SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Center Stack Trim Panel	2 N.m	18 lb in
Closeout Panels to Center Stack	2 N.m	18 lb in
Cluster Trim Panel Screws	2 N.m	18 lb in
Console Extension Trim Bezel Screws	2 N.m	18 lb in
Data Link Connectors (DLC) Screws	2 N.m	18 lb in
DIC and Power Outlet Bracket Screws	1.6 N.m	14 lb in
Driver Side Kick Panel Screws	2 N.m	18 lb in
Floor Console Bracket Bolts	9 N.m	80 lb in
Floor Console End Panel Screws	1.6 N.m	14 lb in
Floor Console Top Panel Screws	2 N.m	18 lb in
HVAC Control Module to Center Stack	2 N.m	18 lb in
Instrument Panel Assembly to Carrier Support Screws	9 N.m	80 lb in
Instrument Panel Carrier Side Bolts	50 N.m	37 lb ft
Instrument Panel Upper Trim Pad Retaining Screws	2 N.m	18 lb in
Knee Bolster Screws	2 N.m	18 lb in
Onstar Module to Center Stack	2 N.m	18 lb in
Passenger Side Air Bag (PSIR) Bolts	2 N.m	18 lb in
Radio to Center Stack	2 N.m	18 lb in
Shift Handle Mounting Screw	1.6 N.m	14 lb in
Substraight to Frame Bolts	9 N.m	80 lb in
Subwoofer to Base Units	2 N.m	18 lb in
Traction Control Module to Center Stack	2 N.m	18 lb in

FUEL LEVEL SPECIFICATIONS

The information in this table is intended for use with the **J 33431-C** Signal Generator and Instrument Panel Tester. See **Special Tools and Equipment** . The fuel level sensor values represent the test values to be used on the Signal Generator to drive the fuel gauge display to the indicated positions. Vehicles that require more than one fuel level sensor calculate gauge position from many possible resistance combinations of fuel levels between the two tanks. Therefore, the values in the table may not correlate directly to readings taken from the vehicle primary or secondary sending units.

The values in the table are approximate values based on information obtained from properly operating vehicles. Actual results may vary slightly.

Fuel Level Specifications

Fuel Gauge Display	Resistance	Sender Voltage	Fuel Level
E	225-240 ohm	2.5 V	0-13%
1/4	185-220 ohm	2.3 V	20-30%
1/2	135-165 ohm	1.9 V	45-50%
3/4	83-110 ohm	1.4 V	73-83%
F	50-62 ohm	0.9 V	88-100%
Low Fuel Indicator On	220-232 ohm	2.4 V	0-13%

SCHEMATIC AND ROUTING DIAGRAMS

INSTRUMENT PANEL, GAUGES, AND CONSOLE SCHEMATIC ICONS

Instrument Panel, Gauges, and Console Schematic Icons

Icon	Icon Definition
	**CAUTION:** **When performing service on or near the SIR components or the SIR wiring, the SIR system must be disabled. Refer to SIR Disabling and Enabling Zones. Failure to observe the correct procedure could cause deployment of the SIR components, personal injury, or unnecessary SIR system repairs.**

INSTRUMENT CLUSTER SCHEMATICS

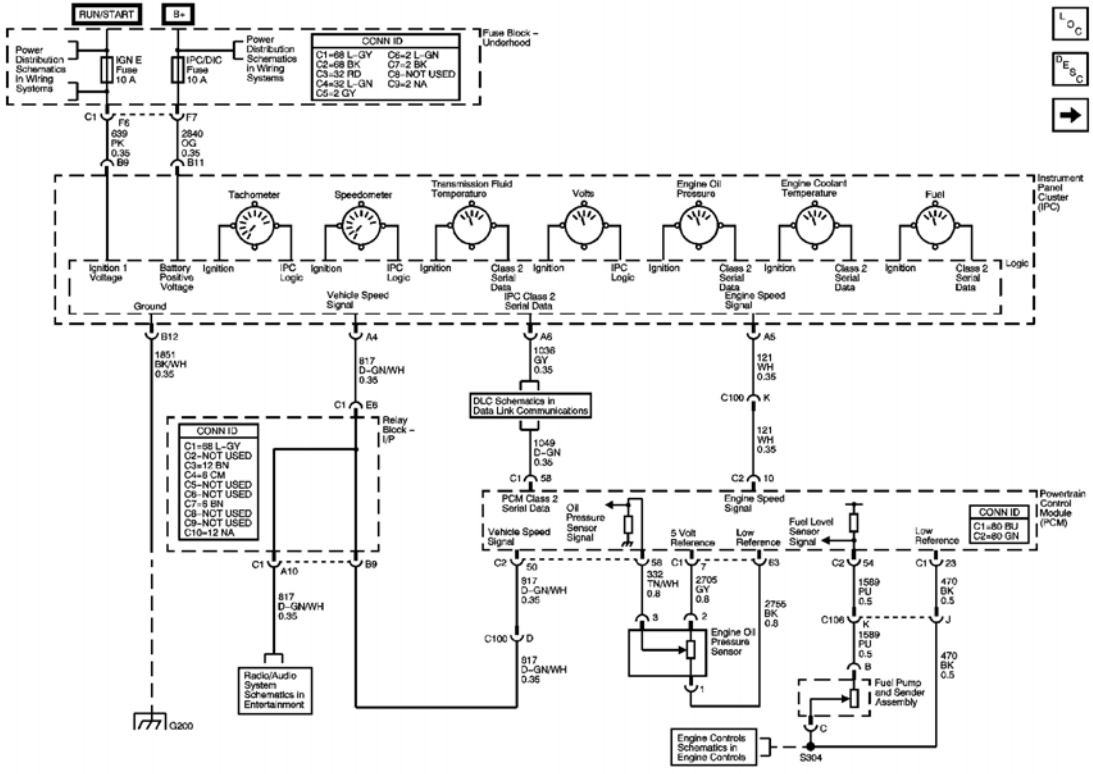


Fig. 1: Power, Grounding, DLC, Sensors, and Gauges
Courtesy of GENERAL MOTORS CORP.

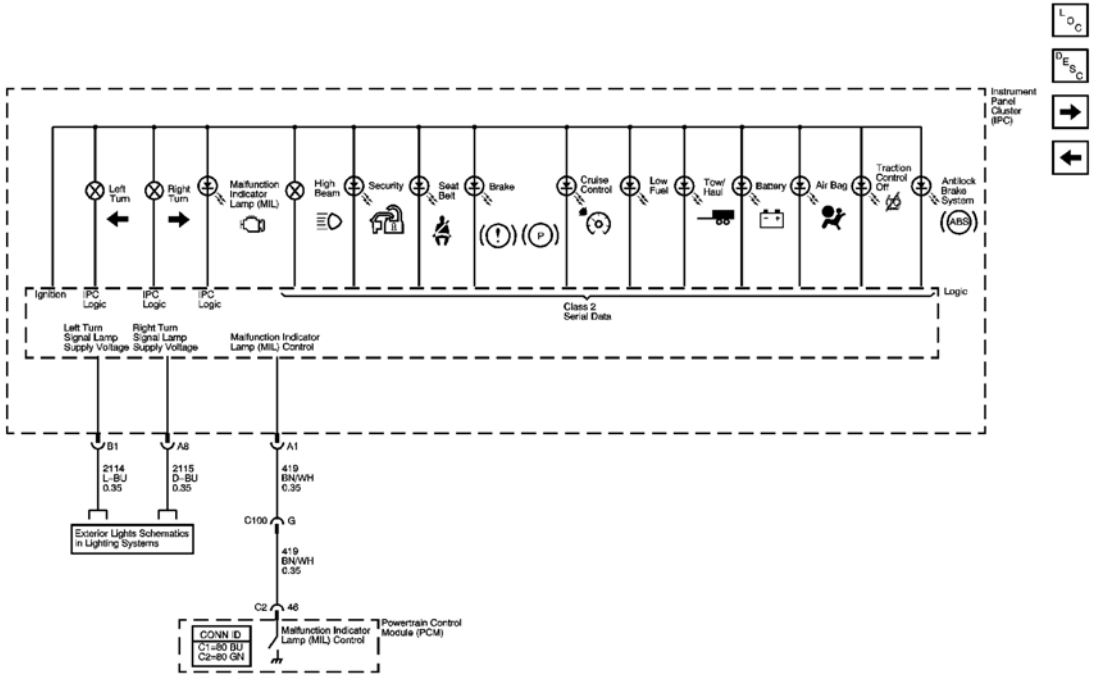


Fig. 2: Indicators
Courtesy of GENERAL MOTORS CORP.

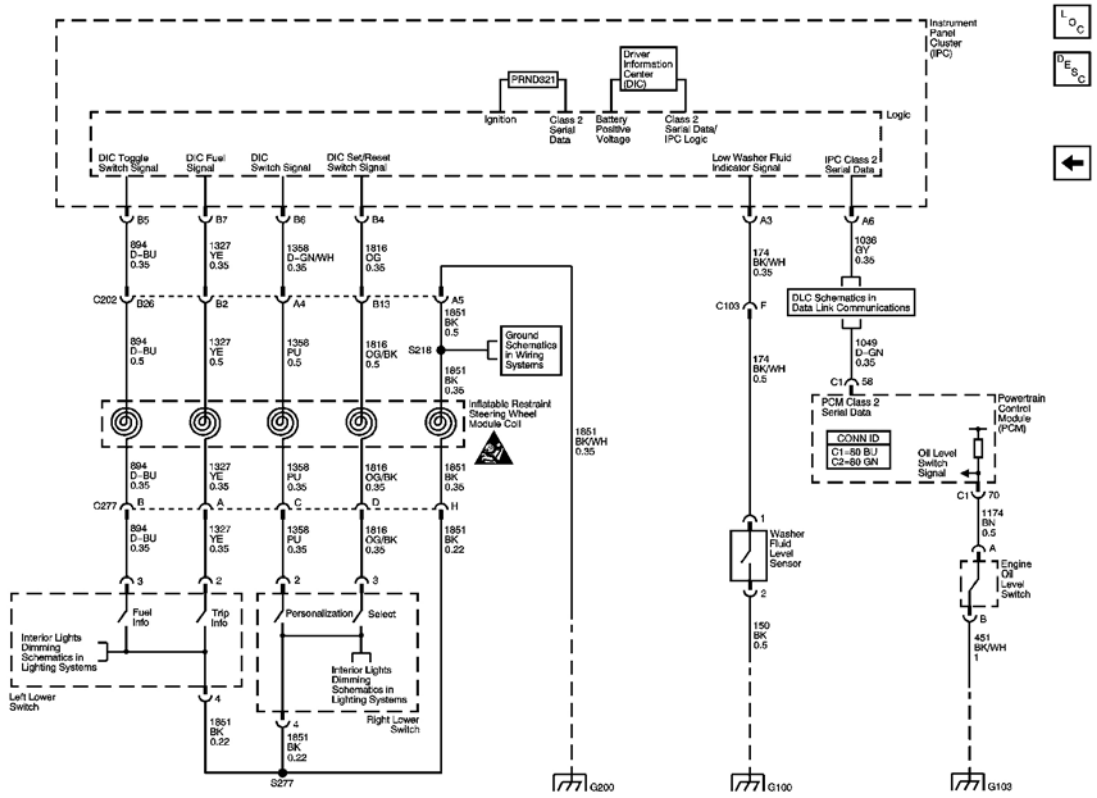


Fig. 3: Displays and Personalization Controls
Courtesy of GENERAL MOTORS CORP.

AUDIBLE WARNINGS SCHEMATICS

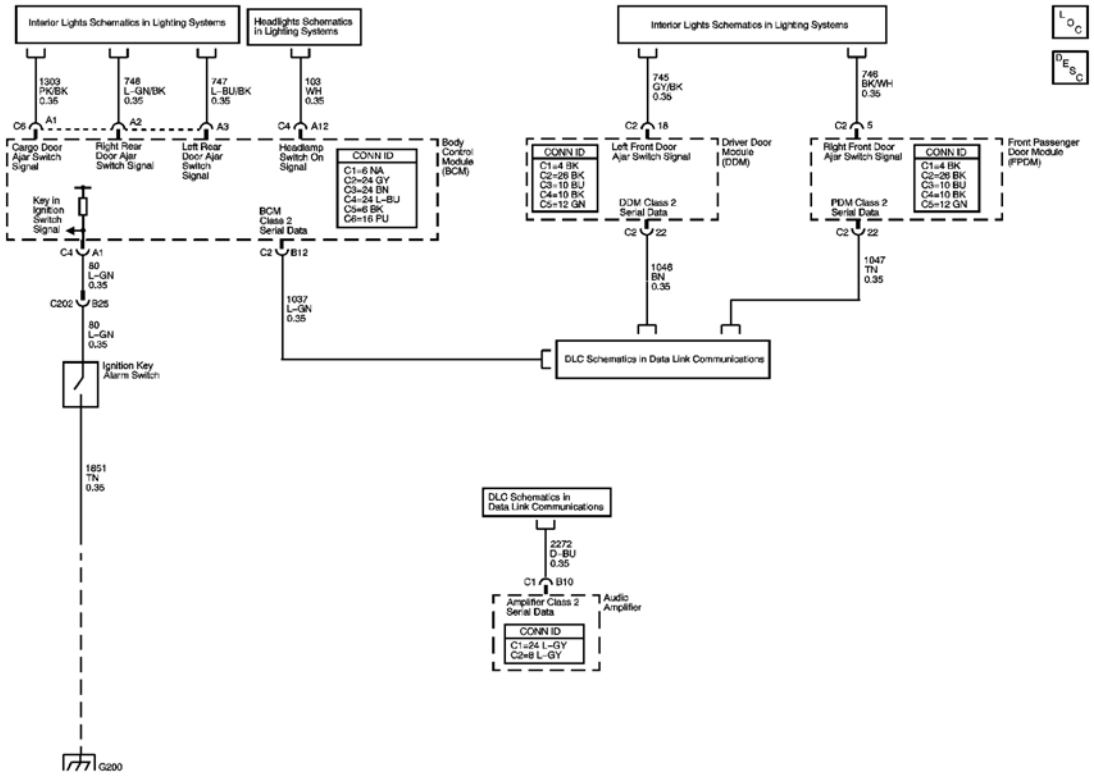


Fig. 4: Audible Warnings
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

INSTRUMENT PANEL, GAUGES, AND CONSOLE COMPONENT VIEWS

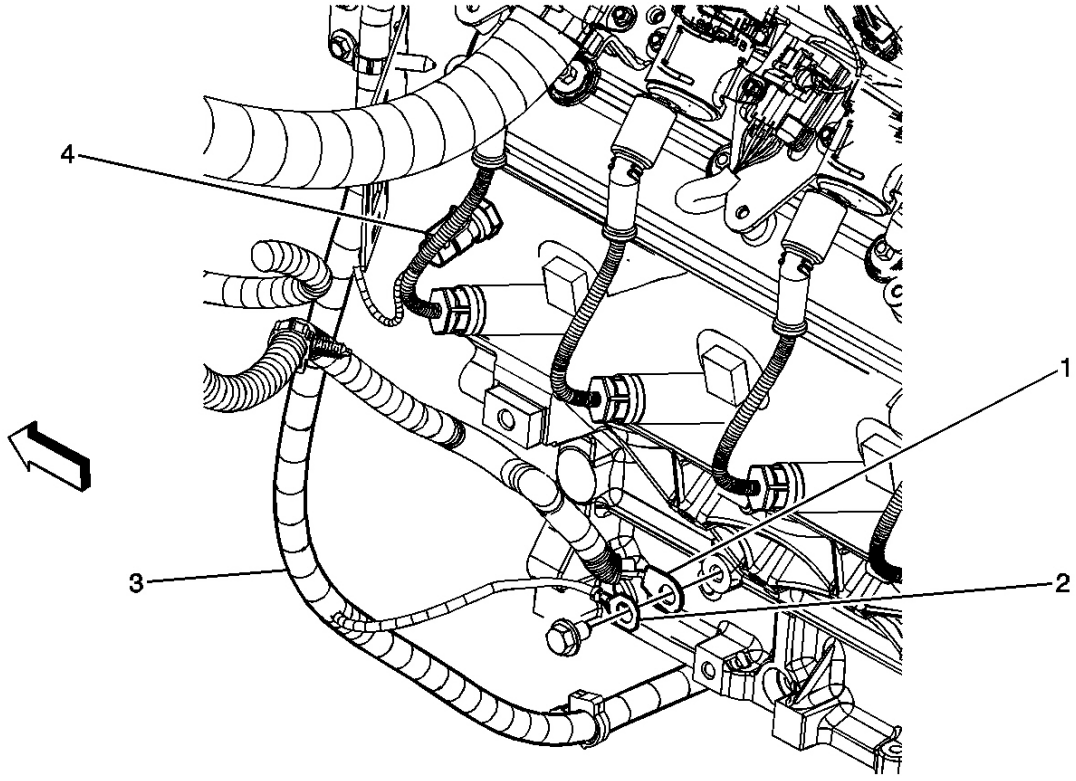


Fig. 5: Left Side Of Engine Component Views
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	G105 - Negative Battery Cable
2	G105 - Engine Harness Ground
3	Engine Harness
4	Engine Coolant Temperature (ECT) Sensor

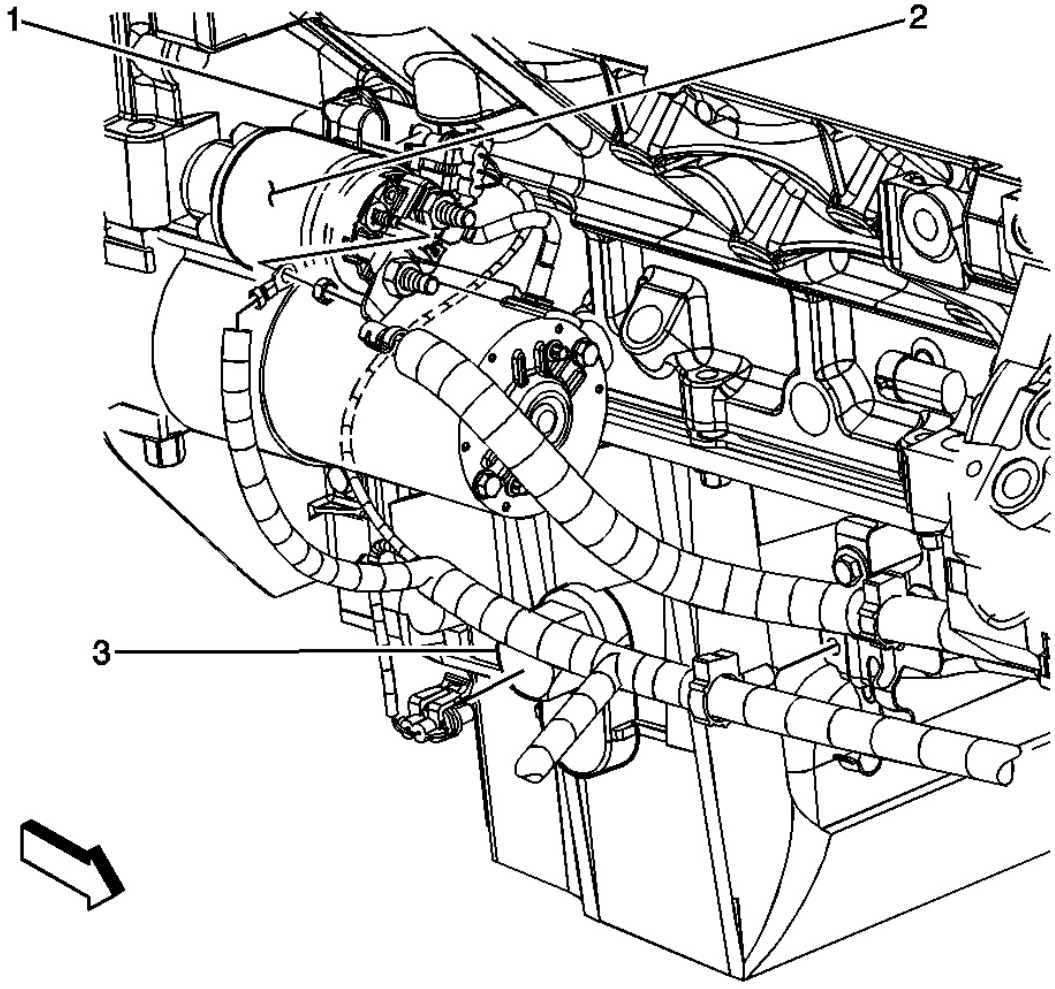


Fig. 6: Lower Right Side Of Engine Component Views
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	Crankshaft Position (CKP) Sensor Connector
2	Starter Motor
3	Engine Oil Level Switch

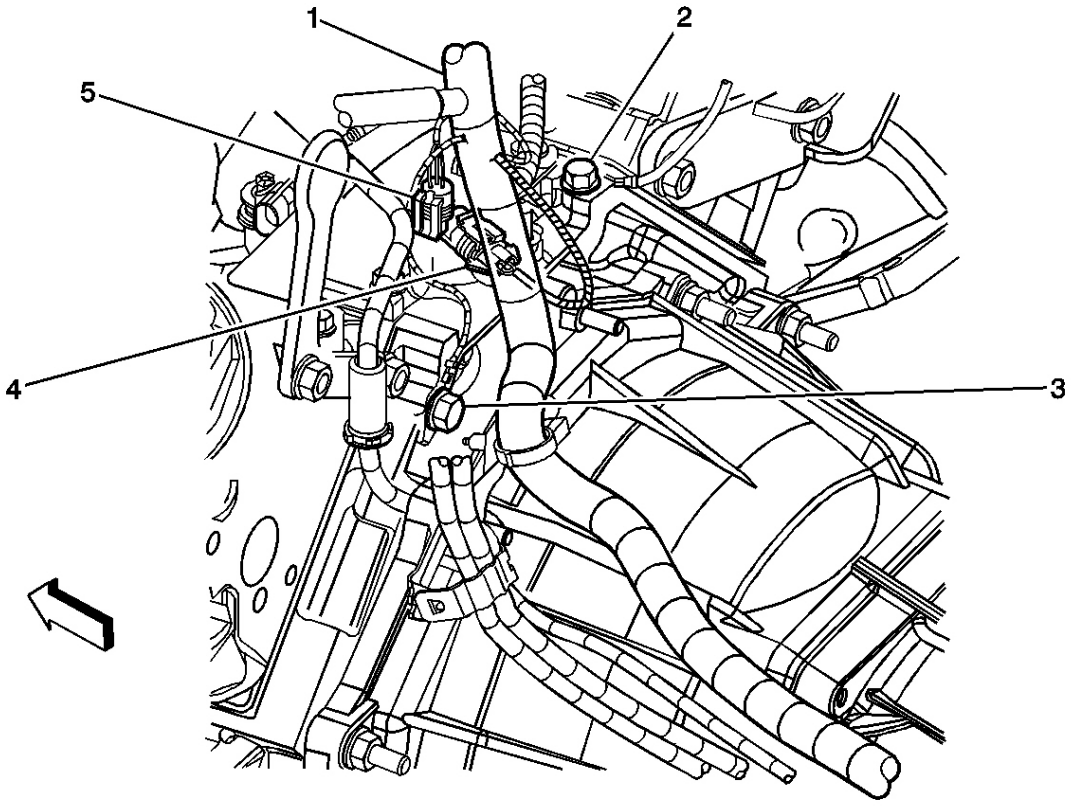


Fig. 7: Upper Rear Of Engine Component Views
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
1	Engine Harness
2	G103 - Engine Harness Ground
3	G104
4	Camshaft Position (CMP) Sensor Connector
5	Engine Oil Pressure (EOP) Sensor Connector

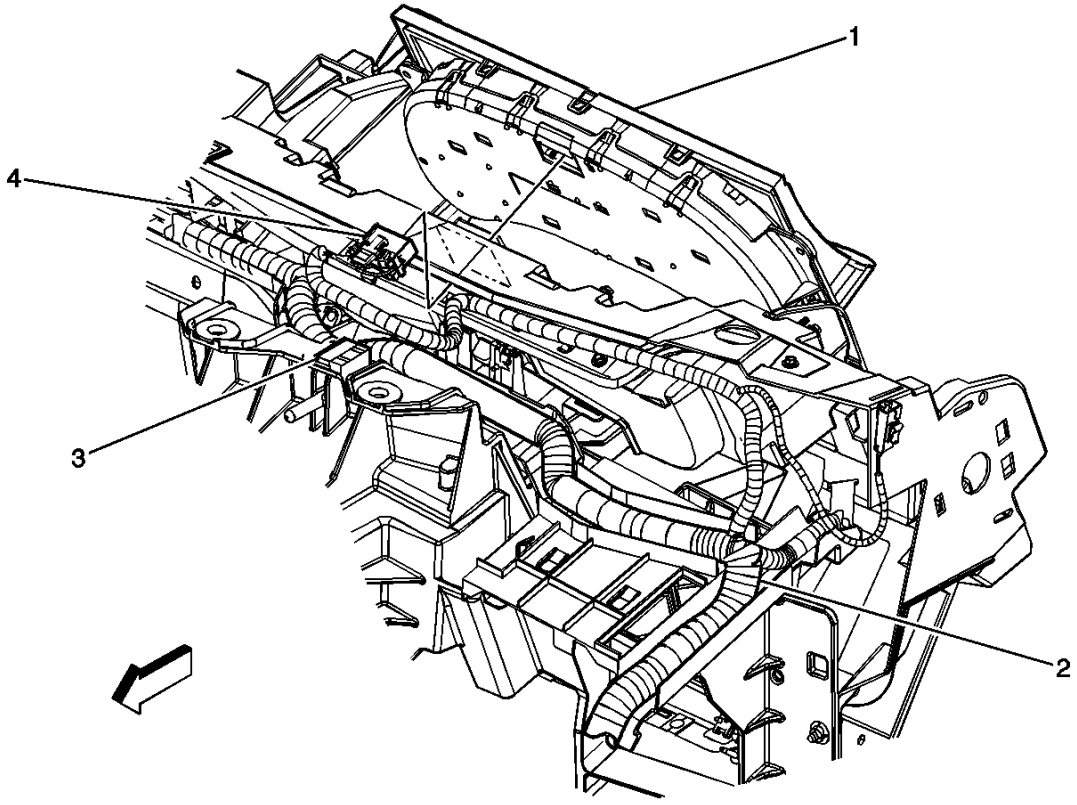


Fig. 8: Upper Left Of I/P Component Views
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 8

Callout	Component Name
1	Instrument Panel Cluster (IPC)
2	I/P Harness
3	C210 - I/P Harness Side
4	IPC Connector

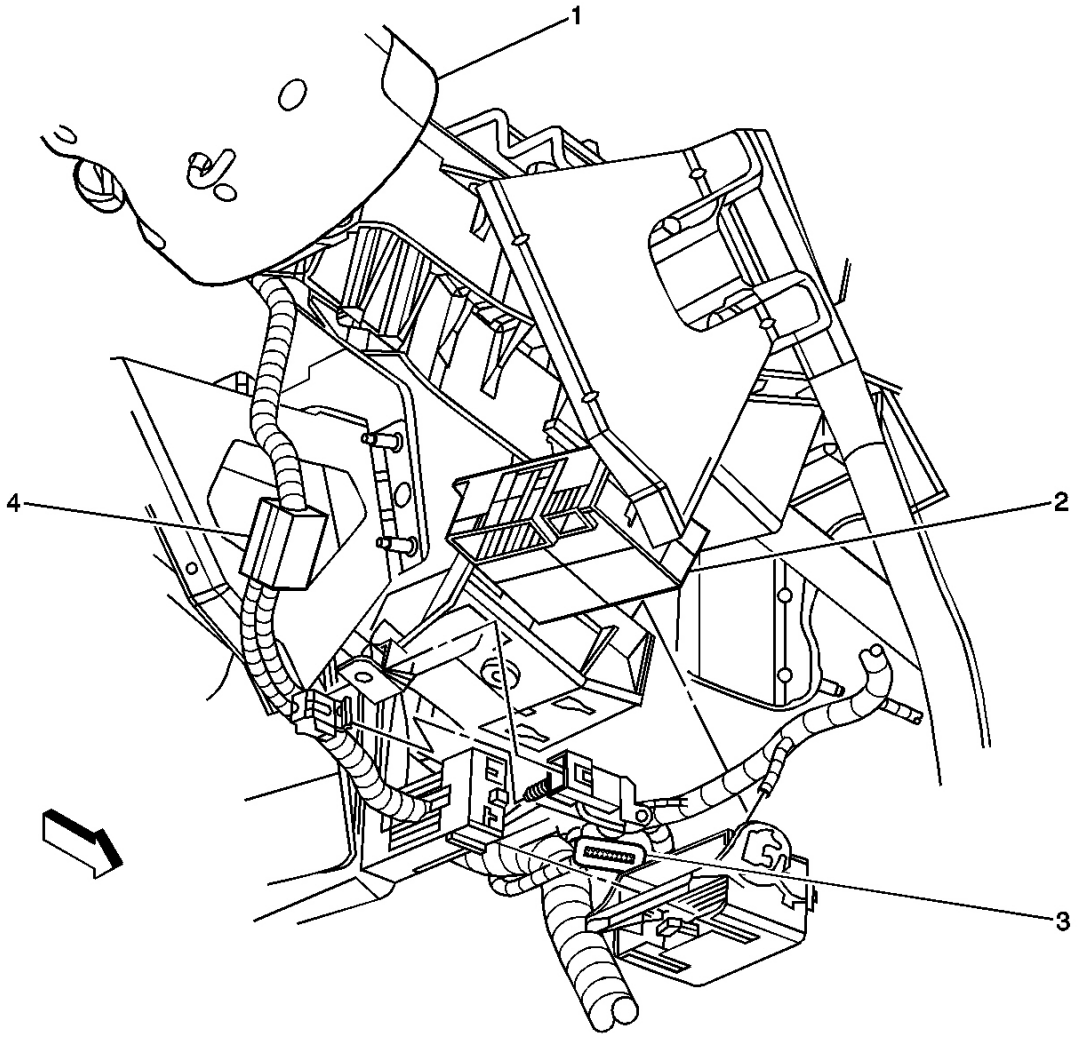


Fig. 9: Splice Pack SP206 Component Views
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 9

Callout	Component Name
1	Steering Column
2	Transfer Case Shift Control Module
3	Splice Pack SP206
4	Steering Wheel Controls Backlight Fuse

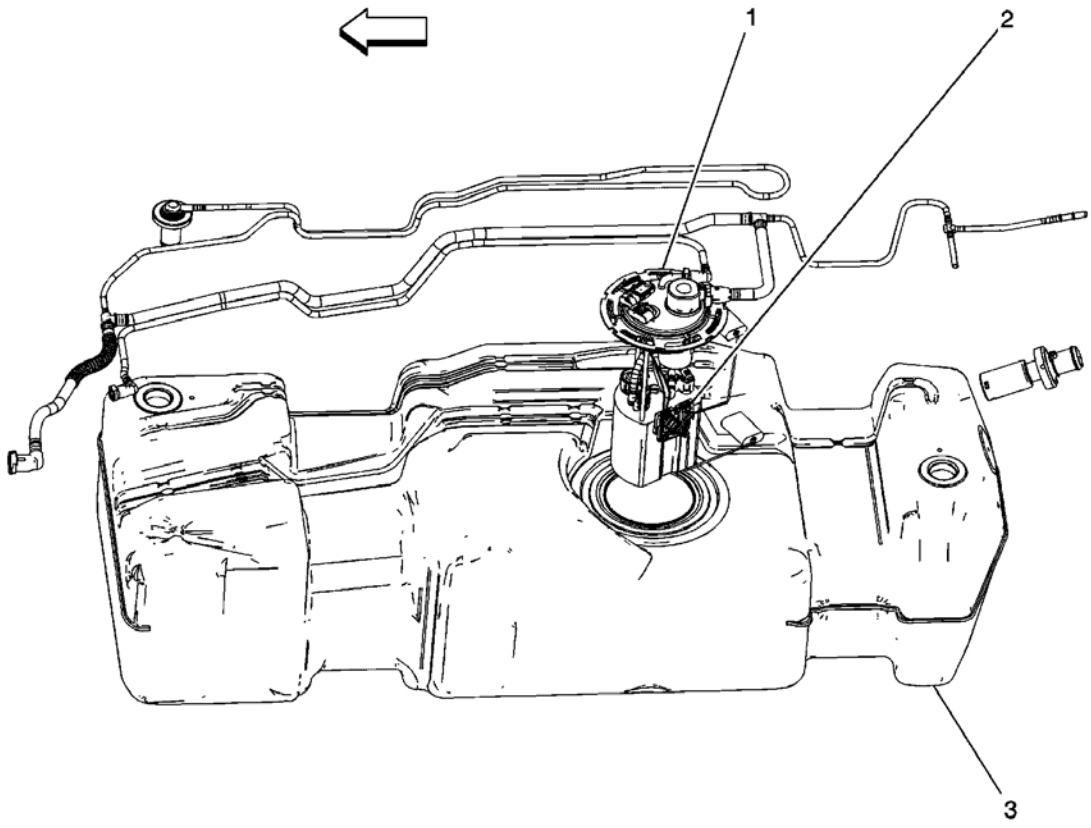


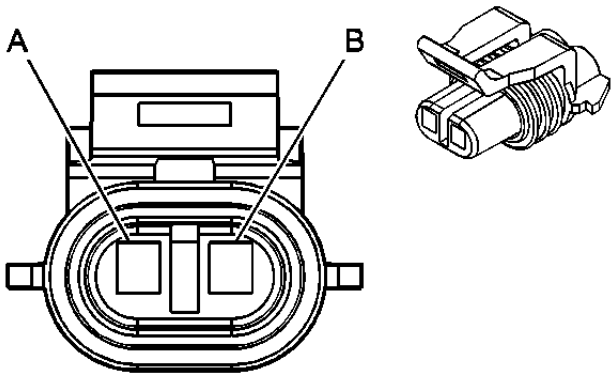
Fig. 10: Fuel Level Sensor Component Views
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 10

Callout	Component Name
1	Fuel Pump and Sender Assembly
2	Fuel Level Sensor
3	Fuel Tank

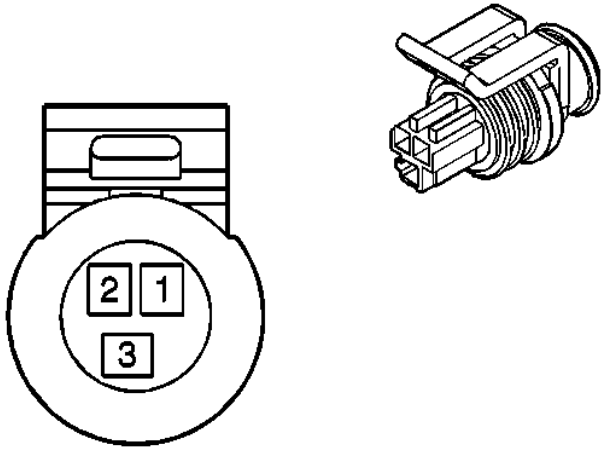
INSTRUMENT PANEL, GAUGES, AND CONSOLE CONNECTOR END VIEWS

Engine Oil Level Terminal Identification Switch



Connector Part Information		• 12052641 • 2-Way F Metri-Pack 150 Series (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	BN	1174	Oil Level Switch Signal
B	BK/WH	451	Ground

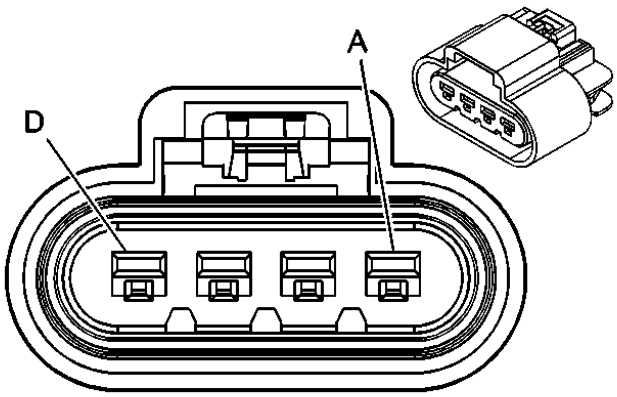
Engine Oil Pressure (EOP) Terminal Identification Sensor



Connector Part Information		• 15344137 • 3-Way F GT 150 Sealed 5.2 (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	BK	2755	Oil Pressure Sensor Low Reference
2	GY	2705	Oil Pressure Sensor 5-Volt Reference

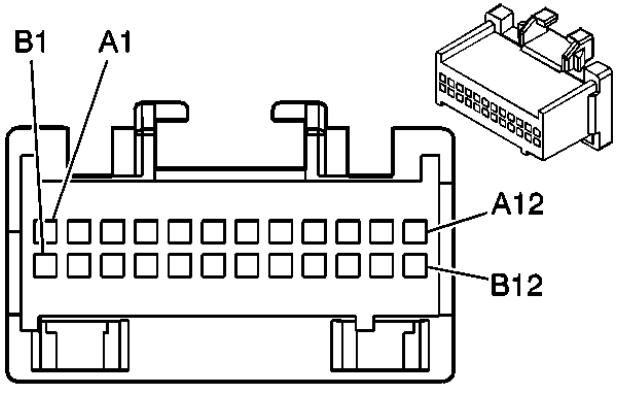
3	TN/WH	332	Oil Pressure Sensor Signal

Fuel Pump and Sender Terminal Identification Assembly



Connector Part Information	• 15326631 • 4-Way F GT 280 Sealed 5.8 (BK)		
Pin	**Wire Color**	**Circuit No.**	**Function**
A	BK	2150	Ground
B	PU	1589	Fuel Level Sensor Signal
C	BK	470	Low Reference
D	GY	120	Fuel Pump Supply Voltage

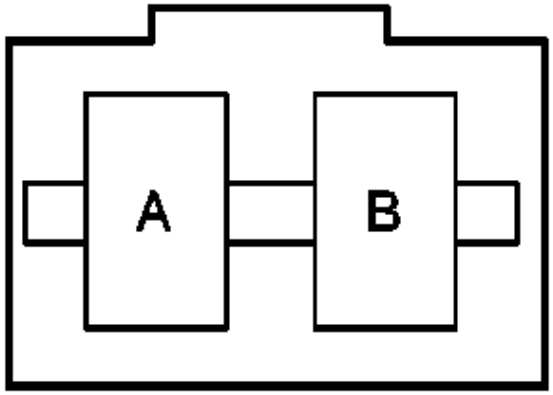
Instrument Panel Cluster (IPC) Terminal Identification



Connector Part Information	• 12110088 • 24-Way F Micro-Pack 100 Series (GY)

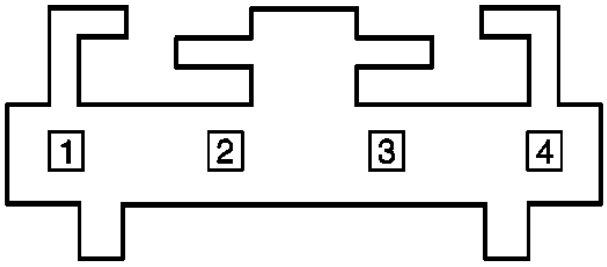
Pin	Wire Color	Circuit No.	Function
A1	BN/WH	419	MIL Control
A2	-	-	Wait to Start
A3	BK/WH	174	Low Washer Fluid Indicator Signal
A4	D-GN/WH	817	Vehicle Speed Signal
A5	WH	121	Engine Speed Signal
A6	GY	1036	IPC Class 2 Serial Data
A7	-	-	IPC Class 2 Serial Data
A8	D-BU	2115	Right Turn Signal Lamps Supply Voltage
A9	-	-	SBA Signal
A10	-	-	Park Switch Input
A11	RD	2353	Instrument Panel Lamps Dimming Supply Voltage
A12	BK	1050	Ground
B1	L-BU	2114	Left Turn Signal Lamps Supply Voltage
B2-B3	-	-	Not Used
B4	OG	1816	DIC Select Switch Signal
B5	D-BU	894	DIC Trip Info Switch Signal
B6	D-GN/WH	1358	DIC Personalization Switch Signal
B7	YE	1327	DIC Fuel Info Switch Signal
B8	-	-	Not Used
B9	PK	639	Ignition 1 Voltage
B10	-	-	Not Used
B11	OG	2840	Battery Positive Voltage
B12	BK/WH	1851	Ground

Steering Wheel Controls Backlight Terminal Identification Fuse



Connector Part Information		• 12010105 • 2-Way F Fuse Holder (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
A	BN/WH	230	Steering Wheel Controls Lamps Dimming Control
B	BN/WH	230	Steering Wheel Controls Lamps Dimming Control

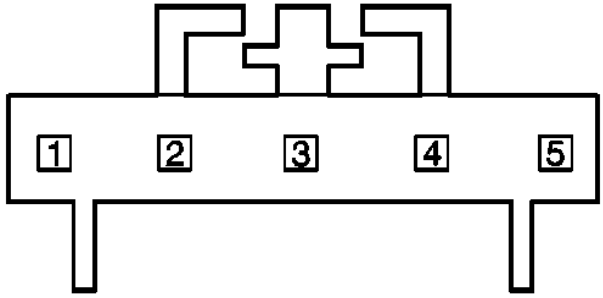
Steering Wheel Controls Terminal Identification - Left Lower (Fuel/Trip)



Connector Part Information		• 50579404 • 4-Way F Molex (BLK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	BN	230	Steering Wheel Switch Dimming Control
2	YE	1327	DIC Fuel Signal
3	D-BU	894	DIC Toggle Switch Signal

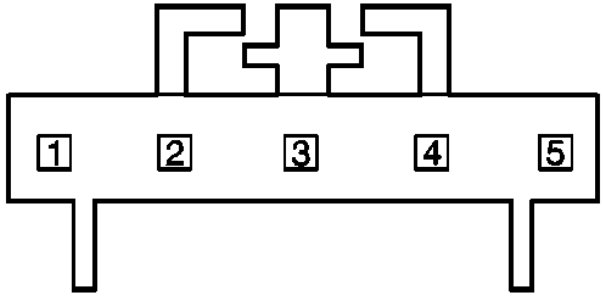
4	BLK	1851	Ground

Steering Wheel Controls Terminal Identification - Right Lower (Personalization/Select)



Connector Part Information		• 50579405 • 5-Way F Molex (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	BN	230	Steering Wheel Switch Dimming Control
2	D-GN	1358	DIC Switch Signal
3	OG	1816	DIC Set/Reset Switch Signal
4	BLK	1851	Ground
5	-	-	Not Used

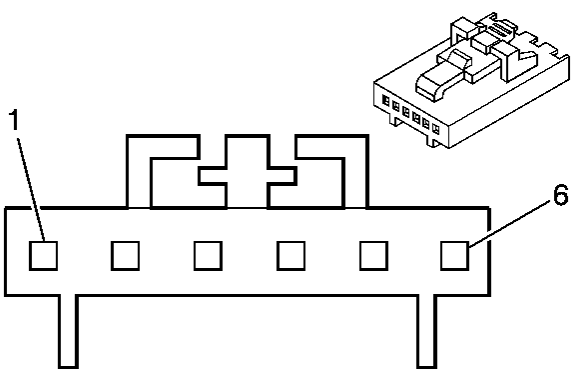
Steering Wheel Controls Terminal Identification - Upper Left (Radio-Program/Source)



Connector Part Information		• 50579405 • 5-Way F Molex (BK)	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	L-GN	1011	Remote Radio Control Signal

2	BN	230	Steering Wheel Switch Dimming Control
3	BK	1851	Ground
4	-	-	Not Used
5	L-GN	1011	Remote Radio Control Signal

Steering Wheel Controls Terminal Identification - Upper Right (Radio-Seek/Volume)



Connector Part Information		• **50579406** • **6-Way F Molex (BLK)**	
Pin	**Wire Color**	**Circuit No.**	**Function**
1	WH	2283	12 Volt Reference
2	L-GN	1011	Remote Radio Control Signal
3	BN	230	Steering Wheel Switch Dimming Control
4	-	-	Not Used
5	BK	1851	Ground
6	L-GN	1011	Remote Radio Control Signal

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - INSTRUMENT PANEL, GAUGES AND CONSOLE

Begin the system diagnosis with **Diagnostic System Check - Instrument Cluster** , **Diagnostic System Check - Driver Information Systems** or **Diagnostic System Check - Audible Warnings** . The Diagnostic System Check will provide the following information:

- The identification of the control module(s) which command the system
- The ability of the control module(s) to communicate through the serial data circuit
- The identification of any stored diagnostic trouble codes (DTCs) and their status

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

Begin the audible warning system diagnosis by reviewing the system operation. Reviewing the operation information will help you determine the correct symptom diagnostic procedure when an audible warning malfunction exists. Reviewing the operation information will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Instrument Panel, Gauges and Console** in order to identify the correct procedure for diagnosing the audible warning system and where the procedure is located.

DIAGNOSTIC SYSTEM CHECK - INSTRUMENT CLUSTER

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: Lack of communication may be due to a partial malfunction of the class 2 serial data circuit or due to a total malfunction of the class 2 serial data circuit. The specified procedure will determine the particular condition.

4: The symptom list in Symptoms will determine the correct diagnostic procedure to use.

5: The presence of DTCs which begin with "U" indicate some other module is not communicating. The specified procedure will compile all the available information before tests are performed.

Diagnostic System Check - Instrument Cluster

Step	Action	Yes	No
Schematic Reference: Instrument Cluster Schematics			
1	Install a scan tool. Does the scan tool power up?	Go to **Step 2**	Go to **Scan Tool Does Not Power Up** in Data Link Communications
2	1. Turn the ignition ON, with the engine OFF. 2. Attempt to establish communication with the following control modules: • Transfer Case Electronic Control (TREC) • Body Control Module (BCM) • Electronic Brake Control Module (EBCM) • Instrument Panel Cluster (IPC) • Powertrain Control Module (PCM) • Sensing and Diagnostic		

	Module (SDM) Does the scan tool communicate with the control modules listed above?	Go to **Step 3**	Go to **Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications
3	**IMPORTANT:** **The engine may start during the following step. Turn the engine OFF as soon as you have observed the Crank Power mode.** 1. Access the Class 2 Power Mode in the Diagnostic Circuit Check on the scan tool. 2. Rotate the ignition switch through all positions while observing the Ignition Switch Power Mode parameter. Does the Ignition Switch parameter reading match the ignition switch position for all switch positions?	Go to **Step 4**	Go to **Power Mode Mismatch** in Body Control System
4	Select the display DTCs function on the scan tool for the following control modules: • Transfer Case Electronic Control (TREC) • Body Control Module (BCM) • Electronic Brake Control Module (EBCM) • Instrument Panel Cluster (IPC) • Powertrain Control Module (PCM) • Sensing and Diagnostic Module (SDM) Does the scan tool display any DTCs for the control modules listed above?	Go to **Step 5**	Go to **Symptoms - Instrument Panel, Gauges and Console**
5	Does the scan tool display any DTCs which begin with a "U"?	Go to **Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications	Go to **Step 6**
6	Does the scan tool display DTC B1000 or B1440?	Go to **Diagnostic Trouble Code (DTC) List** in Body	

		Control System	Go to **Step 7**
7	Does the scan tool display DTC P0562, P0563, P0615, P1637 or P1638?	Go to **Diagnostic Trouble Code (DTC) List** in Engine Electrical	Go to **Diagnostic Trouble Code (DTC) List**

DIAGNOSTIC SYSTEM CHECK - DRIVER INFORMATION SYSTEMS

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: Lack of communication may be due to a partial malfunction of the class 2 serial data circuit or due to a total malfunction of the class 2 serial data circuit. The specified procedure will determine the particular condition.

3: The symptom list in Symptoms will determine the correct diagnostic procedure to use.

4: The presence of DTCs which begin with "U" indicate some other module is not communicating. The specified procedure will compile all the available information before tests are performed.

Diagnostic System Check - Driver Information Systems

Step	Action	Yes	No
Schematic Reference: Instrument Cluster Schematics			
1	Install a scan tool. Does the scan tool power up?	Go to **Step 2**	Go to **Scan Tool Does Not Power Up** in Data Link Communications
2	1. Turn the ignition ON, with the engine OFF. 2. Attempt to establish communication with the following control modules: • Body Control Module (BCM) • Instrument Panel Cluster (IPC) • Powertrain Control Module (PCM) Does the scan tool communicate with the control modules listed above?	Go to **Step 3**	Go to **Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications
	Select the display DTCs function on the scan tool for the following control modules: • Body Control Module		

3	(BCM) • Instrument Panel Cluster (IPC) • Powertrain Control Module (PCM) Does the scan tool display any DTCs for the control modules listed above?	Go to **Step 4**	Go to **Symptoms - Instrument Panel, Gauges and Console**
4	Does the scan tool display any DTCs which begin with a "U"?	Go to **Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications	Go to **Step 5**
5	Does the scan tool display DTC B1000 or B1440?	Go to **Diagnostic Trouble Code (DTC) List** in Body Control System	Go to **Step 6**
6	Does the scan tool display DTC P0562, P0563, P0615, P1637 or P1638?	Go to **Diagnostic Trouble Code (DTC) List** in Engine Electrical	Go to **Diagnostic Trouble Code (DTC) List**

DIAGNOSTIC SYSTEM CHECK - AUDIBLE WARNINGS

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: Lack of communication may be due to a partial malfunction of the class 2 serial data circuit or due to a total malfunction of the class 2 serial data circuit. The specified procedure will determine the particular condition.

3: The symptom list in Symptoms will determine the correct diagnostic procedure to use.

4: The presence of DTCs which begin with "U" indicate some other module is not communicating. The specified procedure will compile all the available information before tests are performed.

Diagnostic System Check - Audible Warnings

Step	Action	Yes	No
Schematic Reference: Audible Warnings Schematics			
1	Install a scan tool. Does the scan tool power up?	Go to **Step 2**	Go to **Scan Tool Does Not Power Up** in Data Link Communications
	1. Turn the ignition ON, with the engine OFF. 2. Attempt to establish communication with the		

2	following control modules: • Body Control Module (BCM) • Instrument Panel Cluster (IPC) • Powertrain Control Module (PCM) Does the scan tool communicate with the control modules listed above?	Go to **Step 3**	Go to **Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications
3	Select the display DTCs function on the scan tool for the following control modules: • Body Control Module (BCM) • Instrument Panel Cluster (IPC) • Powertrain Control Module (PCM) Does the scan tool display any DTCs for the control modules listed above?	Go to **Step 4**	Go to **Symptoms - Instrument Panel, Gauges and Console**
4	Does the scan tool display any DTCs which begin with a "U"?	Go to **Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications	Go to **Step 5**
5	Does the scan tool display DTC B1000 or B1440?	Go to **Diagnostic Trouble Code (DTC) List** in Body Control System	Go to **Step 6**
6	Does the scan tool display DTC P0562, P0563, P0615, P1637 or P1638?	Go to **Diagnostic Trouble Code (DTC) List** in Engine Electrical	Go to **Diagnostic Trouble Code (DTC) List**

SCAN TOOL OUTPUT CONTROLS

Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
		The IPC drives all gauges to the maximum physical position when

IPC Gauges	-	you select On. The IPC drives all gauges to the minimum physical position when you select Off.
Lamp Test	-	The IPC illuminates the following indicators when you select On: • ABS • Air Bag • Battery • Brake • Cargo Lamp On • CRUISE • Fasten safety belt • Four Wheel Drive • High beam • Low Fuel • Overdrive Disable • SECURITY • SERVICE ENGINE SOON • Tire Pressure Low • Tow/Haul • Traction Off • Upshift • Wait to Start The indicators should illuminate until commanded Off.
PRNDL Display	-	An underscore illuminates under each indicator in the PRNDL display until commanded Off.
Segments Test	-	All DIC and Odometer segments illuminate until commanded Off.

SCAN TOOL DATA LIST

The scan tool data lists contain all the instrument panel, gauges, and console related parameters that are available on the scan tool. The parameters in the list are arranged in alphabetical order. The data list column indicates the location of the parameter within the scan tool menu selections.

Use the scan tool data lists as directed by a diagnostic table or in order to supplement the diagnostic procedures. Begin all of the diagnostic procedures with**Diagnostic System Check - Instrument Cluster** ,**Diagnostic System Check - Driver Information Systems** or **Diagnostic System Check - Audible Warnings** .

Use the scan tool data lists only after the following is determined:

- There is no published DTC procedure nor published symptom procedure for the customer concern.

- The DTC or symptom procedure indicated by the Diagnostic System Check does not resolve the customer concern.

The typical data values are obtained from a properly operating vehicle under the conditions specified in the first row of the scan tool data list table. Comparison of the parameter values from the suspect vehicle with the typical data values may reveal the source of the customer concern.

Body Control Module (BCM)

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/High Beams Off/Doors Closed/Trunk Closed/Park Brake Unapplied/Seatbelt Buckled			
Battery Voltage	Data	Active/Inactive	Inactive
Cargo Door Ajar Switch	Inputs	Open/Closed	Closed
Cargo Lamp Switch	Inputs	On/Off	Off
Courtesy Lamp Switch	Inputs	Active/Inactive	Inactive
Driver Door Ajar Switch w/o DDM	Inputs	On/Off	Off
Hazard Switch Signal	Outputs	On/Off	Off
Headlamp Switch	Inputs	Active/Inactive	Inactive
Headlamps On Indicator	Outputs	On/Off	Off
High Beam Relay	Outputs	On/Off	Off
High Beam Switch	Inputs	On/Off	Off
Hood Ajar Switch	Inputs	Active/Inactive	Inactive
Key In Ignition	Inputs	Yes/No	Yes
Left Rear Cargo Door Ajar Switch	Inputs	On/Off	Off
Low Beam Output	Outputs	On/Off	Off
Park Brake Switch	Inputs	Set/Released	Released
Park Lamp Relay	Outputs	On/Off	Off
Parklamp Switch	Inputs	Active/Inactive	Inactive
Passenger Door Ajar Switch w/o PDM	Inputs	On/Off	Off
RAP Relay	Outputs	On/Off	On
Right Rear Door Ajar Switch	Inputs	On/Off	Off

Instrument Panel Cluster (IPC)

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition ON/Engine OFF/Seat Belt Buckled/High Beams OFF/Park Brake Unapplied/Park Lamps ON			
8- Digit GM Part Number	Module Information 1	Numeric	Varies
ABS Lamp	Input/Output	On/Off	Off
Air Bag Lamp	Input/Output	On/Off	Off
Battery	Input/Output	On/Off	On

Battery Voltage	Data 1	Volts	9.0-16 Volts (Varies)
Brake Assist (if equipped)	Input/Output Data 1	Active/Inactive	Inactive
Brake Lamp	Input/Output	On/Off	Off
Cargo Lamp On	Input/Output	On/Off	Off
Cruise Control	Input/Output	On/Off	Off
DIC Fuel Info	Input/Output	On/Off	Off
DIC Personalization	Input/Output	On/Off	Off
DIC Select	Input/Output	On/Off	Off
DIC Trip Info.	Input/Output	On/Off	Off
Display Dimming	Input/Output	Active/Inactive	Inactive
Display Units	Input/Output	Metric/English	English
Displayed Coolant Temp	Data 1	Celsius (Fahrenheit)	32-127°C (89-260°F) (Varies)
Displayed Fuel Level	Data 1	Percent	0-100% (Varies)
Displayed Odometer	Data 2	Kilometers (Miles)	Varies with the mileage of vehicle
Displayed Oil Pressure	Data 1	kPa (PSI)	0 kPa (0 PSI)
Displayed Trans Oil Temp	Data 1	Celsius (Fahrenheit)	29-157°C (84-315° F) (Varies)
Engine Speed	Data 1	RPM	0 RPM
Fasten Seat Belt	Input/Output	On/Off	Off
High Beam Lamp	Inputs	On/Off	Off
Hour Meter	Data 1	Hours	Varies
Ignition 1	Data 1	Volts	9.0-16 Volts (Varies)
Ign. Since Current DTC	Data 1	Cycles	0-255
Julian Date of Build	Module Information 1	Numeric	Varies
Language	Input/Output	English/French/Spanish/German/Arabic	English
Left Turn Input	Input/Output	Open/Closed	Open
Low Fuel Lamp	Input/Output	On/Off	Off
Low Washer Fluid	Input/Output	On/Off	Off
Monitored Coolant Temp	Data 1	Celsius (Fahrenheit)	82-93°C (180-200° F)
Monitored Fuel Level	Data 1	Percent	0-100% (Varies)
Monitored Oil	Data 1	kPa (PSI)	0 kPa (0 PSI)

Pressure			
Over Drive Defeat	Input/Output	Active/Inactive	Inactive
PRNDL State	Inputs	Park / Reverse / Neutral / First / Second / Third / Drive	Park
Right Turn Input	Input/Output	Open/Closed	Open
Security Lamp	Input/Output	On/Off	Off
Service 4WD	Input/Output	On/Off	Off
Software Part Number	Module Information 2	Numeric	Varies
Software Revision Number	Module Information 2	Numeric	Varies
Tow/Haul	Input/Output	On/Off	Off
Trip Odometer A	Data 2	Miles (Kilometers)	Varies
Trip Odometer B	Data 2	Miles (Kilometers)	Varies
Trip Reset Switch	Inputs	Active/Inactive	Inactive
Upshift Lamp	Input/Output	On/Off	Off
Vehicle Speed	Data 1	Miles (Kilometers)	0 km/h (0 mph)
Year Model Built	Module Information 1	Numeric	Varies

Driver Door Module (DDM)/Passenger Door Module (PDM)

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Ignition ON/Engine OFF/Vehicle in PARK/All doors closed			
Battery 1 (Low Current)	Data	Volts	12.8 Volts
Battery 2 (High Current)	Data	Volts	12.8 Volts
Door Ajar Switch	Inputs	On/Off	Off

Powertrain Control Module (PCM)

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Engine Idling/Normal Operating Temperature			
ECT Sensor	Engine Data 1 Engine Data 2 Enhanced EVAP Data Fuel Trim Data HO2S Data Misfire Data	Celsius (Fahrenheit)	85-105°C (185-220°F) (Varies)
Coolant Level Switch	Engine Data 2	OK/Low	OK
Engine Oil Level Switch	Engine Data 2	OK/Low	OK
Engine Oil Life Remaining	Engine Data 2	Percent	0-100% (Varies)
Engine Oil Pressure Sensor	Engine Data 2	Volts	0-5 Volts (Varies)

Engine Speed	Cruise Control Data Engine Data 1 Engine Data 2 Enhanced EVAP Data Fuel Trim Data HO2S Data TAC Data	RPM	+/-100 RPM from Desired Idle Speed
Fuel Level Sensor	Engine Data 1 Enhanced EVAP Data	Volts	0-5 Volts (Varies)
Fuel Level Sensor Rear Tank (If Equipped)	Engine Data 1 Enhanced EVAP Data	Volts	0-5 Volts (Varies)
Fuel Tank Level Remaining	Enhanced EVAP Data	Liters (Gallons)	Varies
Fuel Tank Level Remaining	Enhanced EVAP Data	Percent	0-100% (Varies)
Fuel Tank Rated Capacity	Enhanced EVAP Data	Liters (Gallons)	Varies
Ignition 1 Signal	Cruise Control Data Engine Data 1 Engine Data 2 Enhanced EVAP Data Fuel Trim Data TAC Data	Volts	9-16 Volts (Varies)
Low Oil Lamp Command	Engine Data 2	On/Off	Off
MIL (Malfunction Indicator Lamp) Command	Engine Data 2	On/Off	Off
Reduced Engine Power	Engine Data 1	Active/Inactive	Inactive
Trans. Fluid Temp	Trans Data	Celsius (Fahrenheit)	85-105°C (185-220°F) (Varies)
Vehicle Speed Sensor	Cruise Control Data Engine Data 1 Engine Data 2 Enhanced EVAP Data Fuel Trim Data HO2S Data Misfire Data TAC Data	Kilometers per hour (Miles per hour)	0 km/h (0 mph)

Radio

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition in RUN, Radio ON			
Balance	Data	Value	-50 to +50
Battery Voltage	Data	Volts	0-18 Volts
Chime Type	Outputs	None/Headlamp/Turn Signal/Key in Ignition/Seat Belt/ Park Brake	None
Fade	Data	Value	-50 to +50
Personalization	Inputs	Fuel/Trip/Re/Set/Fuel Econ	Varies
Volume	Data	Percent	0-100%

SCAN TOOL DATA DEFINITIONS

4WD

The scan tool displays On or Off. This is the state of the 4WD indicator as commanded by the instrument panel cluster (IPC).

ABS Lamp

The scan tool displays On or Off. This is the state of the ABS indicator as commanded by the IPC.

Annual Mileage

The scan tool displays 0.0 to 999999.9 miles (0.0 to 999999.9 kilometers). The DIC determines annual mileage travelled from the 4 kppm vehicle speed signal circuit from the PCM.

Balance

The scan tool displays 0-100%. The Balance between the right and left audio output.

Battery

The scan tool displays On or Off. This is the state of the charge indicator as commanded by the IPC.

Battery Voltage

The scan tool displays 0-18 volts. This is the voltage at the battery positive voltage circuit of the BCM.

Battery Voltage

The scan tool displays 0-19 volts. The battery voltage as monitored by the IPC.

Battery Voltage

The scan tool displays 0-18 volts. The voltage measured from the radio or amplifier's ignition positive voltage circuit to ground.

Brake Assist

The scan tool displays Active or Inactive. This is the state of the brake assist as monitored by the IPC.

Brake Lamp

The scan tool displays On or Off. This is the state of the BRAKE indicator as commanded by the IPC.

Business Trip Avg Speed

The scan tool displays 0.0 to 999.9 mph (0.0 to 999.9 km/h). The DIC calculates the average speed from the business trip distance and time.

Business Trip Fuel Used

The scan tool displays 0.0 to 9999.9 gallons (0.0 to 9999.9 liters). The DIC calculates the business trip fuel used based on the class 2 message from the PCM.

Business Trip Mileage

The scan tool displays 0.0 to 999999.9 miles (0.0 to 999999.9 kilometers). The distance traveled is determined using the 4 kppm vehicle speed signal circuit from the PCM.

Business Trip Percent

The scan tool displays 0 to 100%. The DIC calculates the business trip percent of annual mileage from the total business mileage travelled and the annual mileage travelled.

Cargo Door Ajar Switch

The scan tool displays Open or Closed. The BCM monitors the signal circuit of the cargo door ajar switch. An open switch is displayed as Open with the door open.

Cargo Lamp On

The scan tool displays On or Off. This is the state of the cargo lamp as commanded by the IPC.

Cargo Lamp Switch

The scan tool displays On or Off. The scan tool displays On when the cargo lamps are requested from the switch.

Change Engine Oil

The scan tool displays On or Off. This is the state of the change engine oil indicator as commanded by the IPC.

Check Coolant Temp

The scan tool displays On or Off. This is the state of the check coolant temperature indicator as commanded by the IPC.

Check Engine Oil Level

The scan tool displays On or Off. This is the state of the check engine oil level indicator in the message center as commanded by the IPC.

Check Engine Temp

The scan tool displays On or Off. This is the state of the check engine temperature indicator as commanded by the IPC.

Chime Type

The scan tool displays None, Headlamp, Turn Signal, Key in Ignition, Seat Belt, or Park Brake. The selected condition that produces the chime is displayed.

