Technical Training

Model Year Update

08NP-XJ: 2008 Model Year XJ Sedan

Also includes updates for 2008 MY XK, S-TYPE and X-TYPE

JAGUAR

08NP-XJ 08/2007
Printed in USA

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Online Course Evaluation

Class participants are encouraged to fill out an online evaluation for this course. The Jaguar evaluation is available at:

- **http://www.fordtechservice.dealerconnection.com/vdirs/training/classsurvey/jagsurvey.asp**

The information provided in the evaluations is kept confidential and will only be used to improve Jaguar training activities. Your prompt response will be appreciated.

Your feedback is extremely important to us!

ACRONYMS, ABBREVIATIONS AND SYMBOLS

The following acronyms, abbreviations and symbols are used in this course book. The majority of them conform to J1930 standards.

Acronym, Abbreviation or Symbol	Definition or Description
AM	Amplitude Modulation
ASCM	Adaptive Speed Control Module
ASM	Air Suspension Module
BTUM	Bluetooth Upgrade Module
CAN	Controller Area Network
CCSM	Climate Controlled Seat Module
D2B	Digital Data Bus
FCC	Federal Communications Commission
FEM	Front Electronic Module
FM	Frequency Modulation
GPS	Global Positioning System
GWM	Gateway Module
HD	Hybrid Digital
HS	High Speed (CAN)
IBOC	In Band On Channel
ICE	In Car Entertainment System
kHz	Kilohertz
LF	Low Frequency

Acronym, Abbreviation or Symbol	Definition or Description
mbit/s	Million Bits per Second
MHz	Megahertz
MOST	Media Oriented System Transport
NAS	North American Specification
NTC	Negative Temperature Coefficient
OCS	Occupant Classification System
PCB	Printed Circuit Board
PSE	Portable Support Electronics Module
PTC	Positive Temperature Coefficient
PTI	Personal Telephone Integration Module
PWM	Pulse Width Modulated
RCM	Restraints Control Module
RF	Radio Frequency
RMM	Rear Memory Module
SDARS	Satellite Digital Audio Receiver System
TED	Thermoelectric Device
TPMS	Tire Pressure Monitoring System
TSD	Touch-Screen Display

OVERVIEW

The XJ 2008 model year (MY) update provides changes to the vehicle in the following areas:

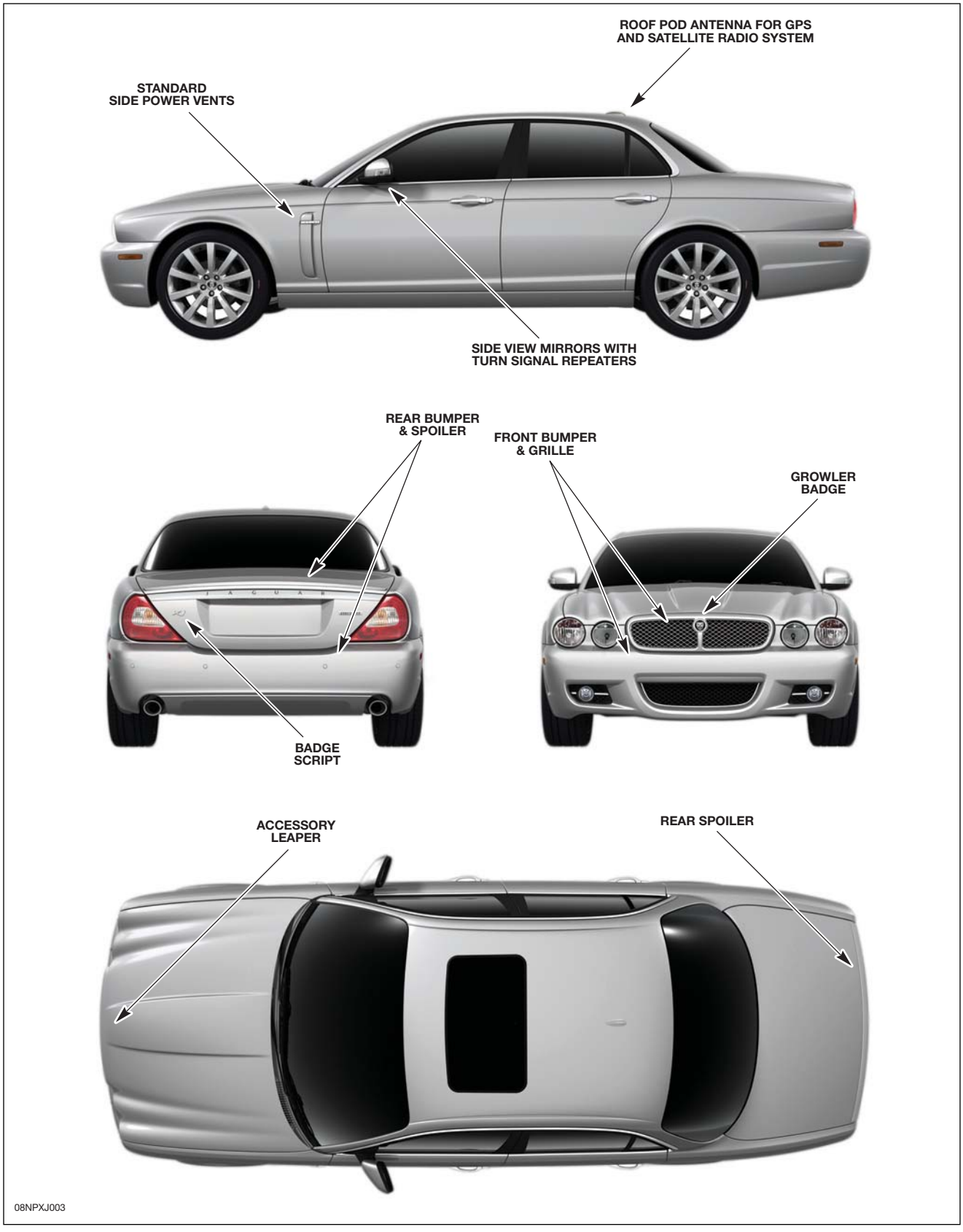
Exterior Changes

- Front and rear bumper design
- Upper and lower grilles
- New Jaguar growler and badges
- Door mirrors with turn signal repeaters
- Side power vents
- Rear spoiler

New Features

- HD Radio™ (only with Navigation)
- Integrated satellite radio (only with Navigation)
- Bluetooth phase 2
- Climate-controlled front seats featuring heating and cooling

The 2008 XJ features some notable exterior styling updates.

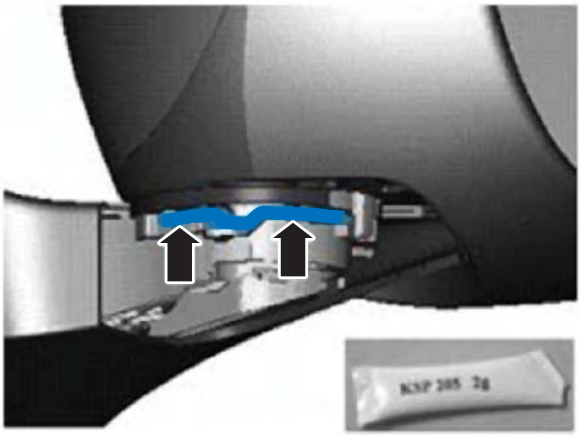


SIDE VIEW MIRRORS

The side view mirrors have been completely redesigned to incorporate turn signal repeaters. To replace the repeater bulb, remove mirror glass for access.

08NPXJ004

Power folding mirrors may bind or operate erratically. If this should happen, follow the instructions for lubricating pivot points in bulletin JTB00041 in the 501 body section.



08NPXJ005

INFOTAINMENT SYSTEM OVERVIEW

The infotainment system is available in two variants: low line and high line, with the high line system offering the options of HD or Satellite radio and rear entertainment.

NOTE: HD and Satellite radio are separate options and are only available with NAV systems; they cannot be combined with one another.

The Bluetooth Phase 2 phone system is introduced.

Roof Pod Antenna

A roof-mounted pod antenna has been added to provide reception for GPS and Satellite radio. The rear parcel shelf Navigation antenna has been deleted.

08NPXJ045

HD RADIO™

In Band On Channel (IBOC) digital radio technology is a method of digital audio transmission developed by iBiquity Digital Corporation. IBOC is a hybrid system in which digital signals are sent along with the analog carrier signal. HD Radio™ is the brand name for this technology (the 'HD' stands for 'Hybrid Digital', not 'High Definition' which is a video terminology). The Federal Communication Commission (FCC) selected HD Radio™ as the standard for local area broadcast of digital signals within the United States.

IBOC technology has the ability to bundle compressed digital signals and data information on top of existing AM/FM analog broadcasts using the sideband signals. The benefit of piggybacking digital data onto the existing analog signal is that legacy AM/FM tuners can still receive AM/FM stations while the newer HD audio modules can receive and deliver both digital and analog formats.

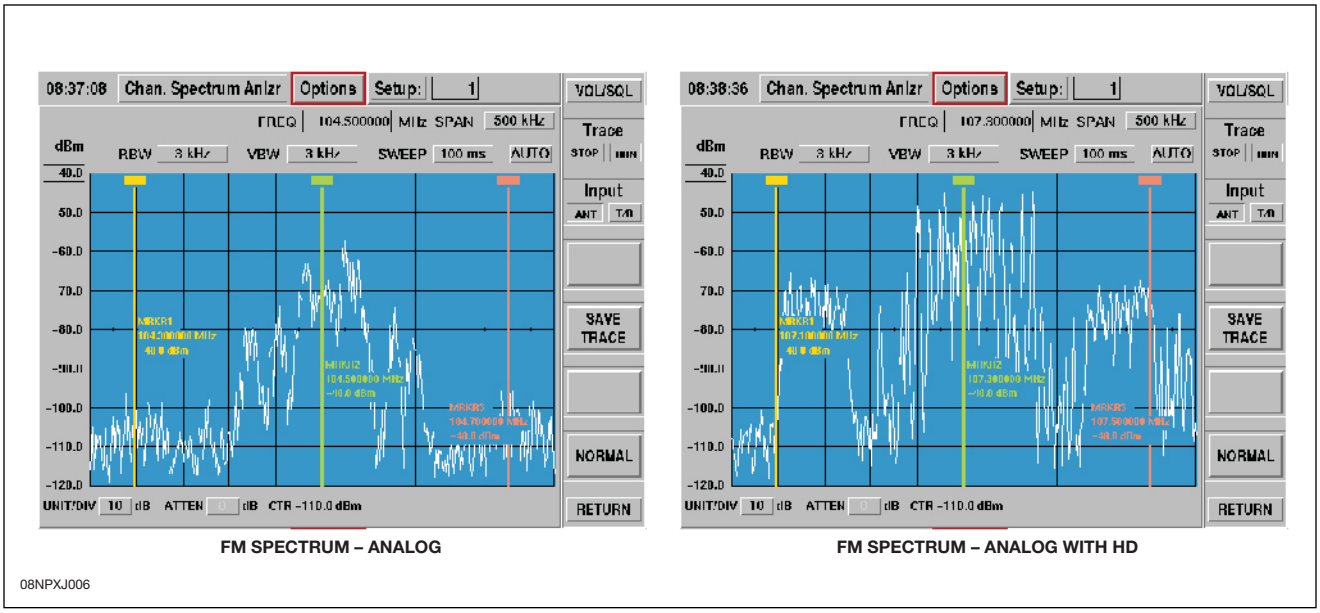
IBOC operates on both AM and FM broadcasts, either in a digital-only mode, or in a 'hybrid' digital/analog mode. Most broadcasts for the foreseeable future will use the hybrid method, giving AM stations 'FM quality' sound, while allowing FM stations to achieve 'CD quality' audio or carry multiple audio programs.

AM stations in the U.S. region have 5kHz of audio *bandwidth* (a measure of frequency) with double sidebands (frequencies higher or lower than the carrier frequency) resulting in a channel 10kHz wide. The AM version of HD Radio™ adds to the signal, creating a channel that is 30kHz (three full channels) wide including sidebands. Because of limited bandwidth assigned to AM stations, only enhanced FM sound quality can be added to AM stations.

Currently, FM stations in the U.S. and Canada are licensed to occupy approximately 200kHz of RF (radio frequency) spectrum and the frequency allocations are 200kHz apart. Due to the nature of frequency modulation and carefully filtered FM transmissions that limit the RF energy more than 120kHz in the sidebands, FM stations have a base bandwidth of about 100kHz. The ratio of power from the analog to digital signal is 100:1. This means that the digital signal only has 1/100th of the power of analog. The remaining frequency, or signal space, is then available for other services, including secondary broadcasting.

The illustration below shows analog FM and HD FM radio signals.

FM Frequency Spectrum



FM SPECTRUM – ANALOG

FM SPECTRUM – ANALOG WITH HD

08NPXJ006

By compressing and broadcasting digital signals on the sidebands of FM analog signals, HD Radio™ can carry multiple streams of data, maxing up to seven different broadcasts per analog channel. For example, a broadcaster can cover two or more sporting events at the same time on a busy afternoon of sports, multicast commercial free music along with talk radio, or stream specific traffic reports – all on the same existing radio frequency. This capability is known as 'multicasting'; these sideband broadcasts are referred to as 'Secondary Components' in this document.

NOTE: Secondary components on AM stations are currently not supported.

The frequencies and ranges for AM and FM radio broadcast are shown in the table below.

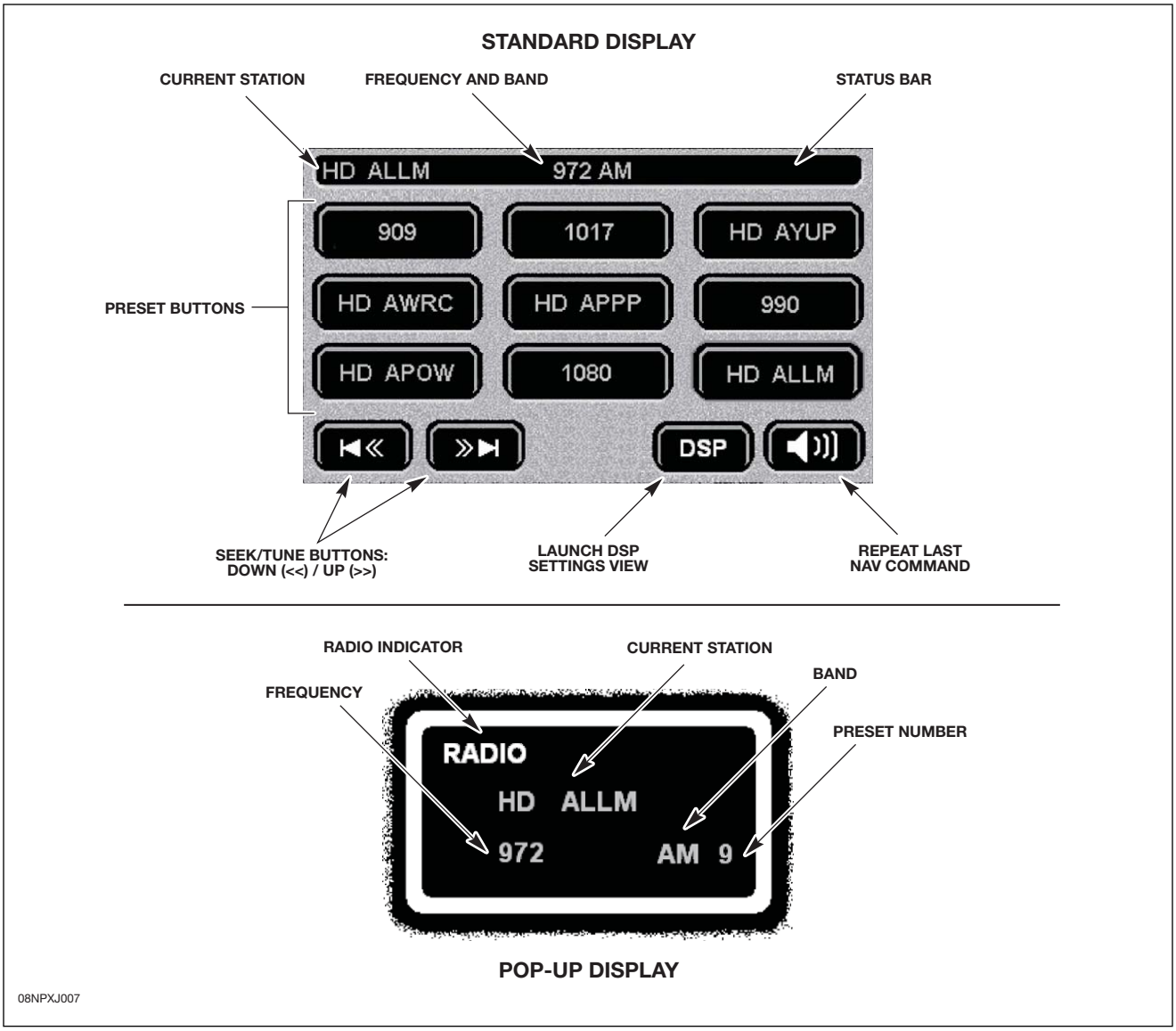
Band	Frequency Range
IBOC AM	530 kHz – 1710 kHz
IBOC FM	87.7 MHz – 107.9 MHz

NOTE: For a listing of HD Radio™ stations in your area, check online at http://www.hdradio.com.

Principles of Operation

The HD Radio™ system displays information on the touch-screen. When NAV visual resources are available, a full digital menu with multiple navigable screens is displayed. When NAV visual resources are not available, the system uses a simple 'Global Text' pop-up screen.

HD Radio™ Digital Display

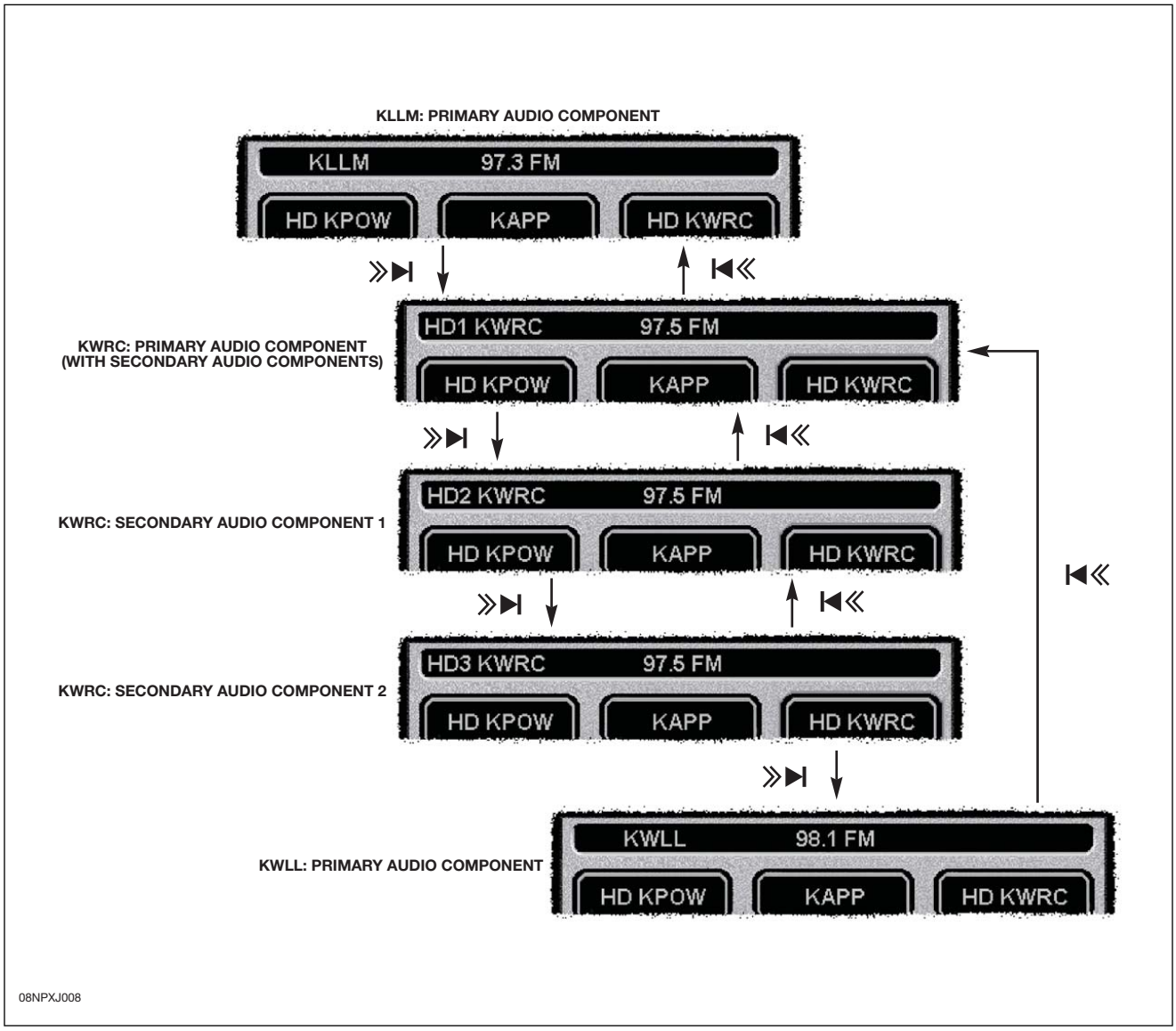


The HD Radio™ operates differently than previous analog audio systems, since HD Radio™ has the ability to 'blend' between analog and digital formats. To distinguish between reception of a non-HD station and an HD station, an 'HD_' indicator is displayed in the status bar to inform the user of the broadcast format.

