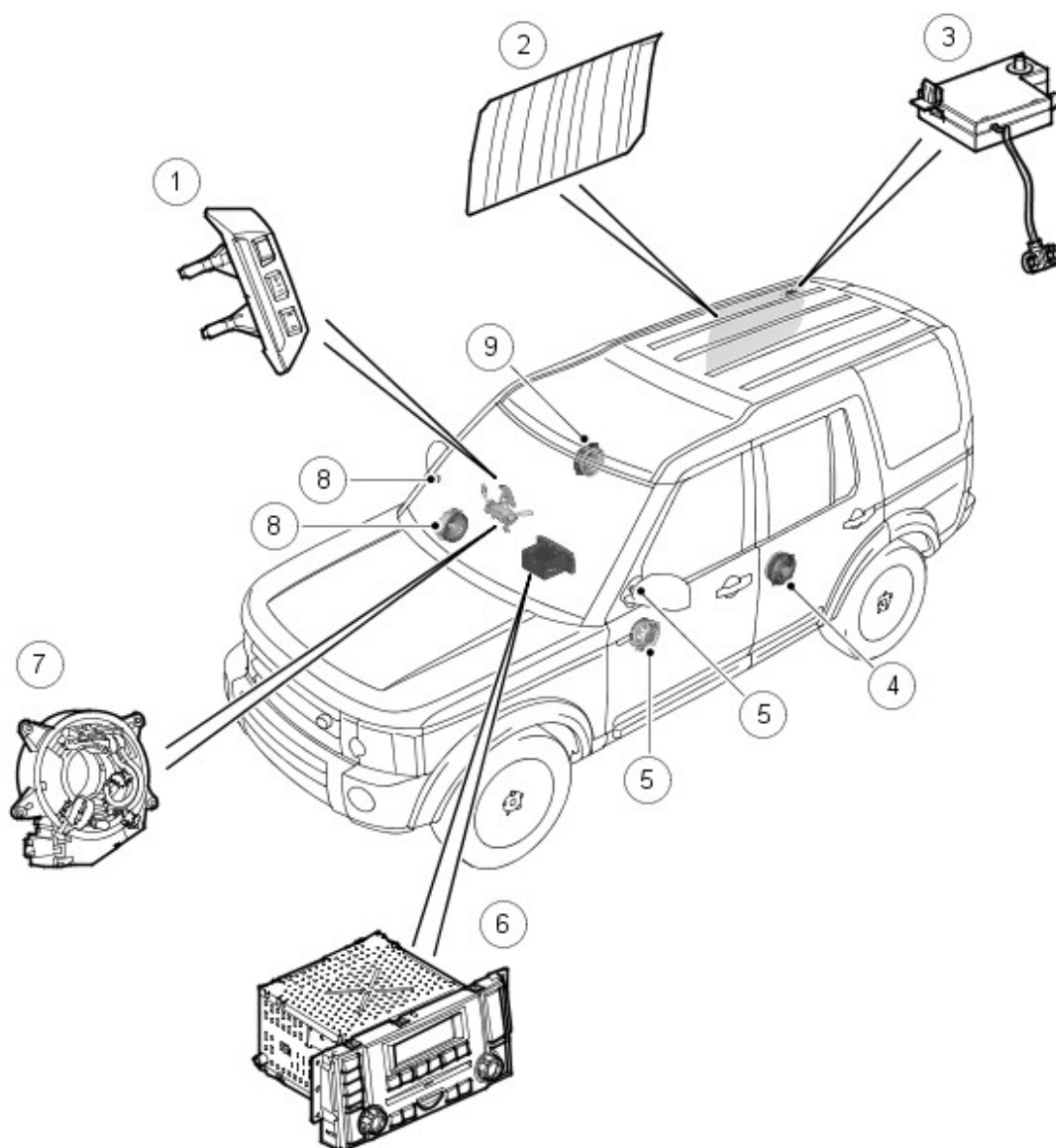


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AUDIO UNIT

# AUDIO SYSTEM (G421265)

## LOWLINE AUDIO - COMPONENT LOCATION




E47719

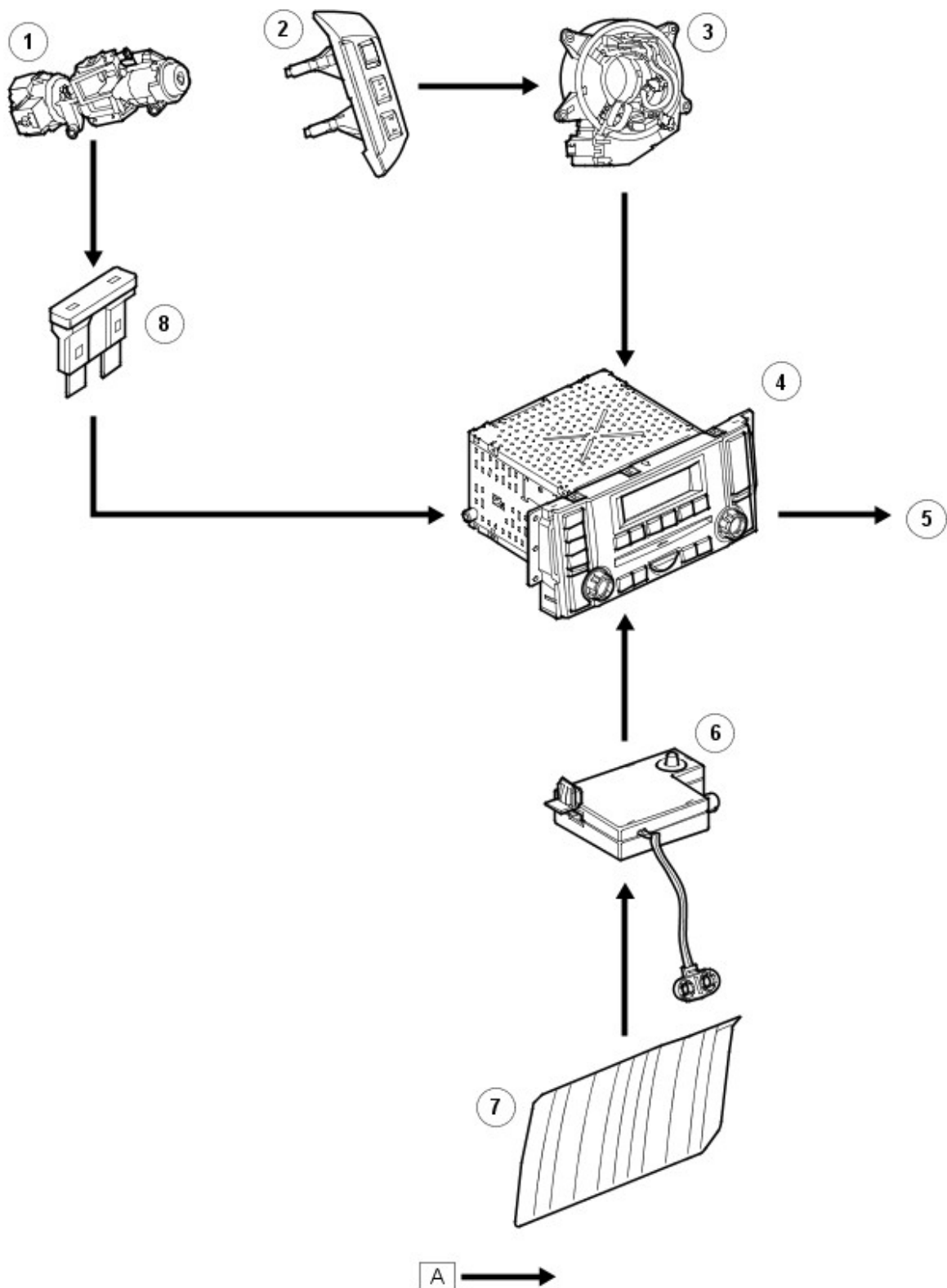
ITEM	DESCRIPTION
1	Audio control switches
2	Screen antennas
3	Antenna amplifier

