Low Line Audio Component Location
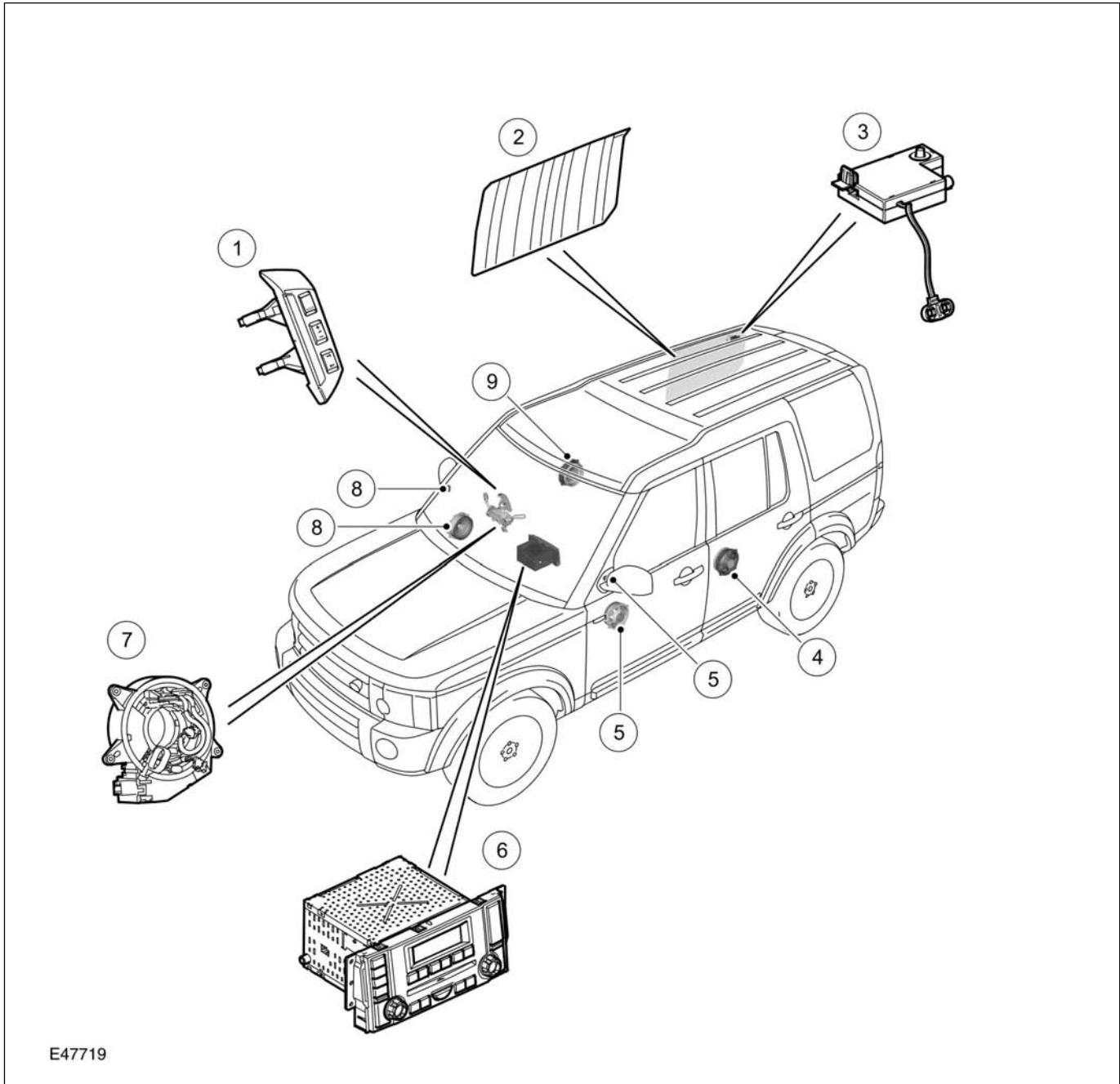