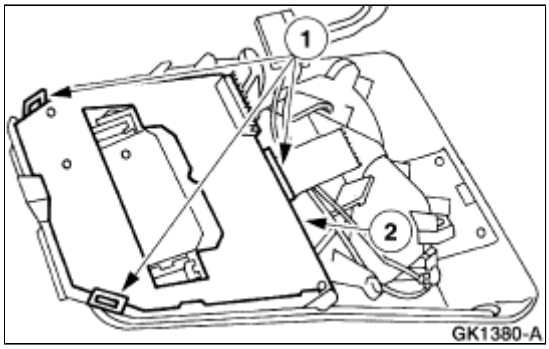
1. Remove the overhead console; refer to Section 501-12 .
2. Remove the screws and disconnect the electrical connector.



3. Remove the compass/lamp bezel from the console housing.
    1. Push the clip.
    2. Remove the compass/lamp bezel from the console housing.



4. Remove the compass and thermometer (19A548).
    1. Push the three locking tabs.
    2. Remove the compass and thermometer.



Installation

1. To install, reverse the removal procedure.