The user will only be aware of a change between signal formats by the display of the 'HD_' indicator, and may notice an increase/decrease in audio quality.

Because some HD stations will broadcast more than one digital component, the status bar display for FM stations will vary. 'HD1' displayed in the status bar indicates that there are secondary components for the station (HD1 is the 'primary component'). Pressing the 'seek station up' (>> >|) button will tune to the first available secondary component (HD2, HD3, etc.). FM HD Radio™ stations can broadcast up to seven components. When tuned to a secondary component, pressing the 'seek station down' (|< <<) will return to the previous secondary component. When tuned to a station without secondary components, pressing '|< <<' will return to the previous station (primary component [HD1] if applicable). If the user selects past the last available secondary component for a station, the next available station will be selected.

Navigating Between Secondary Components



If a digital signal is lost while tuned to a secondary component, the system will ‘mute’ the audio while trying to reacquire the digital signal and ‘NO HD’ will be displayed in place of the station name in the status bar until the format is reestablished. If the digital component cannot be reacquired, the system will blend back to the analog component.

08NPXJ009

If the user recalls a secondary component from a stored preset, the audio will mute and ‘TUNING’ will be displayed until the digital component is reacquired.

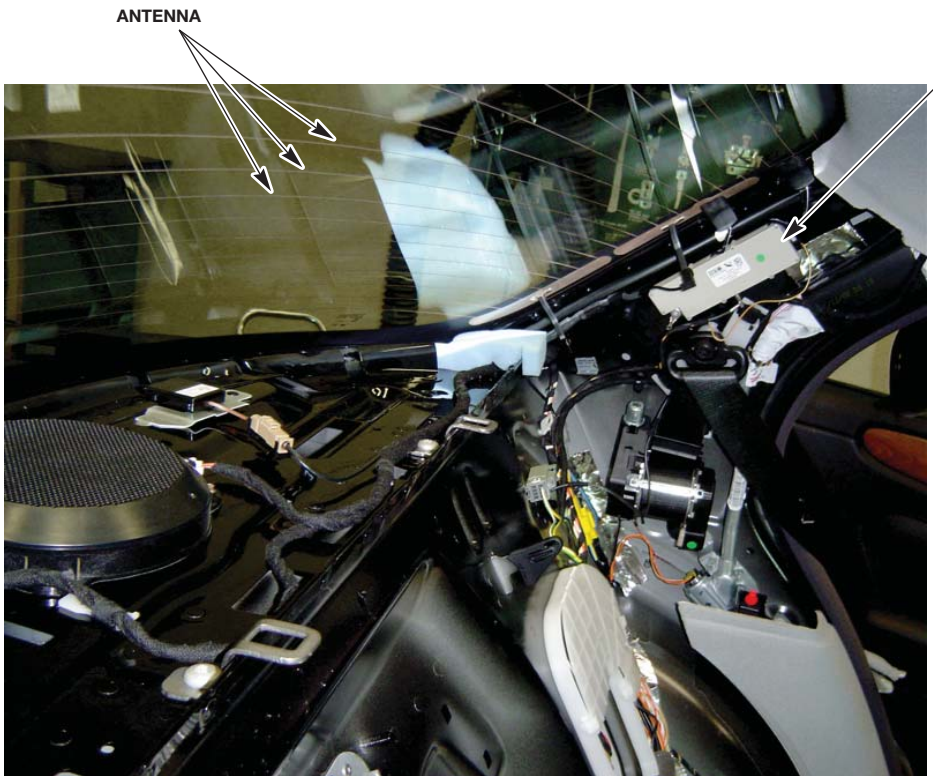
08NPXJ009

Component Description

Antenna and Diversity Module

The IBOC broadcast is received by the existing antenna in the rear windshield and then transported to the AM/FM diversity module located in the LH rear 'D' pillar.

The diversity module sends the broadcast signals directly to the IBOC receiver module located behind the rear seat back via a coaxial cable.



08NPXJ010

IBOC Receiver Module

The IBOC receiver module provides the electronics and software to receive, decode and play the digital signals. The IBOC receiver module also includes a standard AM/FM tuner that allows the system to 'blend' to analog when the signal integrity of a digital broadcast is decreased beyond a defined threshold.

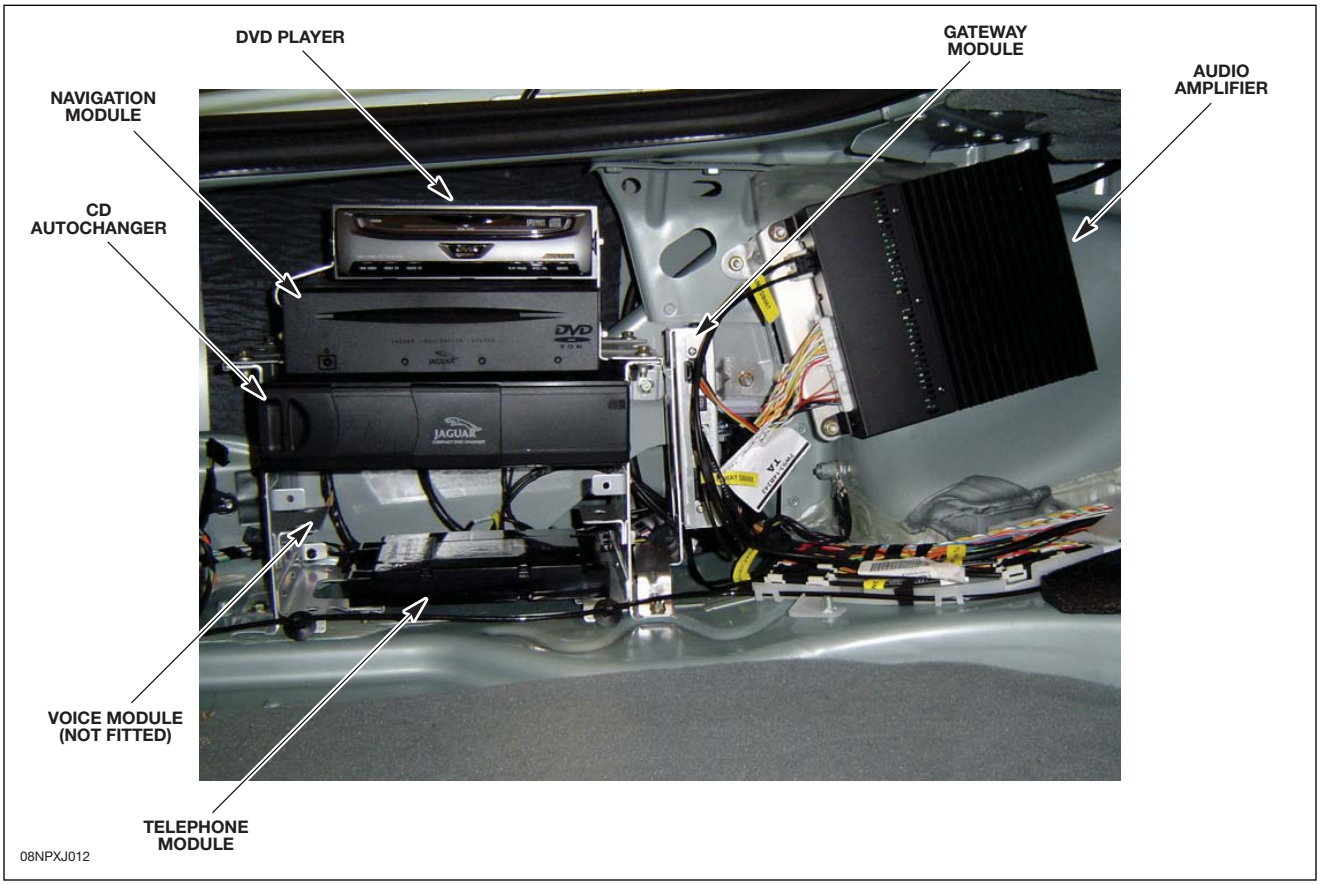
NOTE: When the IBOC receiver is installed in the vehicle, the in-dash AM/FM audio unit will be disabled. The IBOC receiver will offer all of the functionality of the existing AM/FM tuner.

08NPXJ011

Networks

The IBOC receiver operates on a Media Oriented System Transport (MOST) network with a data transfer rate of 24 mbit/s, while the rest of the XJ infotainment system still operates on the D2B network at a much lower data transfer rate of 5.6 mbit/s. In order for the two networks to communicate, both are connected to a gateway module (GWM), located in the left rear of the vehicle.

LH Rear Trunk Modules



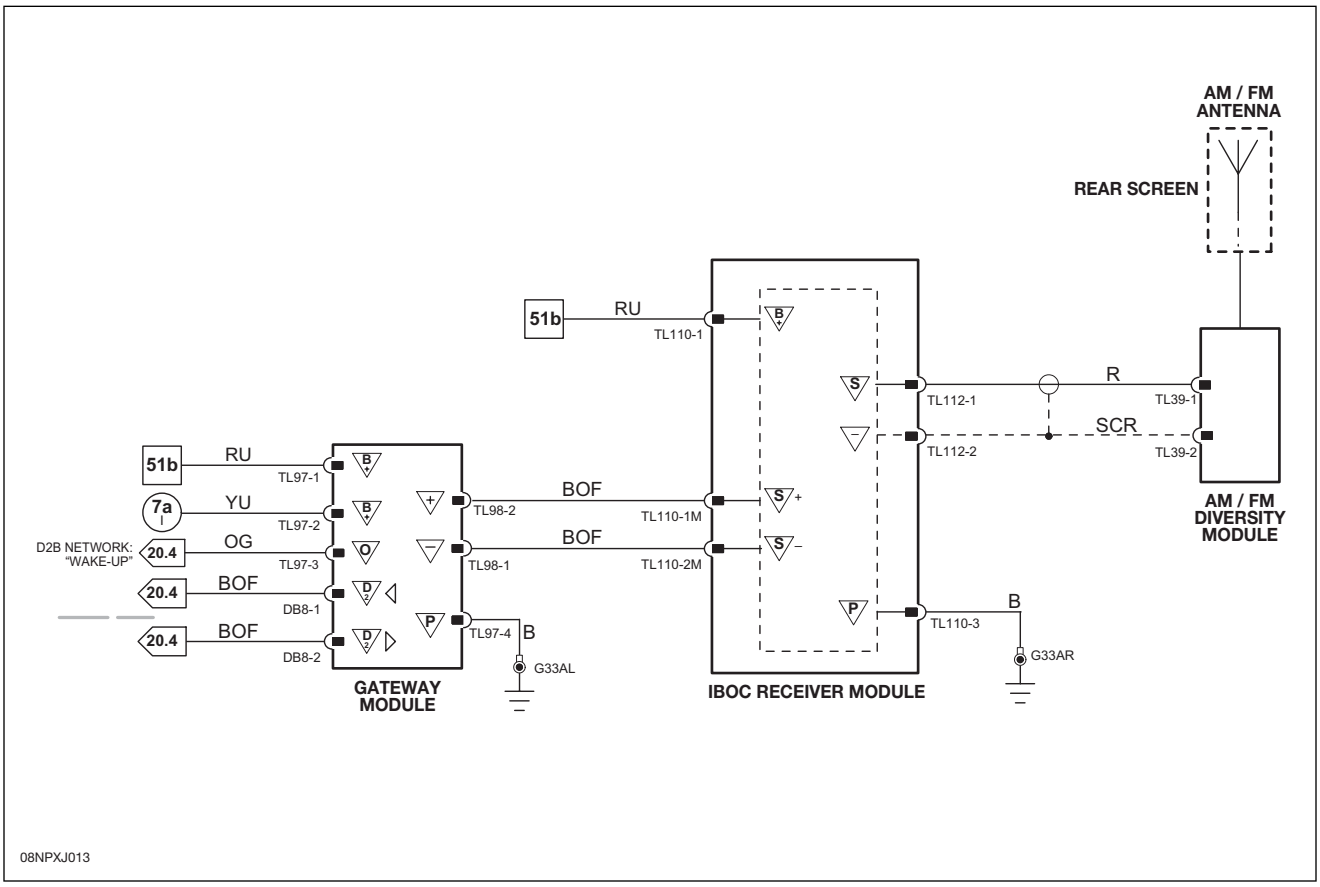
NOTE: The illustration identifies all modules in the LH rear trunk area.

Due to the difference in data transfer rates, the MOST bus has the potential to overwhelm the D2B bus. This potential is avoided by limiting the buffering available in the GWM: the GWM does not acknowledge an incoming message from the MOST bus unless it has processed the previous one.

The GWM incorporates basic ring break diagnostics and stores fault codes from the IBOC receiver module. The GWM appears as the master on the MOST network and a slave on the D2B network.

NOTE: With the IBOC/HD Radio™ option, the in-dash audio unit no longer has or requires a coaxial cable for radio signals. AM/FM and HD signals are now transported on the D2B network.

IBOC Circuit

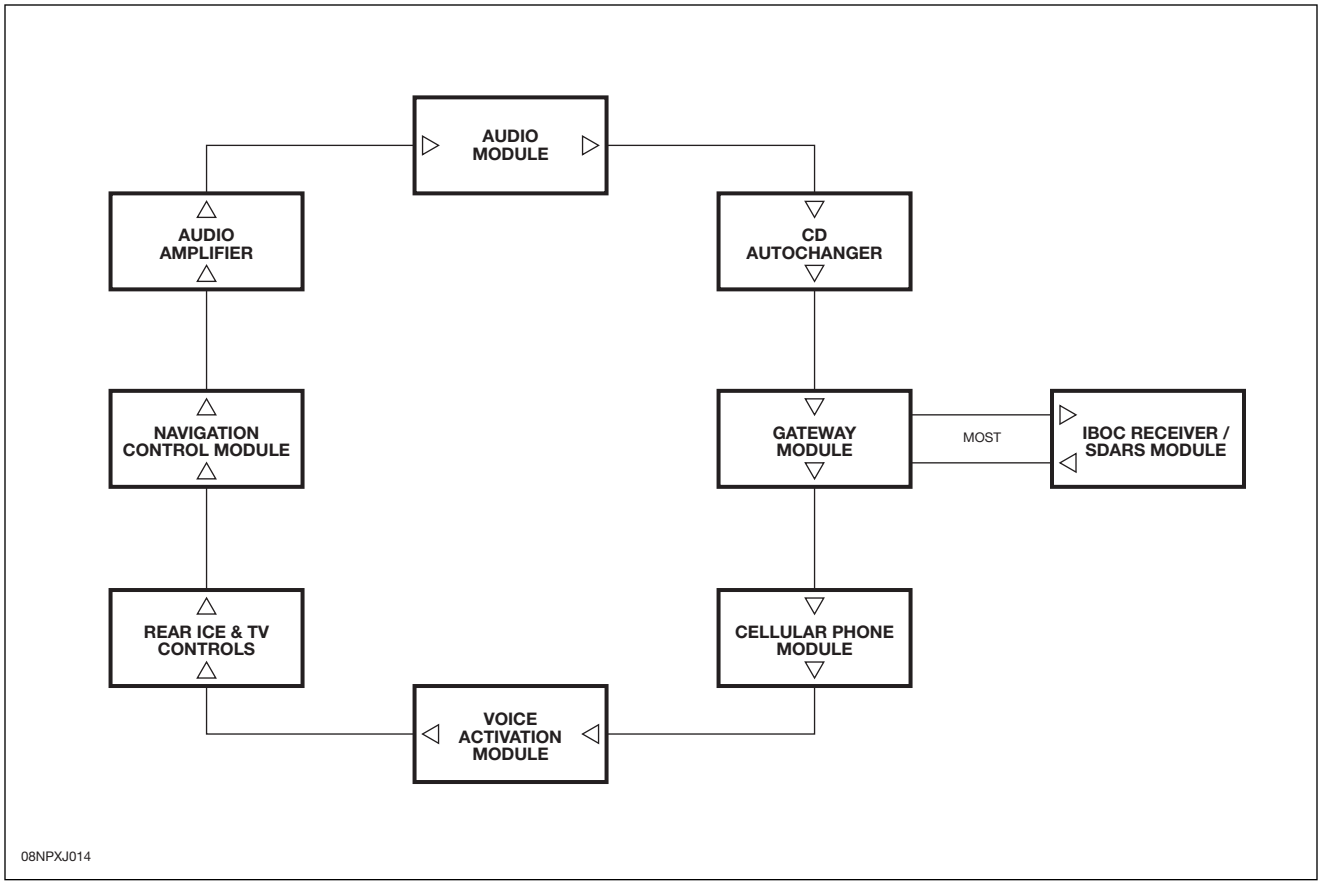


NOTE: The IBOC receiver and GWM modules are not programmable.

D2B Network

The D2B network illustrated below depicts the greatest number of modules available. D2B networks containing fewer than eight modules are always connected in the sequence shown.

When modules are not fitted to the vehicle, the fiber optic cables and connectors are deleted. Therefore, each network containing fewer than eight modules has a unique fiber optic and wake-up circuit.



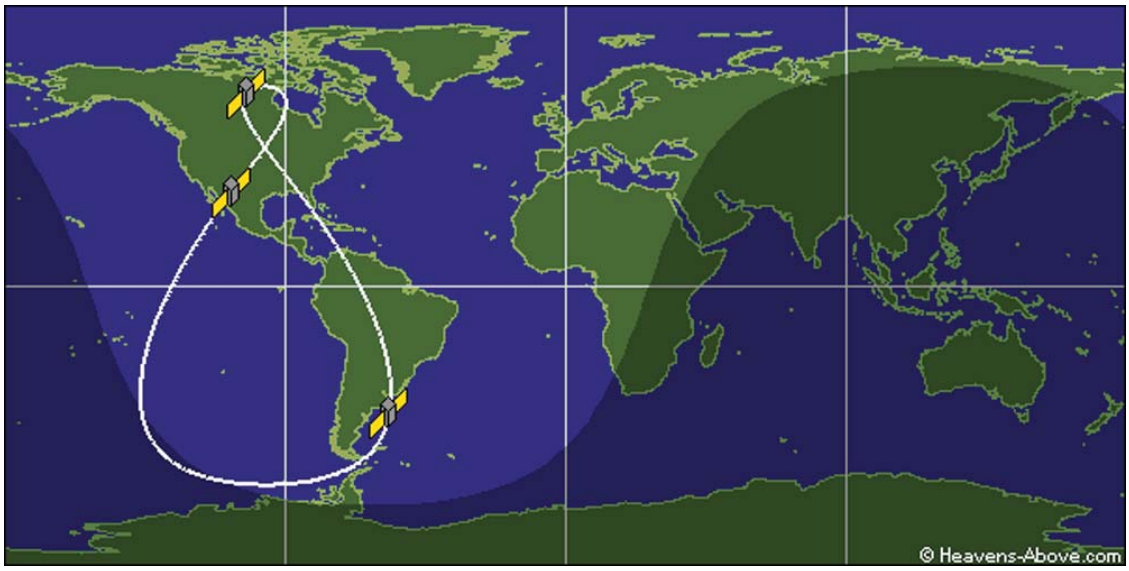
NOTE: The GWM appears as a slave module on the D2B network and the master on the MOST network. The audio module remains the master on the D2B.

SATELLITE RADIO

The Satellite Digital Audio Radio System (SDARS) is a subscription-driven digital radio service with over 100 channels, designed to broadcast commercial-free high-integrity music, news, sports and talk shows to consumers.

SDARS service providers transmit RF signals (of approximately 2.3 GHz) from their up-link facilities to a system of three satellites operating on an inclined elliptical orbit. This orbit pattern ensures that each satellite spends approximately 16 hours a day over the continental USA.

Elliptical Orbit Pattern Showing 3 Satellites



The signal is down-linked directly to car radio receivers, or to a terrestrial ground repeater network which boosts weak or blocked signals. The radio switches between the direct satellite signal and the repeater signal depending on the strength of the signal at any given time. There is an intentional 4-second delay between satellite carrier signals to maintain a large buffer of the audio stream. This helps keep the audio playing in the event the signal is temporarily disturbed (when losing line of site of any satellites or ground repeater stations).

These satellite radio signals are encoded, and a subscription to a broadcast operator is required to receive the broadcasts. Jaguar currently holds an exclusive agreement with SIRIUS™ Satellite Radio.

