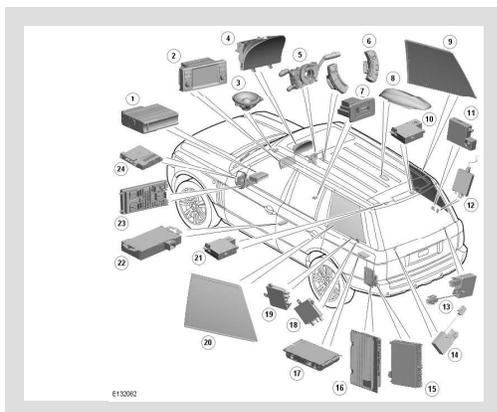


PUBLISHED: 11-MAY-2011
2011.0 RANGE ROVER (LM), 415-01A

AUDIO UNIT

AUDIO SYSTEM (G1311608)

AUDIO SYSTEM COMPONENT LOCATION



ITEM	DESCRIPTION
1	compact disc (CD) autochanger
2	Touch Screen Display (TSD)
3	Speakers
4	Instrument cluster
5	Clock spring
6	Steering wheel switches
7	Portable audio interface
8	Roof pod antenna DAB or SDARS (NAS and Canada only) with / without GPS (Navigation)
9	Right Hand (RH) glass antenna (DAB/TV/Auxiliary park heating)
10	VICS Amplifier (Japan only)) or Traffic Management Channel (TMC)
11	Digital Audio Broadcast (DAB) antenna amplifier
12	RH Rear TV / Auxiliary park heating antenna amplifier (Ref only)
13	Antenna filter
14	Antenna filter
15	Hybrid Digital (HD) radio module
16	Audio amplifier
17	SDARS receiver (NAS only)
18	Left Hand (LH) TV antenna amplifier (Ref only)

ITEM	DESCRIPTION
19	AM/FM / diversity antenna amplifier
20	LH glass antenna (AM/FM/Diversity/TV)
21	FM antenna amplifier
22	Portable audio module
23	Central Junction Box (CJB)
24	Integrated Head Unit (IHU)

GENERAL

Three levels of the system are available and both systems use the dual view Touch Screen Display (TSD) as their interface. One system is based around a Harman/Kardon DSP audio amplifier while the other two are based around the Harman/Kardon Logic7 and Logic7 HD 1200W Premium audio amplifier.

NOTE:

Due to legislation, the NAS markets do not receive the dual-view TSD option. A single view TSD is available in these markets. Where markets allow, dual view TSD is available with the Logic7 and Logic7 HD Premium systems.

It is also possible to specify extras to the audio system to extend its capabilities. These options include:

- Telephone
- Satellite navigation
- Television / Teletext
- Voice recognition system (navigation and telephone)
- Rear Seat Entertainment (RSE).
- Digital radio - DAB/SDARS/HD

MOST

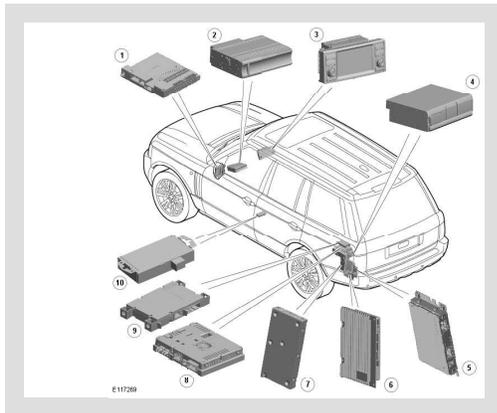
The components of the complete audio/infotainment system are all connected on the Media Orientated Systems Transport (MOST) ring. The MOST ring is a fibre optic communications bus for multi media applications. Sound and control information is passed around the MOST ring and can be picked up by any of the systems units. For example, sound information is sent from the CD autochanger along the MOST ring and is collected by the audio amplifier which then outputs the sound to the speakers.

MOST Components



NOTE:

Not all the components shown are related to the audio system, but form part of the MOST ring.



ITEM	DESCRIPTION
1	Integrated Head Unit (IHU)
2	Compact Disc (CD) autochanger
3	Touch Screen Display (TSD)
4	DVD autochanger
5	Digital Radio (DAB/SDARS/HD)
6	Audio amplifier
7	Rear Seat Entertainment (RSE) module
8	Television (TV) tuner
9	Telephone module
10	Portable audio module

MOST technology uses a plastic optical fibre which forms a network connecting the audio and multimedia system components. Each component in the ring is connected to the plastic optical fibre through a device known as a Fibre Optical Transceiver (FOT). Each FOT has two optical connections; one connection is sensitive to light and is the input and the second connection forms the light source and is the output. The system operates by connecting the output from one FOT to the input of another FOT.

