

Published: 11-May-2011

## Information and Entertainment System -

### Torque Specifications

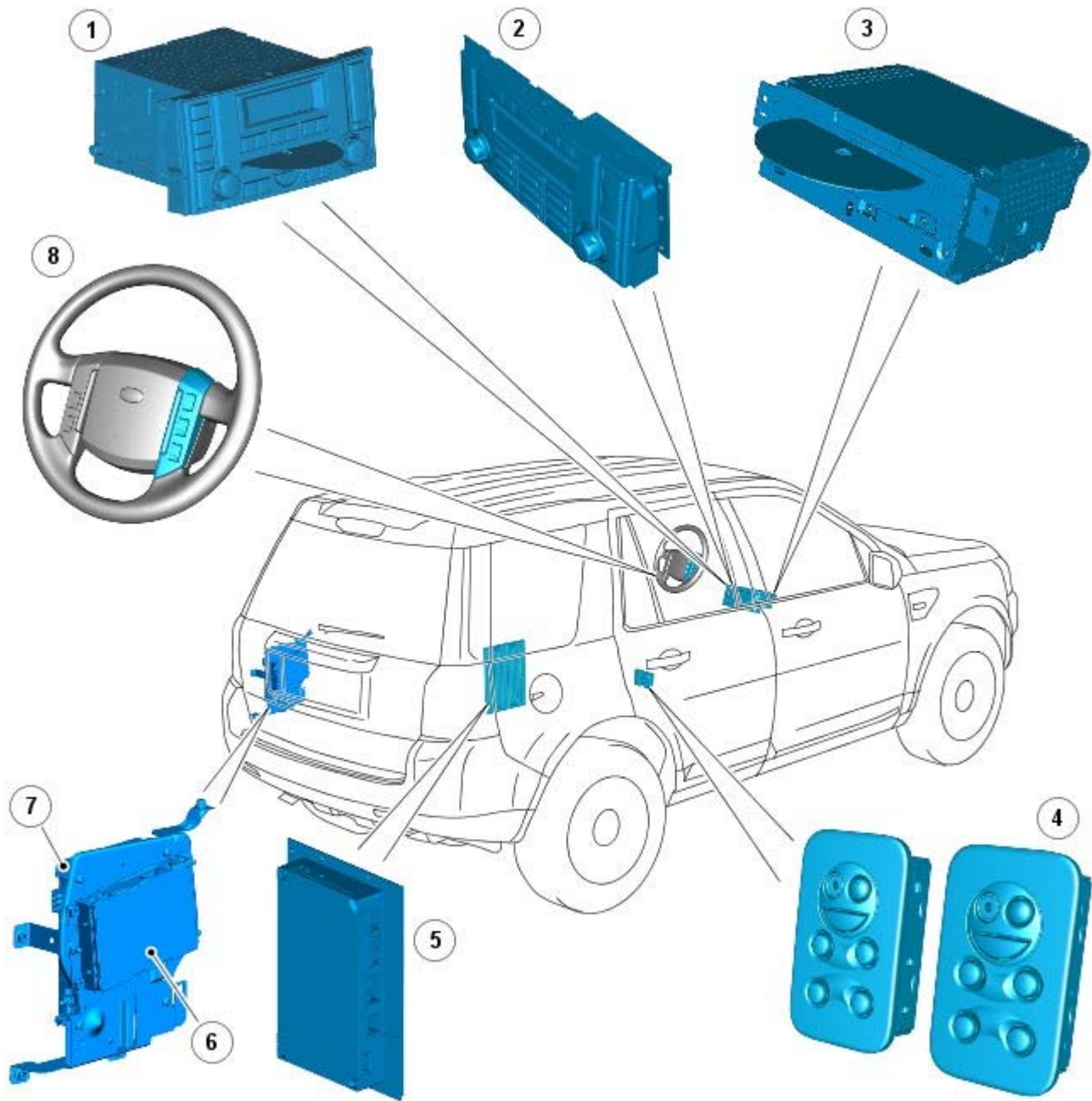
Description	Nm	lb-ft
Audio amplifier bolts	4	3
Audio unit	4	3
Bluetooth module retaining bolts	10	7
Front door speaker	1	1
Instrument panel speaker	1	1
Navigation digital Versatile Disc (DVD) unit retaining bolts	6	4
Rear door speaker	1	1
Satellite radio tuner bracket nuts	10	7
<b>Satellite radio tuner to mounting bracket bolts:</b>		
M5	6	4
M6	10	7
Subwoofer amplifier bracket nuts	10	7
Subwoofer to bracket bolts	10	7
Liftgate speaker to casing bolts	1	1
Liftgate speaker to liftgate Torx screws	1	1
Video display bolts	3	2

**Part Number**

Published: 11-May-2011

**Information and Entertainment System - Audio System**

Description and Operation

**COMPONENT LOCATION**

E79371

Item	Part Number	Description
1	-	Audio head unit
2	-	Infotainment Control Module (ICM)
3	-	Integrated Audio Module (IAM)
4	-	Rear headphone sockets and audio control
5	-	Audio amplifier
6	-	Satellite Digital Audio Radio Service (SDARS) module (NAS Only)
7	-	High Definition (HD) Radio (NAS only - from 2009MY)
8	-	Steering wheel remote audio controls

**OVERVIEW**

The audio system contains the following functions:

- CD player
- AM/FM tuner
- Digital Audio Broadcast (DAB)/SDARS radio systems (where available)
- HD radio system (where available).

The audio system is available in 2 versions, Standard and Premium.

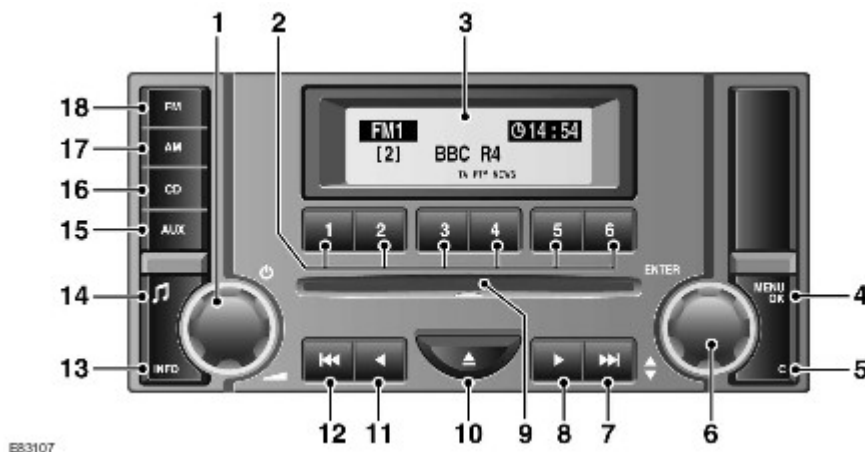
The Standard audio system uses an internal amplifier which directly drives the system speakers and contains a single disc Compact Disc (CD) player. The Standard audio system is controlled purely from the head unit and the remote steering wheel controls. The head unit is connected to the vehicle on the medium speed Controller Area Network (CAN) bus. This allows the unit to be interrogated for diagnostic purposes.

The Premium audio system comprises the following components:

- Integrated Audio Module (IAM)
- Infotainment Control Module (ICM)
- Separate audio amplifier
- Rear seat audio control modules with head phone sockets
- Surround sound speaker system

Control of the Premium audio system is via the ICM located in the center of the instrument panel. Control signals from the ICM are sent to the rest of the audio system on the Media Orientated System Transport (MOST) ring. The ICM is the timing master for the MOST ring and also hosts a gateway function between the medium speed CAN bus and the MOST ring. Audio signals are sent on the MOST ring from the Integrated Audio Module to the amplifier.

## LOW LINE AUDIO SYSTEM



Item	Description
1	On/Off volume control
2	Radio preset/CD select buttons
3	Information display
4	Audio menu button
5	Exit button
6	Audio menu rotary controller
7	Seek up/next track
8	Manual tuning up/CD next track
9	CD slot
10	CD eject
11	Manual tuning down/CD previous track
12	Seek down/previous track
13	Info button
14	Tone/volume settings button
15	Auxiliary mode button
16	CD mode button
17	AM waveband button
18	FM waveband button

The low line audio head unit contains the following functionality:

- Amplitude Modulation (AM)/Frequency Modulation (FM) Radio tuner

- Single disc CD player
- Amplifier

The audio head unit communicates with other vehicle systems on the CAN bus.

The audio head unit contains an internal amplifier which directly drives the vehicle speakers.

For additional information, refer to: [Speakers](#) (415-01 Information and Entertainment System, Description and Operation).

The audio head unit incorporates a power management function. Should the vehicle battery level drop below a predetermined level the unit will limit its functionality. The audio head unit receives CAN signals which help it determine the wake up/shut down process.

## Transit Mode

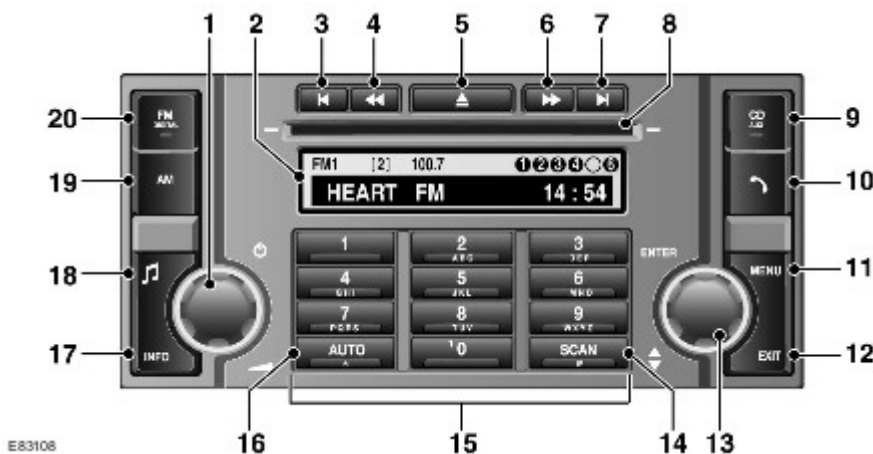
Transit mode is used to reduce the vehicle battery current drain whilst the vehicle is being stored or transported. Transit mode is entered/exited via a CAN signal from the Land Rover approved diagnostic tool. In transit mode the following circuits will be disabled:

- Aux and phone call
- Clock
- Antenna power
- Light Emitting Diode (LED) illumination.

In transit mode the CAN port and the ON/OFF switch are the only circuits that are left active.

The CAN port is left open to allow the EXIT from transit mode signal to be received. The ON/OFF switch is left active to allow feedback to the driver via the head unit LCD (liquid crystal display), that the unit is in transit mode should the driver attempt to power up the head unit. This will only occur when the vehicle engine is running and the battery is above 12.3 Volts.

## HIGH LINE AUDIO SYSTEM



Item	Description
1	On/Off volume control
2	Information display
3	Seek down/previous track
4	Manual tuning down/CD previous track
5	CD eject
6	Manual tuning up/CD next track
7	Seek up/next track
8	CD slot
9	Mode button
10	Telephone mode button
11	Audio menu button
12	Exit button
13	Audio menu rotary controller
14	Scan button
15	Keypad
16	Autostore button
17	Info button

18		Tone/volume settings button
19		AM waveband button
20		FM waveband button

The High Line Audio system is based around an Integrated Audio Module (IAM) which communicates on the Media Orientated System Transport (MOST). The ICM communicates on medium speed CAN and MOST buses.

The IAM contains the following functionality:

- Radio tuner
- CD player (Single CD or Six disc in dash changer)
- Auxilliary input (for any device featuring a 3.5mm jack plug output).

The ICM is woken up by CAN bus activity. The IAM is woken up by the MOST ring.

The ICM is the Bus Master for the MOST system and contains the timing master for the MOST system.

## TUNER

The IAM incorporates a AM/FM tuner which allows for 30 FM pre-sets (FM1 FM2 FM a) and 20 AM (10 AM and 10 AM a, for Europe the 10 strongest LW and MW will be stored in frequency order). Pre-set stations are stored in the IAM and ICM memory. The radio tuner also incorporates the following radio functions:

- Auto tune
- Traffic announcements (TA) – Europe only
- Radio Data System (RDS) EON function (Radio Broadcast Data System RBDS in NAS markets)
- Seek station
- Tune up/down
- Scan
- PTY

**NOTE:** On vehicles fitted with the HD radio module, the module replaces the AM/FM function in the IAM. AM and FM antennae are connected directly into the HD radio module and not into the IAM; therefore the AM/FM functions in the IAM are disabled.

## CD PLAYER

The IAM CD player is a 6 disc multi changer located in the center of the instrument panel. The CD multi changer is capable of playing commercial CDs, CDRs, CDRWs and MP3 discs.

### Random Play

The random play feature works in two different ways:

- Random play of tracks on a CD
- Random play of all tracks on any CD in the autochanger

The single disc random feature plays all the tracks on the selected CD in a random order. All the tracks on that disc will be played before a new random sequence is played. If a new CD is selected while in random mode, the random mode will be cancelled and play will commence from the first track.