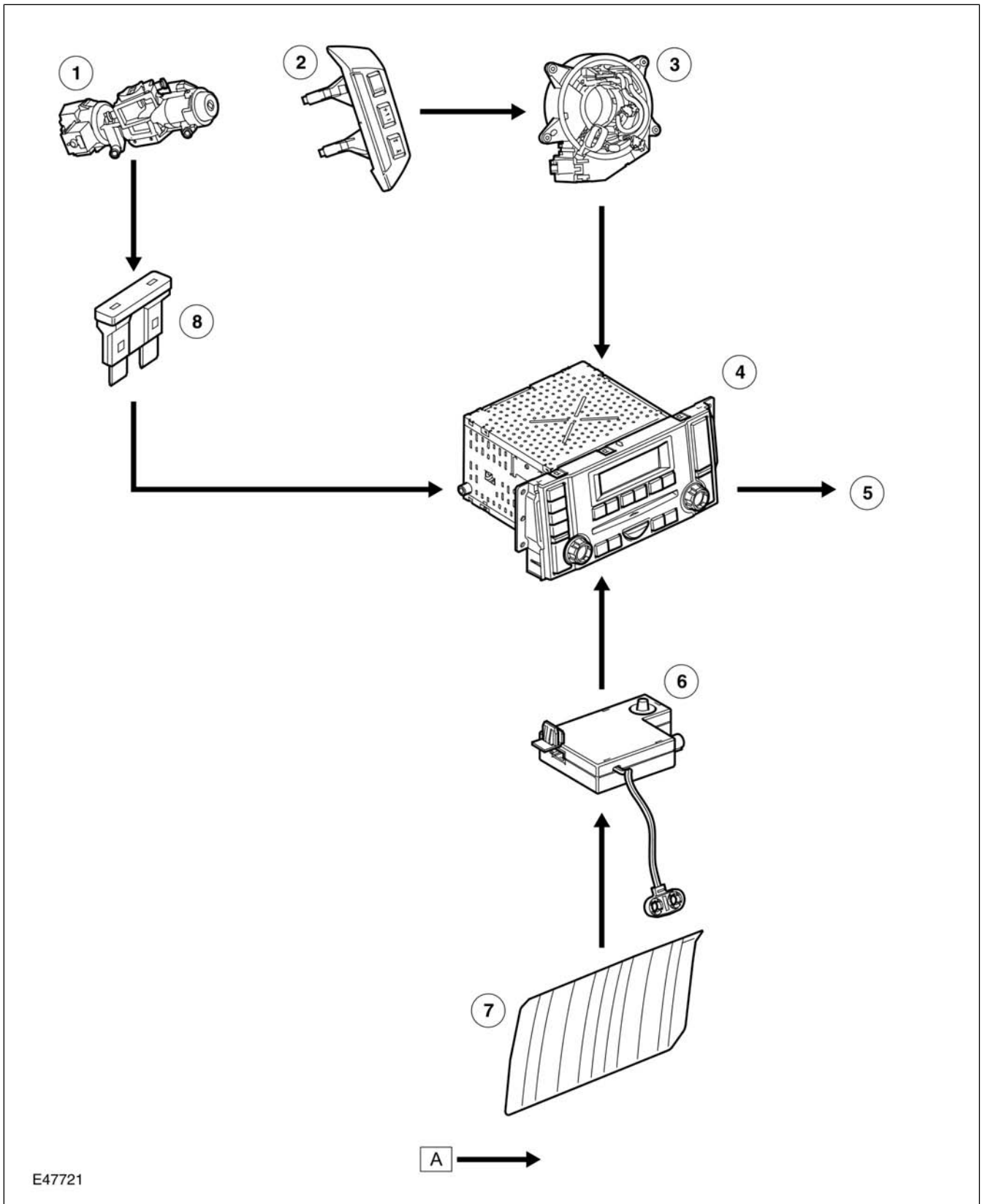