The light signals are sent in one direction only and are formed in the following way:

- Electrical signals are converted into an electrical current
- The current then drives a light emitting diode (LED) in the FOT to produce a high intensity red light
- The LED transmits the light through a fibre optic cable
- A photo diode in the FOT at the opposite end of the fibre optic cable detects the light.

The following components are connected to the MOST ring:

- Integrated Head Unit (IHU)
- Touch Screen Display (TSD)
- SDARS receiver (NAS and Canada only)
- Digital radio module (DAB and SDARS/HD (NAS and Canada only)
- TV tuner
- Audio amplifier
- Rear Seat Entertainment (RSE) module
- Telephone module
- Portable audio interface module
- CD autochanger.

The IHU is the timing master for the MOST system. The IHU controls and manages the MOST ring and the system components. It is also responsible for the MOST security system. Each component in the MOST ring has a unique serial number. The component serial number is stored in a registry file in the instrument cluster. If any component serial number is not recognized, the entire audio system will not function.

A replaced component requires its serial number to be programmed in the instrument cluster registry using Land Rover approved diagnostic equipment. If the instrument cluster is replaced, the complete system will not function until the instrument cluster is programmed with the component serial numbers using Land Rover approved diagnostic equipment.

MOST DIAGNOSTICS

A light box is used to diagnose the MOST system. The light box emits a visible, high intensity red light which can be connected into the ring at any point to test the ring integrity. The light box is used in conjunction with Land Rover approved diagnostic equipment.

Disconnecting a MOST connector will reveal if the high intensity red light is visible. Do not view the red light directly. If a break occurs in the MOST ring fault codes are stored in the IHU which can be retrieved using Land Rover approved diagnostic equipment.

CENTRAL JUNCTION BOX (CJB) GATEWAY FUNCTION

The central junction box (CJB) incorporates a gateway function. The gateway function is the link between the vehicle bus systems and the audio system MOST ring. When the vehicle is unlocked, the CJB receives a system 'wake-up' message on the controller area network (CAN) bus. This message is then passed to the integrated head unit (IHU) which then 'wakes-up' the MOST ring components by energizing the infotainment relay.

SYSTEM SECURITY

The gateway function stores a unique serial number for each component in the infotainment system. This new system, known as 'Security on MOST' replaces the radio codes used on previous audio systems.

During vehicle production, the serial number of each component is extracted from its memory and stored in the CJB. At every subsequent ignition on cycle, the Integrated Head Unit (IHU) reads the serial number for each component and compares them to the stored serial numbers in the CJB. If an incorrect code detected the MOST system will shut down and the infotainment system will not function.

If an infotainment component is replaced, Land Rover approved diagnostic equipment will be required to disable the security on MOST feature. A file is downloaded which extracts the new serial number from the replacement component and records it in the CJB. Land Rover approved diagnostic equipment is used to re-enable the security on MOST feature and restore the system security.

INFOTAINMENT RELAY

An infotainment relay is located in the CJB. The relay receives a permanent power supply from fusible link 2B in the battery junction box (BJB). The relay coil is controlled by the IHU which provides a ground for the coil. When a vehicle unlocked signal is transmitted on the CAN bus, the message is received by the IHU which provides a ground for the relay, closing the contacts and supplying power to the audio/infotainment system components. The IHU maintains the relay in an energized condition for a period of time after the ignition is in the off mode 0 to allow time for the navigation computer to 'power down' and also to allow a faster system start-up if the system is required subsequently.