In multi disc mode the IAM uses the current track as the first random track and will then play a further 2 tracks (if available) from this CD. The IAM will then randomly select another CD, and play 3 random tracks. This sequence continues until all tracks from all CD's are played back.

### MP3 Function

The CD player has the capability to play MP3 files. The MP3 discs follow a format of folders and files within the folder. It is also possible to place all the files in the root directory on the CD.

The random and repeat features follow the normal CD random and repeat feature functions.

## Automatic Volume Control (AVC)

AVC controls the audio volume in relation to vehicle speed. As vehicle speed increases the audio level is adjusted to compensate for extra road and vehicle noise. There are 4 settings for AVC:

- Off
- Low
- Medium
- High

The default setting is medium.

Changing the AVC level is accessed by a long press of the TONE button and selection of the AVC using the rotary encoder to change the level.

The vehicle speed signal is used to enable the ICM to calculate the volume adjustment required. The vehicle speed signal is

received over the medium speed CAN. The signal is an average of the four wheel speed sensor signals. Should an invalid speed signal be received the AVC will not alter the output volume.

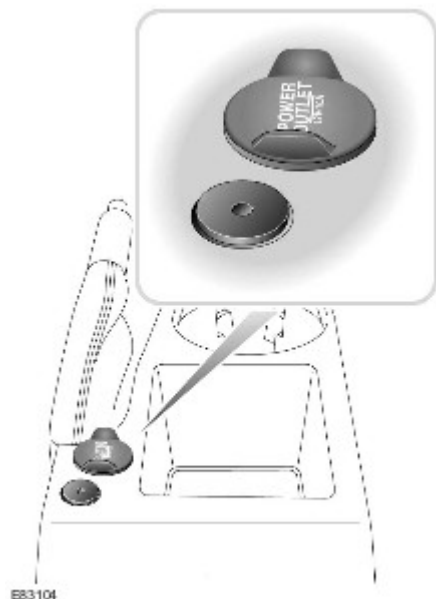
AVC is controlled by the audio amplifier.

## CD Error Messages

When an CD error occurs, the IAM will alert the user by showing a display related to the error. This will be displayed while the CD audio mode is selected until the error is corrected. The CD related error does not affect other areas of the IAM. The user is able to select a different audio source.

Error Message in IAM display	Cause
Deck error	Mechanical Error, CD stuck, Servo related error, etc.
Hot disc	Internal CD temperature too high
Disc unreadable	Invalid Disc, CD ROM inserted, disc inserted upside-down, etc.

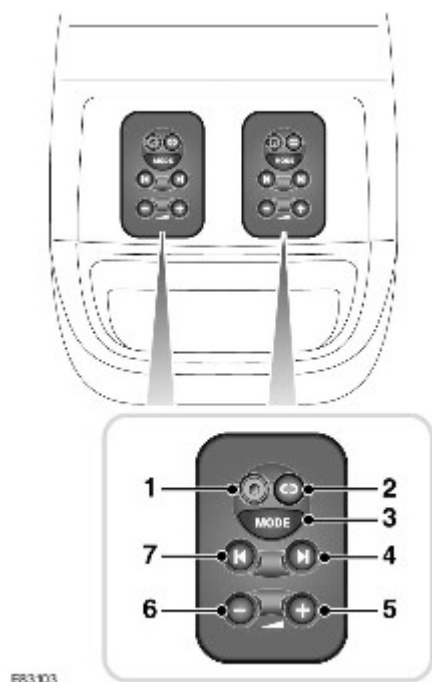
## AUXILIARY SOCKET



The auxiliary connector is located at the rear of the center console. AUX (Auxiliary Input) mode allows extra equipment to be connected to the vehicle's audio system. Items such as a personal stereo, MP3 player, hand-held navigation unit etc., can be plugged in to the vehicle's audio system.

To listen to an auxiliary input source the portable device must be connected via the 3.5 mm stereo jack socket. If the device has a line out socket it is preferable that this is used for connection. Press and hold the AUX button on premium audio units. On standard audio units, press and release the AUX button.

## REAR SEAT HEADPHONE MODULES



EB3103

Item		Description
1		Headphone socket
2		CD select button
3		Mode button
4		Search up button
5		Volume increase button
6		Volume decrease button
7		Search down button

The rear seat headphone modules are located on the rear of the center console. The rear seat headphone modules allow the rear seat passenger to listen to audio via standard headphones. The modules allow the rear seat passengers to control which audio source they want to listen to and the volume. The rear headphone modules do not override the control of the audio head unit.

## STEERING WHEEL CONTROLS



EB3208

Item		Description
1		Mode button
2		Volume increase button
3		Volume decrease button
4		Radio seek up/down, Next preset/previous preset, CD next/previous track button

The steering wheel mounted audio control switches are located on the RH side of the steering wheel. The switches are a resistive ladder type which return a different voltage to the ICM in response to different switches being pressed.

For additional information, refer to: [Steering Column Switches](#) (211-05 Steering Column Switches, Description and Operation).

## SDARS (NAS Only)

The SDARS systems operate in the S-Band frequency range (2.3 GHz) and, as a result of the use of satellite transmission have the ability to provide CD quality audio broadcasts over very large areas (typically continents). SDARS service providers transmit a signal from their up-link facility (which is the original point of transmission of data, voice or other information

through an antenna system) to a satellite where the signal is then down linked to both the terrestrial repeater network and the individual SDARS car radios. The radio switches between the satellite signal and the repeater signal depending on the strength of the signal at any given time.

Land Rover will be using the Sirius Satellite Radio service provider in the USA.

The SDARS systems comprise:

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

The SDARS system uses three satellites on an inclined elliptical orbit. This ensures that each satellite spends approximately 16 hours a day over the continent of the USA, with at least one satellite over the country at any one time.

The satellites beam their signals down to the ground where the signal is picked up by receivers or is transmitted to repeater stations to cover built up areas where the signal is obscured.

SDARS is a subscription based service which requires the user to contact Sirius to obtain a subscription. In order to obtain a subscription the SDARS unit ID number will need to be retrieved from the unit. This is achieved as follows:

- Press the MENU button and then rotate the menu control to scroll to advanced settings.
- Rotate the menu control to scroll to SIRIUS ID and press the menu control to select it.
- The Sirius ID is shown on the display screen.

If no subscription has been taken the ICM will display the Sirius telephone number. To subscribe to Sirius use the displayed phone this number. The user will need payment details, the Sirius ID number and details of the required package.

The SDARS function is accessed by pressing the FM button and then pressing again to toggle through the SAT1 and SAT2 sources. SAT1 and SAT2 operate in the same manner as FM1 and FM2.

The SDARS module is located in the rear Left Hand (LH) side of the luggage compartment. The SDARS module is connected to the rest of the audio system on the MOST ring. This allows control signals and received audio to be routed around the system to the relevant module. The SDARS antenna is located in the roof mounted pod and is hardwired to the SDARS module.

## **HIGH DEFINITION (HD) RADIO - From 2009MY (NAS Only)**

HD radio is the registered trademark for the In-Band On-Channel (IBOC) technology selected by the Federal Communications Commission (FCC) for terrestrial digital audio broadcasting in the United States. A large number of radio stations now broadcast in both AM and FM. FM frequencies are capable of transmitting multiple frequency streams on a single FM frequency. HD radio has an advantage over SDARS in that it is free to receive and requires no subscription.

HD radio enhances the sound quality of the received signal so that FM reception gives near CD quality digital reproduction and AM reception sounds as rich as analog FM stereo. Both AM and FM HD radio offer static-free, crystal-clear reception. An additional benefit is FM Multicasting – the ability to broadcast multiple program streams over a single FM frequency (for example 97.7-1, 97.7-2, etc.). The HD radio module is capable of receiving the traditional analogue transmissions of radio stations not transmitting digital broadcasts in addition to receiving the digital transmissions broadcast alongside the analogue transmissions from radio stations who offer digital output.

The HD radio module replaces the AM/FM function in the IAM. AM and FM antennae are connected directly into the HD radio module and not into the IAM; therefore the AM/FM functions in the IAM are disabled.

The broadcast audio signals are digitally compressed by the radio transmitter. Audio is also transmitted in its current analogue form alongside the digital transmission. The HD radio module receives the analogue and digital signals via the vehicle AM and FM antennae along with accompanying text transmissions. These signals are decoded by the module and played as an audio output or displayed as an information text on the head unit LCD display or the ICM LCD display depending the system installed.

The HD radio module is located in the LH side of the luggage compartment. The module receives a fused power supply from the AJB. The module is also connected on the MOST ring and is able to communicate with the other entertainment and information systems in the vehicle.

## **CLOCK**

The ICM contains the master clock functionality. Other vehicle infotainment modules that require clock functionality use the time supplied from the ICM.

The clock is available to any control module that is connected to an interconnecting bus, for example, either of the CAN buses or the MOST ring.

The clock display configurable to show in AM / PM or 24 hour format. Midnight is shown as 12:00AM or 00:00 respectively. The default condition, if not specified, after power on or delivery, should default to 12:00PM or 00:00. Depending upon the market set the clock will default to either 12 or 24 hour format.

The time is adjusted from the ICM. Under conditions when any bus could be asleep or shut down, the ICM does not allow clock adjustments.



## AMPLIFIERS

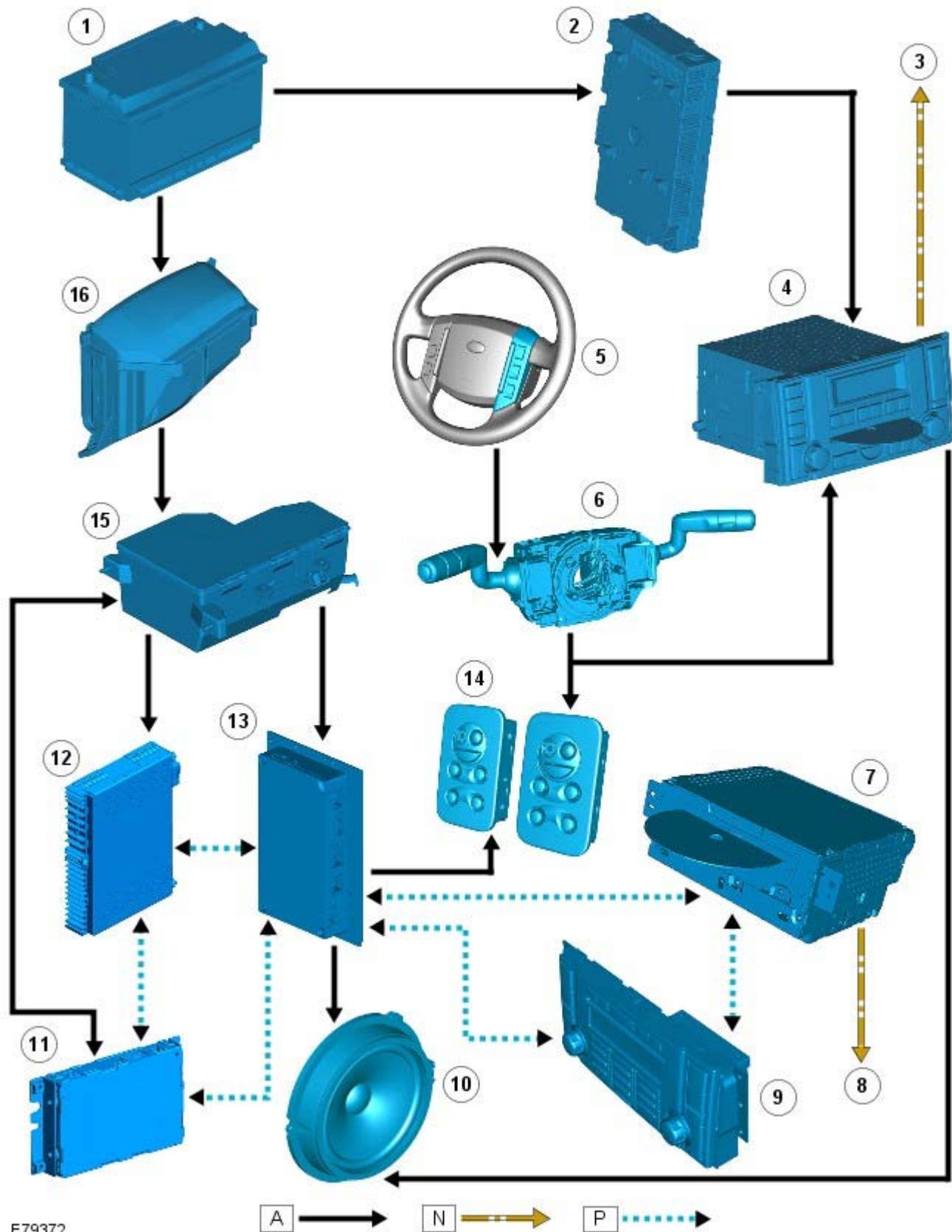
The audio system has three amplification options dependant on the audio system specified:

- Internal amplifier
- Harman kardon
- Harman kardon LOGIC 7

The amplifier is located in the Right Hand (RH) corner of the luggage compartment and is connected to the audio system via the MOST bus. Speaker connections are hardwired.