E47719

1	Audio control switches	6	Head unit
2	Screen antennas	7	Clock spring
3	Antenna amplifier	8	Front RH door speakers
4	Rear LH door speakers	9	Rear RH door speakers
5	Front LH door speakers		

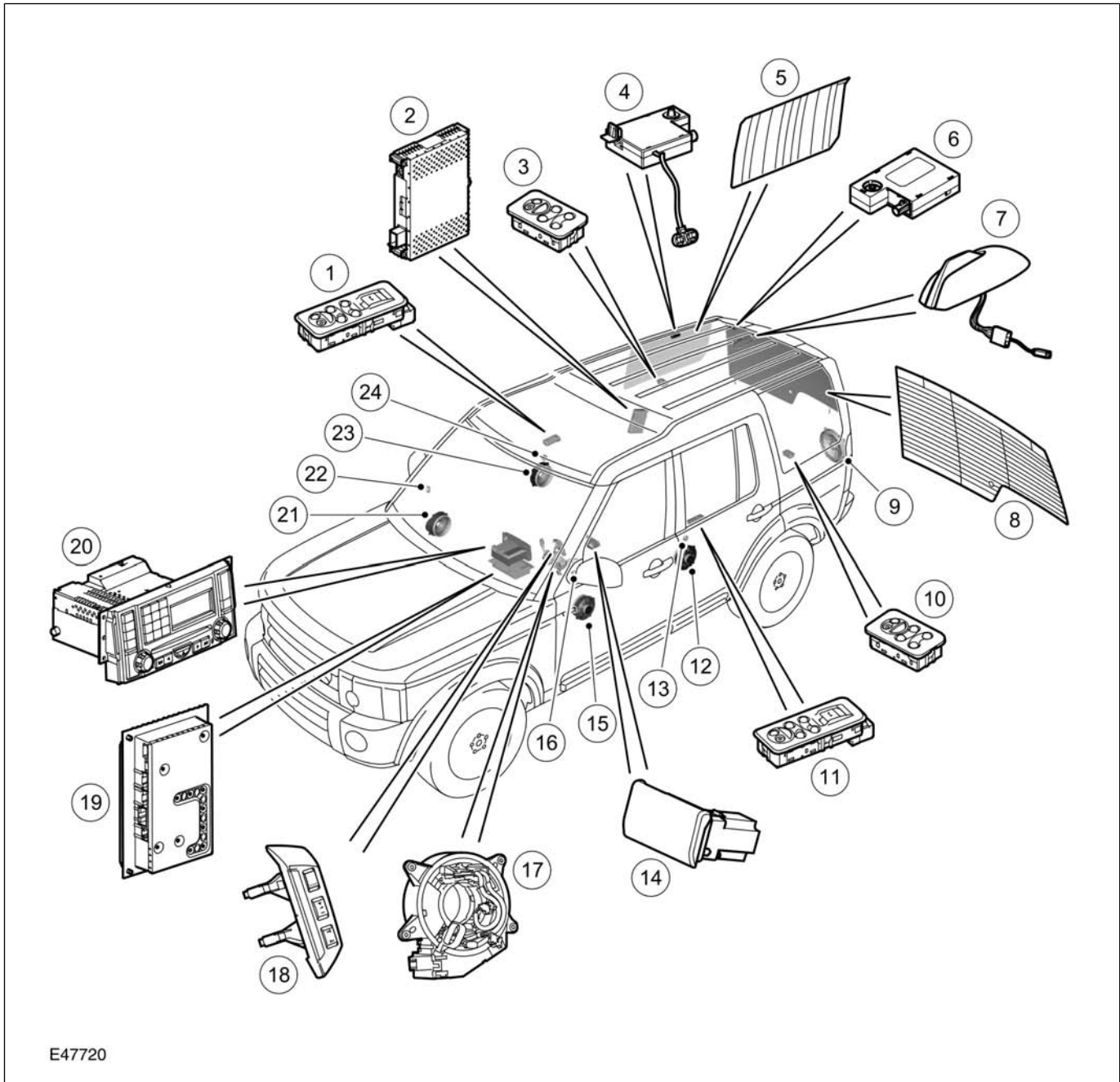**Head Unit Audio Control Diagram**

NOTE: A= Hardwired

E47721

1 Ignition switch	2 Audio remote controls

3   Clock spring   6   Antenna amplifier

4   Head unit   7   AM/FM antenna

5   Speakers   8   Fuse

Integrated Head Unit (IHU) Audio System Component Location

E47720

1   Row two remote audio controls   5   Side screen AM/FM antenna

2   TMC tuner   6   Diversity antenna amplifier

3   Row three audio remote controls   7   SDARS/ Telephone/GPS antenna roof mounted
                                              pod
4   Antenna amplifier