AUDIO SYSTEM

Three levels of audio system are available@

The Hi-Fidelity Digital Signal Processor (DSP) Harman Kardon audio system comprises:

- DSP amplifier
- Touch Screen Display (TSD)
- Integrated Head Unit (IHU)
- Six disc CD autochanger
- Portable audio interface
- 11 Speakers

The Hi-Fidelity Logic7 Harman Kardon audio system comprises:

- Logic7 amplifier
- TSD

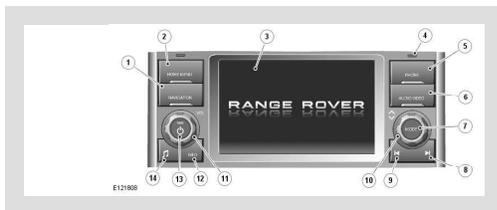
- IHU
- Six disc CD autochanger
- Portable audio interface
- 14 Speakers

The Hi-Fidelity Logic7 HD 1200W Premium Harman Kardon audio system comprises:

- Logic7 HD 1200W amplifier
- TSD
- IHU
- Six disc CD autochanger
- Portable audio interface
- 19 Speakers (5 co-axial)

The systems have the option of Digital Audio Broadcast (DAB) radio or High Definition (HD) digital broadcast radio or Satellite Digital Audio Radio Service (SDARS) (NAS and Canada only). The DAB and HD options are not available in all markets and are dependent on service availability.

TOUCH SCREEN DISPLAY



ITEM	DESCRIPTION
1	Navigation
2	Home menu
3	Touch screen display
4	Light sensor
5	Telephone
6	Audio/Video
7	Search up/increase
8	Mode
9	Search down/decrease
10	Scroll up/down

ITEM	DESCRIPTION
11	Volume
12	Information
13	Audio on/off
14	Tone

The Touch Screen Display (TSD) is located in the center of the instrument panel and is the driver control interface for the infotainment system. The TSD is connected to the MOST ring and communicates with the other components in the audio/infotainment system.

The TSD provides driver display and control of the audio system, telephone, the rear view camera, proximity cameras, VentureCam™, the Traffic Message Channel (TMC) and the navigation system.

The TSD also communicates with the RSE module via a co-axial cable. The TSD processes its own video for system operation but receives the video image data from the RSE via the co-axial cable.

The RSE and other systems are operated by a combination of the physical buttons located on each side of the screen and the 'virtual' buttons displayed on the touch screen. For clarification, the physical buttons are referred to as 'buttons' and the touch screen virtual buttons are referred to as 'icons'.

The TSD is a seven inch touch sensitive, 1280 X 480 pixels LCD (liquid crystal display) VGA screen. The dual-view TSD allows the front seat passenger to view television and video images when the car is being driven. The dual-view screen allows the driver to see the navigation or other system screens but not the TV or video when the vehicle is moving. The screen can be switched between single and dual view using AUDIO VIDEO switch on the TSD.



NOTE:

Due to legislation, the NAS markets do not receive this dual-view option. A single view display is available in these markets.

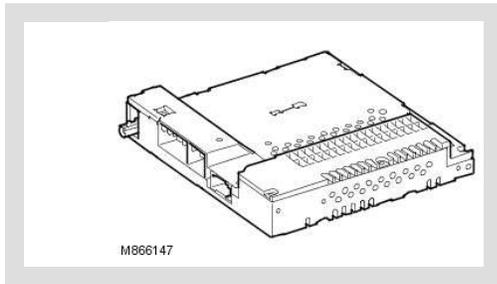
The dual-view TSD uses Parallax Barrier Shutter Technology to alternately hide and reveal columns of pixels to the left and right hand views of the screen. The display comes with a specially designed agar coating to help prevent sunlight bleaching.

Care should be taken with the TSD to ensure its correct operation:

- The screen should be cleaned with a lightly, water moistened cloth. Do not use chemical agents or domestic products to clean the screen or any part of the surround.
- Only use your finger to operate the touch screen. Ensure you only use one finger to avoid incorrect entries.
- A short light press of the touch screen is sufficient. Excessive pressure can damage the screen.

The TSD also incorporates a 40 GB hard disc drive which is used for storing the navigation data and maps. The disc drive cannot store audio files. For additional information, refer to: [Navigation System](#) (419-07 Navigation System, Description and Operation).

INTEGRATED HEAD UNIT (IHU)



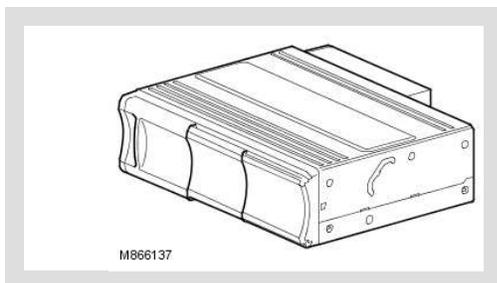
The Integrated Head Unit (IHU) is located behind the glove compartment mounted CD autochanger. The IHU is secured to the instrument panel support frame. The IHU contains the radio functionality for the audio system and communicates on the MOST ring with the components in the audio system. The IHU is also the timing master for the MOST ring. The IHU is the controls and manages the MOST ring and provides the allocations of channels, system power management and the functionality and co-ordination of the other system components.