ITEM	DESCRIPTION
4	Rear left-hand (LH) door speakers
5	Front LH door speakers
6	Head unit
7	Clock spring
8	Front right-hand (RH) door speakers
9	Rear RH door speakers

HEAD UNIT – AUDIO CONTROL DIAGRAM

 **NOTE:**

A= Hardwired

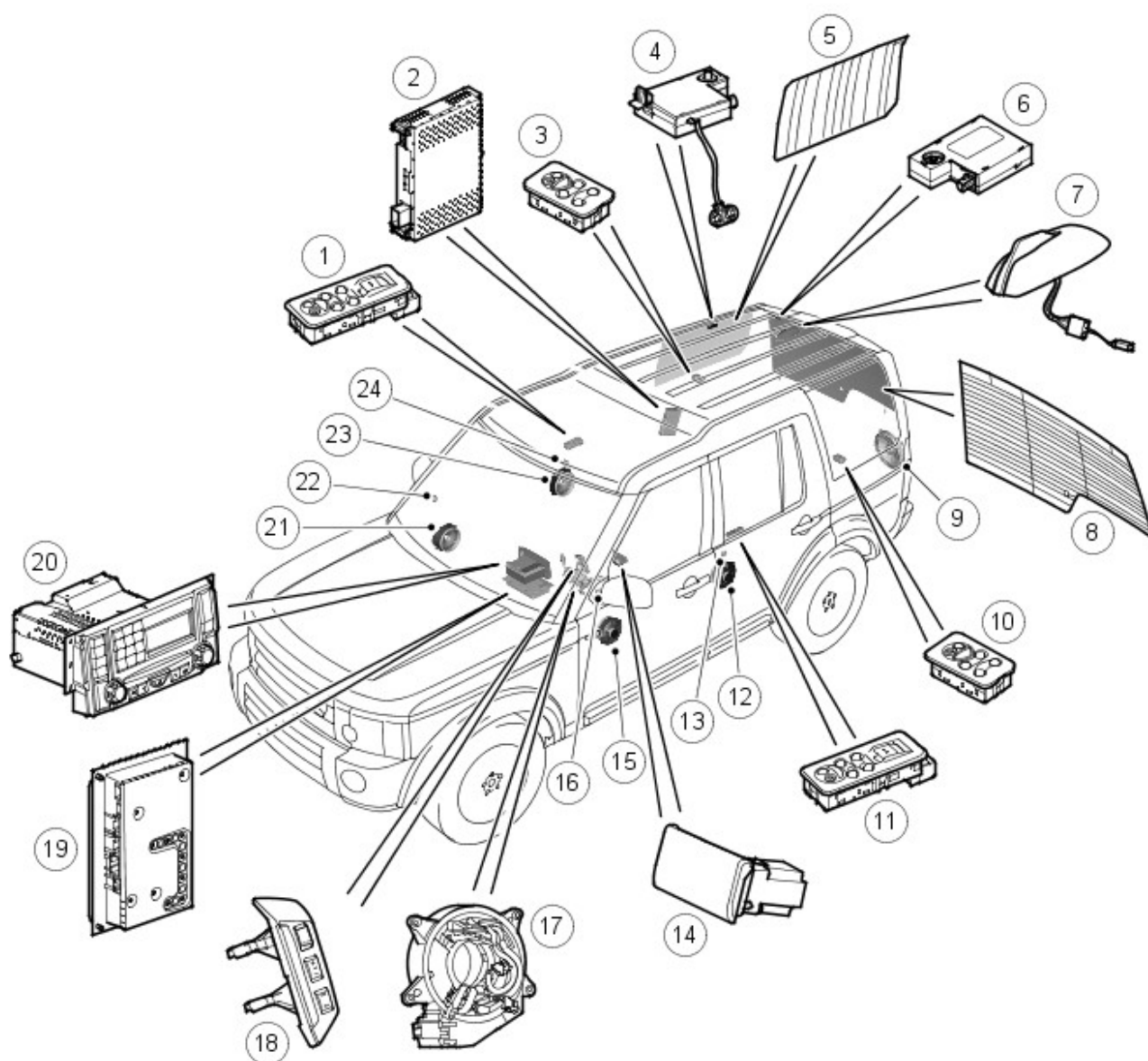


E47721

ITEM	DESCRIPTION
1	Ignition switch
2	Audio remote controls
3	Clock spring

ITEM	DESCRIPTION
4	Head unit
5	Speakers
6	Antenna amplifier
7	amplitude modulation (AM)/ frequency modulation (FM) antenna