The Satellite Digital Audio System is comprised of:

- Up-link ground stations
- Satellites
- Ground repeaters
- Radio receiver systems

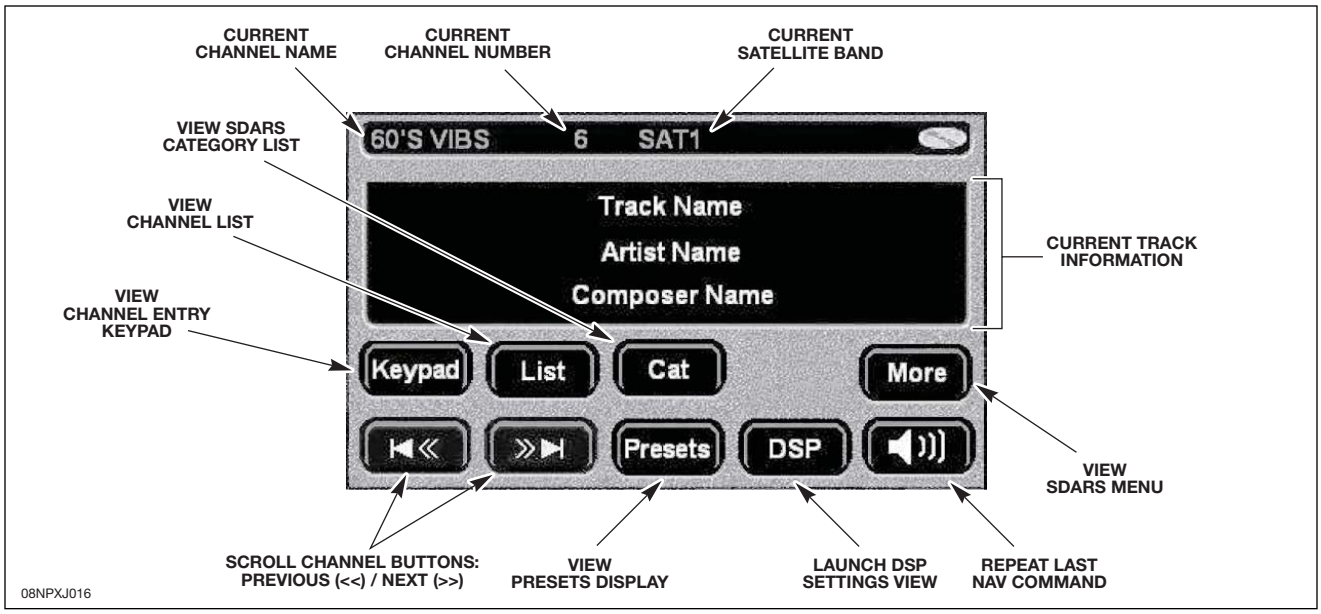
Principles of Operation

The 2008 MY XJ offers factory-installed integrated satellite radio as an option. Satellite radio is only available with Navigation and cannot be combined with HD Radio™.

The Satellite radio display is designed to offer a similar user interface to the existing AM/FM system. The hard key 'BAND' button on the audio unit is used to select between audio formats, which cycle as follows: FM --> AM --> SAT 1 --> SAT 2 --> FM. SAT 1 and SAT 2 are used to provide the user with a wide choice of presets.

The SDARS Options display offers the following information and controls.

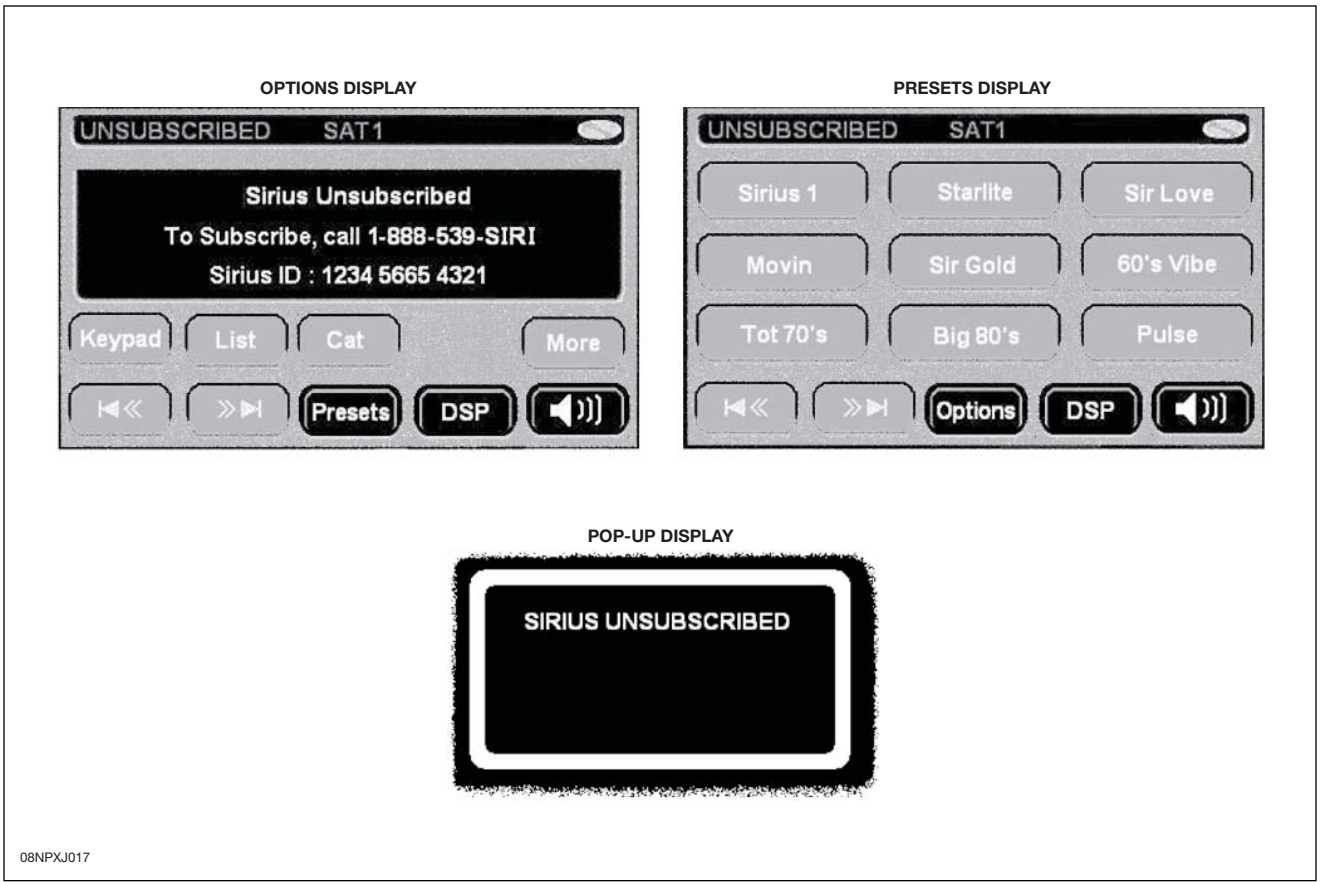
SDARS Options Display



NOTE: As with HD Radio™, when NAV visual resources are not available, the system uses a simple 'Global Text' pop-up screen.

Use of the SDARS system requires a valid subscription with SIRIUS™. If the SDARS receiver is unsubscribed, and either SAT 1or SAT 2 is selected using the BAND button on the audio unit, 'UNSUBSCRIBED' will be displayed in the active SDARS screen (Options, Presets, or Pop-up). In this state, the |< << and >> >| hard and soft keys will be disabled.

Unsubscribed System Display

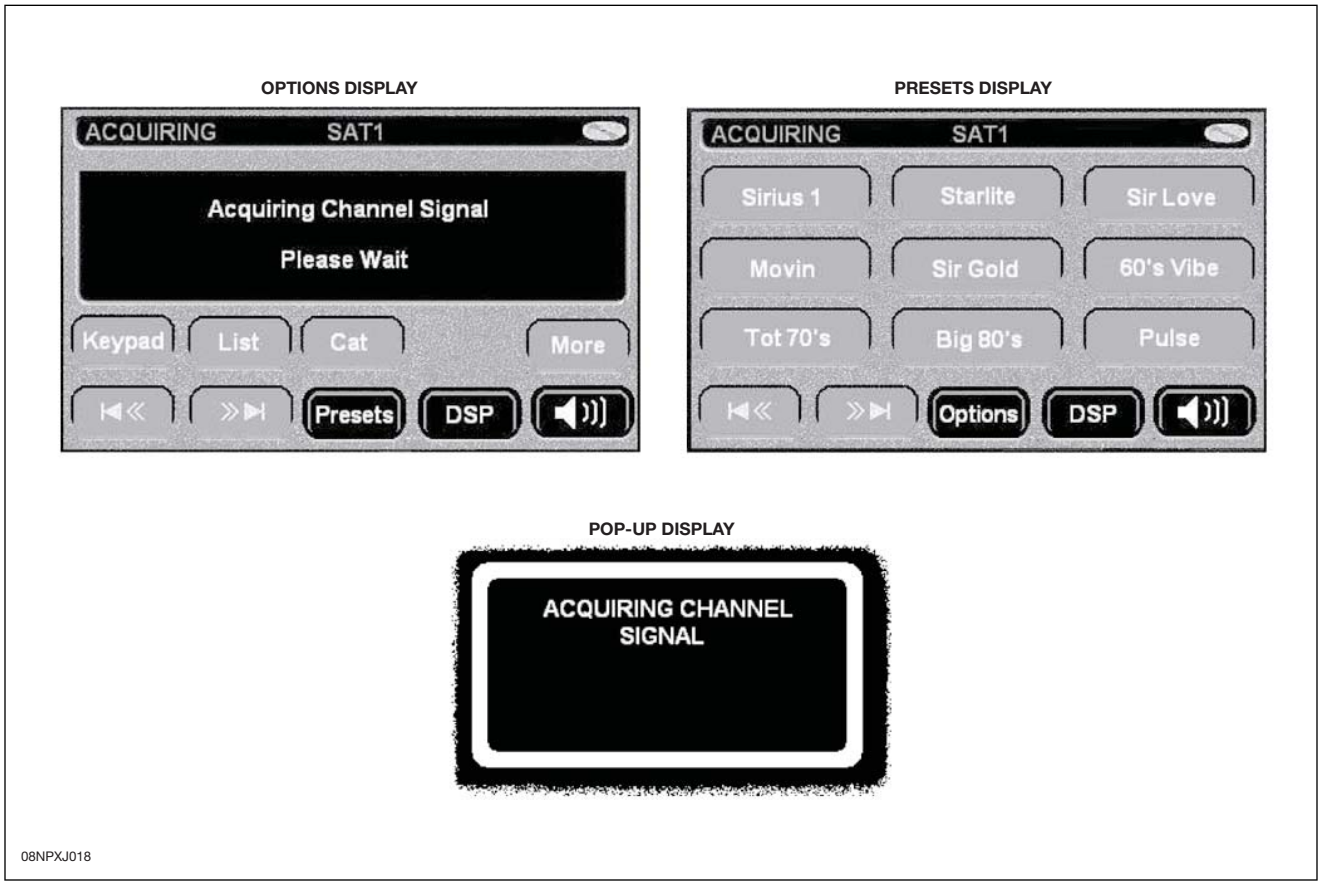


NOTE: If the user deactivates their receiver (on selling the vehicle or turning in a lease) it will become unsubscribed. No channels will be available, including weather and emergency channels.

The SIRIUS™ contact phone number is **1-888-539-SIRI**.

When the user has a valid SIRIUS™ subscription and SAT 1 or SAT 2 is selected, the 'ACQUIRING SIGNAL' will be displayed until the receiver initializes. This is also displayed when the SDARS receiver loses satellite reception.

Signal Acquisition Display

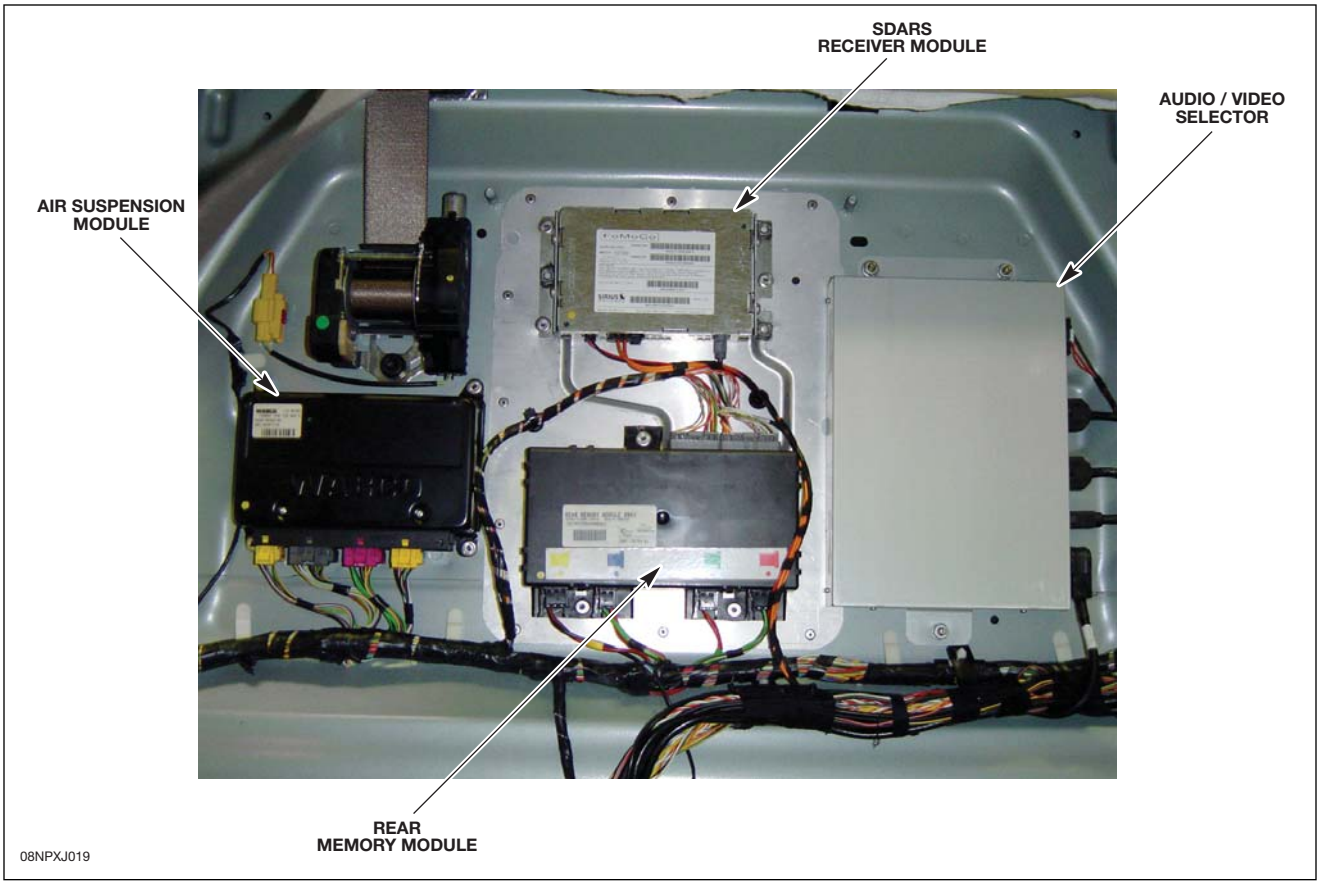


NOTE: For more information about Satellite radio operation please refer to the owner's guide.

Component Description

The SDARS digital broadcast is received by the roof pod antenna. The digital signal is carried via a coaxial cable to the SDARS module located behind the rear seat.

Control Modules Located Behind Rear Seat

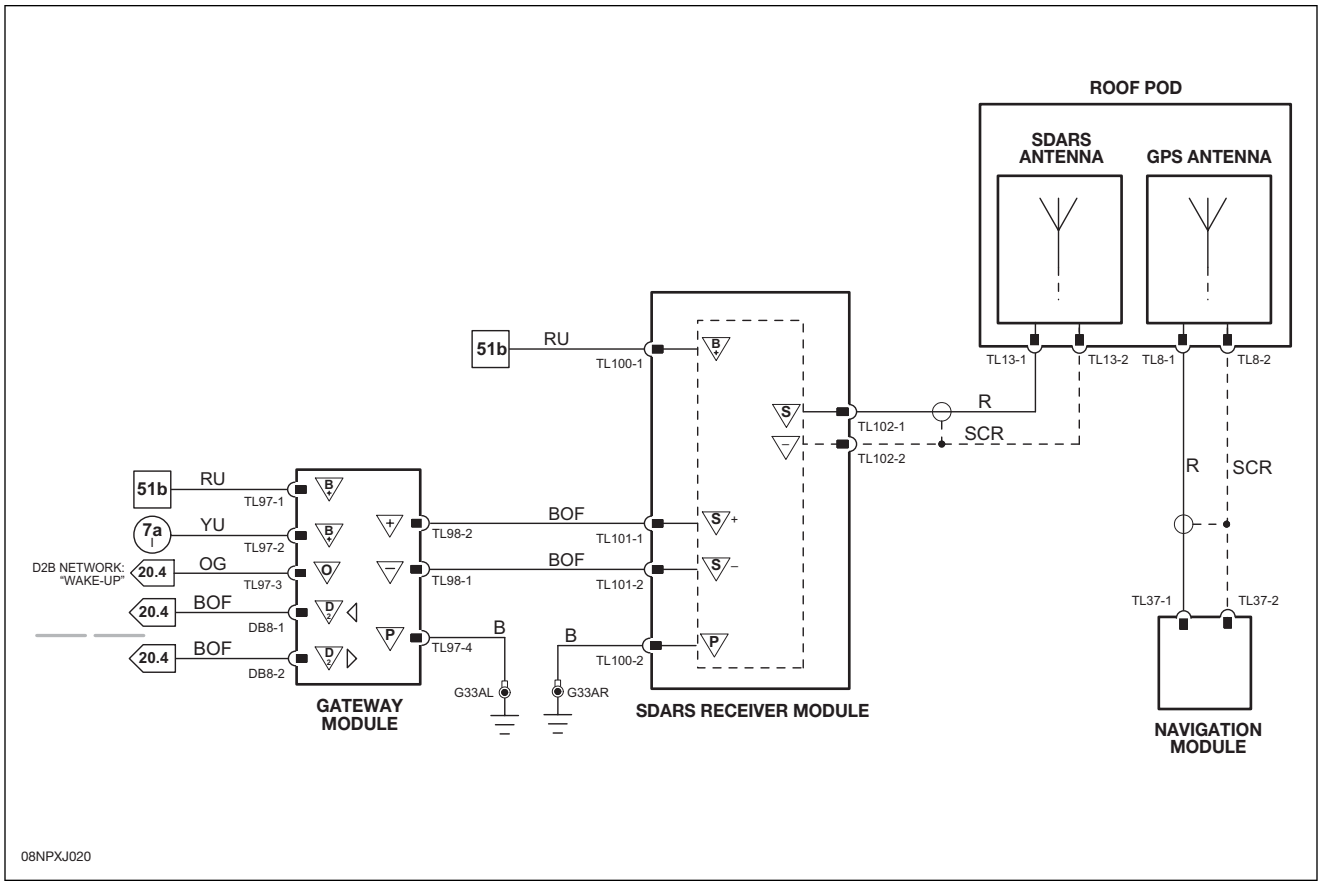


NOTE: The illustration identifies all control modules located behind the rear seat.

Like the IBOC module, the SDARS receiver module operates on the MOST network interface. The decoded signals are sent via MOST network to the GWM to be converted to D2B format, then transported to the audio unit on the D2B network. The GWM incorporates basic ring break diagnostics and stores fault codes from the SDARS receiver module.

Unlike the IBOC system, the SDARS system uses legacy AM/FM audio technology. Analog AM/FM signals are received by the rear windshield antenna and transported to the diversity module and then directly to the in-dash audio unit via a coaxial cable.

Satellite Radio Circuit



NOTE: The SDARS and GWM modules are not programmable.