The IHU also controls the operation of the infotainment relay. The infotainment relay is located in the CJB and the relay coil is controlled by the IHU which provides a ground for the coil. The relay supplies power to a number of the audio system components.

Radio signals are received by antennae located in the left hand rear quarter window and the rear screen. An frequency modulation (FM) antenna amplifier is located in the upper taildoor and passes amplitude modulation (AM)/ FM signals from the rear screen antennae to the IHU. A diversity antenna is located in the left hand rear quarter window. A FM diversity antenna amplifier is located behind the left hand luggage compartment trim panel, below the window and passes FM radio signals from the rear quarter window diversity antenna to the IHU. The FM diversity system uses a multi-antenna system which selects the strongest signals from the antennae. In weak signal areas the amplifier uses an integral ultrasonic noise detector to find the least distorted antenna signal to ensure maximum reception quality is maintained.

Diagnostic messages retrieved via Land Rover approved diagnostic equipment are routed from the IHU through the instrument pack, prior to being transferred to the diagnostic socket.

6 DISC CD AUTOCHANGER



The six disc CD autochanger is located at the rear of the glove compartment. The CD autochanger is a standard fitment on all 2005 MY Range Rovers. The CD autochanger is capable of playing audio CDs and MP3 CDs. The autochanger uses a six disc magazine which is loaded into an aperture on the front of the unit.

The CD autochanger is connected on the MOST ring and receives a permanent fused power supply from the passenger compartment fusebox.

SATELLITE DIGITAL AUDIO RADIO SERVICE (SDARS) (NAS AND CANADA VEHICLES ONLY)

SDARS is a satellite based radio service which is available in the United States of America (USA) and Canada. Digitally encoded audio transmissions are broadcast to receivers from two satellites or from ground based repeater stations. It is possible for the SDARS transmissions to be received in northern Mexico but reception is not guaranteed outside of the USA or Canada.

The service is provided by a company called Sirius. The service comprises over 100 channels of digital entertainment which is provided by subscription requiring a monthly payment.

Operation of the SDARS system is the same as the radio operation with selections made using the TSD icons or controls on the TSD.

The SDARS system requires additional components to be added to the audio system. An SDARS antenna is located in the roof mounted pod and a receiver is located in the left-hand (LH) side of the luggage compartment to allow reception of the service.

The customer must subscribe to receive the SDARS service. If the user selects a channel to which subscription is not authorised, the TSD will display the telephone number of the SDARS providers subscription service. The telephone number is stored in the IHU and can be changed or amended using Land Rover approved diagnostic equipment.

SDARS ANTENNA



The SDARS antenna is located in the roof pod and is shared with the telephone system and the navigation system where fitted. The roof pod is located externally in a central position towards the rear of the roof.

The roof pod contains two antennas for the SDARS system. One receives the digital transmissions from the SDARS satellites and the second receives transmissions from the ground based repeater stations.

The SDARS antennas are connected to the SDARS receiver using co-axial cables.

SDARS RECEIVER

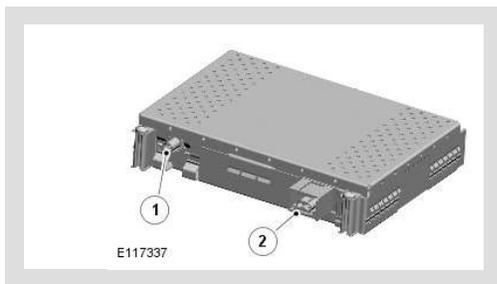


The SDARS receiver is a dedicated SDARS head unit and tuner which is controlled by the IHU on the MOST ring. The receiver is located in the LH rear of the luggage compartment.

The receiver processes the signals from the SDARS antennas. The signals are filtered and the receiver determines which of the two signals is the strongest with the least distortion to use for the audio output. For example, if the vehicle drives into a tunnel, the receiver will change from a satellite signal to a repeater station signal to maintain the strongest signal.

The receiver also contains software and hardware to allow digital reception in Canada in addition to the USA.

