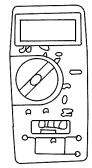
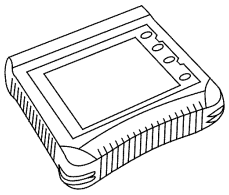
DIAGNOSIS AND TESTING

Gauges And Warning Devices

Refer to Wiring Diagrams Cell 59 for schematic and connector information.
Refer to Wiring Diagrams Cell 60 for schematic and connector information.

Special Tool(s)

 ST1137-A	73III Automotive Meter 105-R0057 or equivalent
 ST2332-A	Worldwide Diagnostic System (WDS) Vehicle Communication Module (VCM) with appropriate adapters, or equivalent diagnostic tool

Principles of Operation

Key-In-Ignition Warning Chime

When the key-in-ignition switch closes, it sends a voltage signal to the instrument cluster, which then sounds a warning chime, provided the ignition key is in and the ignition switch is in the OFF position, and the driver door is open. The instrument cluster sounds a steady tone, which continues until the key is removed, the ignition switch is rotated to the RUN position, or the driver door is closed.

Airbag Warning Chime

The air bag warning chime warns the driver that the air bag warning indicator lamp is not working and a fault has occurred by sounding a chime when the ignition switch is in the RUN position for more than 20 seconds. When these conditions exist, the restraint control module (RCM) sends a chime request through communication network to the instrument cluster. The instrument cluster then activates the warning chime. The warning consists of 5 sets of five 1-second tone bursts. Each set is separated by 5 seconds of silence. The warning is repeated every 30 minutes.

Door/Trunk Ajar Warning Chime

The door/trunk ajar warning chime warns that a door, or the trunk, is not fully closed. The chime sounds when any door or the trunk becomes ajar while the ignition switch is in the RUN position.

Headlamps On Warning Chime

The headlamp chime is activated when the instrument cluster receives the parking lamps ON signal from the smart junction box (SJB), the key is out of the ignition, and the driver door is ajar. The warning consists of repeated one-half second bursts and continues to sound until the exterior lamps are turned off, the driver door is closed, or 10 minutes have elapsed, at which time the battery saver turns the exterior lamps off.

Safety Belt Warning Chime

The safety belt warning chime is activated when the ignition switch is in the RUN position and the restraint control module (RCM) detects an unbuckled driver safety belt. The instrument cluster generates the chime for a duration of 6 seconds or until the safety belt is buckled.

Belt Minder

NOTE: Belt minder is a configurable item. If configuring using a diagnostic tool, refer to Section 418-01. To configure without using a diagnostic tool, refer to Belt Minder Deactivating/Activating in this section.

The belt minder feature supplements the current safety belt warning function. The belt minder feature is enabled after the current safety belt warning is complete. The belt minder reminds the driver that their safety belt is unbuckled by intermittently sounding a chime and illuminating the safety belt warning lamp in the instrument cluster once the vehicle speed has exceeded 5 km/h (3 mph). While activated, the belt minder alternates the chime and indicator from ON for 6 seconds, to OFF for 30 seconds.

The belt minder reminder stops when:

- the driver or passenger safety belt is buckled.
- the ignition switch is turned to the OFF or ACC position.
- 5 minutes have elapsed since belt minder has started.

DIAGNOSIS AND TESTING (Continued)

Message Center Warning Chime

The message center warning chime accompanies any initial warning message display, as well as any repeated initial warning message. As the message center is an integral part of the instrument cluster, the interaction between the message center and the chime function is also integral to the instrument cluster.

The message center switch tone sounds when any switch on the message center is pressed. The message center switches are supplied with a voltage reference signal from the instrument cluster. When a switch is pressed, it routes the signal through a specific resistor in the switch assembly and then to ground. For additional information, refer to Section 413-08.

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
• Safety belt switch (part of the buckle) • Key-in-ignition warning switch (part of the ignition lock cylinder) • Headlamp switch • Door ajar switch(es) • Trunk ajar switch • Message center switches	• Circuitry • Restraint control module (RCM) • Smart junction box (SJB) • Instrument cluster

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 cause is not visually evident, connect the diagnostic tool to the data link connector (DLC) 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 operating manual.
6. Carry out the diagnostic tool data link test. If the diagnostic tool responds with:
   - CAN circuits fault; all electronic control units no response/not equipped, refer to Section 418-00.
   - No response/not equipped for the SJB, refer to Section 419-10.
   - No response/not equipped for the instrument cluster, refer to Section 413-01.
   - System passed, retrieve and record the continuous diagnostic trouble codes (DTCs), erase the continuous DTCs, and carry out the self-test diagnostics for the instrument cluster.
7. If the DTCs retrieved are related to the concern, go to the Instrument Cluster Diagnostic Trouble Code (DTC) Index.
8. If no DTCs related to the concern are retrieved, GO to Symptom Chart.