Coolant Level Switch

The scan tool displays OK or Low. The PCM monitors the coolant level switch signal circuit and a closed switch is displayed as OK.

Cruise Control

The scan tool displays On or Off. The state of the cruise control indicator as commanded by the IPC.

Cumulative Fuel

The scan tool displays gallons (Liters). The DIC receives a class 2 message from the PCM indicating the cumulative fuel gallons (liters).

Dimming

The scan tool displays Inactive or Active. Inactive is displayed when the PRNDL and the odometer or trip odometer vacuum florescent display cannot be dimmed from the dimmer switch. Active is displayed when the PRNDL and the odometer or trip odometer vacuum florescent display can be dimmed from the dimmer switch in the IPC.

Display Fuel Switch

The scan tool displays On or Off. The DIC monitors the signal circuit of the fuel button of the DIC switch. A closed switch is displayed as On.

Displayed Coolant Temp

The scan tool displays 32-127°C (89-260°F). This is the displayed coolant temperature gauge data. This data may differ from the monitored coolant temperature from the PCM.

Displayed Fuel Level

The scan tool displays 0- 100%. This is the displayed fuel gauge data. The data may differ from the monitored fuel level in the PCM.

Displayed Odometer

The scan tool displays 0 to 999999 miles (0 to 999999 kilometers). The scan tool displays the data on the odometer in the IPC.

Displayed Trans Oil Temp

The scan tool displays 29-157°C (84-315°F). This is the displayed transmission oil gauge data. The data may differ from the monitored trans oil temperature from the PCM.

Displayed Trip Odometer

The scan tool displays 9999.9 miles (9999.9 kilometers). The scan tool displays the data on the trip odometer in the IPC.

Driver Door Ajar Switch

The scan tool displays On or Off. The BCM monitors the signal circuit of the driver door ajar switch. An open switch is displayed as On with the door open.

ECT

The scan tool displays -39 to +140°C (-38 to +284°F). This is the engine coolant temperature as monitored by the PCM.

Elapsed Time (Hours)

The scan tool displays 00 to 99 Hours. The DIC begins to calculate elapsed time when Elapsed Time is displayed on the DIC and the RESET button is pressed.

Elapsed Time (Minutes)

The scan tool displays 00 to 59 Minutes. The DIC begins to calculate elapsed time when Elapsed Time is

displayed on the DIC and the RESET button is pressed.

Elapsed Time (Seconds)

The scan tool displays 00 to 59 Seconds. The DIC begins to calculate elapsed time when Elapsed Time is displayed on the DIC and the RESET button is pressed.

Engine Oil Level Switch

The scan tool displays OK or Low. This is the state of the engine oil level switch as monitored by the PCM. A closed switch is displayed as OK.

Engine Oil Life Remaining

The scan tool displays 0-100 percent. This is the engine oil life index that is calculated and maintained by the PCM.

Engine Oil Pressure Sensor

The scan tool displays 0 to 5 volts. The PCM monitors the engine oil pressure sensor signal circuit where a low voltage indicates low pressure.

Engine Speed

The scan tool displays 0-9999 RPM. Engine speed is computed by the PCM from the 3X reference input. It should remain close to desired idle under various engine loads with the engine idling.

Engine Speed

The scan tool displays 0- 9999 RPM. The IPC receives the engine speed from the PCM via the engine speed signal circuit.

Fade

The scan tool displays -50 to +50. The Fade between the front and rear audio output.

Fasten Seat Belt

The scan tool displays On or Off. This is the state of the fasten safety belt indicator as commanded by the IPC.

Fuel Capacity

The scan tool displays gallons. The DIC receives a class 2 message from the PCM indicating the fuel capacity.

Fuel Level Sensor

The scan tool displays 0-5 volts. The PCM monitors the fuel level sensor signal circuit where 0 V is an empty tank.

Fuel Level Sensor Rear

The scan tool displays 0-5 volts. The PCM monitors the rear tank fuel level sensor signal circuit where 0 V is an empty tank.

Fuel Tank Level Remaining

The scan tool displays gallons (liters). This is the amount of fuel remaining in the fuel tank as determined by the PCM.

Fuel Tank Level Remaining

The scan tool displays 0-100%. The scan tool displays in percentage the amount of fuel remaining in the fuel tank as determined by the PCM.

Fuel Tank Rated Capacity

The scan tool displays gallons (liters). This is the fuel tank rated capacity as determined by the PCM.

Headlamp Relay Feedback

The scan tool displays On or Off. This is the state of the headlamp and the panel dimmer switch. The scan tool displays On when the headlamp and the panel dimmer switch is turned On or in auto position with the ambient light sensor in its dark state.

Hi Beam Lamp

The scan tool displays On or Off. This is the state of the high beam indicator as commanded by the IPC.

High Beam Switch

The scan tool displays On or Off. This is the position of the high beam switch where an active switch is displayed as On.

Hood Ajar Switch

The scan tool displays Active or Inactive. The BCM monitors the signal circuit of the hood ajar switch. An open switch is displayed as Active with the hood open.

Hourmeter

The scan tool displays 0-10,000 hours. This is the PCM accumulated engine run time hours provided to the IPC via the class 2 serial data link.

Ignition 1

The scan tool displays Active or Inactive. The scan tool displays Active when the ignition switch is in the RUN or CRANK position

Ignition 3

The scan tool displays Active or Inactive. The scan tool displays Active when the ignition switch is in the RUN position only.

Ignition 1 Signal

The scan tool displays 0-16 volts. The ignition 1 signal represents the system voltage detected by the PCM at the ignition voltage circuit.

Ignition Voltage

The scan tool displays the vehicle ignition voltage at the DIC ignition voltage circuit.

Illumination Input Volt

The scan tool displays 9-16 volts. The illumination input voltage is the ignition monitored voltage at the instrument panel lamp supply voltage circuit at the DIC.

Key In Ignition

The scan tool displays Yes or No. The BCM monitors the signal circuit of the ignition key alarm switch. The scan tool displays Yes when the ignition key is fully inserted into the ignition switch cylinder.

Left Rear Cargo Door Ajar Switch

The scan tool displays On or Off. The BCM monitors the signal circuit of the left rear cargo door ajar switch. An open switch is displayed as On with the door open.

Low Coolant

The scan tool displays On or Off. This is the state of the low coolant indicator as commanded by the IPC.

Low Fuel Lamp

The scan tool displays On or Off. The IPC determines when to illuminate the indicator based on the class 2 message from the PCM indicating the fuel level percent.

Low Oil Lamp Command

The scan tool displays On or Off. This the state of the low oil lamp command as monitored by the PCM.

Low Washer Fluid

The scan tool displays On or Off. The IPC monitors the windshield washer solvent level switch, where a closed switch with low washer fluid is displayed as On.

Menu Switch

The scan tool displays On or Off. The DIC monitors the signal circuit of the Menu button of the DIC switch. A closed switch is displayed as On.

MIL (Malfunction Indicator Lamp) Command

The scan tool displays On or Off. This is the commanded state of the MIL (Malfunction Indicator Lamp) by the PCM.

Module Part Number

The scan tool displays the GM 8-digit part number of the IPC.

Monitored Coolant Temp

The scan tool displays -40°C to +215°C (-40°F to +419°F). This is the PCM monitored coolant temperature data as provided to the IPC via the class 2 serial data link.

Monitored Fuel Level

The scan tool displays 0-100%. This is the PCM monitored fuel level percent as provided to the IPC via the class 2 serial data link.

Monitored Fuel Level

The scan tool displays 0-100%. This is the PCM monitored fuel level percent as provided to the DIC via the class 2 serial data link.

Monitored Trans Oil Temp

The scan tool displays -40°C to +215°C (-40°F to +419°F). This is the PCM monitored transmission oil temperature data as provided to the IPC via the class 2 serial data link.

Odo/Trip Switch

The scan tool displays On or Off. The DIC monitors the signal circuit of the Trip button of the DIC

switch. A closed switch is displayed as On.

Oil Pressure Lamp

The scan tool displays On or Off. The state of the oil pressure indicator in the message center as commanded by the IPC. The IPC monitors the engine oil pressure sensor signal where a low sensor resistance is proportional to low oil pressure.

On/Off Switch

The scan tool displays On or Off. The DIC monitors the signal circuit of the On/Off button of the DIC switch. A closed switch is displayed as On.

Overspeed Lamp

The scan tool displays On or Off. This is the state of the overspeed indicator as commanded by the IPC in the message center.

Park Brake Switch

The scan tool displays Set or Released. The BCM monitors the park brake signal circuit, where a closed switch with the park brake applied is displayed as Set.

Park Switch

The scan tool displays Open or Closed. When the gearshift lever is in the park position, Closed is displayed.

Passenger Door Ajar Switch

The scan tool displays On or Off. The BCM monitors the signal circuit of the passenger door ajar switch. An open switch is displayed as On with the door open.

Personal Trip Avg Speed

The scan tool displays 0.0-999.9 mph (0.0-999.9 km/h). The DIC calculates the average speed from the personal trip distance and time.

Personal Trip Fuel Used

The scan tool displays 0.0-9999.9 gallons (0.0-9999.9 liters). The DIC calculates the personal trip fuel used based on the class 2 message from the PCM.

Personal Trip Mileage

The scan tool displays 0.0-999999.9 miles (0.0-999999.9 kilometers). The distance travelled is

determined using the 4 kppm vehicle speed signal circuit from the PCM.

Personal Trip Percent

The scan tool displays 0-100 percent. The DIC calculates the personal trip percent of annual mileage from the total personal mileage travelled and the annual mileage travelled.

Personalization

The scan tool displays Fuel, Trip, Re/Set, Fuel Econ. The selected personalization feature is displayed.

PRNDL State

The scan tool displays the PRNDL display of the vehicle. This is the state of the PRNDL range as communicated to the IPC by the PCM. The value of this data corresponds to the PRNDL display.

RAP Relay Feedback

The scan tool displays On or Off. This is the state of the RAP relay as monitored by the BCM.

Real Time Clock Day

The scan tool displays a value range of 1-31 days. The scan tool displays the current day of the DIC real time clock.

Real Time Clock Hours

The scan tool displays a value range of 1-12 hours. The scan tool displays the current hour of the DIC real time clock.

Real Time Clock Minutes

The scan tool displays a value range of 00-59 minutes. The scan tool displays the current minute of the DIC real time clock.

Real Time Clock Month

The scan tool displays all calendar months (JAN to DEC). The scan tool displays the current month of the DIC real time clock.

Real Time Clock Seconds

The scan tool displays a value range of 00-59 seconds. The scan tool displays the current second of the DIC real time clock.

Real Time Clock Year

The scan tool displays a value range of 00-99 years. The scan tool displays the current year of the DIC real time clock.

Reduced Engine Power

The scan tool displays Inactive or Active. This is the state of the Reduced Engine Power indicator as commanded by the IPC in the message center.

Reduced Engine Power

The scan tool displays Inactive or Active. This is the state of the Reduced Engine Power indicator as monitored by the PCM.

Reset Switch

The scan tool displays On or Off. The DIC monitors the signal circuit of the Reset button of the DIC switch. A closed switch is displayed as On.

Right Arrow Switch

The scan tool displays On or Off. The DIC monitors the signal circuit of the Right Arrow button of the DIC switch. A closed switch is displayed as On.

Right Rear Door Ajar Switch

The scan tool displays On or Off. The BCM monitors the signal circuit of the right rear door ajar switch. An open switch is displayed as On with the door open.

Right Turn Signal

The scan tool displays On or Off. The BCM monitors the right turn signal control circuit and displays On when the right turn signal switch is activated.

Run/Accy/Rap Voltage

The scan tool displays 9-12 volts. This is the vehicle Run/Accy/Rap voltage.

Seat Belt Buckled

The scan tool displays Yes or No. This is the state of the driver seat belt as monitored by the BCM, where an open seat belt switch is displayed as Yes.

Security Lamp

The scan tool displays On or Off. This is the state of the security lamp indicator as commanded by the IPC in the message center.

Security Lamp State

The scan tool displays On, Off or Flashing. This is the security lamp state as commanded by the BCM.

Service 4WD

The scan tool displays On or Off. This is the state of the service 4WD indicator as commanded by the IPC.

Service Throttle Soon

The scan tool displays On or Off. This is the state of the service throttle soon indicator as commanded by the IPC.

Tow/Haul

The scan tool displays On or Off. This is the state of the Tow/Haul indicator as commanded by the IPC.

Trans Fluid Hot

The scan tool displays On or Off. This is the state of trans fluid hot indicator as commanded by the IPC.

Trip Reset Switch

The scan tool displays On or Off. The IPC monitors the trip reset switch. A closed switch is displayed as On.

Upshift Lamp

The scan tool displays On or Off. This is the state of the upshift lamp as commanded by the IPC.

Vehicle Speed

The scan tool displays 0-255 km/h (0-159 mph). The BCM receives the vehicle speed information from the PCM 4 kppm vehicle speed signal circuit.

Vehicle Speed

The scan tool displays 0-255 km/h (0-159 mph). The DIC receives the vehicle speed information from the PCM 4 kppm vehicle speed signal circuit.

Vehicle Speed

The scan tool displays kilometers per hour (miles per hour). The IPC receives the vehicle speed from the PCM 4 kppm vehicle speed signal circuit.

Vehicle Speed

The scan tool displays 0-255 km/h (0-159 mph). The PCM monitors the voltage at the signal circuit of the vehicle speed sensor. The voltage is proportional to the vehicle speed.

Volume

The scan tool displays 0-100%. The percentage of volume selected at the radio.

Wait to Start

The scan tool displays On or Off. This is the state of the WAIT TO START indicator as displayed in the IPC.

Water in Fuel

The scan tool displays On or Off. This is the state of the water in fuel indicator in the message center as commanded by the IPC.

DIAGNOSTIC TROUBLE CODE (DTC) LIST

Diagnostic Trouble Code (DTC) List

DTC	Diagnostic Procedure	Module(s)
B0540	**DTC B0540**	DIC
B0560	**DTC B0560**	DIC
B1372	**DTC B1372**	IPC
B2961	**DTC B2961**	BCM
BXXXX	• **Diagnostic Trouble Code (DTC) List** in Lighting Systems • **Diagnostic Trouble Code (DTC) List** in SIR	BCM, SDM
CXXXX	Refer to **Diagnostic Trouble Code (DTC) List** in Anti-lock Brake System	EBCM
P0461	**DTC P0461**	PCM
P0462	**DTC P0462**	PCM
P0463	**DTC P0463**	PCM
P0502	**DTC P0502** in Automatic Transmission - 4L60-E	PCM
P0503	**DTC P0503** in Automatic Transmission - 4L60-E	PCM
P0522	**DTC P0522**	PCM
P0523	**DTC P0523**	PCM
P0608	**DTC P0608**	PCM
P0654	**DTC P0654**	PCM
PXXXX	**Diagnostic Trouble Code (DTC) List** in Engine Controls 6.0L (LQ4).	PCM

DTC B0540

Circuit Description

The instrument panel cluster (IPC) monitors the vehicle speed signal to determine the speedometer position. If the IPC determines the vehicle speed signal voltage is out of the normal operating range, a DTC will set.

Conditions for Running the DTC

- The vehicle speed is more than 10 km/h (6 mph).
- The ignition voltage is between 9.0-18.0 volts.

Conditions for Setting the DTC

- The IPC detects that the commanded state of the driver and the actual state of the control circuit do not match.
- The condition above must be present for a minimum of 5 seconds.

Action Taken When the DTC Sets

- The IPC stores a DTC B0540 in memory.
- The speedometer defaults to 0 km/h (0 mph).
- No driver warning message will be displayed for this DTC.

Conditions for Clearing the DTC

- The history DTC clears after 100 malfunction free warm-up cycles.
- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The IPC receives the clear code command from the scan tool.

DTC B0540

Step	Action	Yes	No
Schematic Reference:Instrument Cluster Schematics			
1	Did you perform the instrument panel cluster (IPC) Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Install a scan tool. 2. Raise the vehicles drive wheels. Refer to **Lifting and Jacking the Vehicle** in General Information. 3. Start the engine. 4. Place the transmission into drive for an automatic transmission and third gear for a manual transmission. 5. With the scan tool, observe the Vehicle Speed		

	Sensor parameter in the powertrain control module (PCM) Engine Data 1 data list. Does the Vehicle Speed Sensor parameter match the speedometer display?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Turn OFF the ignition. 2. Disconnect the PCM connector C2. 3. Install the **J 33431-C** Signal Generator and Instrument Panel Tester lead to the vehicle speed signal circuit at the PCM harness connector, and the other lead to a good ground. See **Special Tools and Equipment** . 4. Turn ON the ignition, with the engine OFF. 5. Set the **J 33431-C** to generate a speedometer signal. See **Special Tools and Equipment** . Does the vehicle speedometer indicate a reading?	Go to **Step 5**	Go to **Step 4**
4	Test the vehicle speed signal circuit for an open, short to voltage or a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 9**	Go to **Step 6**
5	Inspect for poor connections at the PCM connector. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 9**	Go to **Step 7**
6	Inspect for a poor connection at the harness connector of the IPC. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 9**	Go to **Step 8**
7	**IMPORTANT:** **Program the replacement PCM.** **Replace the PCM. Refer to Powertrain Control Module (PCM) Replacement in Engine Controls-6.0L (LQ4).** Did you complete the replacement?	Go to **Step 9**	-
8	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 9**	-
	1. Use the scan tool in order to clear the DTC's. 2. Operate vehicle within the conditions for		

9	running this DTC as specified in the supporting text. Does the DTC reset?	Go to **Step 2**	System OK

DTC B0560

Circuit Description

The instrument panel cluster (IPC) monitors the engine speed signal to determine the tachometer position. If the IPC determines the engine speed signal voltage is out of the normal operating range, a DTC will set.

Conditions for Running the DTC

- The engine speed is greater than 800 RPM.
- The ignition voltage is greater than 9.0 volts, but less than 18 volts.

Conditions for Setting the DTC

- The IPC detects that the commanded state of the driver and the actual state of the control circuit do not match.
- The above condition is present for at least 5.0 seconds.

Action Taken When the DTC Sets

The IPC stores the DTC in memory.

Conditions for Clearing the DTC

- A last test failed (current DTC) clears when the diagnostic runs and does not fail.
- A history DTC clears after 100 consecutive malfunction free warm-up cycles.
- The IPC receives the clear code command from the scan tool.

DTC B0560

Step	Action	Yes	No
Schematic Reference:Instrument Cluster Schematics			
1	Did you perform the instrument panel cluster (IPC) Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Install a scan tool. 2. Start the engine. 3. With the scan tool, observe the Engine Speed parameter in the IPC Data 1 data list.	Go to **Testing for**	

	Does the Engine Speed parameter match the tachometer display?	**Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Turn OFF the ignition. 2. Disconnect the powertrain control module (PCM) connector C2. 3. Install the **J 33431-C** Signal Generator and Instrument Panel Tester lead to the engine speed signal circuit at the PCM harness connector, and the other lead to a good ground. See **Special Tools and Equipment** . 4. Turn ON the ignition, with the engine OFF. 5. Set the **J 33431-C** Signal Generator and Instrument Panel Tester to generate a tachometer signal. See **Special Tools and Equipment** . Does the vehicle tachometer indicate an RPM reading?	Go to **Step 5**	Go to **Step 4**
4	Test the engine speed signal circuit for an open, a short to voltage or a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 9**	Go to **Step 6**
5	Inspect for poor connections at the PCM connector. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 9**	Go to **Step 7**
6	Inspect for poor connections at the harness connector of the IPC. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 9**	Go to **Step 8**
7	**IMPORTANT:** **Program the replacement PCM.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-6.0L (LQ4).Did you complete the replacement?	Go to **Step 9**	-
8	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 9**	-
	1. Use the scan tool in order to clear the DTC's.		

9	2. Operate vehicle within the conditions for running this DTC as specified in the supporting text. Does the DTC reset?	Go to **Step 2**	System OK

DTC B1372

Circuit Description

When the ignition switch is in the UNLOCK position, certain class 2 messages do not transmit. The instrument cluster suspends the operation of the indicators and the gauges that are dependent on these messages until the ignition switch is no longer in the UNLOCK position.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

There is a difference of at least 75% between the ignition 1 voltage circuit and the IPC battery positive voltage circuit for 3 seconds.

Action Taken When the DTC Sets

- The odometer and the PRNDL displays do not illuminate.
- The fuel gauge and the engine coolant temperature gauge default to 0.
- The scan tool does not communicate with the instrument cluster.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 100 malfunction free warm-up cycles.
- The IPC receives the clear code command from the scan tool.

Diagnostic Aids

- When the instrument cluster detects low voltage at the ignition 1 voltage circuit, the instrument cluster will not communicate with the scan tool, and the odometer and PRNDL displays will not be illuminated. The season odometer will display if the trip reset switch is pressed, and the instrument cluster will communicate with the scan tool until the trip reset switch is released.
- An intermittent condition is likely to be caused by an open condition in the ignition 1 voltage circuit.
- DTC B1372 can only be read by the scan tool as a history code once the fault is removed. Refer to **Scan Tool Does Not Communicate with Class 2 Device** in Data Link Communications for diagnosis of a loss of communication with the instrument cluster.

DTC B2961

Circuit Description

The body control module (BCM) monitors the ignition key alarm switch. When the key is in the ignition, the ignition key alarm switch is closed with the signal circuit as low. When the key is not in the ignition, the ignition key alarm switch is open with the signal circuit as high.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

- The ignition 1 input is active and the key in ignition switch signal circuit is inactive and the signal circuit is high.
- The above conditions must be present for more than 5 seconds.

Action Taken When the DTC Sets

The BCM stores DTC B2961 in memory.

Conditions for Clearing the DTC

- The DTC becomes history when the fault is no longer present.
- A history DTC will clear after 100 consecutive ignition cycles if the condition for the malfunction is no longer present.
- The BCM receives the clear code command from the scan tool.

DTC B2961

Step	Action	Yes	No
Schematic Reference: Audible Warnings Schematics **Connector End View Reference: Instrument Panel, Gauges, and Console Connector End Views or Body Control System Connector End Views**			
1	Did you perform the Audible Warnings Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Audible Warnings**
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With the scan tool, observe the Key In Ignition parameter in the BCM Inputs data list. Does the Key In Ignition parameter display Yes?	Go to **Step 3**	Go to **Step 4**
	1. Turn the ignition ON, with the engine OFF.		

3	2. Observe the Battery Voltage parameter in the BCM Data list. 3. Turn the ignition OFF. Does the Battery Voltage parameter display Active with the ignition off?	Go to **Step 8**	Go to **Step 7**
4	Test the key in ignition signal circuit for an open or a high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 11**	Go to **Step 5**
5	Test the ground circuit of the ignition key alarm switch for an open or a high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 11**	Go to **Step 6**
6	Inspect for poor connections at the harness connector of the ignition switch. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 11**	Go to **Step 9**
7	Inspect for poor connections at the harness connector of the BCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 11**	Go to **Step 10**
8	Repair the short to voltage in the ignition 1 voltage circuit. Refer to **Wiring Repairs** in Wiring Systems. Did you correct the condition?	Go to **Step 11**	-
9	Replace the ignition switch. Refer to **Ignition Switch Replacement** in Steering Wheel and Column. Did you complete the replacement?	Go to **Step 11**	-
10	**IMPORTANT:** **Perform the set up procedure for the replacement BCM.** Replace the BCM. Refer to **Body Control Module Replacement** in Body Control System.Did you complete the replacement?	Go to **Step 11**	-
11	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	Go to **Step 2**	System OK

DTC P0461

Circuit Description

The fuel level sensor changes resistance in response to the fuel level. The powertrain control module (PCM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the PCM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the PCM senses a high signal voltage. The PCM uses the signal circuit of the fuel level sensor in order to calculate the percentage of remaining fuel in the tank. The PCM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gauge. The fuel level information is also used for misfire and evaporative emission (EVAP) diagnostics.

This diagnostic tests for a stuck fuel level sensor signal. The PCM sets this DTC if the fuel level sensor signal appears to be stuck based on a lack of signal variation expected during normal operation.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

The PCM does not detect a change in fuel level of at least 3.0L (0.79 gal) over a distance of 320 km (200 miles).

Action Taken When the DTC Sets

- The fuel gauge defaults to empty.
- The low fuel indicator illuminates.
- The PCM records the operating conditions at the time that the diagnostic test fails. The PCM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The PCM receives the clear code command from the scan tool.

Diagnostic Aids

- Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.
- Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

DTC P0461

Step	Action	Yes	No
Schematic Reference: **Instrument Cluster Schematics**			

1	Did you perform the Diagnostic System Check - Instrument Cluster?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Remove the fuel level sender. 2. Inspect for the following items: • The fuel level sensor is stuck, perhaps due to an interference with the fuel strainer. • The fuel tank contains foreign material, for instance, ice. Did you find and correct the condition?	Go to **Step 4**	Go to **Step 3**
3	Replace the fuel level sensor. Refer to **Fuel Level Sensor Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	Go to **Step 4**	-
4	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	Go to **Step 2**	System OK

DTC P0462

Circuit Description

The fuel level sensor changes resistance in response to fuel level. The PCM monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the PCM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the PCM senses a high signal voltage. The PCM uses the signal circuit of the fuel level sensor in order to calculate the percentage of remaining fuel in the tank. The PCM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gauge. The fuel level information is also used for misfire and EVAP diagnostics.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

- The sender output is less than 0.39 volts.
- The above condition is present for greater than 30 seconds.

Action Taken When the DTC Sets

- The fuel gauge defaults to empty.
- The low fuel indicator illuminates.

- The PCM records the operating conditions at the time that the diagnostic test fails. The PCM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The PCM receives the clear code command from the scan tool.

Diagnostic Aids

- Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.
- Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

The number below refers to the step number on the diagnostic table.

3: Tests for the proper operation of the circuit in the high voltage range.

DTC P0462

Step	Action	Value (s)	Yes	No
Schematic Reference: Instrument Cluster Schematics				
1	Did you perform the Instrument Cluster Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Fuel Tank Level Remaining parameter in the PCM Enhanced EVAP data list. Does the scan tool indicate that the Fuel Tank Level Remaining parameter is greater than the specified value?	98%	Go to **Step 3**	Go to Diagnostic Aids
	1. Turn the ignition OFF. 2. Disconnect C106. 3. Turn the ignition ON, with the engine OFF.			

3	4. With a scan tool, observe the Fuel Tank Level Remaining parameter. Does the scan tool indicate that the Fuel Tank Level Remaining parameter is less than the specified value?	4%	Go to **Step 5**	Go to **Step 4**
4	Test the signal circuit of the fuel level sensor for a short to ground. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 7**
5	Test the signal circuit of the fuel level sensor for a short to ground between C106 and the fuel level sensor. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 6**
6	Inspect for poor connections at the harness connector of the fuel level sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 8**
7	Inspect for poor connections at the harness connector of the PCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 9**
8	Replace the fuel level sensor. Refer to **Fuel Level Sensor Replacement** in Engine Controls- 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 10**	-
9	**IMPORTANT:** **Program the replacement PCM.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-6.0L (LQ4).Did you complete the replacement?	-	Go to **Step 10**	-
10	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to **Step 2**	System OK

DTC P0463

Circuit Description

The fuel level sensor changes resistance in response to fuel level. The PCM monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the PCM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the PCM

senses a high signal voltage. The PCM uses the signal circuit of the fuel level sensor in order to calculate the percentage of remaining fuel in the tank. The PCM sends the fuel level percentage via the class 2 serial data circuit to the instrument cluster in order to control the fuel gauge. The fuel level information is also used for misfire and EVAP diagnostics.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

- The sender output is greater than 2.9 volts.
- The above condition is present for greater than 30 seconds.

Action Taken When the DTC Sets

- The fuel gauge defaults to empty.
- The low fuel indicator illuminates.
- The PCM records the operating conditions at the time that the diagnostic test fails. The PCM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The PCM receives the clear code command from the scan tool.

Diagnostic Aids

- Use the Freeze Frame/Failure Records data in order to locate an intermittent condition. If you cannot duplicate the DTC, the information included in the Freeze Frame/Failure Records data may help in determining the number of miles since the DTC set. The Fail Counter and Pass Counter can also help in determining the number of ignition cycles that the diagnostic test reported a pass and/or fail. Operate the vehicle within the same freeze frame conditions, including those for RPM, for engine load, for vehicle speed, for temperature, and for others. This will isolate at what point the DTC failed.
- Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

The number below refers to the step number on the diagnostic table.

3: Tests for the proper operation of the circuit in the low voltage range.

DTC P0463

		Value	Yes	No

Step	Action	(s)		
Schematic Reference:Instrument Cluster Schematics				
1	Did you perform the Instrument Cluster Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Fuel Tank Level Remaining parameter in the PCM Enhanced EVAP data list. Does the scan tool indicate that the Fuel Tank Level Remaining parameter is less than the specified value?	4%	Go to **Step 3**	Go to Diagnostic Aids
3	1. Turn the ignition OFF. 2. Disconnect C106. 3. Connect a 3-ampere fused jumper wire between the signal circuit of the fuel level sensor and the low reference circuit of the fuel level sensor on the male terminal side of the connector. 4. Turn the ignition ON, with the engine OFF. 5. With a scan tool, clear the DTCs. 6. With a scan tool, observe the Fuel Tank Level Remaining parameter. Does the scan tool indicate that the Fuel Tank Level Remaining parameter is greater than the specified value?	98%	Go to **Step 6**	Go to **Step 4**
4	Test the signal circuit of the fuel level sensor for an open, for a high resistance, or for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 5**
5	Test the low reference circuit of the fuel level sensor for an open, for a high resistance, or for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 9**
6	Test the signal circuit of the fuel level sensor for an open, for a high resistance, or for a short to voltage between C106 and the fuel level sensor. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 7**
7	Test the low reference circuit of the fuel level sensor for an open, for a high resistance, or for a short to voltage between C106 and the fuel level sensor. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems.	-	Go to **Step**	

	Did you find and correct the condition?		**12**	Go to **Step 8**
8	Inspect for poor connections at the harness connector of the fuel level sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 10**
9	Inspect for poor connections at the harness connector of the PCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 11**
10	Replace the fuel level sensor. Refer to **Fuel Level Sensor Replacement** in Engine Controls- 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 12**	-
11	**IMPORTANT:** **Program the replacement PCM.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls- 6.0L (LQ4).Did you complete the replacement?	-	Go to **Step 12**	-
12	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC as specified in the supporting text. Does the DTC reset?	-	Go to **Step 2**	System OK

DTC P0522

Circuit Description

The engine oil pressure (EOP) sensor changes resistance based on engine oil pressure. The PCM monitors the signal circuit of the EOP sensor. When the oil pressure is high, the sensor resistance is high, and the PCM senses a high signal voltage. When the oil pressure is low, the sensor resistance is low, and the PCM senses a low signal voltage. The PCM sends the engine oil pressure information to the IPC via the class 2 serial data circuit.

Conditions for Running the DTC

- The engine is running.
- DTC P0641 is not present.

Conditions for Setting the DTC

- The PCM detects that the EOP sensor signal circuit is less than 0.4 volts.
- The above condition is present for greater than 9 seconds.

Action Taken When the DTC Sets

- The PCM records the operating conditions at the time the diagnostic test fails. The PCM displays this information in the Failure Records on the scan tool.
- The instrument panel cluster (IPC) illuminates the engine oil pressure indicator.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction free warm-up cycles.
- The PCM receives a clear code command from the scan tool.

Diagnostic Aids

Using the Failure Records data may help locate an intermittent condition. If you cannot duplicate the DTC, the information in the Failure Records can help determine how many miles since the DTC set. The Fail Counter and Pass Counter can help determine how many ignition cycles that the diagnostic test reported a pass and/or a fail.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

The number below refers to the step number on the diagnostic table.

4: This step tests for the proper operation of the circuit in the high voltage range.

DTC P0522

Step	Action	Values	Yes	No
Schematic Reference: Instrument Cluster Schematics				
1	Did you perform the Instrument Cluster Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With the scan tool, observe the Engine Oil Pressure Sensor parameter in the PCM Engine Data 2 data list. Does the Engine Oil Pressure Sensor parameter display less than the specified value?	0.4 V	Go to **Step 3**	Go to Diagnostic Aids
3	Is DTC P0641 current in the PCM?	-	Go to **DTC P0641** in Engine Controls	Go to **Step 4**

4	1. Turn the ignition OFF. 2. Disconnect the engine oil pressure (EOP) sensor. 3. Connect a 3-ampere fused jumper between the EOP sensor signal circuit and the 5 volt reference circuit of the EOP sensor. 4. With the scan tool, observe the Engine Oil Pressure Sensor parameter. Does the Engine Oil Pressure Sensor parameter display greater than the specified value?	4.6 V	Go to **Step 8**	Go to **Step 5**
5	1. Disconnect the fused jumper. 2. Measure the voltage between the 5 volt reference circuit of the EOP sensor and the low reference circuit of the EOP sensor. Does the voltage measure greater than the specified value?	4.6 V	Go to **Step 7**	Go to **Step 6**
6	Test the 5 volt reference circuit of the EOP sensor for an open or for a high resistance. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 9**
7	Test the EOP sensor signal circuit for an open, for a short to ground, or for a high resistance. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 9**
8	Inspect for poor connections at the harness connector of the EOP sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 10**
9	Inspect for poor connections at the harness connector of the PCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 11**
10	Replace the EOP sensor. Refer to **Engine Oil Pressure Sensor and/or Switch Replacement** in Engine Mechanical. Did you complete the replacement?	-	Go to **Step 12**	-
11	**IMPORTANT:** **Program the replacement PCM.**	-		-

	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-6.0L (LQ4).Did you complete the replacement?		Go to **Step 12**	
12	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC. Does the DTC reset?	-	Go to **Step 2**	System OK

DTC P0523

Circuit Description

The engine oil pressure (EOP) sensor changes resistance based on engine oil pressure. The PCM monitors the signal circuit of the EOP sensor. When the oil pressure is high, the sensor resistance is high, and the PCM senses a high signal voltage. When the oil pressure is low, the sensor resistance is low, and the PCM senses a low signal voltage. The PCM sends the engine oil pressure information to the IPC via the class 2 serial data circuit.

Conditions for Running the DTC

- The engine is running.
- DTC P0641 is not present.

Conditions for Setting the DTC

- The PCM detects that the EOP sensor signal circuit is greater than 4.6 volts.
- The above condition is present for greater than 9 seconds.

Action Taken When the DTC Sets

The PCM records the operating conditions at the time that the diagnostic test fails. The PCM displays this information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC is cleared after 40 malfunction-free warm-up cycles.
- The PCM receives the clear code command from the scan tool.

Diagnostic Aids

Using the Failure Records data may help locate an intermittent condition. If you cannot duplicate the DTC, the information in the Failure Records can help in determining how many miles since the DTC set. The Fail Counter and the Pass Counter can help determine how many ignition cycles that the diagnostic test reported a

pass and/or a fail.

Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Test Description

The number below refers to the step number on the diagnostic table.

3: This step tests for the proper operation of the circuit in the low voltage range.

DTC P0523

Step	Action	Values	Yes	No
Schematic Reference: Instrument Cluster Schematics				
1	Did you perform the Instrument Cluster Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With the scan tool, observe the Engine Oil Pressure Sensor parameter in the PCM Engine Data 2 data list. Does the Engine Oil Pressure Sensor parameter display greater than the specified value?	4.6 V	Go to **Step 3**	Go to Diagnostic Aids
3	1. Turn the ignition OFF. 2. Disconnect the engine oil pressure (EOP) sensor. 3. With the scan tool, observe the Engine Oil Pressure Sensor parameter. Does the Engine Oil Pressure Sensor parameter display less than the specified value?	0.4 V	Go to **Step 4**	Go to **Step 5**
4	1. Turn the ignition OFF. 2. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure (Single Battery)** in Engine Electrical. 3. Measure the resistance from the low reference circuit of the EOP sensor to a good ground. Is the resistance less than the specified value?	5 ohm	Go to **Step 7**	Go to **Step 6**
5	Test the EOP sensor signal circuit for a short to voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 8**
	1. Disconnect the PCM.			

6	2. Test the low reference circuit of the EOP sensor for an open or for a high resistance. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 8**
7	Inspect for poor connections at the harness connector of the EOP sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 9**
8	Inspect for poor connections at the harness connector of the PCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 10**
9	Replace the EOP sensor. Refer to **Engine Oil Pressure Sensor and/or Switch Replacement** in Engine Mechanical. Did you complete the replacement?	-	Go to **Step 11**	-
10	**IMPORTANT:** **Program the replacement PCM.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-6.0L (LQ4).Did you complete the replacement?	-	Go to **Step 11**	-
11	1. Use the scan tool in order to clear the DTCs. 2. Operate the vehicle within the Conditions for Running the DTC. Does the DTC reset?	-	Go to **Step 2**	System OK

DTC P0608

Circuit Description

The powertrain control module (PCM) creates the vehicle speed output signal by pulsing the circuit to ground. The PCM monitors the voltage on the vehicle speed output circuit. If the PCM determines that the voltage is out of the normal operating range, a DTC sets.

Conditions for Running the DTC

- The engine speed is more than 400 RPM.
- The ignition voltage is between 6.0-18.0 volts.

Conditions for Setting the DTC

- The PCM detects that the commanded state of the driver and the actual state of the signal circuit do not match.
- The above condition must be present for a minimum of 5 seconds.

Action Taken When the DTC Sets

The PCM records the operating conditions at the time the diagnostic fails. The PCM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the MIL/DTC

- The history DTC clears after 40 malfunction free warm-up cycles.
- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The PCM receives the clear code command from the scan tool.

DTC P0608

Step	Action	Value (s)	Yes	No
Schematic Reference: Instrument Cluster Schematics				
1	Did you perform the instrument panel cluster (IPC) Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Install a scan tool. 2. Raise the vehicles drive wheels. Refer to **Lifting and Jacking the Vehicle** in General Information. 3. Start the engine. 4. Place the transmission into drive for an automatic transmission or third gear for a manual transmission. 5. With the scan tool, observe the Vehicle Speed Sensor parameter in the powertrain control module (PCM) Engine Data 1 data list. Does the Vehicle Speed Sensor parameter match the speedometer display?	-	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Turn OFF the ignition. 2. Disconnect the PCM connector C2. 3. Turn ON the ignition, with the engine OFF. 4. Measure the voltage from the vehicle	9.5 V		

	speed signal circuit of the PCM to a good ground. Does the voltage measure greater than the specified value?		Go to **Step 4**	Go to **Step 5**
4	Test the vehicle speed signal circuit for a short to battery voltage. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 6**
5	Test the vehicle speed signal circuit for an open, for a short to voltage, or for a short to ground. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 7**
6	Inspect for poor connections at harness connector of the PCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 8**
7	Inspect for poor connections at the harness connector of the IPC. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 10**	Go to **Step 9**
8	**IMPORTANT:** **Program the replacement PCM.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-6.0L (LQ4).Did you complete the replacement?	-	Go to **Step 10**	-
9	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	-	Go to **Step 10**	-
10	1. Use the scan tool in order to clear the DTCs. 2. Operate vehicle within the Conditions for Running this DTC. Does the DTC reset?	-	Go to **Step 2**	System OK

DTC P0654

Circuit Description

The powertrain control module (PCM) creates the engine speed signal by pulsing the circuit to ground. The PCM monitors the voltage on the engine speed signal circuit. If the PCM determines that the voltage is not within the normal operating range, the PCM sets a DTC.

Conditions for Running the DTC

- The engine speed is greater than 400 RPM.
- The ignition voltage is greater than 6 volts, but less than 18 volts.

Conditions for Setting the DTC

- The PCM detects that the commanded state of the driver and the actual state of the signal circuit do not match.
- The above condition exists for a minimum of 5.0 seconds.

Action Taken When the DTC Sets

- The PCM stores the DTC information in memory when the diagnostic test runs and fails.
- The malfunction indicator lamp (MIL) will not illuminate.
- The PCM records the operating conditions at the time when the diagnostic test fails. The PCM stores this information in the Failure Records.

Conditions for Clearing the MIL/DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- A history DTC is cleared after 40 consecutive malfunction free warm-up cycles.
- The PCM receives the clear code command from the scan tool.

DTC P0654

Step	Action	Yes	No
Schematic Reference:Instrument Cluster Schematics			
1	Did you perform the instrument panel cluster (IPC) Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Install a scan tool. 2. Start the engine. 3. With the scan tool, observe the Engine Speed parameter in the powertrain control module (PCM) Engine Data 1 data list. Does the Engine Speed parameter match the	Go to **Testing for Intermittent Conditions and Poor Connections** in	

	tachometer display?	Wiring Systems	Go to **Step 3**
3	1. Turn OFF the ignition. 2. Disconnect the PCM connector C2. 3. Install one **J 33431-C** lead to the engine speed signal circuit at the PCM harness connector, and connect the other lead to a good ground. See **Special Tools and Equipment** . 4. Turn ON the ignition, with the engine OFF. 5. Set the **J 33431-C** to generate a tachometer signal. See **Special Tools and Equipment** . Does the vehicle tachometer indicate an RPM reading?	Go to **Step 5**	Go to **Step 4**
4	Test the engine speed signal circuit for a short to voltage or for a short to ground. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 9**	Go to **Step 6**
5	Inspect for poor connections at the PCM connector. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 9**	Go to **Step 7**
6	Inspect for a poor connection at the harness connector of the IPC. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 9**	Go to **Step 8**
7	**IMPORTANT:** **Program the replacement PCM.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-6.0L (LG4).Did you complete the replacement?	Go to **Step 9**	-
8	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 9**	-
9	1. Use the scan tool in order to clear the DTCs. 2. Operate vehicle within the Conditions for Running this DTC.		

	Does the DTC reset?	Go to **Step 2**	System OK

SYMPTOMS - INSTRUMENT PANEL, GAUGES AND CONSOLE

IMPORTANT: The following steps must be completed before using the symptom tables.

1. Perform **Diagnostic System Check - Instrument Cluster** , **Diagnostic System Check - Driver Information Systems** or **Diagnostic System Check - Audible Warnings** before using the Symptom Tables in order to verify that all of the following are true:
   - There are no DTCs set.
   - The control modules can communicate via the serial data link.
2. Review the system operation in order to familiarize yourself with the system functions. Refer to the following:
   - **Instrument Panel Cluster (IPC) Description and Operation**
   - **Indicator/Warning Message Description and Operation**
   - **Driver Information Center (DIC) Description and Operation**
   - **Audible Warnings Description and Operation**

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the Instrument Cluster or Audible Warning Systems. Refer to **Checking Aftermarket Accessories** in Wiring Systems.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.
- Inspect for proper fluid level.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

Gauges and Odometer

- **Instrument Cluster Inoperative**
- **Engine Oil Pressure Gauge Inaccurate or Inoperative**
- **Fuel Gauge Inaccurate or Inoperative**
- **Instrument Panel Cluster (IPC) Gauges Inoperative**
- **Odometer Trip/Reset Switch Inoperative**
- **Speedometer and/or Odometer Inaccurate or Inoperative**

- **Tachometer Inaccurate or Inoperative**
- **Volt Gauge Inaccurate or Inoperative**
- **Change Engine Oil Indicator Always On**
- **Low Engine Oil Level Indicator Always On**

Indicators

- **ABS Indicator Always On** in Anti-lock Brake System
- **ABS Indicator Inoperative** in Anti-lock Brake System
- **Air Bag Indicator Circuit Malfunction** in SIR
- **Brake Warning Indicator Always On** in Hydraulic Brakes
- **Brake Warning Indicator Inoperative** in Hydraulic Brakes
- **Change Engine Oil Indicator Always On**
- **Charge Indicator Always On** in Engine Electrical
- **Charge Indicator Inoperative** in Engine Electrical
- **Engine Coolant Temperature Indicator Always On** in Engine Cooling
- **Engine Overheated Indicator Always On** in Engine Cooling
- **High Beam Indicator Always On** in Lighting Systems
- **High Beam Indicator Inoperative** in Lighting Systems
- **Low Engine Oil Level Indicator Always On**
- **Low Washer Fluid Indicator Malfunction** in Wipers/Washer Systems
- **Malfunction Indicator Lamp (MIL) Inoperative** in Engine Controls - 6.0L (LG4)
- **Malfunction Indicator Lamp (MIL) Always On** in Engine Controls - 6.0L (LG4)
- **Security Indicator Always On or Flashing** in Theft Deterrent
- **Security Indicator Inoperative** in Theft Deterrent
- **Service Indicator Always On** in Transfer Case BW 4484
- **Service Indicator Inoperative** in Transfer Case BW 4484
- **Tow/Haul Switch/Indicator Always On or Inoperative** in Automatic Transmission - 4L60E
- **Traction Off Indicator Always On** in Anti-lock Brake System
- **Traction Off Indicator Inoperative** in Anti-lock Brake System
- **Turn Signal Lamps and/or Indicators Always On or Flashing** in Lighting Systems
- **Turn Signal Lamps and/or Indicators Inoperative** in Lighting Systems

Instrument Cluster Dimming

- **Interior Backlighting Inoperative** in Lighting Systems
- **Interior Backlighting Does Not Dim** in Lighting Systems

Driver Information Center (DIC)

Driver Information Center (DIC) Switch(es) Inoperative

Audible Warnings

- **Chime Always On**
- **Chime Inoperative**

INSTRUMENT CLUSTER INOPERATIVE

Instrument Cluster Inoperative

Step or	Action	Yes	No
Schematic Reference: Instrument Cluster Schematics **Connector End View Reference: Instrument Panel, Gauges, and Console Connector End Views**			
1	Did you perform the Instrument Cluster Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Turn the ignition ON, with the engine OFF. 2. Observe the instrument cluster. Does the instrument cluster perform the displays test?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Turn the ignition OFF. 2. Disconnect the IPC. 3. Turn the ignition ON, with the engine OFF. 4. Connect a test lamp between the ignition 1 voltage circuit and a good ground. Does the test lamp illuminate?	Go to **Step 4**	Go to **Step 7**
4	Connect a test lamp between the ignition 1 voltage circuit of the instrument cluster and the ground circuit of the instrument cluster. Does the test lamp illuminate?	Go to **Step 5**	Go to **Step 6**
5	Inspect for poor connections at the harness connector of the IPC. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 9**	Go to **Step 8**
6	Repair the open or a high resistance in the ground circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 9**	-

7	Repair the open, short to ground or high resistance in the ignition 1 voltage circuit. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you complete the repair?	Go to **Step 9**	-
8	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 9**	-
9	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to **Step 3**

ENGINE OIL PRESSURE GAUGE INACCURATE OR INOPERATIVE

Engine Oil Pressure Gauge Inaccurate or Inoperative

Step	Action	Value(s)	Yes	No
Schematic Reference: Instrument Cluster Schematics				
1	Did you perform the Instrument Cluster Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	Start the engine. Does the engine oil pressure (EOP) gauge display within the specified range?	207-483 kPa (30-70 psi)	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, perform the Displays Test in the IPC scan tool Output Controls. Does the engine oil pressure gauge move up and down when commanded?	-	Go to **Step 4**	Go to **Step 10**
4	1. Turn the ignition OFF. 2. Disconnect the negative battery cable. 3. Disconnect the engine oil pressure (EOP) sensor 4. Measure the resistance from the low reference circuit of the EOP sensor to a good ground. Does the resistance measure less than the specified value?	5 ohm	Go to **Step 6**	Go to **Step 5**

5	Test the low reference circuit of the EOP sensor for high resistance or for an open. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 7**
6	Inspect for poor connections at the harness connector of the EOP sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 8**
7	Inspect for poor connections at the harness connector of the PCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 9**
8	Replace the EOP sensor. Refer to **Engine Oil Pressure Sensor and/or Switch Replacement** in Engine Mechanical. Did you complete the replacement?	-	Go to **Step 11**	-
9	**IMPORTANT:** **Program the replacement PCM.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls- 6.0L (LQ4).Did you complete the replacement?	-	Go to **Step 11**	-
10	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	-	Go to **Step 11**	-
11	Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 2**

FUEL GAUGE INACCURATE OR INOPERATIVE

Diagnostic Aids

- Verify that the fuel level is in the same range as the customer concern.
- For intermittent diagnosis, refer to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems.
- Refer to **Fuel Level Specifications** in order to verify the correct readings for the fuel level sensor. The Fuel Tank Level Remaining parameter is available on the scan tool in the powertrain control module (PCM) Enhanced Evap data list.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step tests for a high resistance in the signal circuit and the low reference circuit of the fuel level sensor.

13: DTCs will set in the PCM when you perform this diagnostic table.

Fuel Gauge Inaccurate or Inoperative

Step	Action	Value (s)	Yes	No
Schematic Reference:Instrument Cluster Schematics				
1	Did you perform the instrument panel cluster (IPC) Diagnostic System Check?	-	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Disconnect C106. 2. Connect the **J 33431-C** Signal Generator and Instrument Panel Tester between the signal circuit of the fuel level sensor and the low reference circuit of the fuel level sensor on the male terminal side of the connector. See **Special Tools and Equipment** . 3. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Verify the J 33431-C resistance settings with a DMM. See Special Tools and Equipment .** 4. Vary the resistance on the **J 33431-C** from 40-250 ohm. See **Special Tools and Equipment** . 5. Refer to **Fuel Level Specifications** in order to convert from resistance to fuel gauge display. Does the fuel gauge display the correct fuel level?	-	Go to **Step 4**	Go to **Step 3**
	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Verify the J 33431-C resistance settings with a DMM. See Special Tools and Equipment .** 3. Vary the resistance on the **J 33431-C** from 40-250 ohm. See **Special Tools and Equipment** . 4. Refer to **Fuel Level Specifications** in order to			

3	convert from resistance to fuel level percentage. **IMPORTANT:** **Turn OFF the ignition momentarily between the resistance settings in order to quickly update the scan tool display.** 5. With the scan tool, observe the Fuel Tank Level Remaining parameter in the PCM Enhanced EVAP Data list. Does the scan tool display the correct fuel level percentage?	-	Go to **Step 11**	Go to **Step 5**
4	Inspect for the following items: • A poor connection at the harness connector of the fuel level sensor. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. • A high resistance in the signal circuit of the fuel level sensor or the low reference circuit of the fuel level sensor between the fuel level sensor and C106. • A misaligned fuel level sender. • A deformed fuel tank. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 7**
5	Test the signal circuit of the fuel level sensor for a high resistance. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 6**
6	Test the low reference circuit of the fuel level sensor for a high resistance. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 9**
7	1. Remove the fuel level sender. 2. Inspect for the following items: • The fuel level sensor is stuck, perhaps due to an interference with the fuel strainer. • The fuel tank contains foreign material, for instance, ice. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 8**
	1. With the **J 39200** DMM, measure the resistance of			

8	the fuel level sensor while moving the float arm. 2. Observe both the analog and digital displays on the DMM. Does the resistance change smoothly across the specified range?	40-250 ohm	Go to Diagnostic Aids	Go to **Step 10**
9	Inspect for poor connections at the harness connector of the powertrain control module (PCM). Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 12**
10	Replace the fuel level sensor. Refer to **Fuel Level Sensor Replacement** in Engine Controls- 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 13**	-
11	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	-	Go to **Step 13**	-
12	**IMPORTANT:** **Program the replacement PCM.** Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-6.0L (LQ4).Did you complete the replacement?	-	Go to **Step 13**	-
13	1. Use the scan tool in order to clear the PCM DTCs. 2. Operate the system in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 2**

HOURMETER INACCURATE OR INOPERATIVE

Hourmeter Inaccurate or Inoperative

Step	Action	Yes	No
Schematic Reference:Instrument Cluster Schematics			
1	Did you perform the Instrument Cluster Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	Verify the hourmeter operation. Refer to **Instrument Panel Cluster (IPC) Description and Operation** . Does the hourmeter operate normally?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 4**	-
	Operate the system in order to verify		

4	the repair. Did you correct the condition?	System OK	Go to **Step 2**

INSTRUMENT PANEL CLUSTER (IPC) GAUGES INOPERATIVE

Instrument Panel Cluster (IPC) Gauges Inoperative

Step	Action	Yes	No
Schematic Reference:Instrument Cluster Schematics DEFINITION: This diagnostic procedure applies only to the serial data gauges located in the instrument cluster which include the engine coolant temperature gauge, and the transmission fluid temperature gauge.			
1	Did you perform the instrument panel cluster (IPC) Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Turn ON the ignition, with the engine OFF. 2. Install a scan tool. 3. With the scan tool, perform the Displays Test in the IPC scan tool Output Controls. Does the gauge move from 0 to its maximum value and back to 0 when you perform the Displays Test?	Go to **Step 3**	Go to **Step 4**
3	1. Install a scan tool. 2. Start the engine. 3. Observe the appropriate parameter in the PCM Data list. Refer to **Scan Tool Data List** . Does the parameter match the gauge display?	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 4.8L, 5.3L, and 6.0L	Go to **Step 4**
4	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 5**	-
5	1. Use the scan tool in order to clear any induced DTCs. 2. Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

ODOMETER TRIP/RESET SWITCH INOPERATIVE

Diagnostic Aids

Refer to **Instrument Panel Cluster (IPC) Description and Operation** in order to determine if the condition described by the customer concerning the season and trip odometers is normal operation.

Odometer Trip/Reset Switch Inoperative

Step	Action	Yes	No
Schematic Reference: Instrument Cluster Schematics			
1	Did you perform the Instrument Cluster Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Turn the ignition ON, with the engine OFF. 2. Press the trip odometer reset switch. Does the odometer toggle between the season odometer, the trip odometer, and the hourmeter?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 4**	-
4	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

SPEEDOMETER AND/OR ODOMETER INACCURATE OR INOPERATIVE

Speedometer and/or Odometer Inaccurate or Inoperative

Step	Action	Yes	No
Schematic Reference: Instrument Cluster Schematics **Connector End View Reference: Instrument Panel, Gauges, and Console Connector End Views**			
1	Did you perform the Instrument Cluster Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Install a scan tool. 2. Raise the vehicle's drive wheels. Refer to **Lifting and Jacking the Vehicle** in General Information. 3. Start the engine. 4. Place the transmission into drive for automatic transmission or third gear for manual transmission.		

	5. With the scan tool, observe the Vehicle Speed parameter in the IPC Data 1 data list. Does the VSS parameter match the speedometer display?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	Test the vehicle speed signal circuit for a high resistance between the IPC and the PCM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 4**
4	Inspect for poor connections at the harness connector of the IPC. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 5**
5	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 6**	-
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

TACHOMETER INACCURATE OR INOPERATIVE

Tachometer Inaccurate or Inoperative

Step	Action	Yes	No
Schematic Reference: Instrument Cluster Schematics **Connector End View Reference: Instrument Panel, Gauges, and Console Connector End Views**			
1	Did you perform the Instrument Cluster Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Install a scan tool. 2. Start the engine. 3. With the scan tool, observe the Engine Speed parameter in the IPC Data 1 data list. Does the Engine Speed parameter match the tachometer display?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	Test the engine speed signal circuit for a high resistance between the IPC and PCM. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 4**
	Inspect for poor connections at the harness		

4	connector of the instrument cluster. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 6**	Go to **Step 5**
5	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 6**	-
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

VOLT GAUGE INACCURATE OR INOPERATIVE

Volt Gauge Inaccurate or Inoperative

Step	Action	Yes	No
Schematic Reference:Instrument Cluster Schematics			
1	Did you perform the Diagnostic System Check - Vehicle?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	1. Turn the ignition ON, with the engine OFF. 2. Install a scan tool. 3. With the scan tool, perform the Displays Test in the IPC scan tool Output Controls. Does the gauge move from 0 to its maximum value and back to 0 when you perform the Displays Test?	Go to **Step 3**	Go to **Step 4**
3	1. Install a scan tool. 2. Start the engine. 3. With the scan tool, observe the Battery Voltage parameter in the BCM Data list. Does the Battery Voltage parameter match the gauge display?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 4**
4	Replace the instrument panel cluster (IPC). Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 5**	-
	1. Use the scan tool in order to clear any induced DTCs.		

5	2. Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

CHANGE ENGINE OIL INDICATOR ALWAYS ON

Change Engine Oil Indicator Always On

Step	Action	Yes	No
Schematic Reference: Instrument Cluster Schematics			
1	Did you perform the Instrument Cluster Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
2	Start the engine. Does the CHANGE ENGINE OIL indicator illuminate in the Driver Information Center?	Go to **Step 3**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
3	1. Install a scan tool. 2. With the scan tool, observe the Engine Oil Life Remaining parameter in the PCM Engine Data 2 data list. Does the Engine Oil Life Remaining parameter display 0%?	Go to **Step 4**	Go to **Step 5**
4	Reset the engine oil life. Refer to **GM Oil Life System - Resetting** in Maintenance and Lubrication. Does the CHANGE ENGINE OIL indicator turn off?	Go to **Step 6**	Go to **Step 5**
5	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 6**	-
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

LOW ENGINE OIL LEVEL INDICATOR ALWAYS ON

Low Engine Oil Level Indicator Always On

Step	Action	Yes	No
Schematic Reference:Instrument Cluster Schematics			
1	Did you perform the instrument panel cluster (IPC) Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Instrument Cluster**
	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. With the scan tool, observe the Engine Oil Level		

2	Switch parameter in the powertrain control module (PCM) Engine Data 2 data list. Does the Engine Oil Level Switch parameter display Ok?	Go to **Step 3**	Go to **Step 4**
3	Does the CHECK ENG OIL LEVEL indicator remain illuminated after the displays test?	Go to **Step 11**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
4	1. Turn OFF the ignition. 2. Disconnect the engine oil level switch. 3. Connect a 3-ampere fused jumper between the signal circuit of the engine oil level switch and a good ground. 4. Turn ON the ignition, with the engine OFF. 5. With the scan tool, observe the Engine Oil Level Switch parameter. Does the Engine Oil Level Switch parameter display Ok?	Go to **Step 6**	Go to **Step 5**
5	Test the signal circuit of the engine oil level switch for a short to battery voltage, for an open or for a high resistance. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 8**
6	Test the ground circuit of the engine oil level switch for an open or for a high resistance. Refer to **Circuit Testing** and to **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 7**
7	Inspect for poor connections at the harness connector of the engine oil level switch. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 9**
8	Inspect for poor connections at the harness connector of the PCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and to **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 12**	Go to **Step 10**
9	Replace the engine oil level switch. Refer to **Engine Oil Level Sensor and/or Switch Replacement** in Engine Mechanical. Did you complete the replacement?	Go to **Step 12**	-
10	**IMPORTANT:** **Program the replacement PCM.**		

	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls-6.0L (LQ4).Did you complete the replacement?	Go to **Step 12**	-
11	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 12**	-
12	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 2**

DRIVER INFORMATION CENTER (DIC) SWITCH(ES) INOPERATIVE

Driver Information Center (DIC) Switch(es) Inoperative

Step	Action	Yes	No
Schematic Reference:Instrument Cluster Schematics			
1	Did you perform the driver information center (DIC) Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Driver Information Systems**
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Press and release each of the DIC switches. 4. With a scan tool, observe the DIC Switch parameters in the instrument panel cluster (IPC) Input/Output data list. Does the scan tool display ON when each switch is pressed and OFF when each switch is released?	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	Does the scan tool display OFF when each switch is pressed?	Go to **Step 9**	Go to **Step 4**
4	Does the scan tool always display ON for the suspect switch even when the switch is released?	Go to **Step 5**	Go to **Step 6**
5	1. Turn OFF the ignition. 2. Disconnect the DIC switch connector. 3. Turn ON the ignition, with the engine OFF. 4. With a scan tool, observe the suspect DIC Switch parameter. Does the scan tool display ON for the suspect switch?	Go to **Step 7**	Go to **Step 12**

6	1. Turn OFF the ignition. 2. Disconnect the DIC switch connector. 3. Connect a 3-amp fused jumper wire between the signal circuit of the suspect DIC switch and a good ground. Refer to **Circuit Testing** in Wiring Systems. 4. Turn ON the ignition, with the engine OFF. 5. With a scan tool, observe the suspect DIC Switch parameter. Does the scan tool display ON for the suspect switch?	Go to **Step 10**	Go to **Step 8**
7	Test the signal circuit of the suspect DIC switch for a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 11**
8	Test the signal circuit of the suspect DIC switch for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 11**
9	Test the ground circuit of the DIC switch for an open or high resistance. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 10**
10	Inspect for poor connections at the harness connector of the DIC switch. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 12**
11	Inspect for poor connections at the harness connector of the IPC. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 14**	Go to **Step 13**
12	Replace the DIC switch. Refer to **Steering Wheel Control Switch Assembly Replacement** in Steering Wheel and Column. Did you complete the replacement?	Go to **Step 14**	-
13	Replace the IPC. Refer to **Instrument Panel Cluster (IPC) Replacement** . Did you complete the replacement?	Go to **Step 14**	-
	Operate the system in order to verify the repair.		

14	Did you correct the condition?	System OK	Go to **Step 2**

CHIME ALWAYS ON

Chime Always On

Step	Action	Yes	No
Schematic Reference:Audible Warnings Schematics			
1	Did you perform the Audible Warnings Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Audible Warnings**
2	Do any indicators illuminate when the chime sounds?	Go to **Symptoms - Instrument Panel, Gauges and Console**	Go to **Step 3**
3	1. Turn the ignition OFF. 2. Remove the key from the ignition. 3. Turn the headlamp switch to OFF. 4. Close all of the vehicles doors. 5. Open one or more of the vehicles doors Does the chime sound at all times regardless if the doors are open or closed?	Go to **Step 16**	Go to **Step 4**
4	1. Close all of the vehicles doors. 2. With a scan tool observe the Driver Door Ajar Switch and the Passenger Door Ajar Switch parameters in the BCM inputs data list or the Door Ajar Switch parameters in the DDM/PDM inputs data list. Do all of the Door Ajar Switch parameters display Off or Inactive?	Go to **Step 5**	Go to **Courtesy Lamps Always On** in Lighting Systems
5	With a scan tool observe the Left Rear Cargo Door Ajar Switch and the Right Rear Door Ajar Switch parameters in the BCM inputs data list. Do all of the Door Switch parameters display Inactive?	Go to **Step 6**	Go to **Courtesy Lamps Always On** in Lighting Systems
6	With a scan tool, observe the Cargo Door Ajar Switch and the Hood Ajar Switch parameters in the BCM inputs data list. Does the Cargo Door Ajar Switch and the Hood Ajar Switch parameters display Inactive?	Go to **Step 7**	Go to **Courtesy Lamps Always On** in Lighting Systems
	1. Turn the ignition OFF. 2. Remove the key from the ignition.		