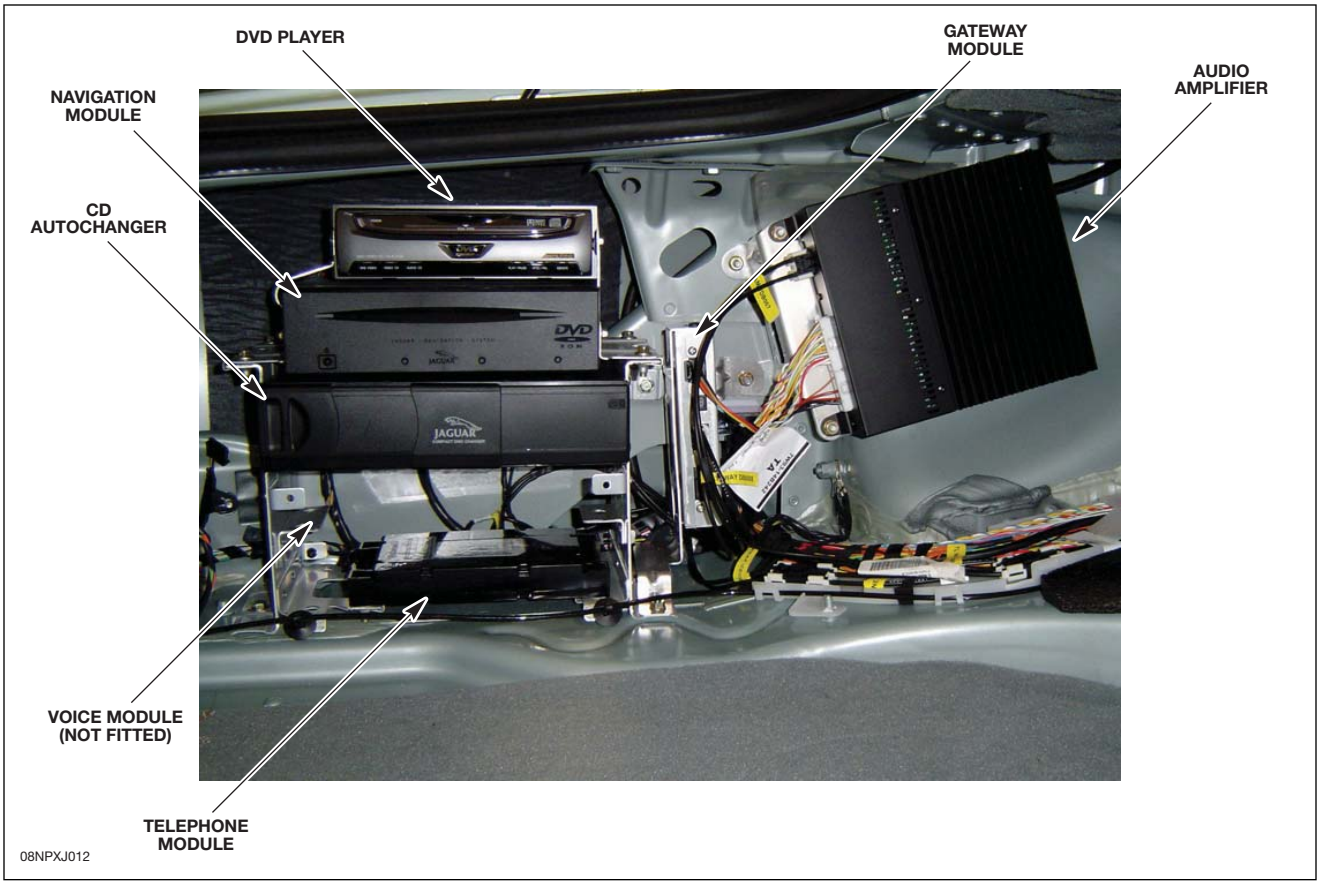
BLUETOOTH PHASE 2 OVERVIEW

The Bluetooth telephone system has been revised and provides additional benefits to XJ customers.

The Portable Support Electronics Module (PSE) and Bluetooth Upgrade Module (BTUM) are now combined into one Personal Telephone Integration (PTI) Module, located in the left rear of the car.

NOTE: The illustration identifies all of the modules in the LH rear trunk area.

LH Rear Trunk Modules

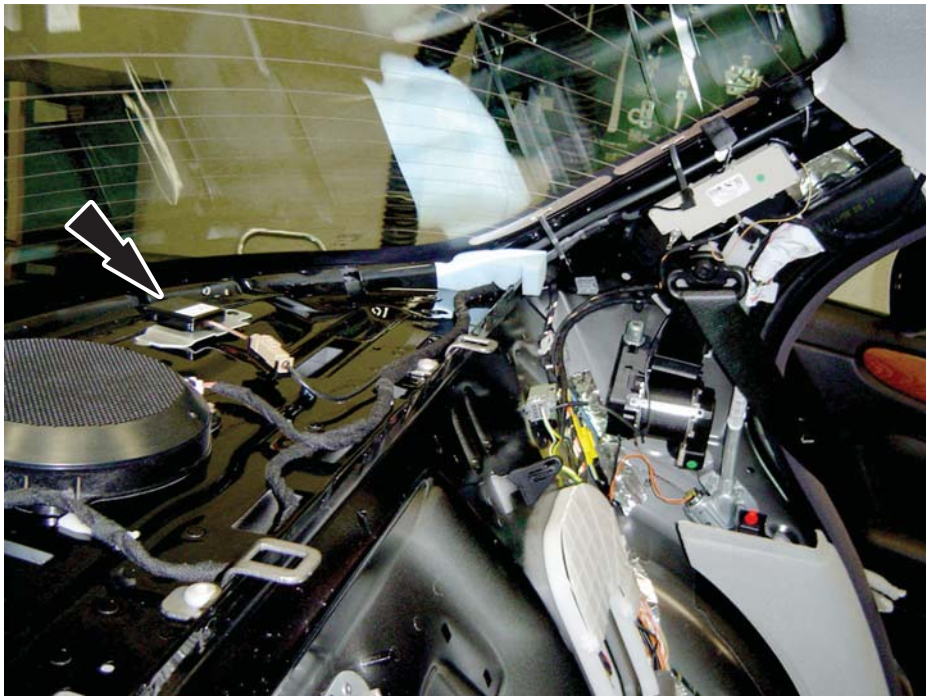


Other revisions include:

- Ability to pair up to five different phones (only one with current system)
- New ‘pairing strategy’, no need to enter ##1#*# into vehicle anymore. If no phone is paired, vehicle is in ‘discover me’ mode.
- Phonebook, last number redial list and call stacks are stored and synchronized for each of the five phones, and are resynchronized when each phone connects.
- Connection strategy: the last paired phone connects first.
- Connection to the car will only occur with ignition on.
- Phone disconnects upon ignition off (six minute timer removed.) Disconnection of phone is no longer required.
- Bluetooth modules are not programmable.

Bluetooth Antenna

The Bluetooth antenna is located on the rear speaker deck.



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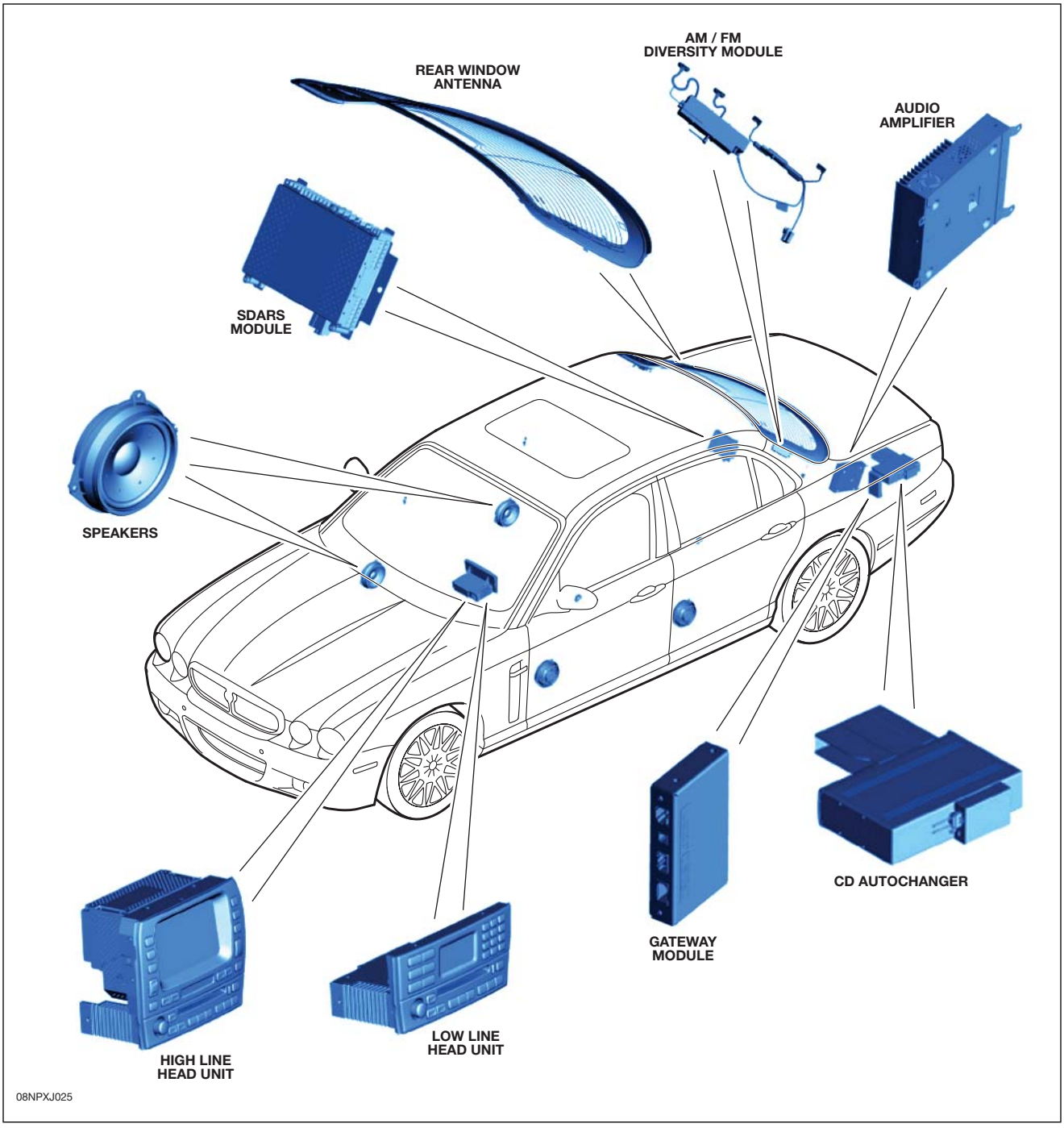
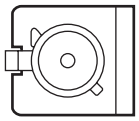
COMPONENT LOCATION

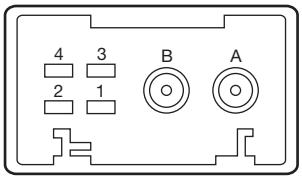


CONTROL MODULES

IBOC Receiver Module Connector Details



TL112

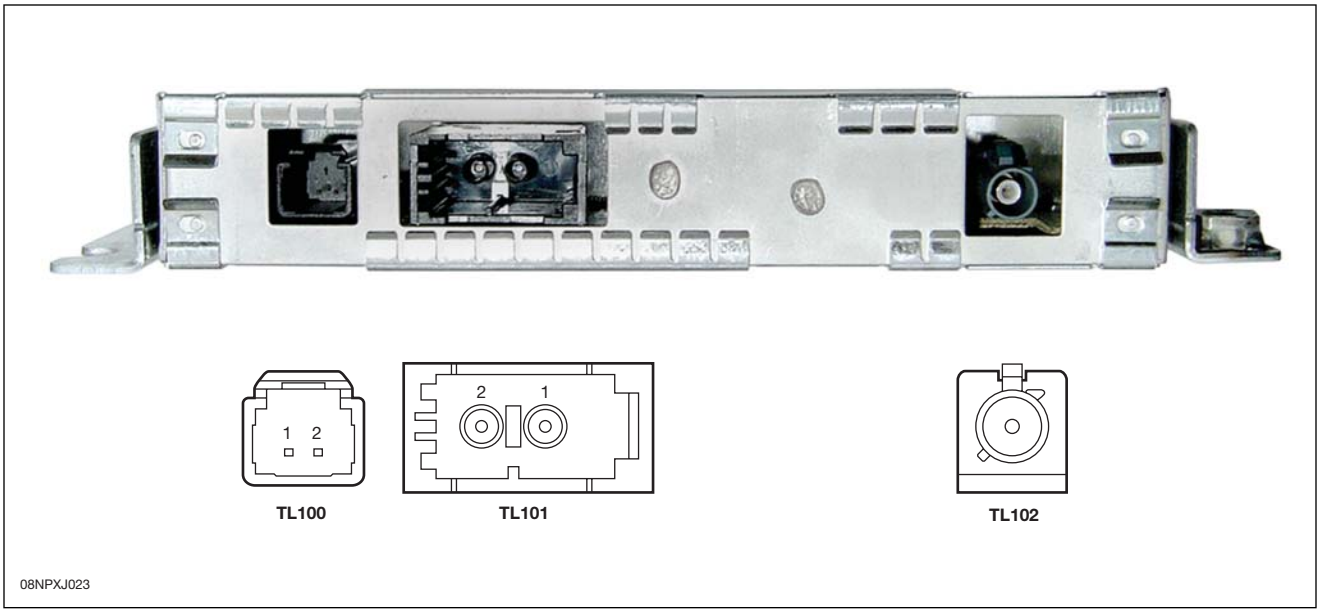


TL110

08NPXJ022

Connector TL110	
Pin#	**Function**
A	MOST Out
B	MOST In
1	Battery +
2	Scan Div On
3	Battery –
4	N/C

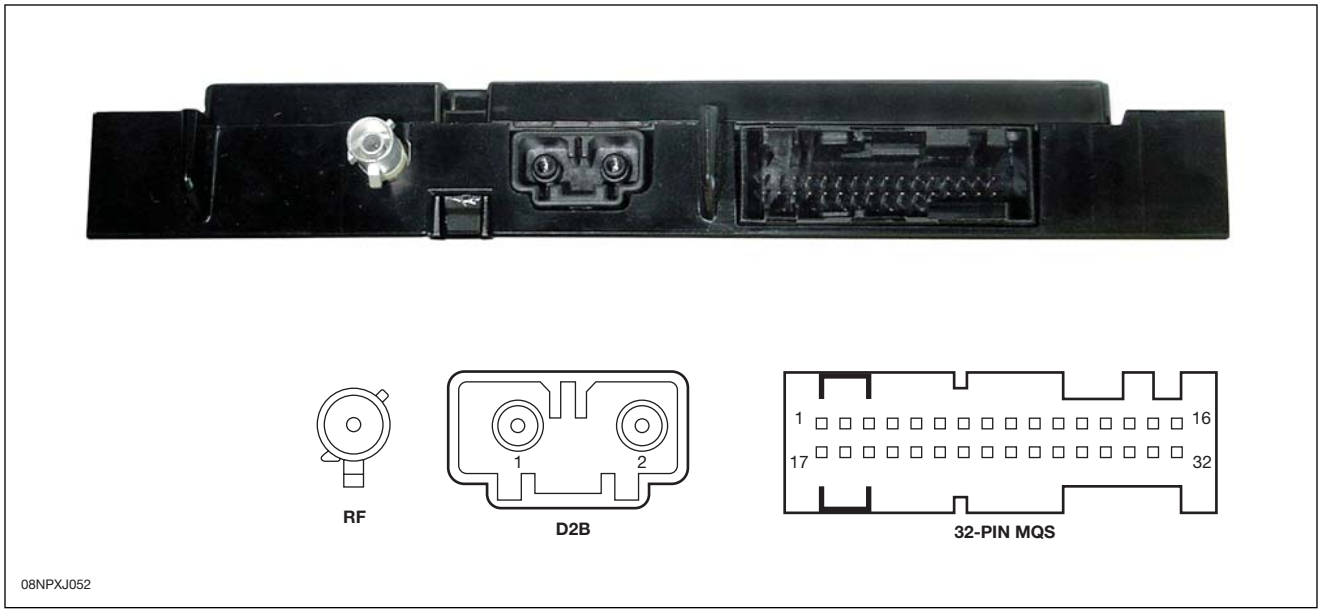
SDARS Receiver Module Connector Details



Connector TL100	
Pin#	**Function**
1	Power
2	Ground

Connector TL101	
Pin#	**Function**
1	MOST Receiver
2	MOST Transmitter

PTI Module Connector Details

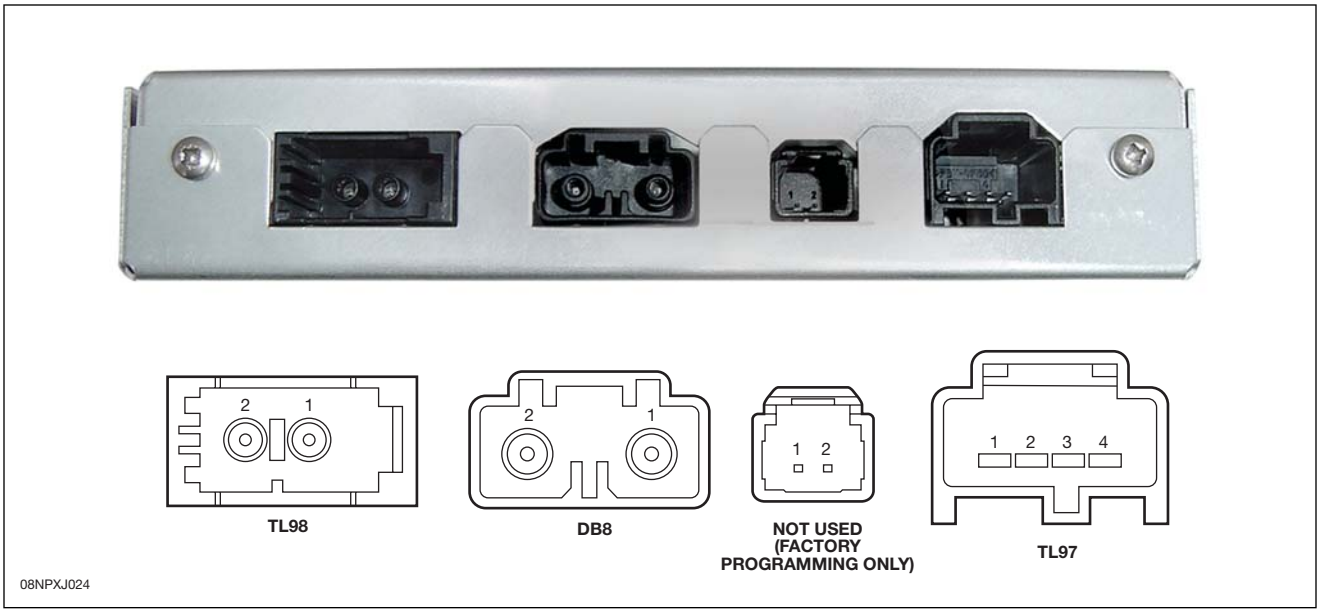


D2B Connector	
Pin#	**Function**
1	D2B Receiver
2	D2B Transmitter

32-Pin MQS	
Pin#	**Function**
1	Not Used
2	Not Used
3	Not Used
4	Mute head unit
5	Not Used
6	Not Used
7	CAS diagnostic
8	CAS diagnostic
9	Vehicle ground
10	Not Used
11	Microphone shield
12	VBatt input
13	VBatt input
14	ACC ignition status
15	Not Used
16	Not Used

32-Pin MQS	
Pin#	**Function**
17	Microphone +
18	Microphone –
19	Not Used
20	Not Used
21	Not Used
22	Not Used
23	D2B wake-up IN
24	Not Used
25	Vehicle ground
26	Not Used
27	CAS diagnostic
28	CAS diagnostic
29	RUN ignition status
30	Not Used
31	Not Used
32	Not Used

Gateway Module Connector Details



Connector TL98	
Pin#	**Function**
1	MOST Receiver
2	MOST Transmitter

Connector DB8	
Pin#	**Function**
1	D2B Receiver
2	D2B Transmitter

Connector TL97	
Pin#	**Function**
1	Battery +
2	RUN/ACC
3	D2B Wake-Up
4	Ground

Gateway Module Diagnostic Trouble Codes

Displayed DTC	DTC Description	Fault Conditions	Comments / Information	Pin#
U1A15	Incomplete MOST ring	Ring break		MOST 1/2
U0194	Lost Communication with Digital Audio Control Module B	No response from DABM on MOST ring	Digital Audio Broadcast Module	MOST 1/2
U0237	Lost Communication with Digital Audio Control Module C	No response from IBOC receiver module on MOST ring	IBOC: In Band On Channel / HD Radio	MOST 1/2
U0193	Lost Communication with Digital Audio Control Module A	No response from SDARS receiver module on MOST ring	Satellite Radio Module (SDARS)	MOST 1/2
U3004	Digital Tuner (MOST slave)	Internal fault	Digital Tuner (MOST slave) module is Inoperative (Remote DTC)	
U3098	Digital Tuner (MOST slave)	Over temperature	Digital Tuner (MOST slave) module is dangerously hot (risk of module internal damage). (Remote DTC)	
B1A89	SDARS or HD Digital Tuner Antenna	Circuit Fault	Circuit Open or Short to ground or Batter	
B1238	High Temperature	Over temperature encountered in Gateway Module		—
B1342	Module is defective	Internal failure in Gateway Module	Module Failure: replace module	—
U2609	D2B Wake-up pulse width out of spec	pulse< 50mS, pulse > 110mS		D2B 1/2
U2601	(D2B) Wake-up Line Short to GND	Ground short detected		D2B 1/2
U2610	D2B Slave Module fails to receive a report position	During initialization no position status report is received	C & C reference DTC is D117	D2B 1/2
U2611	D2B Slave Module fails to receive an alarm clear command	On entering alarm state, slave module has failed to receive alarm clear command.	C & C reference DTC is D118	D2B 1/2
B2477	Module Configuration Failure	Sanity check for configuration / No VIN	VIN data is checked	
B11A4	DAB L Band Antenna	Circuit Fault	DAB L Band antenna open circuit, short to ground or battery voltage (DAB radio system only)	
B11A5	DAB Band 3 Antenna	Circuit Fault	DAB Band 3 antenna open circuit, short to ground or battery voltage (DAB radio system only)	

SEATS OVERVIEW

The 2008 XJ front 16-way luxury seats are an all new design.