8	Fuse

## INTEGRATED HEAD UNIT (IHU) - AUDIO SYSTEM COMPONENT LOCATION



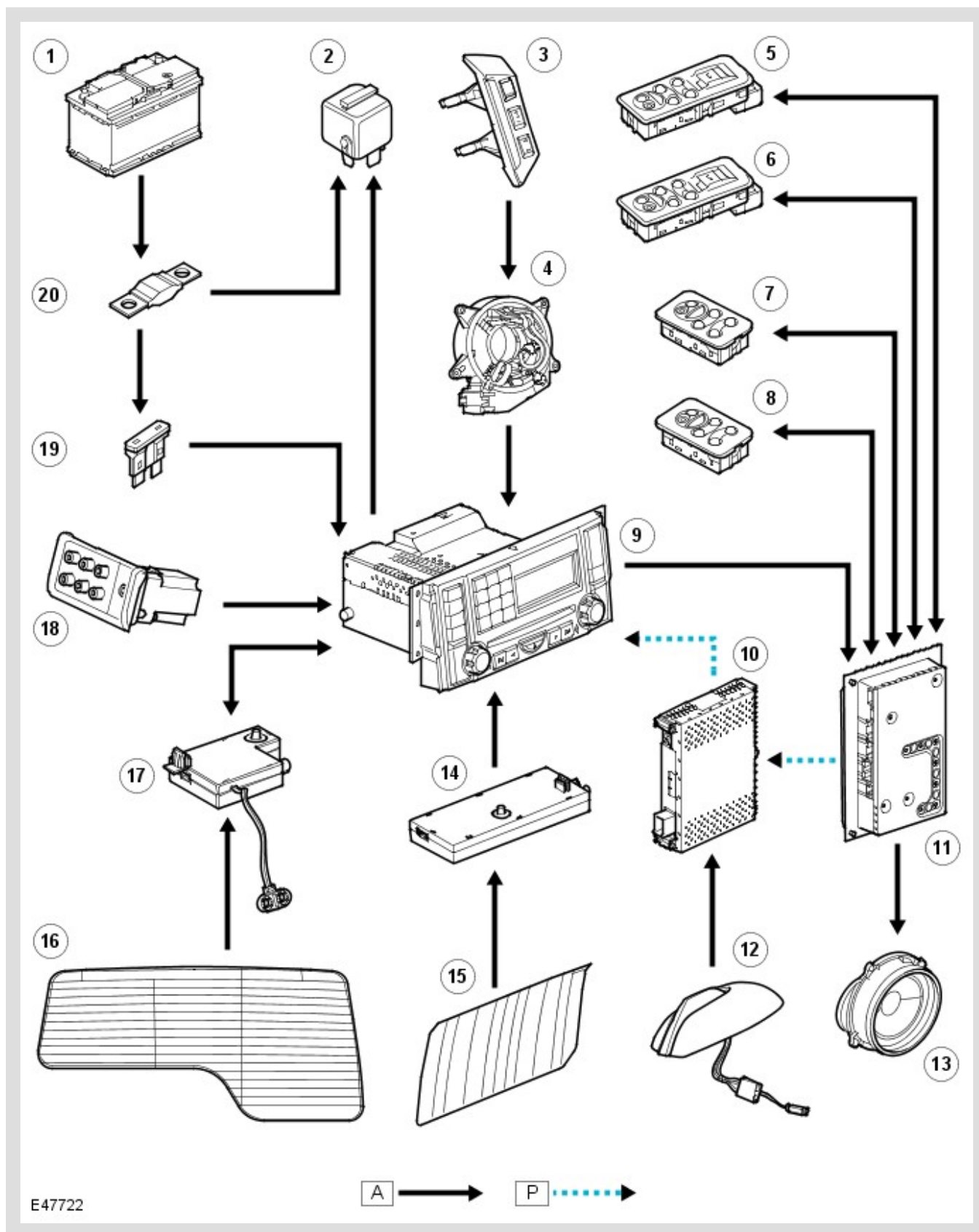
ITEM	DESCRIPTION
1	Row two remote audio controls
2	TMC tuner
3	Row three audio remote controls
4	Antenna amplifier
5	Side screen AM/ FM antenna
6	Diversity antenna amplifier
7	SDARS/Telephone antenna roof mounted pod
8	Rear screen antennas
9	Subwoofer
10	Row three audio remote controls
11	Row two audio 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