7	3. Turn the headlamp switch to OFF. 4. Open the drivers door. Does the chime sound?	Go to **Step 8**	Go to **Testing for Intermittent Conditions and Poor Connections** in Wiring Systems
8	1. Install a scan tool. 2. Turn the ignition ON, with the engine OFF. 3. With a scan tool, observe the Parklamp Switch parameter in the BCM inputs data list. Does the Parklamp Switch parameter display inactive?	Go to **Step 9**	Go to **Step 11**
9	With a scan tool, observe the Headlamp Switch parameter in the BCM inputs data list. Does the Headlamp Switch parameter display Inactive?	Go to **Step 10**	Go to **Step 11**
10	1. Turn the ignition OFF. 2. Remove the key from the ignition. 3. With a scan tool, observe the Key In Ignition parameter in the BCM inputs data list. Does the Key In Ignition parameter display No?	Go to **Step 15**	Go to **Step 12**
11	Test the headlamp input signal circuit and the park lamp signal circuit at the BCM for a short to voltage. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 21**	Go to **Step 13**
12	Test the key in ignition signal circuit for a short to ground. Refer to **Circuit Testing** and **Wiring Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 21**	Go to **Step 14**
13	Inspect for poor connections at the harness connector of the headlamp switch. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 21**	Go to **Step 17**
14	Inspect for poor connections at the harness connector of the ignition key alarm switch. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 21**	Go to **Step 18**
	Inspect for poor connections at the harness		

15	connector of the BCM. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 21**	Go to **Step 19**
16	Inspect for poor connections at the harness connector of the radio or audio amplifier. Refer to **Testing for Intermittent Conditions and Poor Connections** and **Connector Repairs** in Wiring Systems. Did you find and correct the condition?	Go to **Step 21**	Go to **Step 20**
17	Replace the headlamp switch. Refer to **Headlamp Switch Replacement** in Lighting Systems. Did you complete the replacement?	Go to **Step 21**	-
18	Replace the ignition switch. Refer to **Ignition Switch Replacement** in Steering Wheel and Column. Did you complete the replacement?	Go to **Step 21**	-
19	**IMPORTANT:** **Program the replacement BCM.** Replace the BCM. Refer to **Body Control Module Replacement** in Body Control System.Did you complete the replacement?	Go to **Step 21**	-
20	**IMPORTANT:** **Program the replacement radio or audio amplifier.** Replace the radio. Refer to **Radio Replacement** or**Amplifier Replacement** in Entertainment.Did you complete the replacement?	Go to **Step 21**	-
21	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 3**

CHIME INOPERATIVE

Chime Inoperative

Step	Action	Yes	No
Schematic Reference:Audible Warnings Schematics DEFINITION: One or more chime functions are inoperative.			
1	Did you perform the Audible Warning Diagnostic System Check?	Go to **Step 2**	Go to **Diagnostic System Check - Audible Warnings**
	1. Turn the ignition OFF, with the key in the ignition.	Go to **Testing for**	

2	2. Open the driver's door. Does the chime sound?	**Intermittent Conditions and Poor Connections** in Wiring Systems	Go to **Step 3**
3	Do the courtesy lights turn on when you open the drivers door?	Go to **Step 4**	Go to **Courtesy Lamps Inoperative** in Lighting Systems
4	1. Turn the ignition ON, with the engine OFF. 2. Turn the radio ON. 3. Adjust the radio balance and fade to the left front speaker. Does the speaker operate properly?	Go to **Step 5**	Go to **Speakers Inoperative - One or More** in Entertainment
5	**IMPORTANT:** **Program the replacement radio or audio amplifier.** Replace the radio. Refer to **Radio Replacement** or **Amplifier Replacement** in Entertainment.Did you complete the replacement?	Go to **Step 6**	-
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Step 1**

REPAIR INSTRUCTIONS

INSULATOR REPLACEMENT - INSTRUMENT PANEL (I/P)

Removal Procedure

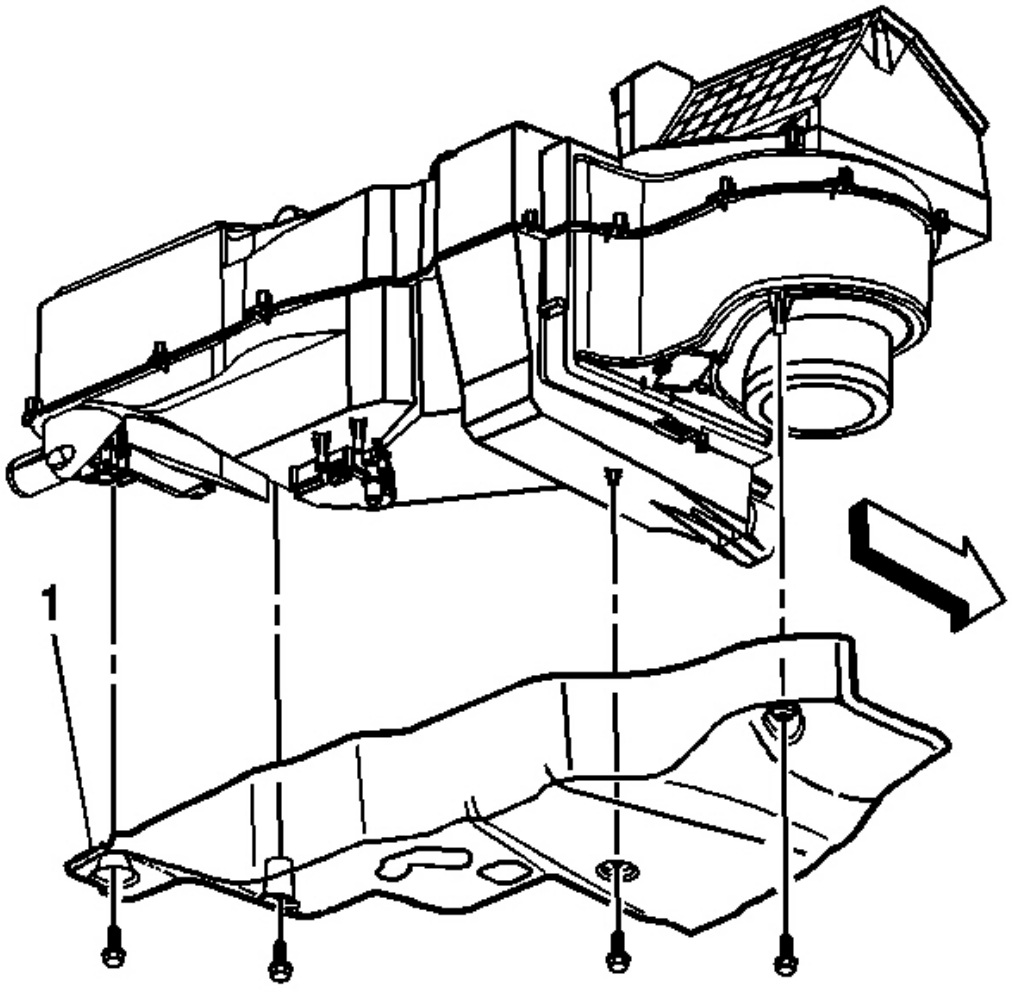


Fig. 11: Insulator & Instrument Panel
Courtesy of GENERAL MOTORS CORP.

1. Remove the retaining bolts.
2. Remove the insulator (1) from the instrument panel by pulling downwards.

Installation Procedure

1. Install the insulator (1) to the instrument panel.

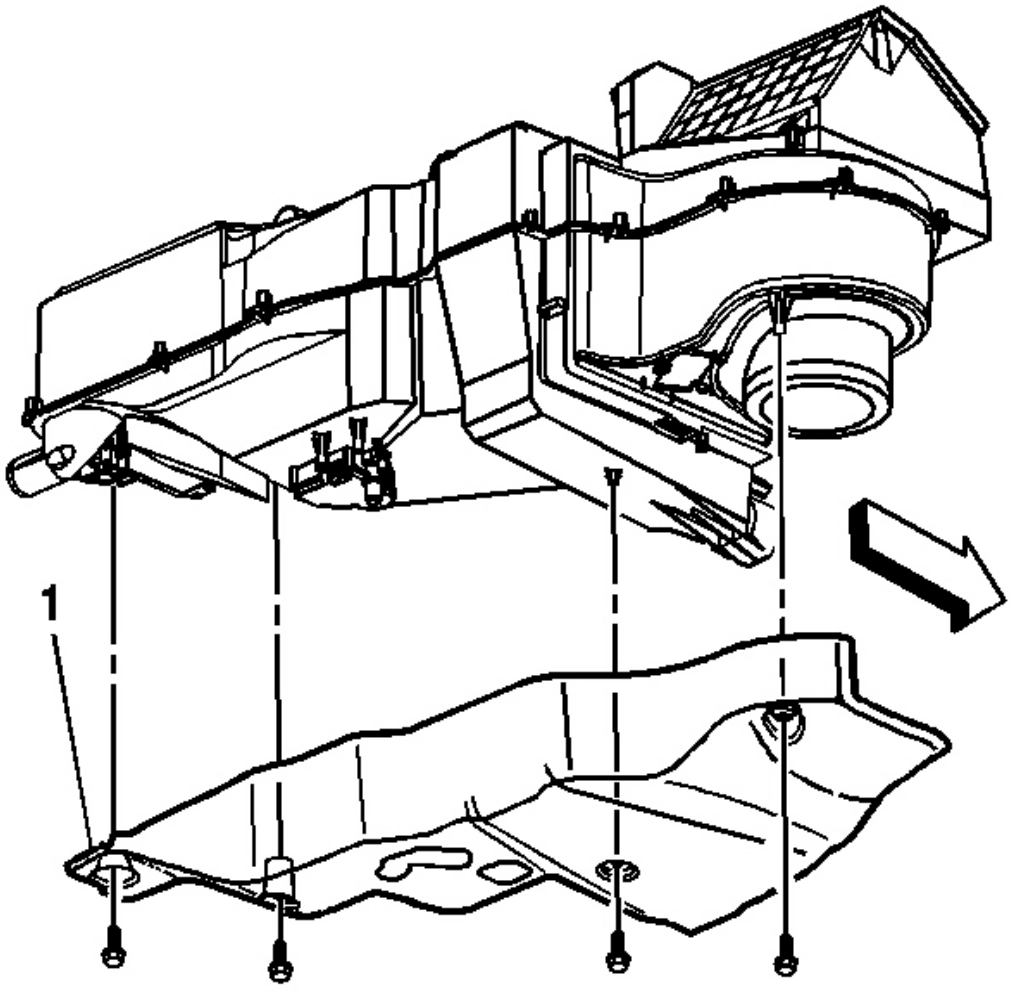


Fig. 12: Insulator & Instrument Panel
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the retaining bolts.

   Tighten: Tighten the bolts to 1.6 N.m (14 lb in)

INSTRUMENT PANEL (I/P) EXTENSION TRIM PLATE REPLACEMENT

Removal Procedure

1. Loosen and move center console reward for access to the I/P extension trim plate. Refer to **Console Replacement** .
2. Loosen and remove the I/P center trim panel from the I/P. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Center** .

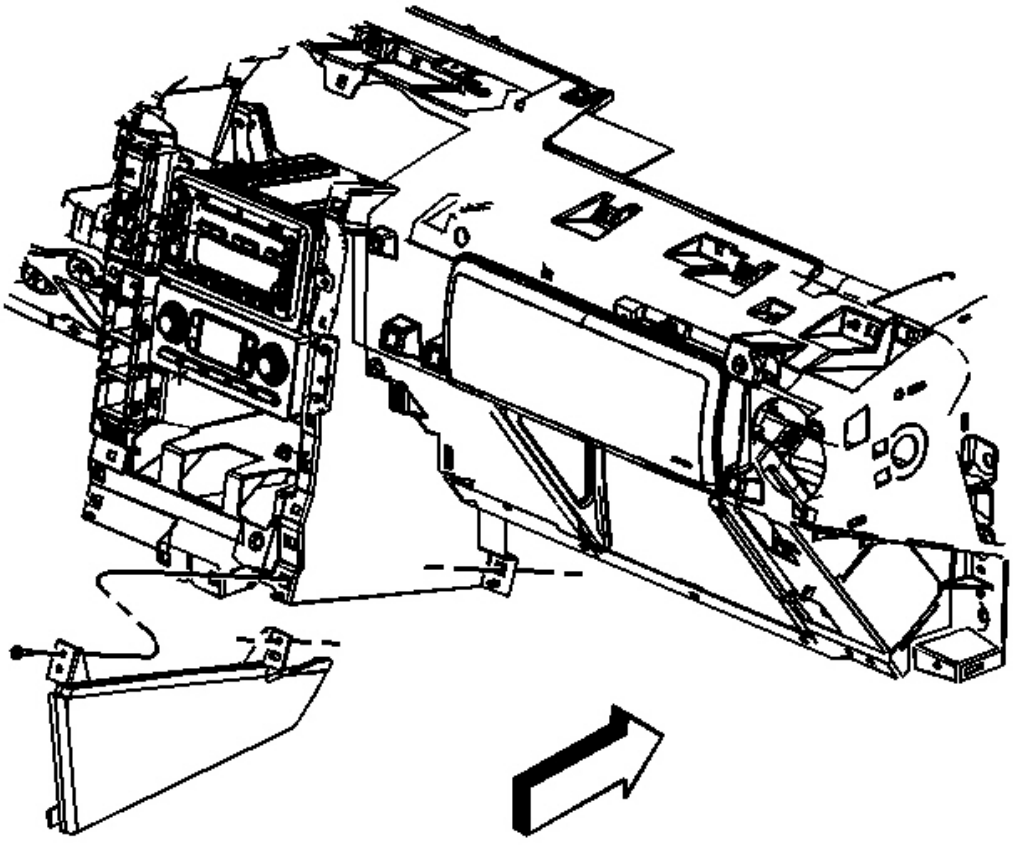


Fig. 13: I/P Extension Trim Plate
Courtesy of GENERAL MOTORS CORP.

3. Remove the screws that hold the I/P extension trim plate to the I/P.

Installation Procedure

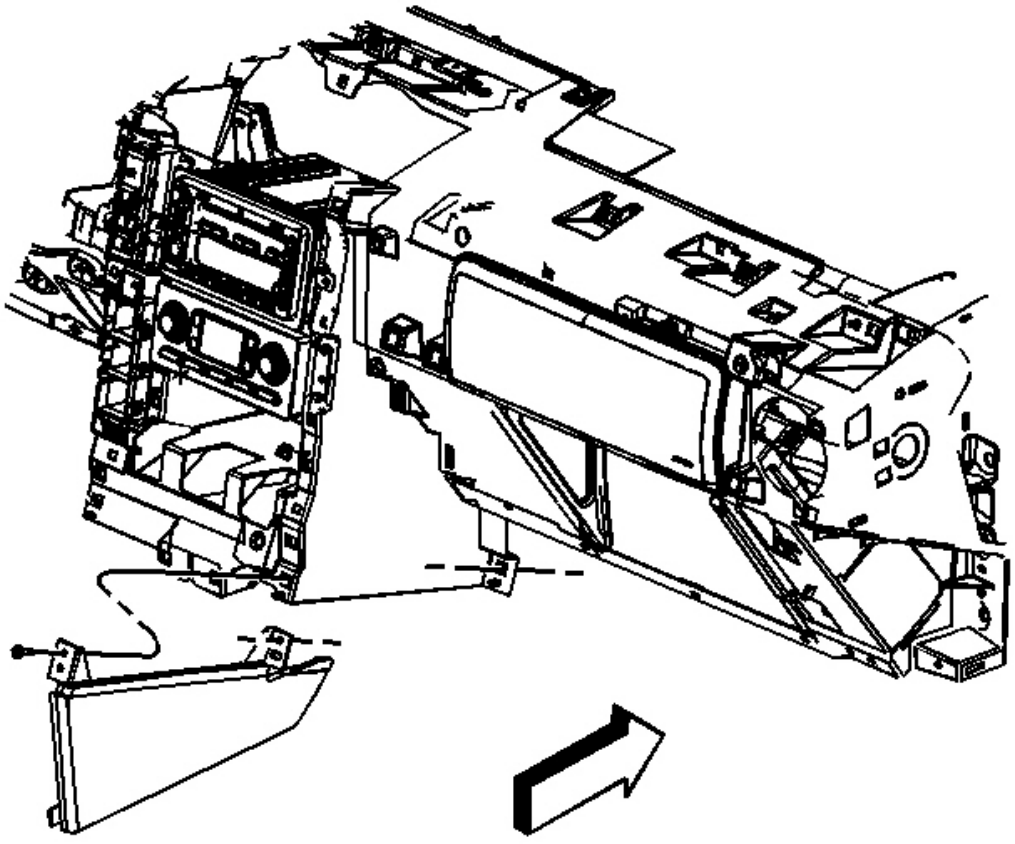


Fig. 14: I/P Extension Trim Plate
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Align and tighten the screws that hold the I/P extension trim plate with the I/P.

   Tighten: Tighten the screws to 2 N.m (18 lb in).

2. Align and fasten the I/P corner trim panel with the I/P. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Center** .
3. Align and move forward the center console into place and fasten to the center console bracket. Refer to **Console Replacement** .

TRIM PANEL REPLACEMENT - KNEE BOLSTER

Removal Procedure

1. Loosen and move reward center console for access to knee bolster bolt. Refer to **Console Replacement** .
2. Remove the instrument panel cluster (IPC) trim. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Cluster** .

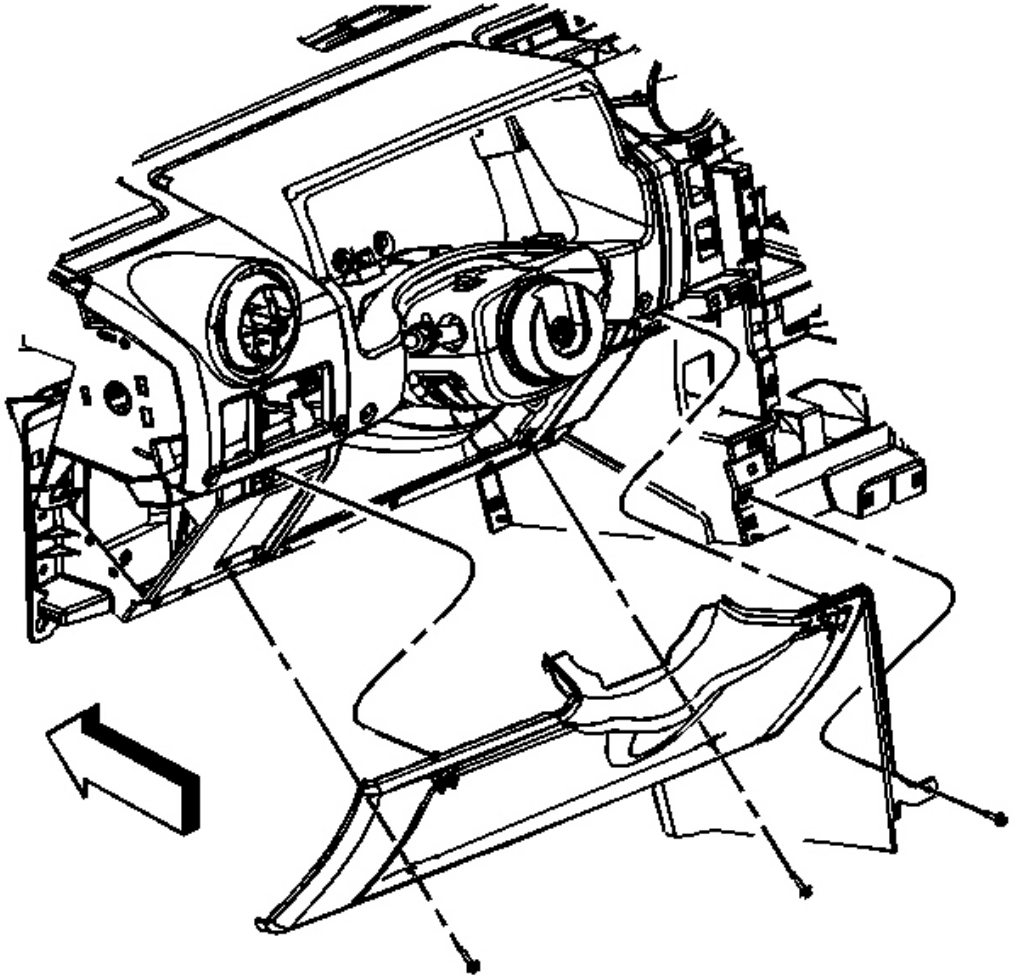


Fig. 15: Knee Bolster Trim Panel
Courtesy of GENERAL MOTORS CORP.

3. Remove the screws/bolts that hold knee bolster trim panel to I/P.
4. Remove the knee bolster trim.

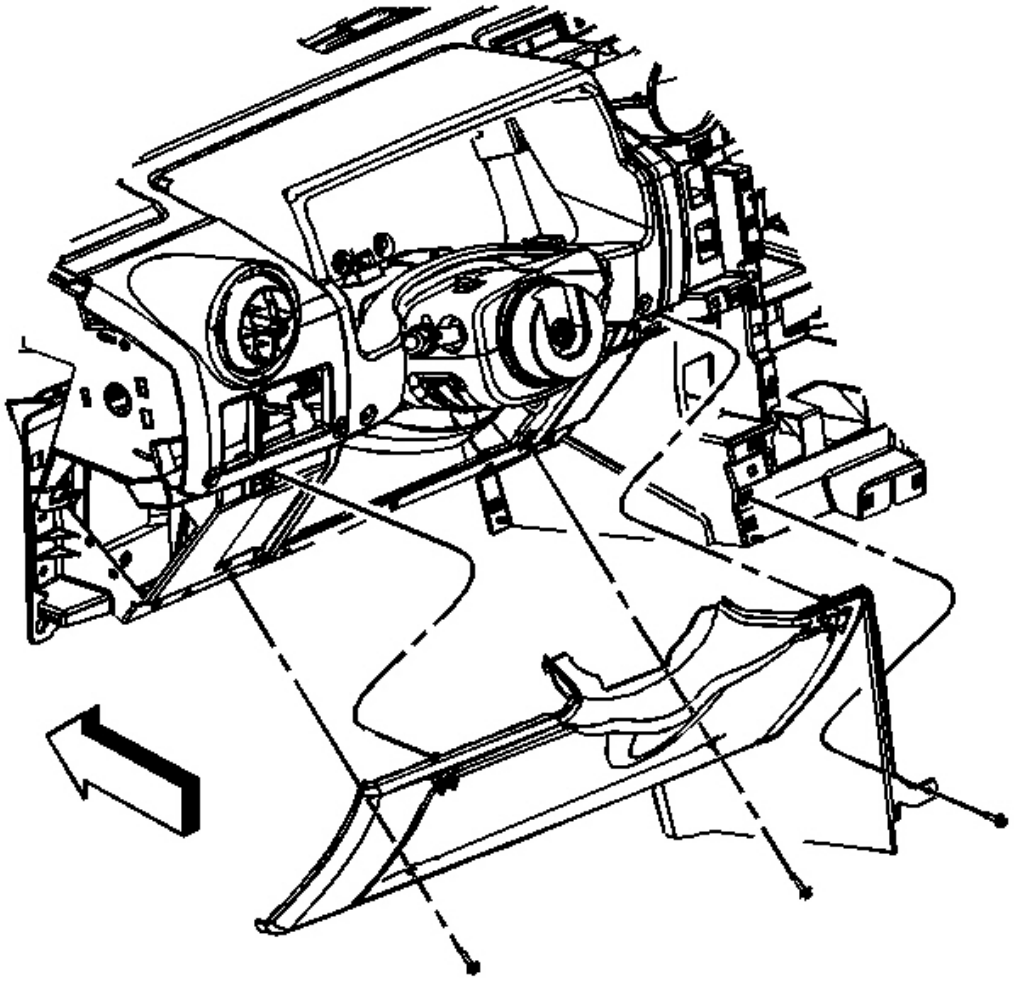


Fig. 16: Knee Bolster Trim Panel
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the knee bolster trim panel to I/P.
2. Install the knee bolster trim panel screws.

Tighten: Tighten the screws to 2 N.m (18 lb in).

3. Install the IPC trim. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Cluster** .
4. Align and move forward center console in place and fasten to center console bracket. Refer to **Console Replacement** .

TRIM PANEL REPLACEMENT - INSTRUMENT PANEL (I/P) ACCESSORY RIGHT

Removal Procedure

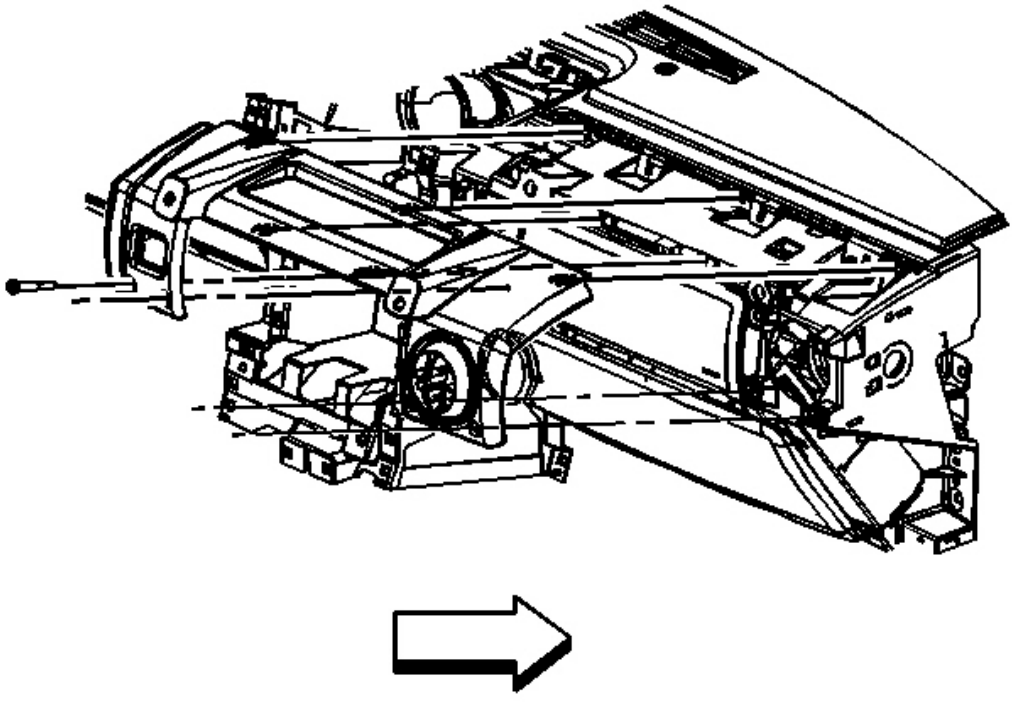


Fig. 17: I/P Accessory Right Trim Panel
Courtesy of GENERAL MOTORS CORP.

1. Remove the I/P (Instrument Panel) compartment. Refer to **Compartment Replacement - Instrument Panel (I/P)** .
2. Remove the I/P assist handle. Refer to **Instrument Panel (I/P) Assist Handle Replacement** .
3. Remove the screws that hold the trim panel to the I/P.
4. Remove the trim from the tabs in the I/P.

Installation Procedure

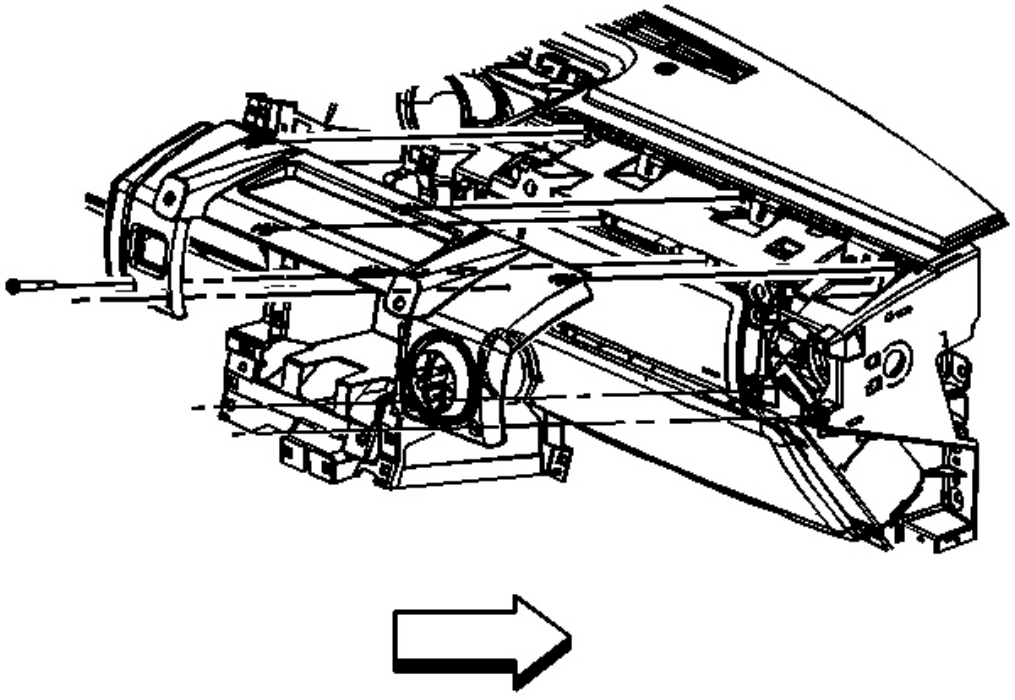


Fig. 18: I/P Accessory Right Trim Panel
Courtesy of GENERAL MOTORS CORP.

1. Align the trim pad with the I/P substrate tabs.

NOTE: **Refer to Fastener Notice in Cautions and Notices.**

2. Install the trim panel screws.

   Tighten: Tighten the screws to 2 N.m (18 lb in).

3. Install the I/P compartment. Refer to **Compartment Replacement - Instrument Panel (I/P)** .
4. Install the I/P assist handle. Refer to **Instrument Panel (I/P) Assist Handle Replacement** .

TRIM PANEL REPLACEMENT - INSTRUMENT PANEL (I/P) ACCESSORY LEFT

Removal Procedure

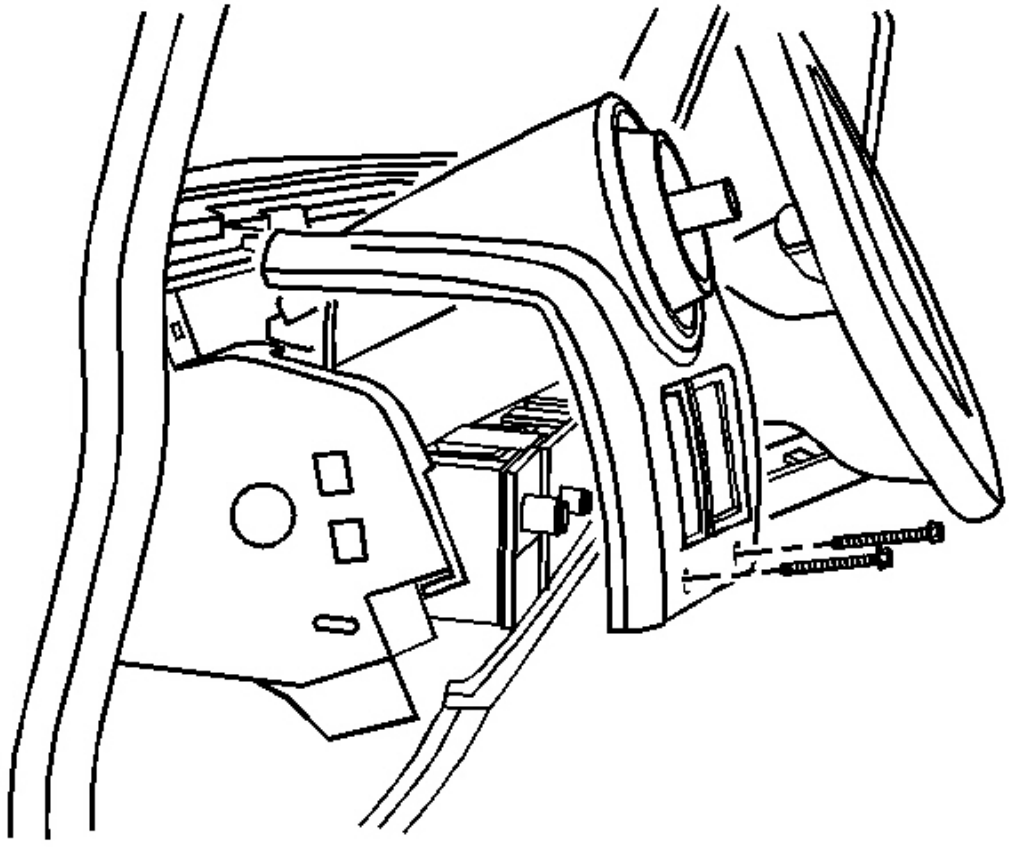


Fig. 19: I/P Accessory Left Trim Panel
Courtesy of GENERAL MOTORS CORP.

1. Remove screws that hold trim panel to I/P.
2. Remove trim from tabs in I/P.

Installation Procedure

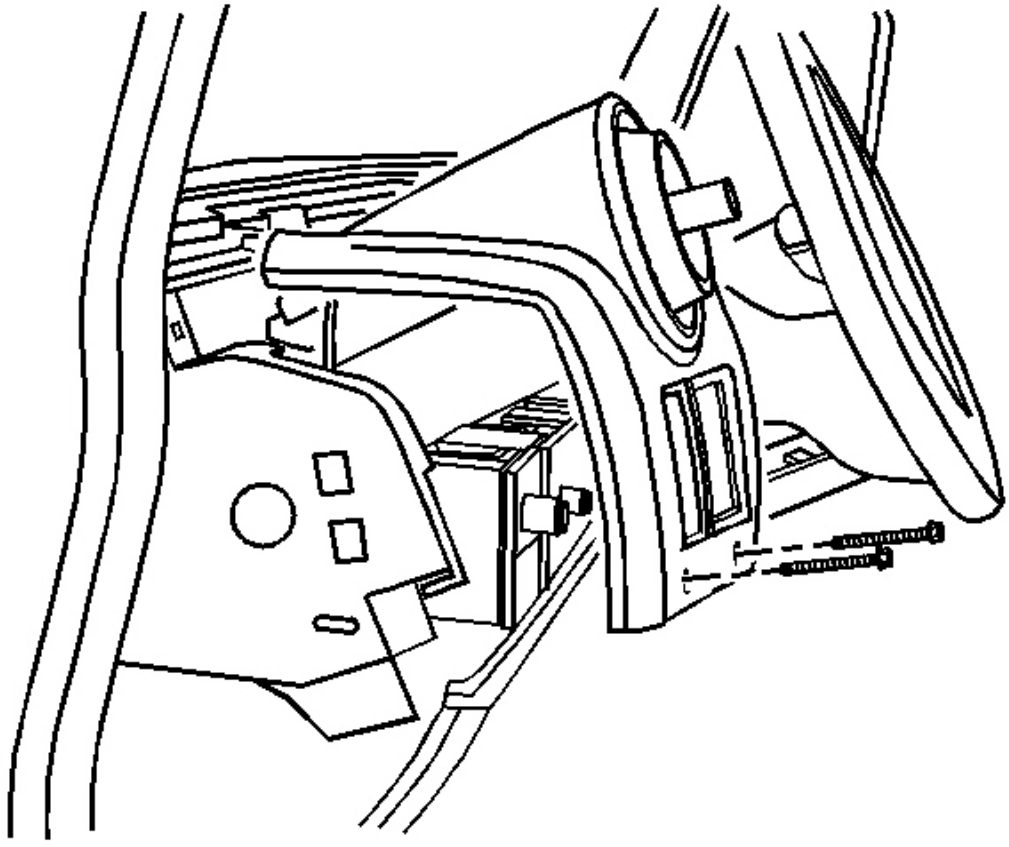


Fig. 20: I/P Accessory Left Trim Panel
Courtesy of GENERAL MOTORS CORP.

1. Align trim pad with I/P tabs.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Fasten trim panel to I/P.

Tighten: Tighten the screws to 2 N.m (18 lb in).

TRIM PANEL REPLACEMENT - INSTRUMENT PANEL (I/P) CENTER

Removal Procedure

1. Loosen and remove the center console for access to the center trim panel. Refer to **Console**

Replacement .

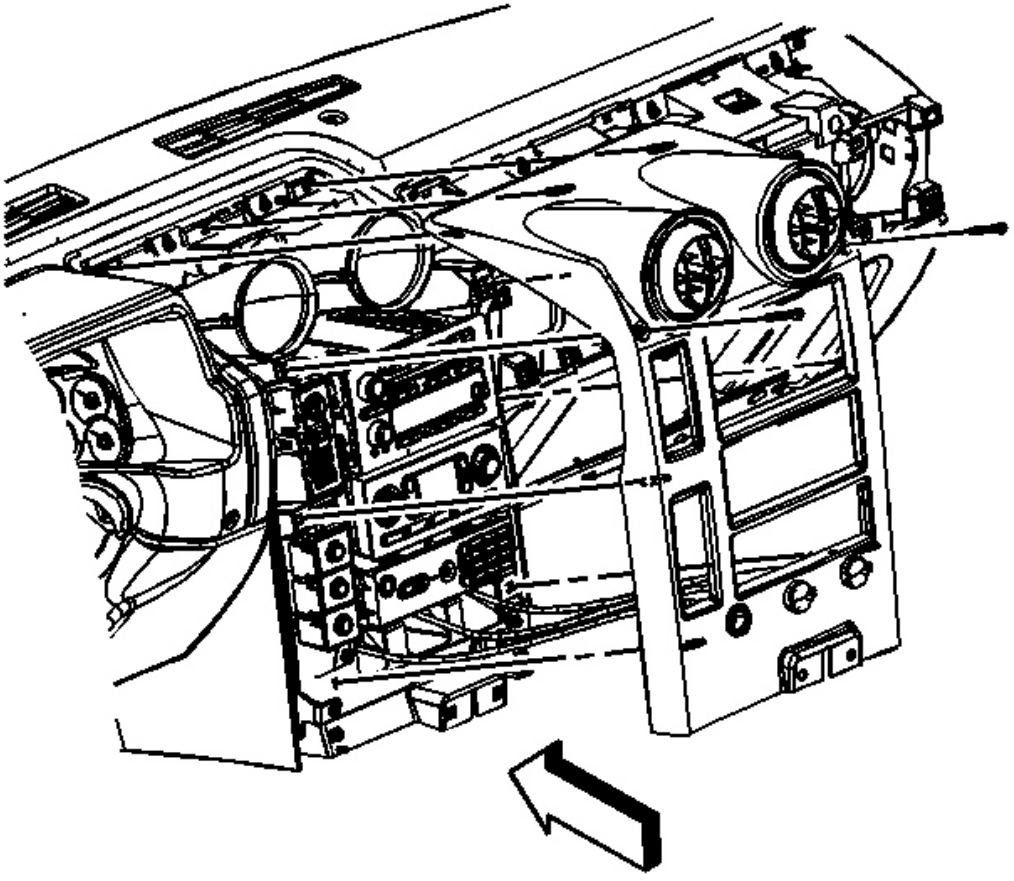


Fig. 21: I/P Center Trim Panel
Courtesy of GENERAL MOTORS CORP.

2. Remove the screws that hold the trim panel to the I/P.
3. Remove the trim from the tabs in the I/P.

Installation Procedure

1. Align the trim pad with the I/P tabs.

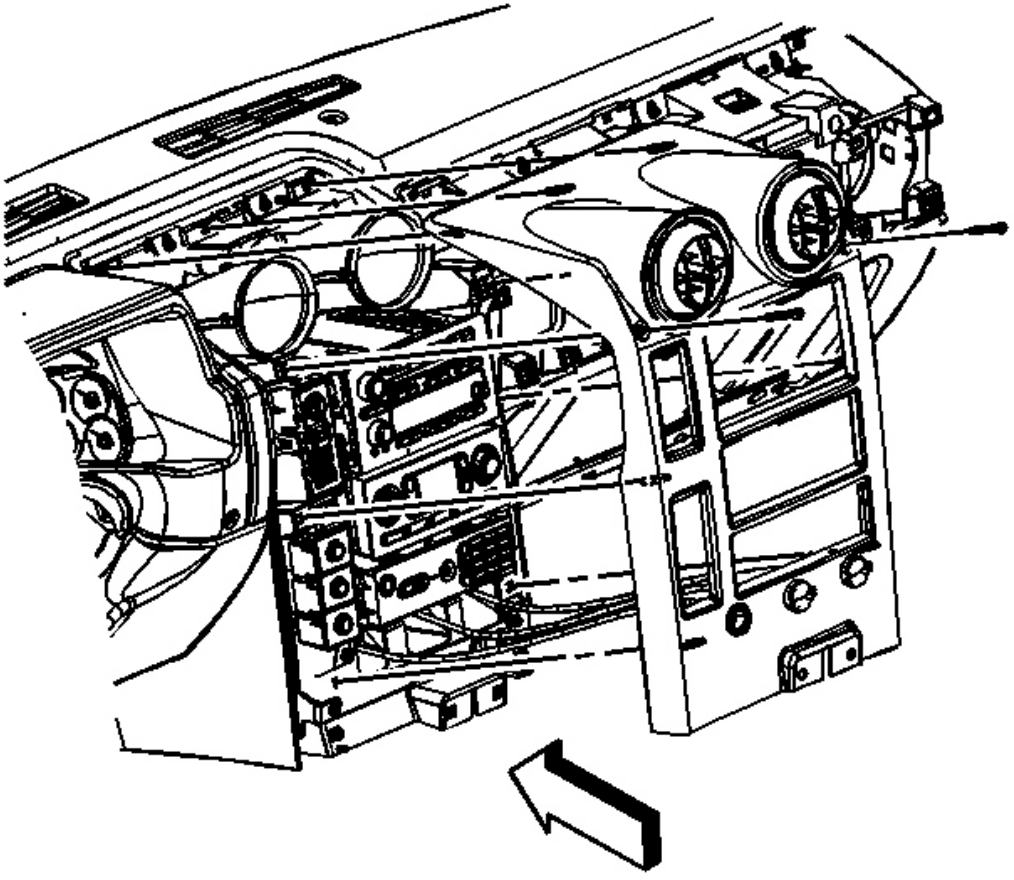


Fig. 22: I/P Center Trim Panel
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices

2. Fasten the trim panel to the I/P.

   Tighten: Tighten the screws to 2 N.m (18 lb in).

TRIM PANEL REPLACEMENT - INSTRUMENT PANEL (I/P) CLUSTER

Removal Procedure

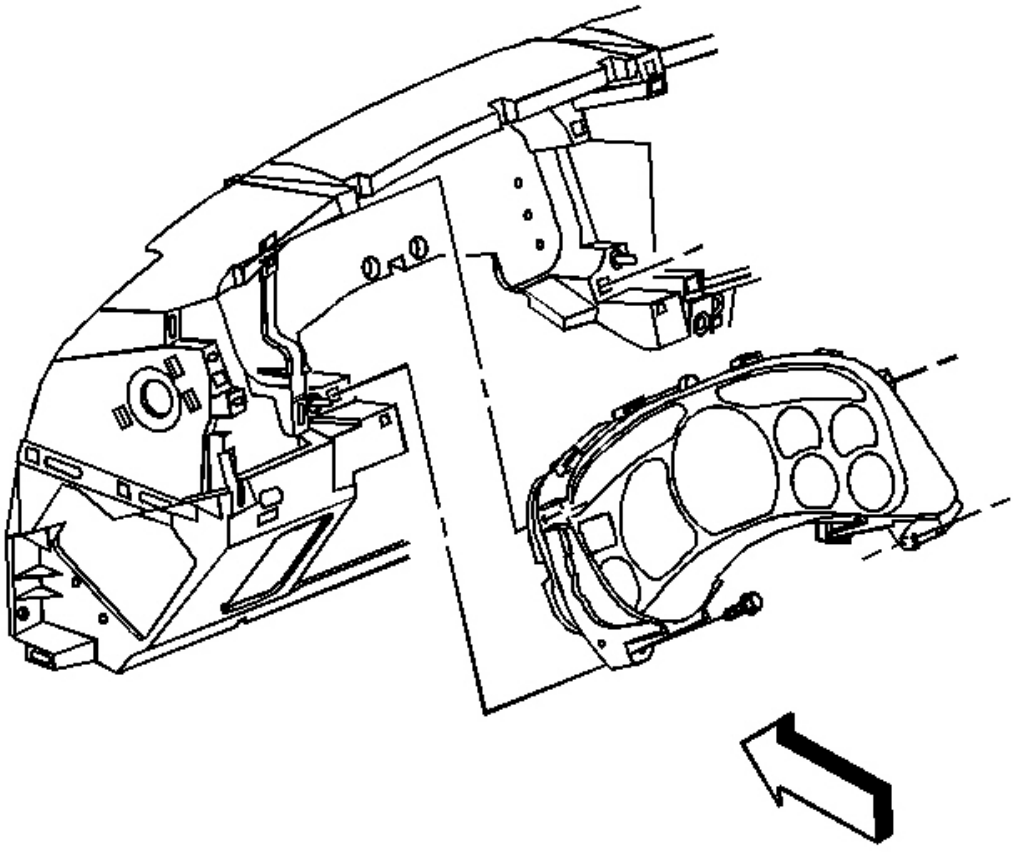


Fig. 23: I/P Cluster Trim Panel Screws
Courtesy of GENERAL MOTORS CORP.

1. Remove screws that hold cluster trim panel to I/P.

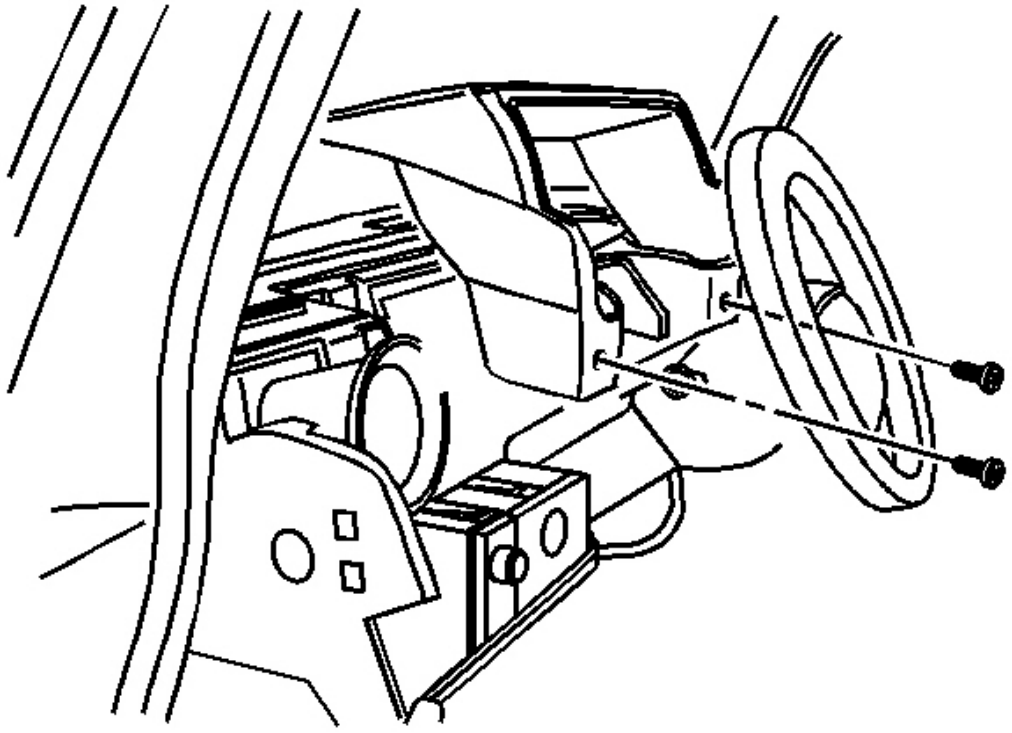


Fig. 24: I/P Cluster Trim Panel
Courtesy of GENERAL MOTORS CORP.

2. Use care to remove cluster trim panel from tabs in I/P.

Installation Procedure

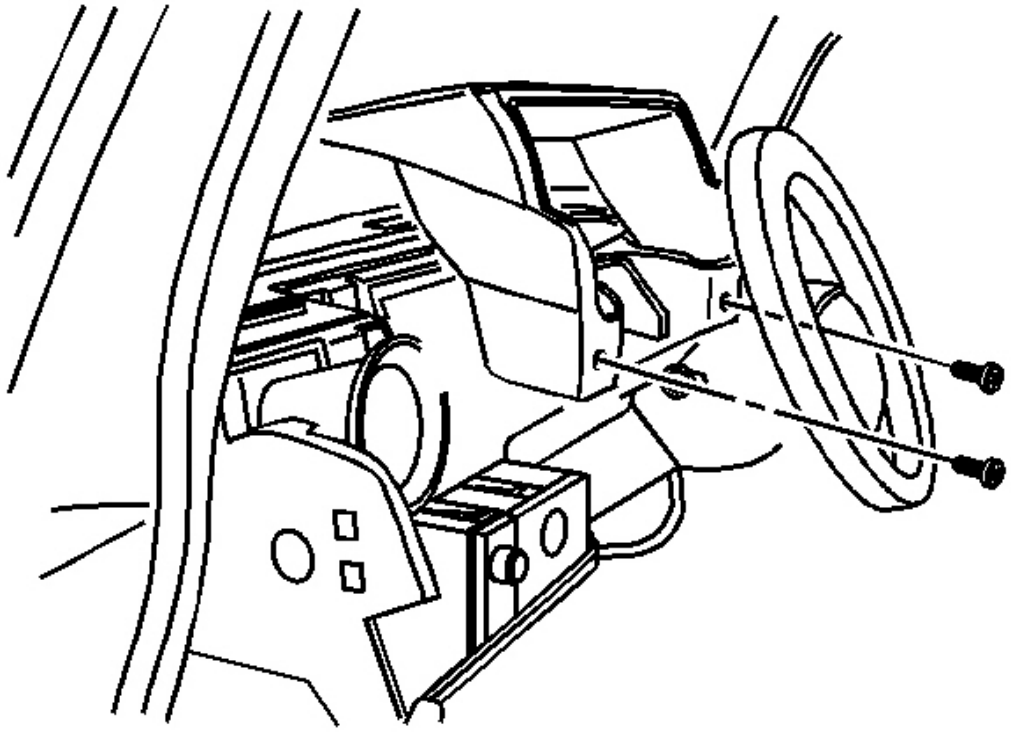


Fig. 25: I/P Cluster Trim Panel
Courtesy of GENERAL MOTORS CORP.

1. Align trim panel to I/P.

NOTE: **Refer to Fastener Notice in Cautions and Notices.**

2. Install cluster trim panel to I/P.

Tighten: Tighten 2 N.m (18 lb in).

COMPARTMENT REPLACEMENT - INSTRUMENT PANEL (I/P)

Removal Procedure

1. Loosen and move center console reward for access to compartment trim panel. Refer to **Console Replacement** .

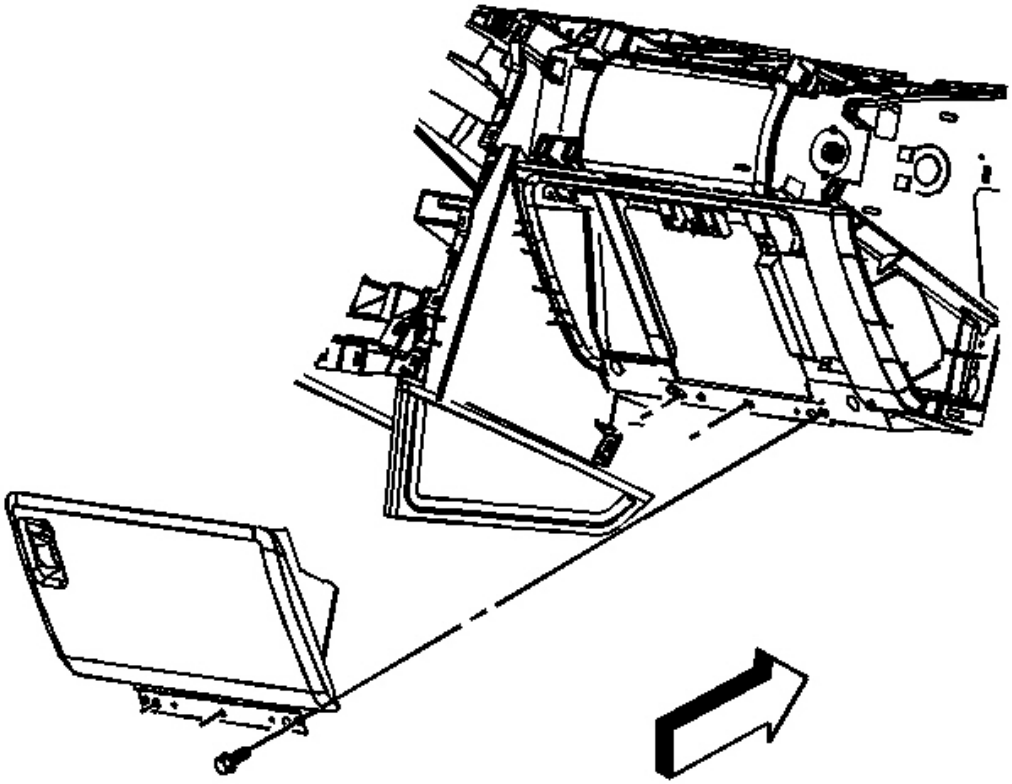


Fig. 26: I/P Compartment Door
Courtesy of GENERAL MOTORS CORP.

2. Remove the compartment door from I/P. Refer to **Door Replacement - Instrument Panel (I/P) Compartment** .

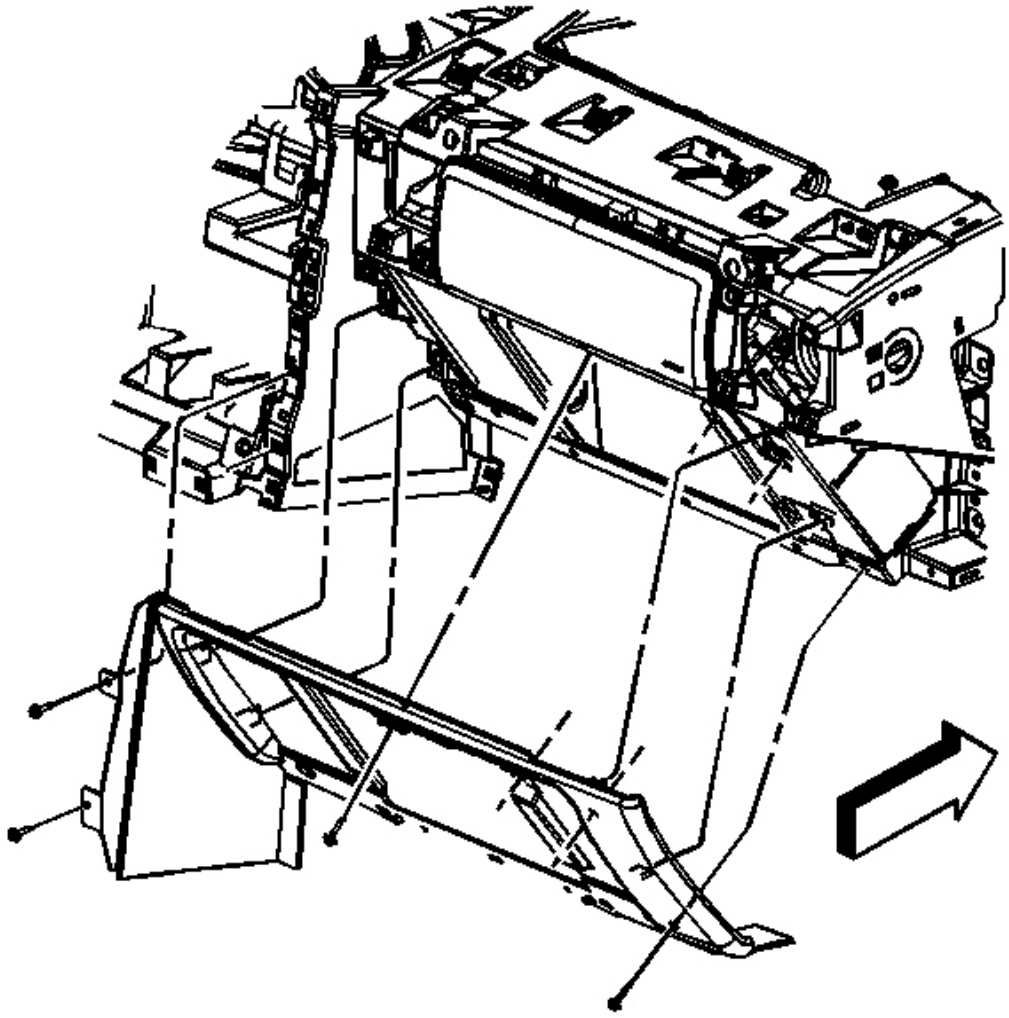


Fig. 27: I/P Compartment
Courtesy of GENERAL MOTORS CORP.

3. Remove the I/P compartment from I/P.

Installation Procedure

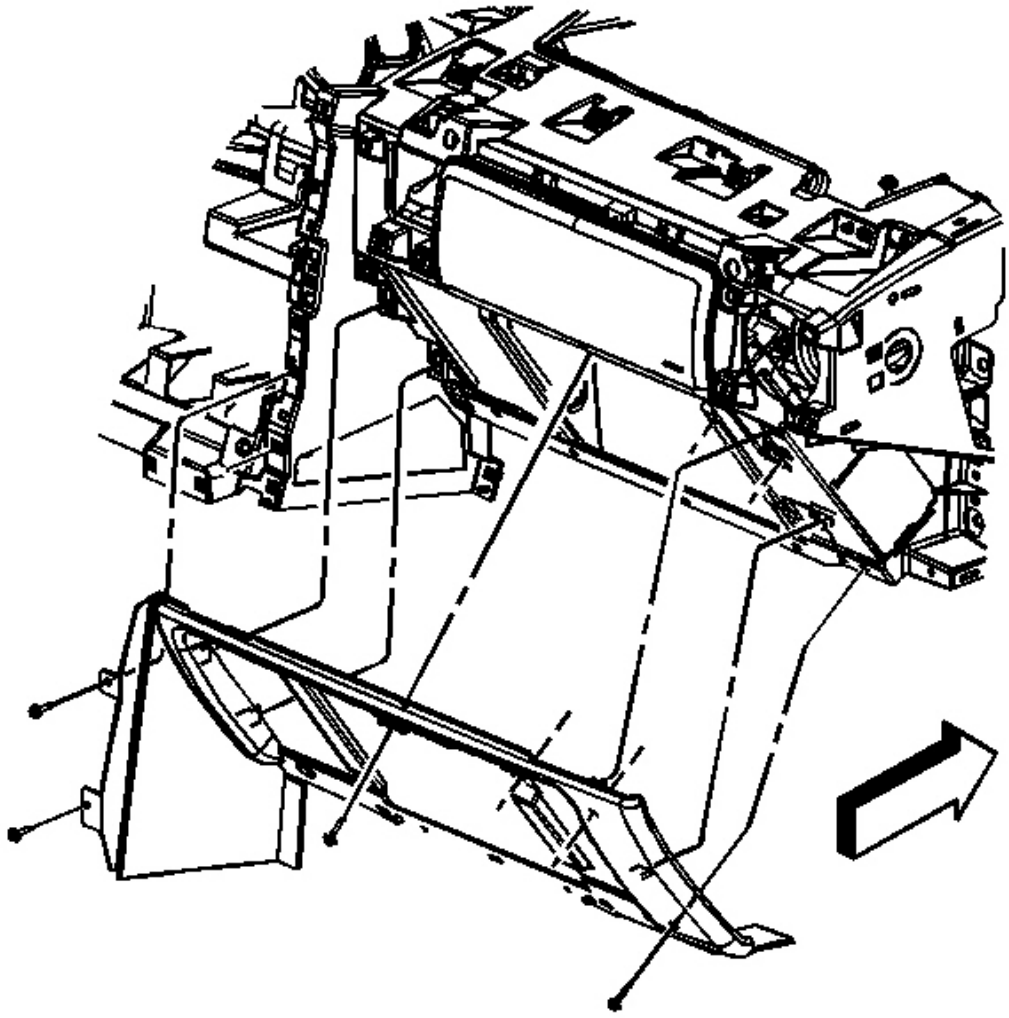


Fig. 28: I/P Compartment
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the I/P compartment to I/P.

   Tighten: Tighten the screws to 1.6 N.m (14 lb in).

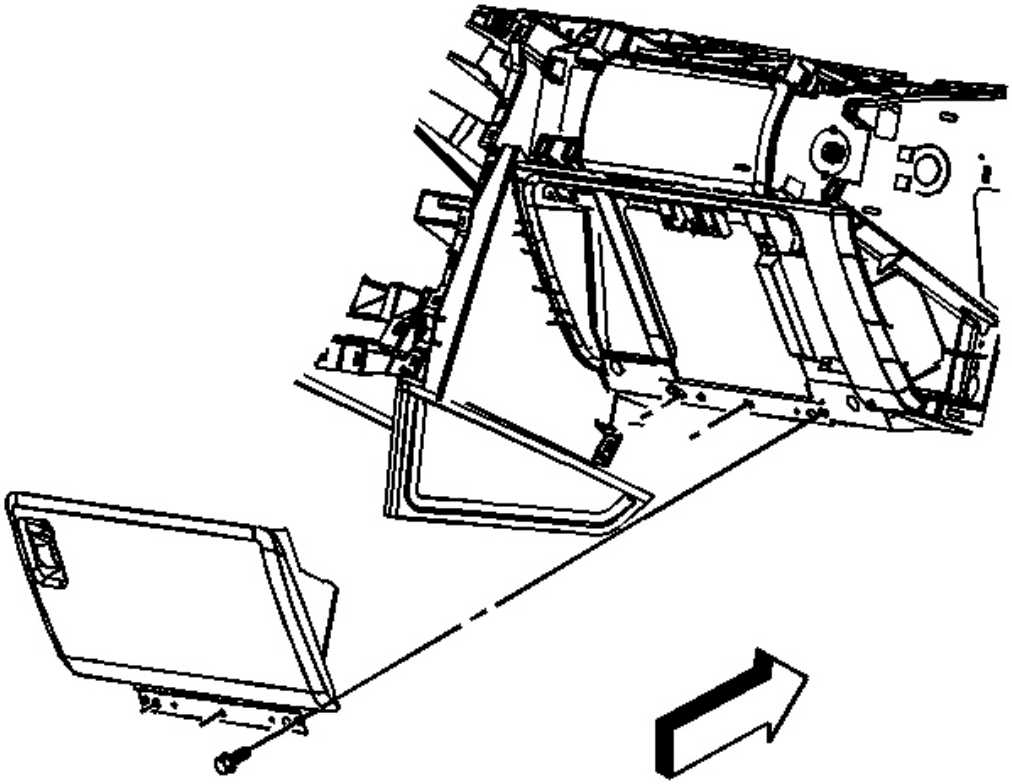


Fig. 29: I/P Compartment Door
Courtesy of GENERAL MOTORS CORP.

2. Install the I/P compartment door to I/P. Refer to **Door Replacement - Instrument Panel (I/P) Compartment** .

   Tighten: Tighten the screws to 1.6 N.m (14 lb in).

3. Align and move forward center console in place and fasten console to center console bracket. Refer to **Console Replacement** .