Changes include:

- Revised cushions and relaxed leather trim
- Redesigned front seat backs and cushions
- Improved rear foot and leg room
- Optional Climate Controlled Seats™
- New Active Head Restraint System
- New style Occupant Classification Sensing mat

Climate Controlled Seats™ (CCS) are equipped with perforated leather to allow conditioned air to circulate. To maintain consistent interior styling, rear seats will also include perforated leather in vehicles with the CCS option, but cooled seating will only be available for the front seats

16-Way Standard Heated Seats with New Relaxed Leather

08NPXJ026

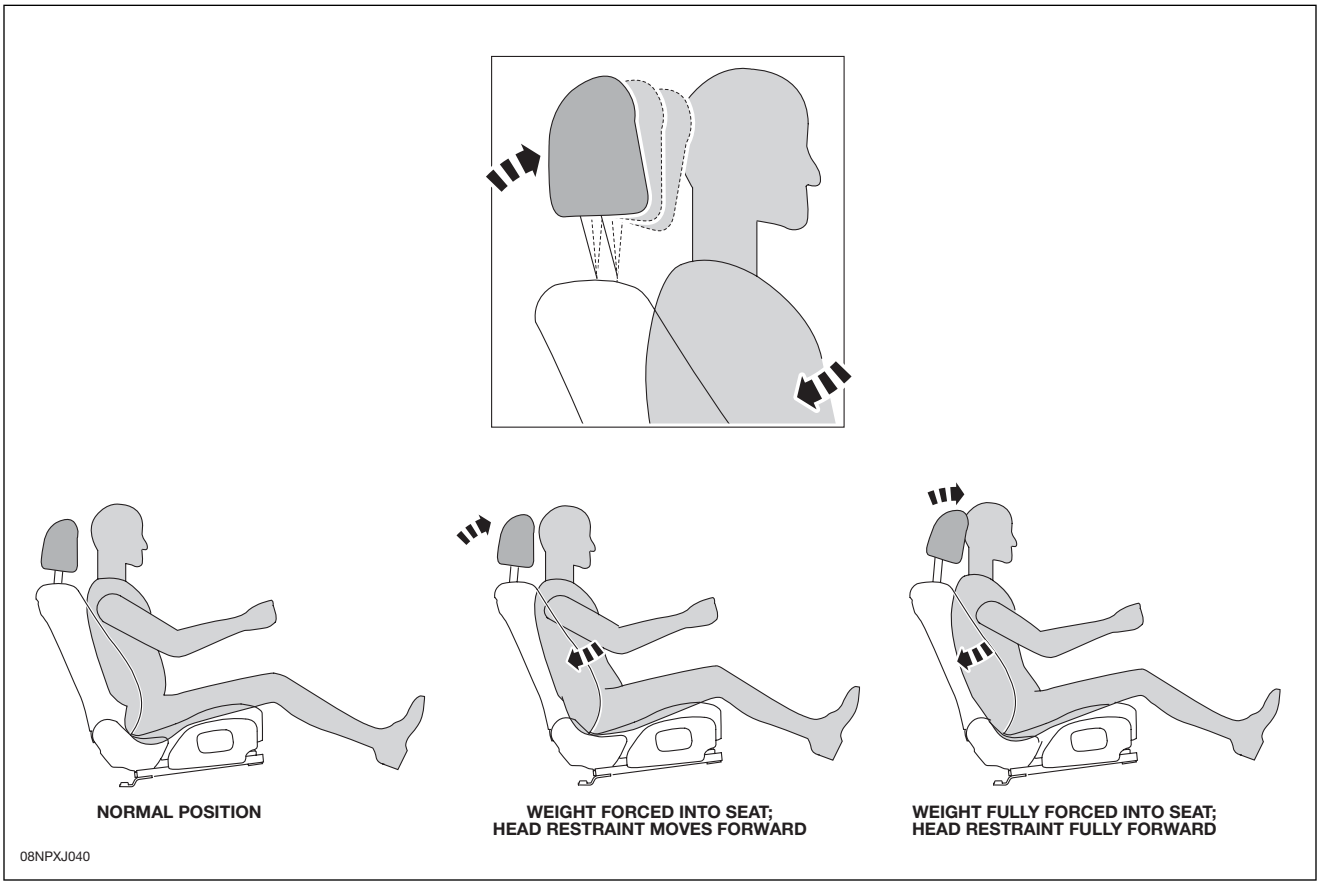
16-Way Optional Climate Controlled Seats™ with Relaxed Perforated Leather

08NPXJ027

OCCUPANT PROTECTION

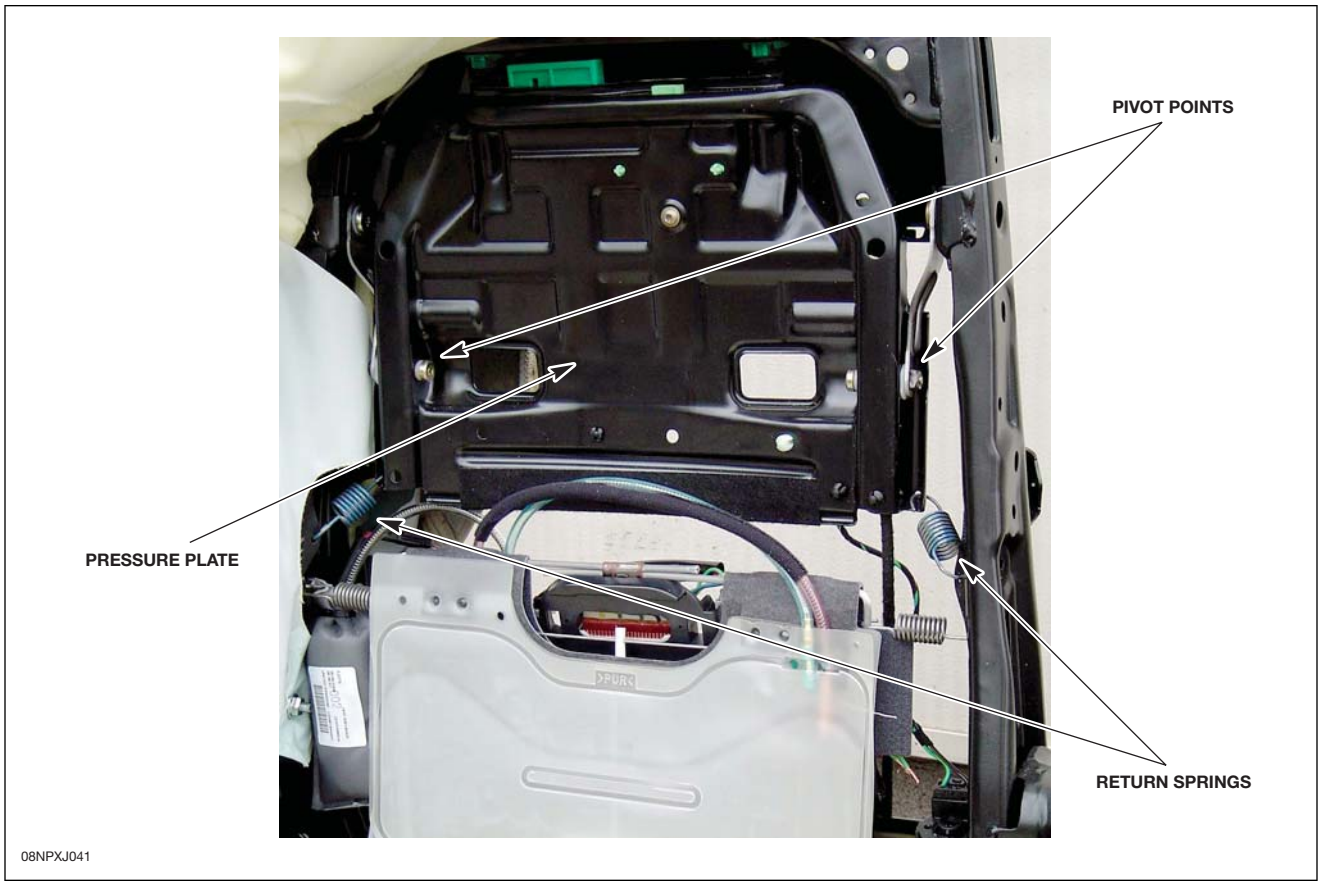
Active Head Restraint System

Both front seats are fitted with mechanical active head restraints that reduce injuries to the spinal column and possible whiplash in the event of a rear collision. The two supports of the head restraints inside the seat backrest are attached to a pressure plate in the seat back. In a collision from the rear, the occupant is pressed into the backrest, moving the pressure plate towards the rear. As the seat occupant's back and body weight press against the pressure plate, the head restraint moves upwards and forwards mechanically by means of a pivot point. The movement of the headrest cushions the occupant's head, altering the posture and reducing the relative motion between the body and the head. The head restraint then returns to its original position using a spring return mechanism. Precise activation of the system is determined by the force with which the occupant's back is pressed against the backrest, the magnitude of the collision, and the occupant's weight.



NOTE: The active head restraint system is a second - generation X150 system; it resets automatically and does not require manual resetting.

Active Head Restraint Seat Back Components



New Style OCS Mat

The Occupant Classification Sensing System uses a new type of pressure-sensing mat in the passenger's seat.

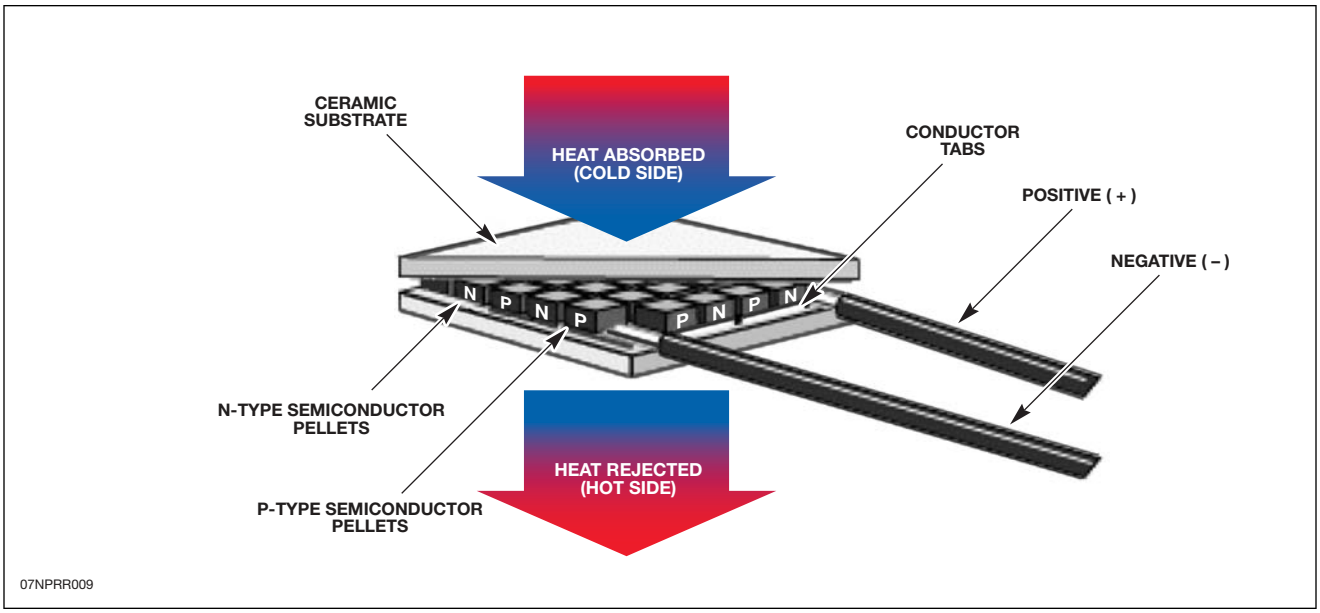
CLIMATE CONTROLLED SEAT™ SYSTEM

Vehicles fitted with the optional Climate Controlled Seat™ system (CCS) significantly improve the comfort level of the occupants by focusing the cooling directly on the passenger through the seat. The CCS system uses a Peltier cell, also known as a proprietary thermoelectric device (TED), to provide individual heating and cooling to the front seat assemblies. Named for Jean Peltier, who discovered the thermoelectric cooling effect in 1834, the Peltier effect occurs when an electrical current is passed through a junction formed by two dissimilar conductors, creating a heat pump. A heat pump absorbs heat from one side of the system, causing it to cool, and then transfers the heat to the other side, causing it to warm.

The 2008 MY XJ uses a solid-state Peltier cell that consists of a number of semiconductor elements, sandwiched between two substrates and connected in series and parallel. When voltage is applied in one direction, one side absorbs heat (creating a cooling effect) while the other the cell rejects heat. Switching polarity between the circuits creates the same effect but in the opposite direction.

The operation is similar to a conventional air conditioning system; one cell acts as the evaporator and absorbs heat while the other cell is the condenser which rejects the heat. The pump is replaced by an electrical charge and the heat energy is transported by the cell's metal construction rather than by a refrigerant.

Peltier Cell Operation



It is important to understand the operation and limitations of the Peltier cell. A Peltier cell has an efficiency of only 5-10%, compared to a conventional air conditioning system with an efficiency of 40%. The cell is capable of cooling the incoming air by approximately 8°C (12.4°F), which means that temperature output will depend on the ambient temperature inside the vehicle.

Example: If the temperature in the vehicle is the same as or exceeds the heat rejection side of the cell, poor cooling will be the result. If the temperature is colder than the heat absorption rate, the cell may start to ice up.

Benefits of using Peltier cells:

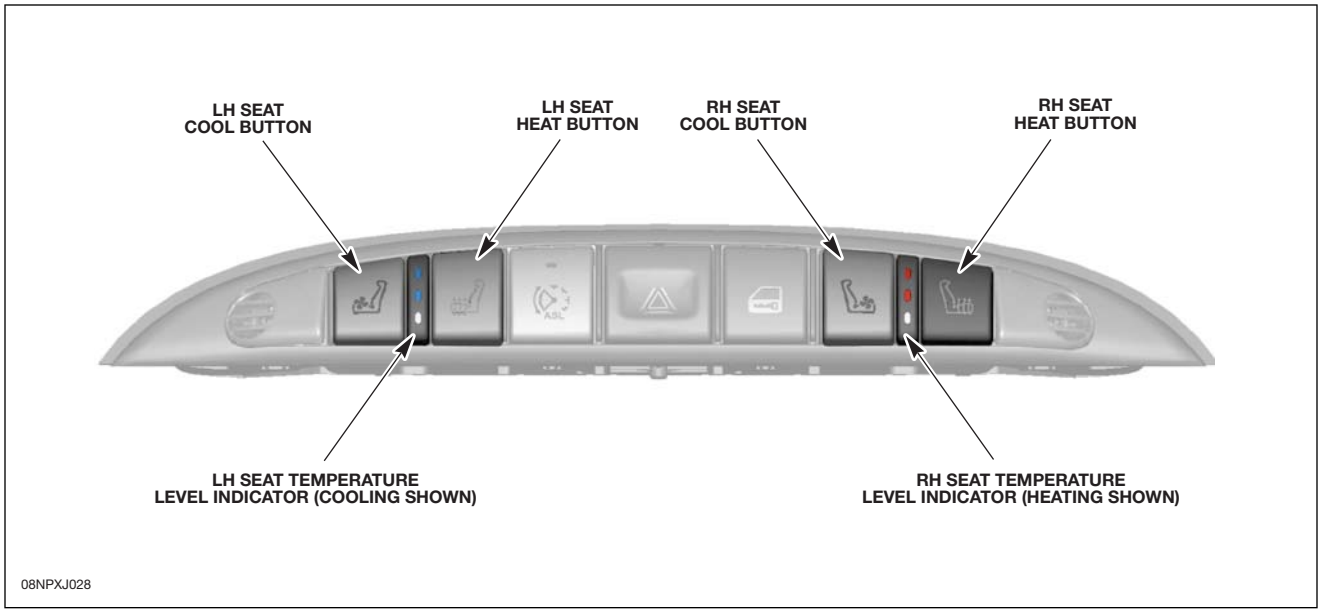
- Ability to cool or heat by simply reversing current flow
- Solid-state device, no moving parts
- Rugged, highly reliable
- Quiet, small & lightweight
- Pulse width modulated with feedback for accuracy
- Environmentally safe

Component Description

Temperature Control Switches

CCS adds additional temperature control switches located in the instrument panel switch pack above the touch screen display (TSD). There are separate switches for heating or cooling.

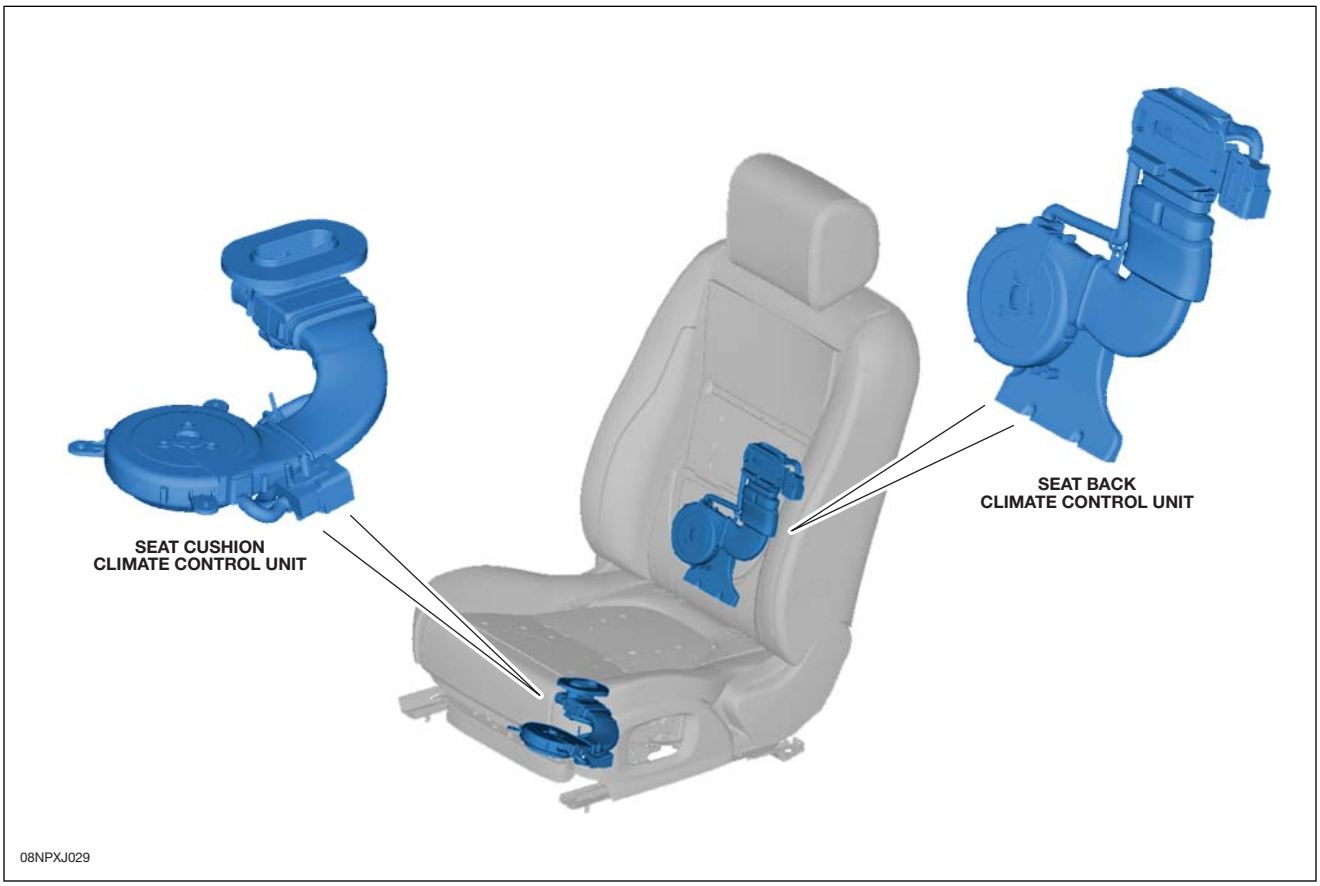
The switches are momentary contact non-latching. The electronics in the switch pack capture switch presses and step through the three levels of heating or cooling. The temperature level indicators light up either red or blue to show the selected level of heating or cooling. The internal electronics in the switch pack then output a steady PWM signal representing the selected heating or cooling level to the Climate Control Seat Module (CCSM).



When one of the heating or cooling settings is selected, filtered ambient air is circulated by a fan, forcing the air through a Peltier cell, where it is thermally conditioned. Due to electrical loads, if the CCS system is activated with the key on / engine off, the lights will illuminate on the dash, but the system will not operate.