HYBRID DIGITAL (HD) RADIO



ITEM	DESCRIPTION
1	Antenna connector
2	Power, ground and MOST connector

Hybrid Digital (HD) radio is a 'free to air' alternative to the SDARS subscription system. The HD module is designed to receive and convert radio signals transmitted by stations sending out a hybrid signal (both analogue and digital) in both AM and FM frequencies. As it is digital, textual data such as song titles can also be displayed.

HD radio does not require a dedicated antenna. It uses the existing AM/FM antennas. If HD radio is specified to the vehicle, the output from the antenna amplifier is diverted to the HD module instead of the IHU tuner

 **NOTE:**

Not all radio stations will provide the HD element of the broadcast.

HD Radio provides digital signals to improve standard AM/FM audio quality. It also provides additional secondary HD channels on FM, when available.

The HD broadcast is carried with an existing AM/FM signal. This means that if the HD signal is unavailable, the analogue (AM/FM) signal is automatically selected.

HD radio stations simultaneously transmits a digital version of the analog broadcast and also provide a second digital channel, which can be used for alternate radio programming or data services such as song information, weather reports and car navigation updates.

HD radio transmits the digital signals in unused portions of the same channel as the analogue AM and FM signals, known as In-Band On-Channel (IBOC). As a result, radios are more easily designed to pick up both signals and tune into the station's analogue (AM/FM) signal first and then look for a digital signal.

AUDIO SYSTEM DIAGNOSTICS

The TSD can store diagnostic fault codes to enable diagnosis of system malfunctions. The fault codes can be accessed using Land Rover approved diagnostic equipment or by using the on-board diagnostic routine available on the TSD. Refer to the TSD section for details.

DIGITAL AUDIO BROADCAST (DAB)

The DAB module is located in the Left Hand (LH) side of the luggage compartment. DAB is available for most European markets and gives access to digital radio channels for better sound quality and enhanced functionality depending on local service availability.

The system receives reception signals from the following sources to ensure optimum signal strength:

- DAB L-band antenna located in the roof pod antenna module
- DAB band III antenna located in the RH rear side window.

The DAB module is a dedicated receiver/tuner which is controlled by the IHU on the MOST ring. The module processes the signals from the DAB antennas. Digital information is transmitted on the MOST ring and processed by the IHU. The processed information is sent out to the audio amplifier, converted to analogue then broadcast through the speaker system.

DIAGNOSTICS

Digital radio transmission does not always produce a higher resolution sound. This is very much dependant on the compression rate the provider is transmitting the signal.

Coverage of the digital network is still relatively young in terms of development and is constantly evolving. The United Kingdom for example currently enjoys a coverage of more than 85%, France in comparison is limited to a 20% coverage. Prior to any diagnostic action in the event of a customer reception complaint consider the following:

- DAB reception depends on local channels/stations and their signal strength
- Reception is affected by tunnels, hills, tall buildings or densely tree-lined roads.

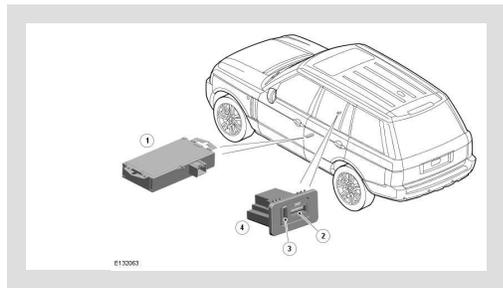
Try using a stored channel with proven strength in your area to demonstrate.

During periods of signal strength deterioration, the DAB system is designed to notify the driver that the signal is weak. As an alternative to muting the sound, possibly replicating a fault symptom to the driver, the over-laying of a ‘bubbling’ sound is deliberately produced during the transmission. This sound should also not be perceived as a fault, no further diagnosis is required in this instance.

NOTE:

The DAB system will not revert to a FM station in the event of signal loss.

PORTABLE AUDIO INTERFACE

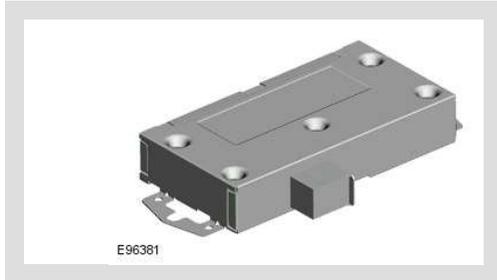


ITEM	DESCRIPTION
1	Portable audio module
2	iPod port
3	USB port
4	Portable audio interface

Portable audio devices can be connected to the interface panel, located in the front center armrest. Auxiliary devices can be connected to the AUX socket in the Audio Visual Input Output (AVIO) panel at the rear of the floor console.