8   Rear screen antennas

9   Subwoofer

10   Row three audio remote controls

11   Row two audio remote controls

12   Mid range speaker

13   Tweeter

14   Audio Video Input/Output panel

15   Mid range speaker

16   Tweeter

17   Clock spring

18   Audio remote controls

19   Audio amplifier

20   Integrated Head Unit (IHU)

21   Mid range speaker

22   Tweeter

23   Mid range speaker

24   Tweeter

Integrated Head Unit (IHU) Audio Control Diagram

NOTE: A= Hardwired P= MOST
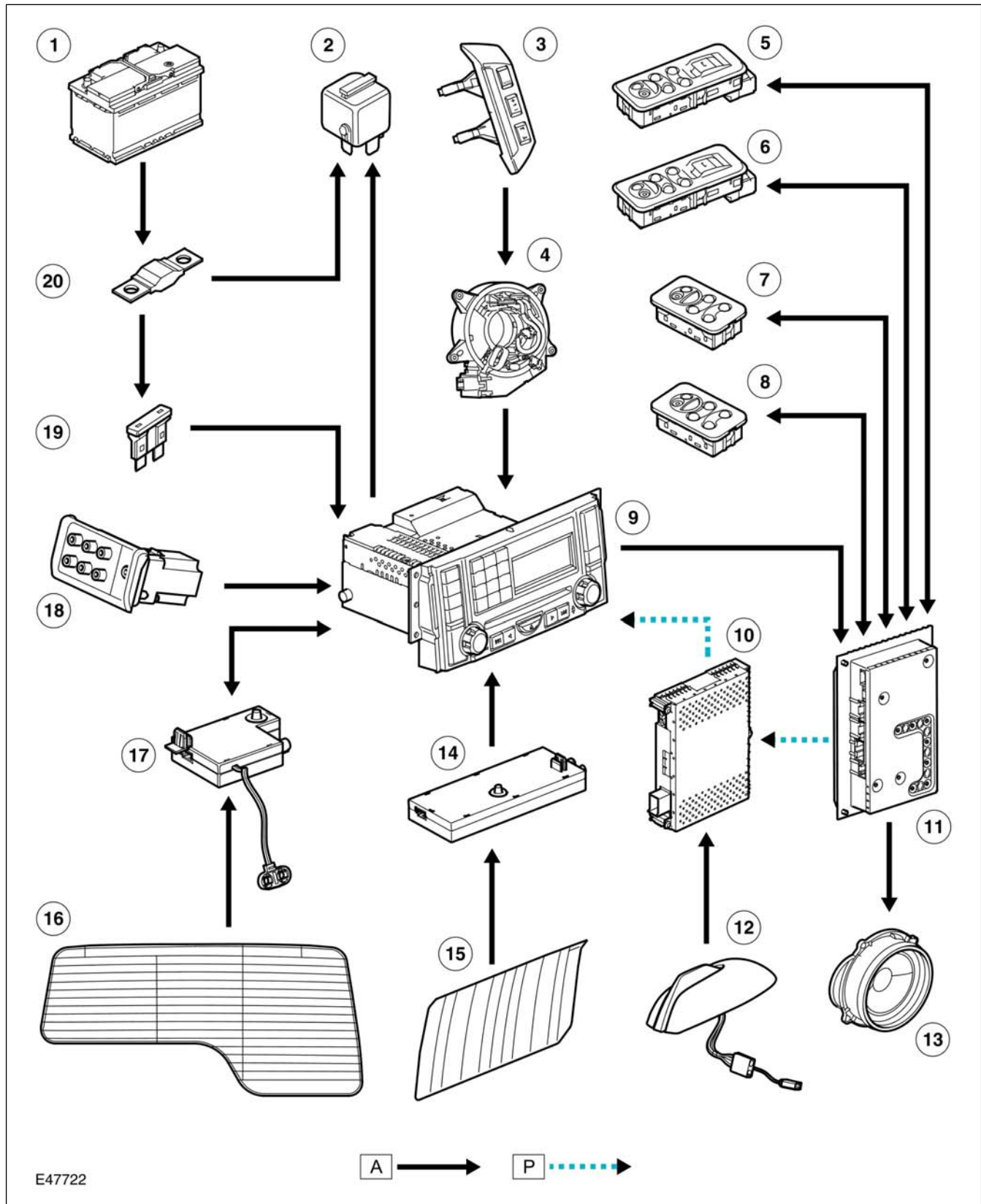

E47722

1	Battery	2 Infotainment main relay

3   Audio remote controls

4   Clock spring

5   Row two audio remote controls

6   Row two audio remote controls

7   Row three audio remote controls

8   Row three audio remote controls

9   Integrated Head Unit (IHU)

10 SDARS tuner

11 Audio amplifier

12 SDARS/GPS/telephone antenna roof mounted pod

13 Speakers

14 Side screen antenna diversity amplifier

15 Side screen AM/FM antenna

16 Rear screen antennas

17 Rear screen antenna amplifier

18 Audio/video input/output panel

19 Fuse 53p

20 Fuseable link 18E

HEAD UNITS

The audio systems has two levels of head unit. A low line and high line unit. The low line unit system is based around a head unit which communicates on the medium speed CAN bus while the High line system is based around an Integrated Head Unit (IHU) which communicates on the Media Orientated System Transport (MOST) ring and the medium speed CAN bus.