## CONTROL DIAGRAM

NOTE: **A** = Hardwired connection; **D** = Medium speed CAN bus; **P** = MOST



E79372

Item		Description
1		Battery
2		CJB
3		CAN out to other vehicle systems
4		Audio head unit
5		Steering wheel controls
6		Clockspring
7		Integrated Audio Module (IAM)

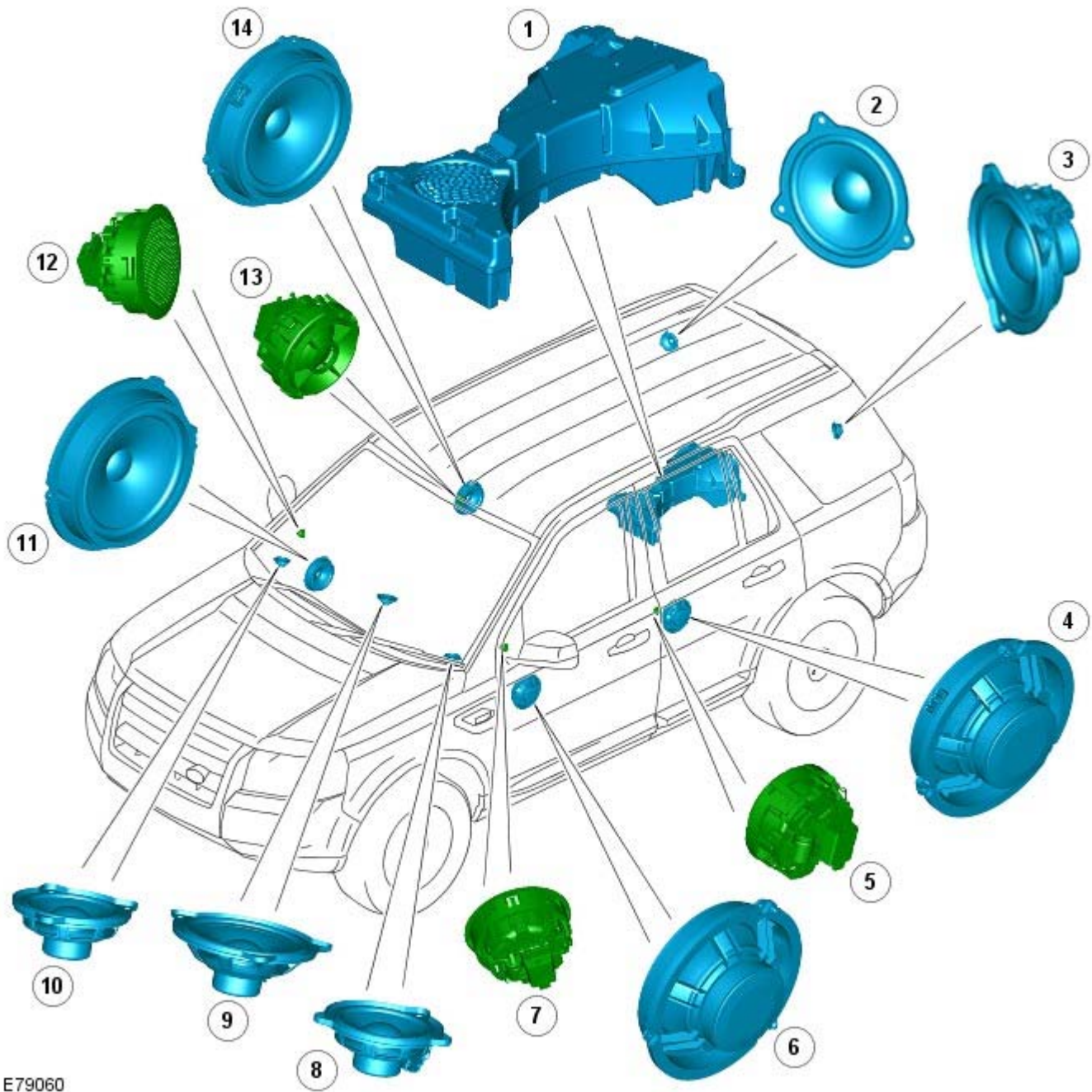
8	CAN out to other vehicle systems
9	Infotainment Control Module (ICM)
10	Speakers
11	SDARS module (NAS only)
12	HD radio module (NAS only - from 2009MY)
13	Audio amplifier
14	Rear headphone sockets and audio control
15	AJB
16	BJB

Part Number

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**Information and Entertainment System - Speakers**

Description and Operation

**COMPONENT LOCATION**

E79060

Item	Part Number	Description
1	-	Subwoofer enclosure
2	-	Rear RH surround speaker
3	-	Rear LH surround speaker
4	-	Rear LH mid range speaker
5	-	Rear LH high range speaker
6	-	Front LH mid/low range speaker
7	-	Front LH high range speaker
8	-	Front LH mid range speaker
9	-	Center fill speaker
10	-	Front RH mid range speaker
11	-	Front RH mid/low range speaker

12		Front RH high range speaker
13		Rear RH high range speaker
14		Rear RH mid range speaker

## OVERVIEW

Depending on the audio system fitted there are 3 different speaker configurations, these are:

### Base audio

- 2 Front door mounted mid/low range speakers
- 2 Front door mounted high range speakers
- 2 Rear door mounted mid/low range speakers
- 2 Rear door mounted high range speakers

### Mid range audio system

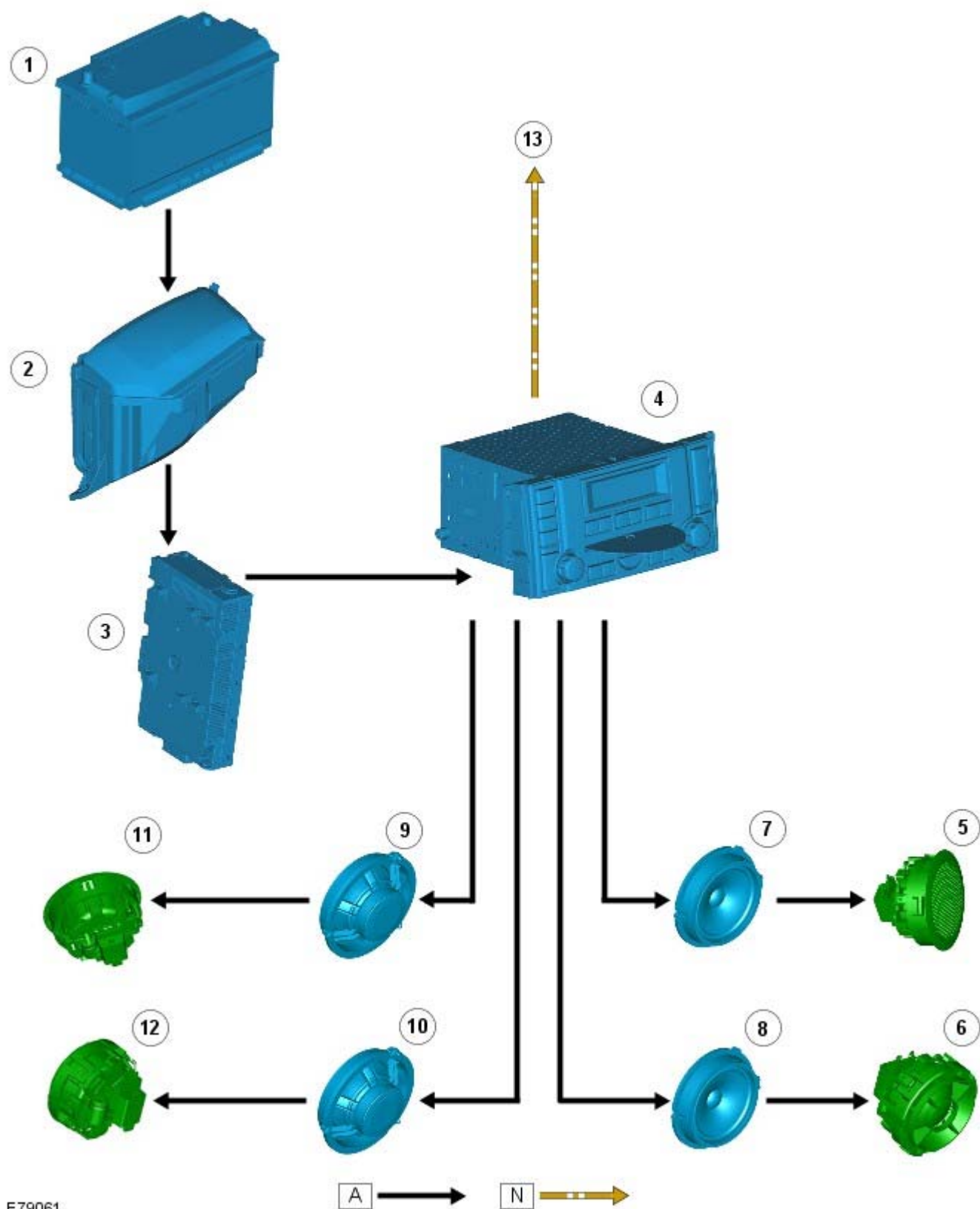
- 2 Front door mounted mid/low range speakers
- 2 Front door mounted high range speakers
- 2 Rear door mounted mid/low range speakers
- 2 Rear door mounted high range speakers
- Rear loadspace mounted sub-woofer enclosure

### High line audio system

- 2 Front door mounted low range speakers
- 2 Front door mounted high range speakers
- 2 Rear door mounted mid/low range speakers
- 2 Rear door mounted high range speakers
- Rear loadspace mounted sub-woofer enclosure
- 2 Mid range speakers mounted on the instrument panel
- 1 center fill speaker centrally located in the instrument panel
- 2 rear surround speakers mounted in the rear C pillars

## CONTROL DIAGRAM SHEET 1 of 3

NOTE: **A** = Hardwired; **N** = Medium speed CAN bus



E79061

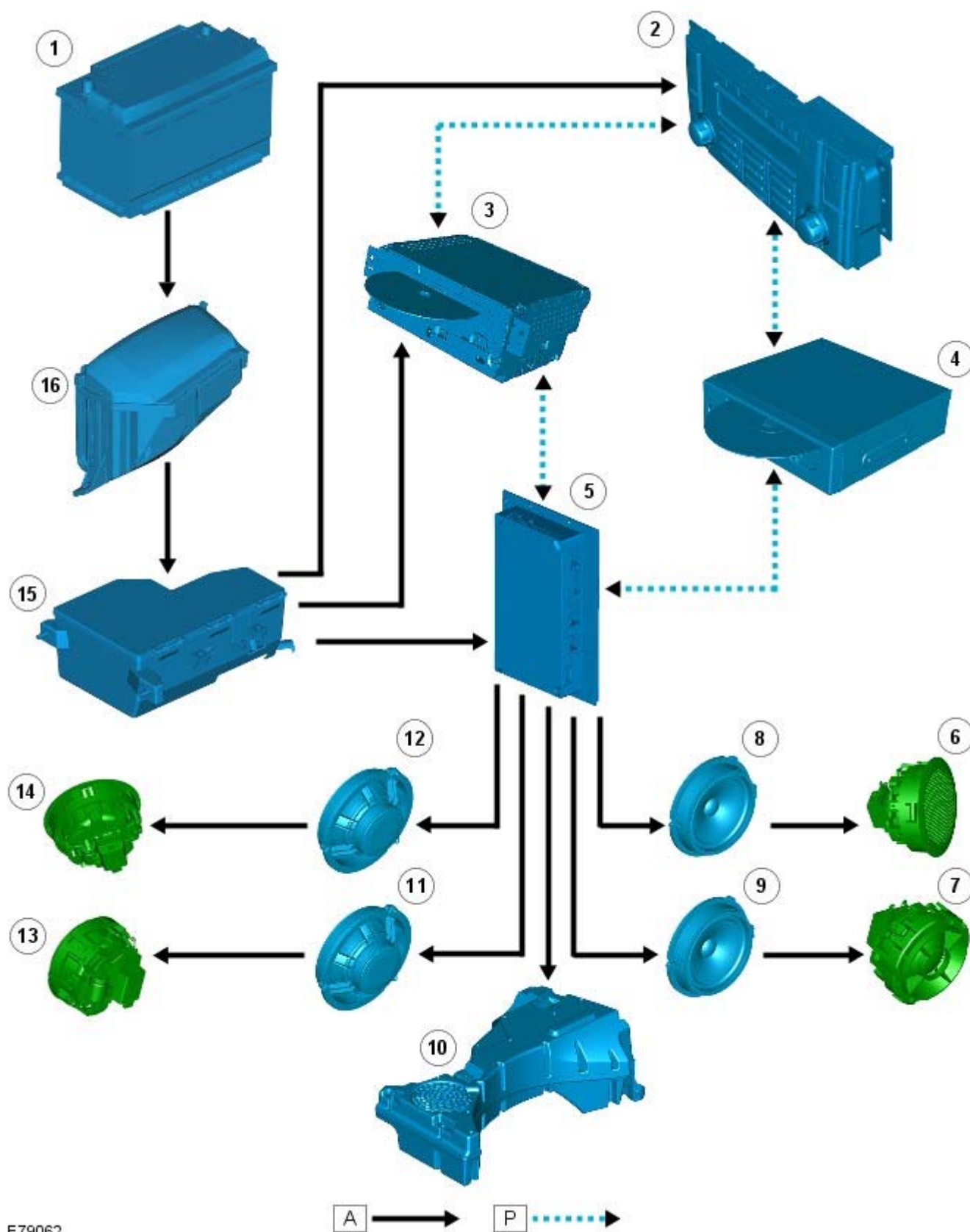
Item		Description
1		Battery
2		BJB
3		CJB
4		Audio head unit
5		Front RH high range speaker
6		Rear RH high range speaker
7		Front RH mid/low range speaker