STRIKER ADJUSTMENT - INSTRUMENT PANEL (I/P) COMPARTMENT

Removal Procedure

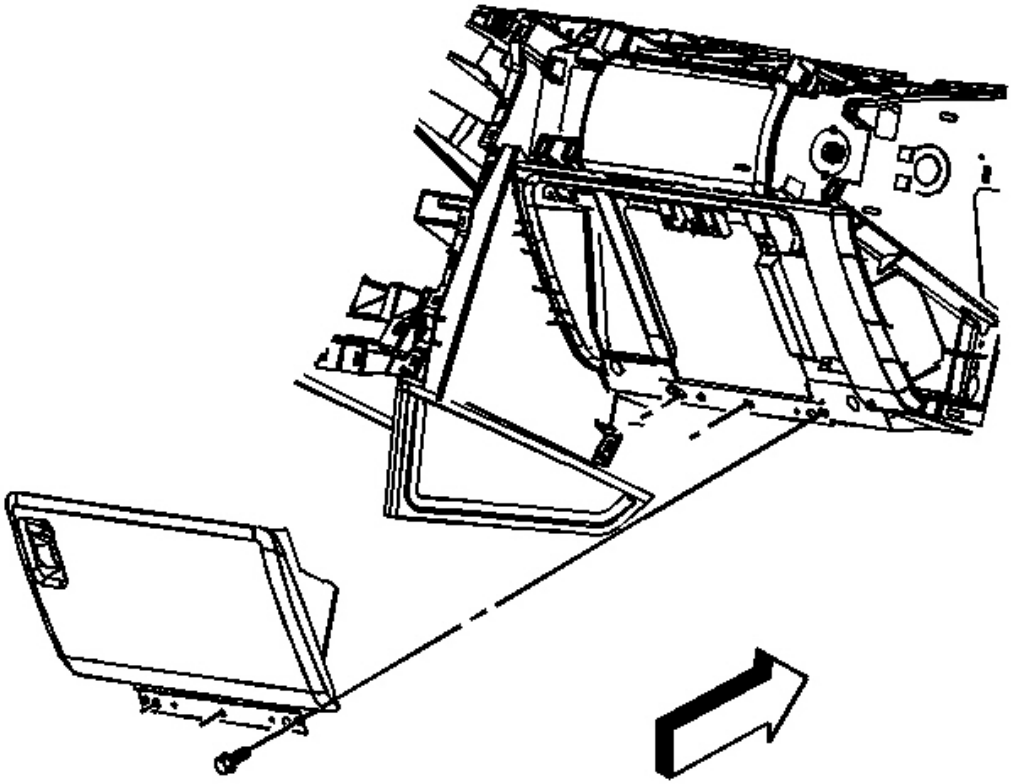


Fig. 30: I/P Compartment Door
Courtesy of GENERAL MOTORS CORP.

1. Loosen hinge screws holding compartment door to I/P.

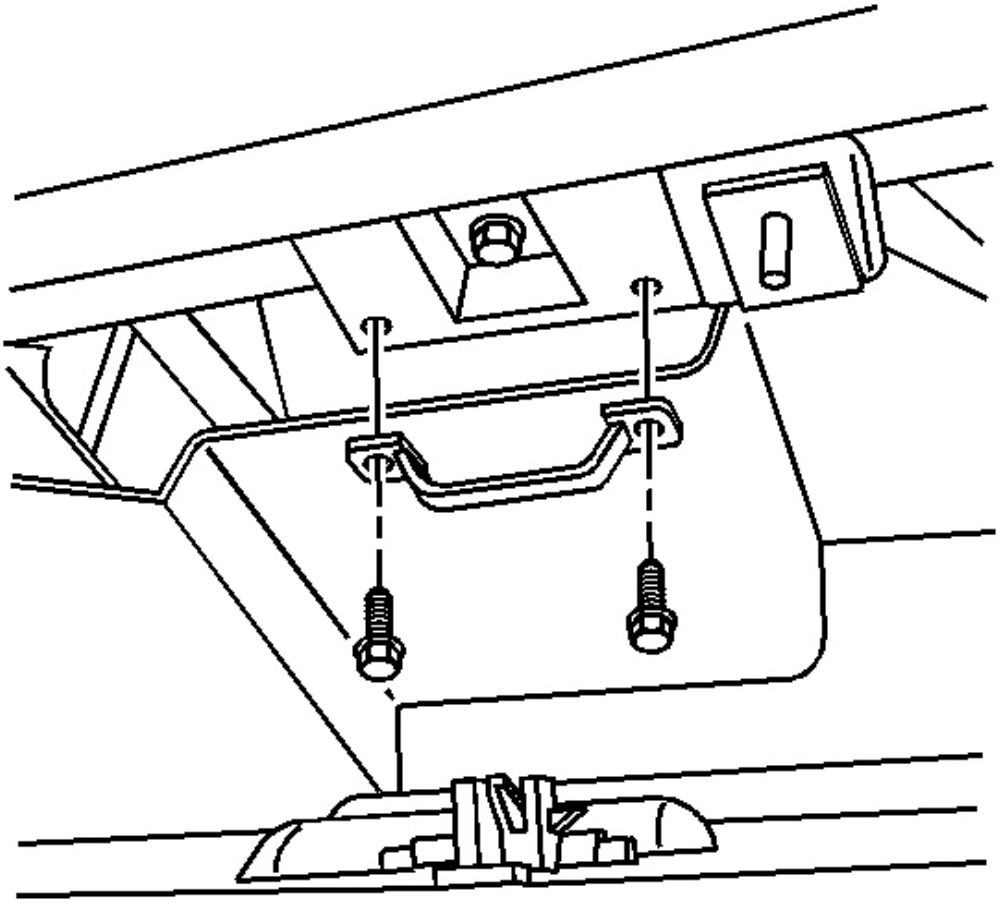


Fig. 31: I/P Compartment Striker Assembly
Courtesy of GENERAL MOTORS CORP.

2. Loosen screws/bolts holding striker assembly to I/P.

Installation Procedure

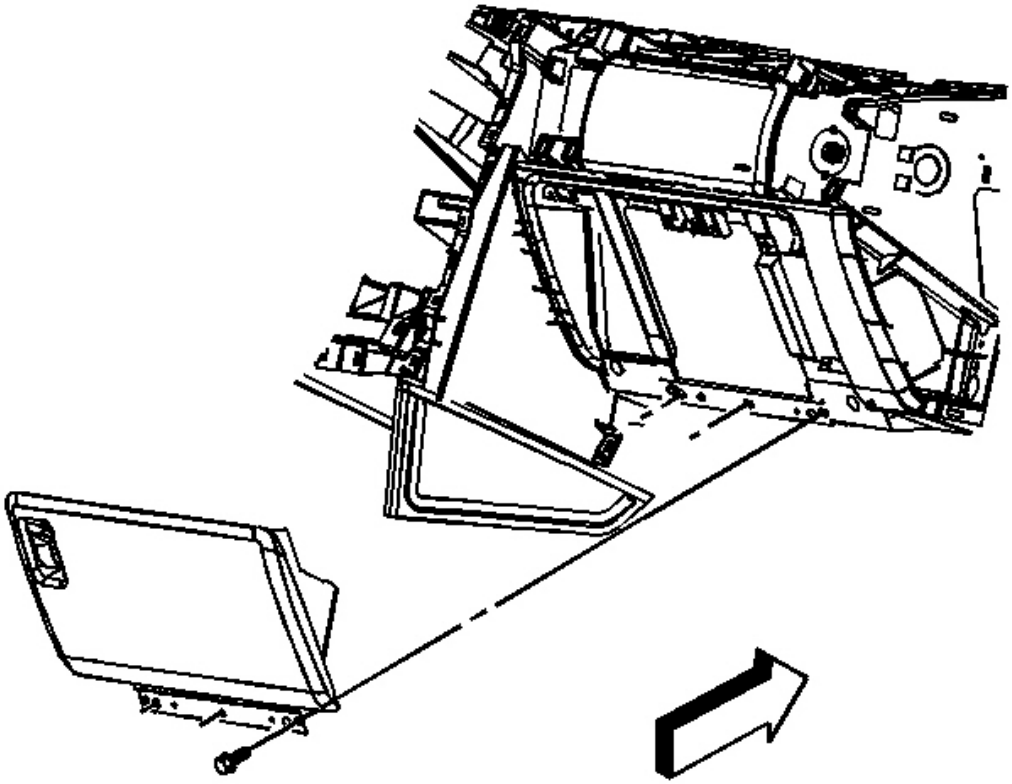


Fig. 32: I/P Compartment Door
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Align door assembly with striker assembly.

   Tighten: Tighten the screws to 1.6 N.m (14 lb in).

2. Tighten door assembly to I/P.

STRIKER REPLACEMENT - INSTRUMENT PANEL (I/P) COMPARTMENT

Removal Procedure

1. Open compartment door to expose compartment striker bracket.
2. Loosen screws/bolts holding striker bracket to I/P.

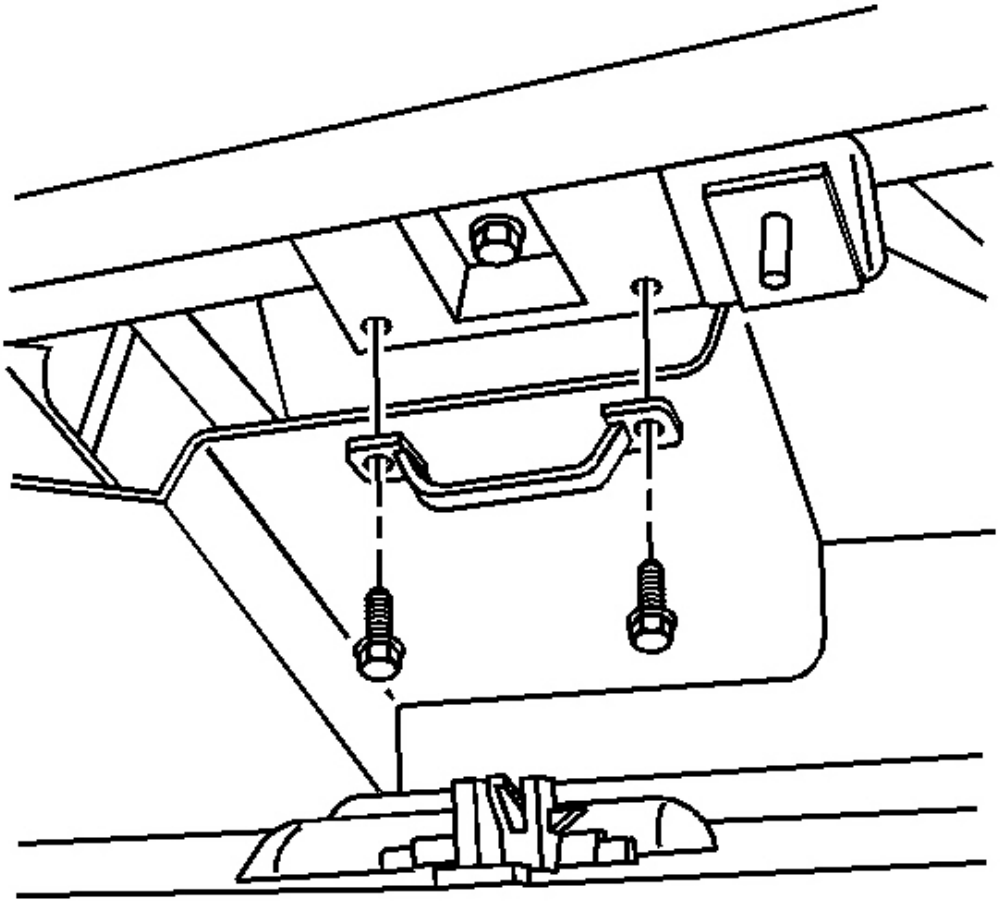


Fig. 33: I/P Compartment Striker Assembly
Courtesy of GENERAL MOTORS CORP.

3. Remove striker bracket assembly from I/P.

Installation Procedure

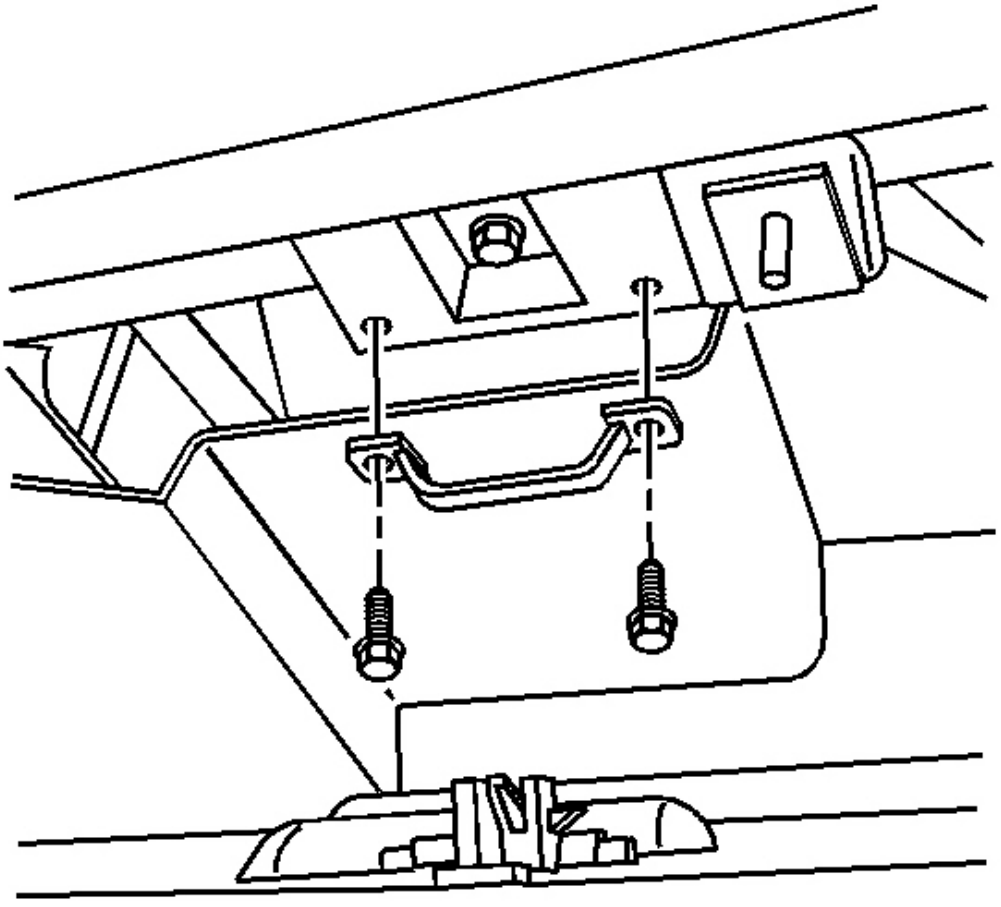


Fig. 34: I/P Compartment Striker Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install striker bracket to instrument panel subscript loosely.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Align striker with I/P compartment door and tighten striker bracket in place.

Tighten: Tighten the screws to 1.6 N.m (14 lb in).

DOOR REPLACEMENT - INSTRUMENT PANEL (I/P) COMPARTMENT

Removal Procedure

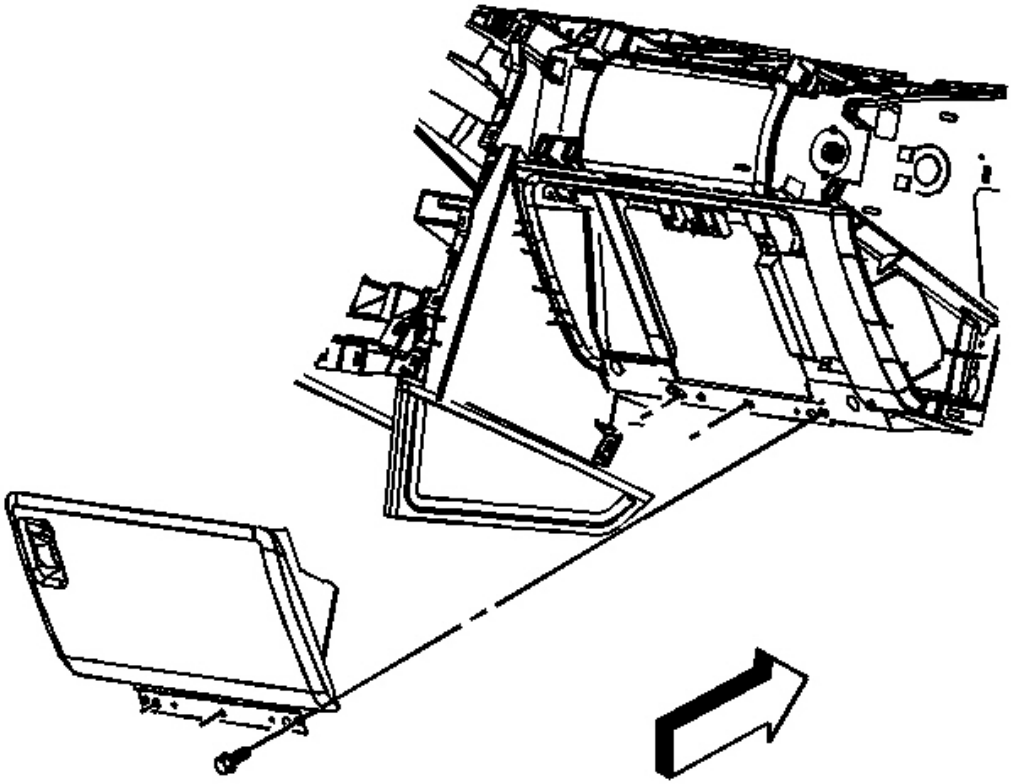


Fig. 35: I/P Compartment Door
Courtesy of GENERAL MOTORS CORP.

1. Remove screws from hinge assembly that holds the compartment door to the I/P.
2. Remove door compartment.

Installation Procedure

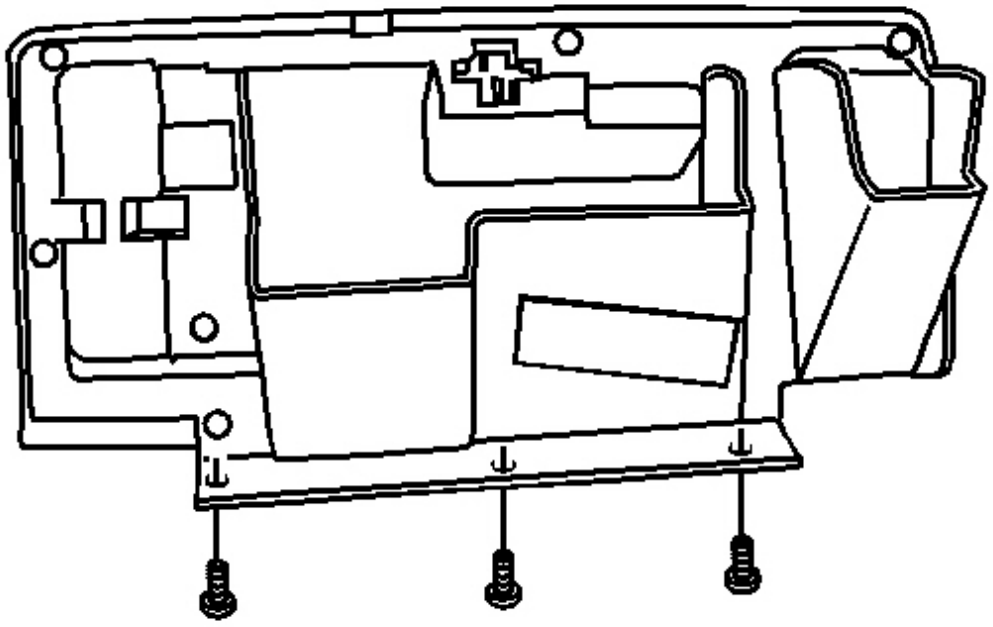


Fig. 36: I/P Compartment Door Hinge
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Align door compartment hinge to I/P.

   Tighten: Tighten the screws to 1.6 N.m (14 lb in).

2. Fasten compartment hinge to IP.

HANDLE REPLACEMENT - INSTRUMENT PANEL (I/P) COMPARTMENT

Removal Procedure

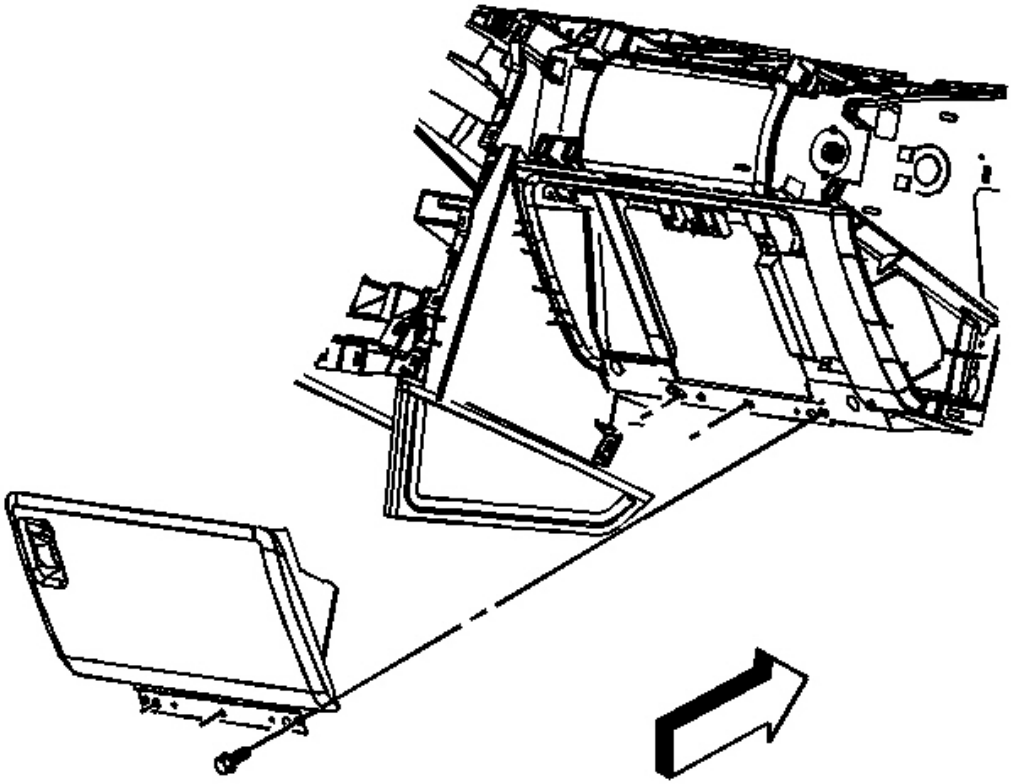


Fig. 37: I/P Compartment Door
Courtesy of GENERAL MOTORS CORP.

1. Remove compartment door from instrument panel subscript. Refer to **Door Replacement - Instrument Panel (I/P) Compartment** .
2. Place the compartment door on a work bench.

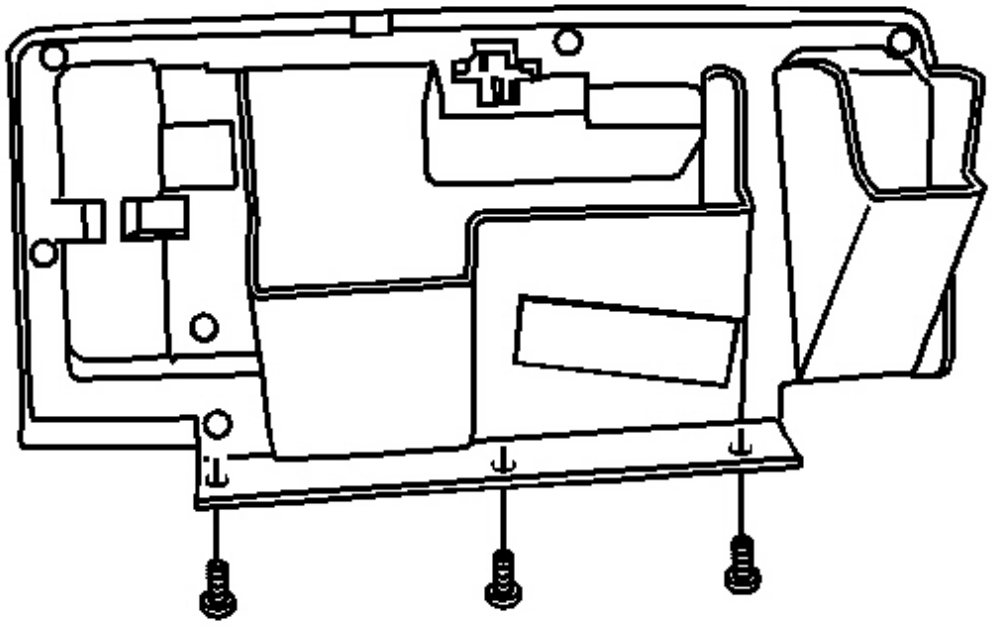


Fig. 38: I/P Compartment Door Hinge
Courtesy of GENERAL MOTORS CORP.

3. Remove the retaining screws to gain access to compartment handle.
4. Remove the compartment handle assembly.

Installation Procedure

1. Install new handle assembly to compartment door.
2. Ensure the linkage for the top compartment door are all connected before installing the inside panel.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the inside panel screws.

   Tighten: Tighten the screws to 1.6 N.m (14 lb in).

4. Inspect the operation of the top compartment door

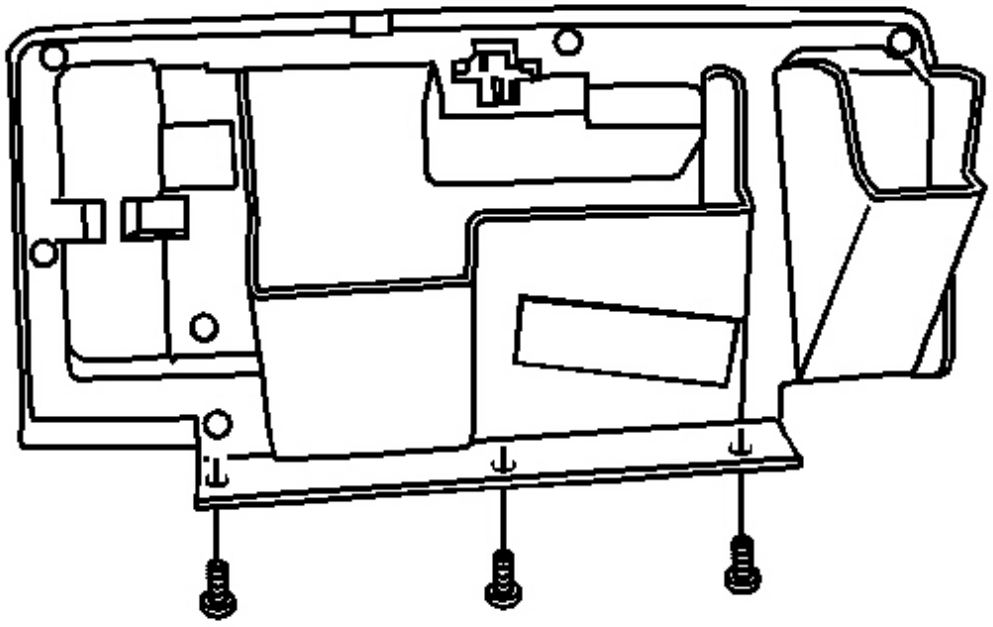


Fig. 39: I/P Compartment Door Hinge
Courtesy of GENERAL MOTORS CORP.

5. Install the compartment door to the I/P. Refer to **Door Replacement - Instrument Panel (I/P) Compartment** .

INSTRUMENT PANEL (I/P) ASSIST HANDLE REPLACEMENT

Removal Procedure

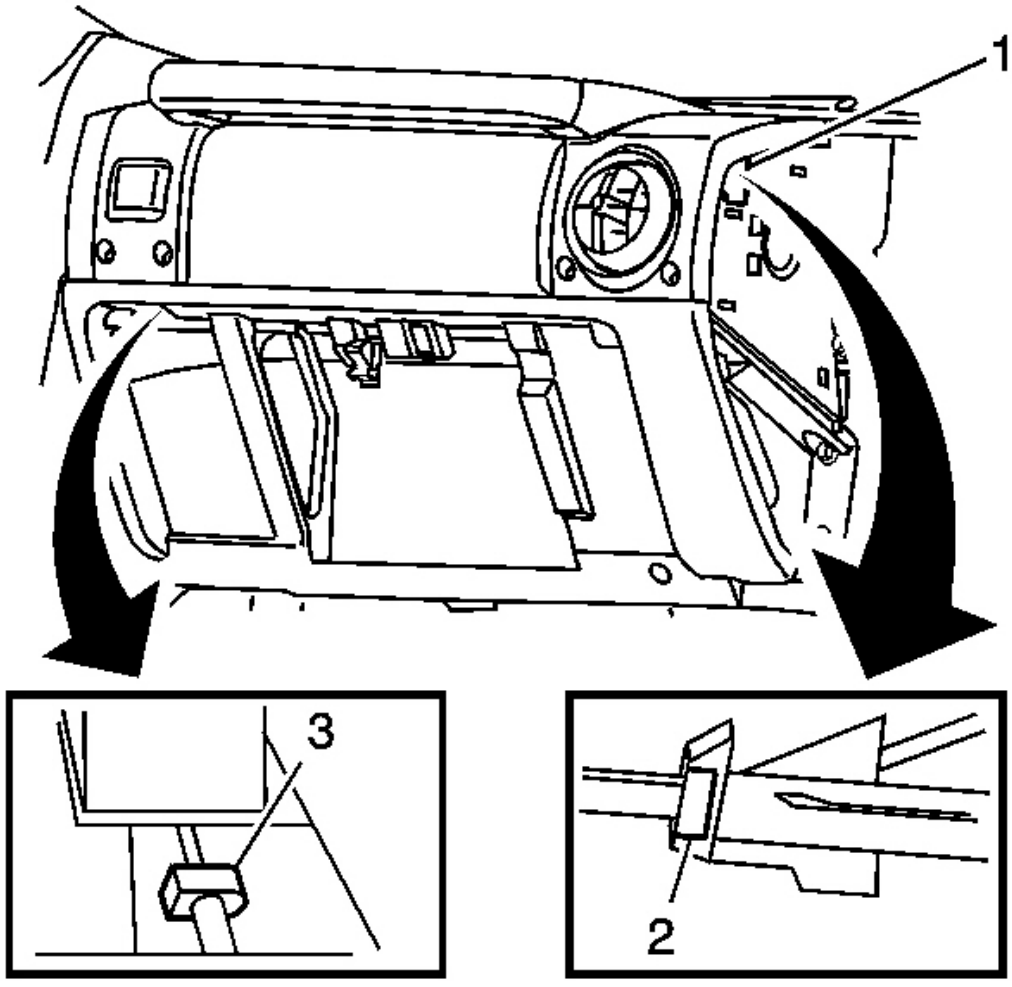


Fig. 40: I/P Passenger Side Trim Panel
Courtesy of GENERAL MOTORS CORP.

1. Remove the passenger I/P (Instrument Panel) side trim panel.
2. Fully open the I/P storage compartment.

IMPORTANT: Both the left and the right assist handle release buttons face the outside of the vehicle. The release buttons need to be pushed towards the inside of the vehicle to release the assist handle.

3. Using a long flat-bladed tool, through the opening in the I/P retainer (1) on the passenger side of the I/P:
    1. Push in on the assist handle release button (2) and

2. Pull out on the handle to partially disengage the assist handle.

4. Using a flat-bladed tool, through the I/P storage compartment opening, push in on the inboard assist handle release button (3).
5. Remove the I/P assist handle.

Installation Procedure

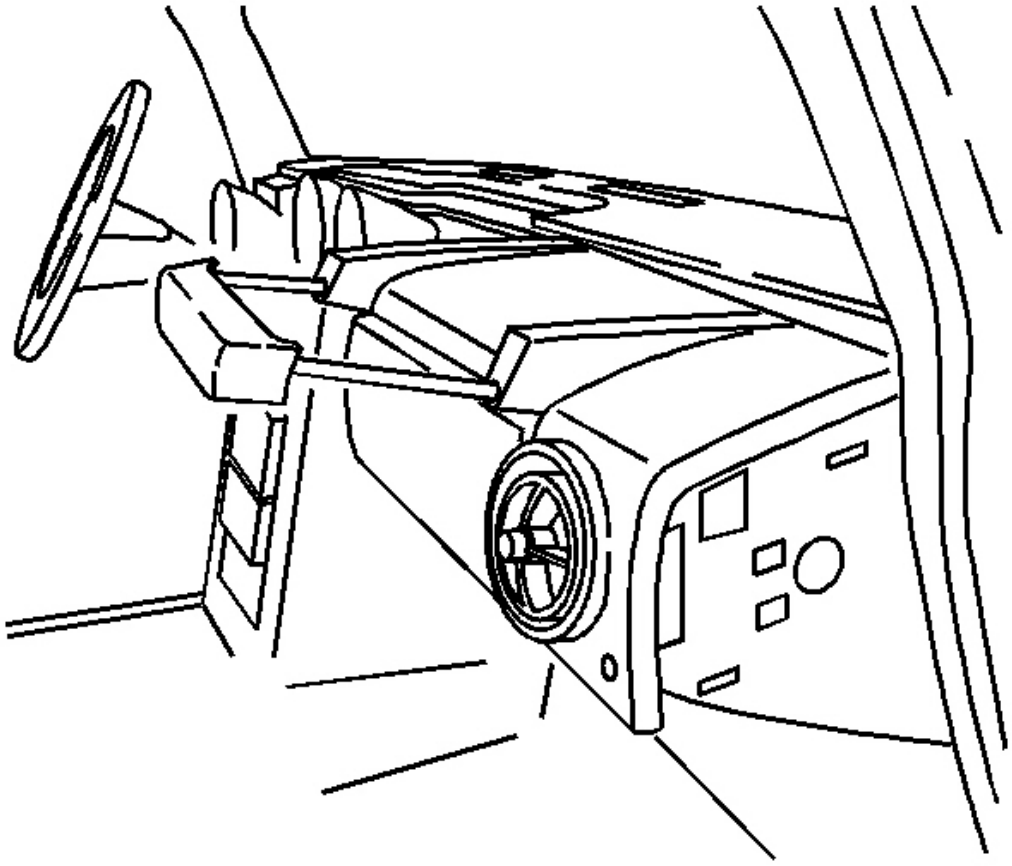


Fig. 41: I/P Assist Handle
Courtesy of GENERAL MOTORS CORP.

1. Line assist handle with holes in I/P and push the I/P assist handle into the I/P until I/P assist handle clicks into place.
2. Pull rearward on the assist handle to ensure the handle is secure.
3. Install the passenger side I/P side trim panel.

4. Close the I/P storage compartment.

TRIM PAD REPLACEMENT - INSTRUMENT PANEL (I/P) UPPER

Removal Procedure

IMPORTANT: All trim panels on the instrument panel must be removed to gain access to the upper trim panel. Also the center console has to be loosened and moved back to gain access to the center stack panel.

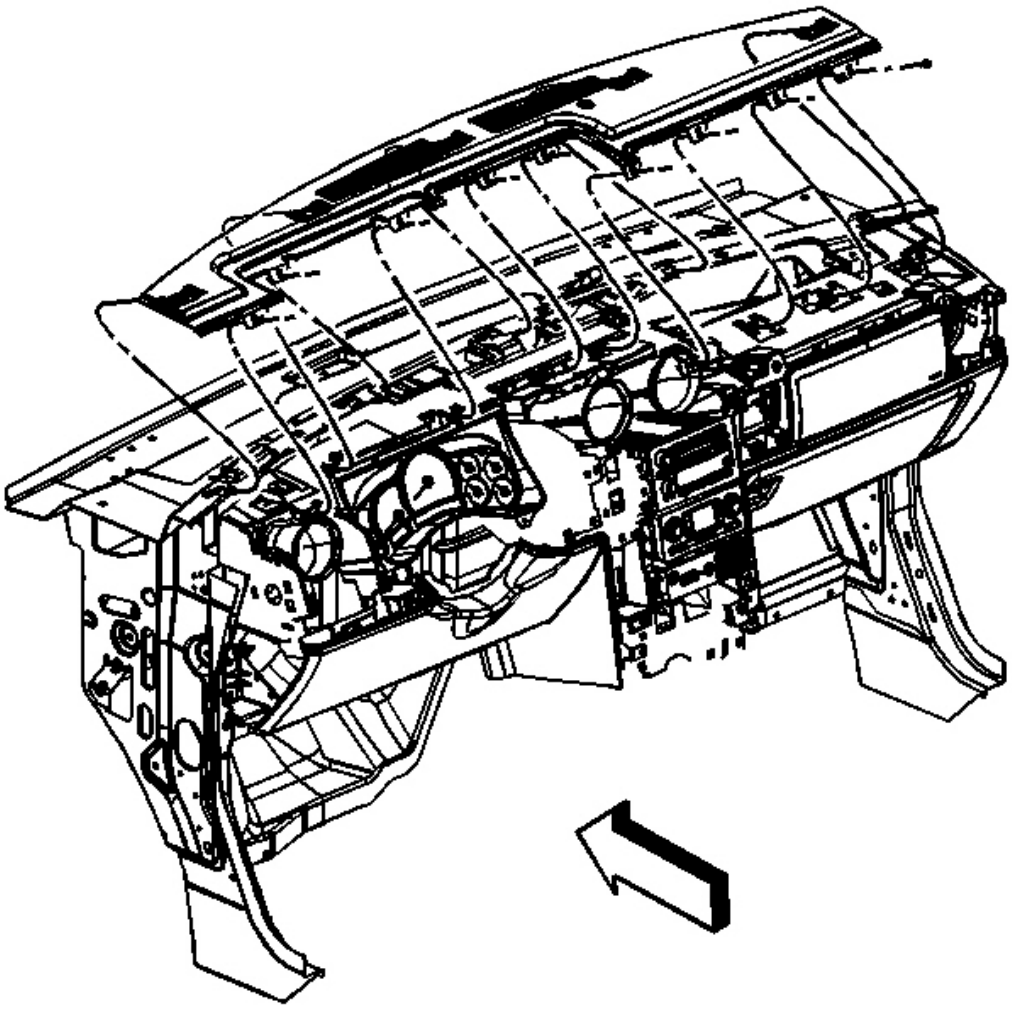


Fig. 42: Right Trim Panel Accessory

Courtesy of GENERAL MOTORS CORP.

1. Move back center console. Refer to **Console Replacement** .
2. Remove the assist handle from the instrument panel. Refer to **Instrument Panel (I/P) Assist Handle Replacement** .
3. Remove the door striker from the IP compartment. Refer to **Striker Replacement - Instrument Panel (I/P) Compartment** .
4. Remove the trim panel from the IP cluster. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Cluster** .
5. Remove the IP compartment door. Refer to **Compartment Replacement - Instrument Panel (I/P)** .
6. Remove the knee bolster from the IP compartment. Refer to **Trim Panel Replacement - Knee Bolster** .
7. Remove the right trim plate from the IP. Refer to **Trim Plate Replacement - Instrument Panel (I/P) Accessory Right** .
8. Remove the left trim plate from the IP. Refer to **Trim Plate Replacement - Instrument Panel (I/P) Accessory Left** .
9. Remove the center trim panel from the IP compartment. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Center** .
10. Remove the right trim panel accessory from the IP.
11. Remove the upper trim pad from the IP.

Installation Procedure

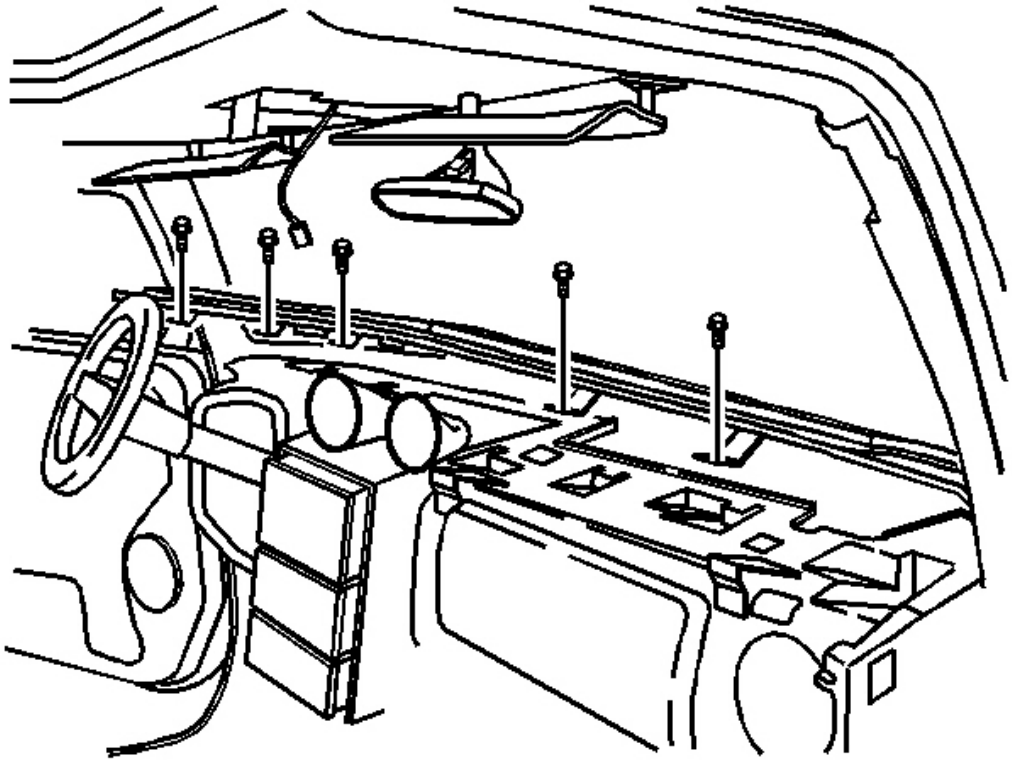


Fig. 43: Upper Trim Pad
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the upper trim pad to the IP.

   Tighten: Tighten the screws to 2 N.m (18 lb in).

2. Install the right trim panel accessory to the IP.

   Tighten: Tighten the screws to 2 N.m (18 lb in).

3. Install the center trim panel to the IP compartment. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Center** .

   Tighten: Tighten the screws to 2 N.m (18 lb in).

4. Install the left trim plate to the IP. Refer to **Trim Plate Replacement - Instrument Panel (I/P) Accessory Left** .

   Tighten: Tighten the screws to 2 N.m (18 lb in).

5. Install the right trim plate to the IP. Refer to **Trim Plate Replacement - Instrument Panel (I/P) Accessory Right** .

   Tighten: Tighten the screws to 2 N.m (18 lb in).

6. Install the knee bolster to the IP compartment. Refer to **Trim Panel Replacement - Knee Bolster** .

   Tighten: Tighten the screws to 2 N.m (18 lb in).

7. Install the IP compartment door. Refer to **Compartment Replacement - Instrument Panel (I/P)** .

   Tighten: Tighten the screws to 2 N.m (18 lb in).

8. Install the trim panel to the IP cluster. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Cluster** .

   Tighten: Tighten the screws to 2 N.m (18 lb in).

9. Install the door striker to the IP compartment. Refer to **Striker Replacement - Instrument Panel (I/P) Compartment** .

   Tighten: Tighten the screws to 2 N.m (18 lb in).

10. Install the assist handle to the IP. Refer to **Instrument Panel (I/P) Assist Handle Replacement** .
11. Tighten all parts of the center console. Refer to **Console Replacement** .

BRACKET REPLACEMENT - INSTRUMENT PANEL (I/P) CENTER SUPPORT

Removal Procedure

1. Remove the center console from the center console bracket. Refer to **Console Replacement** .
2. Remove the extension panel from the I/P. Refer to **Instrument Panel (I/P) Extension Trim Plate Replacement** .

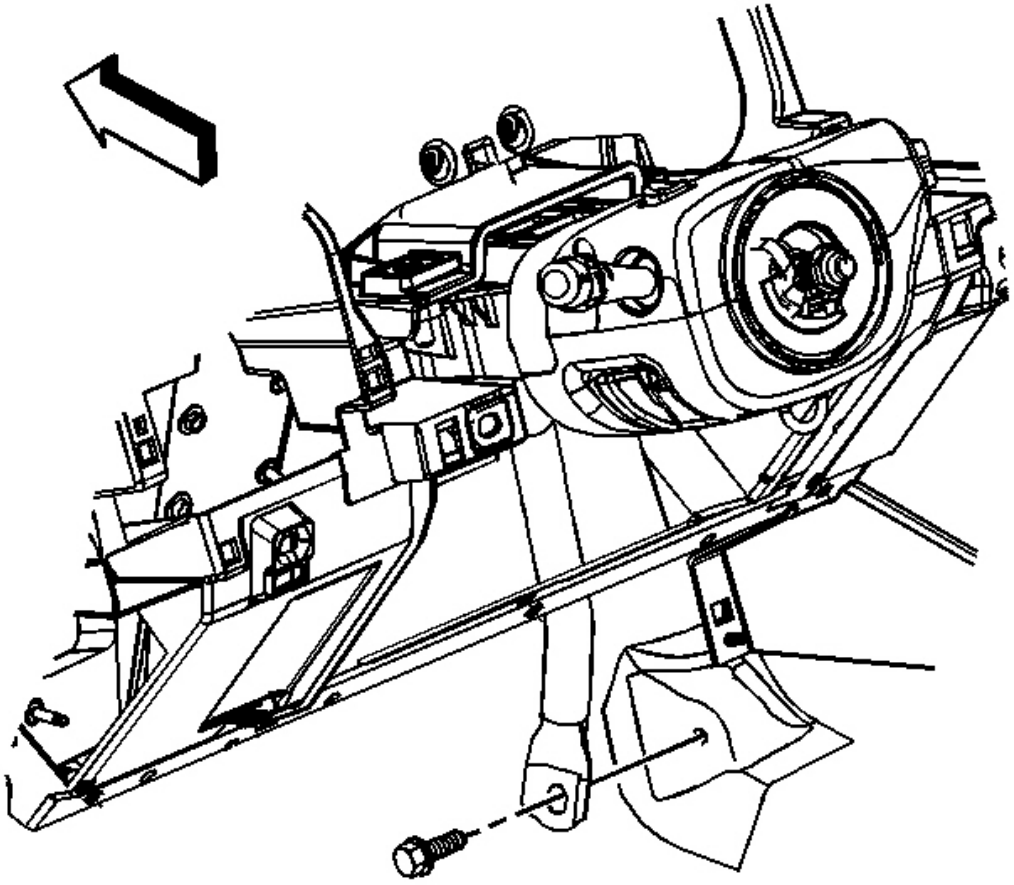


Fig. 44: I/P Carrier Center Support Bracket Nut
Courtesy of GENERAL MOTORS CORP.

3. Remove the bolt holding the bracket assembly-I/P center.

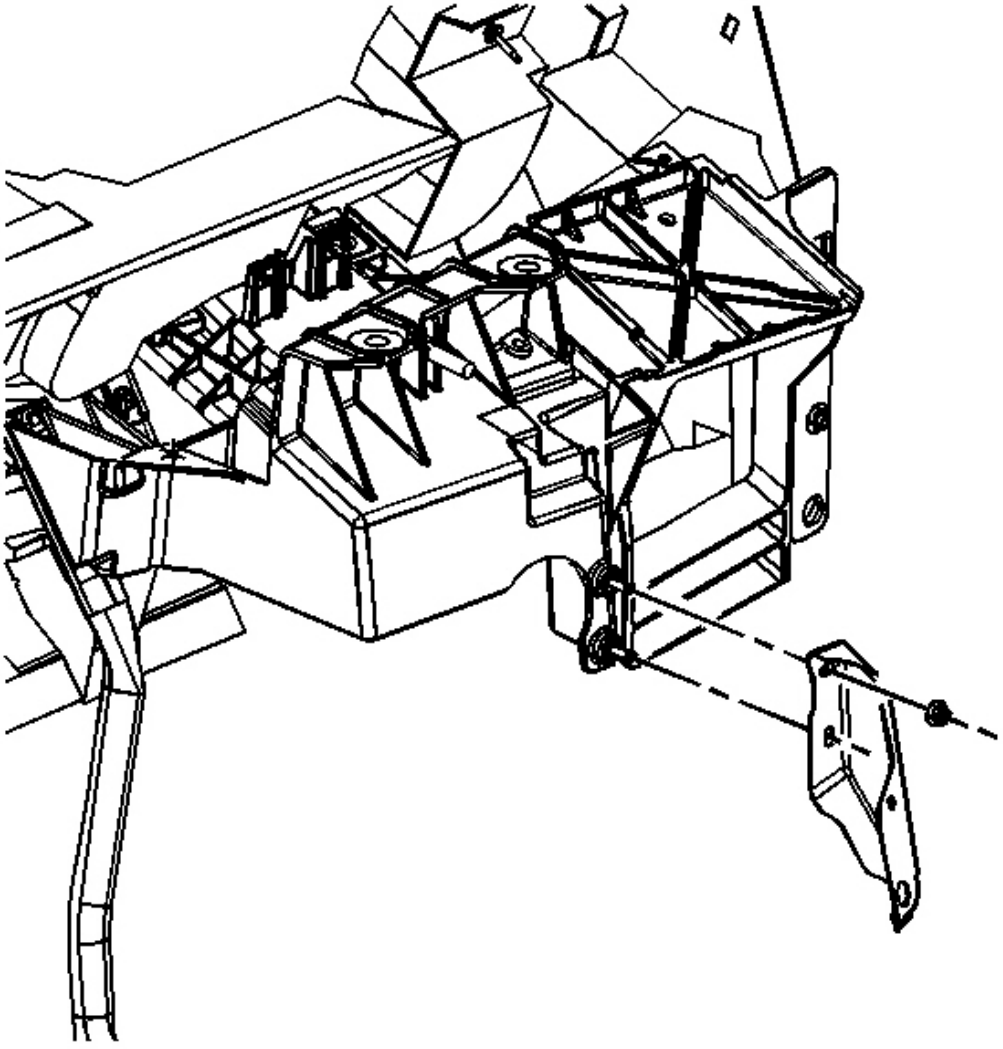


Fig. 45: I/P Center Support Bracket
Courtesy of GENERAL MOTORS CORP.

4. Remove the bracket from the I/P and floor.

Installation Procedure

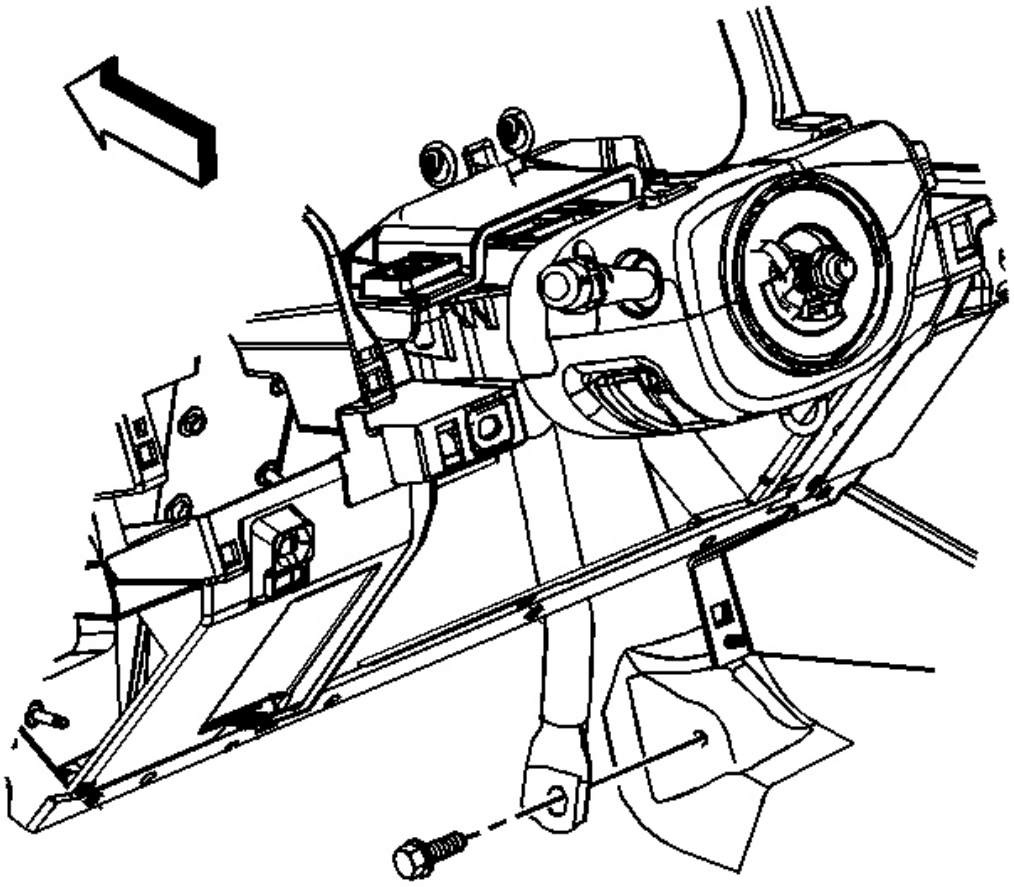


Fig. 46: I/P Carrier Center Support Bracket Nut
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Align the center bracket with the I/P and floor, then bolt the bracket in place.

   Tighten: Tighten the bolt to 25 N.m (18 lb in).

2. Install the extension panel the I/P. Refer to **Instrument Panel (I/P) Extension Trim Plate Replacement** .
3. Install the center console to the center console bracket. Refer to **Console Replacement** .

BRACKET REPLACEMENT - STEERING COLUMN

Removal Procedure

1. Loosen and move center console reward for access to the knee bolster bolt. Refer to **Console Replacement** .
2. Remove the screws/bolts that hold the knee bolster trim panel to the I/P. Refer to **Trim Panel Replacement - Knee Bolster** .

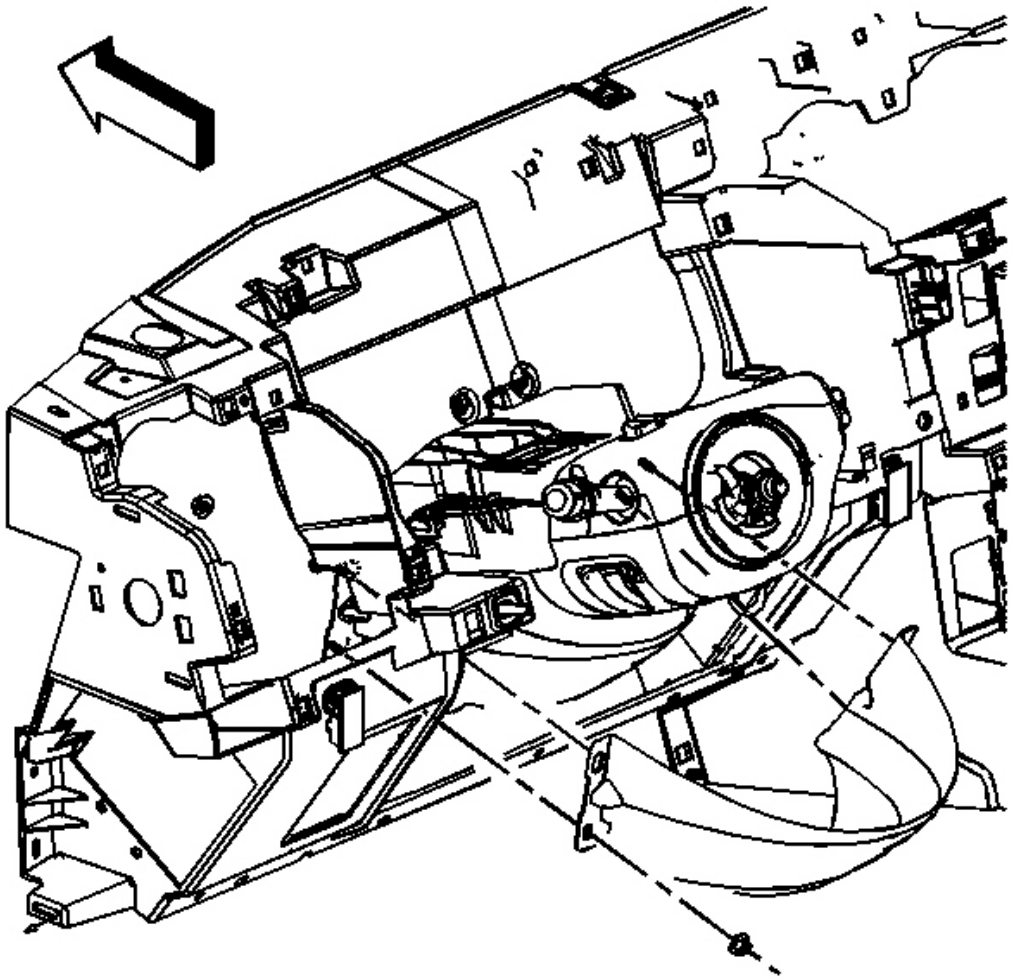


Fig. 47: Steering Column Bracket
Courtesy of GENERAL MOTORS CORP.

3. Remove the nuts that hold the knee bolster deflector to the I/P.

Installation Procedure

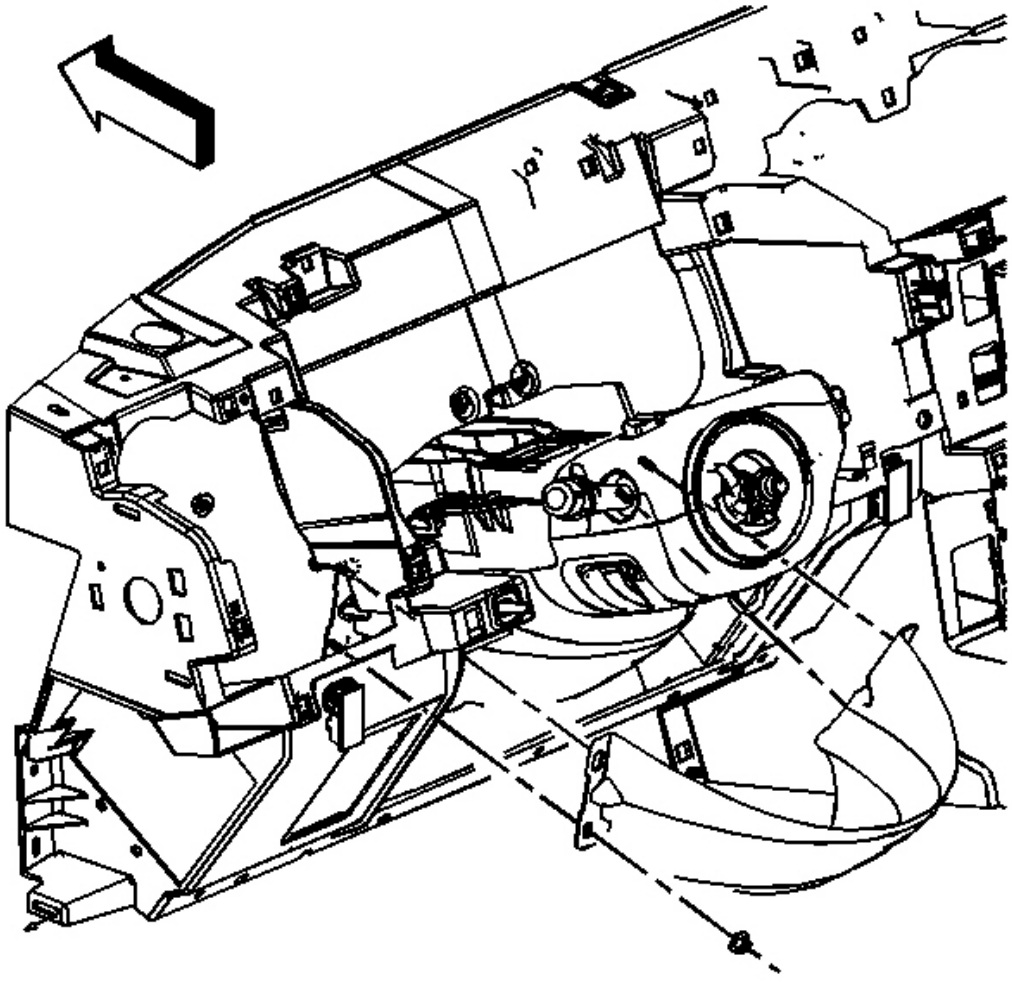


Fig. 48: Steering Column Bracket
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Align and fasten the nuts that hold the knee bolster deflector.

   Tighten: Tighten the nuts to 2 N.m (18 lb in).

2. Fasten the screws/bolts that hold the knee bolster trim panel to the I/P. Refer to **Trim Panel Replacement - Knee Bolster** .
3. Align and move forward center console in place and fasten to the center console bracket. Refer to

Console Replacement .

INSTRUMENT PANEL CLUSTER (IPC) REPLACEMENT

Removal Procedure

IMPORTANT: The ignition switch must be in the OFF position when removing the instrument panel cluster.

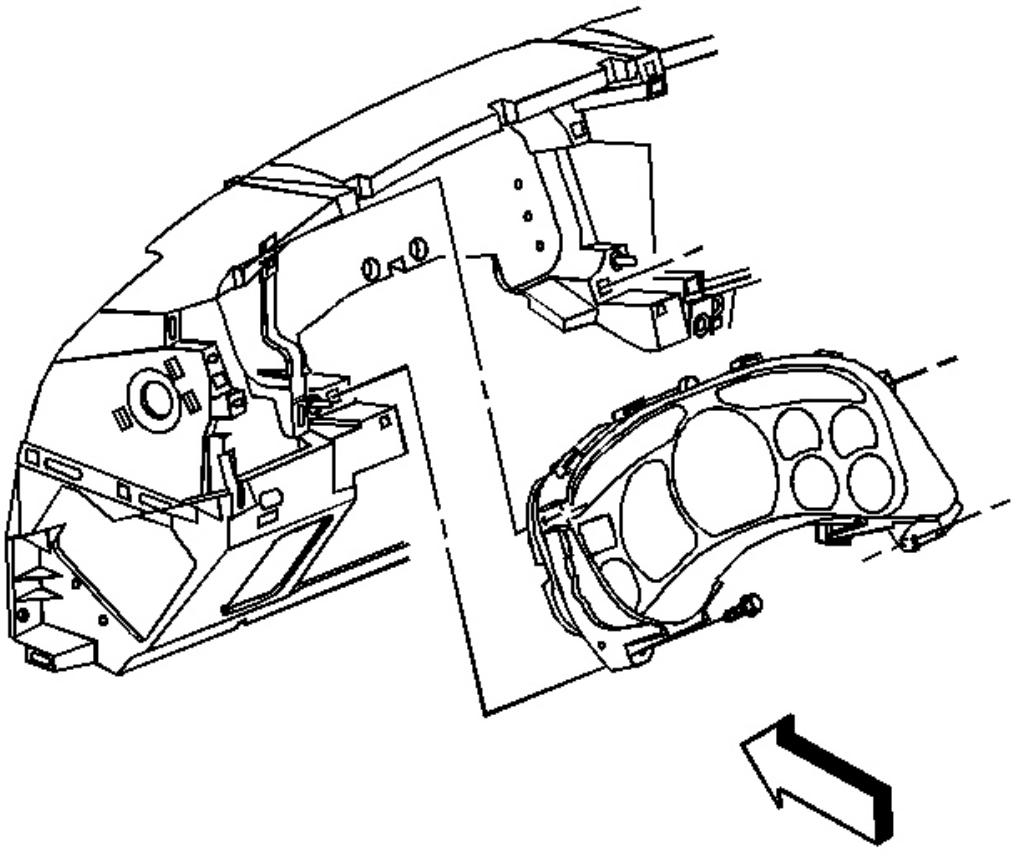


Fig. 49: I/P Cluster Trim Panel Screws
Courtesy of GENERAL MOTORS CORP.

1. Remove the I/P cluster trim plate from the instrument panel. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Cluster** .
2. Remove the screws from the I/P cluster to instrument panel.