LOW LINE AUDIO HEAD UNIT

E47723
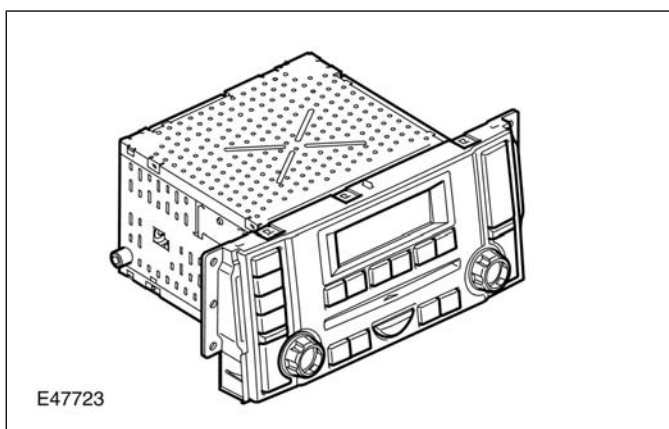
The low line Head Unit (HU) contains the following functionality:

• Radio tuner

• Single disc CD player

• Amplifier

The HU communicates with other vehicle systems on the CAN bus.

Connector C1354 Pinout Table For Low Line Head Unit

Pin No	Description	Input/Output
1	Power ground	-
2		
3	Speaker rear LH +	Output
4	Speaker rear LH -	-
5	Speaker rear RH +	Output
6	Speaker rear RH -	-
7	Steering wheel controls signal	Input
8	Not used	-
9	CAN in +	Input
10	CAN out -	-

Pin No	Description	Input/Output
11	Battery voltage	Input
12	Antenna power +	Output
13	Speaker front LH -	-
14	Speaker front LH +	Output
15	Speaker front RH -	-
16	Speaker front RH +	Output
17	NC	-
18	Steering wheel controls reference voltage +	Output
19	CAN out +	Output
20	CAN out -	-

The HU incorporates a power management function. Should the vehicle battery level drop below a predetermined level the unit will limit its functionality. The HU receives CAN signals which help it determine the wake up/shut down process. The following describes the wake up / shut down triggers initiated by the ignition key switching cycle.

- If CAN Bus activity is detected and the battery voltage is above 12.3 volts, the HU will display the clock on the LCD.

- With the ignition key inserted and the ignition switch turned to ACC/AUX, the HU will operate normally in power save mode if the HU was powered down with the 1 hour power save time out.

- If the key is moved from ACC/AUX to IGN/RUN the HU still has normal functionality.

- If the key is moved from IGN/RUN to crank HU audio is muted during engine crank.

- Once engine cranking is complete and the ignition key is returned to IGN/RUN the HU will operate in normal power mode.

- Turning the key from IGN/RUN to ACC/AUX will cause the HU to go into power save mode, limiting the output volume.

- Turning the key from ACC/AUX to the key in position will cause the HU to operate in power save mode for ten minutes. After this time the HU will go into stand by mode. If the ignition key is not removed and the CAN network goes into sleep mode, the HU will shut down completely. The HU will only power up again once any the following conditions have been met; The door lock status changes from lock to unlock, the key position changes from key in to ACC/AUX, pressing the power button on the HU, inserting or ejecting a CD.

- Removing the ignition key will cause the HU to enter stand-by mode. The only exception to this is if a phone call is in progress, where the HU will stay powered until the phone call is over and then return to stand-by mode.

All of the previous power strategies rely upon receiving the ignition key switch status via CAN.

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 T4. In transit mode the following circuits will be disabled:

- Amplifiers

- Aux and phone call

- Clock

- Antenna power

- 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/OF switch is left active to allow feedback to the driver via the HU LCD, that the unit is in Transit mode should the driver attempt to power up the HU. This will only occur when the vehicle engine is running and the battery is above 12.3 Volts.

Radio Function

The radio tuner is located in the head unit. The radio is capable of receiving AM and FM waveband and can store 18 FM pre-sets and 12 AM pre-sets. The AM presets are stored as follows:

European AM Preset Storage

- 6 MW
- 6 MWa
- 6 LW
- 6LWa

NAS AM Preset Storage
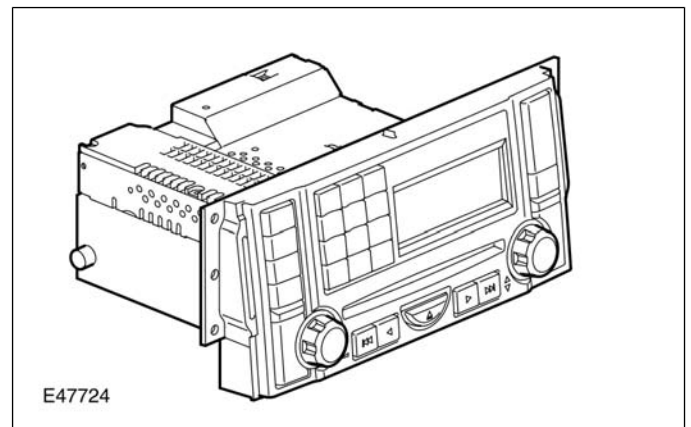
- 6 MW1
- 6 MW2
- 6 MWa