8		Rear RH mid/low range speaker
9		Front LH mid/low range speaker
10		Rear LH mid/low range speaker
11		Front LH high range speaker
12		Rear LH high range speaker

## CONTROL DIAGRAM SHEET 2 of 3

NOTE: **A** = Hardwired; **P** = MOST



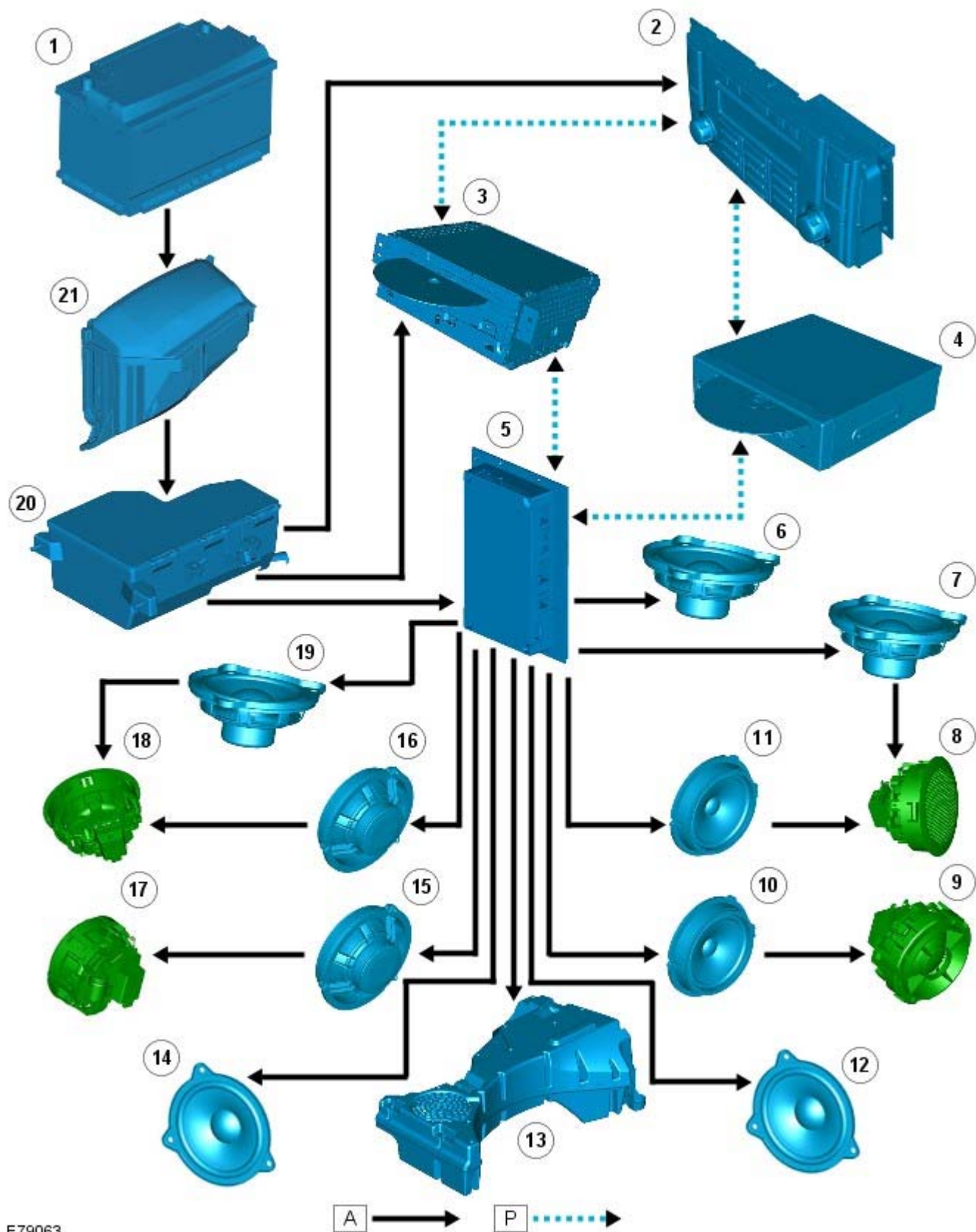
E79062

Item		Description
1		Battery
2		Infotainment control module
3		Integrated audio module
4		Navigation computer
5		Audio amplifier
6		Front RH high range speaker
7		Rear RH high range speaker
8		Front RH mid/low range speaker
9		Rear RH mid/low range speaker
10		Subwoofer enclosure
11		Rear LH mid/low range speaker
12		Front LH mid/low range speaker
13		Rear LH high range speaker
14		Front LH high range speaker
15		AJB
16		BJB

### CONTROL DIAGRAM SHEET 3 of 3

NOTE: **A** = Hardwired; **P** = MOST





E79063

Item		Description
1		Battery
2		Infotainment control module
3		Integrated audio module
4		Navigation computer
5		Audio amplifier
6		Front center fill speaker
7		Front RH mid range speaker

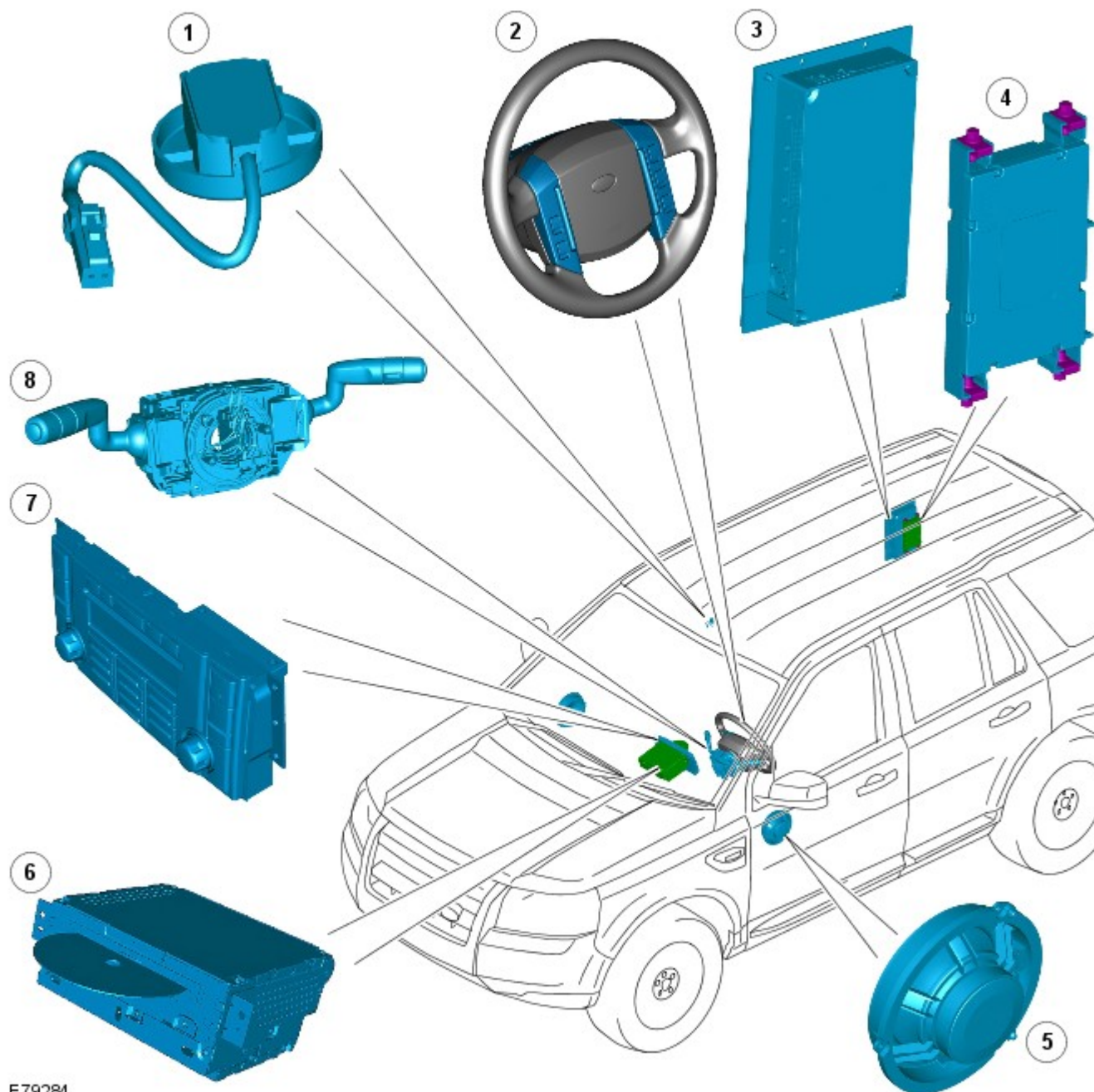
8		Front RH high range speaker
9		Rear RH high range speaker
10		Rear RH mid/low range speaker
11		Front RH low range speaker
12		Rear RH surround speaker
13		Subwoofer
14		Rear LH surround speaker
15		Rear LH mid/low range speaker
16		Front LH mid range speaker
17		Rear LH high range speaker
18		Front LH high range speaker
19		Front LH mid range speaker
20		AJB
21		BJB

**Part Number**

Published: 11-May-2011

**Information and Entertainment System - Cellular Phone**

Description and Operation

**COMPONENT LOCATION**

E79284

Item	Part Number	Description
1	-	Microphone
2	-	Steering wheel switches
3	-	Audio amplifier
4	-	Telephone control module
5	-	Speakers
6	-	Integrated audio module (IAM)
7	-	Infotainment control module (ICM)
8	-	Clockspring

**OVERVIEW**

The system allows the driver to use a Bluetooth equipped cellular phone handset through the vehicles Information and

Entertainment system.

**NOTE:** There is no physical connection (cradle) between the phone handset and the telephone control module. Communications between the 2 components are purely Bluetooth. This can limit the available functions dependant on the handset used.

The cellular phone system comprises the following components:

- Telephone control module
- Microphone

Phone dialing is achieved using one of the following methods:

- Dialing a number using the ICP keypad
- Selecting a number from the handsets phonebook via the ICM
- Selecting from the handsets call register via the ICM

The Telephone control module is connected to the Information and Entertainment system on the MOST ring. This allows audio and control signals to be routed to and from the telephone control module. The telephone control module has an integral Bluetooth antenna.

Telephone handsets must be paired with the telephone control module before they can be used with the vehicle system. Up to five telephone handsets can be paired with the vehicle, but only one telephone can be used at a time.

## PHONE MODULE



E88681

The telephone control module is located in the rear RH side of the loadspace. The phone module is connected on the MOST ring to the rest of the entertainment system.

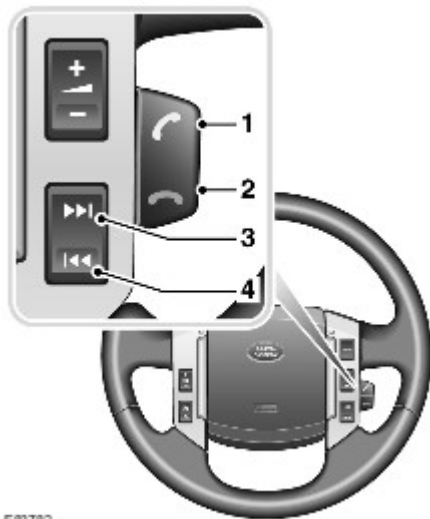
## MICROPHONE



E88682

The microphone is located in the overhead console which surrounds the front interior lamp. The microphone is hardwired to the IAM.

## CONTROL SWITCHES



E83782

Item	Description
1	Answer call or dial switch
2	End or reject call switch
3	Menu next button
4	Menu previous button

The steering wheel mounted telephone control switches are located on the RH side of the steering wheel. The switches are a resistive ladder type which return a different voltage to the ICM in response to different switches being pressed.

For additional information, refer to: Steering Column Switches (211-05 Steering Column Switches, Description and Operation).

The following table details the cellular phone steering wheel switch functions.