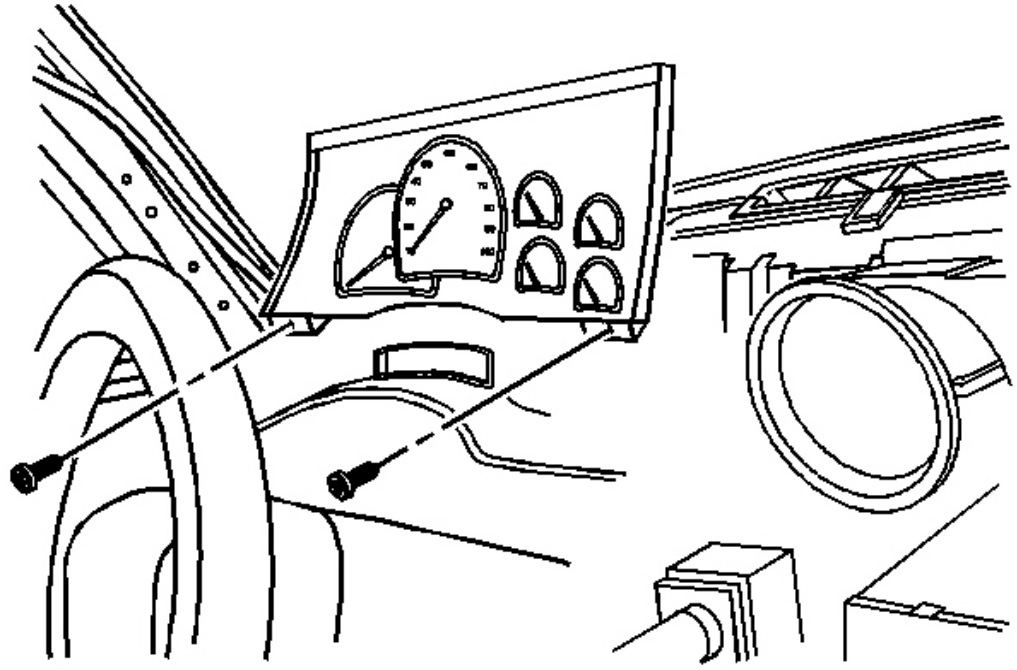


Fig. 50: I/P Cluster
Courtesy of GENERAL MOTORS CORP.

3. Remove the I/P cluster from the instrument panel.

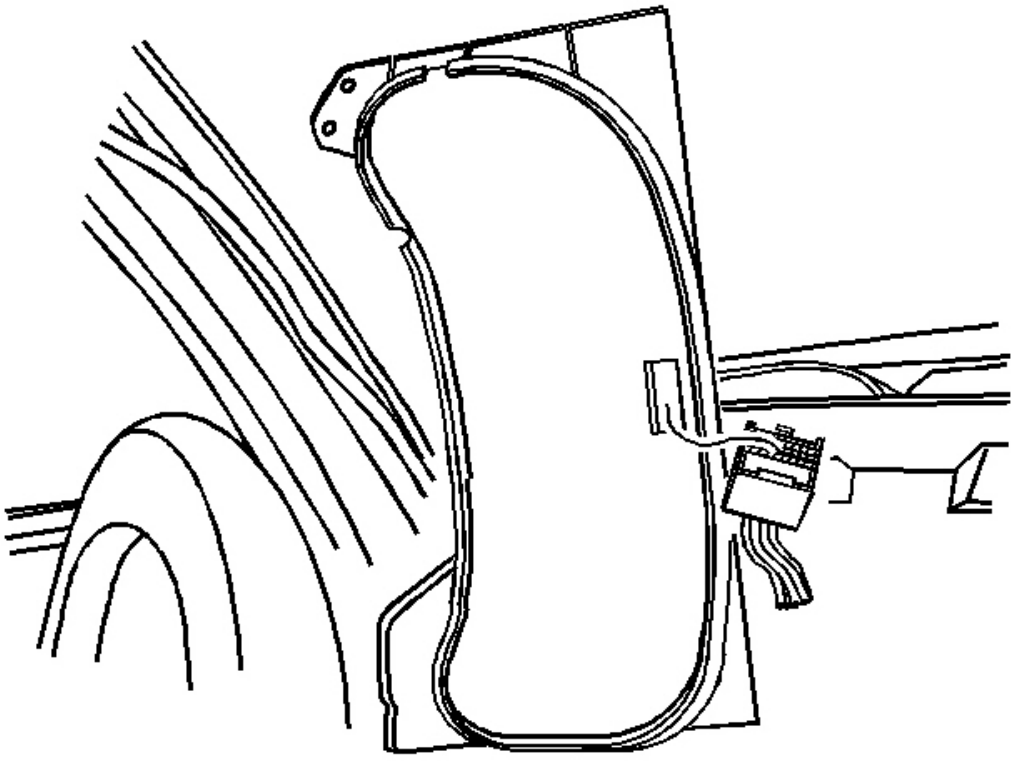


Fig. 51: I/P Cluster Electrical Connections
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the I/P cluster electrical connections.

Installation Procedure

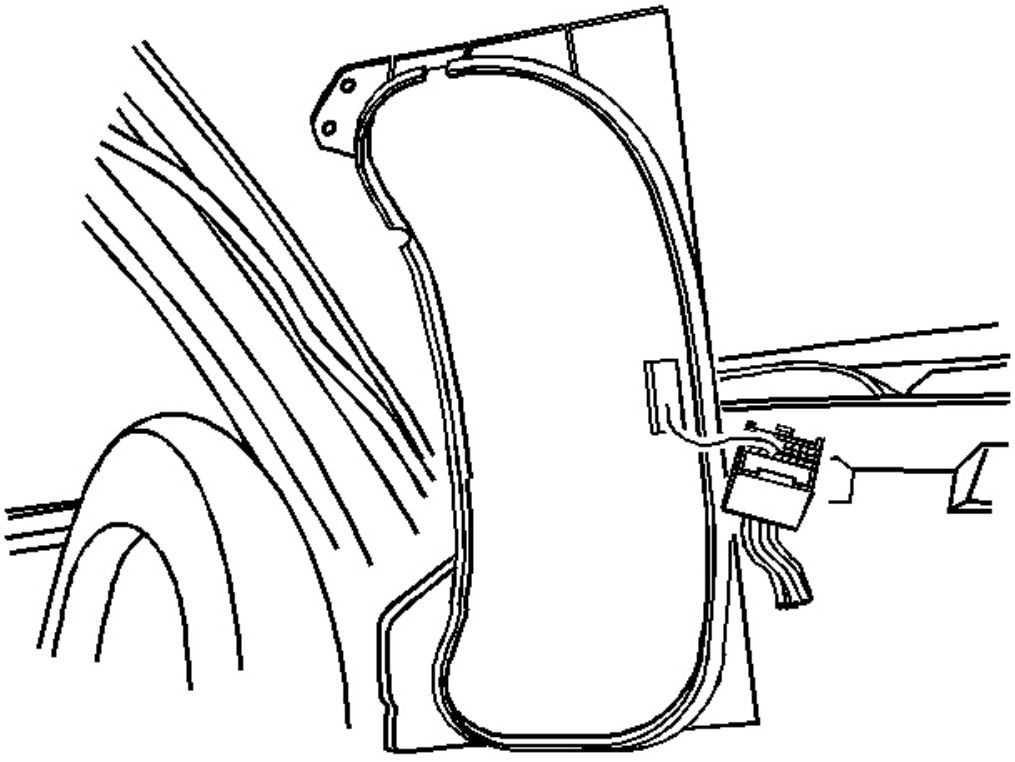


Fig. 52: I/P Cluster Electrical Connections
Courtesy of GENERAL MOTORS CORP.

1. Connect the electrical connections to the cluster.
2. Position the I/P cluster to the instrument panel.

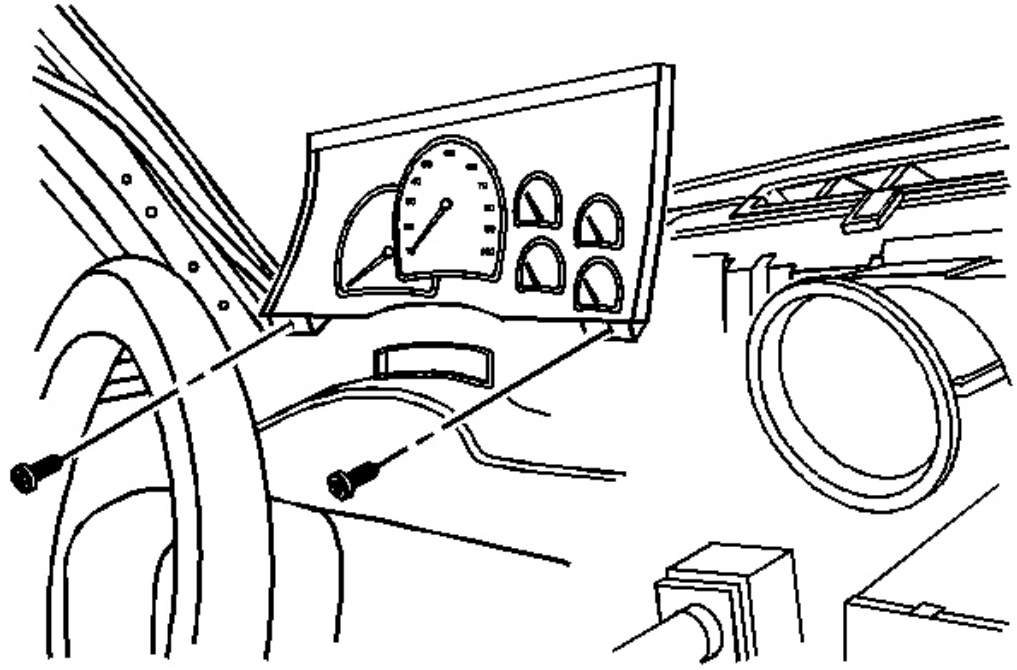


Fig. 53: I/P Cluster
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the screws to the instrument panel cluster.

   Tighten: Tighten the screws to 2 N.m (18 lb in).

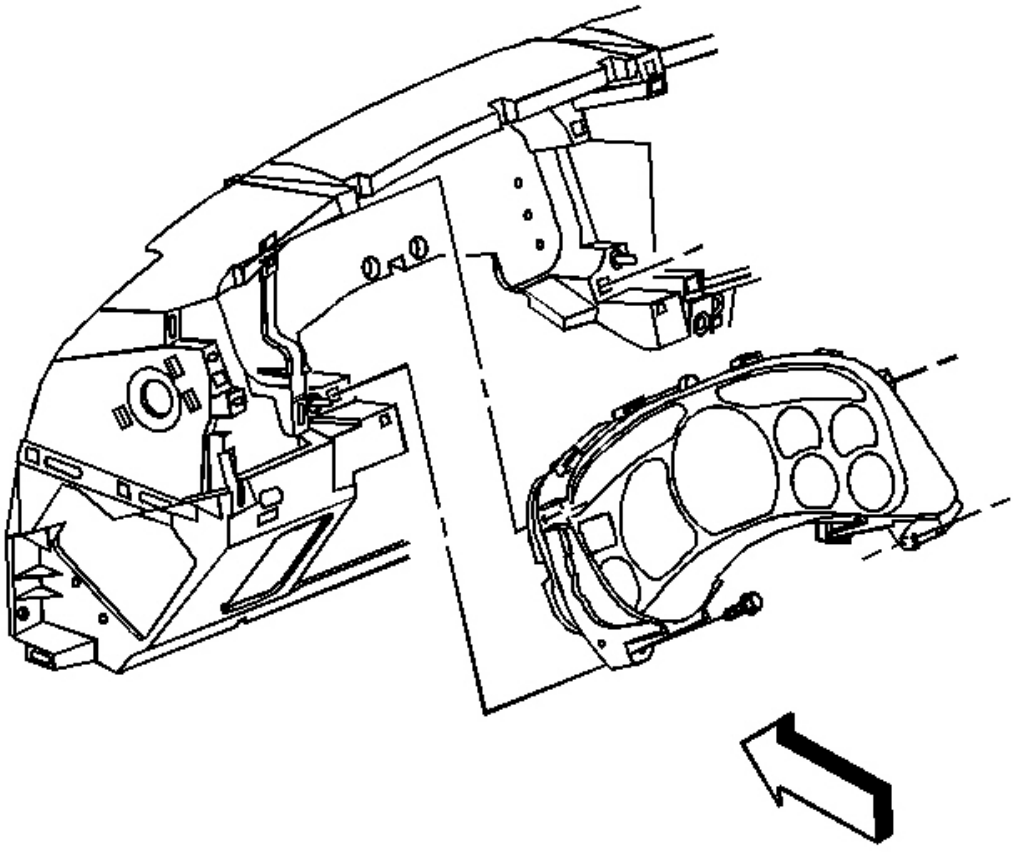


Fig. 54: I/P Cluster Trim Panel Screws
Courtesy of GENERAL MOTORS CORP.

4. Install the instrument cluster trim plate. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Cluster** .

CUPHOLDER REPLACEMENT

Removal Procedure

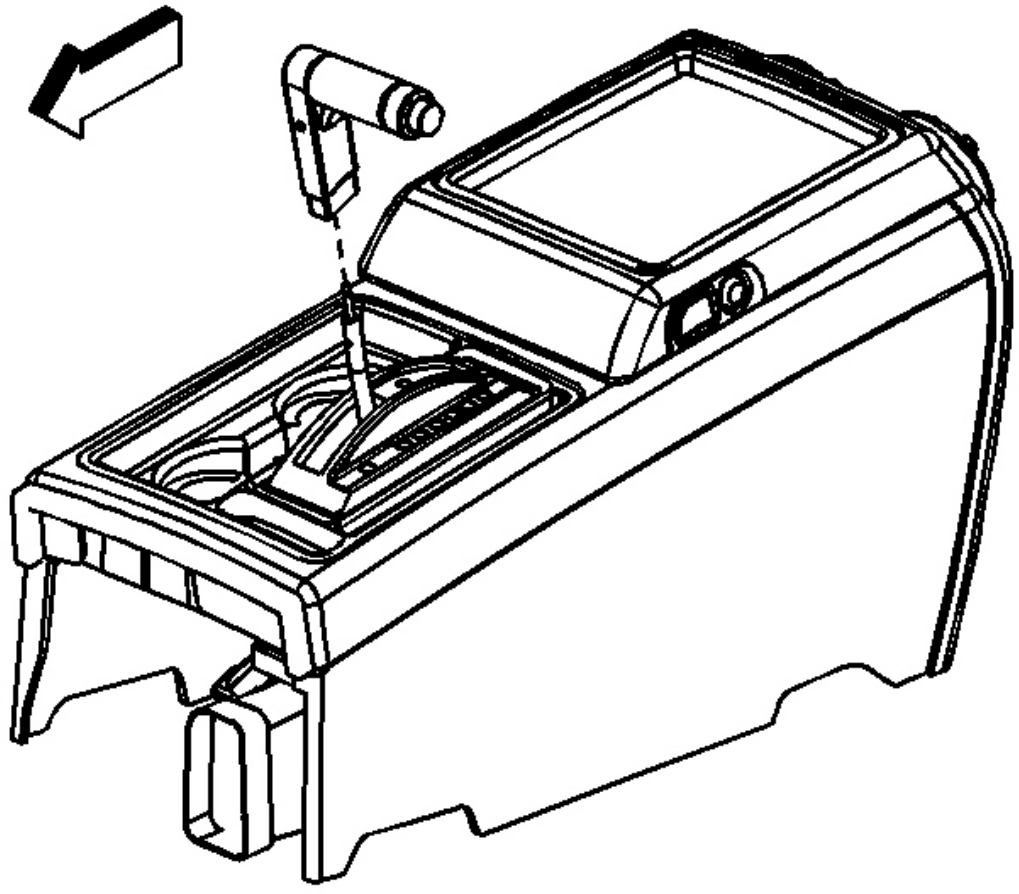


Fig. 55: Identifying Shifter
Courtesy of GENERAL MOTORS CORP.

1. Loosen the locking screw that fastens the shift lever to the shifter.
2. Remove the shifter.

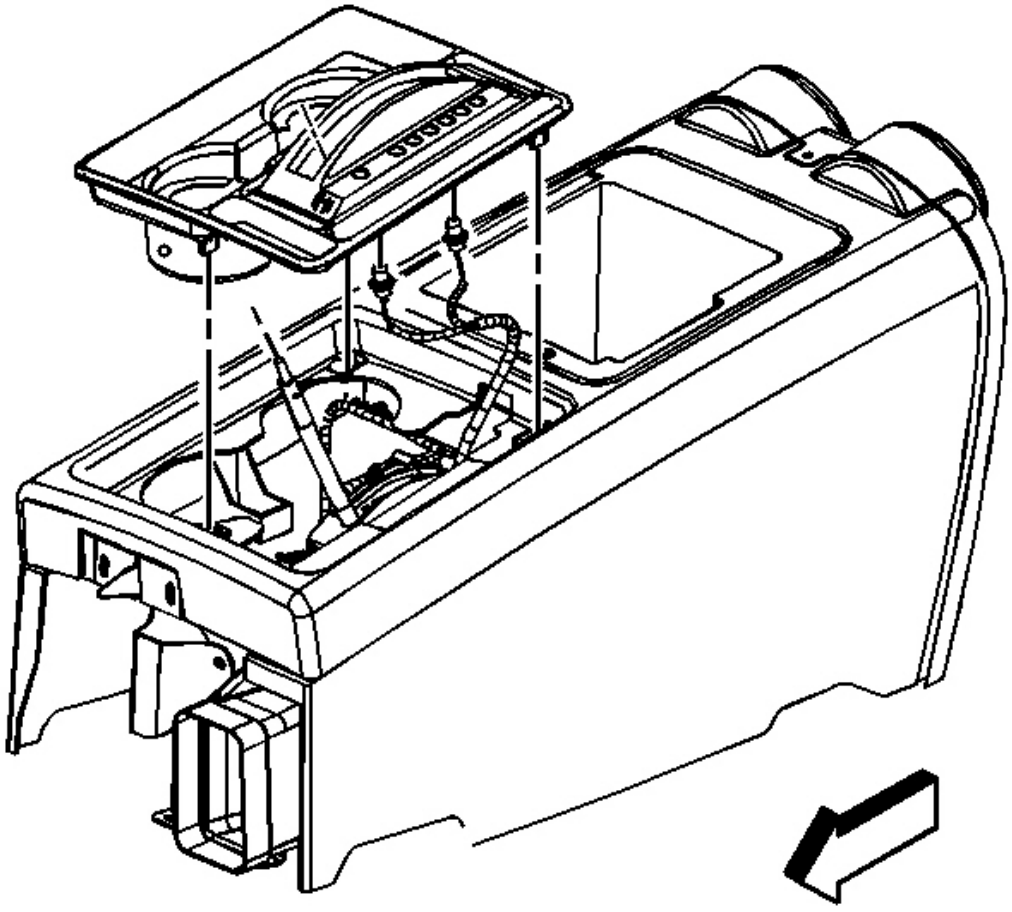


Fig. 56: Cup Holder
Courtesy of GENERAL MOTORS CORP.

3. Using a flat bladed tool, pry up on the cup holder to release the clips.
4. Disconnect the PRNDL lamps from the cup holder.
5. Remove the cup holder.

Installation Procedures

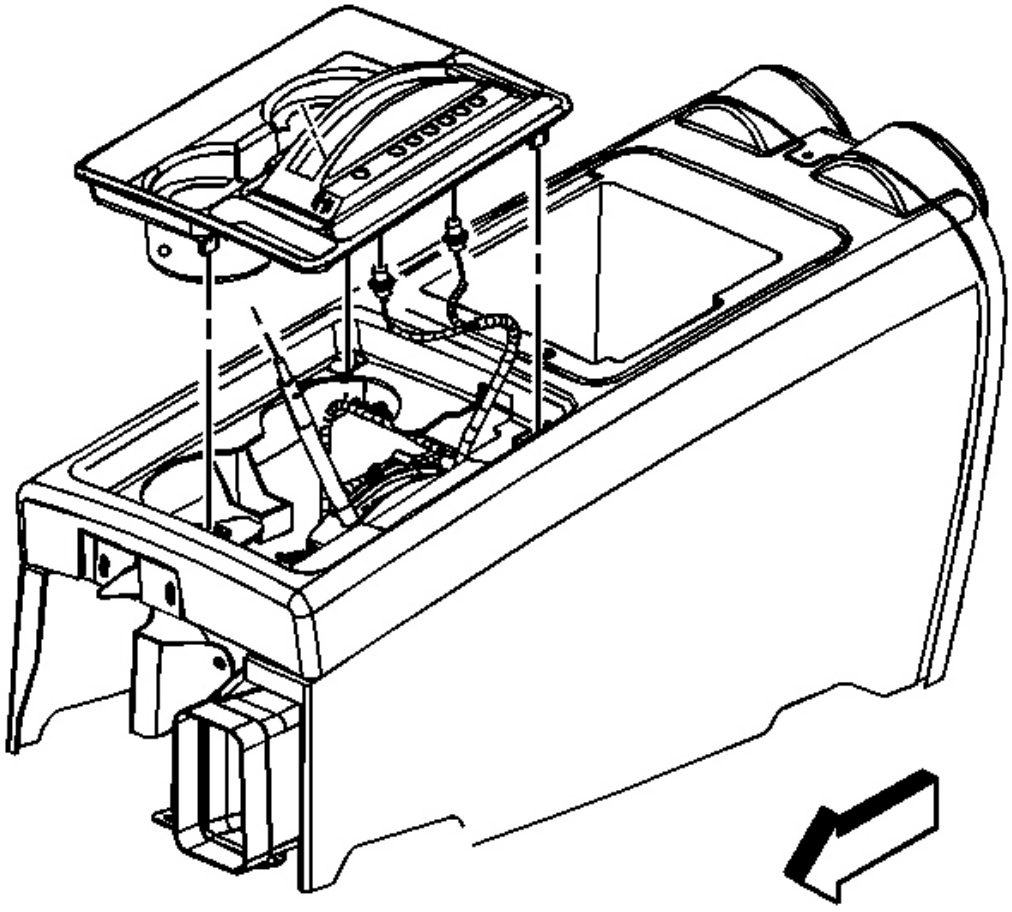


Fig. 57: Cup Holder
Courtesy of GENERAL MOTORS CORP.

1. Connect the lamps to the cup holder.
2. Align the cup holder to the center console.
3. Push the cup holder firmly into place to engage the clips.

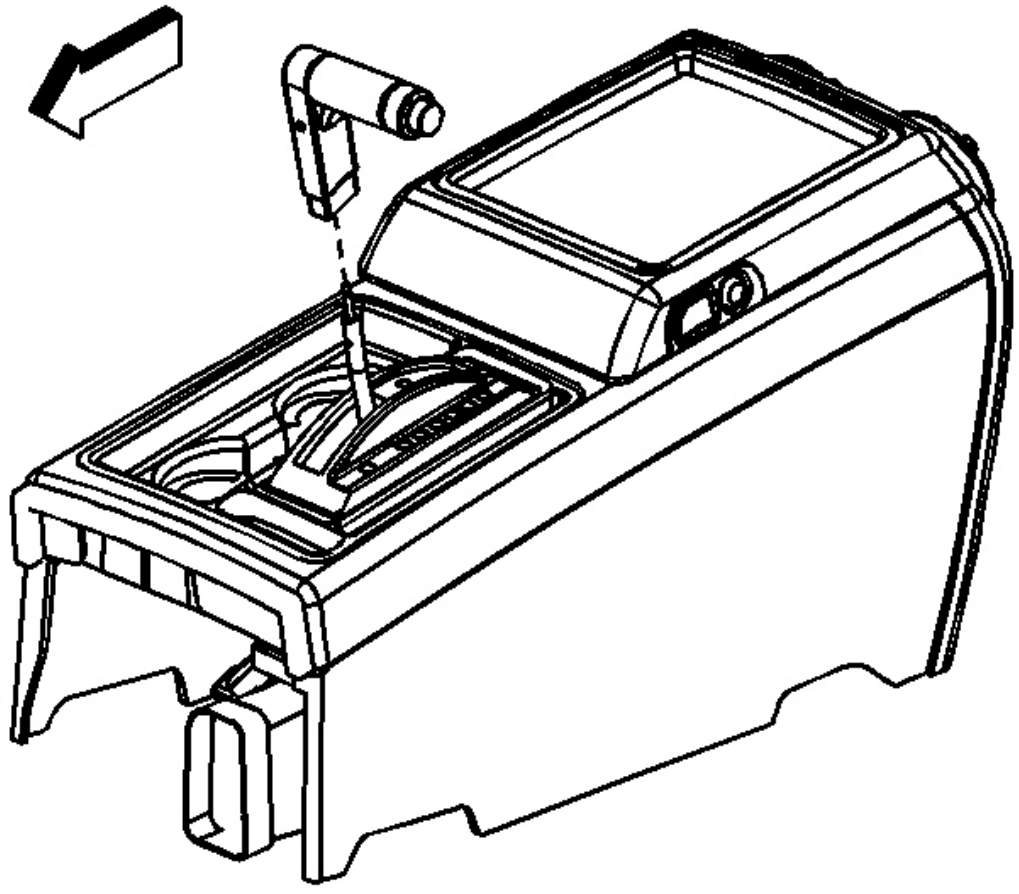


Fig. 58: Identifying Shifter
Courtesy of GENERAL MOTORS CORP.

4. Install shift handle to shifter and use hex nut to fasten in place.

   Tighten: Tighten the nut to 1.6 N.m (14 lb in).

INSTRUMENT PANEL (I/P) CARRIER REPLACEMENT

Removal Procedure

CAUTION: Refer to Battery Disconnect Caution in Cautions and Notices.

1. Disconnect the negative battery cable.

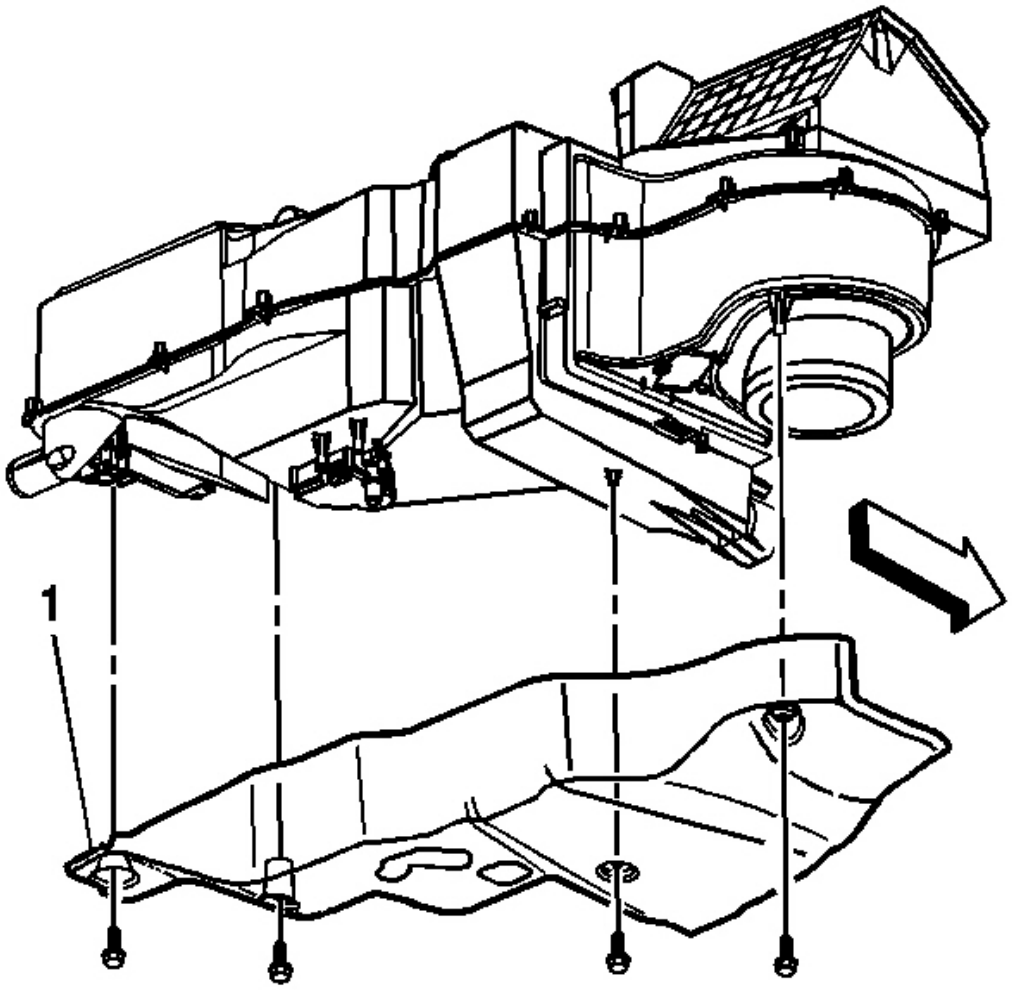


Fig. 59: Insulator & Instrument Panel
Courtesy of GENERAL MOTORS CORP.

2. Remove the passenger insulator. Refer to **Insulator Replacement - Instrument Panel (I/P)** .
3. Disconnect the brake release lever from the instrument panel (I/P).

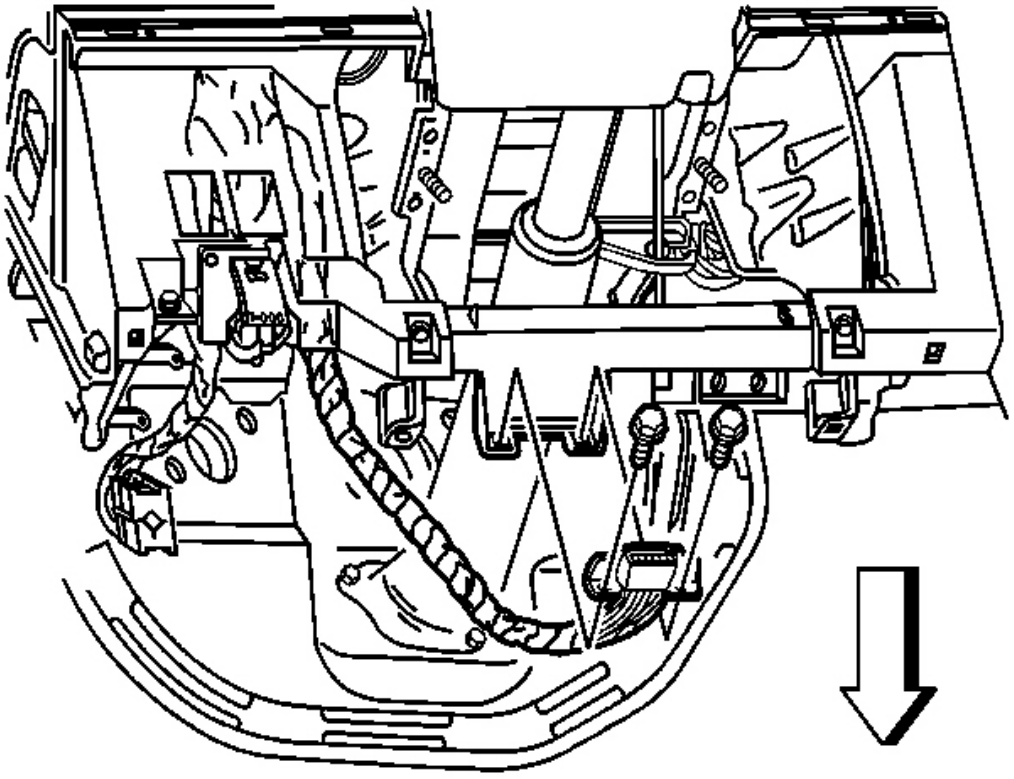


Fig. 60: I/P Data Link Connector
Courtesy of GENERAL MOTORS CORP.

4. Remove the screws from the data link connector.
5. Remove the data link connector from the I/P.

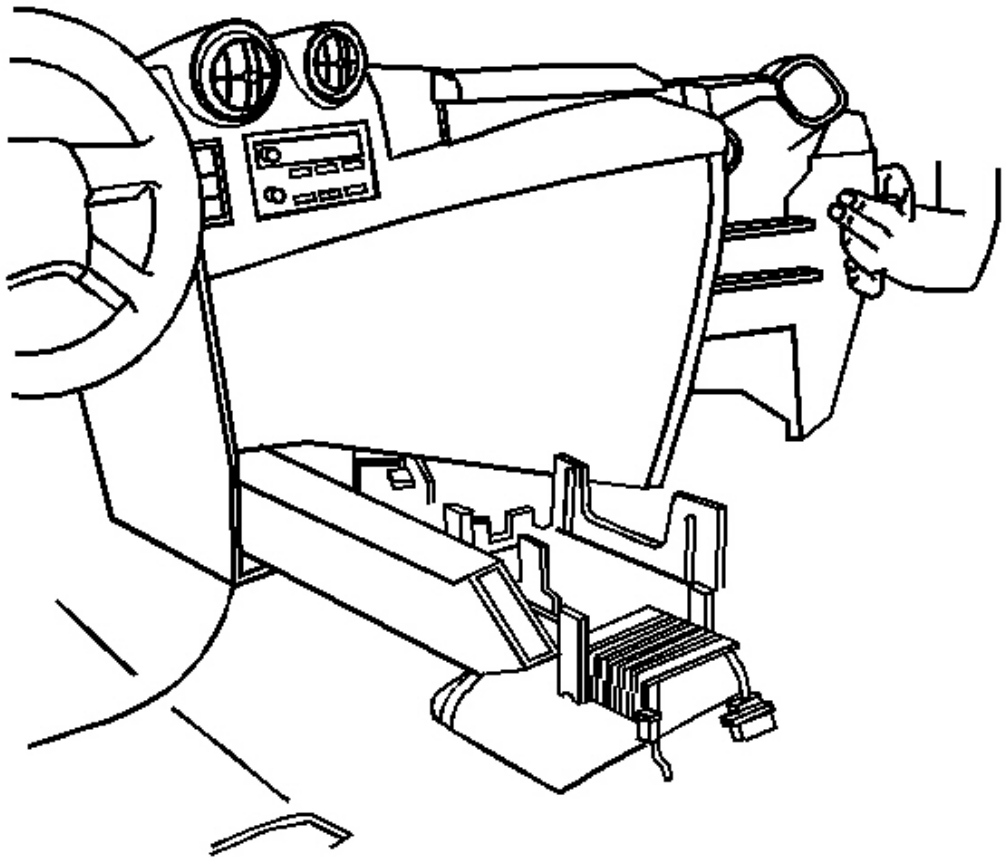


Fig. 61: I/P Center Console
Courtesy of GENERAL MOTORS CORP.

6. Remove the I/P center console. Refer to **Console Replacement** .

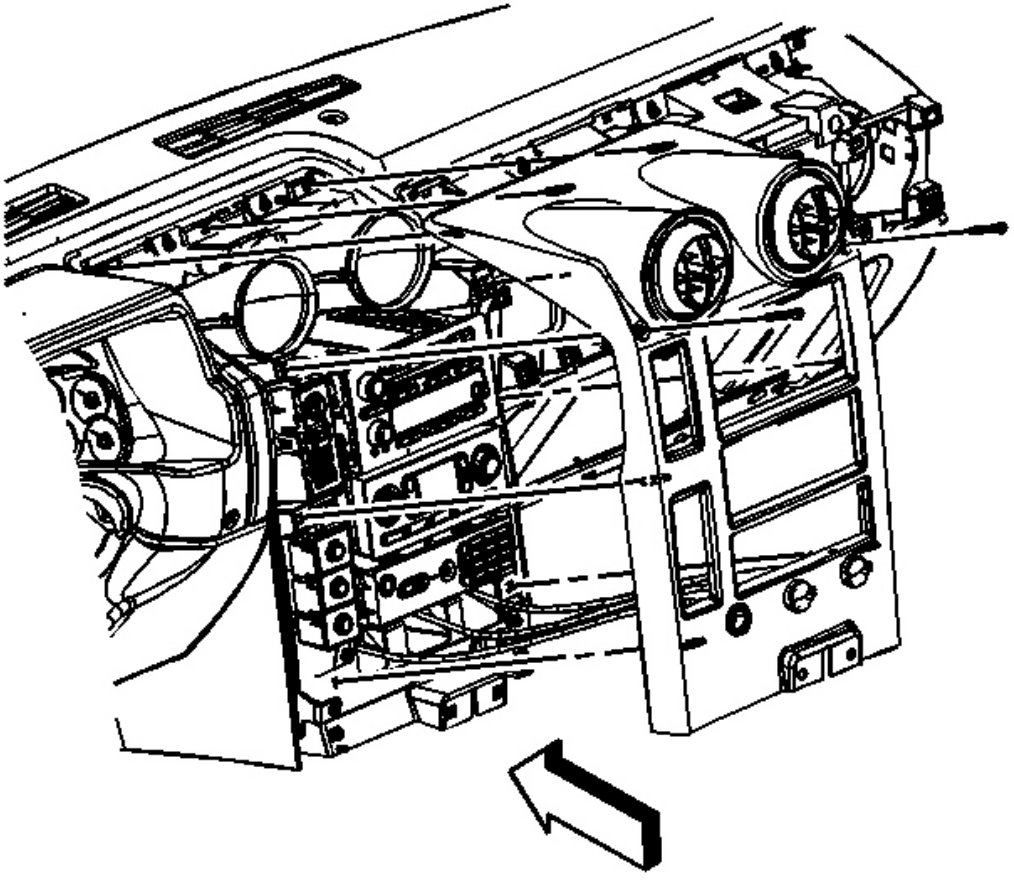


Fig. 62: I/P Center Trim Panel
Courtesy of GENERAL MOTORS CORP.

7. Remove the I/P center trim panel. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Center** .

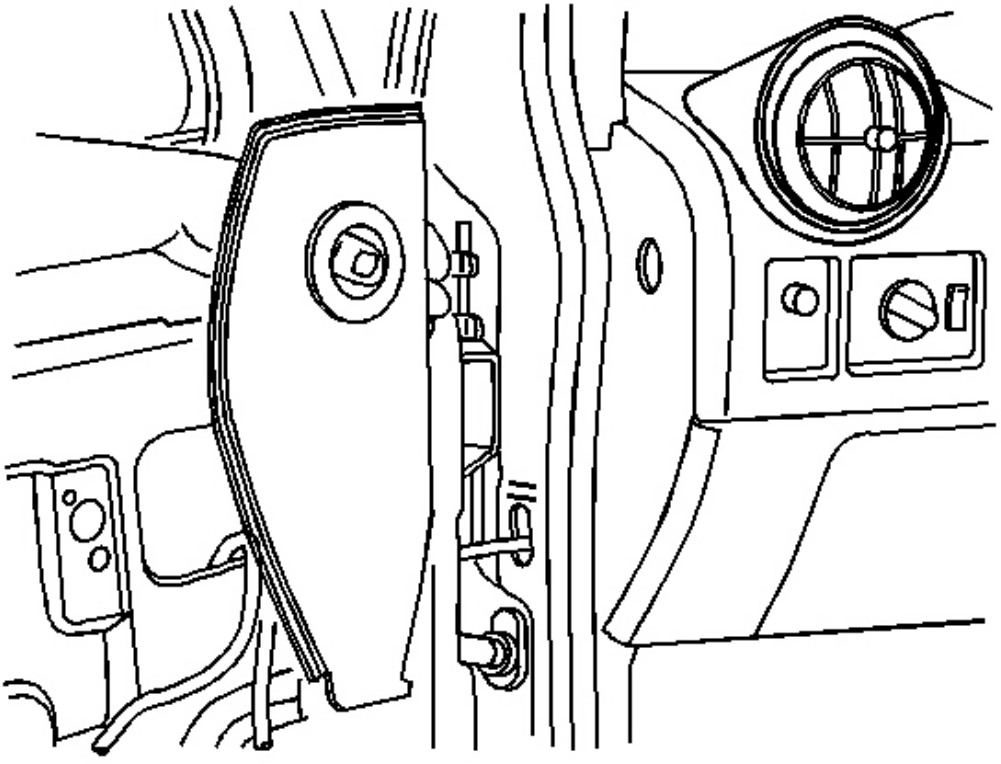


Fig. 63: Left & Right I/P Side Trim
Courtesy of GENERAL MOTORS CORP.

8. Remove the left and right I/P side trim.

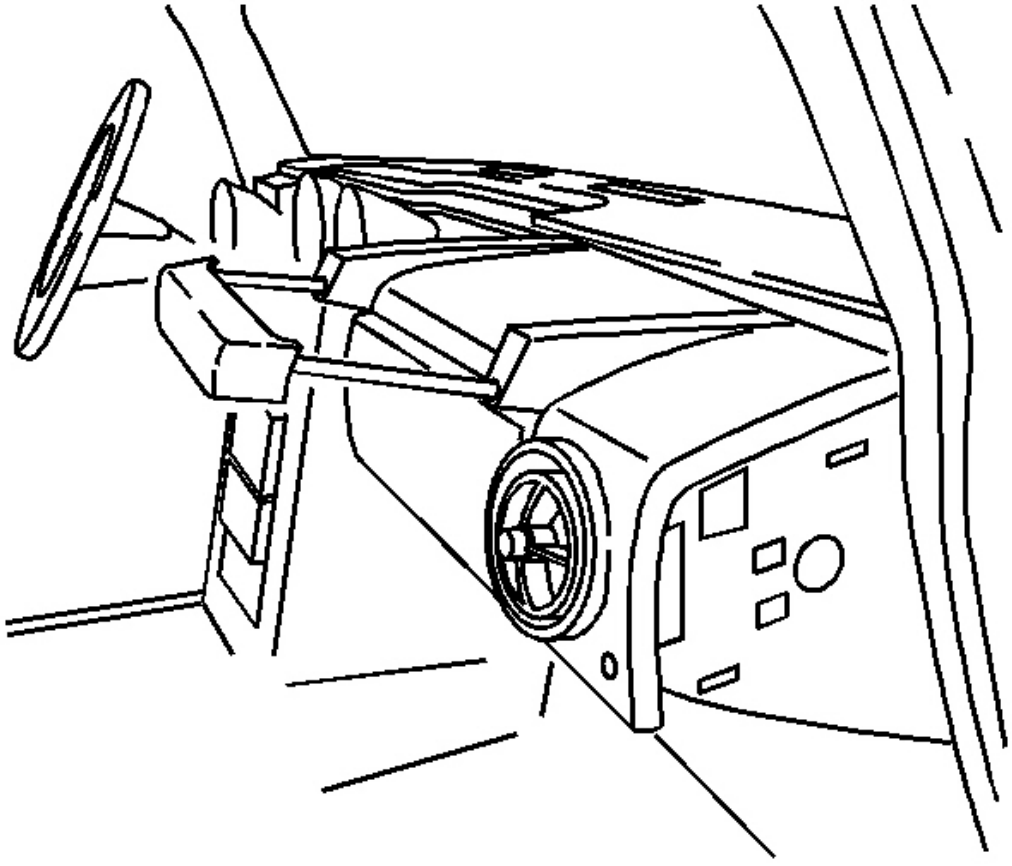


Fig. 64: I/P Assist Handle
Courtesy of GENERAL MOTORS CORP.

9. Remove the assist handle. Refer to **Instrument Panel (I/P) Assist Handle Replacement** .

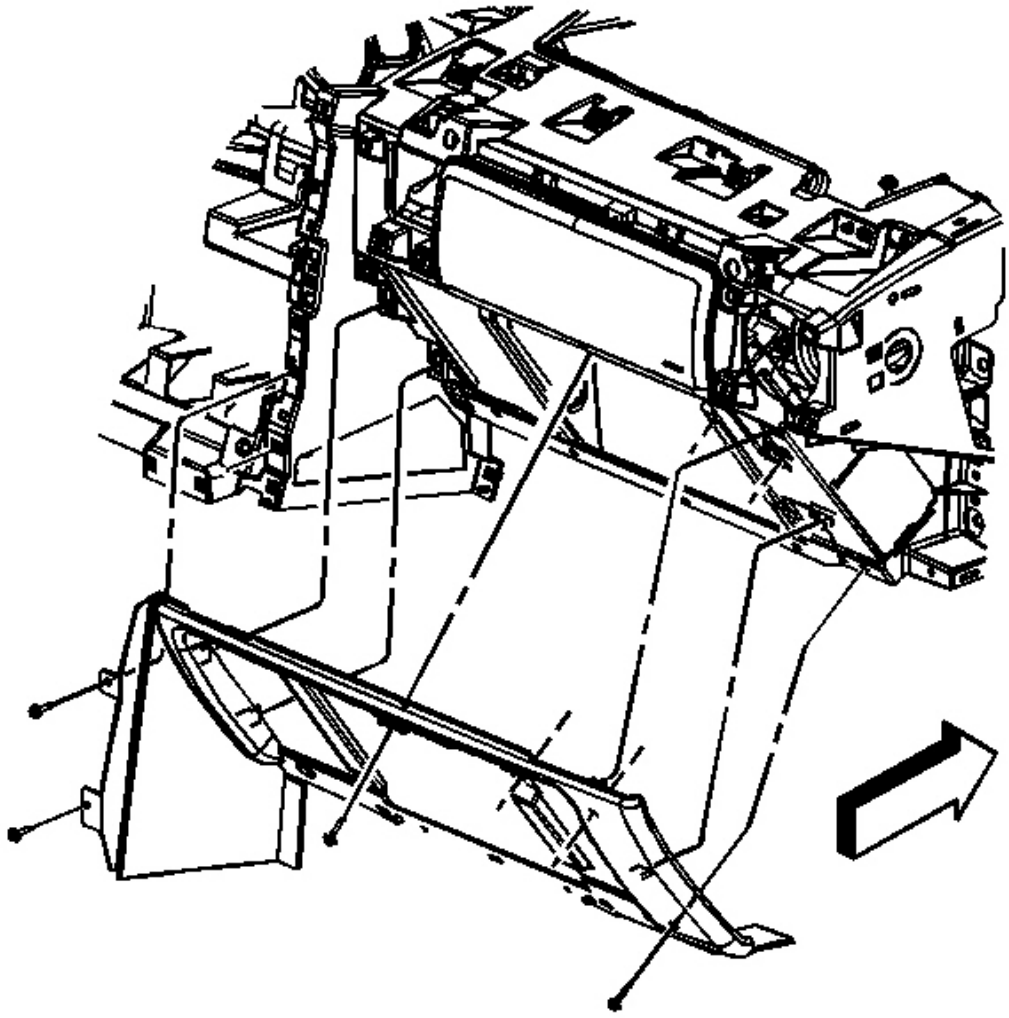


Fig. 65: I/P Compartment
Courtesy of GENERAL MOTORS CORP.

10. Remove the I/P compartment. Refer to **Compartment Replacement - Instrument Panel (I/P)** .

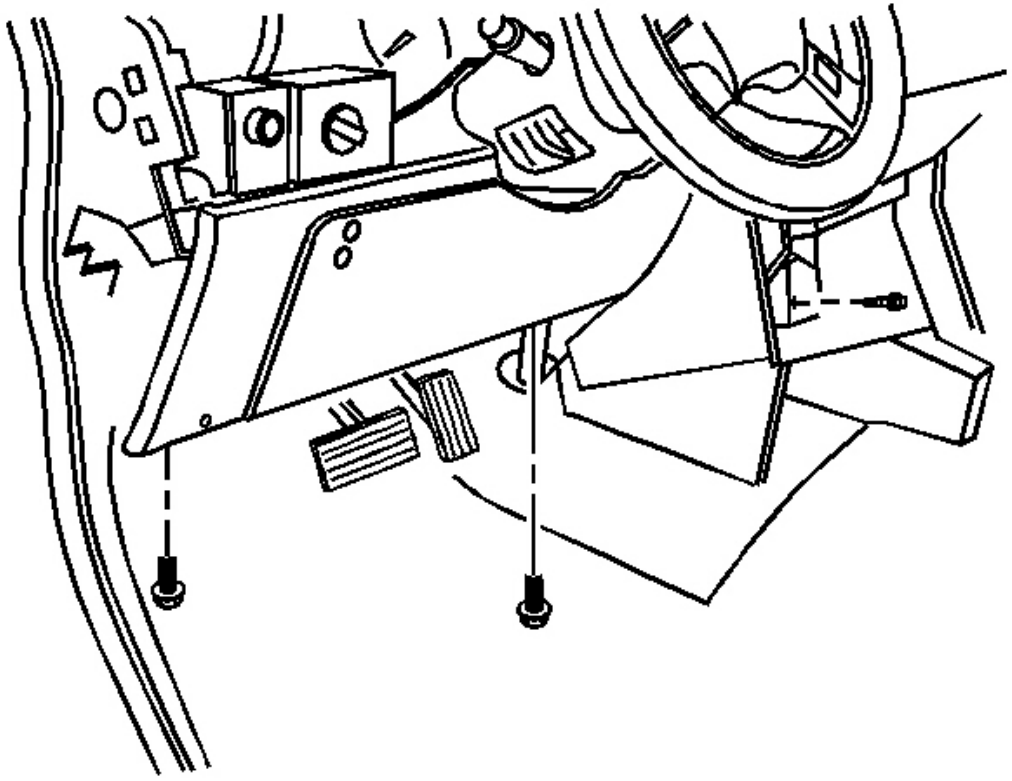


Fig. 66: Driver Knee Bolster
Courtesy of GENERAL MOTORS CORP.

11. Remove the drivers knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** .

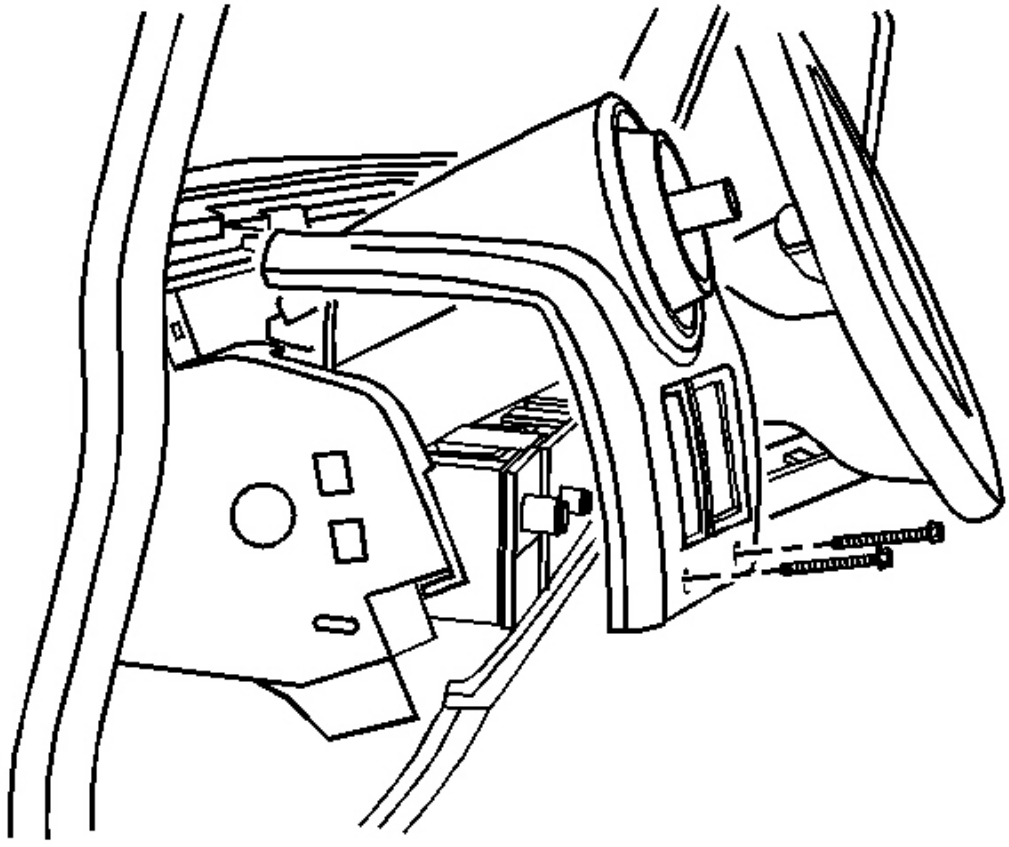


Fig. 67: I/P Accessory Left Trim Panel
Courtesy of GENERAL MOTORS CORP.

12. Remove the left accessory trim plate. Refer to **Trim Plate Replacement - Instrument Panel (I/P) Accessory Left** .

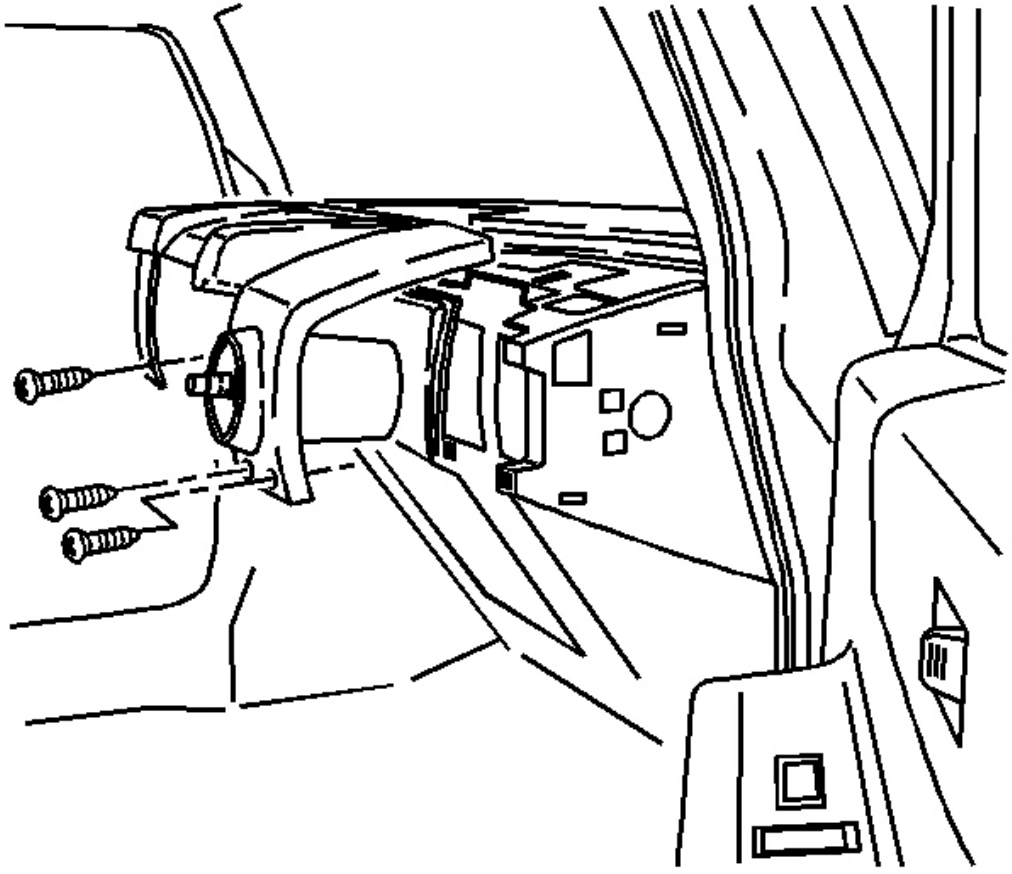


Fig. 68: I/P Accessory Right Trim Panel
Courtesy of GENERAL MOTORS CORP.

13. Remove the right accessory trim panel. Refer to **Trim Plate Replacement - Instrument Panel (I/P) Accessory Right** .

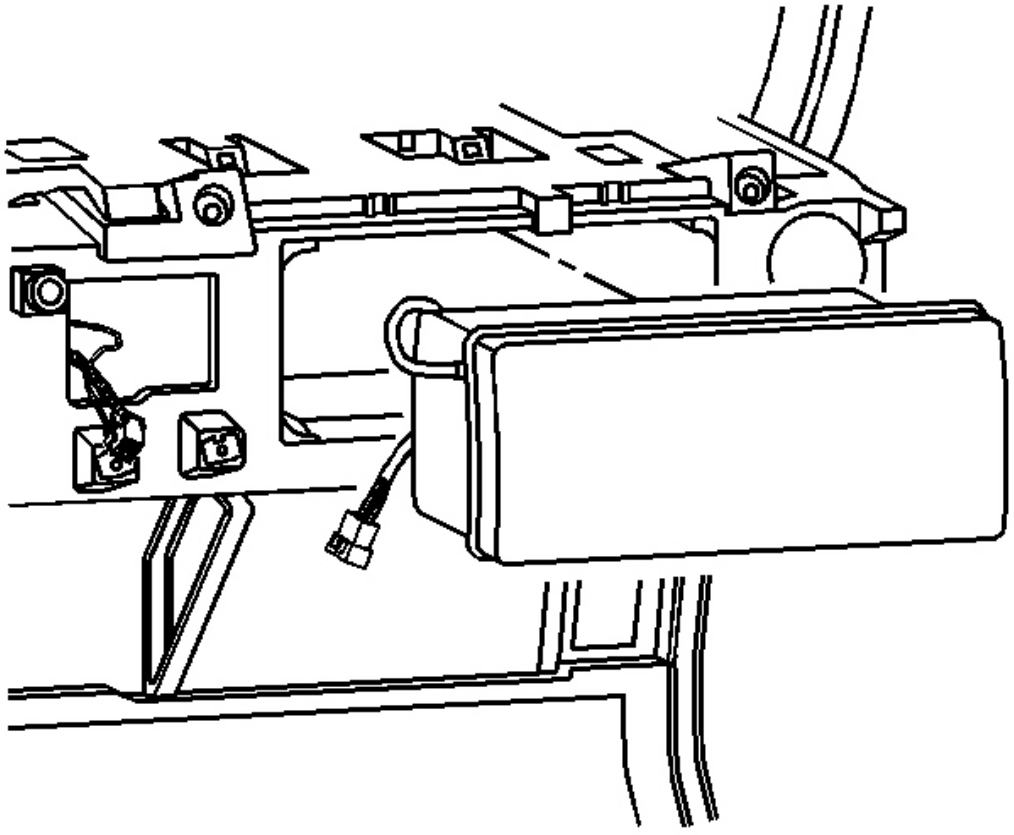


Fig. 69: I/P Air Bag Module
Courtesy of GENERAL MOTORS CORP.

14. Remove the I/P air bag module. Refer to **Inflatable Restraint Instrument Panel Module Replacement** in SIR.
15. Remove the steering column. Refer to **Steering Column Replacement** in Steering Wheel and Column.

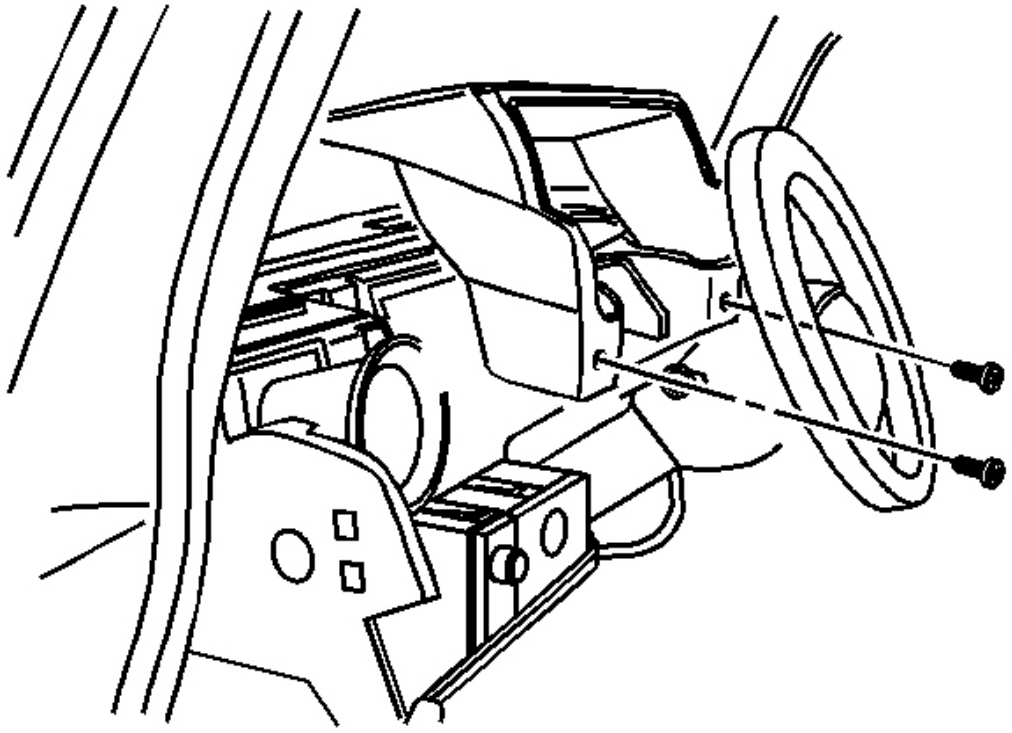


Fig. 70: I/P Cluster Trim Panel
Courtesy of GENERAL MOTORS CORP.

16. Remove the I/P cluster. Refer to **Instrument Panel Cluster (IPC) Replacement** .

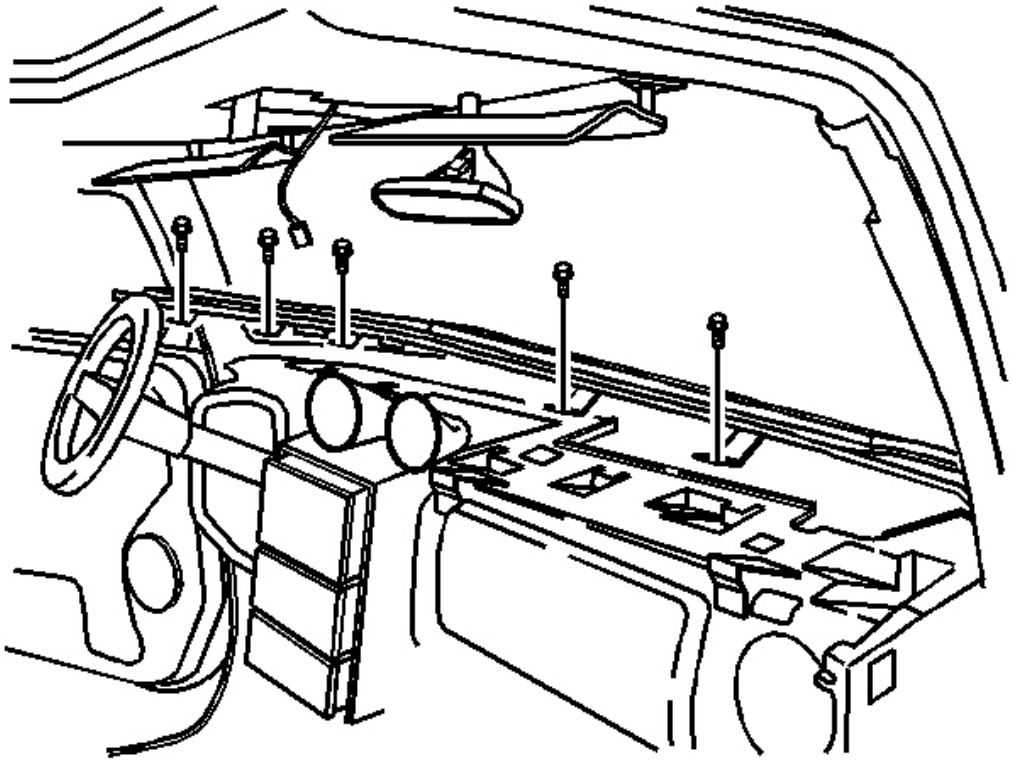


Fig. 71: I/P Upper Trim Pad
Courtesy of GENERAL MOTORS CORP.