CD Function

The HU includes single play CD player. The CD player has all the usual functions of a CD player:

- CD play
- Previous/ next track

- Shuffle tracks
- Load/eject CD
- Scan
- Repeat

INTEGRATED HEAD UNIT

E47724

The high line head unit contains the following functionality:

- Radio tuner.
- CD player (Six disc in dash changer).
- Integrated telephone control.
- Auxiliary input (for any device featuring a 3.5mm jack plug output).

The IHU (Integrated Head Unit) unit also integrates with the navigation system, this requires the addition of a navigation computer, touch screen display and GPS antenna.

The IHU is woken up by CAN bus activity and is not woken up from the ignition aux position.

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

Connector C1354 Pinout Table For High Line Audio

Pin No	Description	Input/Output
1	Ground	-
2	Not used	-
3	Not used	-
4	Not used	-
5	Not used	-
6	Not used	-
7	Steering wheel switch ground	-
8	Infotainment relay switch	Output
9	CAN +	Input
10	CAN -	Output
11	Battery voltage	Input
12	Antenna power	Output
13	Not used	-
14	Not used	-
15	Not used	-
16	Not used	-
17	Not used	-
18	Steering wheel switch reference voltage	Output
	CAN +	Input
	CAN -	Output

Connector C2115 Pinout Table

Pin No	Description	Input/Output
1	NC	-
2	NC	-
3	Phone +	Output
4	NC	-

Pin No	Description	Input/Output
5	Phone -	-
6	Aux Screen	-
7	Right aux Jack plug input	Input
8	Left aux Jack plug input	Input
9	Not used	-
10	Not used	-
11	Not used	-
12	Audio Ground	-

Tuner

The IHU incorporates a AM/FM tuner which allows for 18 FM pre-sets and 12 AM (6 MW and 6 LW) pre-set stations to be stored in the IHU memory. The radio tuner also incarcerates the following radio functions:

- Auto tune
- Traffic announcements (TA)
- RDS EON function
- Seek station
- Tune up/down

CD Player

The CD player is a 6 disc in dash mounted device. The CD multi changer is capable of playing commercial CDs, CDRs, CDRWs and MP3 discs.

Random Play

The Random feature only works on the CD, which has been selected. The 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 track 1.

Repeat

The Repeat feature allows the current track to be repeated in an endless loop, when selected by the user.

MP3

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.

Scan

Scan allows the user to play the first 10 seconds of each track on the CDs in the unit.

Automatic Volume Control - AVC

The AVC feature is designed to adjust output volume to compensate for the rising level noise of the vehicle as the vehicle travels faster.

There are 10 settings for AVC, where 0 = off, 1 is the lowest setting (minimum volume change with speed and 9 the maximum).

The vehicle speed signal is used to enable the IHU to calculate the volume adjustment required. The vehicle speed signal is received over the CAN from the ABS control module. The signal is an average of the four wheel speed sensor signals.

Control of the AVC is carried out by the audio amplifier.

Should an invalid speed signal be received the AVC will not alter the output volume.

IHU Diagnostics

The IHU has built in diagnostics functions accessed via hidden menus, to enable the technician to diagnose problems with the system. The diagnostics are grouped into three areas:

* Security

* Set-up

Access to the hidden menus, to he functions within the menus are not intended to give direct control to the customer and should, where possible, kept transparent

The following sequence outlines the process of entering and navigating through the Menus.

NOTE: Exiting the hidden menu is achieved by turning the unit OFF, via the On/Off button at any time.

NOTE: Head unit is assumed to be in OFF condition

– Press ON/OFF button.

– Within 5 seconds press and hold the On/OFF button for 10 seconds to access the SECURITY menu.

– A short press of the FF button (<2seconds) enters the SET-UP1 menu.

Exiting the hidden menus can be achieved at any time by pressing the ON/OFF button.

the following table details the hidden menus. Each screen is broken down into greater detail, within the relevant Hidden Menu Type.