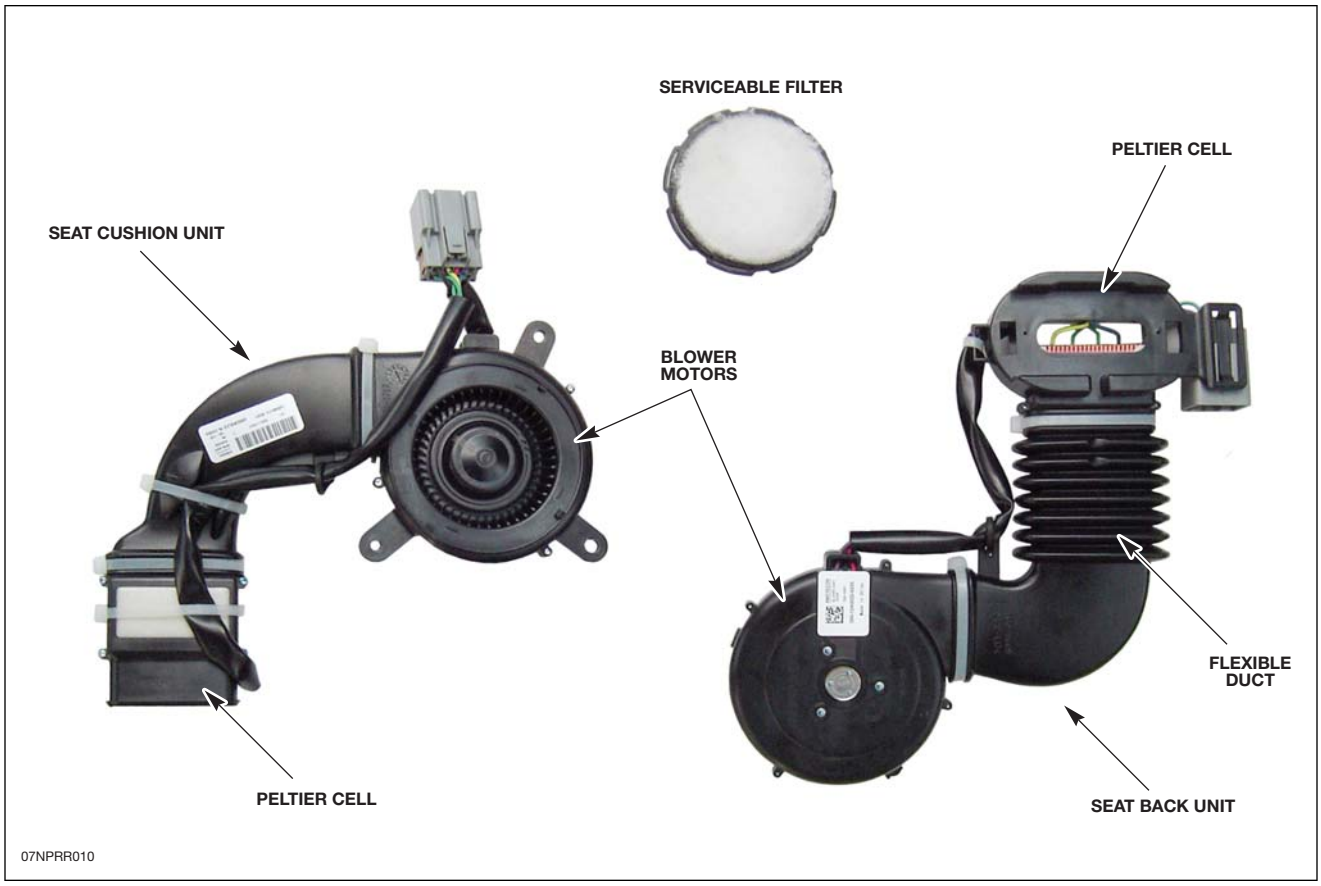
Climate Units

Each seat contains two climate units, one located in the seat back and the other in the seat cushion. Each contains a filter, blower fan, Peltier cell and an air duct. They are serviced as a complete unit with the exception of the separately serviceable filter. Ported channels in the foam cushions evenly direct the flow of conditioned air through breathable perforated leather seat covers to the occupant. Both the cushion and seat back cool or heat at the same time and cannot be controlled independently.



NOTE: Refer to GTR for climate unit replacement procedures.

Climate Unit Components



Seat Cushion Components

Seat Cushion Peltier Cell

08NPXJ034

Seat Cushion Air Distribution Components

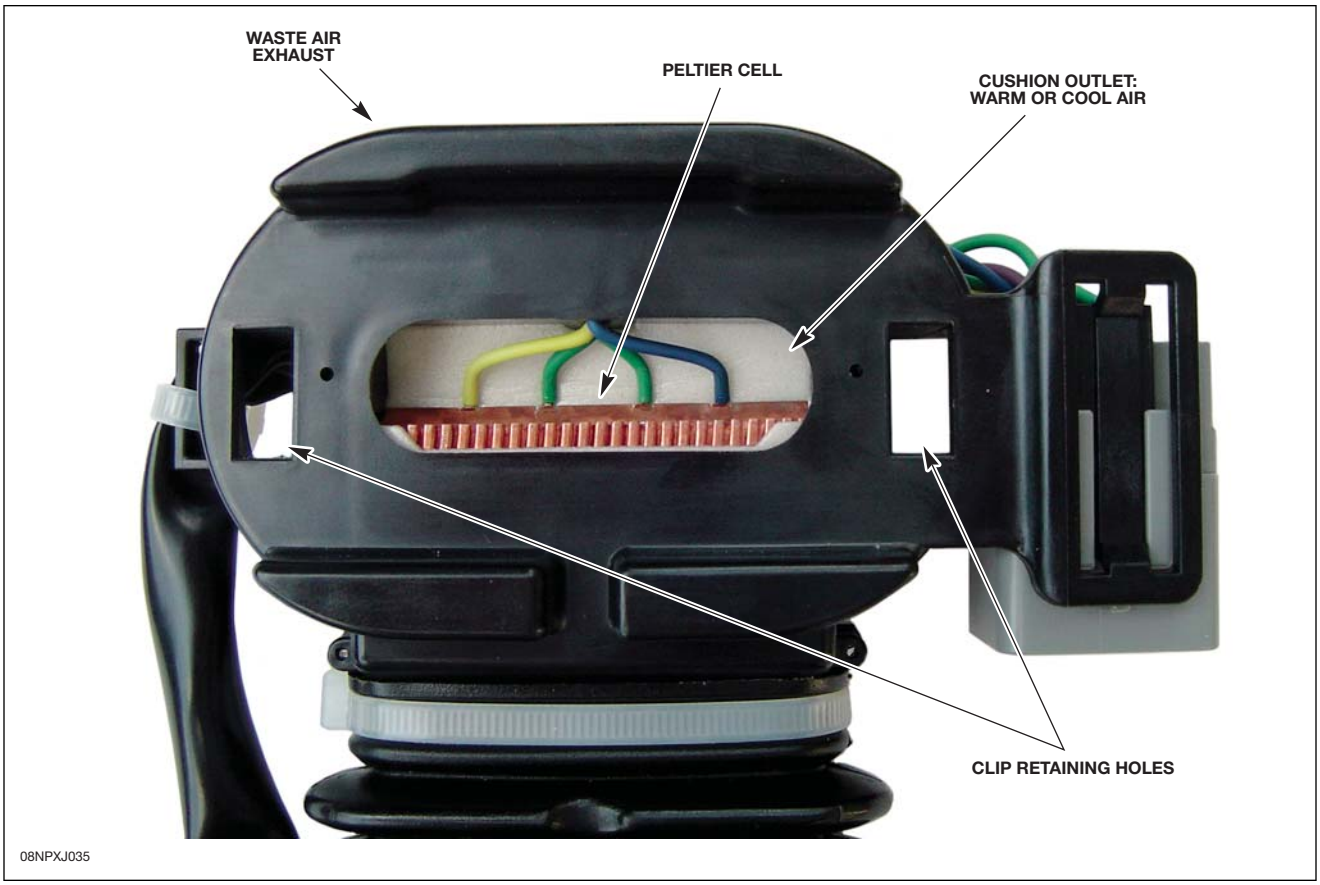
Seat Cushion Air Distribution Channels

Seat Cushion Lower Peltier Cell Retaining Screw

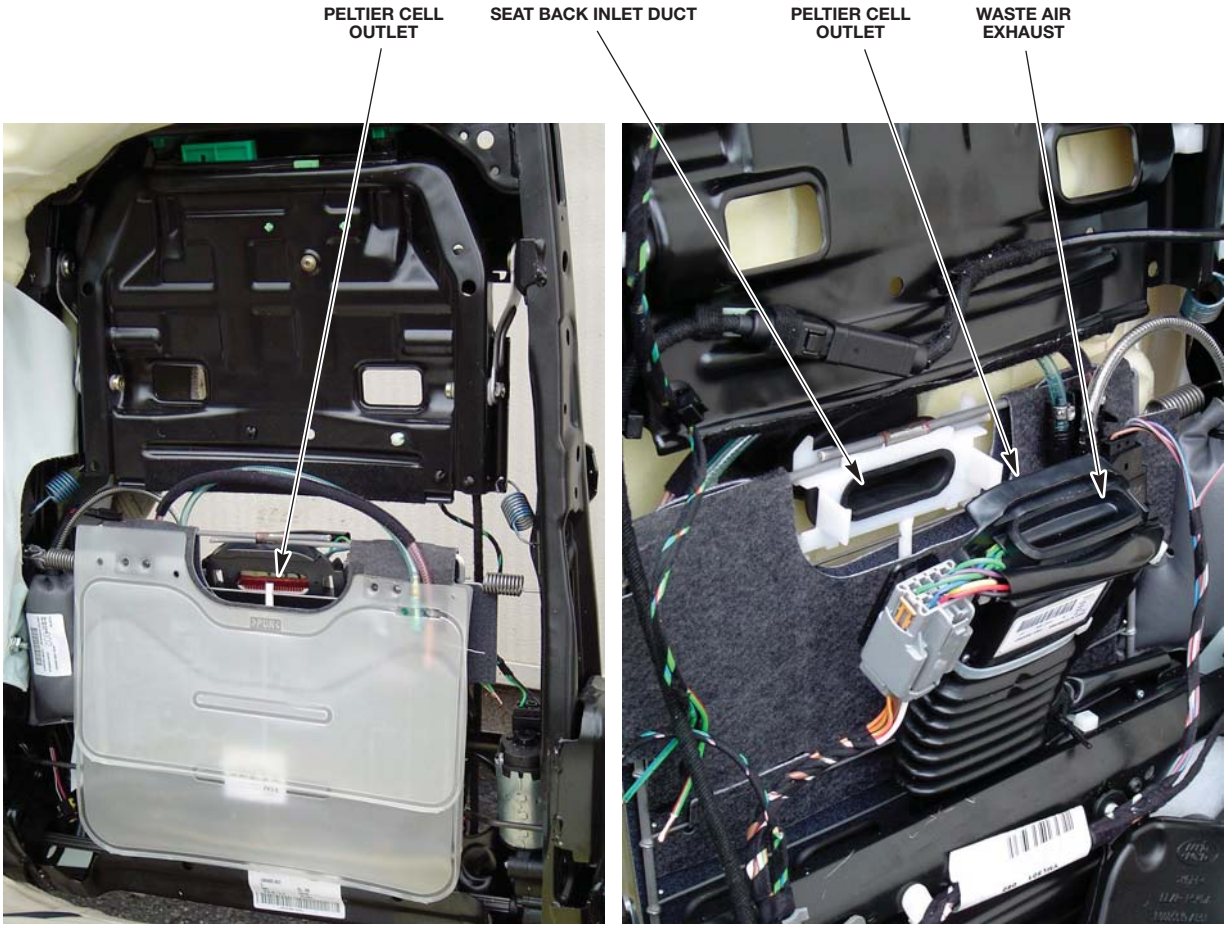
08NPXJ038

Seat Back Components

Seat Back Peltier Cell



Seat Back Components

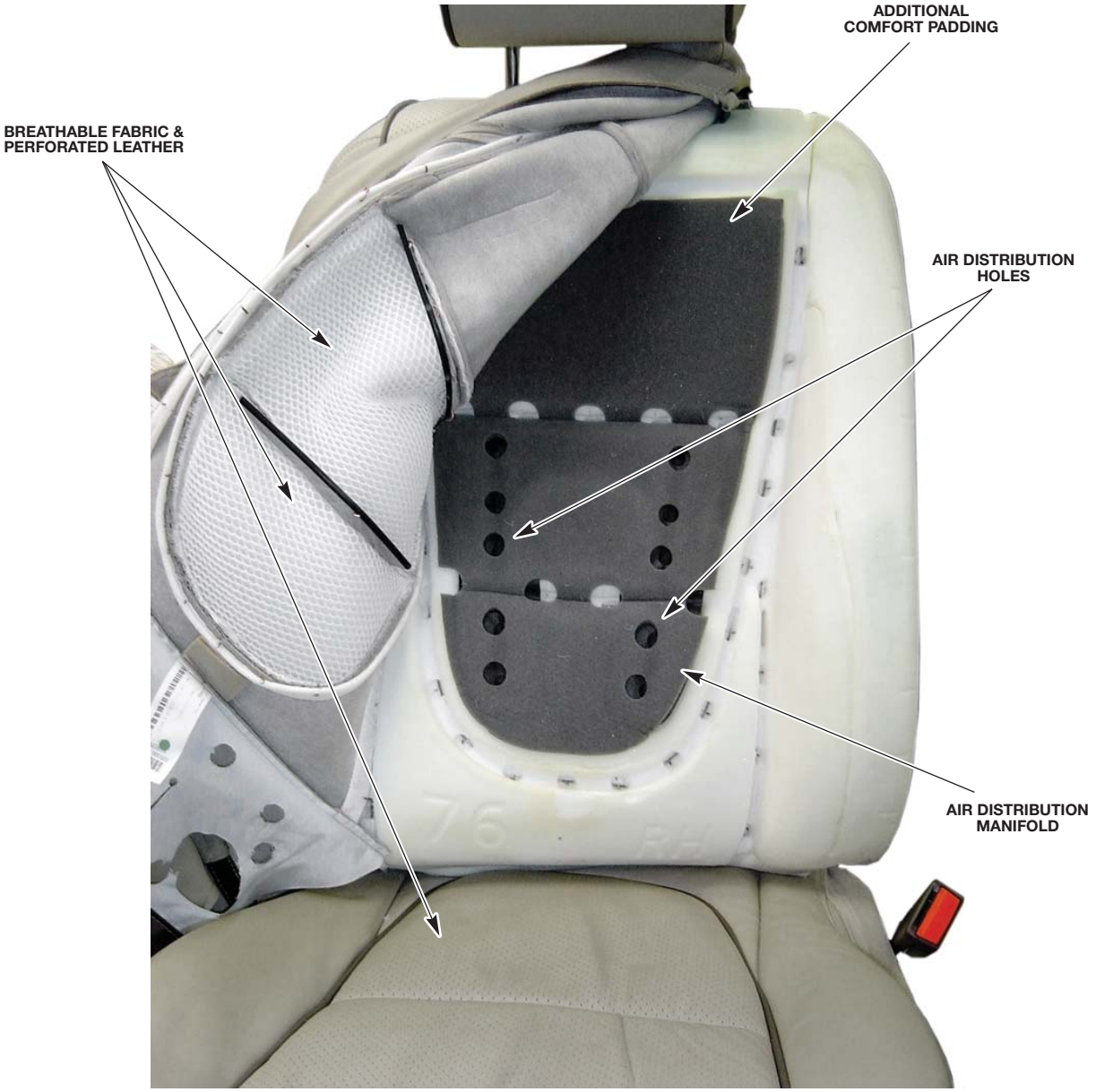


SEAT BACK COMPONENTS: FRONT

SEAT BACK COMPONENTS: REAR

08NPXJ036

Seat Back Air Distribution Components



Principles of Operation

The CCS system is completely independent of the heating and air conditioning system. The existing automatic temperature control module does not control any aspect of CCS operation; the controlling software is contained within the Climate Controlled Seat Module (CCSM) located behind the left side of the instrument panel above the adaptive cruise control module (when fitted).

08NPXJ033

The CCSM is on the high speed (HS) CAN network, as it requires information from other modules for operation, such as engine RPM. The CCSM requires an 'Engine Running' message to allow system operation as well as an 'enable' message from the Engine Control Module (ECM).

In order to preserve battery and electrical system functionality, the ECM will reduce or even disable system operation based on total vehicle electrical loads. For example, when a request is made for cooling or heating, the ECM uses an electrical load management strategy to determine the available current and regulates power to the cells as it becomes available. During a high demand or electrical load (rear defroster, A/C, wipers, etc.) the ECM will regulate the power to the Peltier cells to prevent potential overloading of the electrical system.

The CCSM uses a PWM signal to regulate the temperature of the Peltier cells and a variable-voltage for the speed of the blower fans in order to maintain the selected temperature. Fan speed may increase or decrease slightly while on a specific setting as the controller regulates system output temperature.

The CCSM logic applies a series of steps when the system receives a command. The steps vary depending on the mode selected and whether the cells are hot or cold. The CCSM powers up the cells with minimum air flow to set the cell temperature, and then the module steps up the blower speed to ensure the correct temperature is achieved quickly.

Heat Mode Operation

The CCSM operates in a closed loop control mode, using the feedback from the system thermistor. In heat mode, the Peltier cells are wired in parallel with nearly full battery voltage across each cell when first turned on. The CCSM monitors the NTC fin temperature sensors and adjusts the PWM duty cycle to the Peltier cells while also varying voltage to the blowers to achieve and maintain the temperature set point. The air flow from the blower is split over both sides of the cell, half going into the seat cushions and the other half released as waste. If either blower fails or the cells start to overheat, the CCSM will shut down both assemblies in that individual seat for protection.

Cool Mode Operation

The CCSM operates in an open loop mode. In cool mode, the Peltier cells are wired in series, with each cell supplied with half the battery voltage during initial start-up.

The difference between heat and cool modes is in the way the system is controlled. The CCSM monitors the fin temperature to ensure that the system is working properly with no PWM adjustments to the Peltier cells. For example, if the CCSM sees the fin temperature on the cells getting very cold to a potential ice up condition, it will turn off the cells for approximately 4 seconds, until the temperature stabilizes, then restart. During this process the blower speed will cycle from low to high, which may be noticeable to the user. This is considered normal operation if there are no codes stored in the CCSM.

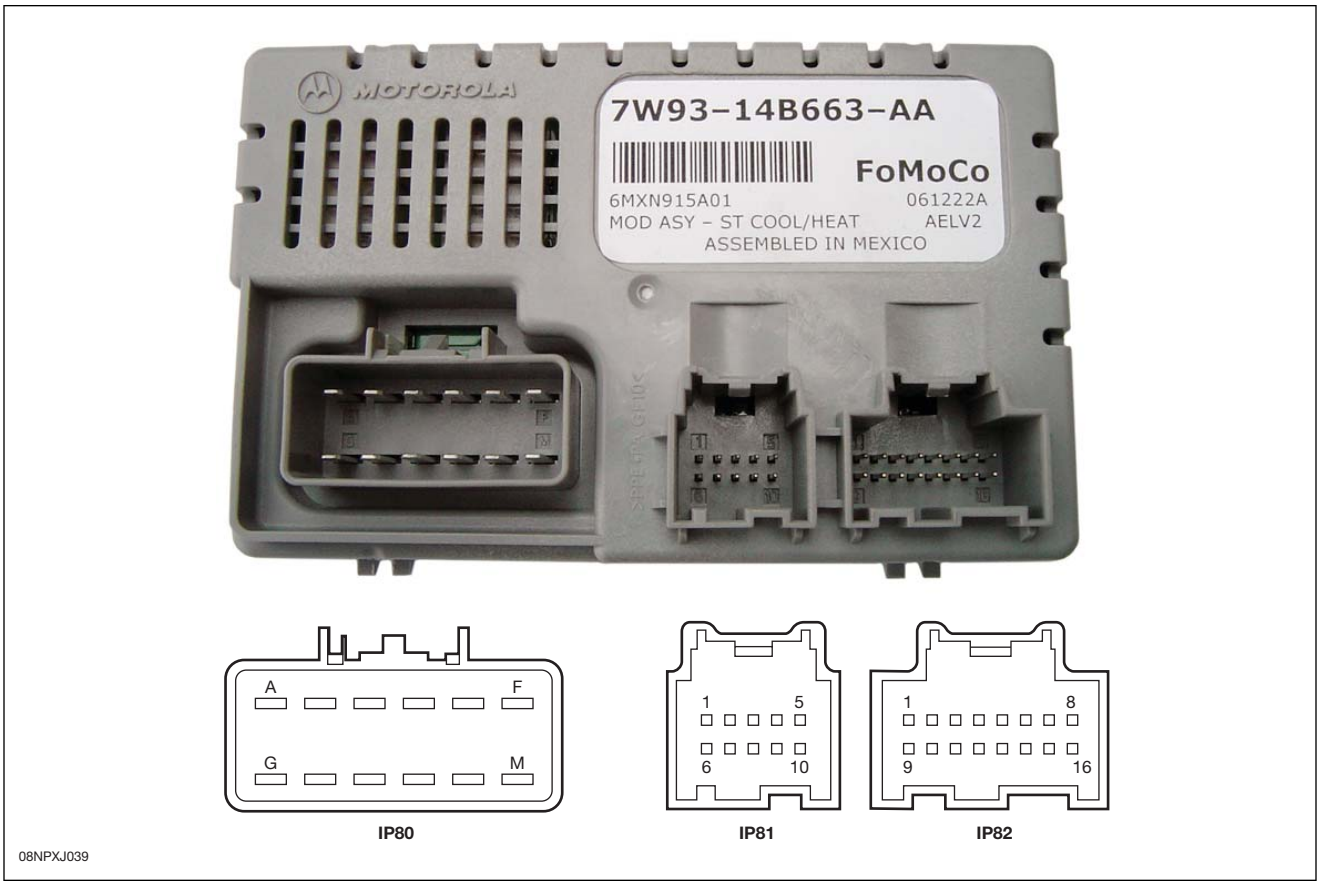
Climate Controlled Seat Module (CCSM) Details

CCSM Fuses

The CCSM is powered by two 20amp fuses located in the passenger junction fuse box. These are separate circuits, but once inside the CCSM they are joined together. Due to current load, if one fuse blows, the other will also.