Instrument Cluster Diagnostic Trouble Code (DTC) Index

DTC	Description	Source	Action
B1353	Ignition Key-In Circuit Open	Instrument Cluster	GO to Pinpoint Test A.
B236A	Chime Output Circuit Open	Instrument Cluster	INSTALL a new instrument cluster. REFER to Section 413-01. TEST the system for normal operation.

DIAGNOSIS AND TESTING (Continued)

Instrument Cluster Diagnostic Trouble Code (DTC) Index (Continued)

DTC	Description	Source	Action
B2903	Chime Output Circuit Short to Battery	Instrument Cluster	INSTALL a new instrument cluster. REFER to Section 413-01. TEST the system for normal operation.
B2940	Chime Output Circuit Short to Ground	Instrument Cluster	INSTALL a new instrument cluster. REFER to Section 413-01. TEST the system for normal operation.

For a complete master list of instrument cluster DTCs, refer to Section 419-10.

Symptom Chart

Symptom Chart

Condition	Possible Sources	Action
• The safety belt warning chime is inoperative	• Driver safety belt switch • Instrument cluster • Restraint control module (RCM)	• CHECK the safety belt warning indicator operation. — If the safety belt warning indicator operates correctly, INSTALL a new instrument cluster. REFER to Section 413-01. — If the safety belt warning indicator does not operate correctly, REFER to Section 413-01 to continue diagnosis of the safety belt warning indicator.
• The belt minder feature does not operate correctly	• Belt minder deactivated • Safety belt switch • Restraint control module (RCM) • Instrument cluster	• ACTIVATE the belt minder feature. • CHECK the safety belt warning indicator operation. — If the safety belt warning indicator operates correctly, INSTALL a new instrument cluster. REFER to Section 413-01. — If the safety belt warning indicator does not operate correctly, REFER to Section 413-01 to continue diagnosis of the safety belt warning indicator.

DIAGNOSIS AND TESTING (Continued)

Symptom Chart (Continued)

Condition	Possible Sources	Action
• The key-in-ignition chime is inoperative	• Circuitry • Key-in-ignition switch (part of the ignition switch) • Instrument cluster	• GO to Pinpoint Test A.
• All the chimes are inoperative	• Instrument cluster • Smart junction box (SJB)	• CONNECT the diagnostic tool. SELECT the instrument cluster warning lamps and chime active command and trigger the chimes on. — If the chimes do not sound, INSTALL a new instrument cluster. REFER to Section 413-01. TEST the system for normal operation. — If the chimes sound, INSTALL a new SJB. REFER to Section 419-10. TEST the system for normal operation.
• The headlamp on reminder chime is inoperative	• Instrument cluster	• CHECK the operation of the key-in-ignition warning chime. — If the key-in-ignition warning chime operates correctly, INSTALL a new instrument cluster. REFER to Section 413-01. TEST the system for normal operation. — If the key-in-ignition warning chime does not operate correctly, GO to Pinpoint Test A.
• The chime sounds when the driver door is ajar (no key in the ignition and the headlamps are off)	• Circuitry • Key-in-ignition switch (part of the ignition switch) • Instrument cluster	• GO to Pinpoint Test B.

DIAGNOSIS AND TESTING (Continued)

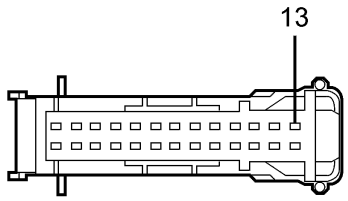
Symptom Chart (Continued)

Condition	Possible Sources	Action
• The air bag warning chime does not operate correctly	• Restraint control module (RCM) • Instrument cluster	• CHECK the operation of the safety belt and air bag warning indicators. — If the safety belt and air bag warning indicators operate correctly, INSTALL a new instrument cluster. REFER to Section 413-01. TEST the system for normal operation. — If the safety belt and air bag warning indicators do not operate correctly, REFER to Section 413-01 to continue diagnosis of the warning indicators.
• The message center warning chime is inoperative	• Instrument cluster	• CONNECT the diagnostic tool. SELECT the instrument cluster warning lamps and chime active command and trigger the chimes on. — If the chimes do not sound, INSTALL a new instrument cluster. REFER to Section 413-01. TEST the system for normal operation. — If the chimes sound, the system is operating correctly at this time.
• The message center switch tone is inoperative	• Instrument cluster	• CHECK the operation of the message center switches. — If the message center switches operate correctly, INSTALL a new instrument cluster. REFER to Section 413-01. TEST the system for normal operation. — If the message center switches do not operate correctly, REFER to Section 413-08 to continue diagnosis of the message center switches.