Switch	Functions
Mode	Change audio source no change to display. (Also changes ICM display to match source)
< > >	Scroll through phonebook down / Up (While Display is in Phone mode)
Send key	Last 10 dialed calls, initiate call, accept call (While Display is in Phone mode)

ICM Control Switches



E83781

Item	Description
1	Call status icon
2	Paired telephone name
3	Clock
4	Telephone mode button
5	MENU button
6	EXIT button
7	ENTER button
8	Keypad
9	On or off or volume button

Accessing the cellular phone system from the ICM allows the user various options depending on the Bluetooth version of the phone.

## TELEPHONE VOICE CONTROL

The vehicle system is able to use any voice tags which are stored in the mobile telephone. There is no voice dialing feature of the cellular telephone system.

Voice dialing is accessed via a long press of the RH rotary ENTER button. The ICM displays that Voice tag dialing is in progress and an audible prompt is generated from the telephone control module. After the prompt the handset waits several seconds for the voice command.

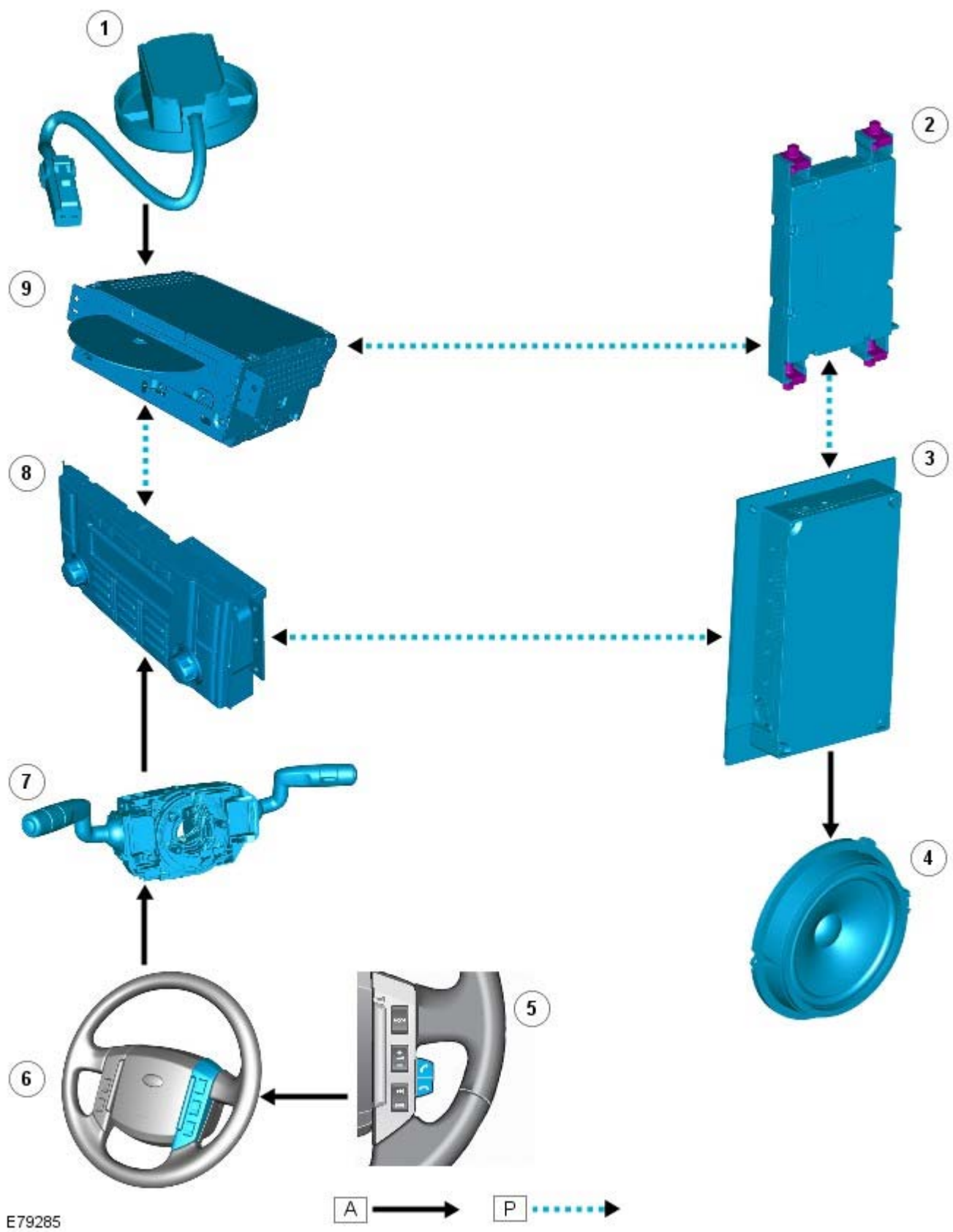
## PRINCIPLES OF OPERATION

The phone system is controlled from the ICM and/or the steering wheel mounted switches. Control signals from the steering wheel switches are sent via the clock spring and the steering wheel module to the ICM. The ICM sends control signals on the MOST ring to the telephone control module. Audio is sent on the MOST ring to the audio amplifier and is output on the vehicle speaker system.

## CONTROL DIAGRAM

NOTE: **A** = Hardwired; **P** = MOST





E79285

Item		Description
1		Microphone
2		Telephone control module
3		Audio amplifier
4		Speakers
5		Steering wheel mounted call switches
6		Steering wheel mounted audio control switches
7		Clockspring

8	Infotainment control module (ICM)
9	Integrated audio module (IAM)

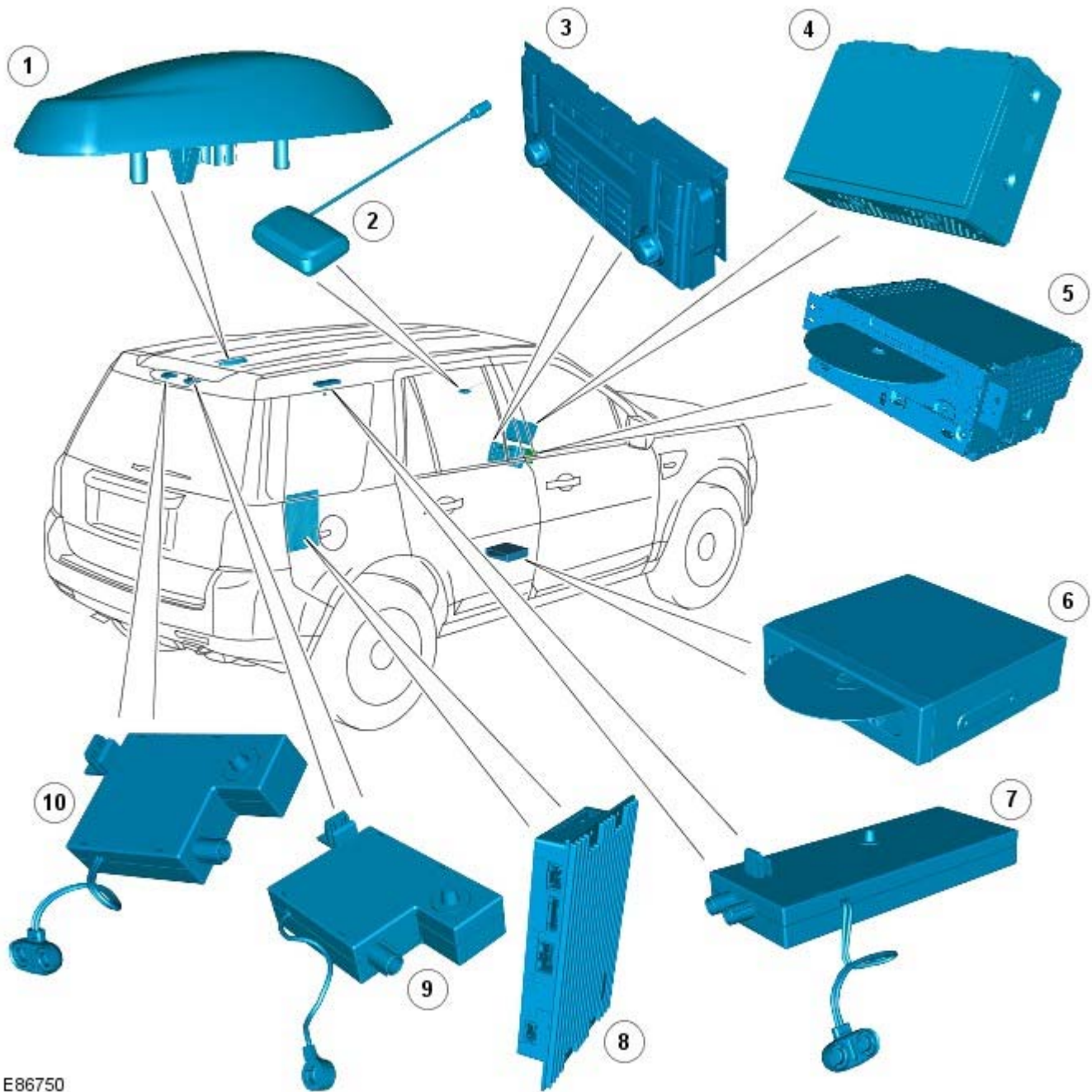


Part Number

Published: 11-May-2011

**Information and Entertainment System - Navigation System**

Description and Operation

**COMPONENT LOCATION**

E86750

Item	Part Number	Description
1	-	Global positioning system (GPS) antenna
2	-	Vehicle Information and Communication System (VICS) beacon antenna - Japan only
3	-	Control panel and infotainment control module
4	-	Touch screen display
5	-	Integrated audio module
6	-	Navigation computer
7	-	AM (amplitude modulation) / FM (frequency modulation) antenna amplifier – non diversity system, or AM/FM diversity antenna amplifier
8	-	Audio amplifier
9	-	VICS/TMC antenna amp
10	-	Twin FM antenna amp for diversity tuning

## OVERVIEW

The navigation system provides audible and visual route guidance information to enable the driver to reach a desired destination. The system allows the driver to choose the desired route using minor or major roads or highways with the option of three routes. Directions to hospitals, museums, monuments and hotels are also available. The computer uses map information stored on a DVD to determine the best route for the journey and provide the driver with details of directions and approaching junctions.

The navigation system is controlled by the driver from the touch screen display. Control signals from the touch screen display are sent on the Media Orientated System Transport (MOST) ring to the infotainment control module where they are then transmitted on the MOST ring to the navigation computer. The navigation computer uses a dedicated Gigabit Video Interface (GVIF) to transmit video signals to the touch screen display.

Vehicles with navigation systems also incorporate additional traffic information systems. These are market dependant and are as follows:

- Europe - Traffic Message Channel (TMC).
- Japan - Vehicle Information and Communication System (VICS).
- NAS - No additional system.

## Navigation Computer



E86751

The navigation computer located under the right-hand front seat, houses the DVD drive that reads the map data from the region specific DVD. Access to the DVD slot is from the rear of the seat.

A button, located adjacent to the DVD slot, is provided to eject the DVD from the unit. Prior to ejecting the disc the slot protection has to be slid to the side. If the ignition is on, or the entertainment system is in 1-hour mode, one press of the button will eject the DVD.

Connected to the MOST bus, the navigation computer generates its own graphics and transmits them to the touch screen display on a dedicated Gigabyte Video Interface (GVIF) bus.

The navigation computer also incorporates the following:

- GPS receiver
- VICS receiver (Japan only)
- Traffic Message Channel (TMC) receiver

The GPS receiver receives information from between 1 and 8 satellites at any one time. This information is received from the GPS antenna. The built in GPS receiver is used for calculating the position (i.e. latitude, longitude and height), direction and speed.

The navigation computer contains a solid state piezo gyro which measures the motion of the vehicle around its vertical axis. The gyro operates on the principle known as the Coriolis force. The Coriolis force is the force that appears to accelerate a body moving away from its rotational axis against the direction of rotation of the axis.

To calculate the vehicle's current position, direction and speed, the navigation computer uses:

- speed signals transmitted on the high-speed CAN from the ABS module to the MOST ring,
- and signals transmitted from the GPS antenna and the gyro sensor.

For the Japanese market the navigation computer incorporates a VICS receiver. The VICS receiver, receives information from the VICS beacon antenna in the center of the instrument panel and the electric Frequency Modulation (FM) antenna. Using this information the VICS system monitors information regarding traffic conditions from roadside transmitters, and if necessary, adjusts the navigation instructions accordingly to avoid traffic congestion.

For certain European markets the navigation computer incorporates the Traffic Message Channel (TMC) receiver. The TMC receiver decodes TMC data. The navigation computer then displays this information on the touch screen display and re-routes the navigation guidance system to avoid traffic congestion. The TMC data is received via the electric FM antenna.

The navigation computer uses non-volatile memory to store settings and configuration information when it is powered down. This process takes place just before the computer turns off.