NOTE: GTR uses new terminology for the 2008 XJ. The passenger junction fuse box is referred to as the central junction box (CJB) and the rear power distribution box as the auxiliary junction box (AJB); this is for engineering location purposes only. These are not to be confused with smart boxes as used in other models. The wiring diagrams use legacy terms and are deemed correct at the time of this printing.

CCSM Connectors



Connector IP80			
Pin#	**Function**	**Pin#**	**Function**
A	Passenger cushion TED +	G	Driver cushion TED +
B	Passenger cushion TED –	H	Driver cushion TED –
C	Passenger seat back TED +	J	Driver seat back TED +
D	Passenger seat back TED –	K	Driver seat back TED –
E	Passenger battery	L	Not used
F	Driver battery	M	Power ground

Connector IP81			
Pin#	**Function**	**Pin#**	**Function**
1	VA (ignition)	6	Not used
2	Passenger cushion sensor signal	7	Driver cushion sensor signal
3	Passenger cushion sensor return	8	Driver cushion sensor return
4	Passenger seat back sensor signal	9	Driver seat back sensor signal
5	Passenger seat back sensor return	10	Driver seat back sensor return

Connector IP82			
Pin#	**Function**	**Pin#**	**Function**
1	CAN +	9	Reserved
2	CAN –	10	Not used
3	Passenger cushion blower speed	11	Driver cushion blower speed
4	Passenger seat back blower speed	12	Driver seat back blower speed
5	Not used	13	Not used
6	Passenger SP	14	Driver SP
7	Passenger blowers –	15	Driver blowers –
8	Passenger blowers +	16	Driver blowers +

DTC	Description	Possible cause	Action
B10B913	Blower control	• Driver's seat cushion heater and blower assembly circuit open circuit. • Driver's seat backrest heater and blower assembly circuit open circuit. • Climate controlled seat module (CCSM) failure.	Check the driver's seat heater and blower assembly for the cushion and backrest circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B10B94B	Blower control	• Driver's seat cushion heater and blower assembly circuit short circuit to ground. • Driver's seat backrest heater and blower assembly circuit short circuit to ground. • Mechanical restriction in the heater and blower assembly housing. • Climate controlled seat module (CCSM) failure.	Check the driver's seat heater and blower assembly for the cushion and backrest circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect
B114B13	Passenger TED control	• Passenger's seat cushion heater and blower assembly circuit open circuit. • Passenger's seat backrest heater and blower assembly circuit open circuit. • Passenger's seat heater and blower assembly failure • Climate controlled seat module (CCSM) failure.	Check the passenger's seat heater and blower assembly for the cushion and backrest circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B114B19	Passenger TED control	• Passenger's seat cushion heater and blower assembly circuit short circuit to ground. • Passenger's seat backrest heater and blower assembly short circuit to ground. • Passenger's seat heater and blower assembly failure. • Climate controlled seat module (CCSM) failure.	Check the passenger's seat heater and blower assembly for the cushion and backrest circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.

DTC	Description	Possible cause	Action
B114B4B	Passenger TED control	• Passenger's seat cushion heater and blower assembly circuit short circuit to ground. • Passenger's seat backrest heater and blower assembly short circuit to ground. • Passenger's seat heater and blower assembly failure. • Climate controlled seat module (CCSM) failure. • Possible restricted duct.	Check the passenger's seat heater and blower assembly for the cushion and backrest circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the passenger's seat and make sure nothing is restricting the seat heater and blower assembly blower duct Rectify as necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B114C13	Driver TED control	• Driver's seat cushion heater and blower assembly circuit open circuit. • Driver's seat backrest heater and blower assembly circuit open circuit. • Climate controlled seat module (CCSM) failure.	Check the driver's seat heater and blower assembly for the cushion and backrest circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B114C19	Driver TED control	• Driver's seat cushion heater and blower assembly circuit short circuit to ground. • Driver's seat backrest heater and blower assembly circuit short circuit to ground. • Mechanical restriction in the heater and blower assembly housing. • Climate controlled seat module (CCSM) failure.	Check the driver's seat heater and blower assembly for the cushion and backrest circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B114C4B	Driver TED control	• Driver's seat cushion heater and blower assembly circuit short circuit to ground. • Driver's seat backrest heater and blower assembly circuit short circuit to ground. • Mechanical restriction in the heater and blower assembly housing. • Possible restricted duct. • Climate controlled seat module (CCSM) failure.	Check the driver's seat heater and blower assembly for the cushion and backrest circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the driver seat cushion and backrest, make sure nothing is restricting the seat heater and blower assembly blower duct. Rectify as necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.

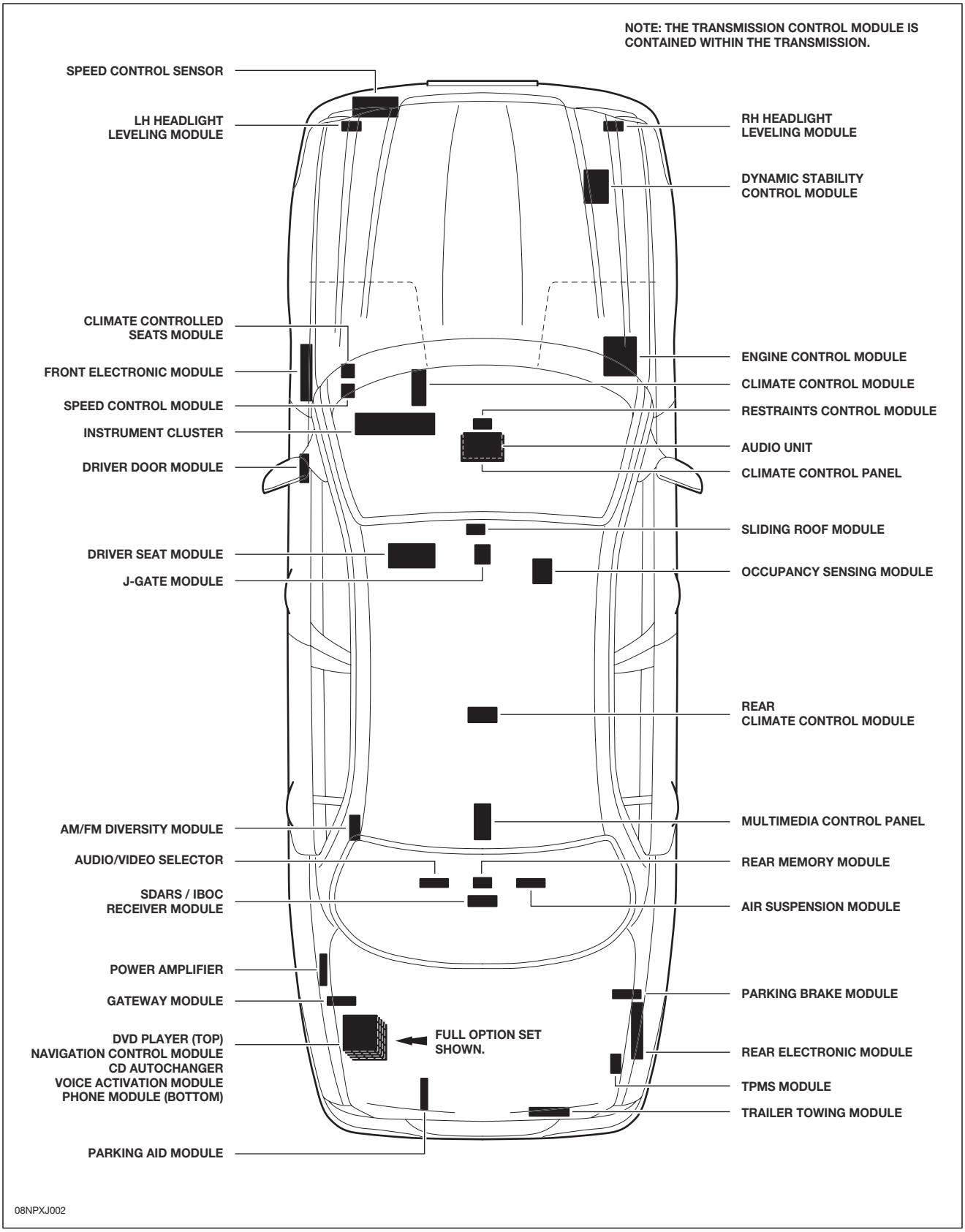
DTC	Description	Possible cause	Action
B114D11	Passenger's seat cushion blower speed sensor	• The passenger seat cushion seat heater and blower assembly circuit short circuit to ground. • Internal motor failure. • Climate controlled seat module (CCSM) failure.	Check the passenger seat cushion heater and blower assembly circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B114D12	Passenger's seat cushion blower speed sensor	• The passenger's seat cushion seat heater and blower assembly circuit short circuit to ground. • Internal motor failure • Climate controlled seat module (CCSM) failure.	Check the passenger's seat cushion heater and blower assembly circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B114E11	Passenger's seat back blower speed sensor	• The passenger's seat backrest seat heater and blower assembly circuit short circuit to ground. • Internal motor failure. • Climate controlled seat module (CCSM) failure.	Check the passenger's seat backrest heater and blower assembly circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B114E12	Passenger's seat back blower speed sensor	• The passenger's seat backrest seat heater and blower assembly circuit short circuit to ground. • Internal motor failure. • Climate controlled seat module (CCSM) failure.	Check the passenger's seat backrest heater and blower assembly circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B114F11	Driver seat cushion blower speed sensor	• The driver seat cushion seat heater and blower assembly circuit short circuit to ground. • Internal motor failure. • Climate controlled seat module (CCSM) failure.	Check the driver seat cushion heater and blower assembly circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.

DTC	Description	Possible cause	Action
B114F12	Driver seat cushion blower speed sensor	• The driver seat cushion seat heater and blower assembly circuit short circuit to ground. • Internal motor failure. • Climate controlled seat module (CCSM) failure.	Check the driver seat cushion heater and blower assembly circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B115011	Driver seat back blower speed sensor	• The driver seat backrest seat heater and blower assembly circuit short circuit to ground. • Internal motor failure. • Climate controlled seat module (CCSM) failure.	Check the driver seat backrest heater and blower assembly circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect
B115012	Driver seat back blower speed sensor	• The driver seat backrest seat heater and blower assembly circuit short circuit to ground. • Internal motor failure. • Climate controlled seat module (CCSM) failure.	Check the driver seat backrest heater and blower assembly circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B115198	Passenger's seat cushion	• Passenger's seat cushion over temperature fault. • Possible restricted duct.	Check the passenger's seat cushion, make sure nothing is restricting the seat heater and blower assembly blower duct. Rectify as necessary. Clear the DTCs and test for normal operation.
B115298	Passenger's seat back	• Passenger's seat back over temperature fault. • Possible restricted duct.	Check the passenger's seat backrest, make sure nothing is restricting the seat heater and blower assembly blower duct. Rectify as necessary. Clear the DTCs and test for normal operation.
B115398	Driver seat cushion	• Driver seat cushion over temperature fault. • Possible restricted duct.	Check the driver seat cushion, make sure nothing is restricting the seat heater and blower assembly blower duct. Rectify as necessary. Clear the DTCs and test for normal operation.
B115498	Driver seat back	• Driver seat back over temperature fault. • Possible restricted duct.	Check the driver seat backrest, make sure nothing is restricting the seat heater and blower assembly blower duct. Rectify as necessary. Clear the DTCs and test for normal operation
B11557A	Passenger's seat	• Possible restricted blower duct on the passenger cushion heater and blower assembly. • Possible restricted blower duct on the passenger backrest heater and blower assembly. • Possible blower duct adrift.	Check the passenger side front seat and make sure the blower duct is not adrift from the heater and blower assembly. Make sure nothing is restricting the seat heater and blower assembly blower duct check the exhaust outlet of each heater and blower assembly. Rectify as necessary. Clear the DTCs and test for normal operation.

DTC	Description	Possible cause	Action
B11567A	Driver seat	• Possible restricted blower duct on the driver cushion heater and blower assembly. • Possible restricted blower duct on the driver backrest heater and blower assembly. • Possible blower duct adrift.	Check the driver side front seat and make sure the blower duct is not adrift from the heater and blower assembly. Make sure nothing is restricting the seat heater and blower assembly blower duct check the exhaust outlet of each heater and blower assembly. Rectify as necessary. Clear the DTCs and test for normal operation.
B115713	Blower control B	• Passenger's seat cushion heater and blower assembly circuit open circuit. • Passenger's seat backrest heater and blower assembly circuit open circuit. • Climate controlled seat module (CCSM) failure.	Check the passenger's seat heater and blower assembly for the cushion and backrest circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B11574B	Blower control B	• Passenger's seat cushion heater and blower assembly circuit short circuit to ground. • Passenger's seat backrest heater and blower assembly circuit short circuit to ground. • Mechanical restriction in the heater and blower assembly housing. • Climate controlled seat module (CCSM) failure.	Check the passenger's seat heater and blower assembly for the cushion and backrest circuit. Refer to the electrical guides. Install a new heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B120813	Driver seat cushion temperature sensor	• The driver seat cushion heater and blower assembly circuit open circuit. • Climate controlled seat module (CCSM) failure.	Check the driver's seat cushion heater and blower assembly circuit. Refer to the electrical guides. Install a new driver's seat heater and blower assembly if necessary. Clear the DTCs and test for normal operation
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B120913	Driver seat back temperature sensor	• The driver seat backrest heater and blower assembly circuit open circuit. • Climate controlled seat module (CCSM) failure.	Check the driver's seat backrest heater and blower assembly circuit. Refer to the electrical guides. Install a new driver's seat heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.

DTC	Description	Possible cause	Action
B120A13	Passenger's seat cushion temperature sensor	• Passenger's seat cushion seat heater and blower assembly circuit open circuit. • Climate controlled seat module (CCSM) failure.	Check the passenger's seat cushion heater and blower assembly circuit. Refer to the electrical guides. Install a new passenger's seat heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
B120B13	Passenger's seat back temperature sensor	• Passenger's seat backrest front seat heater and blower assembly circuit open circuit. • Passenger's seat backrest over temperature fault. • Climate controlled seat module (CCSM) failure.	Check the passenger's seat backrest heater and blower assembly circuit. Refer to the electrical guides. Install a new front seat heater and blower assembly if necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
U000188	High speed controller area network (CAN) communication bus	• CAN signal fault. • Climate controlled seat module (CCSM) failure.	Check the CAN circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs and test for normal operation.
			Check the CCSM ground supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
U210100	Control module configuration incompatible	• Module not Configured. • Incorrect module fitted.	Check the control module power supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.
U210538	Switch pack signal A	• Possible open circuit. • Short circuit to power. • Pulse width modulated (PWM) signal from switchpack to climate controlled seat module (CCSM) is potentially corrupt.	Check the driver PWM signals and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs and test for normal operation.
U210638	Switch pack signal B	• Possible open circuit. • Short circuit to power. • Pulse width modulated (PWM) signal from switchpack to climate controlled seat module (CCSM) is potentially corrupt.	Check the passenger PWM signals and circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTCs and test for normal operation.
U300004	Control module	• Climate controlled seat module (CCSM) failure.	Check the control module power supply and relay circuits. Refer to the electrical guides. Rectify as necessary. Clear the DTC. Cycle the ignition and retest. If the DTC resets suspect the control module. Refer to the warranty policy and procedures manual if a module is suspect.

The following illustration shows the approximate locations of the control modules fitted to the vehicle.



2008 MODEL YEAR XK

Antenna

The 2008 MY XK is equipped with a new AM/FM antenna incorporated in the rear spoiler along with the Navigation and Satellite radio antennas.

Benefits of the new antenna include:

- Lack of antenna mast provides a sleeker look
- Reduced wind noise
- Can be back serviced to fit 2007 MY

A technical service bulletin is being released with the procedure for fitting the new antenna on earlier vehicles. The coupe will require replacement of the tailgate hinges for a more robust ground.

Occupant Classification System

The Occupant Classification System (OCS) was added as a running change during the 2007 MY, after VIN B09097. It is now standard on all vehicles. Previous vehicles were fitted only with Occupant Detection for the seat belt system.

The occupant classification system provides the restraints control module (RCM) with the occupancy status of the front passenger seat. The RCM uses the passenger seat occupancy and seat belt buckle status in the evaluation of the firing strategy for the passenger front airbag, side airbag, and pretensioner.

The occupant classification system can determine if the front passenger seat is unoccupied, occupied by a small person, or occupied by a large person. The system consists of:

- A pressure pad, installed under the cushion of the front passenger seat, which is connected to a pressure sensor
- A safety belt tension sensor, integrated into the anchor point of the front passenger safety belt
- An occupant classification module, installed under the front passenger seat.

The pressure pad is a silicone-filled bladder. Any load on the pressure pad is detected by the pressure sensor.

The safety belt tension sensor is a strain gauge that measures the load applied by the safety belt anchor to the anchor bolt. The sensor is located in the lower safety belt anchor point.

The occupant classification module supplies a reference voltage to the pressure sensor and the safety belt tension sensor. The returned signals measure the loads acting on the pressure pad and the safety belt tension sensor. The load measurement from the safety belt tension sensor is used to produce a correction factor for the load measurement from the pressure pad. The tightness of the safety belt affects the load acting on the pressure pad, so without the correction factor the occupant classification module cannot derive an accurate occupancy status.

For example, if a child restraint seat is fitted in the front passenger seat using the seat belt's automatic locking function, the belt tension sensor supports the decision of the OCS and the front passenger airbag is deactivated.

The occupant classification module translates the load readings into a seat occupancy status and transmits the result to the RCM, on a dedicated high speed CAN bus link. The occupant classification module incorporates two load limits for the seat cushion: when the load exceeds the lower limit, but is less than the upper limit, the occupant is classified as small; when the upper limit is exceeded, the occupant is classified as large.

The occupant classification system has 4 possible states, as detailed in the following table.

Classification	Seat Status	Passenger Airbag Status	Airbag Indicator Status
Empty	Empty	Disabled	Off
Occupied inhibit	The seat is occupied by a small person or child restraint is being used	Passenger airbag / side airbag operation is disabled	On
Occupied allow	The seat is occupied by a large person	Passenger airbag / side airbag operation is enabled	Off
Error	——	Passenger airbag / side airbag operation is disabled	On

Passenger Airbag Deactivation Indicator

The passenger airbag deactivation indicator light works in conjunction with the OCS for the passenger seat. The light will illuminate on start-up as part of the airbag system self-check and will go out in approximately six seconds. When the light is illuminated, the front passenger airbag is deactivated and will not be deployed in the event of an impact.

2008 MY S-TYPE OVERVIEW

The 2008 S-TYPE has received the following minor changes:

- Secondary air injection added to V8 engines
- Adjustable pedals not available
- Fog lamps are accessory fit only
- Only sport ‘R’ bumpers are being used
- Power folding mirrors not available
- Tire pressure monitoring not available

2008 MY X-TYPE OVERVIEW

The 2008 X-TYPE has received the following minor changes:

- Tire Pressure Monitoring System (TPMS) now standard
- Rear center head rest

TIRE PRESSURE MONITORING SYSTEM

The Tire Pressure Monitoring System (TPMS) is now standard for the 2008 X-TYPE, starting at VIN J28493.

The TPMS is designed to monitor the inflation air pressure in a vehicle's tires and to alert the driver when the pressure in one or more tires deviates from defined tolerances. The driver is then better able to maintain the vehicle's tire pressures at the optimum level.

In addition to complying with Federal legislation and lowering the risk of rapid tire deflation (which may be caused by under-inflated tires), properly inflated tires can:

- improve fuel economy
- maintain optimum ride and handling characteristics
- extend the life of the tires

NOTE: The system is not designed to warn the driver of a blow-out. Due to the very rapid reduction in pressure during a blow-out, it is not possible to give the driver sufficient warning. The TPMS is designed to assist the driver in maintaining correct tire pressure, which should reduce the likelihood of a tire blow-out.