ITEM	DESCRIPTION
1	Battery
2	Infotainment main relay
3	Audio remote controls

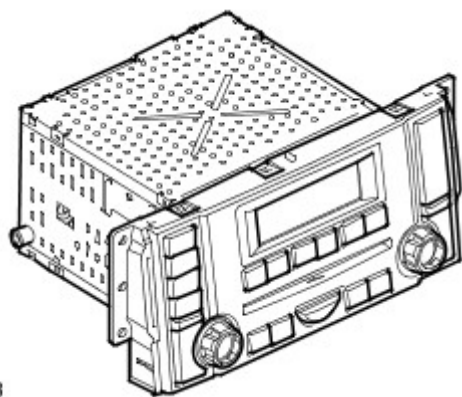
ITEM	DESCRIPTION
4	Clock spring
5	Row two audio remote controls
6	Row two audio remote controls
7	Row three audio remote controls
8	Row three audio remote controls
9	Integrated Head Unit (IHU)
10	SDARS tuner
11	Audio amplifier
12	SDARS/telephone antenna roof mounted pod
13	Speakers
14	Side screen antenna 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 controller area network (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 compact 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 -	-
11	Battery voltage	Input
12	Antenna power +	Output

PIN NO	DESCRIPTION	INPUT/OUTPUT
13	Speaker front LH -	-
14	Speaker front LH +	Output
15	Speaker front RH -	-
16	Speaker front RH +	Output
17	Not used	-
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 liquid crystal display (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
- 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 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

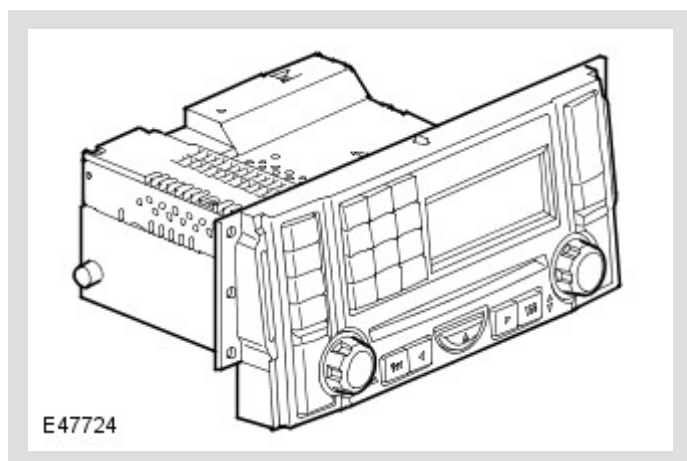
- 6 MW1
- 6 MW2
- 6 MWa

### **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



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 global positioning system (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

PIN NO	DESCRIPTION	INPUT/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	Not used	-
2	Not used	-
3	Phone +	Output
4	Not used	-
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 incorporates the following radio functions:

- Auto tune
- Traffic announcements (TA)
- radio data system (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, CD Rs, 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 anti-lock brake system (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.