IHU Menu Screens

Screen	Menu	Screen name	Display
1	Security	Security 1	Serial Number, VIN, Part Number.
2	Set-Up	Set-Up 1	Tuner Set-Up. RDS, REG, AF General Set-Up.
3	Set-Up	Set-Up 2	AVC, Market, Personalisation, Transit Mode.
4	Test	Component	Hardware, Software, Date Stamp, Vehicle

In the security menu the only buttons that function are:

* Volume

* Fast forward

* Fast rewind

In the Set-Up Menus, the only buttons that function are:

* Volume

* Fast forward

* Fast rewind

* Source

* Seek

In the test menu the only buttons that function are:

- Volume
- Fast forward
- Fast rewind
- Source
- Seek

CLOCK

The IHU contains the master clock functionality. The IHU contains and displays the clock in one unit. Other vehicle modules that require clock functionality use the time supplied from the IHU.

The clock is available to any control module that is connected to an interconnecting bus ie either of the CAN busses or the MOST ring.

The clock display configurable to show in AM / PM or 24 hour format. Midnight is shown as 12:00AM or 0:00 respectively. The default condition, if not specified, after power on or delivery, should default to 1:00PM or 13:00. Depending upon the market set the clock will default th=o either 12 or 24 hour format.

The time is adjusted from the IHU. This will ensure that all vehicle clocks will be synchronised at all times. Under conditions when any bus could be asleep or shut down, the HMI does not allow clock adjustments.

AMPLIFIERS

Harman Kardon High Line/Logic 7 Amplifier

E47726
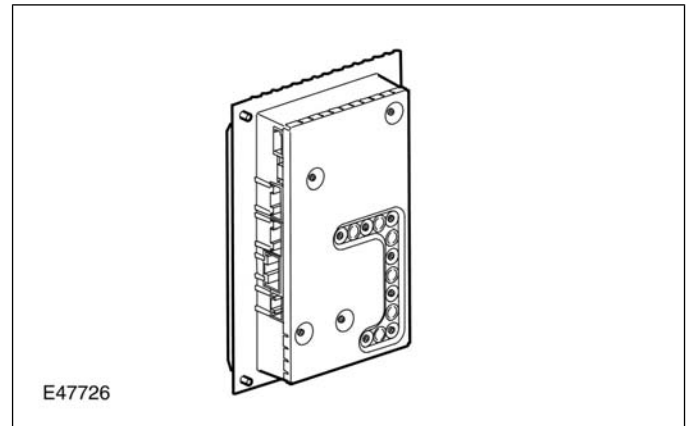
The audio system has the option of one of two audio amplifiers:

- Harman Kardon
- Harman Kardon Logic 7

The amplifier is located under the RH front seat and is connected to the audio system via the MOST bus.

Speaker Connector C0491 for Harman Kardon Amplifier

Pin No	Description	Input/Output
1	LH rear door speaker -	-
2	RH rear door speaker -	-
3	NC	-
4	NC	-
5	LH front door speaker -	-
6	RH front door speaker -	-
7	Subwoofer left -	-
8	Subwoofer right -	-
9	LH rear door speaker +	Output

Pin No	Description	Input/Output
10	RH rear door speaker +	Output
11	NC	-
12	NC	-
13	LH front door speaker +	Output
14	RH front door speaker +	Output
15	Subwoofer left +	Output
16	Subwoofer right +	Output

Speaker Connector C0491 for Harman Kardon Logic 7 Amplifier

Pin No	Description	Input/Output
1	LH rear door speaker -	-
2	RH rear door speaker -	-
3	LH front bass speaker -	-
4	RH front bass speaker -	-
5	Rear surround left -	-
6	Rear surround right -	-
7	Subwoofer left -	-
8	Subwoofer right -	-
9	LH rear door speaker +	Output
10	RH rear door speaker +	Output
11	LH front bass speaker +	Output
12	RH front bass speaker +	Output
13	Rear surround left +	Output
14	Rear surround right +	Output
15	Subwoofer left +	Output
16	Subwoofer right +	Output

Speaker Connector C0492 for Harman Kardon Amplifier

Pin No	Description	Input/Output
1	NC	
2	NC	
3	NC	
4	NC	
5	Headphone module 1 left channel	Output
6	Headphone module 1 right channel	Output
7	Headphone module 2 right channel	Output
8	Headphone module 2 left channel	Output
9	NC	-
10	NC	-
11	NC	-
12	NC	-
13	NC	-
14	NC	-
15	Headphone module 1 left ground	-
16	Headphone module 1 right ground	-
17	Headphone module 2 left ground	-
18	Headphone module 2 right ground	-
19	NC	-
20	NC	-