17. Remove the I/P upper trim pad. Refer to **Trim Pad Replacement - Instrument Panel (I/P) Upper** .

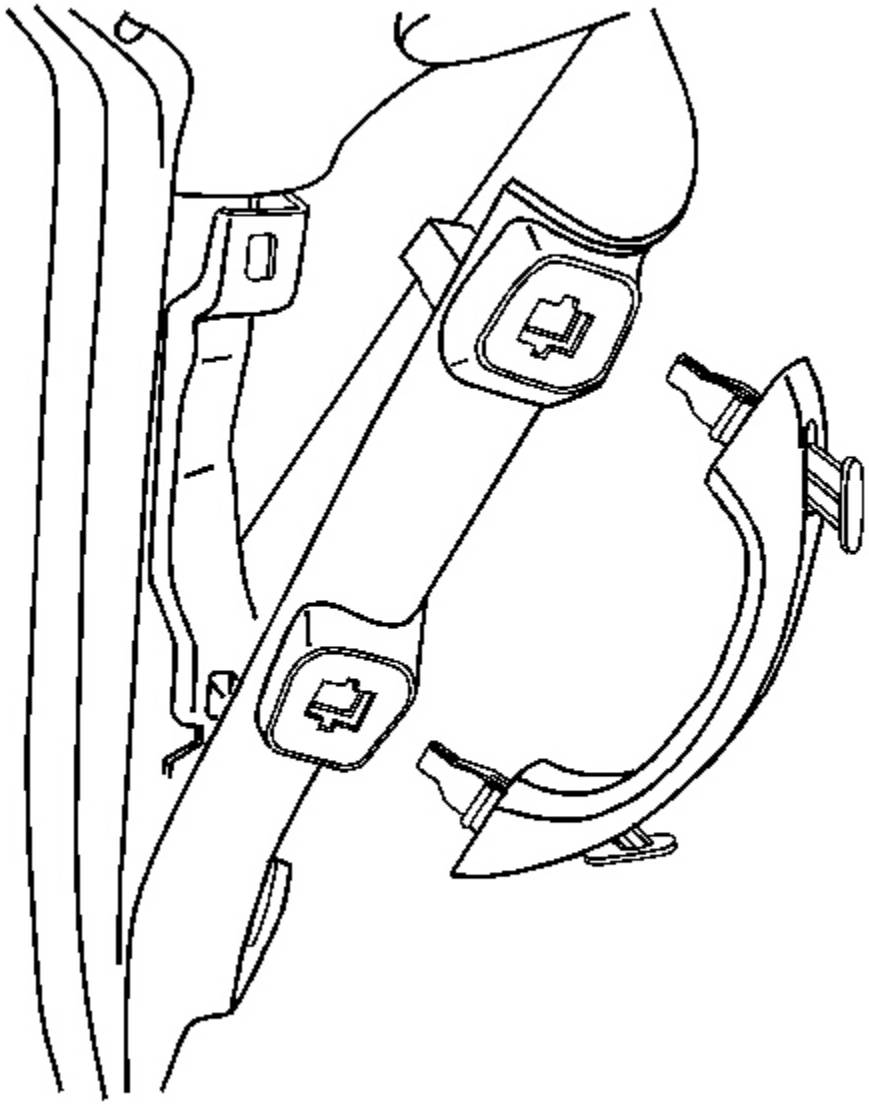


Fig. 72: Windshield Garnish Moldings
Courtesy of GENERAL MOTORS CORP.

18. Remove both windshield garnish moldings. Refer to **Garnish Molding Replacement - Windshield Pillar** in Interior Trim.

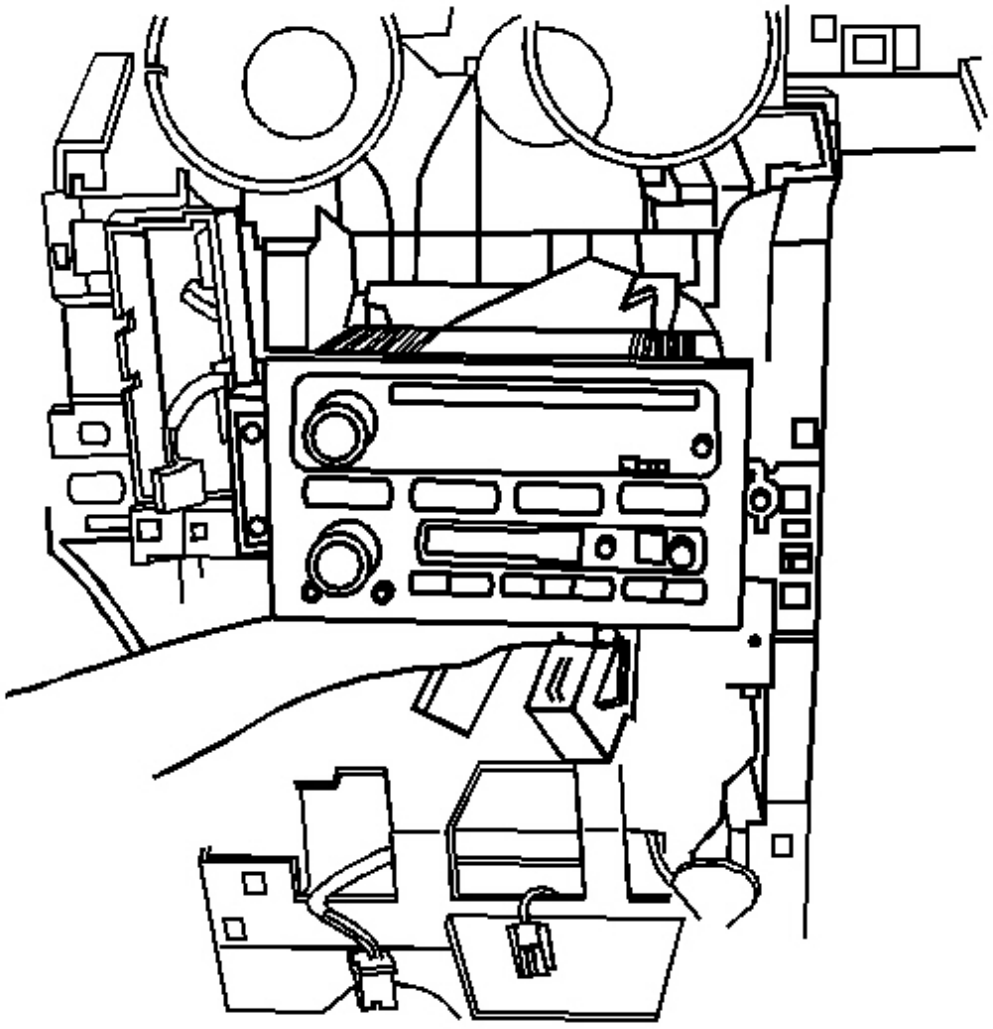


Fig. 73: Radio
Courtesy of GENERAL MOTORS CORP.

19. Remove the radio from center stack. Refer to **Radio Replacement** in Entertainment.

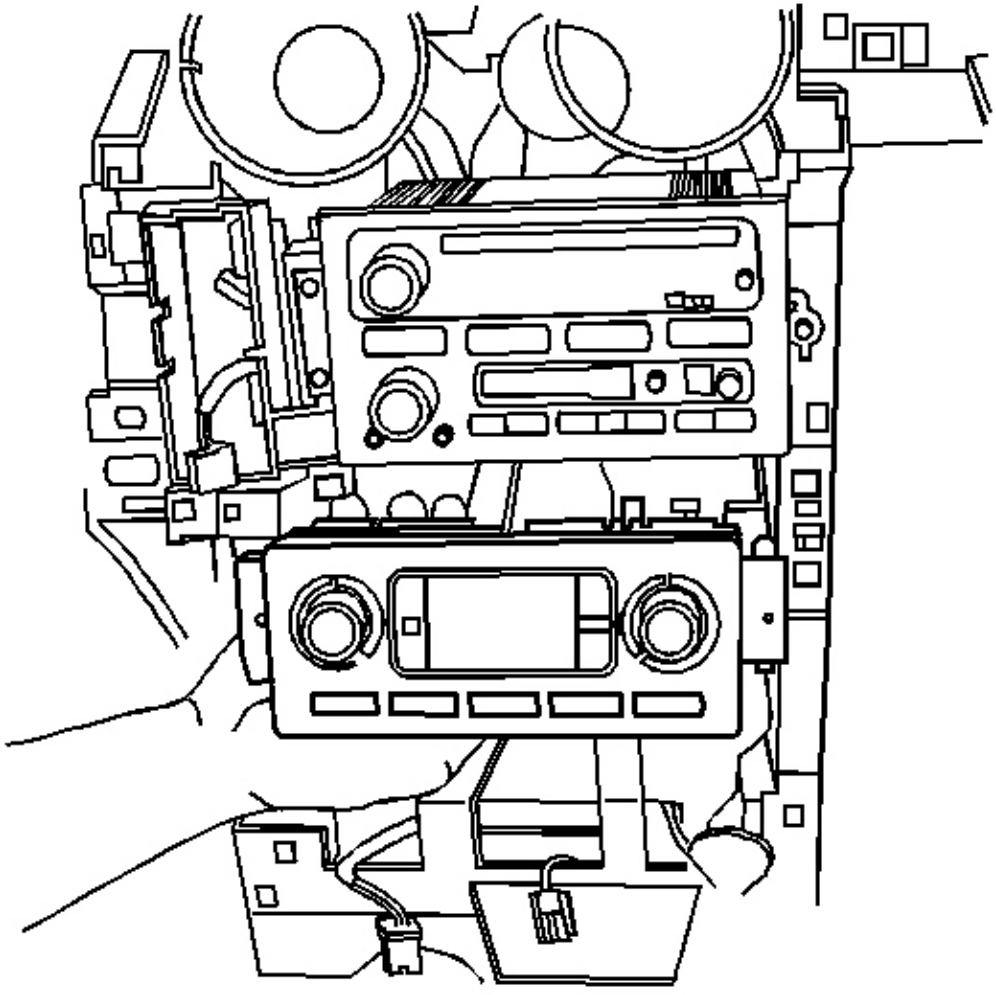


Fig. 74: HVAC Control
Courtesy of GENERAL MOTORS CORP.

20. Remove the HVAC control. Refer to **HVAC Control Module Replacement** in HVAC Systems - Automatic.

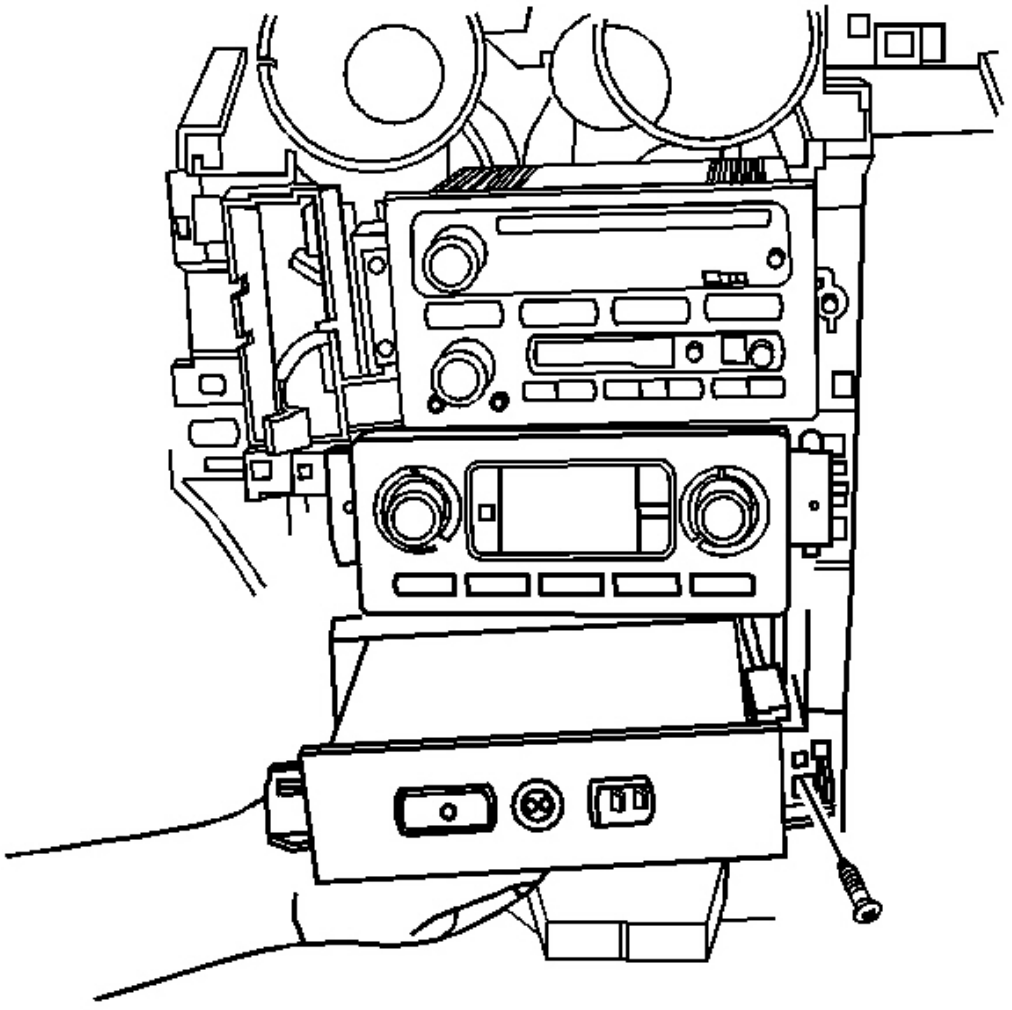


Fig. 75: Onstar(R) Module
Courtesy of GENERAL MOTORS CORP.

21. Remove the Onstar(R) module from center stack. Refer to **OnStar Button Assembly Replacement** in Cellular Communication.

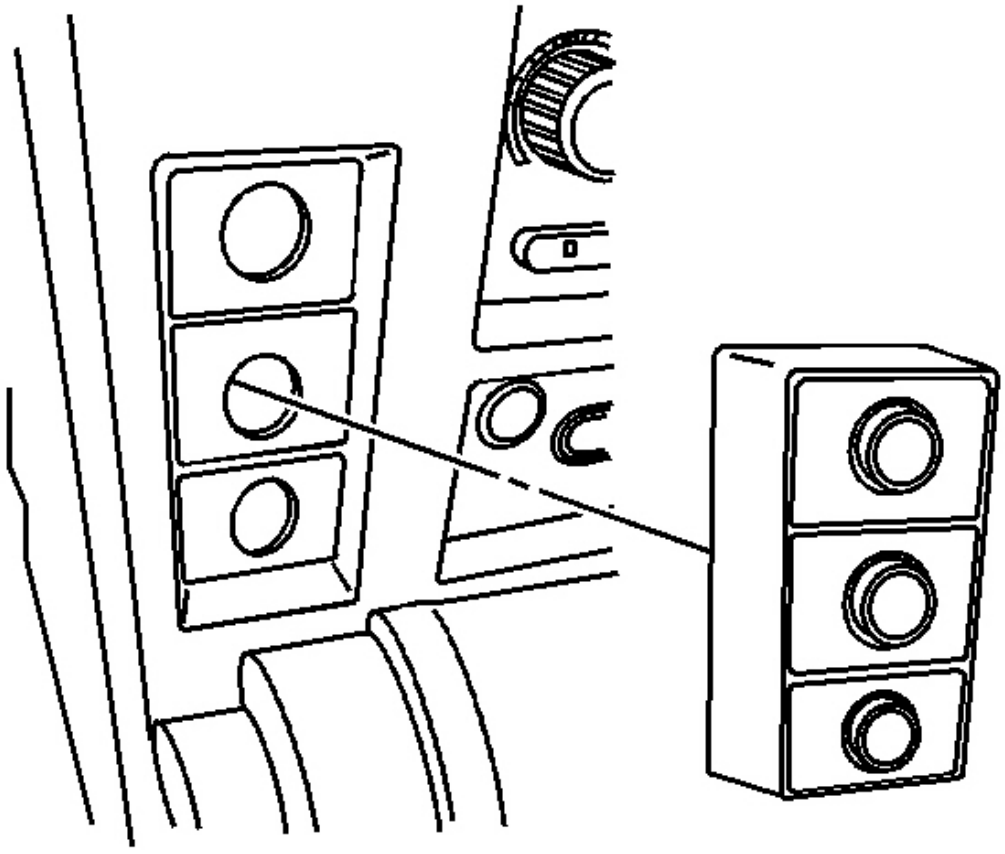


Fig. 76: Traction Control & Air Ride Switch Module Assembly
Courtesy of GENERAL MOTORS CORP.

22. Remove the traction control, air ride switch module assembly.

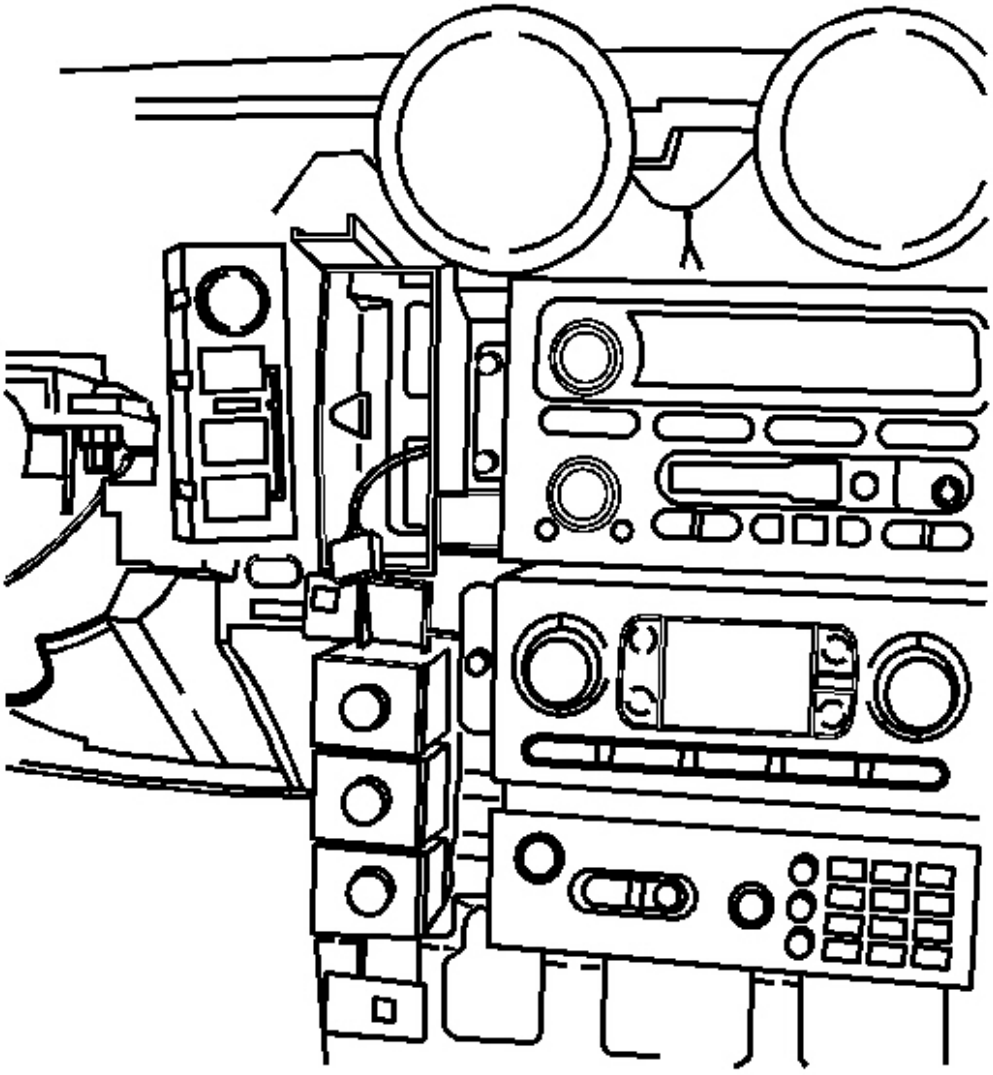


Fig. 77: Transfer Case Control Switch Module
Courtesy of GENERAL MOTORS CORP.

23. Remove the transfer case control switch module. Refer to **Transfer Case Shift Control Module Replacement** in Transfer Case - BW 4484.

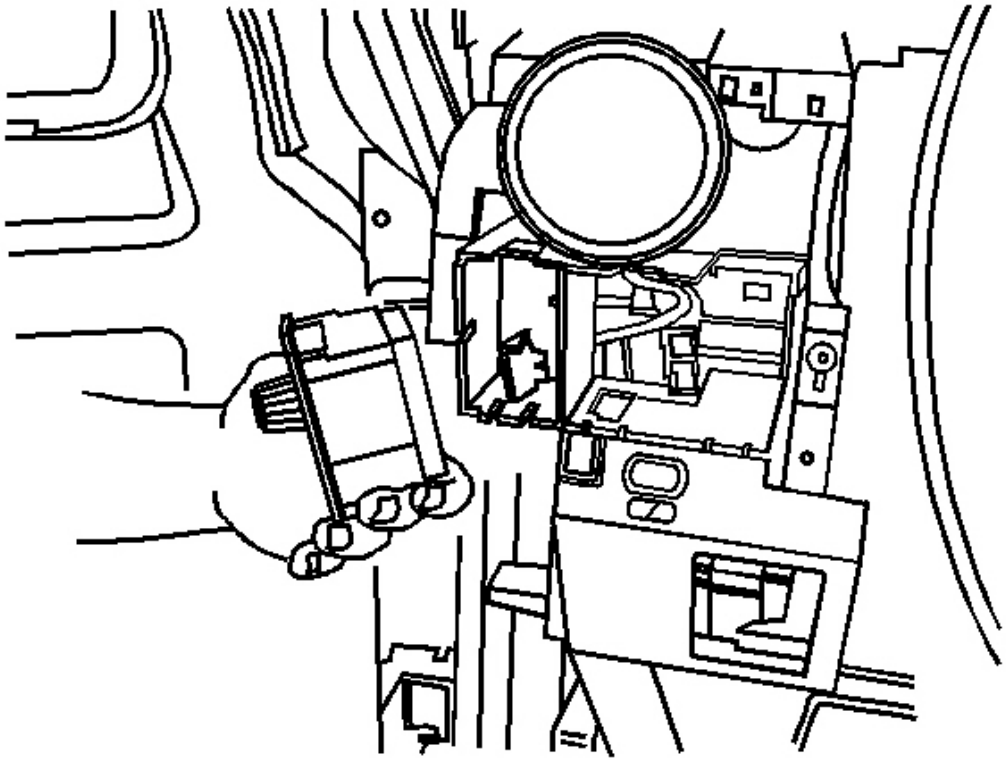


Fig. 78: Rear Wiper Switch
Courtesy of GENERAL MOTORS CORP.

24. Remove the rear wiper switch. Refer to **Wiper/Washer Switch Replacement - Rear** in Wipers/Washer Systems.

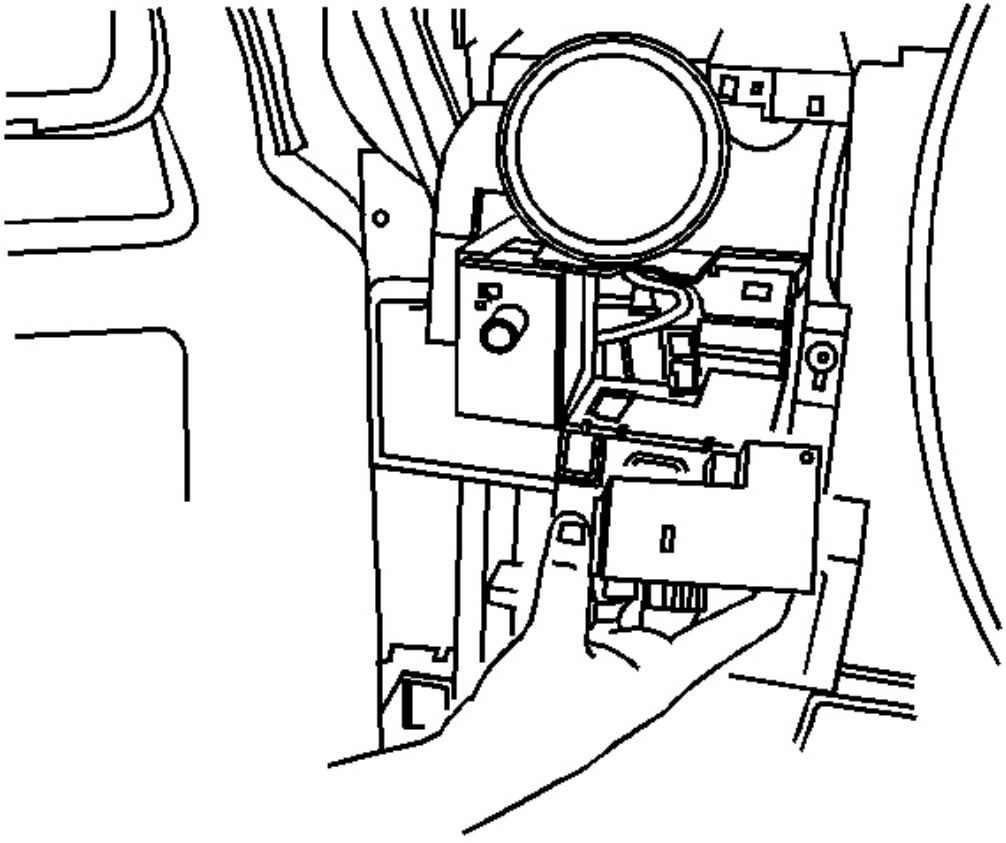


Fig. 79: Headlamp Switch
Courtesy of GENERAL MOTORS CORP.

25. Remove headlamp switch. Refer to **Headlamp Switch Replacement** in Lighting Systems.
26. Remove the upper HVAC air temperature sensors from the HVAC ducts. Refer to **Air Temperature Sensor Replacement - Upper Right** and **Air Temperature Sensor Replacement - Upper Left** in HVAC Systems - Automatic.
27. Remove the lower HVAC air temperature sensors from the HVAC ducts. Refer to **Air Temperature Sensor Replacement - Lower Left** and **Air Temperature Sensor Replacement - Lower Right** in HVAC Systems - Automatic.

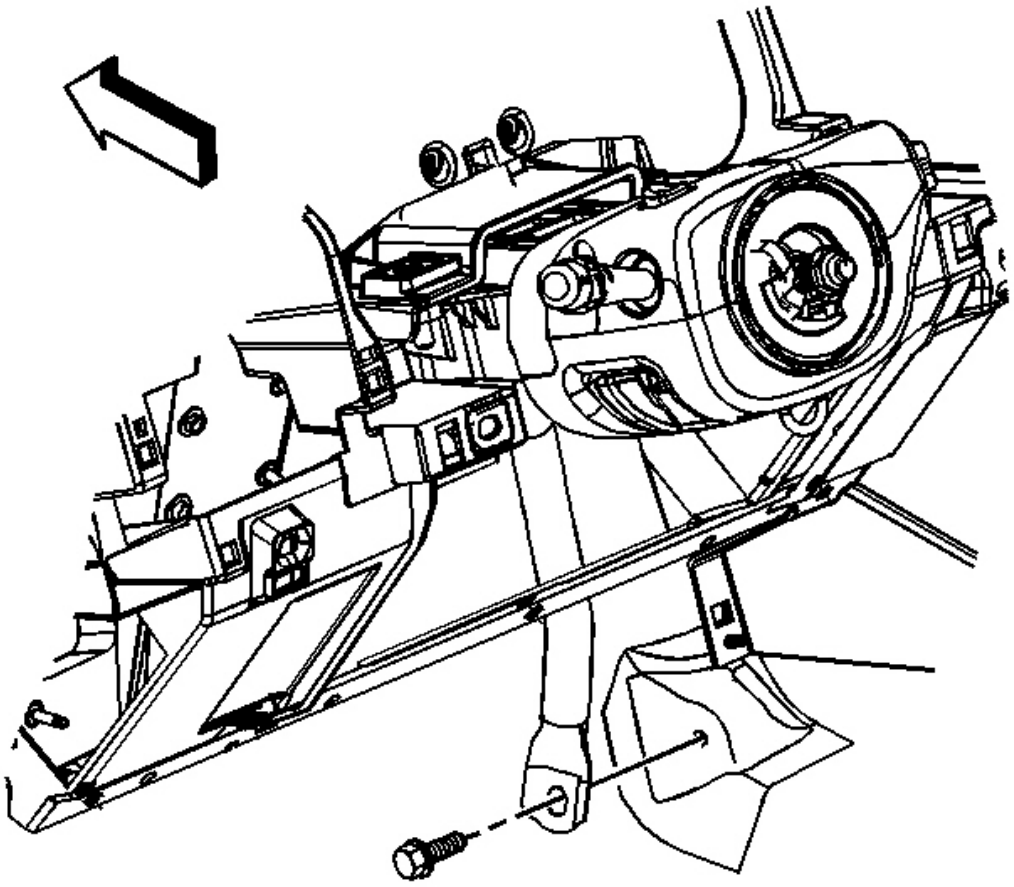


Fig. 80: I/P Carrier Center Support Bracket Nut
Courtesy of GENERAL MOTORS CORP.

28. Remove the nut from the I/P carrier center support.
29. Remove the upper I/P carrier bolts.
30. Remove the drivers and passenger side I/P carrier bolts.
31. Disconnect the electrical connections from the body control module (BCM) to the body harness.
32. Remove the wiring harnesses through the openings in the I/P retainer.
33. Remove the I/P assembly from the vehicle.

Installation Procedure

IMPORTANT: Make sure the ambient light sensor is routed to the top of the I/P.

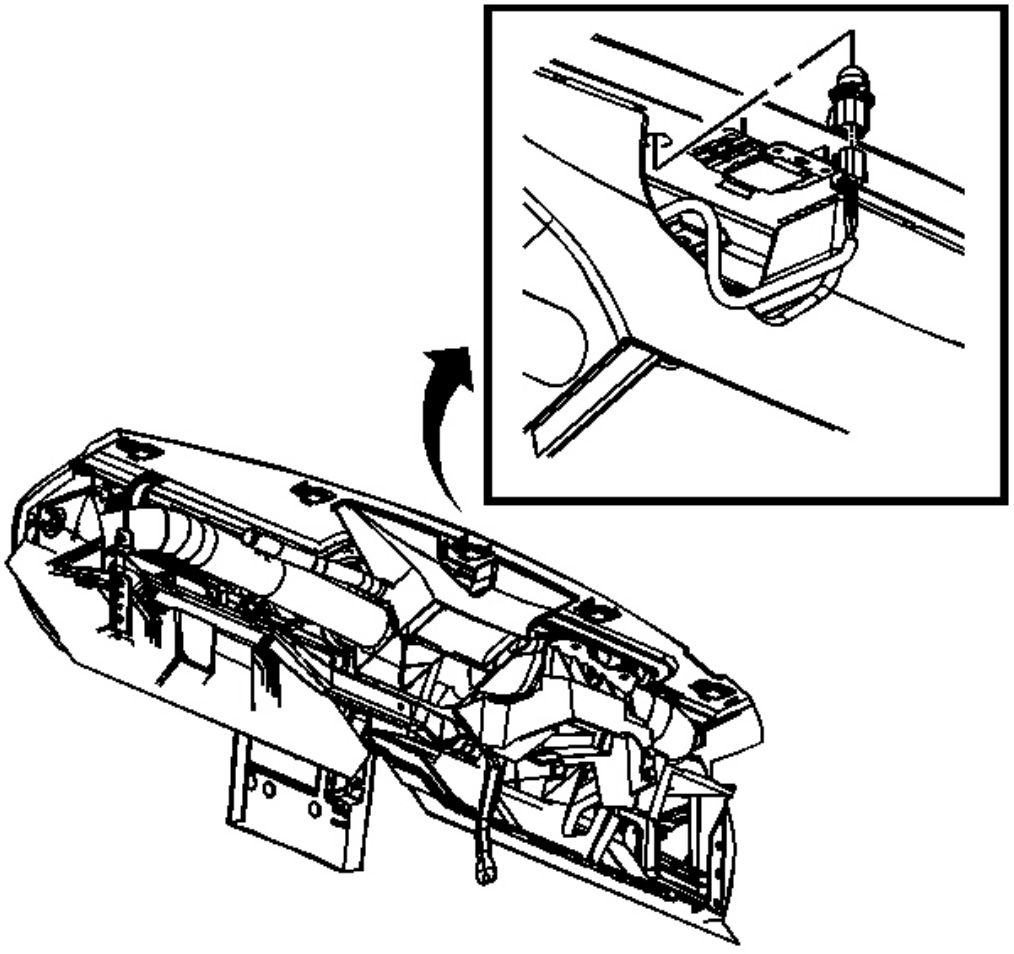


Fig. 81: Aligning I/P & Routing Electrical Harnesses
Courtesy of GENERAL MOTORS CORP.

1. Align the I/P in the vehicle and route all electrical harnesses through the I/P retainer.

   NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the upper and side I/P carrier bolts.

   Tighten: Tighten the bolts to 50 N.m (37 lb ft).

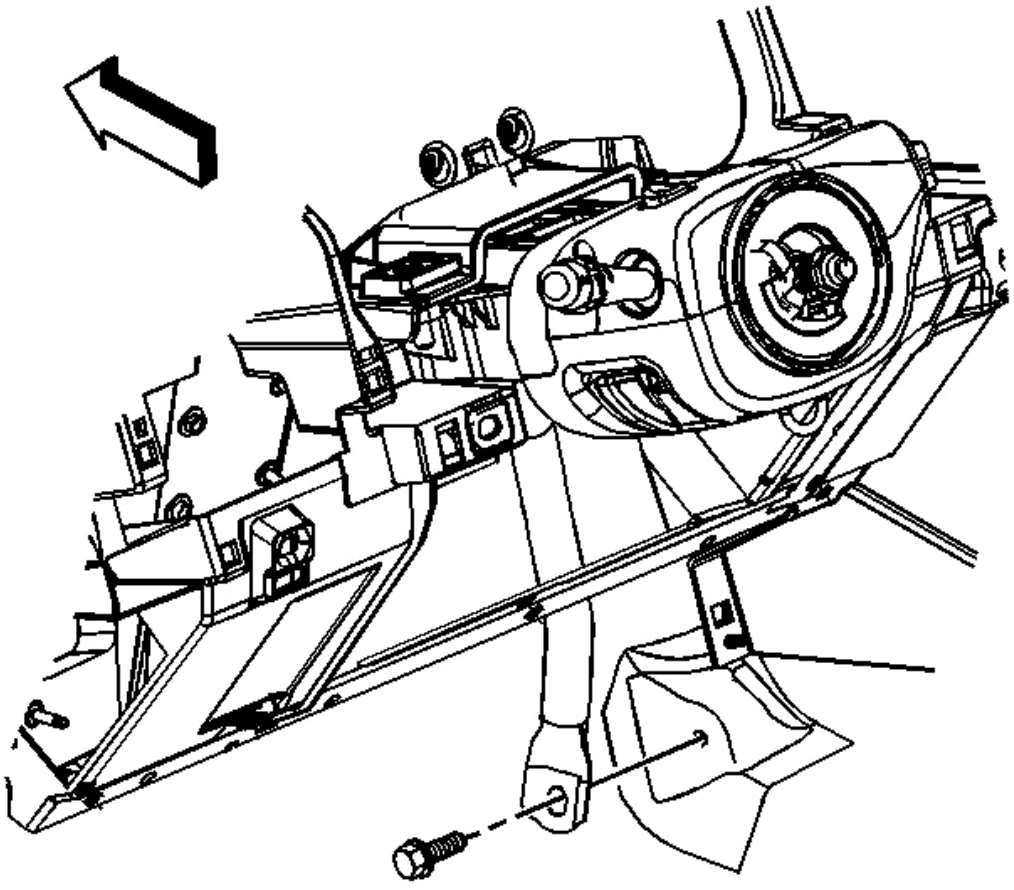


Fig. 82: I/P Carrier Center Support Bracket Nut
Courtesy of GENERAL MOTORS CORP.

3. Install the I/P carrier center support nut.

   Tighten: Tighten the nut to 9 N.m (80 lb in).

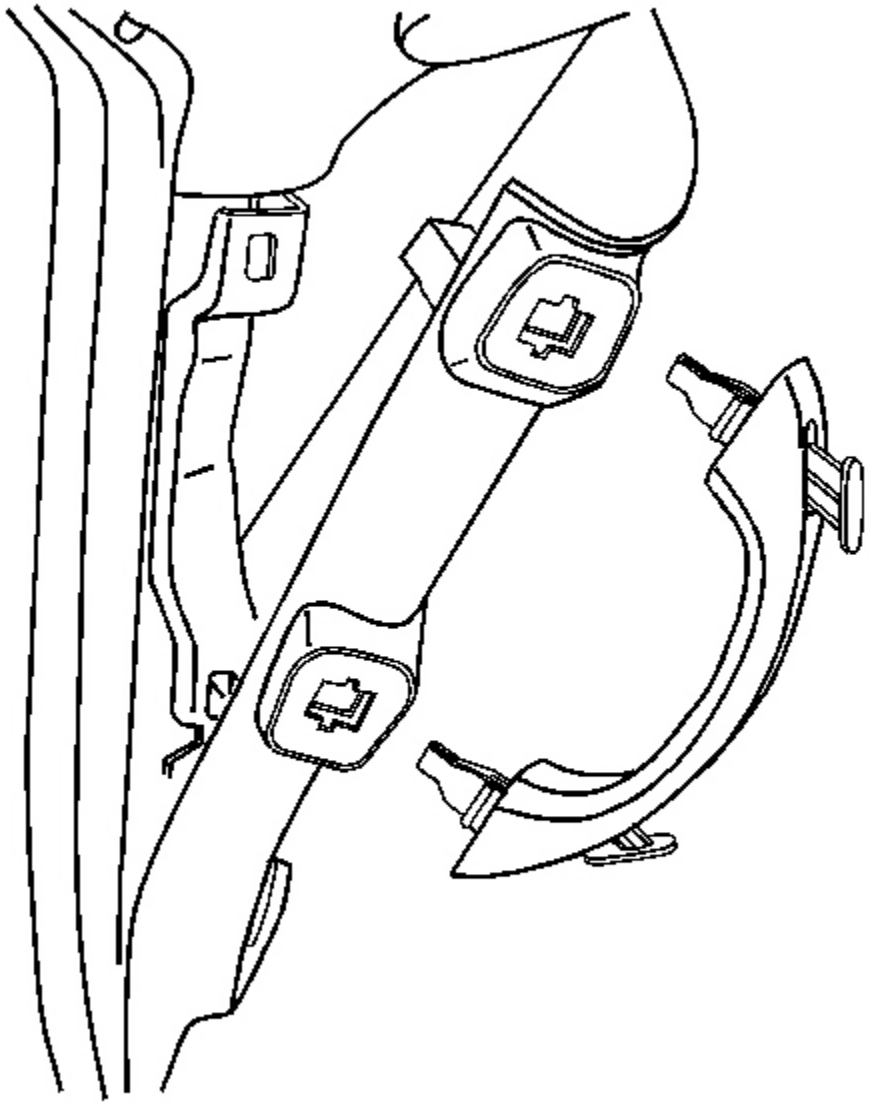


Fig. 83: Windshield Garnish Moldings
Courtesy of GENERAL MOTORS CORP.

4. Install the windshield garnish moldings. Refer to **Garnish Molding Replacement - Windshield Pillar** .
5. Install the upper HVAC air temperature sensors from the HVAC ducts. Refer to **Air Temperature Sensor Replacement - Upper Right** and **Air Temperature Sensor Replacement - Upper Left** in HVAC Systems - Automatic.

6. Install the lower HVAC air temperature sensors from the HVAC ducts. Refer to **Air Temperature Sensor Replacement - Lower Left** and **Air Temperature Sensor Replacement - Lower Right** in HVAC Systems - Automatic.

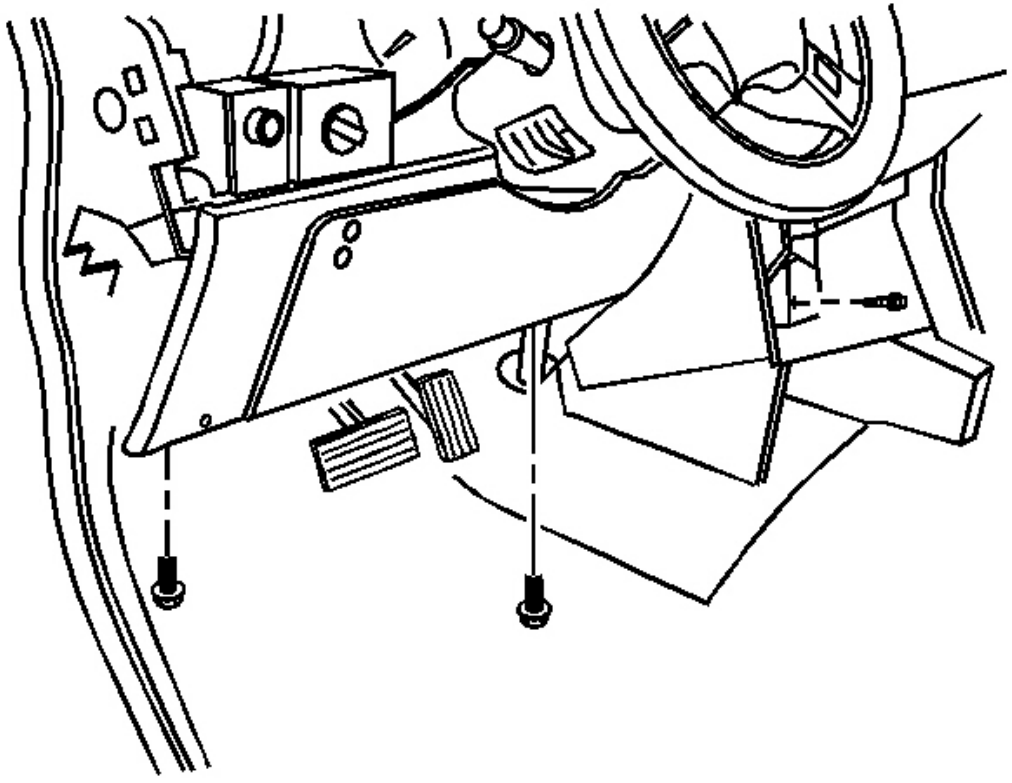


Fig. 84: Driver Knee Bolster
Courtesy of GENERAL MOTORS CORP.

7. Install the steering column. Refer to **Steering Column Replacement** in Steering Wheel and Column.

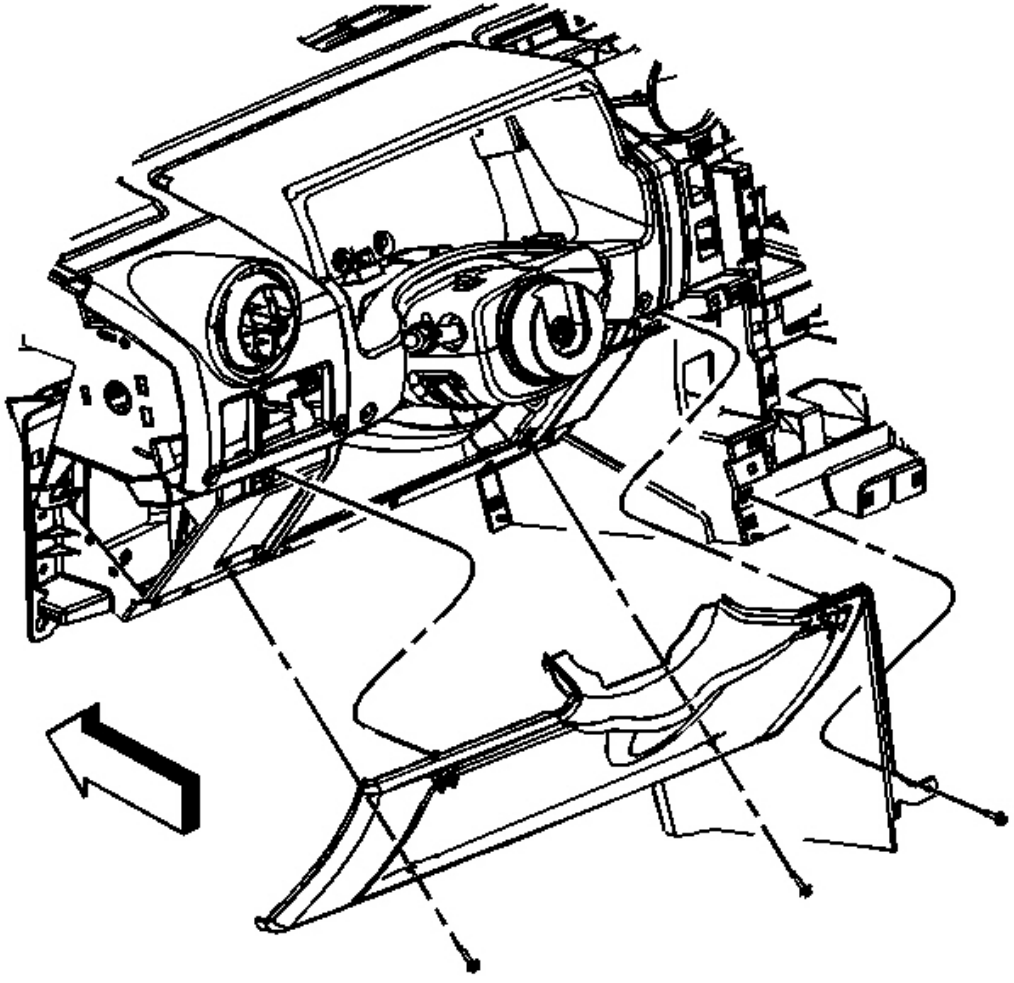


Fig. 85: Knee Bolster Trim Panel
Courtesy of GENERAL MOTORS CORP.

8. Install the drivers knee bolster. Refer to **Trim Panel Replacement - Knee Bolster** .

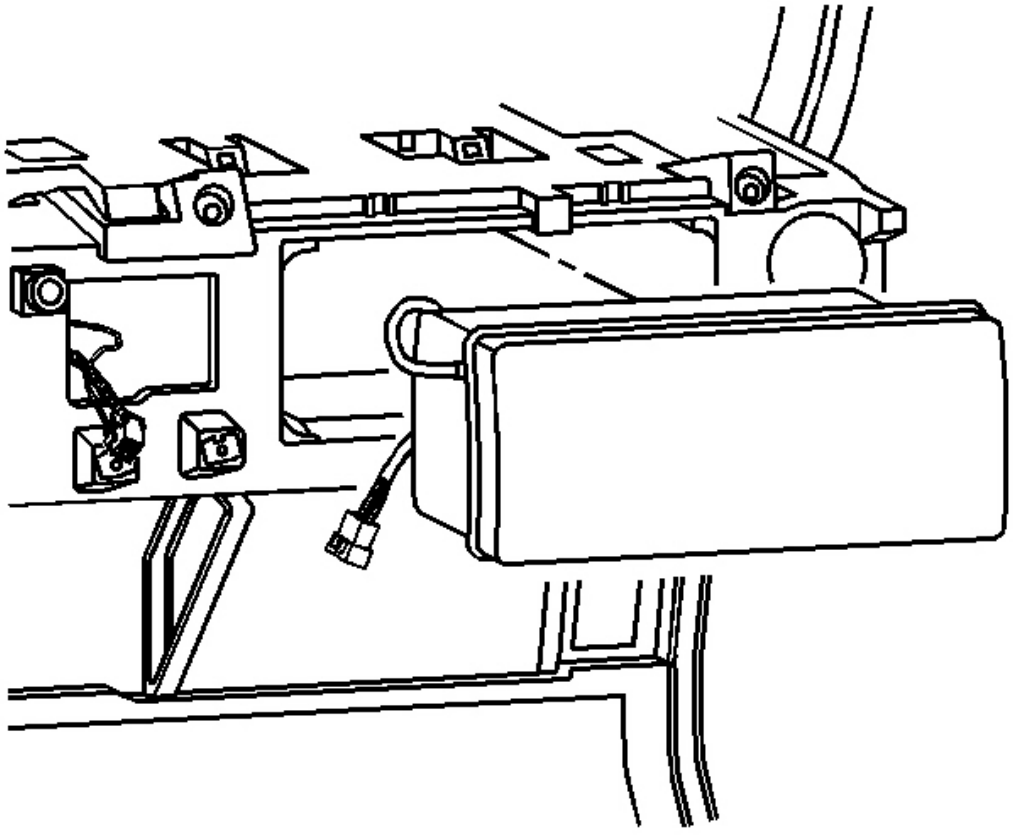


Fig. 86: I/P Air Bag Module
Courtesy of GENERAL MOTORS CORP.

9. Install the I/P air bag module. Refer to **Inflatable Restraint Instrument Panel Module Replacement** in SIR.

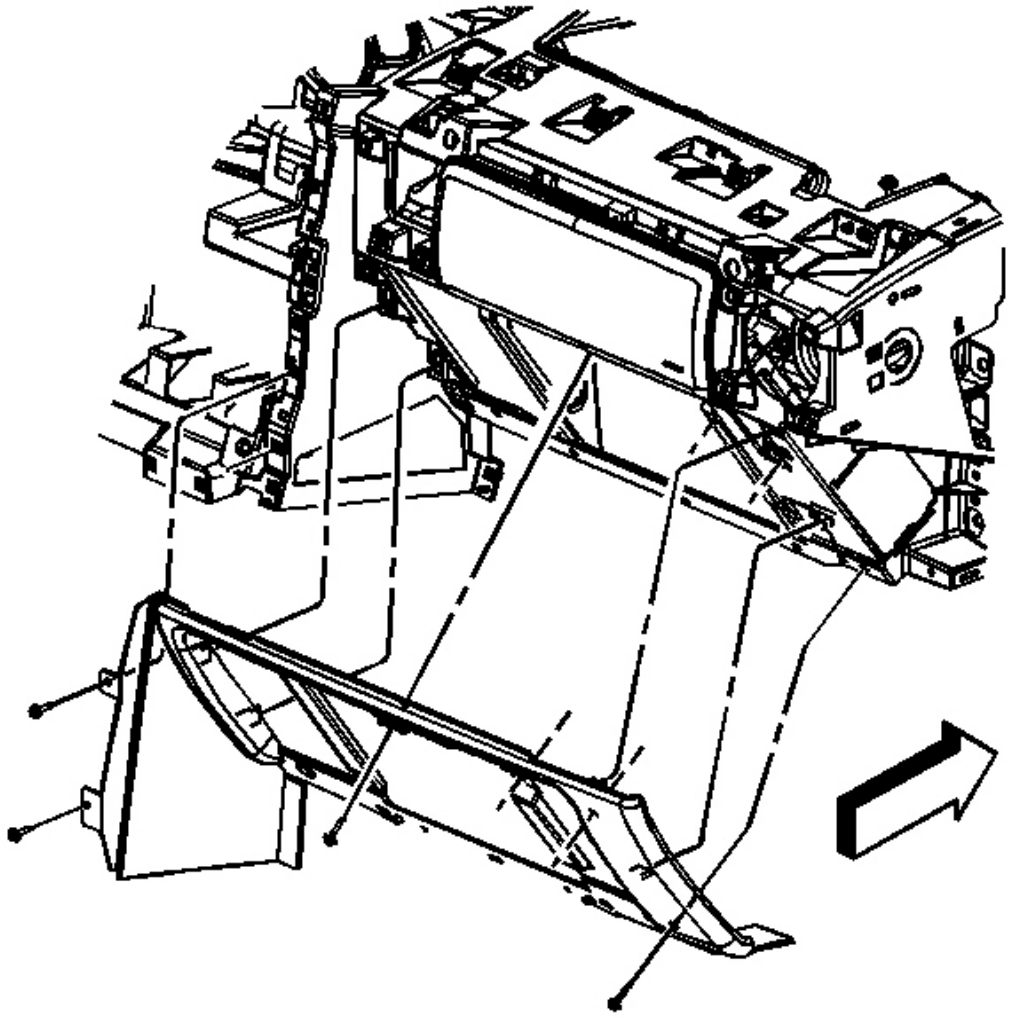


Fig. 87: I/P Compartment
Courtesy of GENERAL MOTORS CORP.

10. Install the I/P storage compartment. Refer to **Compartment Replacement - Instrument Panel (I/P)** .

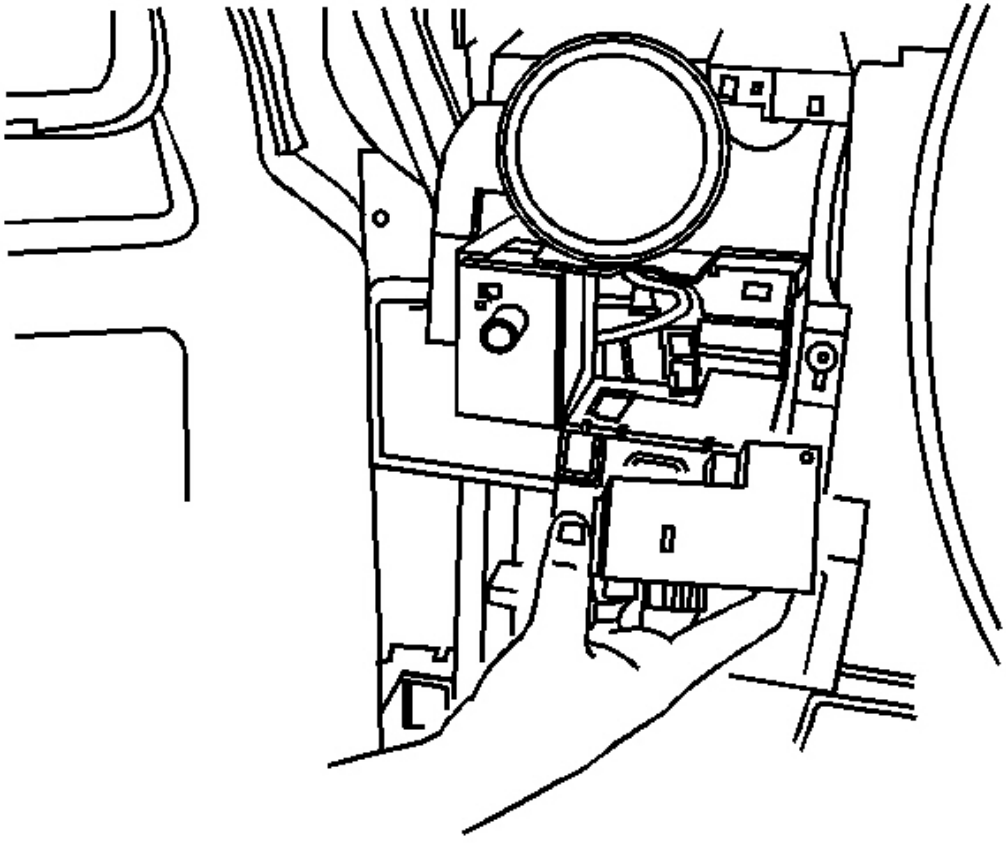


Fig. 88: Headlamp Switch
Courtesy of GENERAL MOTORS CORP.

11. Install the headlamp switch. Refer to **Headlamp Switch Replacement** in Lighting Systems.

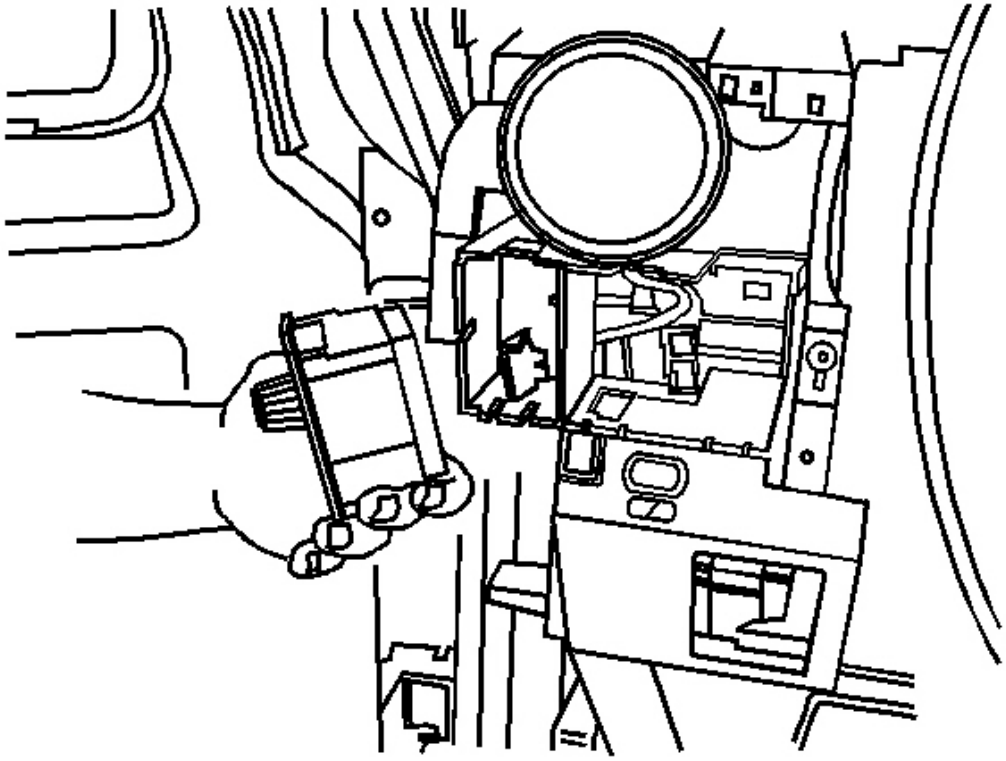


Fig. 89: Rear Wiper Switch
Courtesy of GENERAL MOTORS CORP.

12. Install the rear wiper switch. Refer to **Wiper/Washer Switch Replacement - Rear** in Wipers/Washer Systems.

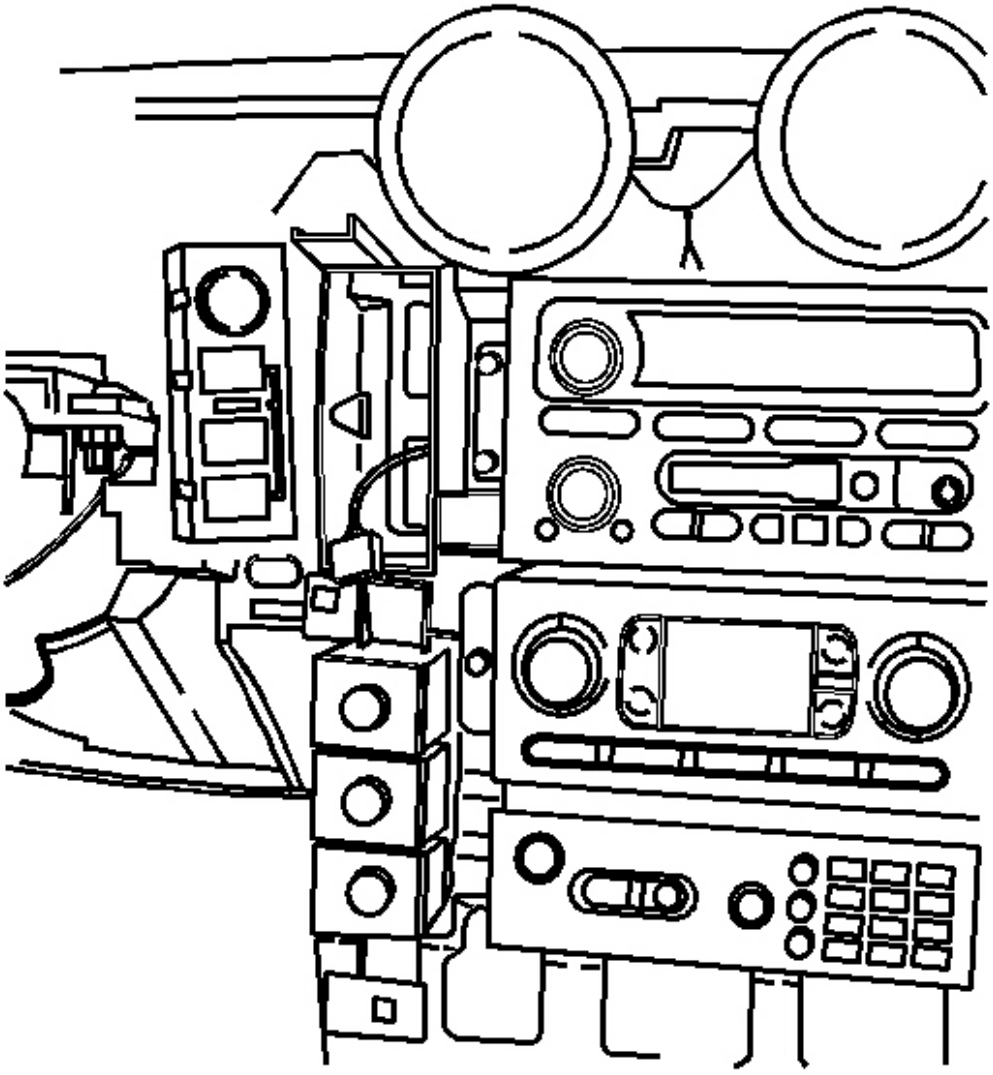


Fig. 90: Transfer Case Control Switch Module
Courtesy of GENERAL MOTORS CORP.

13. Install the transfer case control switch module. Refer to **Transfer Case Shift Control Module Replacement** in Transfer Case - BW 4484.