DIAGNOSIS AND TESTING (Continued)

Connector Circuit Reference

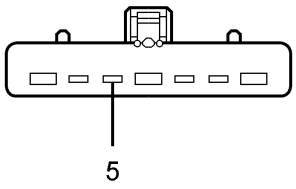
Instrument Cluster C220



N0012128

Pin Number(s)	Circuit Designation/Description	Normal Condition/Measurement
13	1414 (LG/VT) key-in-ignition switch input	0 volts with the ignition key removed from the ignition lock cylinder, greater than 10 volts with the ignition key inserted into the ignition lock cylinder. Less than 5 ohms between the instrument cluster and the ignition switch.

Ignition Switch C250



N0012129

Pin Number(s)	Circuit Designation/Description	Normal Condition/Measurement
5	1414 (LG/VT) key-in-ignition switch input	0 volts, less than 5 ohms between the ignition switch and the instrument cluster.

Pinpoint Test A: The Key-In-Ignition Chime Is Inoperative

Normal Operation

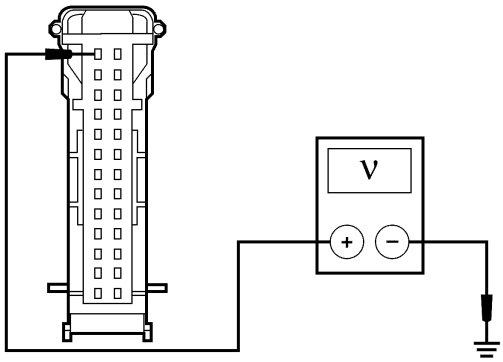
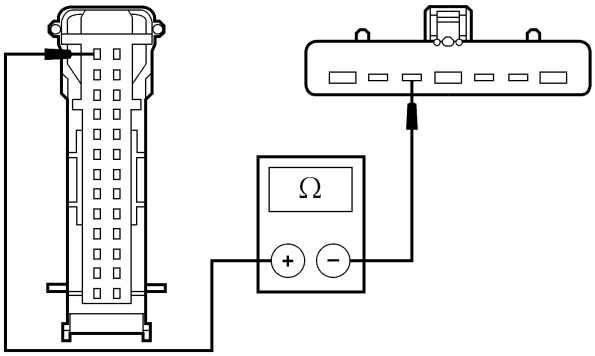
When the key is inserted into the ignition lock cylinder, the key-in-ignition switch (part of the ignition switch) closes and routes a voltage signal to the instrument cluster through circuit 1414 (LG/VT). The voltage signal indicates to the instrument cluster the key is inserted into the ignition lock cylinder. If the instrument cluster detects that the ignition switch is in the OFF or ACC position with the key inserted in the ignition lock cylinder and the driver door is ajar, the key-in-ignition warning chime (located in the instrument cluster) sounds.

Possible Causes

- circuit 1414 (LG/VT) open
- key-in-ignition switch (part of the ignition switch)
- instrument cluster

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: THE KEY-IN-IGNITION CHIME IS INOPERATIVE

Test Step		Result / Action to Take
A1	**CHECK FOR DRIVER DOOR AJAR INPUT TO THE SMART JUNCTION BOX (SJB)**	
	• Check the operation of the interior lamps while opening and closing the driver door. • **Do the interior lamps operate correctly?**	**Yes** GO to **A2**. **No** REFER to Section 417-02 to continue diagnosis of the interior lamps.
A2	**CHECK THE INPUT TO THE INSTRUMENT CLUSTER FOR DTC B1353**	
	• Key in OFF position. • Disconnect: Instrument Cluster C220. • Insert the ignition key into the ignition lock cylinder. • Measure the voltage between the instrument cluster C220-13, circuit 1414 (LG/VT), harness side and ground.  N0012126 • **Is the voltage greater than 10 volts?**	**Yes** GO to **A4**. **No** GO to **A3**.
A3	**CHECK CIRCUIT 1414 (LG/VT) FOR AN OPEN**	
	• Disconnect: Ignition Switch C250. • Measure the resistance between the instrument cluster C220-13, circuit 1414 (LG/VT), harness side and the ignition switch C250-5, circuit 1414 (LG/VT), harness side.  N0012127 • **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new ignition lock cylinder. REFER to Section 501-14. CLEAR the DTCs. REPEAT the self-test. **No** REPAIR the circuit. CLEAR the DTCs. REPEAT the self-test.
A4	**CHECK FOR CORRECT INSTRUMENT CLUSTER OPERATION**	

	• Disconnect the instrument cluster connector.
	• Check for:
	  • corrosion
	  • pushed-out pins
	• Connect the instrument cluster connector and make sure it seats correctly.
	• Operate the system and verify the concern is still present.
	• **Is the concern still present?**
		Yes
		INSTALL a new instrument cluster. REFER to Section 413-01. TEST the system for normal operation.
		No
		The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. CLEAR the DTCs. REPEAT the self-test.