### Touch Screen Display



E86752

The touch screen display is located in the center of the instrument panel and is the dedicated interface with the navigation system. The touch screen display does not operate any other vehicle systems. The screen is a touch sensitive 7 inch liquid crystal display (LCD) screen containing 800 x 480 pixels in a 15:9 format. The touch screen display is connected to the Information and Entertainment system on the MOST ring. The MOST ring is a fiber optic communications data bus that allows high speed transfer of control instructions and audio around the system.

The touch screen display processes its own video for system operation but receives the navigation graphics from the navigation computer on a dedicated serial link called Gigabit Video Interface (GVIF).

The touch screen display navigation control signals are sent on the MOST ring to the navigation computer.

### GPS Antenna



E86753

The Global Positioning System (GPS) antenna is located on the rear of the vehicle's roof. The GPS antenna is connected to navigation computer by a single co-axial cable and passes signals from the GPS satellites to the navigation computer's built in receiver for processing.

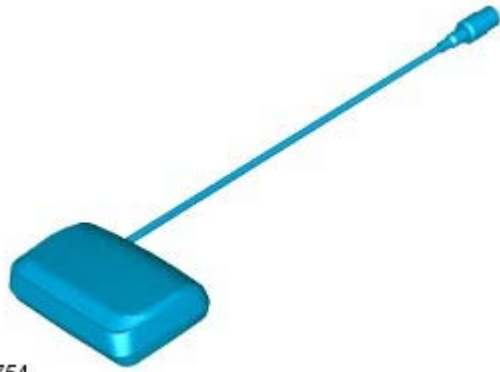
It is possible for the GPS antenna to lose the signal from the GPS satellites:

- In hilly or tree lined areas
- Built up areas with tall buildings
- In multi storey car parks
- In garages
- In tunnels
- In bridges
- During heavy rain or thunderstorms.

When the signal is lost the navigation computer will continue to give guidance using memory mapped data from the DVD map until the signal is restored.

For additional information, refer to: Antenna (415-02, Description and Operation).

### VICS Beacon Antenna - Japan Only



E86754

The VICS beacon antenna is located on top of the instrument panel. The antenna receives infra red and RF signals from road side transmitters. The Antenna is connected to the navigation computer which incorporates a VICS receiver.

For additional information, refer to: Antenna (415-02, Description and Operation).

### **Control Panel and Infotainment Control Module**

The control panel incorporates switches for audio system and telephone control. The navigation system is operated from the touch display screen via signals on the MOST ring. Hard switches on the control panel send CAN signals to the infotainment control module which transfers signals to the relevant module on the MOST ring.

The infotainment control module is the gateway between the medium-speed CAN bus and the infotainment system MOST bus.

For additional information, refer to: Audio System (415-01, Description and Operation).

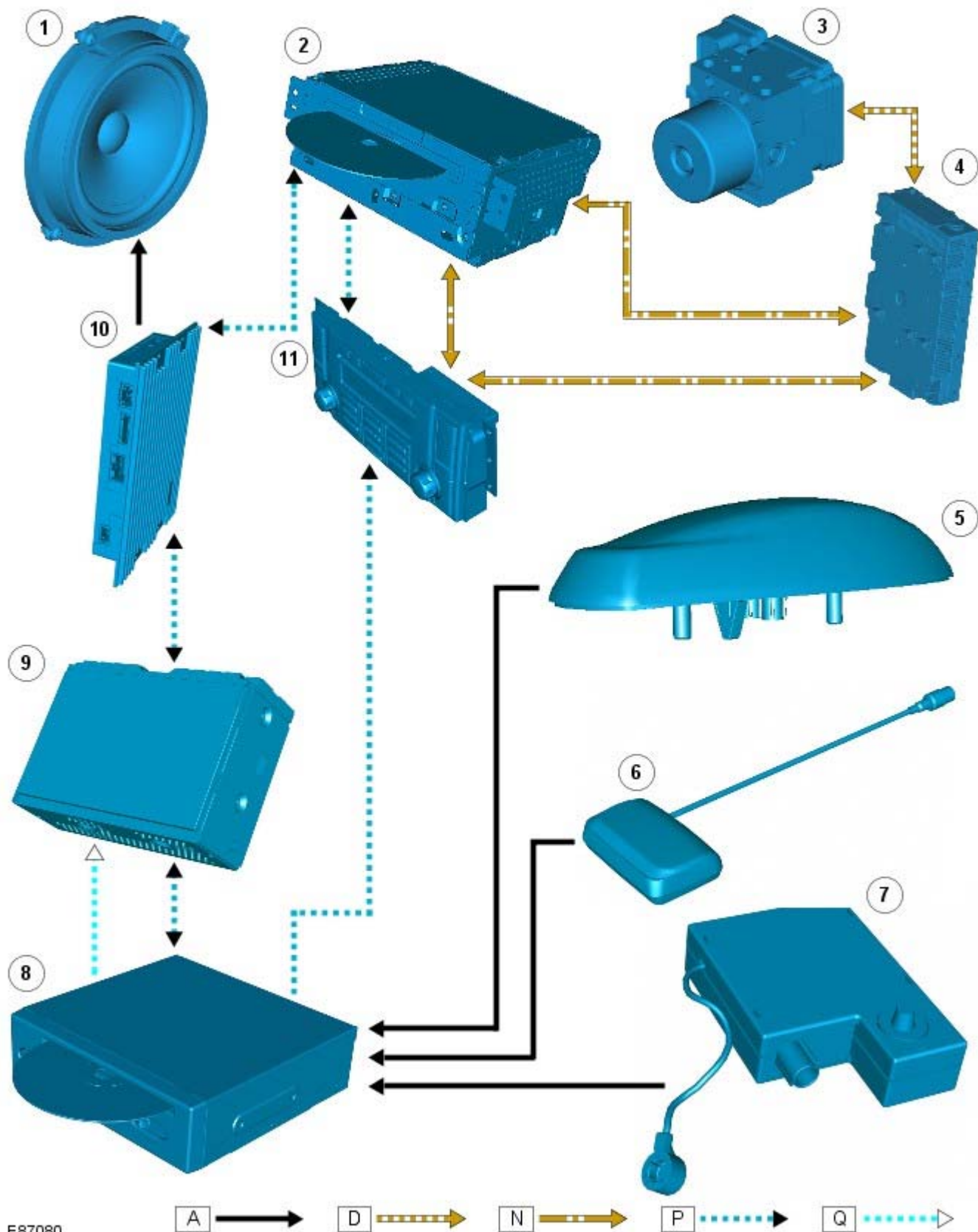
### **Integrated Audio Module**

Audio signals are sent on the MOST ring from the Integrated Audio Module to the amplifier.

For additional information, refer to: Audio System (415-01, Description and Operation).

### **CONTROL DIAGRAM**

NOTE: **A** = Hardwired; **D** = High speed CAN bus; **N** = Medium speed CAN bus; **P** = MOST; **Q** = GVIF



Item		Description
1		Speakers
2		Integrated audio module
3		Anti-lock brake system (ABS) control module
4		Central junction box (CJB)
5		Global positioning system (GPS) antenna
6		Vehicle Information and Communication System (VICS) beacon antenna - Japan only
7		Traffic Message Channel (TMC) antenna amplifier - Europe only



8		Navigation computer
9		Touch screen display (TSD)
10		Audio amplifier
11		Infotainment control module (ICM)

## PRINCIPLES OF OPERATION

The system used to calculate the current position of the vehicle is called the Global Positioning System (GPS). The system utilizes satellites which are owned by the United States Department of Defense. A total of 24 satellites orbit the earth every 12 hours at a height of 20,000 km (12500 miles), and between 5 and 11 of these satellites can be seen from a single point at any given time. The orbits are tilted to the earth's equator by 55 degrees to ensure coverage of polar regions. Each satellite transmits radio signals to provide information about the satellite's position, for example the latitude, longitude, altitude, almanac data and an accurate time signal generated by an on-board atomic clock. Each satellite contains four atomic clocks.

The vehicle needs to receive data from at least four different satellites to give a three dimensional fix on its current position.

As the vehicle moves, this information is continually being updated. The computer determines which satellites are 'visible' to the system and their current position and relationship to each other. Using this information the computer can account for positional deviations of the satellites and compensate to enhance the accuracy of the navigation system.

The Global Positioning System (GPS) signal is also known as the Precision Positioning Signal (PPS).

PPS predictable accuracy is:

- 22 meters horizontal accuracy
- 27.7 meters vertical accuracy
- 200 nanoseconds time accuracy.

The navigation system receives GPS information via the GPS antenna. The GPS signals are used by the navigation computer to calculate the vehicles position. Once the driver has entered a destination, the navigation computer can calculate a route, based on the driver's pre-determined preferences or the default settings in the navigation computer.

The navigation system receives GPS (global positioning system) information via the GPS antenna. The GPS signals are used by the navigation computer to calculate the vehicles position. Once the driver has input a desired destination the navigation computer can calculate a route, based on the drivers pre-determined preferences or the default settings in the navigation computer.

The navigation system is accessed by pressing the navigation soft key on the touch screen display.

Navigation is initiated by the driver entering a destination. This can be achieved by:

- Entering in an address using the touch screen display.
- Entering a post code.
- Choosing a previous destination
- Choosing a point of interest from the map disc database.
- Choosing the home location.
- Choosing a memory stored location.

The driver is then guided to the destination by a scrolling map display and voice guidance. The display can be varied by scale and display type.

In addition to the navigation system there are two market dependant systems that supply extra information to the navigation system and the driver. These are:

- Traffic Message Channel (TMC) – Europe only.
- Vehicle Information and Communication System (VICS) - Japan only.

### Traffic Message Channel (TMC)

The Traffic Message Channel (TMC) traffic data is currently broadcast in many European countries.

TMC is a function of the FM (frequency modulation) Radio Data System (RDS). The system broadcasts real-time traffic and weather information. TMC information is received via the normal FM radio antenna.

Data messages are received and decoded by the TMC receiver and passed onto the navigation system, which then delivers them via the navigation system interface. TMC messages can be filtered by the navigation computer so that only those relevant to the current journey are displayed, allowing the navigation system to offer dynamic route guidance - alerting the driver of a problem on the planned route and calculating an alternative route to avoid the incident. All TMC events on the map can be viewed not just the ones on the calculated route.

TMC traffic information systems conform to a global standard that has been adopted by:

- traffic data gatherers,
- information service providers,
- broadcasters, and
- vehicle/receiver manufacturers.

All TMC receivers use the same list of event codes, while the location database (on the map disc) contains both a country-specific set of location codes for the strategic European road network.

## Vehicle Information and Communication System (VICS)

The Vehicle Information and Communication System (VICS) is broadcast in the Japanese market.

The VICS system supplies the navigation computer with information that enables the computer to inform the vehicle driver of traffic conditions in the vehicle's vicinity and calculate an alternative route if necessary. Information is transmitted to the navigation system through three routes:

### 1. Radio Frequency Transmission

Radio frequency transmission is generally transmitted from road side beacons mainly on highways. The information transmitted is as follows:

- Traffic congestion
- Travel time to next intersection
- Traffic conditions in surrounding areas and highway turn offs
- Traffic accidents
- Speed limits
- Lane regulations
- Tire change
- Parking availability at highway service areas and parking areas.

### 2. Infra-red Transmission.

Infra-red transmission is received by the beacon antenna mounted on the top of the instrument panel. Infra-red transmissions are transmitted from road side beacons on major trunk roads. The information transmitted is:

- Traffic congestion and travel time
- Traffic accidents
- Breakdowns
- Road works restrictions
- Parking availability.

### 3. FM (frequency modulation) Transmissions.

FM (frequency modulation) transmissions are received via the FM antenna, broadcast as part of the normal RDS FM transmission.

Information transmitted is:

- Traffic congestion and travel time for wide areas
- Traffic accidents, road works, speed limits and lane restrictions for a wide area
- Parking availability information.

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## **Information and Entertainment System - Information and Entertainment System**

Diagnosis and Testing

For additional information.

REFER to: [Information and Entertainment System](#) (415-00 Information and Entertainment System - General Information, Diagnosis and Testing).