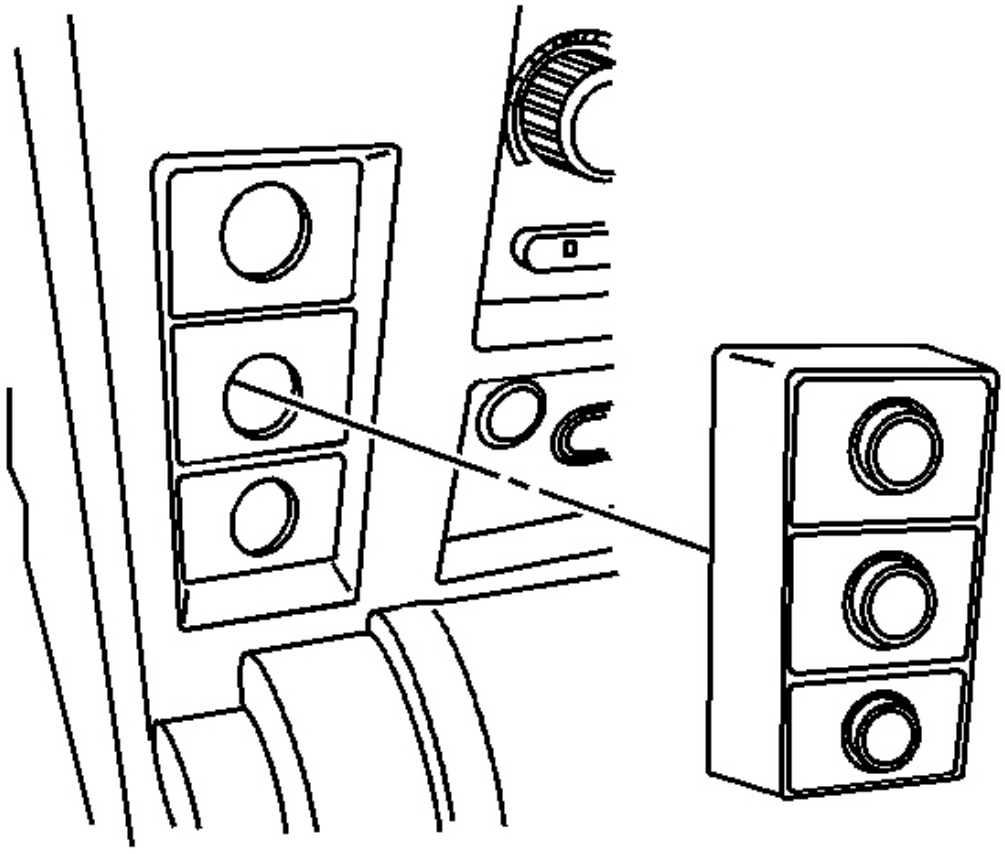


Fig. 91: Traction Control & Air Ride Module Assembly
Courtesy of GENERAL MOTORS CORP.

14. Install the traction control, air ride module to center stack and make electrical connections.

    Tighten: Tighten the screws to 2 N.m (18 lb in).

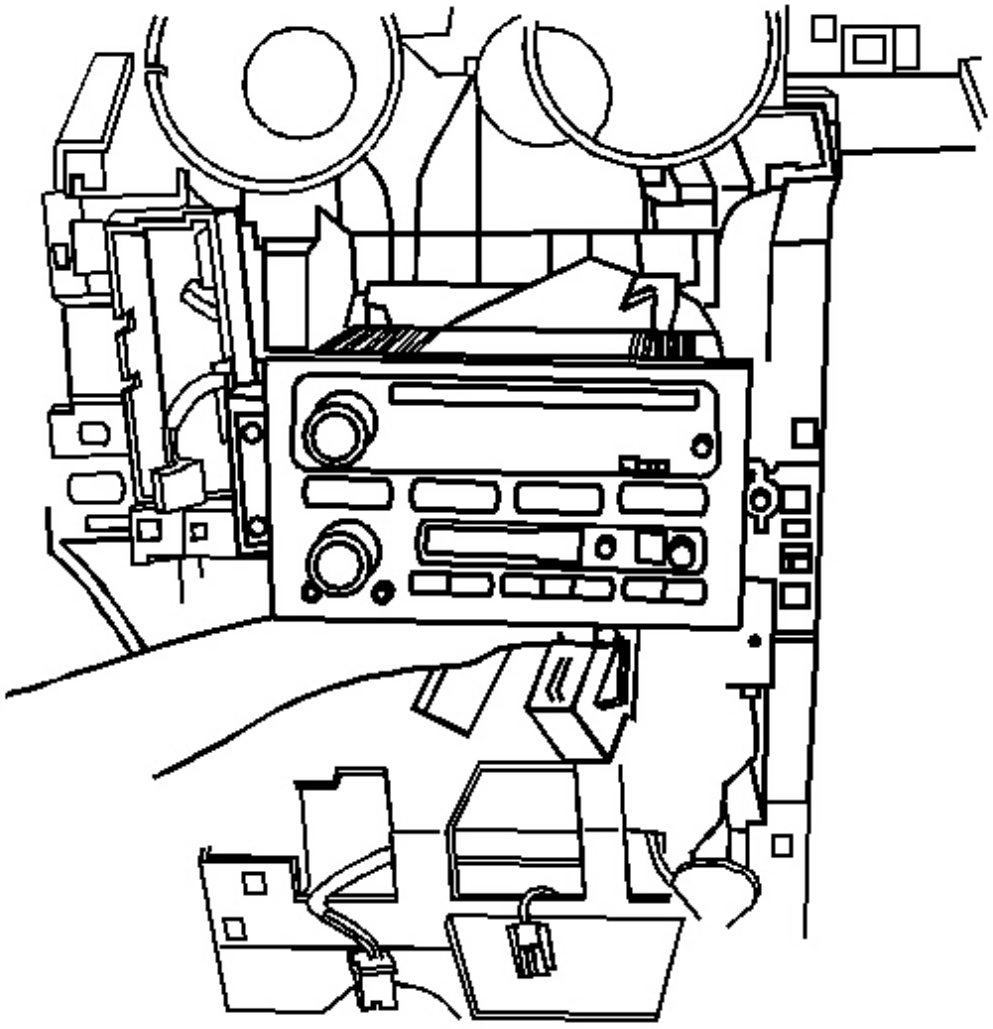


Fig. 92: Radio
Courtesy of GENERAL MOTORS CORP.

15. Install the radio. Refer to **Radio Replacement** in Entertainment.

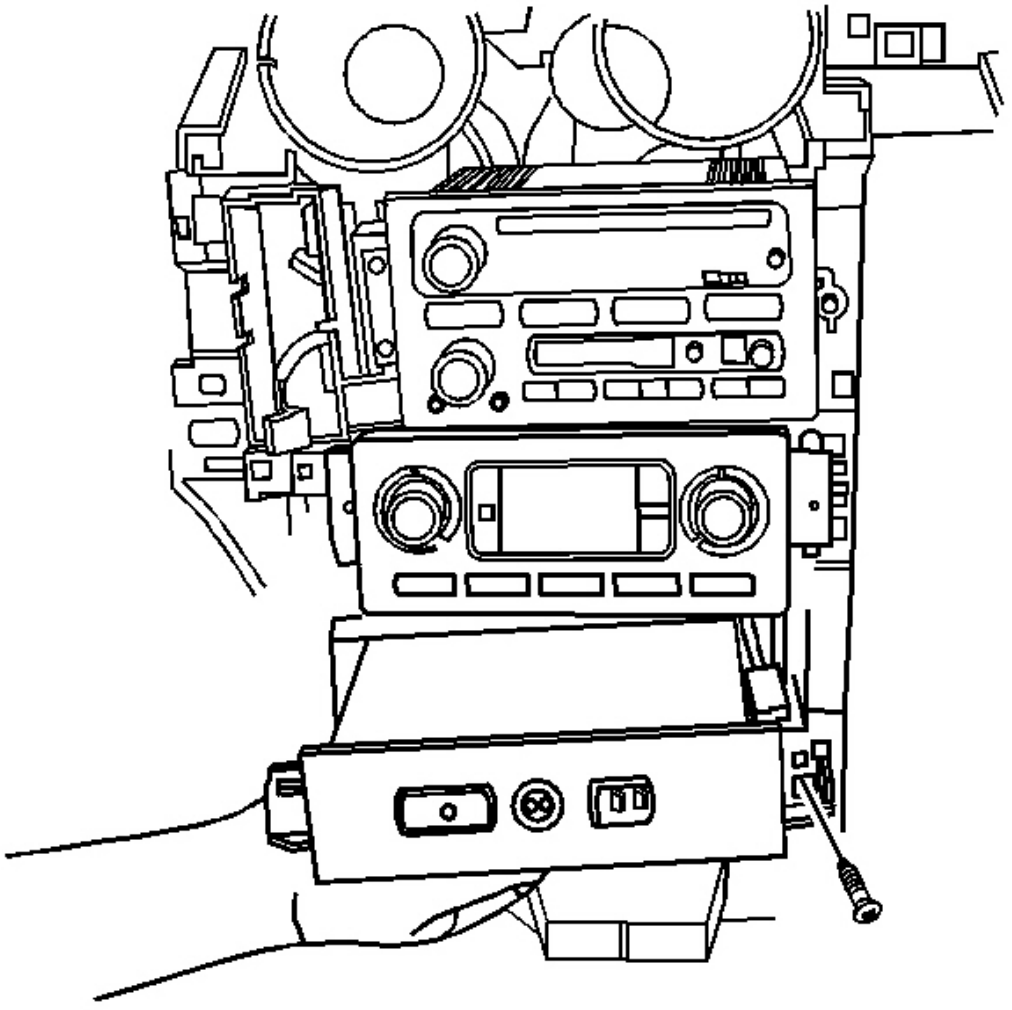


Fig. 93: Onstar(R) Module
Courtesy of GENERAL MOTORS CORP.

16. Install the Onstar(R) module from center stack. Refer to **OnStar Button Assembly Replacement** in Cellular Communication.

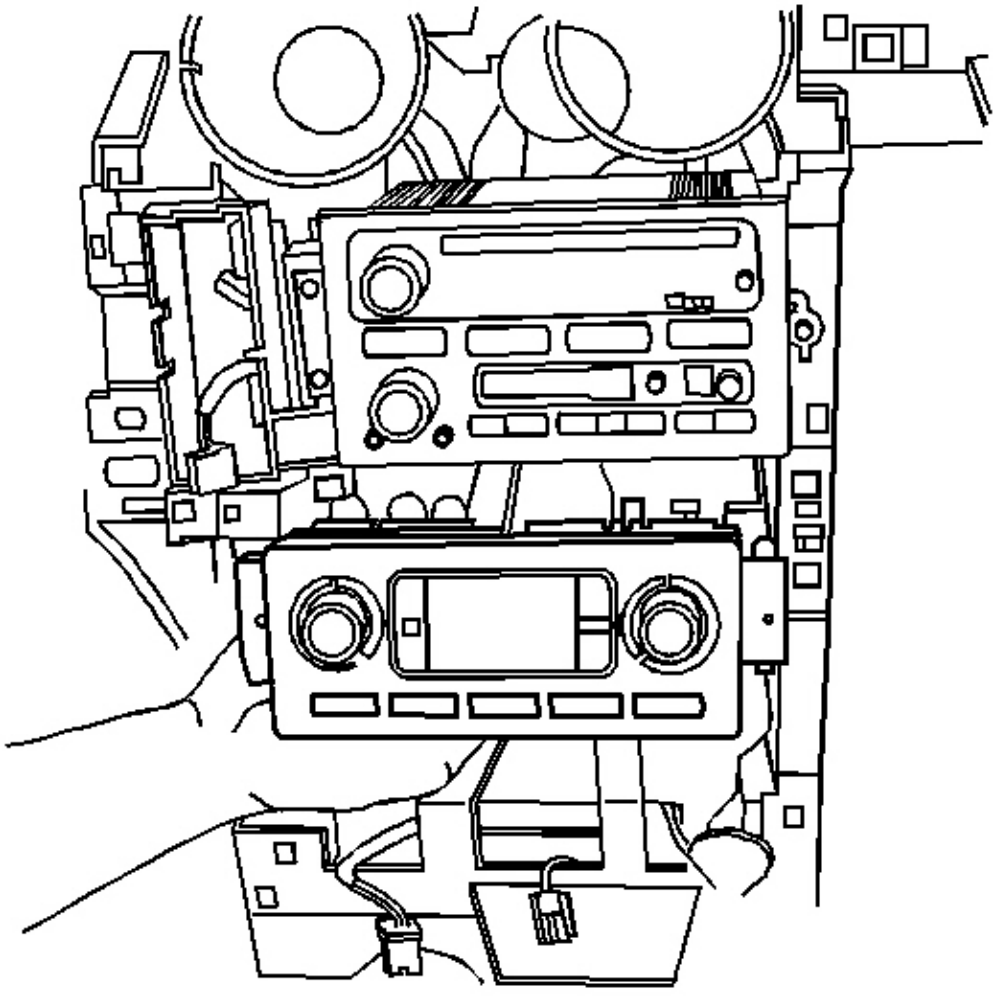


Fig. 94: HVAC Control
Courtesy of GENERAL MOTORS CORP.

17. Install the HVAC control. Refer to **HVAC Control Module Replacement** in HVAC Systems - Automatic.

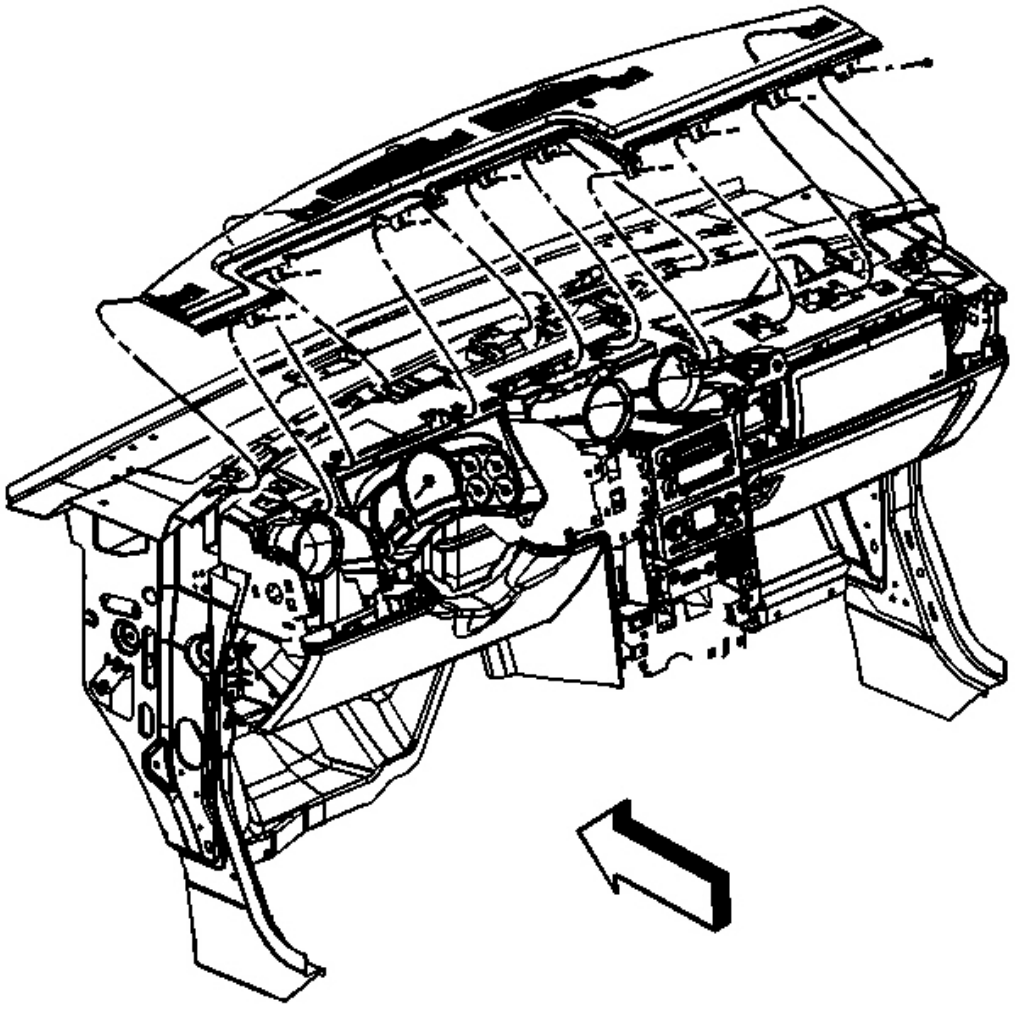


Fig. 95: I/P Upper Trim Pad
Courtesy of GENERAL MOTORS CORP.

18. Install the I/P upper trim pad. Refer to **Trim Pad Replacement - Instrument Panel (I/P) Upper** .

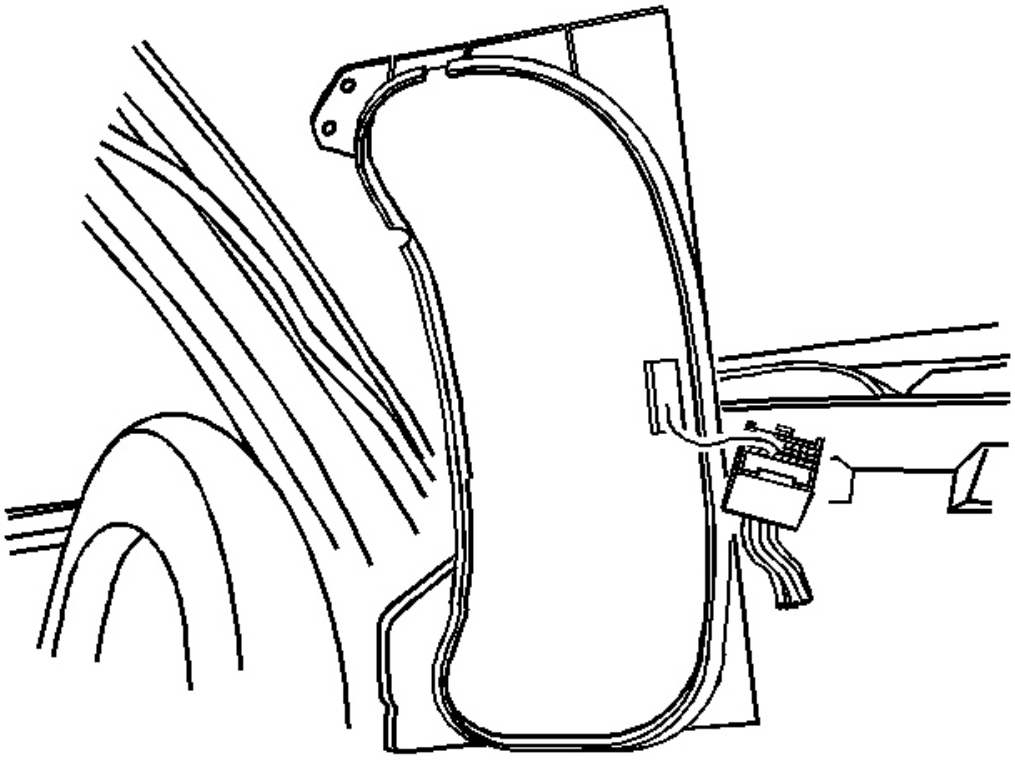


Fig. 96: I/P Cluster Electrical Connections
Courtesy of GENERAL MOTORS CORP.

19. Install the IPC cluster and trim panel. Refer to **Instrument Panel Cluster (IPC) Replacement** .

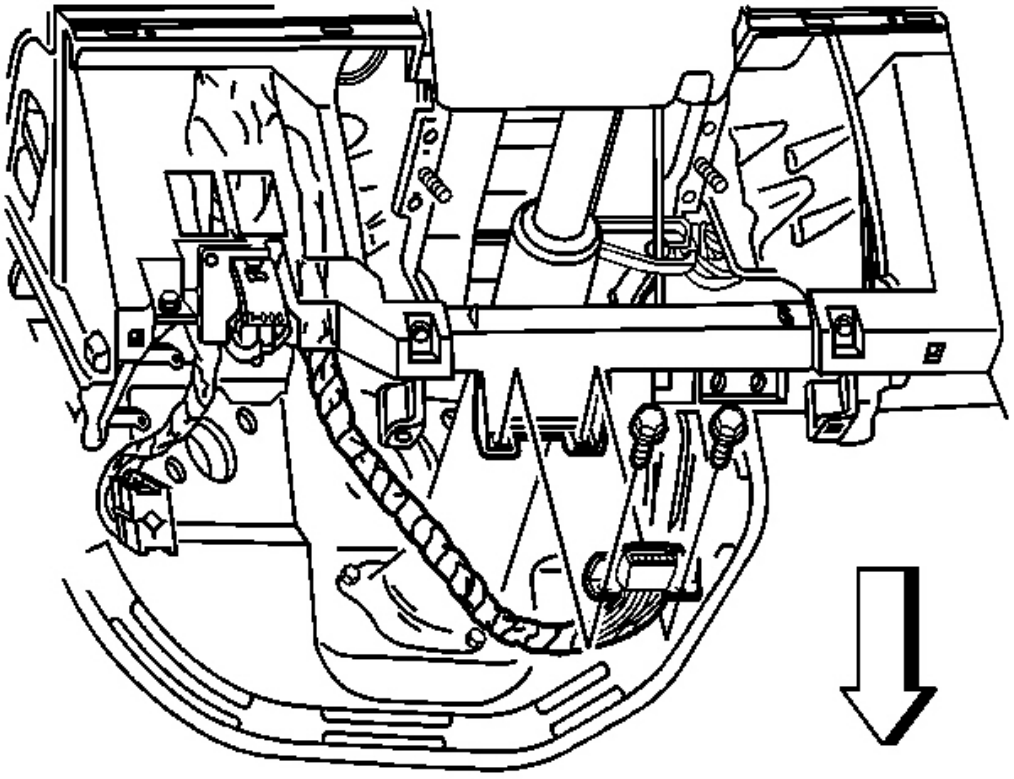


Fig. 97: I/P Data Link Connector
Courtesy of GENERAL MOTORS CORP.

20. Install the diagnostic connector to the I/P.
21. Tighten the data link connector screws.

    Tighten: Tighten the screws to 2 N.m (18 lb in).

22. Connect brake release lever to I/P.

    Tighten: Tighten the screws to 2 N.m (18 lb in).

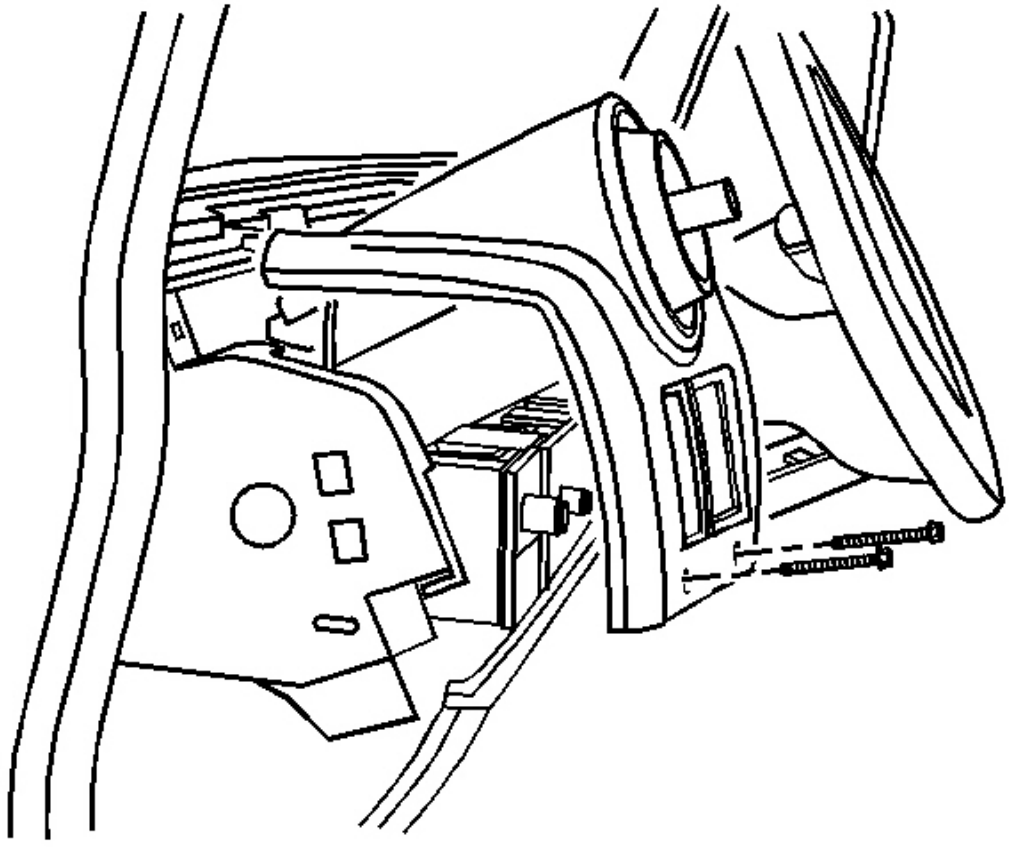


Fig. 98: I/P Accessory Left Trim Panel
Courtesy of GENERAL MOTORS CORP.

23. Install the left accessory trim panel. Refer to **Trim Plate Replacement - Instrument Panel (I/P) Accessory Left** .

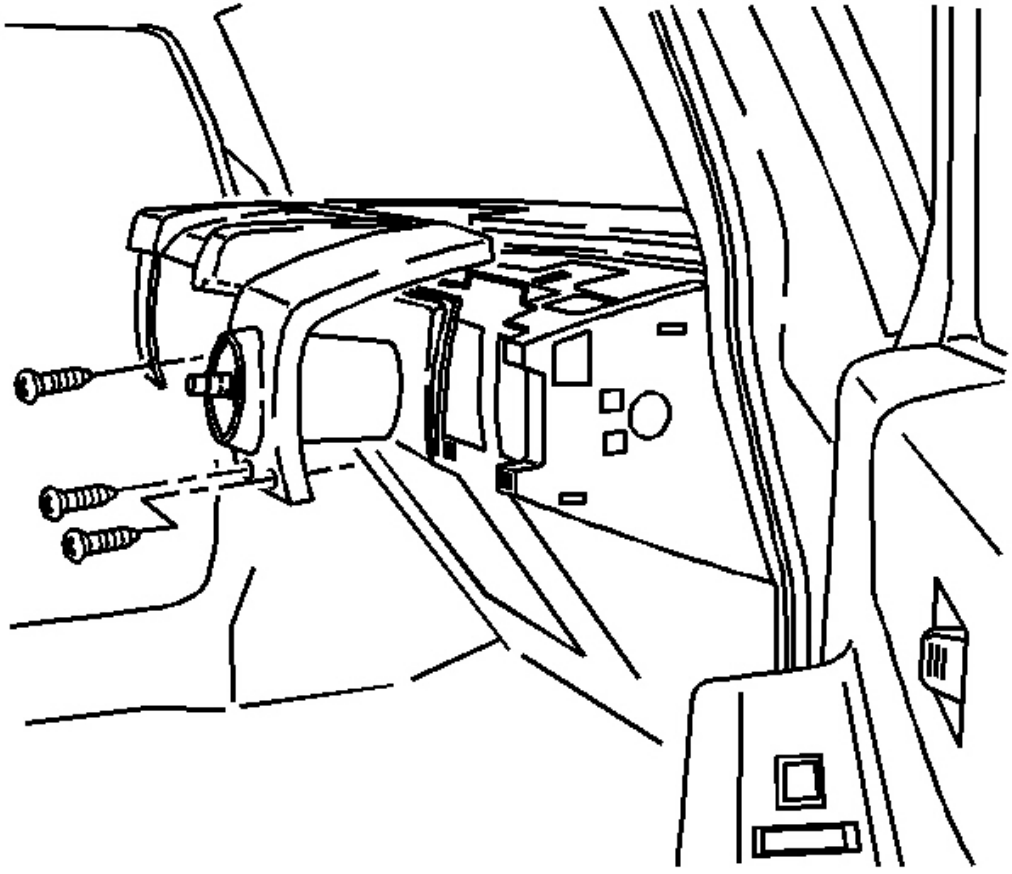


Fig. 99: I/P Right Accessory Trim Panel
Courtesy of GENERAL MOTORS CORP.

24. Install the right accessory trim panel. Refer to **Trim Plate Replacement - Instrument Panel (I/P) Accessory Right** .

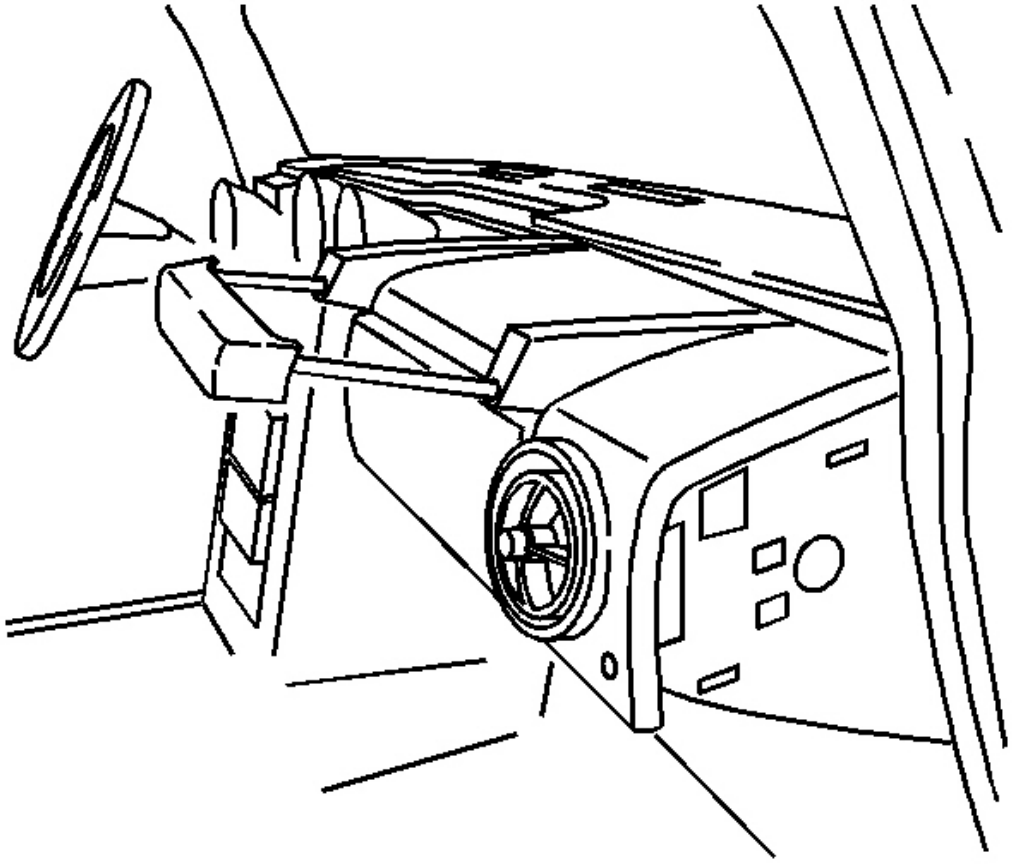


Fig. 100: I/P Assist Handle
Courtesy of GENERAL MOTORS CORP.

25. Install the assist handle. Refer to **Instrument Panel (I/P) Assist Handle Replacement** .

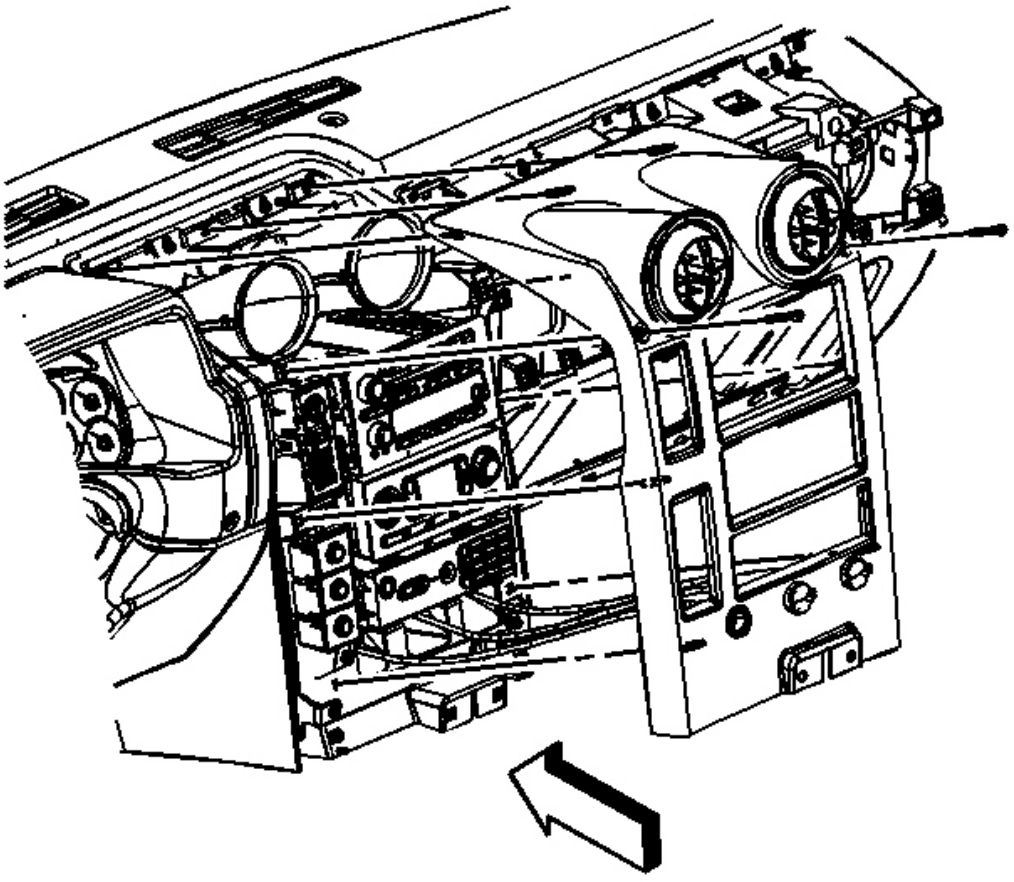


Fig. 101: I/P Center Trim Panel
Courtesy of GENERAL MOTORS CORP.

26. Install the I/P center trim panel. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Center** .

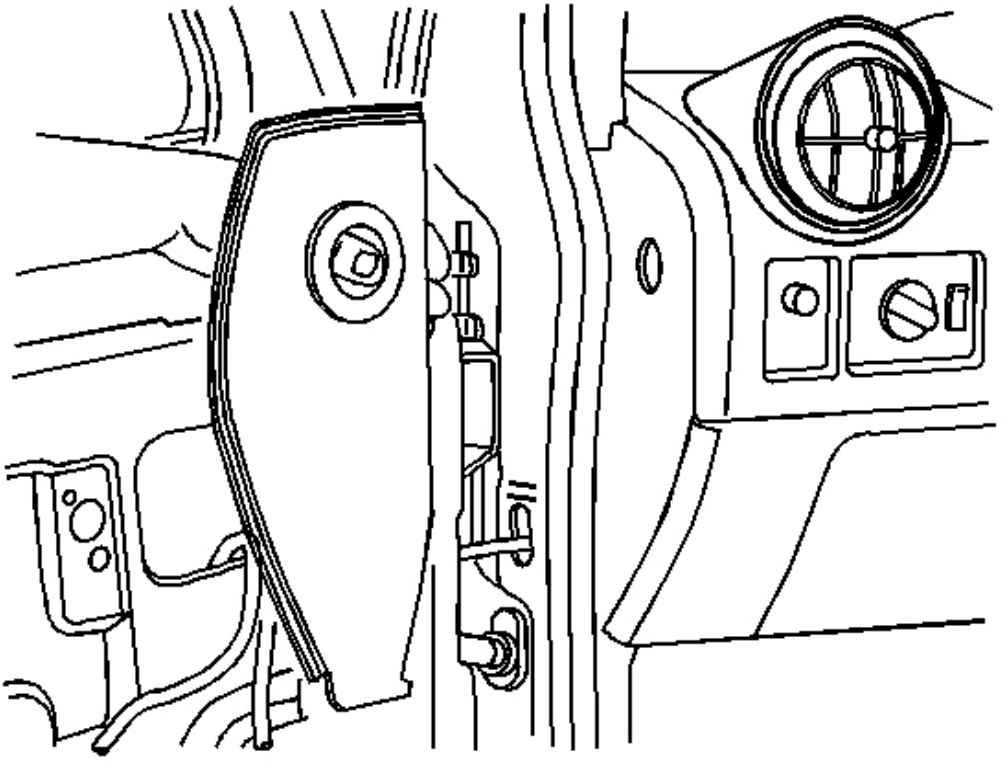


Fig. 102: Left & Right I/P Side Trim
Courtesy of GENERAL MOTORS CORP.

27. Align the drivers and passenger side I/P side trim panel and snap into place.

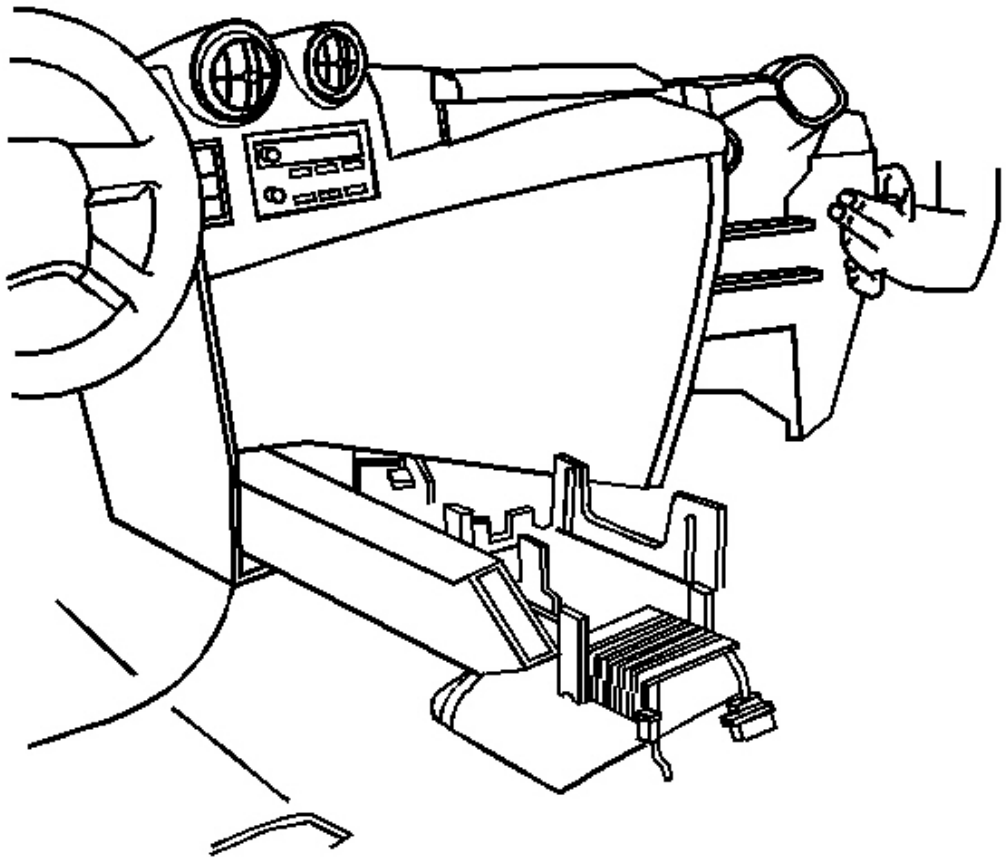


Fig. 103: I/P Center Console
Courtesy of GENERAL MOTORS CORP.

28. Install the I/P center console. Refer to **Console Replacement** .

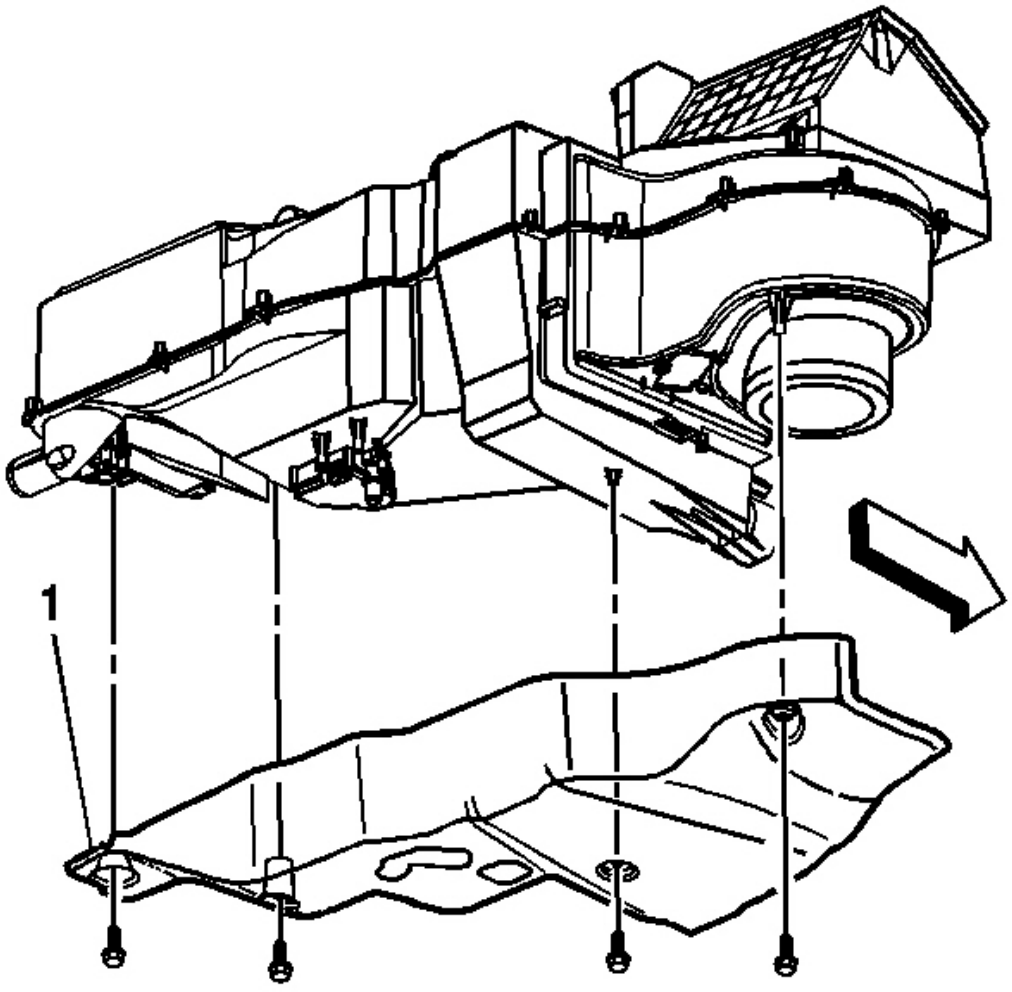


Fig. 104: Insulator & Instrument Panel
Courtesy of GENERAL MOTORS CORP.

29. Install the passengers insulator. Refer to **Insulator Replacement - Instrument Panel (I/P)** .

DOOR REPLACEMENT - CONSOLE COMPARTMENT CENTER

Removal Procedure

1. Lift compartment door.
2. Remove the console storage bin. Refer to **Console Storage Bin Replacement** .

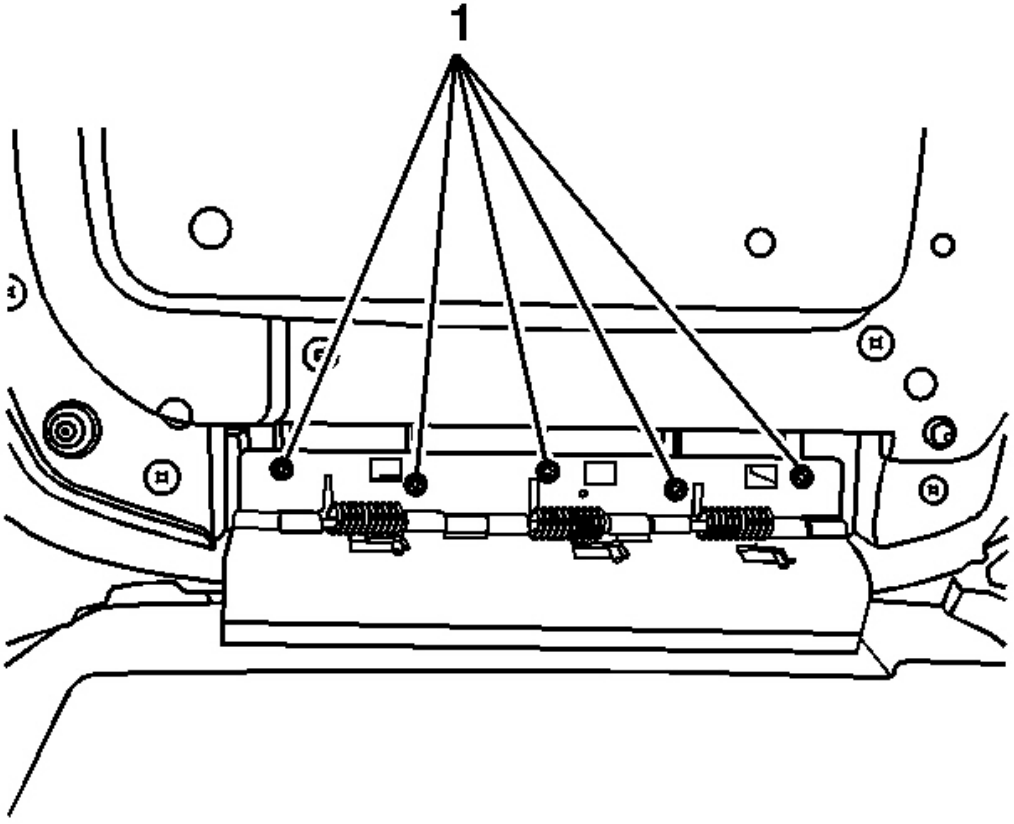


Fig. 105: Compartment Door & Center Console
Courtesy of GENERAL MOTORS CORP.

3. Remove the screws (1) holding compartment door to center console.

Installation Procedure

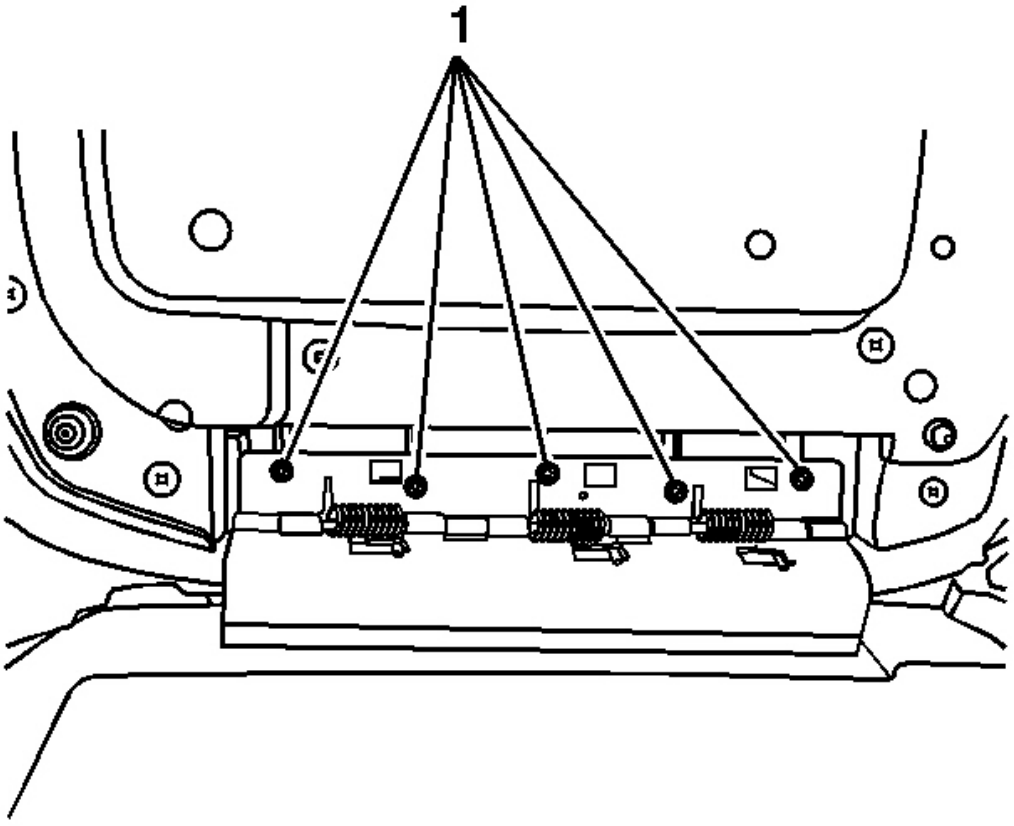


Fig. 106: Compartment Door & Center Console
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Align compartment door to center console.
2. Install the compartment door hinge screws (1).

   Tighten: Tighten the screws to 2 N.m (18 lb in).

3. Install the storage bin. Refer to **Console Storage Bin Replacement** .
4. Close compartment door and check alignment for latch assembly.

LATCH REPLACEMENT - CONSOLE COMPARTMENT DOOR

Removal Procedure

1. Remove the console compartment door from the center console. Refer to **Door Replacement - Console Compartment Center** .
2. Place the compartment door on a work bench.

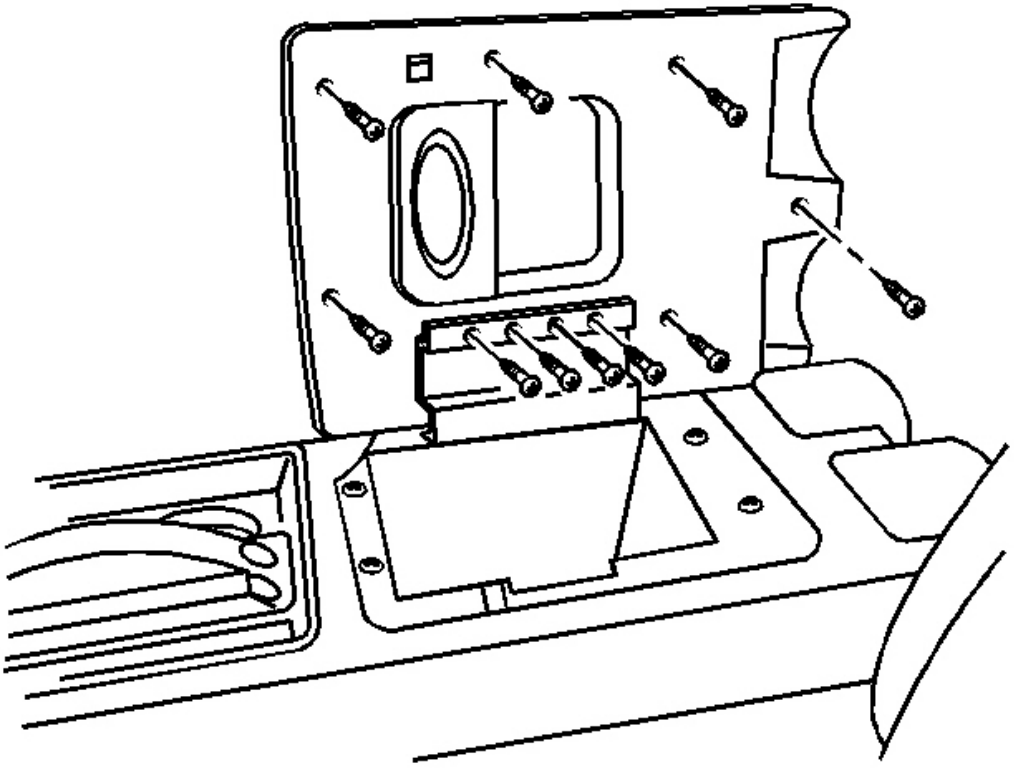


Fig. 107: Console Compartment Center Door Latch
Courtesy of GENERAL MOTORS CORP.

3. Remove the screws from the door inside panel.
4. Remove the inside panel to gain access to the latch compartment.
5. Remove the screws retaining the latch to the console compartment door.
6. Remove the latch assembly.

Installation Procedure

1. Install the latch by pressing inwards until it is seated.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the latch screws.

   Tighten: Tighten the latch screws to 1.6 N.m (14 lb in).

3. Install the inside panel.

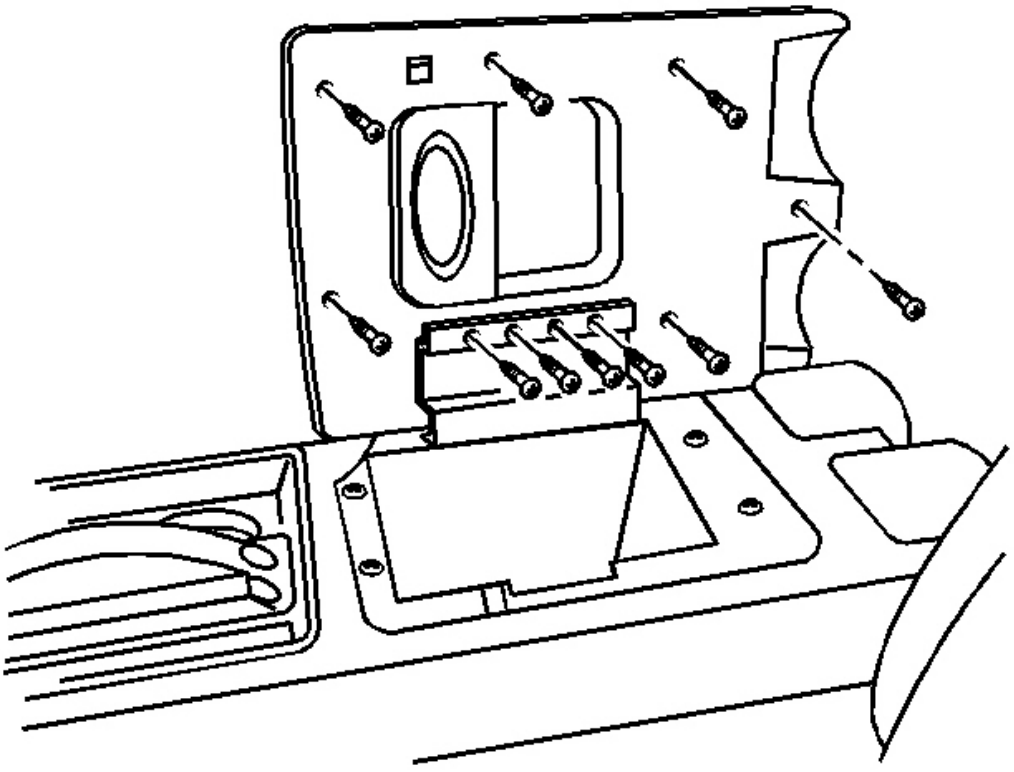


Fig. 108: Console Compartment Center Door Latch
Courtesy of GENERAL MOTORS CORP.

4. Install the console door inner screws.

   Tighten: Tighten the screws to 1.6 N.m (14 lb in).

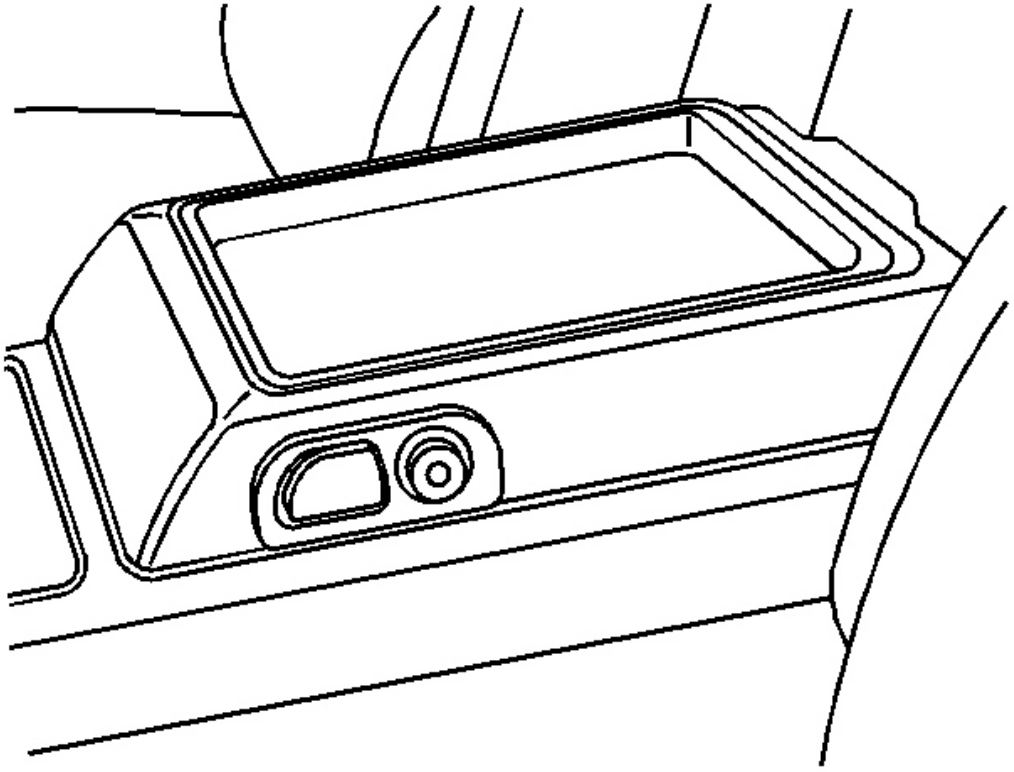


Fig. 109: Compartment Door & Console
Courtesy of GENERAL MOTORS CORP.

5. Inspect the top compartment door operation.
6. Install the compartment door to the console. Refer to **Door Replacement - Console Compartment Center** .

CONSOLE STORAGE BIN REPLACEMENT

Removal Procedure

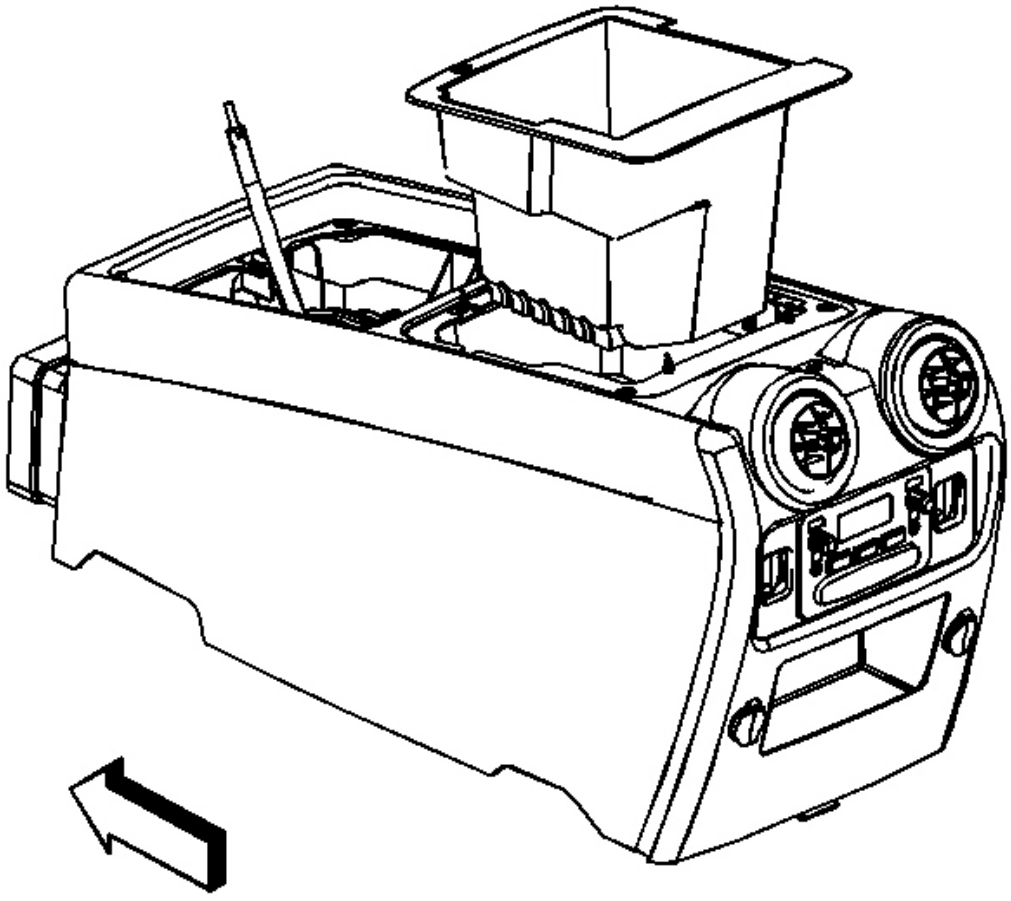


Fig. 110: Console Storage Bin
Courtesy of GENERAL MOTORS CORP.

1. Remove the screws that hold storage bin in place.
2. Remove the storage bin from the center console.

Installation Procedure

NOTE: Refer to Fastener Notice in Cautions and Notices.

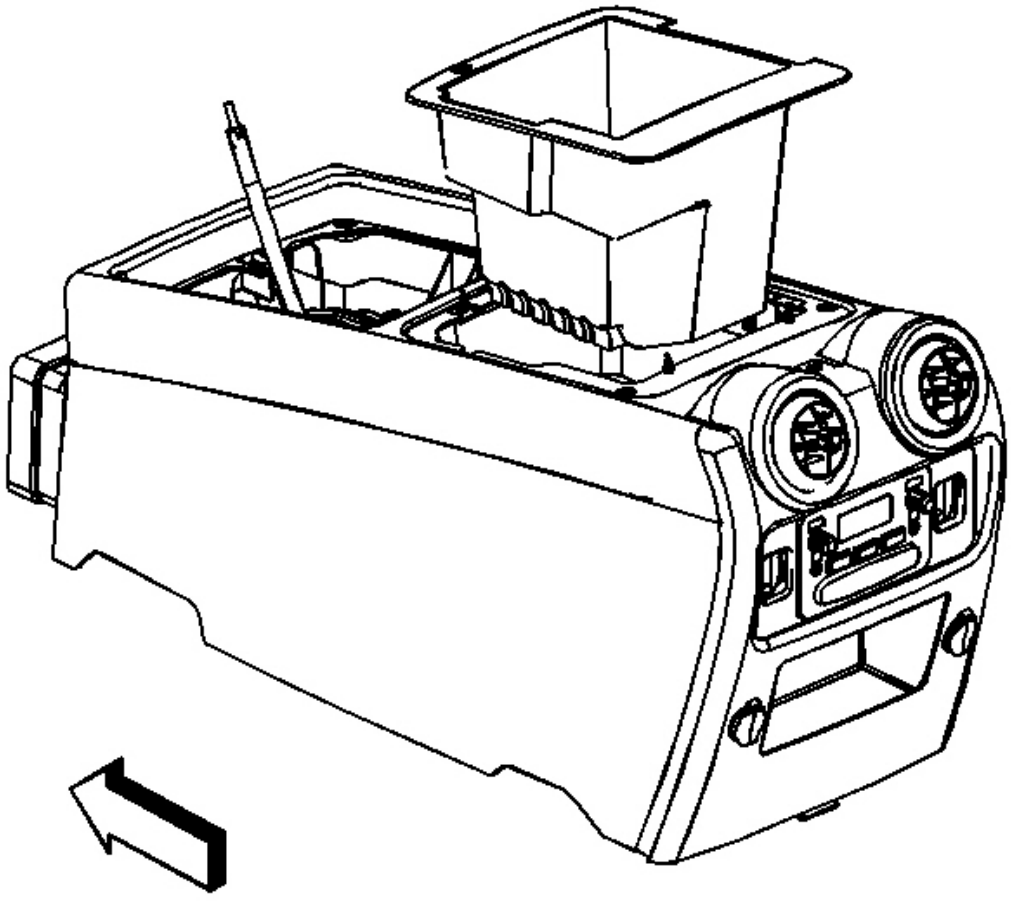


Fig. 111: Console Storage Bin
Courtesy of GENERAL MOTORS CORP.

1. Install the storage bin.
2. Install the storage bin screws.

Tighten: Tighten the screws to 2 N.m (18 lb in).