DIAGNOSIS AND TESTING (Continued)

Pinpoint Test B: The Chime Sounds When The Driver Door Is Ajar (No Key In The Ignition And The Headlamps Are Off)

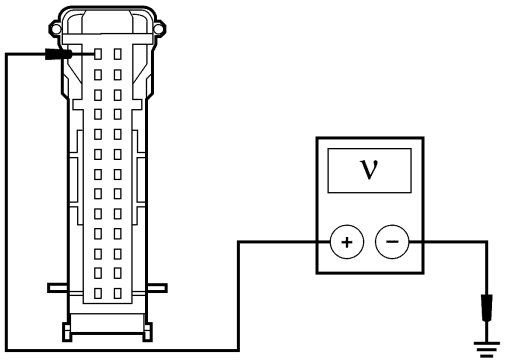
Normal Operation

When the key is inserted into the ignition lock cylinder, the key-in-ignition switch (part of the ignition switch) closes and routes a voltage signal to the instrument cluster through circuit 1414 (LG/VT). The voltage signal indicates to the instrument cluster the key is inserted into the ignition lock cylinder. If the instrument cluster detects that the ignition switch is in the OFF or ACC position with the key inserted in the ignition lock cylinder and the driver door is ajar, the key-in-ignition warning chime (located in the instrument cluster) sounds.

Possible Causes

- circuit 1414 (LG/VT) short to voltage
- key-in-ignition switch (part of the ignition switch)
- instrument cluster

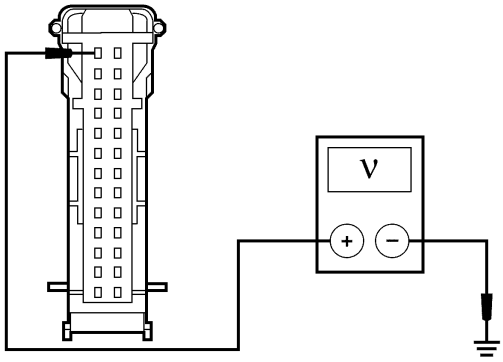
PINPOINT TEST B: THE CHIME SOUNDS WHEN THE DRIVER DOOR IS AJAR (NO KEY IN THE IGNITION AND THE HEADLAMPS ARE OFF)

Test Step		Result / Action to Take
B1	**CHECK THE INSTRUMENT CLUSTER ILLUMINATION**	
	• Check the operation of the instrument cluster illumination. • **Does the instrument cluster illumination operate correctly?**	**Yes** GO to **B2**. **No** REFER to Section 413-00 to continue diagnosis of the instrument cluster illumination.
B2	**CHECK THE INPUT TO THE INSTRUMENT CLUSTER**	
	• Key in OFF position. • Disconnect: Instrument Cluster C220. • Remove the ignition key from the ignition lock cylinder. • Measure the voltage between the instrument cluster C220-13, circuit 1414 (LG/VT), harness side and ground.  N0012126 • **Is any voltage present?**	**Yes** GO to **B3**. **No** GO to **B4**.
B3	**CHECK CIRCUIT 1414 (LG/VT) FOR A SHORT TO VOLTAGE**	
	• Disconnect: Ignition Switch C250.	

(Continued)

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: THE CHIME SOUNDS WHEN THE DRIVER DOOR IS AJAR (NO KEY IN THE IGNITION AND THE HEADLAMPS ARE OFF) (Continued)

Test Step		Result / Action to Take
B3	**CHECK CIRCUIT 1414 (LG/VT) FOR A SHORT TO VOLTAGE (Continued)**	
	• Measure the voltage between the instrument cluster C220-13, circuit 1414 (LG/VT), harness side and ground.  N0012126 • **Is any voltage present?**	**Yes** REPAIR the circuit. TEST the system for normal operation. **No** INSTALL a new ignition switch. REFER to Section 211-05. TEST the system for normal operation.
B4	**CHECK FOR CORRECT INSTRUMENT CLUSTER OPERATION**	

	• Disconnect the instrument cluster connector.
	• Check for:
	  • corrosion
	  • pushed-out pins
	• Connect the instrument cluster connector and make sure it seats correctly.
	• Operate the system and verify the concern is still present.
	• **Is the concern still present?**
		Yes
		INSTALL a new instrument cluster. REFER to Section 413-01. TEST the system for normal operation.
		No
		The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.