# Information and Entertainment System - Audio Unit

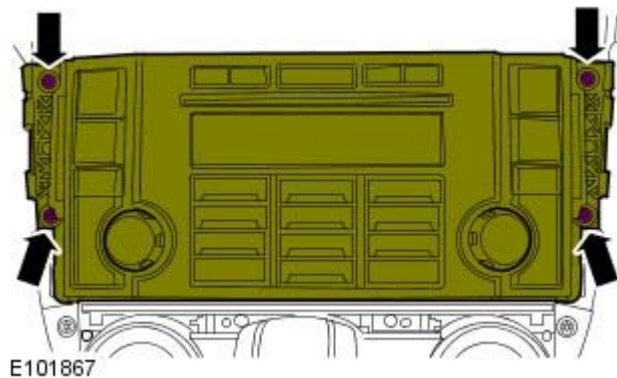
## Removal and Installation

### Removal

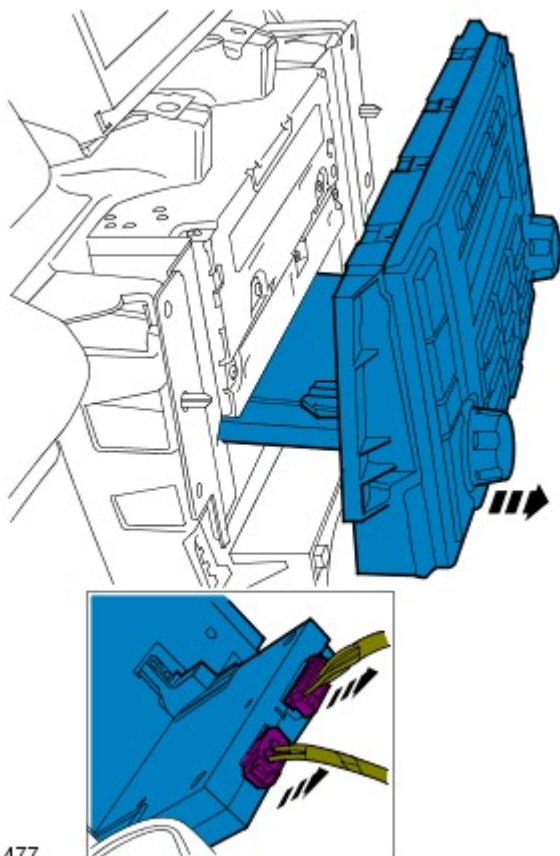
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: [Instrument Panel Console](#) (501-12 Instrument Panel and Console, Removal and Installation).

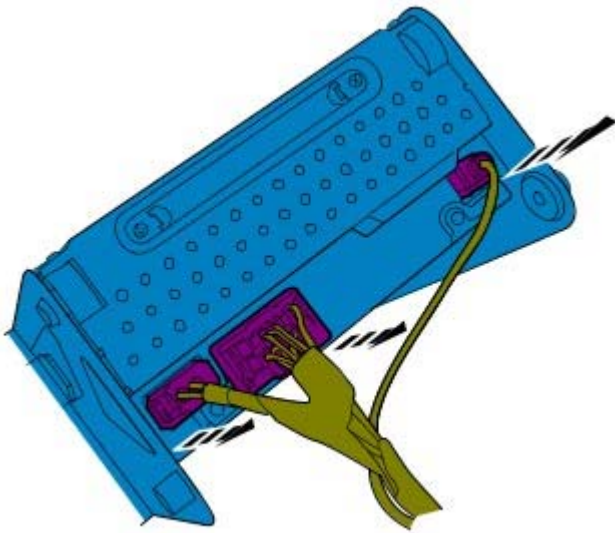
2.



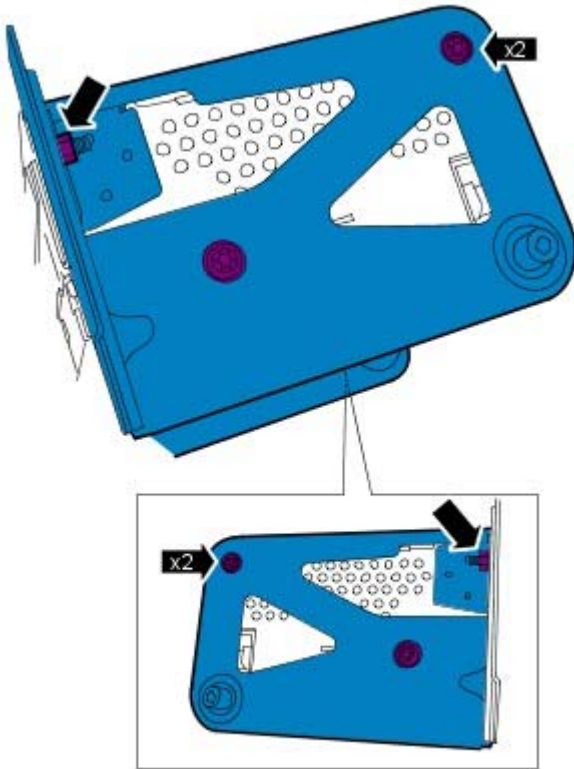
3.




4. NOTE: Do not disassemble further if the component is removed for access only.



E101478



E101479

5.  CAUTION: During installation the top edge of the brackets must be aligned with the top edge of the audio unit. Failure to do so may result in damage to the vehicle.

## Installation

1. To install, reverse the removal procedure.

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## Information and Entertainment System - Front Door Speaker

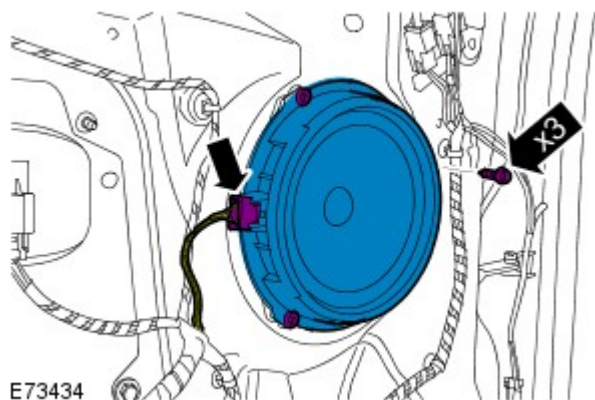
Removal and Installation

### Removal

1. Remove the front door trim panel.

Refer to: [Front Door Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

- 2.



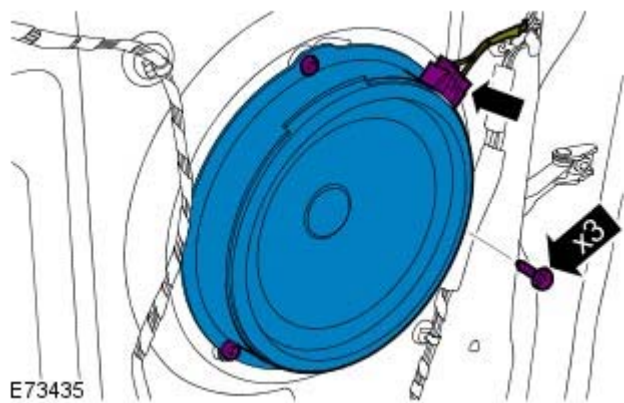
### Installation

1. To install, reverse the removal procedure.

## Information and Entertainment System - Rear Door Speaker

### Removal and Installation

#### Removal



1. Remove the rear door trim panel.

Refer to: [Rear Door Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

- 2.

#### Installation

1. To install, reverse the removal procedure.
2. Install the rear door trim panel.

Refer to: [Rear Door Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

## Information and Entertainment System - Video Display

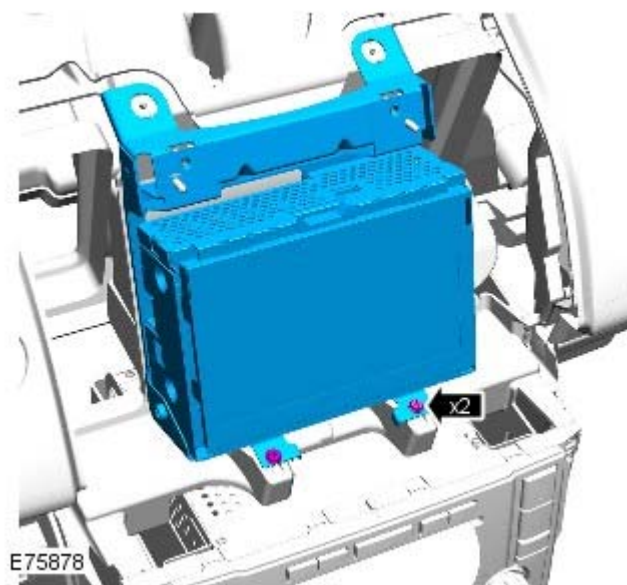
### Removal and Installation

#### Removal

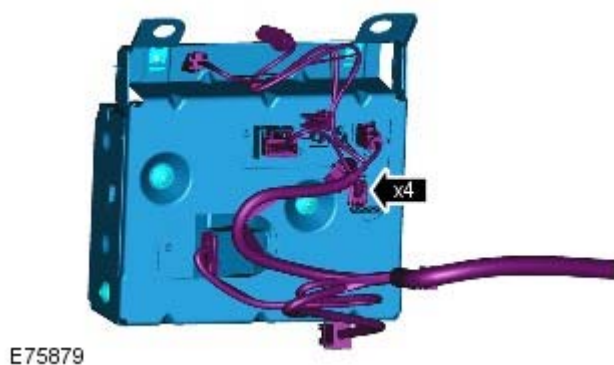
1. Remove the instrument panel console.

Refer to: [Instrument Panel Console](#) (501-12 Instrument Panel and Console, Removal and Installation).

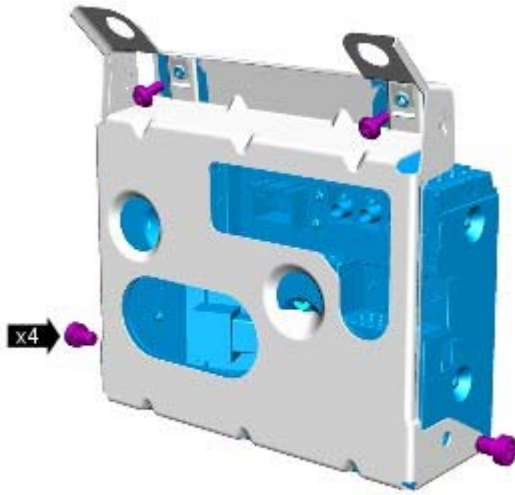
- 2.



- 3.



4. NOTE: Do not disassemble further if the component is removed for access only.



E82912

## Installation

1. To install, reverse the removal procedure.
2. If a new component has been installed, configure using Land Rover approved diagnostic equipment.

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## Information and Entertainment System - Audio Unit Antenna

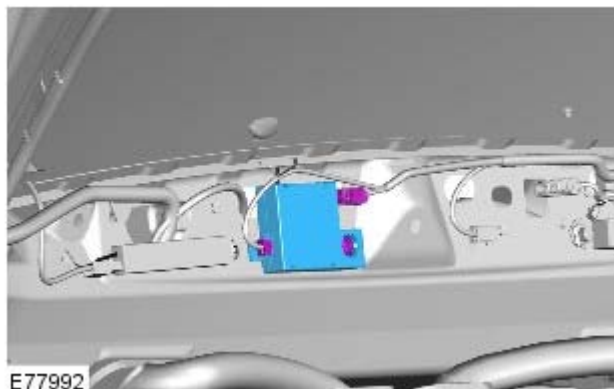
Removal and Installation

### Removal

**NOTE:** Removal steps in this procedure may contain installation details.

1. Remove the liftgate upper trim panel.

Refer to: [Liftgate Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).



2. Remove the audio unit antenna.

*Torque:* 10 Nm

### Installation

1. To install, reverse the removal procedure.



# Information and Entertainment System - Satellite Radio Tuner

## Removal and Installation

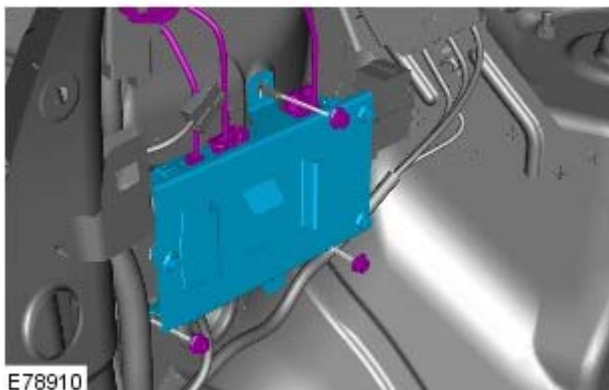
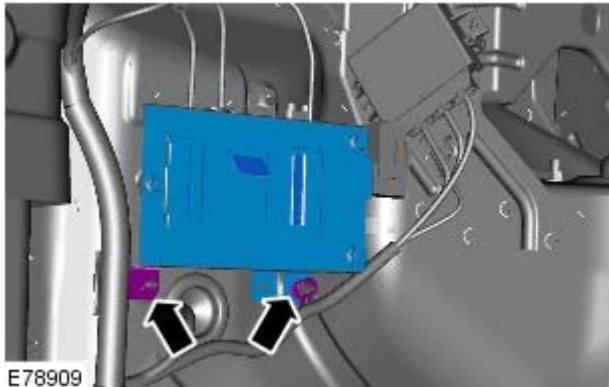
### Removal

**NOTE:** Removal steps in this procedure may contain installation details.

1. Remove the LH rear quarter trim panel.

Refer to: [Rear Quarter Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

- 2.



3. **CAUTIONS:**



Make sure that the fiber optic cables are not bent to a radius of less than 25 mm.



Make sure that the optical connectors are clean and free of foreign material.