TRIM PLATE REPLACEMENT - CONSOLE UPPER

Removal Procedure

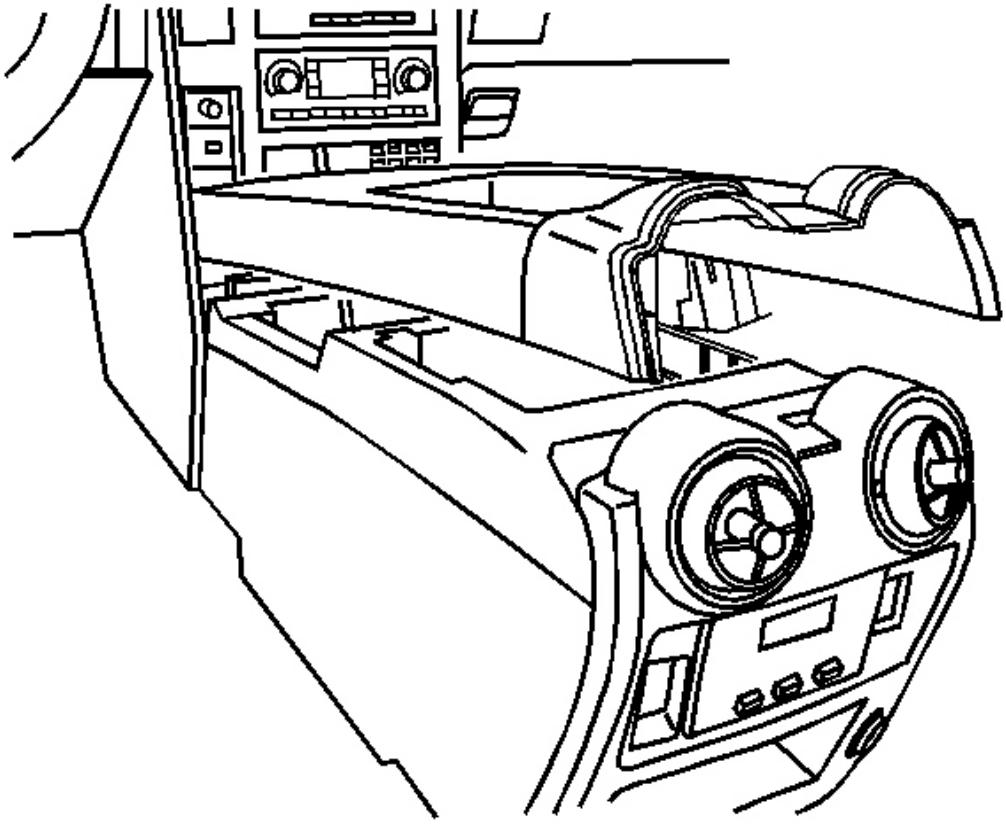


Fig. 112: Console Upper Trim Panel
Courtesy of GENERAL MOTORS CORP.

1. Remove the shift handle. Refer to **Floor Shift Control Knob Replacement** in Automatic Transmission.
2. Remove the console storage bin. Refer to **Console Storage Bin Replacement** .
3. Remove the cup holder/PRNDL assembly. Refer to **Cupholder Replacement** .
4. Remove the center console end panel. Refer to **Center Console End Panel Replacement** .
5. Pull upwards on the upper console trim panel to release the trim panel clips.
6. Remove the upper console trim panel.

Installation Procedure

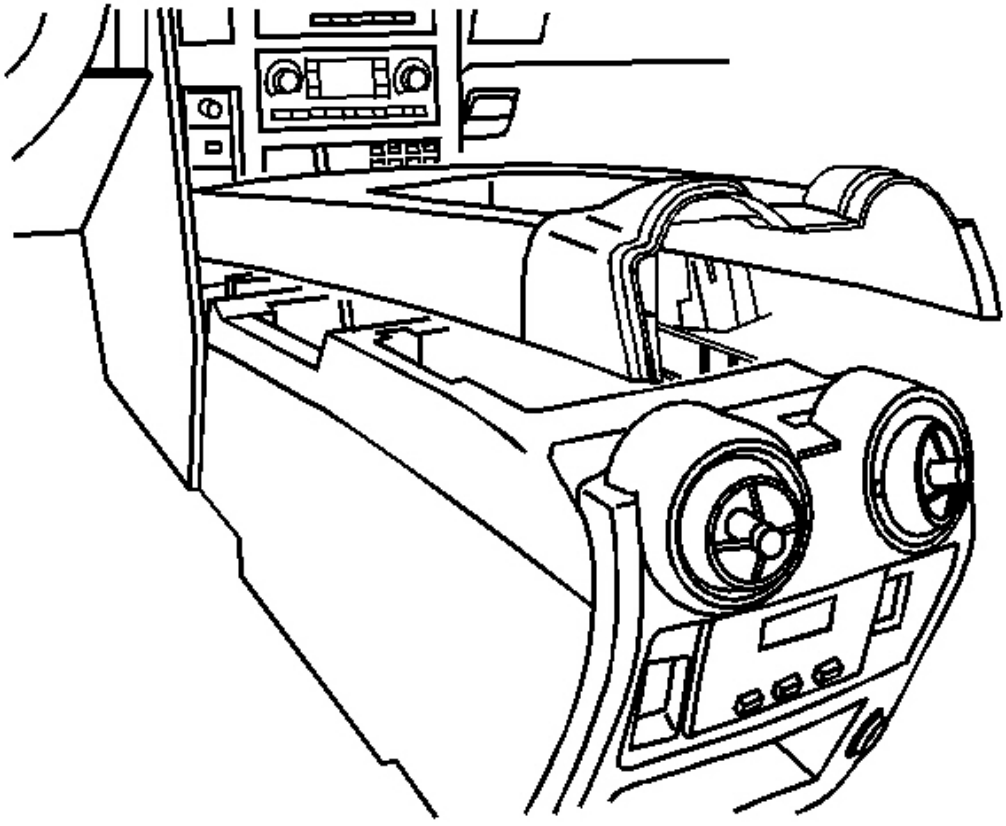


Fig. 113: Console Upper Trim Panel
Courtesy of GENERAL MOTORS CORP.

1. Align the trim panel with the console.
2. Push towards the console to engage the trim panel clips.
3. Install the center console end panel. Refer to **Center Console End Panel Replacement** .
4. Install the cup holder/PRNDL assembly. Refer to **Cupholder Replacement** .
5. Install the console storage bin. Refer to **Console Storage Bin Replacement** .
6. Install the shift handle. Refer to **Floor Shift Control Knob Replacement** in Automatic Transmission.

CONSOLE REPLACEMENT

Removal Procedure

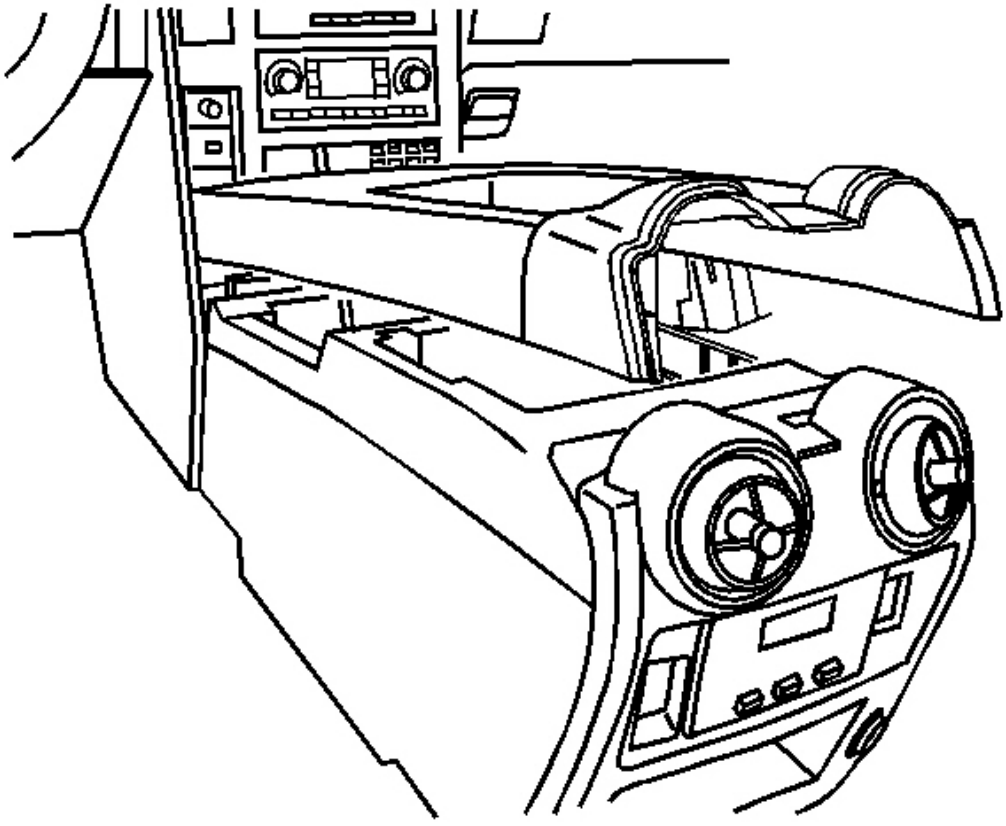


Fig. 114: Console Upper Trim Panel
Courtesy of GENERAL MOTORS CORP.

1. Remove the console upper trim plate. Refer to **Trim Plate Replacement - Console Upper** .
2. Disconnect the console electrical connector.

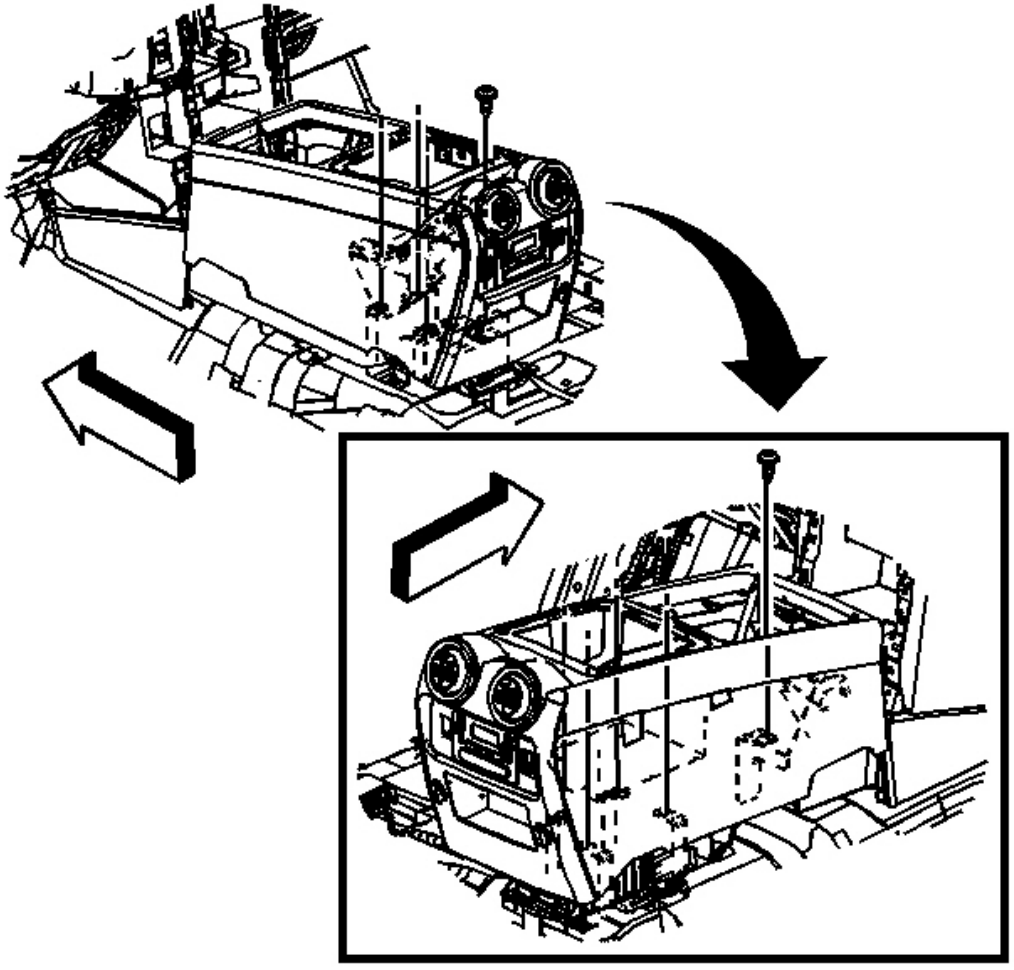


Fig. 115: Center Console Bolts
Courtesy of GENERAL MOTORS CORP.

3. Remove the bolts holding center console to center console bracket.

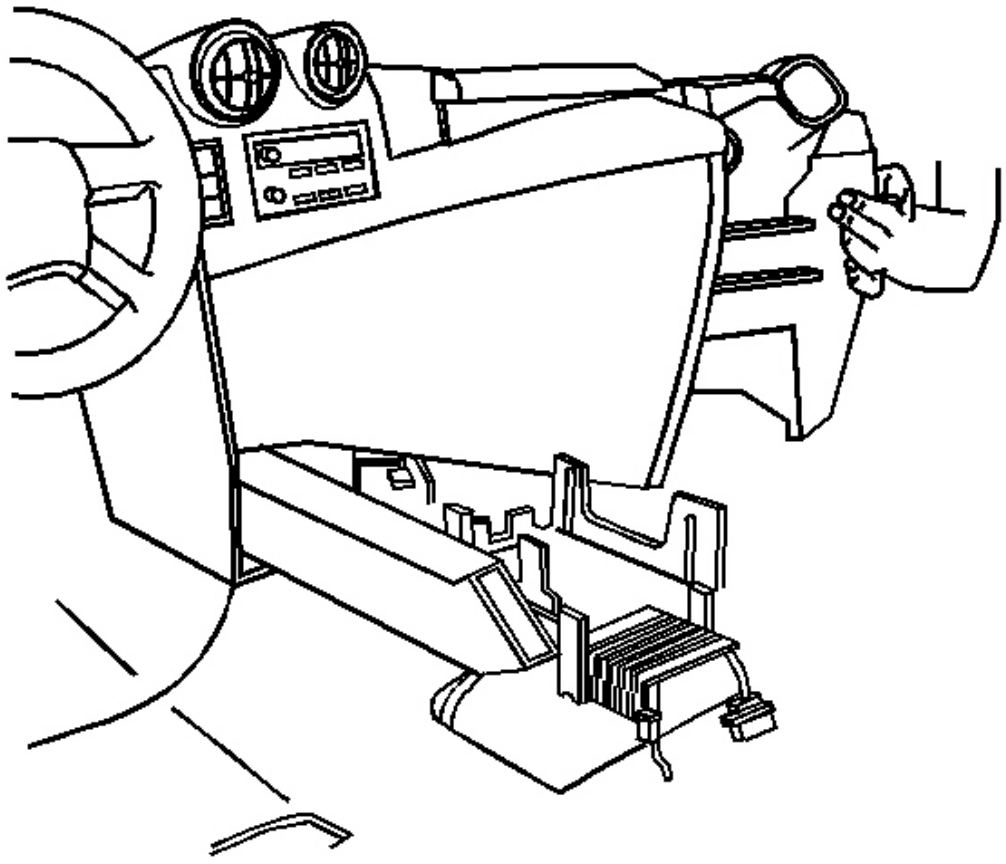


Fig. 116: I/P Center Console
Courtesy of GENERAL MOTORS CORP.

4. Remove the center console.

Installation Procedure

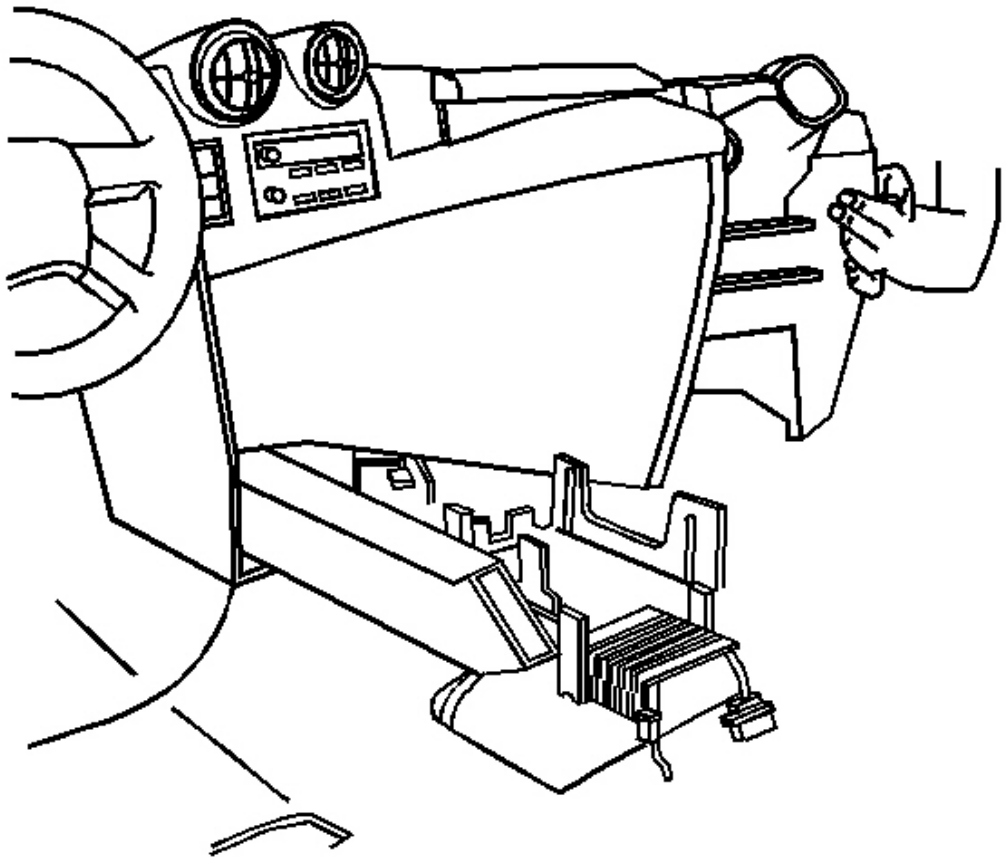


Fig. 117: I/P Center Console
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Make sure HVAC duct is aligned with center console.

1. Align center console to center console bracket and route the electrical wiring through console.
2. Connect the console electrical connector.

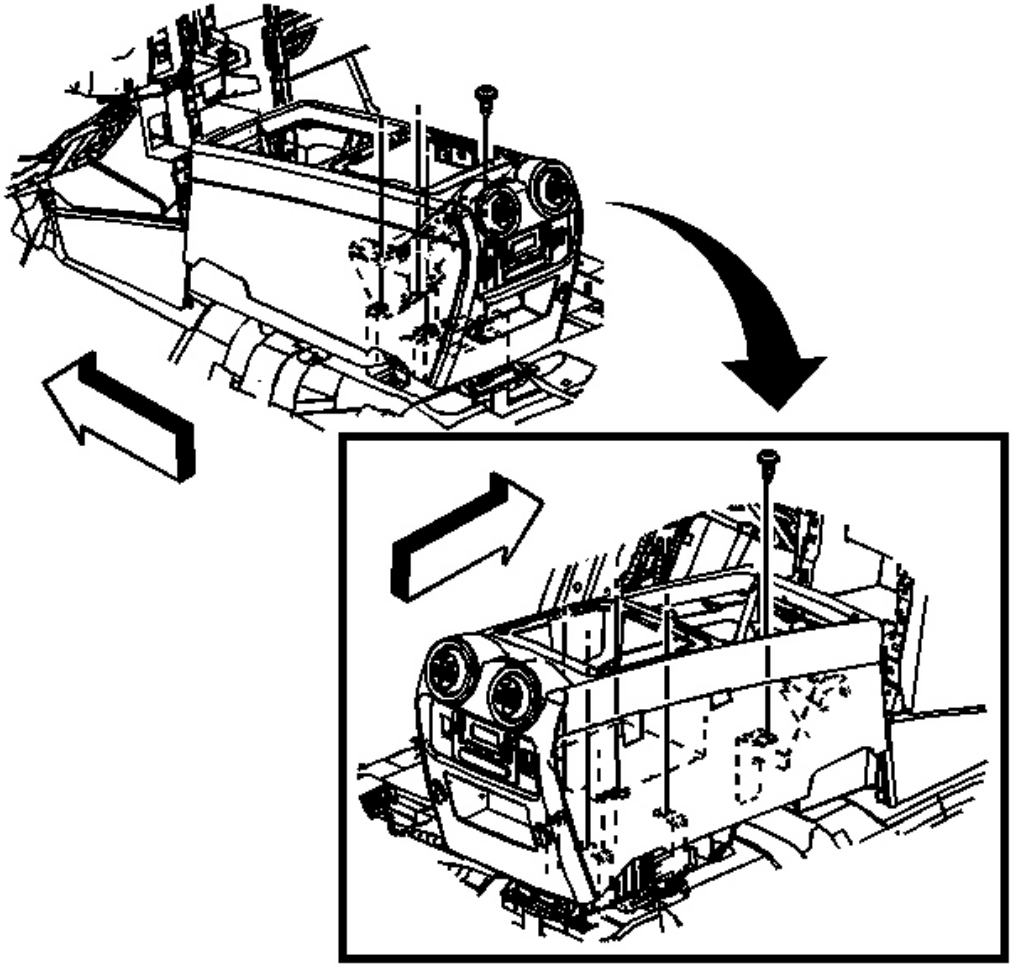


Fig. 118: Center Console Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the center console to center console bracket.
4. Install the center console bolts.

Tighten: Tighten the bolts to 9 N.m (80 lb in).

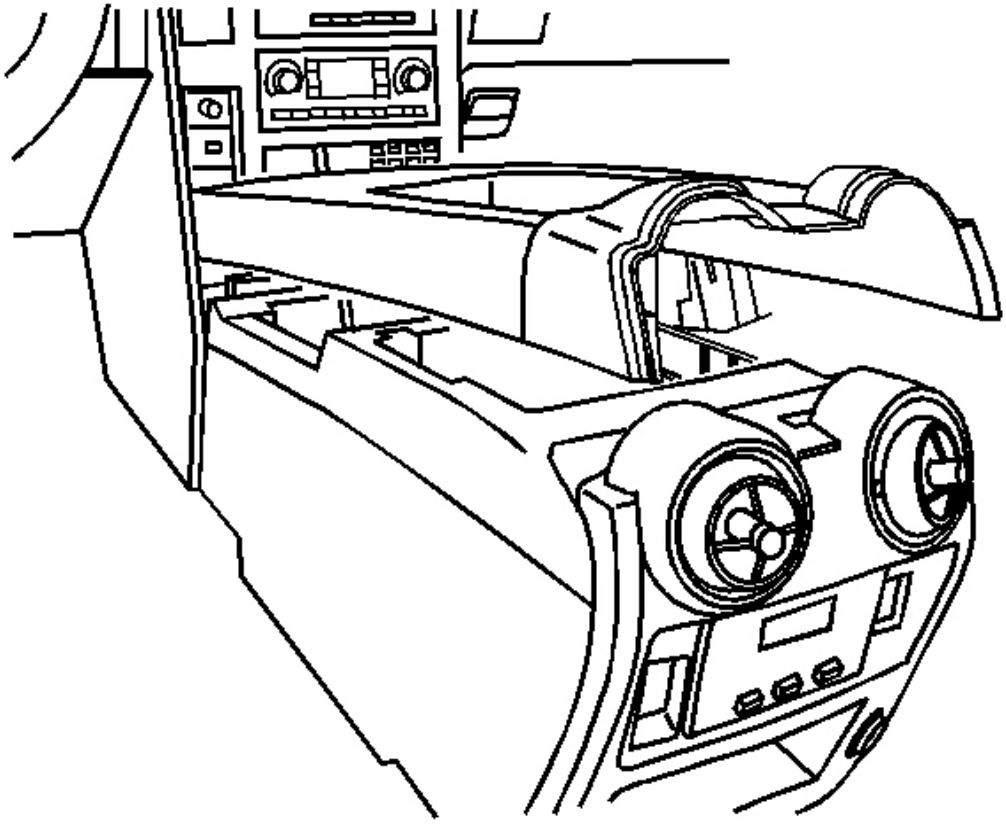


Fig. 119: Console Upper Trim Panel
Courtesy of GENERAL MOTORS CORP.

5. Install the top panel to center console. Refer to **Trim Plate Replacement - Console Upper**

CENTER CONSOLE END PANEL REPLACEMENT

Removal Procedure

1. Remove screws that hold end panel to center console.

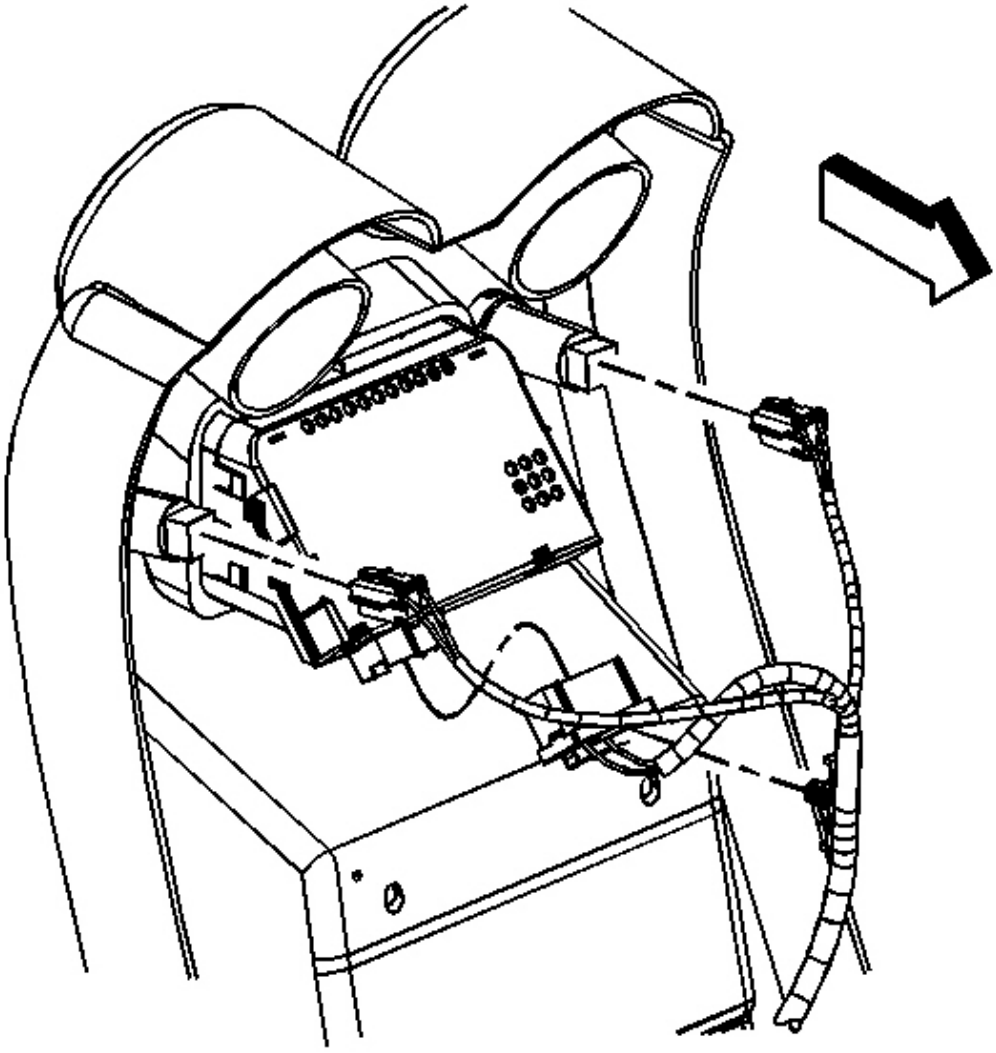


Fig. 120: Electrical Connectors & Center Console End Panel
Courtesy of GENERAL MOTORS CORP.

2. Disconnect electrical connectors to end panel.

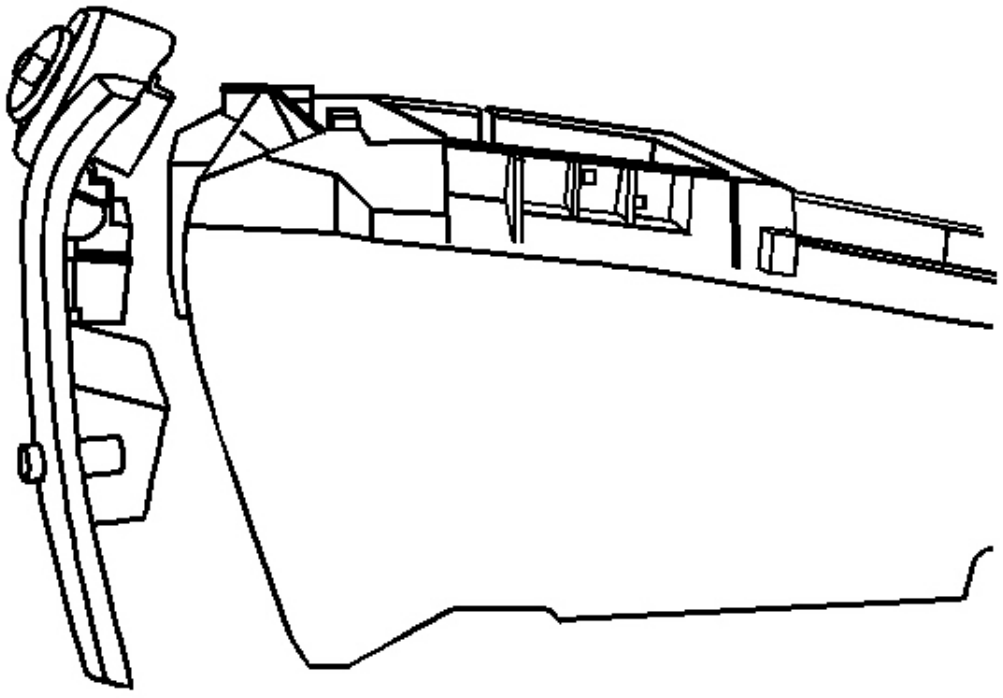


Fig. 121: Center Console End Panel
Courtesy of GENERAL MOTORS CORP.

3. Remove console end panel.

Installation Procedure

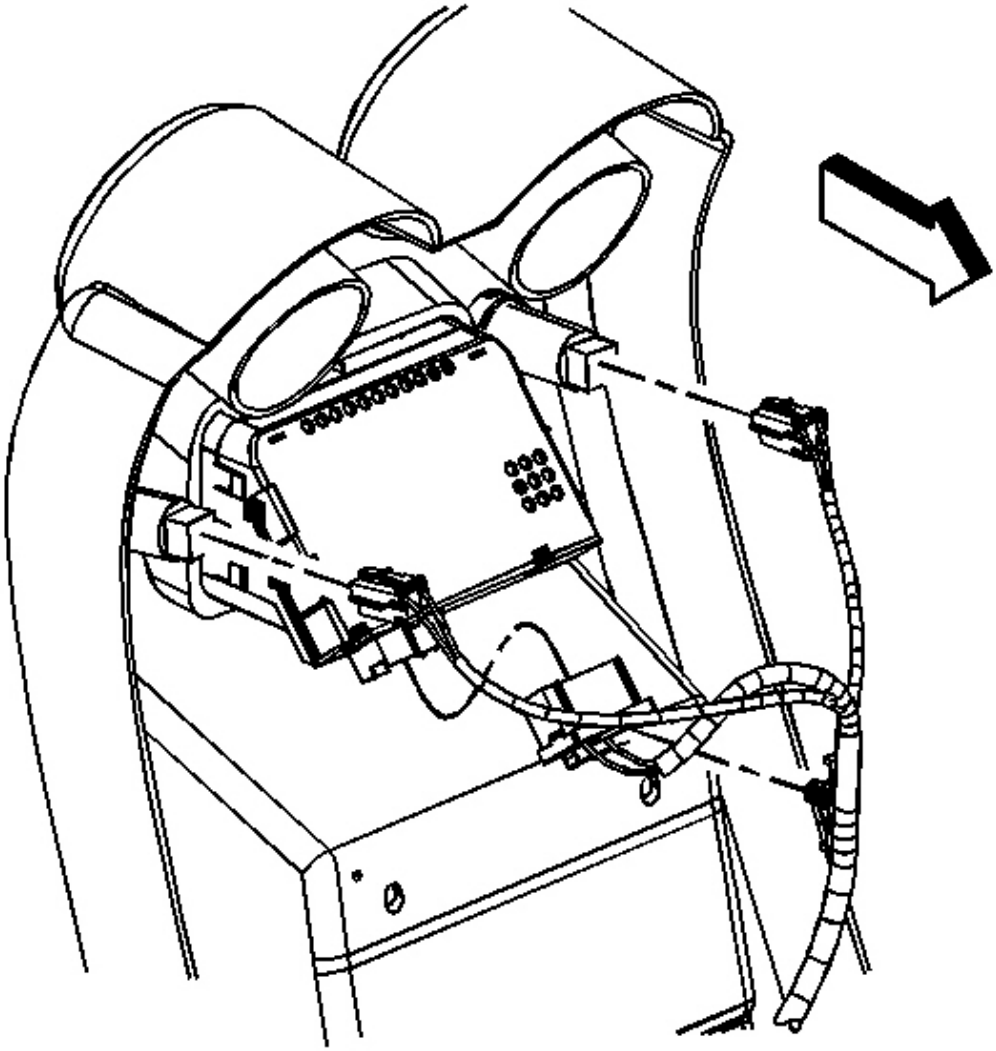


Fig. 122: Electrical Connectors & Center Console End Panel
Courtesy of GENERAL MOTORS CORP.

1. Connect electrical connectors to console end panel.

NOTE: Refer to Fastener Notice in Cautions and Notices.

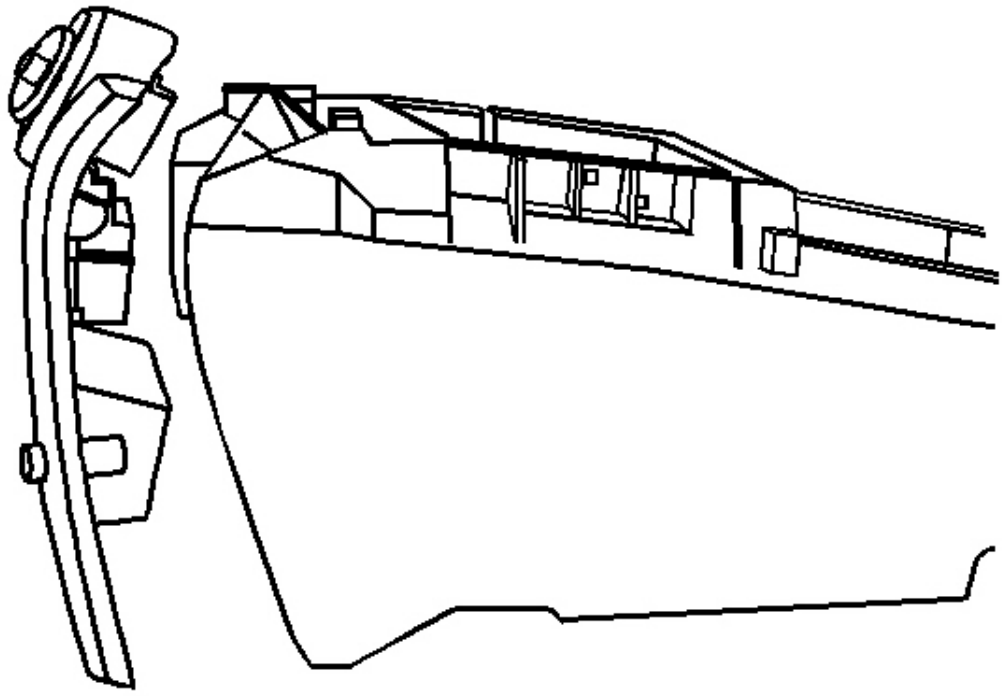


Fig. 123: Center Console End Panel
Courtesy of GENERAL MOTORS CORP.

2. Install the center console end panel.
3. Install the center console end panel screws.

Tighten: Tighten the screws to 1.6 N.m (14 lb in).

DESCRIPTION AND OPERATION

INSTRUMENT PANEL CLUSTER (IPC) DESCRIPTION AND OPERATION

Displays Test

Certain instrument panel cluster (IPC) features are tested when the ignition is turned on in order to verify the features are working properly. The following indicators illuminate for 3 seconds:

- The ABS indicator
- The battery indicator

- The brake indicator
- The LOW FUEL indicator
- The park brake indicator
- Security indicator
- All gauges sweep to their minimum physical position and then to their actual physical position.

The following indicators illuminate for the specified times:

- The AIR BAG indicator flashes 7 times.
- The fasten seatbelt indicator illuminates for 20 seconds followed by 55 seconds of flashing with the drivers seatbelt unfastened, or, the fasten seatbelt indicator will illuminate for 8 seconds with the drivers seatbelt fastened.
- The SERVICE ENGINE SOON indicator (MIL) illuminates briefly.
- All segments of the driver information center (DIC) illuminate briefly.
- All gauges sweep to their minimum physical position and then to their actual physical position.

Indicators and Warning Messages

Refer to **Indicator/Warning Message Description and Operation** .

Engine Coolant Temperature Gauge

The IPC displays the engine coolant temperature as determined by the powertrain control module (PCM). The IPC receives a class 2 message from the PCM indicating the engine coolant temperature. The engine coolant temperature gauge defaults to 75°C (160°F) or below when:

- The PCM detects a malfunction in the engine coolant temperature sensor circuit.
- The IPC detects a loss of class 2 communication with the PCM.

Engine Oil Pressure Gauge

The IPC displays the engine oil pressure as determined by the PCM. The IPC receives a class 2 message from the PCM indicating the engine oil pressure. The engine oil pressure gauge defaults to 0 kPa (0 psi) or below if:

- The PCM detects a malfunction in the engine oil pressure sensor circuit.
- The IPC detects a loss of class 2 communications with the PCM.

Fuel Gauge

The IPC displays the fuel level as determined by the PCM. The IPC receives a class 2 message from the PCM indicating the fuel level percent. The fuel gauge defaults to empty if:

- The PCM detects a malfunction in the fuel level sensor circuit.
- The IPC detects a loss of class 2 communications with the PCM.

When the fuel level is less than a pre-determined value, the low fuel indicator illuminates.

Reviewing the fuel system description will further explain how the system functions. Refer to **Fuel System Description** in Engine Controls - 6.0L (LQ4).

Hourmeter

The IPC can display the accumulated engine run time hours using the VF display when the cluster is in the LOCK or ACC position. The IPC stores the accumulated engine run time hours in a non-volatile format. The accumulated hours would not change if the battery was disconnected or removed. When the ignition is OFF and the trip reset switch is pushed in and held for more than 4 seconds, the IPC will display the accumulated hours for 30 seconds. The hourmeter will reset to 0.0 when 100,000 hours are accumulated, and begin to accumulate hours again.

Odometer

The IPC contains a season odometer, a trip odometer, and a hourmeter. Momentarily press the trip/reset switch on the IPC in order to toggle between the season odometer, the trip odometer, and the hourmeter. Press the trip/reset switch for greater than 1 second, while the trip odometer is displayed, in order to reset the trip odometer. For vehicles with steering controls, the Personal Trip On/Off (Business Trip On/Off) must be turned On in order for the trip odometer to accumulate. When the Personal Trip On/Off (Business Trip On/Off) parameter is displayed and the select button is pressed on the steering wheel, the On/Off state of the Personal Trip (Business Trip) shall be changed to the opposite state. The IPC displays the vehicle mileage and trip mileage as determined by the IPC. The IPC calculates the mileage based on the vehicle speed signal circuit from the PCM. The odometer will display 'error' if an internal IPC memory failure is detected. The odometer can be configured to display either miles or kilometers.

PRNDL Display

The IPC displays the selected gear position as determined by the PCM. The IPC receives a class 2 message from the PCM indicating the gear position. The PRNDL display blanks if:

- The PCM detects a malfunction in the transmission range switch circuit.
- The IPC receives a class 2 message indicating the park position and the column park switch indicates a position other than park, open input.
- The IPC detects a loss of class 2 communications with the PCM.

Speedometer

The IPC displays the vehicle speed on the analog speedometer based on the vehicle speed signal from the PCM. The PCM converts the data from the vehicle speed sensor to a 4,000 pulses/mile signal. The IPC uses the vehicle speed signal circuit from the PCM in order to calculate the vehicle speed.

The speedometer defaults to 0 km/h (0 mph) if a malfunction in the vehicle speed signal circuit exists.

Tachometer

The IPC displays the engine speed on the analog tachometer based on the engine speed signal from the PCM. The IPC uses the engine speed signal circuit - 2 pulses/engine revolution - from the PCM in order to calculate the engine speed.

The tachometer defaults to 0 RPM if a malfunction in the engine speed signal circuit exists.

Transmission Temperature Gauge

The IPC displays the transmission temperature as determined by the PCM. The IPC receives a class 2 message from the PCM indicating the transmission temperature. The transmission temperature gauge will default to 40° C (100°F) or below if:

- The PCM detects a malfunction in the transmission temperature sensor circuit.
- The IPC detects a loss of class 2 communications with the PCM.

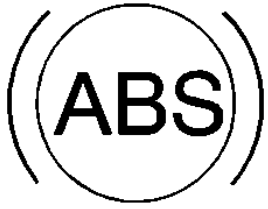
Voltmeter

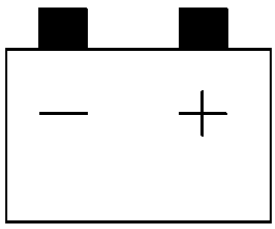
The IPC displays the system voltage as detected at the ignition 1 input of the IPC. When the engine is ON, the gauge should be between 10 and 16 volts.

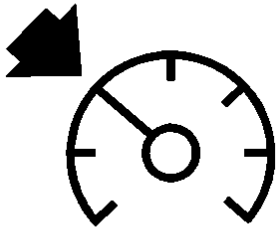
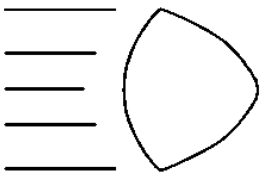
INDICATOR/WARNING MESSAGE DESCRIPTION AND OPERATION

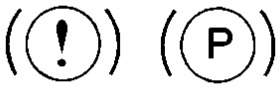
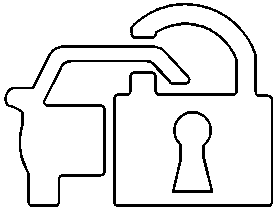
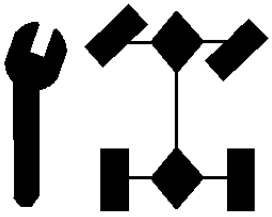
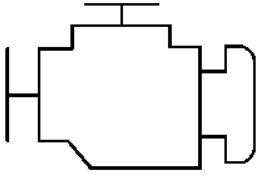
Indicators

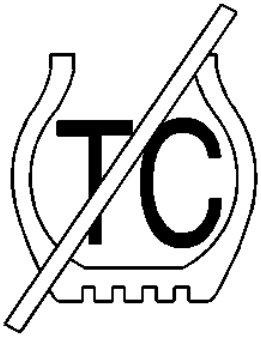
Indicator/Warning Message Description and Operation

Symbol	Description
	ABS: Refer to **ABS Description and Operation** in Anti-lock Brake System
	Air Bag: Refer to **SIR System Description and Operation** in SIR

	
  (Canada) BRAKE (U.S.)	Brake: Refer to **Brake Warning System Description and Operation** in Hydraulic Brakes
	Charge: Refer to **Charging System Description and Operation** in Engine Electrical

 (Canada) CRUISE (U.S.)	CRUISE: Refer to **Cruise Control Description and Operation** in Cruise Control
	Fasten Safety Belt: Refer to **Seat Belt System Description and Operation** in Seat Belts
	High Beam: Refer to **Exterior Lighting Systems Description and Operation** in Lighting Systems
Low Fuel	Low Fuel: Refer to Indicator/Warning Message Description and Operation
	Park Brake: Refer to **Park Brake System Description and Operation** in Park Brake

 PARK BRAKE	
 (Canada) SECURITY (U.S.)	SECURITY: Refer to **Theft Systems Description and Operation** in Theft Deterrent
 (Canada) SERVICE 4WD (U.S.)	SERVICE 4WD: Refer to **Transfer Case Description and Operation** in Transfer Case - BW 4484
 (Canada) SERVICE ENGINE SOON (U.S.)	Malfunction Indicator Lamp (MIL): Refer to **Powertrain Control Module (PCM) Description** in Engine Controls - 4.3L, 5.3L, and 6.0L

	Tow/Haul: Refer to **Transmission Component and System Description** in Automatic Transmission - 4L60-E
	Traction Off: Refer to **ABS Description and Operation** in Anti-lock Brake System
	Turn Signals: Refer to **Exterior Lighting Systems Description and Operation** in Lighting Systems

DIC Warning Messages

Indicator/Warning Message Description and Operation

Symbol	Description
BATTERY NOT CHARGING	Refer to **Charging System Description and Operation** in Engine Electrical
CARGO DOOR AJAR	Refer to **Door Ajar Indicator Description and Operation** in Doors
CHANGE ENGINE OIL	Refer to Indicator/Warning Message Description and Operation
CHECK OIL LEVEL	Refer to Indicator/Warning Message Description and Operation
CHECK WASHER FLUID	Refer to **Wiper/Washer System Description and Operation** in Wiper/Washer System
DRIVER DOOR AJAR	Refer to **Door Ajar Indicator Description and Operation** in Doors
ENGINE COOLANT HOT	Refer to **Cooling System Description and Operation** in Engine Cooling
ENGINE OVERHEATED	Refer to **Cooling System Description and Operation** in Engine Cooling

FUEL LEVEL LOW	Refer to Indicator/Warning Message Description and Operation
ICE POSSIBLE	Refer to Indicator/Warning Message Description and Operation
LEFT REAR DOOR AJAR	Refer to **Door Ajar Indicator Description and Operation** in Doors
LOW COOLANT LEVEL	Refer to **Cooling System Description and Operation** in Engine Cooling
OIL LIFE RESET	Refer to Indicator/Warning Message Description and Operation
OIL PRESSURE LOW	Refer to Indicator/Warning Message Description and Operation
OVERSPEED	Refer to Indicator/Warning Message Description and Operation
PASSENGER DOOR AJAR	Refer to **Door Ajar Indicator Description and Operation** in Doors
PROGRAM CLUSTER	Refer to Indicator/Warning Message Description and Operation
REAR ACCESS OPEN	Refer to **Interior Lighting Systems Description and Operation** in Lighting Systems
REDUCED ENGINE POWER	Refer to **Cooling System Description and Operation** in Engine Cooling
REPLACE LIFTGATE FUSE	Refer to **Door Ajar Indicator Description and Operation** in Roof
RIGHT REAR DOOR AJAR	Refer to **Door Ajar Indicator Description and Operation** in Doors
RKA # BATTERY LOW	Refer to **Keyless Entry System Description and Operation** in Keyless Entry
SERVICE 4WD	Refer to **Transfer Case Description and Operation** in Transfer Case - BW 4484
SERVICE AIR BAG	Refer to **SIR System Description and Operation** in SIR
SERVICE AIR SUSPENSION	Refer to **Air Suspension Description and Operation** in Air Suspension
SERVICE BRAKE SYSTEM	Refer to **Brake Warning System Description and Operation** in Hydraulic Brakes
SERVICE TIRES SOON (Mideast export)	Refer to Indicator/Warning Message Description and Operation
SERVICE VEHICLE SOON (Mideast export)	Refer to Indicator/Warning Message Description and Operation
TIGHTEN FUEL CAP	Refer to Indicator/Warning Message Description and Operation
TIRE SERVICE REQUIRED (Mideast export)	Refer to Indicator/Warning Message Description and Operation
TRACTION ACTIVE	Refer to **ABS Description and Operation** in Anti-lock Brake Systems
TRANS IN WARM UP	Refer to **Transmission Component and System Description** in Automatic Transmission - 4L60-E
TURN SIGNAL ON	Refer to **Exterior Lighting Systems Description and Operation** in Lighting Systems
VEHICLE SPEED LIMITED	Refer to Indicator/Warning Message Description and Operation

CHECK OIL LEVEL

The instrument panel cluster (IPC) illuminates the CHECK OIL LEVEL message in the driver information

center (DIC) when the powertrain control module (PCM) detects a low engine oil level condition. The PCM only monitors the oil level switch signal circuit for a brief period between key on and ignition crank. The IPC receives a class 2 message from the PCM requesting illumination.

CHANGE ENGINE OIL

The instrument panel cluster (IPC) illuminates the CHANGE ENGINE OIL message when the powertrain control module (PCM) determines that the engine oil should be changed. The IPC receives a class 2 message from the PCM requesting illumination. Once the oil is changed, perform the engine oil monitor reset procedure in order to clear the Change Engine Oil indicator. Refer to **GM Oil Life System - Resetting** in Maintenance and Lubrication.

FUEL LEVEL LOW

The instrument panel cluster (IPC) illuminates the FUEL LEVEL LOW message in the driver information center (DIC) and the LOW FUEL indicator when the IPC detects that the fuel level is less than a pre-determined value. The IPC receives a class 2 message from the powertrain control module (PCM) indicating fuel level percent.

ICE POSSIBLE

The instrument panel cluster (IPC) illuminates the ICE POSSIBLE message in the driver information center (DIC) when the outside air temperature drops below 2.5°C (36.5°F). The IPC receives a class 2 message from the body control module (BCM) indicating the outside air temperature.

OIL LIFE RESET

The instrument panel cluster (IPC) illuminates the OIL LIFE RESET message when the powertrain control module (PCM) determines that the engine oil should be changed. The IPC receives a class 2 message from the PCM indicating the remaining oil life percent. Once the oil is changed, perform the engine oil monitor reset procedure in order to clear the Change Engine Oil indicator. Refer to **GM Oil Life System - Resetting** in Maintenance and Lubrication.

OIL PRESSURE LOW

The instrument panel cluster (IPC) illuminates the OIL PRESSURE LOW message in the driver information center (DIC) when the powertrain control module (PCM) detects a low oil pressure condition with the signal circuit low. The IPC receives a class 2 message from the PCM requesting illumination.

OVERSPEED

The instrument panel cluster (IPC) illuminates the OVERSPEED indicator when the IPC detects that the vehicle speed is more than 120 km/h (75 mph).

PROGRAM CLUSTER

The instrument panel cluster (IPC) illuminates the PROGRAM CLUSTER message in the driver information center (DIC) when the IPC has not been programmed after an IPC replacement. Refer to **Service Programming**

System (SPS) in Programming.

SERVICE TIRES SOON (Mideast export)

The instrument panel cluster (IPC) illuminates the SERVICE TIRE SOON message when the vehicle communication interface module (VCIM) determines that the tires have to be changed. The IPC receives a class 2 message from the VCIM.

SERVICE VEHICLE SOON (Mideast export)

The instrument panel cluster (IPC) illuminates the SERVICE VEHICLE SOON message when the vehicle communication interface module (VCIM) has to be replaced. The IPC receives a class 2 message from the VCIM.

TIGHTEN FUEL CAP

The instrument panel cluster (IPC) illuminates the TIGHTEN FUEL CAP message in the driver information center (DIC) when the powertrain control module (PCM) detects a low fuel pressure condition. The IPC receives a class 2 message from the PCM requesting illumination.

TIRE SERVICE REQUIRED (Mideast export)

The instrument panel cluster (IPC) illuminates the Tire Service Required message one month after the Service Tires Soon message is displayed. The powertrain control module (PCM) receives a class 2 message from the IPC limiting the vehicle speed to 64.4 km/h (40 mph).

VEHICLE SPEED LIMITED

The instrument panel cluster (IPC) illuminates the VEHICLE SPEED LIMITED message in the driver information center (DIC).

DRIVER INFORMATION CENTER (DIC) DESCRIPTION AND OPERATION

Driver Information Center (DIC)

The driver information center (DIC) consists of a single line 22 character vacuum fluorescent (VF) display placed in the lower center area of the instrument panel cluster (IPC). The DIC will display vehicle information, configuration, and warning parameters to the driver.

The display parameters are cycled, changed, and acknowledged using 4 DIC buttons.

- Trip Information

  Button representation icon appears as a road to the horizon.

- Fuel Information

Button representation icon appears as a gasoline pump.

- Personalization

  Button representation icon appears as a human next to vehicle.

- Select

  Button representation icon appears as an arrow.

DIC Displays

The DIC parameters are displayed by order of priority as follows (from highest to lowest) :

- Service Diagnostics
- Driver Identifier
- Feature Programming
- Driver Warnings
- Vehicle Information

Vehicle Information

Vehicle information provides feedback to the driver on vehicle performance, mileage, maintenance, or related information.

Vehicle information can only be displayed with the ignition switch in the RUN position.

When the English/Metric status changes, any applicable vehicle information data values will also change.

DIC Trip Information / Reset Capabilities

The available DIC Trip Information and reset capabilities are as follows:

- Odometer - Cannot be reset
- Personal Trip Odometer - Can be reset
- Business Trip Odometer - Can be reset
- Timer - Can be reset
- Hourmeter - Cannot be reset

Trip Reset Stem

The trip reset stem on the IPC operates in the following manner with the ignition switch in the RUN position:

1. Each time the trip reset stem is pushed the display will cycle to the next trip parameter. The trip parameters are as follows:

- Odometer
- Personal Trip odometer
- Business Trip odometer
- Timer
- Hourmeter

2. Holding the trip reset stem for greater than 1 second or depressing the SWC Select button while either Personal Trip or Business Trip odometer is displayed will reset the displayed trip odometer and all other corresponding trip parameters to 0.0 upon release of the stem. The trip odometer will remain displayed after being reset.
3. If a trip information parameter is being displayed, pressing the DIC Trip Information button will display the next trip information parameter.
4. If the next Trip Information parameter to be displayed is Timer, Hourmeter, or blank, pressing the reset stem will return the display to the Odometer.

Odometer

The odometer is capable of displaying values from 0 - 999,999 mi or km.

If the ignition is in the OFF or UNLOCK/ACC position, the odometer can be displayed by pressing the trip reset stem. The odometer will remain displayed for 5 seconds.

Trip Odometers

The DIC can display Personal Trip or Business Trip odometers.

The trip odometers are capable of displaying values from 0 - 999999.9 mi or km.

When the maximum value is reached, the trip odometer will roll over to 0.0.

Timer

The Timer is displayed as XX (hours) : XX (minutes) : XX (seconds).

The Timer is started and stopped using the DIC Select button.

Holding the Select button for longer than 1 second while the Timer parameter is displayed will reset the Timer to 00:00:00.

The Timer status and data value is retained in memory when the ignition is turned OFF. When the ignition is turned ON again, the Timer status and data value is resumed.

The Timer maximum value is 99:59:59. When the maximum is reached, the Timer rolls over to 00:00:00 and continues to operate.

Fuel Information

DIC Fuel Information / Reset Capabilities

The available DIC Fuel Information and reset capabilities are as follows:

- Range - Can not be reset
- Avg. Fuel Economy - Can be reset
- Inst. Fuel Economy - Can not be reset
- Engine Oil Life - Can be reset

Range

The range display is the estimated distance that the vehicle can travel under current fuel economy and fuel level conditions.

This range is calculated from odometer information and class 2 messages.

Fuel Range is capable of displaying values from 0-999 mi or km.

Display appears as: RANGE: XXX MILES (English), RANGE: XXX km (Metric).

If the range is less than 40 miles, RANGE: LOW will be displayed.

Average Fuel Economy

The Average Fuel Economy (AFE) value is calculated by the cluster based on Trip Distance and Trip Fuel Used.

Pressing the Select button for longer than 1 second while the Average Fuel Economy is displayed in the DIC will reset to 0.0.

Average Fuel Economy is capable of displaying values from 0.0-99.9.

Display appears as: AVG ECON XX.X (English) MPG, AVG ECON XX.X L/100km (Metric).

Trip Distance and Trip Fuel Used accumulated values are stored in memory when the ignition is turned OFF.

Instantaneous Fuel Economy

Instantaneous Fuel Economy values are calculated by the cluster from odometer information and class 2 messages.

The cluster calculates instantaneous fuel economy based on distance and fuel.

Instantaneous fuel economy is capable of displaying values from 0.0 - 99.9.

Display appears as INST ECON XX.X (English), INST ECON XX.X L/100km (Metric).

Values for the Instantaneous fuel economy are not stored when the ignition is turned OFF.

Engine Oil Life

Engine Oil Life percentage values are based on class 2 messages to the IPC. The IPC requests this value when Engine Oil Life is selected on the DIC.

Engine Oil Life is capable of displaying values from 0-100 percent and the OIL LIFE RESET driver warning will be displayed.

Pressing the Select button for longer than 5 seconds while Engine Oil Life is displayed on the DIC the value will reset to 100 percent.

Display appears as ENGINE OIL LIFE: XXX%.

Feature Programming

Refer to **Personalization Description and Operation** in Personalization.

Driver Warnings

For the list of Driver Warnings, refer to **Indicator/Warning Message Description and Operation** .

AUDIBLE WARNINGS DESCRIPTION AND OPERATION

The audible warnings alert the driver of a system concern or a critical vehicle condition. The radio generates the audible warnings through the left front speaker. The radio receives audible warning requests via the class 2 serial data line. If the radio receives multiple audible warning requests, the warning with the highest priority sounds first. On vehicles with an audio amplifier, the amplifier instead of the radio generates the audible warnings and receives audible warnings requests via the class 2 serial data line. Either the radio or the audio amplifier is the chime producer. The following lists the audible warning priority and the pulse rate:

1. Fast rate chime (150 pulses per min)
2. Medium rate chime (100 pulses per min)
3. Slow rate chime (50 pulses per min)
4. Turn signal reminder (will pulse at turn signal flasher rate)

Door Ajar Warning

The chime producer activates the door ajar audible warning as requested by the instrument panel cluster (IPC). The IPC sends a class 2 message to the chime producer indicating the chime duration, 4 pulses. The door ajar warning sounds and the appropriate DOOR AJAR indicator illuminates in the driver information center (DIC) when the following occurs:

- The body control module (BCM) determines that a door; driver door, passenger door, left rear door, right rear door, is open, signal is low. The IPC receives a class 2 message from the BCM indicating the door

ajar status.

- The vehicle is not in PARK. The IPC receives a class 2 message from the powertrain control module (PCM) indicating the gear position.
- The vehicle speed is greater than 8.05 km/h (5 mph). The IPC uses the vehicle speed signal circuit, 4000 pulses/mile, from the PCM in order to calculate the vehicle speed.

Fasten Safety Belt Warning

The inflatable restraint sensing and diagnostic module (SDM) senses that the drivers seat belt is not buckled and the signal is low. The SDM sends a class 2 message to the instrument panel cluster (IPC) requesting illumination of the seat belt indicator. The SDM sends a class 2 message to the chime producer indicating a chime at the rate of 50 pulses per minute, slow rate chime, for a duration of approximately 6 seconds. The fasten safety belt warning sounds and the seat belt indicator illuminates when the following occurs:

- Ignition switch transitions to ON.
- The seat belt switch signal to the SDM is low.

If the seat belt is buckled when the ignition is turned ON, the chime will not sound. If the seat belt is buckled while the chime is sounding, the chime stops.

Key-In-Ignition Warning

When the body control module (BCM) detects the key is in the ignition and the signal is low with the driver door open, it activates an audible warning. The key-in-ignition chime sounds at the rate of 100 pulses per minute, medium rate chime, until the driver door is closed or the key removed from the ignition switch. The BCM activates the key-in-ignition warning when all of the following occurs:

- The ignition switch is OFF.
- The key-in-ignition switch signal is low.
- The driver door jamb switch signal is low with the driver door open.

Lights On Chime

The body control module (BCM) will activate an audible warning as a reminder that the headlamps are left ON when exiting the vehicle with the ignition switch in the OFF position. The lights ON warning sounds at the rate of 150 pulses per minute, fast rate chime, until the headlamp switch is turned OFF. The BCM receives a signal from the headlamp and panel dimmer switch via the headlamp relay. The BCM activates the lights on warning chime when the following occurs:

- The ignition is OFF.
- The park lamp switch input is active.
- The dimming potentiometer input is not in a maximum dimming state.

Turn Signal Warning

The body control module (BCM) activates an audible warning as a reminder that the turn signal has been on for a distance of more than 1.20 km (0.75 mi). The BCM receives the vehicle speed and distance via the vehicle speed signal circuit. The turn signal chime will use a tone that is synchronized with the turn signal flasher. The BCM will activate the turn signal chime when the following occurs:

- The ignition is ON.
- Left or right turn signal switch is ON.
- The vehicle has traveled further than 1.20 km (0.75 mi).

Park Brake Chime

The body control module (BCM) activates the park brake chime when the park brake is engaged and the signal circuit is low and vehicle is driven for at least 3 seconds at a speed above 4.8 km/h (3 mph). The chime will sound at the rate of 150 pulses per minute, fast rate chime. The park brake indicator will flash for any distance the vehicle is driven every half second until the park brake is no longer engaged.

Additional Warnings

The following warnings have an associated instrument panel cluster (IPC) indicator or driver information center (DIC) indicator:

- Engine Overheated Stop Engine

  The chime producer activates the audible warning as requested by the IPC. The IPC sends a class 2 message to the chime producer indicating the chime frequency and duration, continuous.

- Ice Possible

  The chime producer activates the audible warning as requested by the IPC. The IPC sends a class 2 message to the chime producer indicating the chime frequency and duration.

- Liftgate Ajar/Rear Access Open

  The chime producer activates the audible warning as requested by the IPC. The IPC sends a class 2 message to the chime producer indicating the chime frequency and duration, 4 pulses.

- Low Fuel

  The chime producer activates the audible warning as requested by the IPC. The IPC sends a class 2 message to the chime producer indicating the chime frequency, medium rate, and duration, 4 pulses.

- Oil Pressure Low Stop Engine

  The chime producer activates the audible warning as requested by the IPC. The IPC sends a class 2 message to the chime producer indicating the chime frequency and duration, continuous.

- Overspeed/Vehicle Overspeed

  The chime producer activates the audible warning as requested by the IPC. The IPC sends a class 2 message to the chime producer indicating the chime frequency and duration, continuous.

- Reduced Engine Power

  The chime producer activates the audible warning as requested by the IPC. The IPC sends a class 2 message to the chime producer indicating the chime frequency and duration.

- Service Stability System

  The chime producer activates the audible warning as requested by the IPC. The IPC sends a class 2 message to the chime producer indicating the chime frequency and duration.

- Stability System Disabled

  The chime producer activates the audible warning as requested by the IPC. The IPC sends a class 2 message to the chime producer indicating the chime frequency and duration.

- Trans Hot Idle Engine

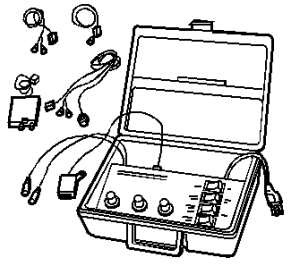
  The chime producer activates the audible warning as requested by the IPC. The IPC sends a class 2 message to the chime producer indicating the chime frequency and duration, continuous.

Refer to **Indicator/Warning Message Description and Operation** .

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/Description
	J 33431-C Signal Generator and Instrument Panel Tester