CAUTION:

The TPMS is not intended as a replacement for good tire maintenance practices and should be considered as additional to regular tire pressure and tire condition checks.

Each wheel on the vehicle is fitted with a tire pressure sensor, which measures the inflation air pressure and temperature within the tire and transmits data via RF signal to a central processing unit, the TPMS module. The TPMS module compares the data against a defined low pressure threshold. If a tire pressure falls below the threshold, the TPMS module communicates a CAN message to the instrument cluster, which then displays an appropriate warning.

The system is comprised of a TPMS module, an RF antenna, 4 initiators and 4 tire pressure sensors (the space saver spare wheel is not fitted with a sensor).

The controlling software for the system is contained within the TPMS module. The software can detect the following:

- Tire pressure is below the recommended low pressure value (under-inflated tire)
- Position of the tire on the vehicle
- Component malfunction

The TPMS module is located under the RH side of the rear seat. The RF antenna is located behind the rear bumper. The front initiators are positioned at the front of the wheel arches; the rear initiators are positioned at the rear of the rear wheel arches.

The four initiators are hardwired to the TPMS module. The initiators transmit 125 KHz Low Frequency (LF) signals to the tire pressure sensors, which respond by modifying the mode status within the RF transmission. The 315 MHz RF signals are detected by the RF antenna which is connected directly to the TPMS module. The received RF signals from the tire pressure sensors are passed to the TPMS module and contain identification, pressure, temperature, and acceleration information for each wheel and tire.

The TPMS module communicates with the instrument cluster via the high-speed Controller Area Network (HS CAN) bus to provide the driver with appropriate warnings. The TPMS module also indicates status or failure of the TPMS or components.

Wheel Location and Identification

Because of the requirement for different pressure targets and thresholds for the front and rear tires, the TPMS module must be able to identify the position of the tires on the vehicle. For this reason, each tire pressure sensor has a unique identifying code which is transmitted to the TPMS module for location purposes. The TPMS identifies the position of a tire on the vehicle based on the sensor's code and assigns the identification to a specific position on the vehicle: FL (front left), FR (front right), RL (rear left) and RR (rear right).

'Auto-Locate' wheel location is performed by the TPMS module and requires no input from the driver. The TPMS module automatically relearns the position of the wheels on the vehicle if the tire pressure sensors are replaced or the wheel positions on the vehicle are changed.

The TPMS module can detect the following, under all operating conditions:

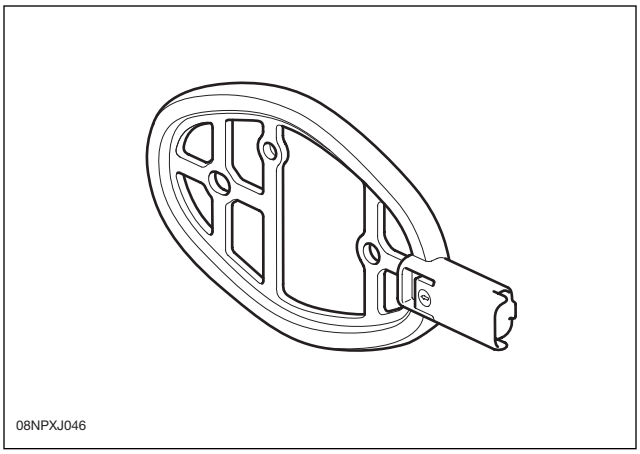
- that one or more tire pressure sensors have been replaced
- that one or more tire pressure sensor has stopped transmitting
- that one or more alien identifications are being received (the module can reject identifications from tire pressure sensors that do not belong to the vehicle)
- that two wheels on the vehicle have changed positions

If the tire pressure sensor on a wheel is replaced, or if the position of the wheels on the vehicle is changed, the TPMS will automatically learn the new locations on the next drive cycle (when the vehicle is driven for more than 15 minutes at a speed of more than 20 km/h (12.5 mph).

The Auto-Locate process is ready to commence when the vehicle has been stationary or traveling at a speed below 12 mph (20 km/h) for 15 minutes (this is known as 'parking mode'). The Auto-Locate process requires the vehicle to be driven at speeds above 20 km/h (12.5 mph) for 15 minutes. If the vehicle speed falls below 20 km/h (12.5 mph), the Auto-Locate timer is suspended until the vehicle speed increases above 20 km/h (12.5 mph), after which the timer is resumed. If the vehicle speed remains below 20 km/h (12.5 mph) for more than 15 minutes, the timer is set to zero and process starts again.

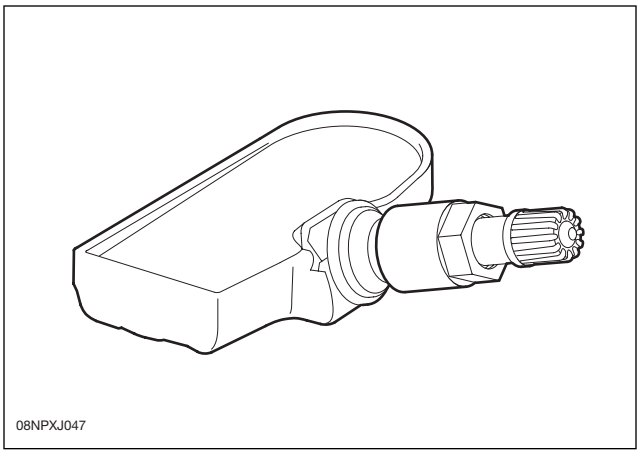
Component Description

Initiator



The initiator is a passive LF transmitter. The TPMS module energizes each initiator in turn using LF drivers. The initiator then transmits an LF signal to its corresponding tire pressure sensor, which detects the LF signal and responds by modifying the mode status within the RF transmission.

Tire Pressure Sensor



The TPMS uses active tire pressure sensors which are located on each wheel, inside the tire cavity. The sensor incorporates the tire valve and is secured in the wheel by a nut on the outside of the wheel.

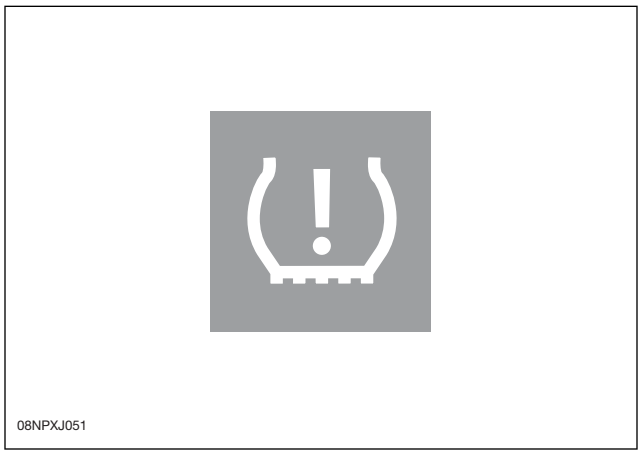
The sensor contains a Printed Circuit Board (PCB), which houses a Positive Temperature Coefficient (PTC) sensor, a Piezo pressure sensor, a radio receiver and transmitter and a lithium battery. The tire pressure sensors use the PTC sensor and the Piezo sensor to periodically measure the pressure and temperature of the air inside the tire. The data is transmitted by RF data signals at 315 MHz.

The RF transmission from the sensor contains a unique identification code in its transmission data, which allows the TPMS to identify the location of the wheel on the vehicle. If the sensor is replaced on a ‘running’ wheel, the new sensor identification will be learned when the vehicle is driven at speed of more than 20 km/h (12.5 mph) for 15 minutes.

The tire pressure sensor can also detect when the wheel is rotating. In order to preserve battery power, the sensor uses different transmission rates depending on whether the wheel is stationary or moving.

Instrument Cluster

The TPMS warning indicator is common on all vehicles fitted with TPMS. The driver is alerted to system warnings by a low tire pressure warning indicator in the instrument cluster and an applicable text message in the message center.



The TPMS module passes system status information to the instrument cluster on the HS CAN bus. The instrument cluster then converts this data into appropriate warnings.

When the ignition is switched on, the warning indicator is illuminated for 3 seconds for a bulb check. During this time the TPMS performs internal tests and CAN bus initialization. The instrument cluster checks for a CAN bus message from the TPMS.

If the instrument cluster receives a TPMS fault warning message, the warning indicator will flash for 72 seconds after the 3 second bulb check period and then remain permanently illuminated.

If the instrument cluster receives a tire pressure warning message, the warning indicator will extinguish briefly after the 3 second bulb check period before re-illuminating to indicate a tire pressure warning.

If the instrument cluster receives no fault or warning messages from the TPMS module, the warning indicator will extinguish after the bulb check.

Principles of Operation

Each time the vehicle is driven the TPMS module activates each initiator in turn to transmit a LF 125 KHz signal to each tire pressure sensor. The LF signal is received by the tire pressure sensor, which responds by transmitting a 315 MHz signal, which is received by the RF antenna. The signal contains coded data which corresponds to sensor identification, air pressure, air temperature and acceleration data and is passed to the TPMS module.

When the vehicle has been parked for more than 15 minutes and then driven at a speed of more than 12.5 mph (20 km/h), the initiators fire in turn for 18 seconds in the following order:

- Front left (followed by an 18-second pause for the TPMS module to detect a response from the sensor)
- Front right / 18 second pause
- Rear right / 18 second pause
- Rear left / 18 second pause

Each tire pressure sensor responds in turn, which allows the TPMS module to establish the sensor positions at the start of the drive cycle. This process is repeated up to 3 times (less if the sensor positions are already known). The process is known as 'Auto Location' and takes 2 to 5 minutes to complete.

During this period the tire pressure sensors transmit at regular intervals, once every 15 seconds. For the remainder of the drive cycle the tire pressure sensors transmit once every 60 seconds (more often if a change of tire pressure is sensed) until the vehicle stops and the TPMS returns to the parking mode.

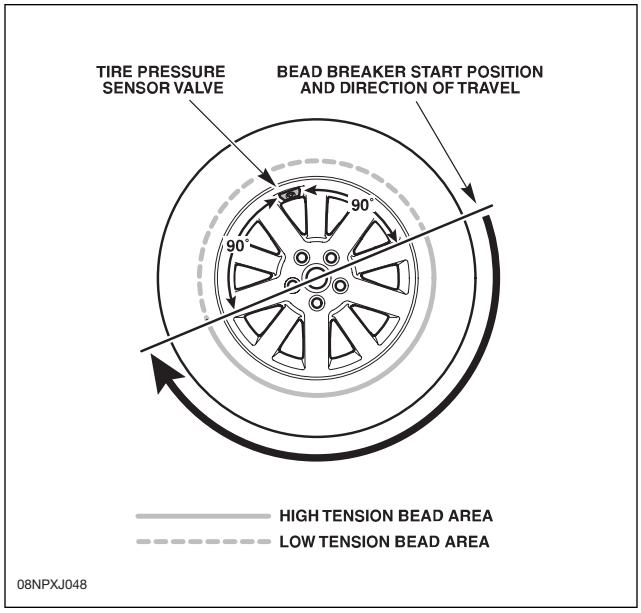
Once the wheel positions have been established, the initiators stop transmitting the LF signal and do not transmit again until the vehicle has been parked for more than 15 minutes.

The TPMS enters 'Parking Mode' after the vehicle speed has been below 20 km/h (12.5 mph) for 15 minutes. In parking mode the tire pressure sensors transmit a coded RF signal once every 13 hours. If the tire pressure decreases by more than 0.06 bar (0.8 lb/in^3), the sensor will transmit more often.

Tire Changing

On vehicles fitted with TPMS, care must be taken when removing and refitting tires to ensure that the tire pressure sensor is not damaged. Vehicles fitted with TPMS can be visually identified by the external metal locknut and valve of the tire pressure sensor on the road wheels. Vehicles without TPMS will have a rubber tire valve.

When removing the tire, the bead breaker must not be used within 90 degrees of the tire valve in either direction on each side of the tire. When using the tire removal machine, the fitting arm start position must be positioned as shown in the illustration (for each side of the tire).



The wheel can then be rotated through 180 degrees in a counter-clockwise direction. This will relieve tension from the tire bead, allowing the remaining 180 degrees of the tire to be manually pulled from the rim.

When refitting the tire, position the fitting arm as shown. Rotate the tire and take care that the bead on the low-tension side of the tire does not damage the sensor.

NOTE: It is recommended that the wear parts – the nut, seal, washer, valve core and cap – be replaced after every tire change; replacement of these wear items is mandatory if the valve stem nut has been loosened.

NOTE: The tire low pressure sensor valve cap must always be in place except when inflating, releasing pressure or checking pressure.

Please refer to the Wheels and Tires section of the Workshop Manual for detailed replacement procedures.

TPMS System Similarities and Differences

The 2006 XJ (X350) was the first vehicle in the Jaguar line to be fitted with TPMS. In order to achieve the optimal Radio Frequency (RF) signal strength, the vehicle was equipped with an external RF antenna. The X-TYPE (X400) uses this same system for two reasons: the electrical architecture is similar and both vehicles function well with an external RF antenna.

At the same time, the 2007 XK (X150) was being developed. Due to the electrical architecture of the XK, an external RF Receiver was used for optimal performance.

Both systems receive and decode the RF transmissions from the tire pressure sensors in the same way, so the overall functionality is the same.

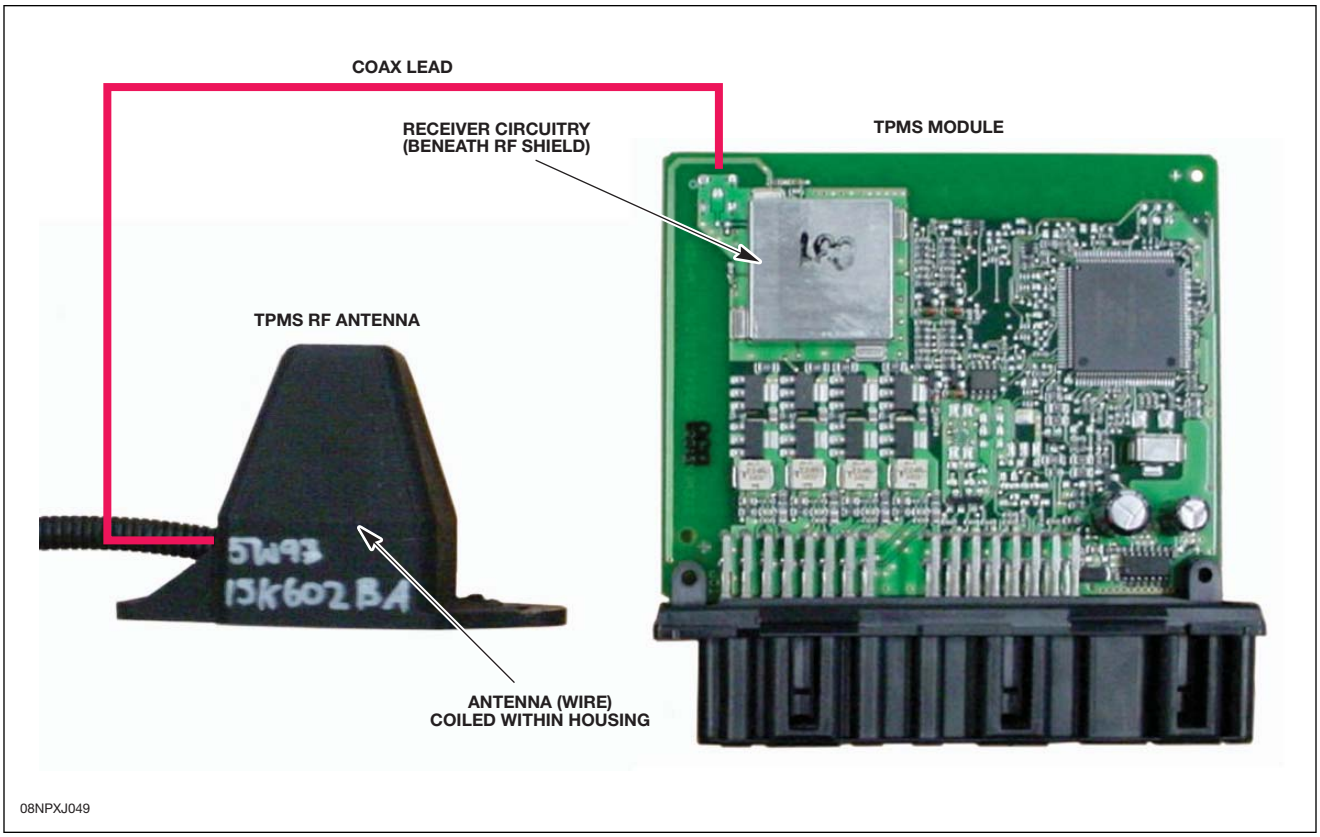
Configuration and Network Differences

- X350 and X400 are configured using the PECUS process (configured in plant). X150 is configured using the CCF process (CAN signal transmitted by a Body Control Module.)
- X350 and X400 are on the High Speed CAN network. X150 is on the Medium Speed CAN network.
- X350 and X400 store data to permanent memory when the engine stops firing. X150 stores data at each ignition cycle.
- X350 and X400 use the external RF Antenna. X150 uses the external RF Receiver.
- X150 has a security feature where the TPMS module learns the vehicle VIN in-plant.

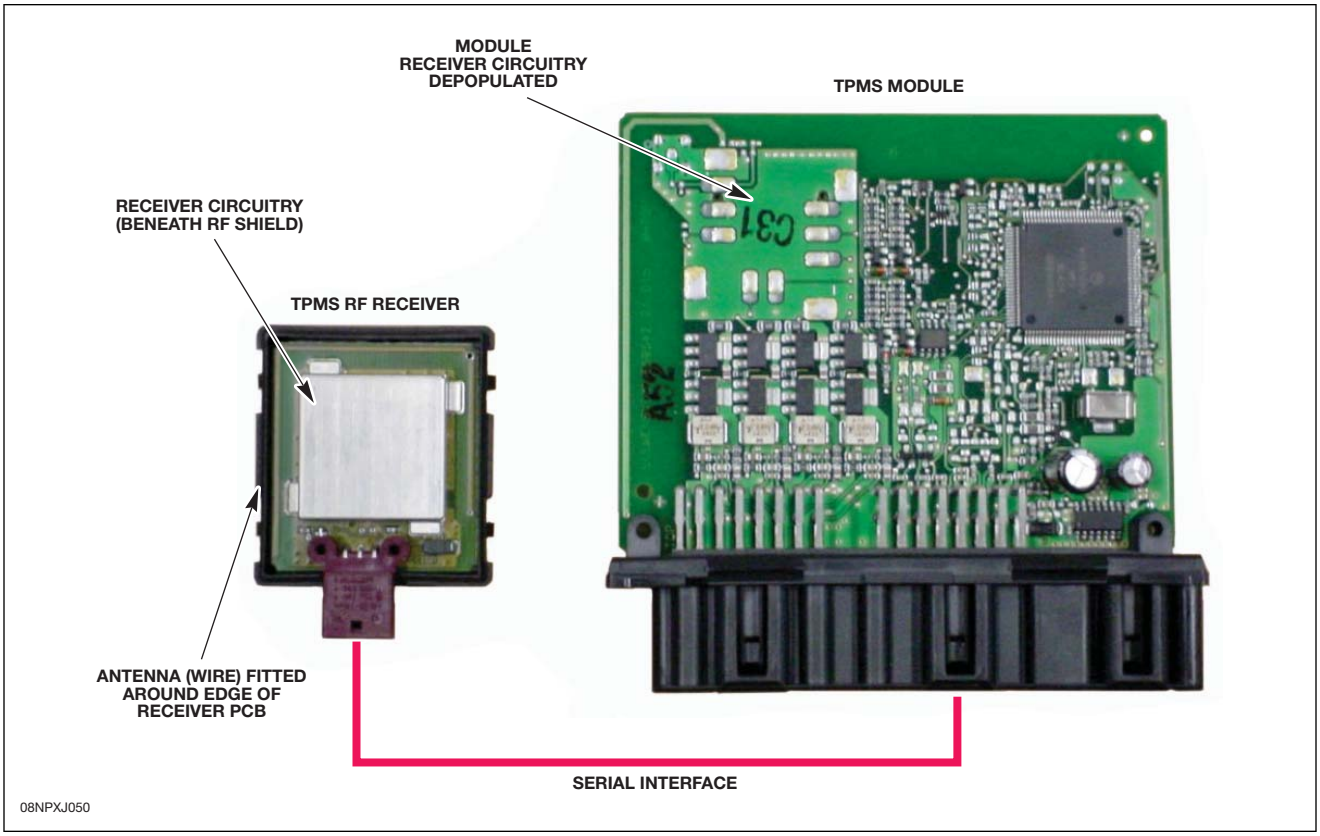
External RF Antenna and External RF Receiver Locations

- X350 – the external RF Antenna is mounted underneath the body above the rear differential.
- X400 – the external RF Antenna is mounted within the rear bumper.
- X150 – the external RF Receiver is mounted behind the center of the rear seat.

X-TYPE and XJ TPMS Module and External RF Antenna



XK TPMS Module and External RF Receiver



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