## 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.

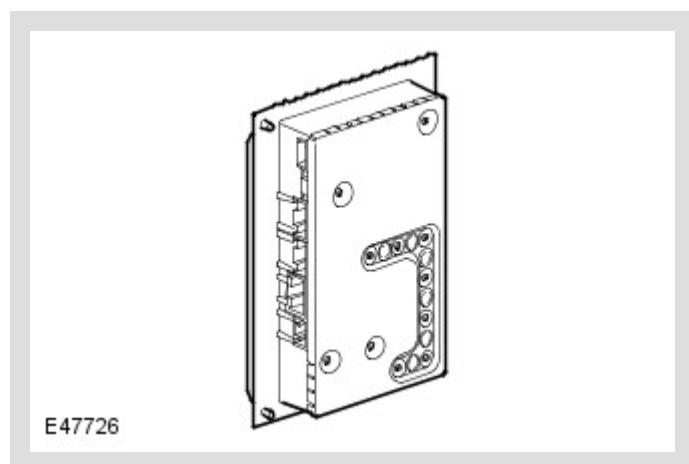
The clock is available to any control module that is connected to an interconnecting bus i.e. either of the CAN busses or the MOST ring.

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 to either 12 or 24 hour format.

The time is adjusted from the IHU. This will ensure that all vehicle clocks will be synchronized 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



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 -	-

PIN NO	DESCRIPTION	INPUT/OUTPUT
3	Not used	-
4	Not used	-
5	LH front door speaker -	-
6	RH front door speaker -	-
7	Subwoofer left -	-
8	Subwoofer right -	-
9	LH rear door speaker +	Output
10	RH rear door speaker +	Output
11	Not used	-
12	Not used	-
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



PIN NO	DESCRIPTION	INPUT/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	Not used	
2	Not used	
3	Not used	
4	Not used	
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	Not used	-
10	Not used	-
11	Not used	-
12	Not used	-
13	Not used	-
14	Not used	-
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	Not used	-
20	Not used	-

#### Speaker Connector C0493 for Harman Kardon Amplifier

PIN NO	DESCRIPTION	INPUT/OUTPUT
1	Headphone module 3 left channel	Output

PIN NO	DESCRIPTION	INPUT/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	Not used	—
10	Not used	—
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	Not used	-
20	Not used	-

#### 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	Center fill speaker -	-
4	Not used	-
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

PIN NO	DESCRIPTION	INPUT/OUTPUT
9	Not used	-
10	Not used	-
11	LH front mid/high range speaker +	Output
12	RH front mid/high range speaker +	Output
13	Center fill speaker +	Output
14	Not used	-
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	Not used	-
20	Not used	-