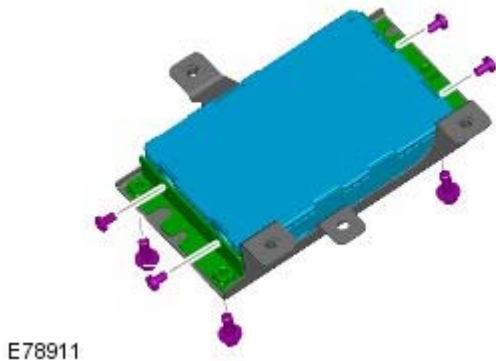
*Torque:* 10 Nm

4. **NOTE:** Do not disassemble further if the component is removed for access only.

*Torque:*

M5 6 Nm

M6 10 Nm



### Installation

1. To install, reverse the removal procedure.

2. If a new component is to be installed, configure using Land Rover approved diagnostic equipment.

# Information and Entertainment System - Cellular Phone Antenna

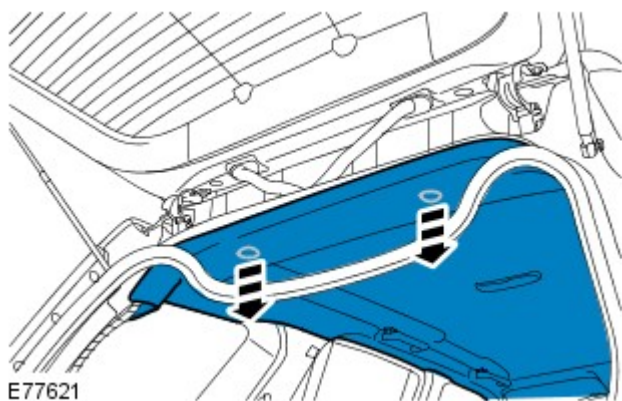
## Removal and Installation

### Removal

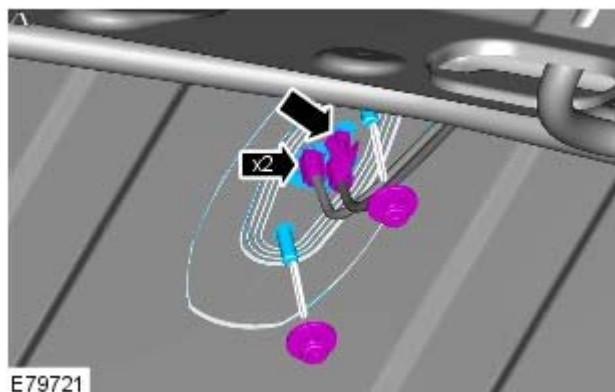
**NOTE:** Removal steps in this procedure may contain installation details.

1. Remove both D-pillar upper trim panels.

Refer to: [D-Pillar Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).



2. Release the rear of the headliner.



3. Torque: 10 Nm

### Installation

1. To install, reverse the removal procedure.

# Information and Entertainment System - Subwoofer Amplifier

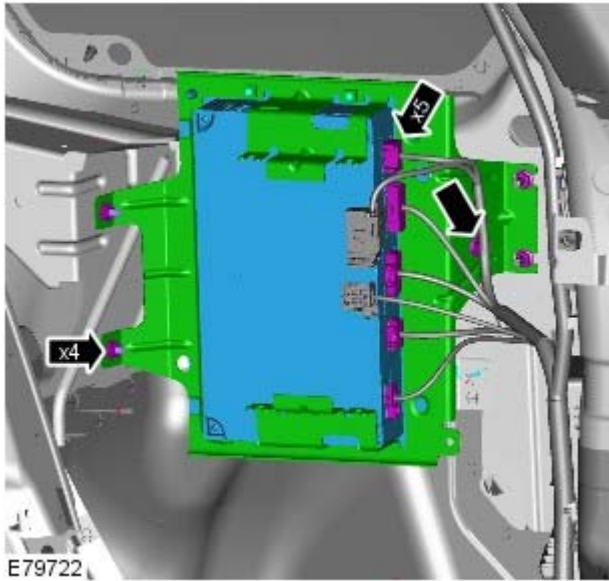
Removal and Installation

## Removal

**NOTE:** Removal steps in this procedure may contain installation details.

1. Remove the bluetooth module.

Refer to: [Bluetooth Module](#) (415-01 Information and Entertainment System, Removal and Installation).



2. **CAUTIONS:**



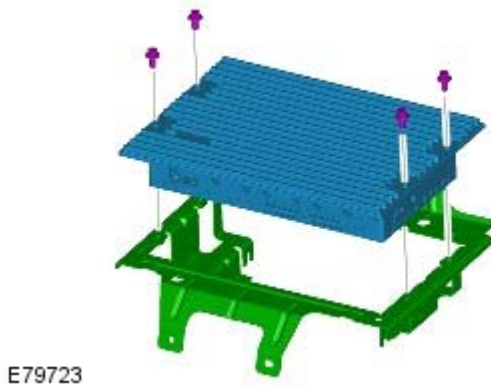
Make sure that the fiber optic cables are not bent to a radius of less than 25 mm.



Make sure that the optical connectors are clean and free of foreign material.

*Torque:* 10 Nm

3. *Torque:* 10 Nm



## Installation

1. To install, reverse the removal procedure.

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## Information and Entertainment System - Subwoofer Speaker

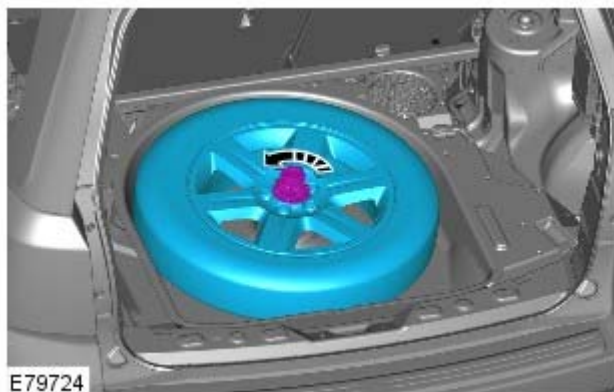
Removal and Installation

### Removal

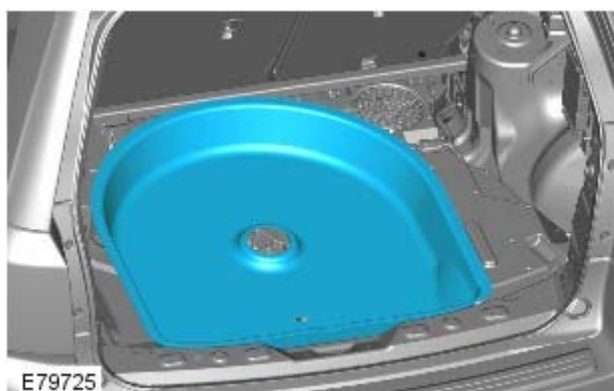
1. Remove the RH rear quarter trim panel.

Refer to: [Rear Quarter Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

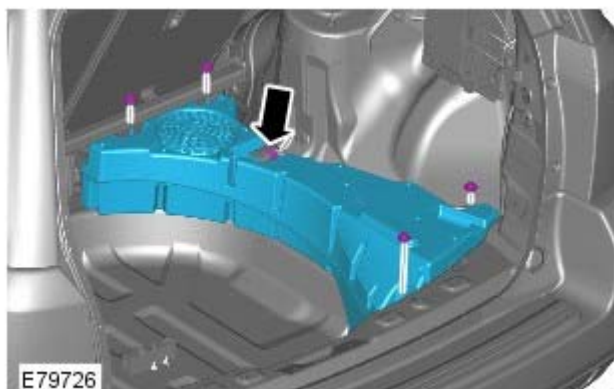
2.



3.



4.



### Installation

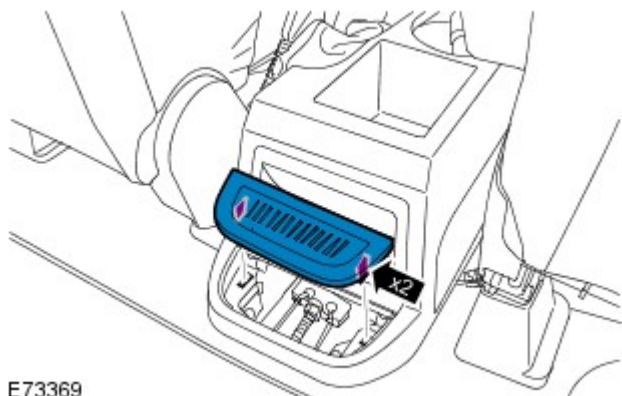
1. To install, reverse the removal procedure.

Published: 11-May-2011

## Information and Entertainment System - Rear Auxiliary Audio Controls

Removal and Installation

### Removal

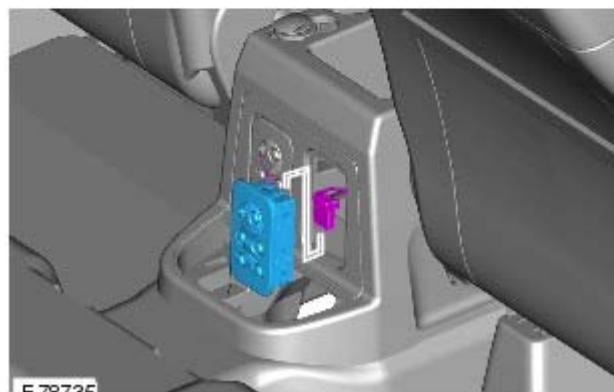


E73369

1. Remove the coin tray.



2. Remove the audio control switch.



E 78735

### Installation

1. To install, reverse the removal procedure.

## Information and Entertainment System - Bluetooth Module

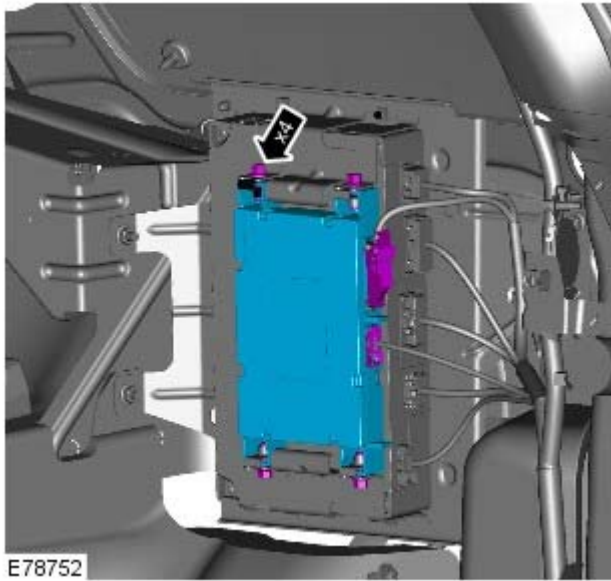
### Removal and Installation

#### Removal

NOTE: Removal steps in this procedure may contain installation details.

1. Remove the RH rear quarter trim panel.

Refer to: [Rear Quarter Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).



2. CAUTIONS:



Make sure that the fiber optic cables are not bent to a radius of less than 25 mm.



Make sure that the optical connectors are clean and free of foreign material.

Torque: 10 Nm

#### Installation

1. To install, reverse the removal procedure.
2. If a new component is to be installed, configure using IDS.

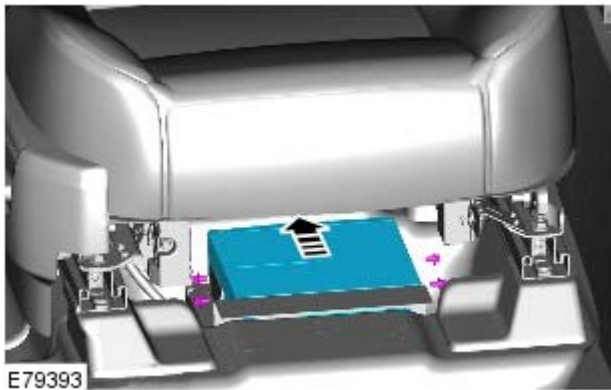


## Information and Entertainment System - Navigation System Digital Versatile Disc (DVD) Unit

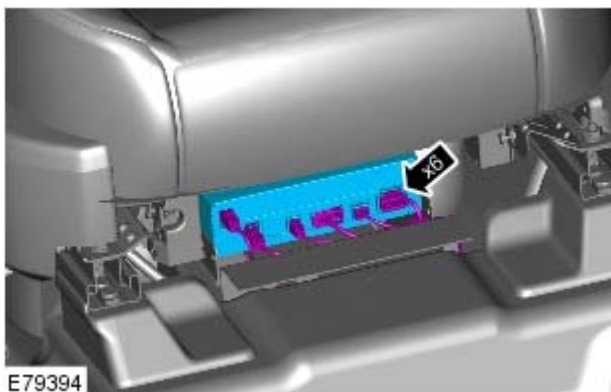
Removal and Installation

### Removal

NOTE: Removal steps in this procedure may contain installation details.



1. Torque: 6 Nm



2. CAUTIONS:



Make sure that the fiber optic cables are not bent to a radius of less than 25 mm.



Make sure that the optical connectors are clean and free of foreign material.

### Installation

1. To install, reverse the removal procedure.
2. If a new component is to be installed, configure using Land Rover approved diagnostic equipment.