Speaker Connector C0493 for Harman Kardon Amplifier

Pin No	Description	Input/Output
1	Headphone module 3 left channel	Output
2	Headphone module 3 right channel	Output
3	Headphone module 4 left channel	Output
4	Headphone module 4 right channel	Output
5	Headphone module 1 control signal	Output

Pin No	Description	Input/Output
6	Headphone module 2 control signal	Output
7	Headphone module 3 control signal	Output
8	Headphone module 4 control signal	Output
9	NC	_
10	NC	_
11	Headphone module 3 left ground	-
12	Headphone module 3 right ground	-
13	Headphone module 4 left ground	-
14	Headphone module 4 right ground	-
15	Headphone module 1 control ground	-
16	Headphone module 2 control ground	-
17	Headphone module 3 control ground	-
18	Headphone module 4 control ground	-
19	NC	-
20	NC	-

Speaker Connector C0492 for Harman Kardon Logic 7 Amplifier

Pin No	Description	Input/Output
1	LH front mid/high range speaker -	-
2	RH front mid/high range speaker -	-
3	Centre fill speaker -	-
4	NC	-
5	Headphone module 1 left channel	Output
6	Headphone module 1 right channel	Output
7	Headphone module 2 left channel	Output
8	Headphone module 2 right channel	Output
9	NC	-
10	NC	-

Pin No	Description	Input/Output
11	LH front mid/high range speaker +	Output
12	RH front mid/high range speaker +	Output
13	Centre fill speaker +	Output
14	NC	-
15	Headphone module 1 left channel ground	-
16	Headphone module 1 right ground	-
17	Headphone module 2 left ground	-
18	Headphone module 2 right ground	-
19	NC	-
20	NC	-

Speaker Connector C0493 for Harman Kardon Logic 7 Amplifier

Pin No	Description	Input/Output
1	Headphone module 3 left channel	Output
2	Headphone module 3 right channel	Output
3	Headphone module 4 left channel	Output
4	Headphone module 4 right channel	Output
5	Headphone module 1 control signal	Output
6	Headphone module 2 control signal	Output
7	Headphone module 3 control signal	Output
8	Headphone module 4 control signal	Output
9	NC	-
10	NC	-
11	Headphone module 3 left channel ground	-
12	Headphone module 3 right channel ground	-

Pin No	Description	Input/Output
13	Headphone module 4 left channel ground	-
14	Headphone module 4 right channel	-
15	Headphone module 1 control ground	-
16	Headphone module 2 control ground	-
17	Headphone module 3 control ground	-
18	Headphone module 4 control ground	-
19	NC	-
20	NC	-

STEERING WHEEL CONTROLS

Steering Wheel Audio Controls

E47725
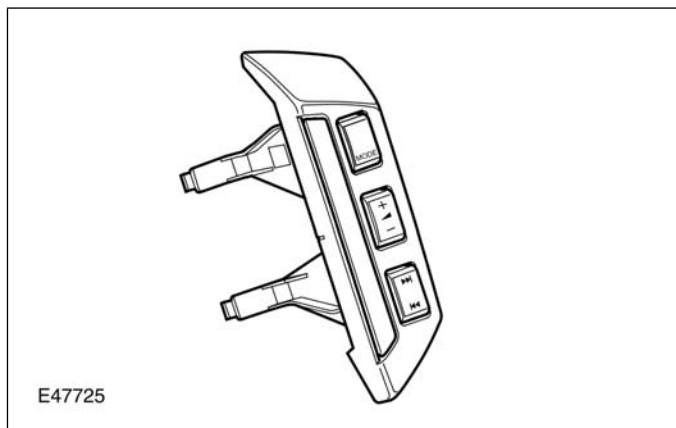
The IHU can be remotely controlled via steering wheel mounted controls. The steering wheel controls are mounted to the right hand side of the steering wheel.

The switches are a resistive ladder type. The IHU supplies a reference voltage to the switches, which then return an altered voltage to the IHU depending on which switch is pressed.

The controls allow the user to adjust the volume, change CD tracks/ radio pre-sets, answer and end a phone call (where a phone is fitted) and use the voice recognition system.

SATELLITE DIGITAL AUDIO RADIO SERVICE (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 Sirius SDARS systems comprise:

• Satellites

• Ground repeaters

• Up-link ground stations

• Radio receiver systems

The Sirius 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.

TRAFFIC MESSAGE CHANNEL (TMC)

The TMC system is a European only system whereby traffic information is received by the TMC tuner and used by the navigation computer to recalculate the route being used to avoid the traffic disruption. This system information is broadcast on the RDS data carriers.