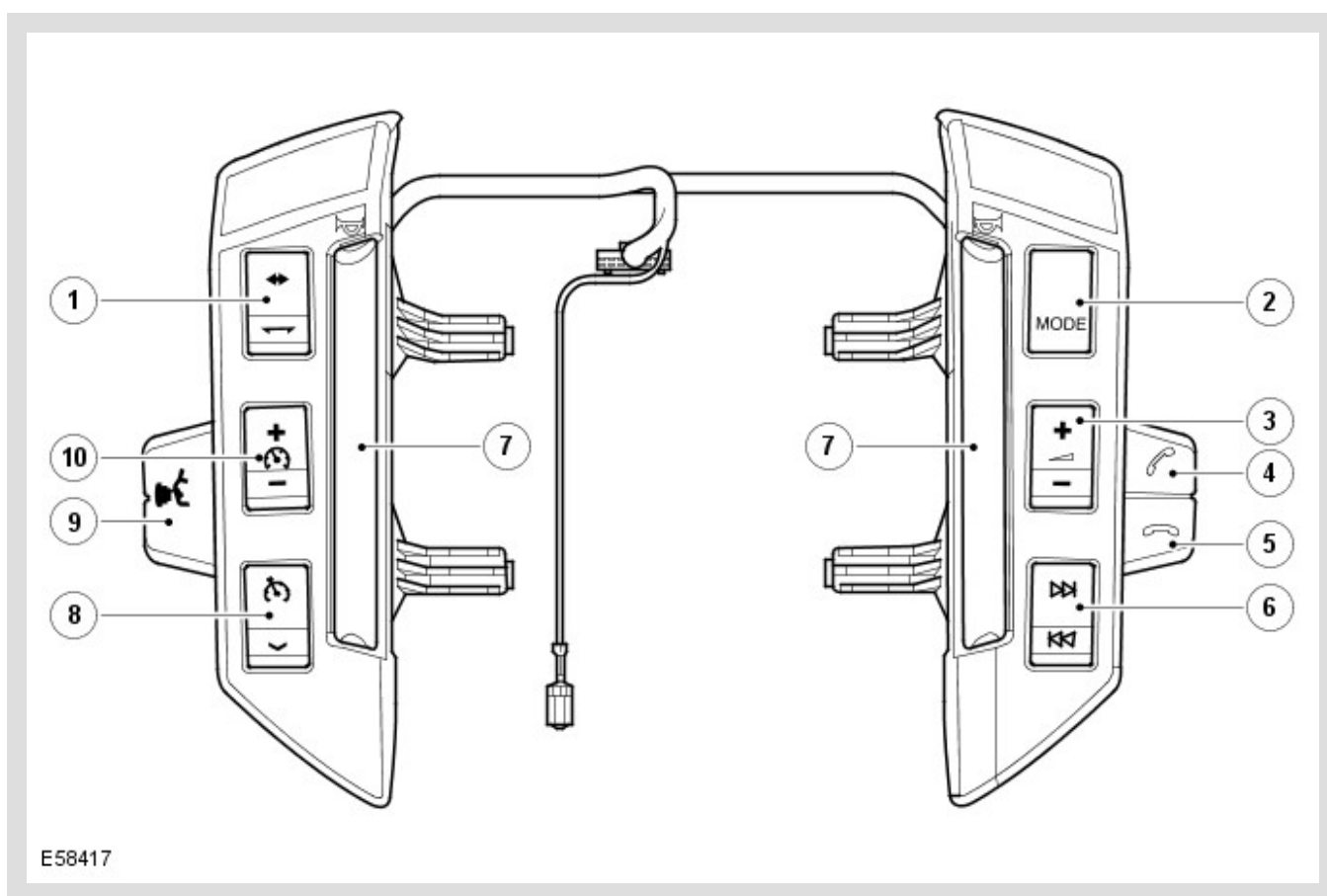
#### Speaker Connector C0493 for Harman Kardon Logic 7 Amplifier

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	Not used	-
10	Not used	-
11	Headphone module 3 left channel ground	-
12	Headphone module 3 right channel ground	-
13	Headphone module 4 left channel ground	-
14	Headphone module 4 right channel	-
15	Headphone module 1 control ground	-

PIN NO	DESCRIPTION	INPUT/OUTPUT
16	Headphone module 2 control ground	-
17	Headphone module 3 control ground	-
18	Headphone module 4 control ground	-
19	Not used	-
20	Not used	-

## STEERING WHEEL CONTROLS

### Steering Wheel Audio Controls



ITEM	DESCRIPTION
1	Adaptive speed control gap adjustment switches
2	Audio mode change switch
3	Audio volume control
4	Send key
5	End key
6	Audio system up/down

ITEM	DESCRIPTION
7	Horn
8	Speed control ON/OFF/set speed
9	Push to talk voice recognition switch
10	Speed control set speed adjust

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.