The portable audio interface system comprises a portable audio interface module, which is located below the driver's seat, and an interface panel located in the center armrest cubby box.

Portable Audio Module



Portable devices that can be connected include:

- USB mass storage devices (for example a memory stick). Devices must use FAT or FAT32 file format
- iPod® (iPod Classic®, iPod touch®, iPhone® and Nano® are supported - full functionality for older devices cannot be guaranteed). iPod Shuffle® functionality cannot be guaranteed

NOTE:

iPod® is a trademark of Apple Computer Inc., registered in the US and other countries.
A dedicated iPod lead is available from Land Rover Dealers.

Auxiliary device (personal audio, MP3 players, all iPods®)

If an iPod® or mass storage device is connected, use the TSD to operate and search the device. Many of the controls are similar to those available for compact disc (CD) play.

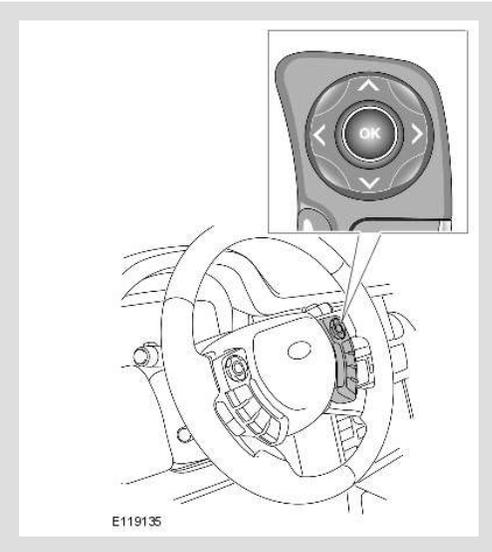
If you are using any portable media device via the AUX socket, then playback control must be from the device itself.

NOTES:

- an iPod shuffle may be connected via the AUX socket.
- The audio system will play MP3, WMA, WAV and AAC files.

Refer to the Owners Handbook for details of portable audio interface operation.

STEERING WHEEL SWITCHES



The audio system can be controlled using steering wheel mounted control to adjust audio settings.

Four positions on the switch control volume up, volume down, search up and search down.

The steering wheel audio control switches are hardwired to steering wheel module. The module converts the switch selections into local interconnect network (LIN) bus messages which are passed via the rotary coupler to the CJB. These signals are then passed from the CJB to the IHU to control the requested audio functions.

INITIAL SCREEN DISPLAY

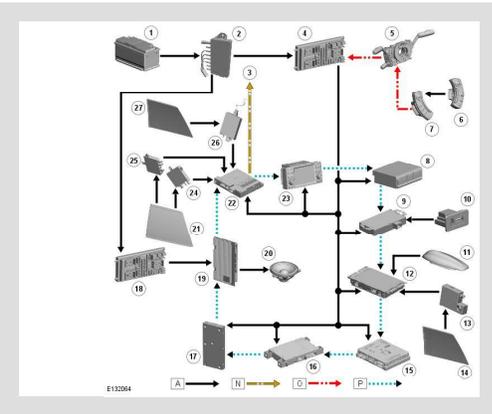
Once powered the TSD will initially display the 'Range Rover' image for a short time followed by the last displayed screen or menu. On a new vehicle, when the system is operated for the first time, the system will display the 'Home' menu to allow the user to adjust the factory default settings. The system settings are set to suit the market to which the vehicle is to be delivered. These can be changed by the customer to suit their preferences.

The infotainment system can be operated at times when the ignition is in the off mode and is known as one hour mode. Pressing the audio on/off button will power the system for a period of one hour. After the one hour period, the system will power down to avoid excessive drain on the vehicle battery.

AUDIO SYSTEM CONTROL DIAGRAM

NOTES:

- Not all the components shown are related to the audio system, but form part of the MOST ring.
- **A** = Hardwired, **N** = Medium Speed CAN bus, **O** = LIN Bus, **P** = MOST



ITEM	DESCRIPTION
1	Battery
2	Battery Junction Box (BJB)
3	Medium Speed Controller Area Network (CAN) bus to other systems
4	Central Junction box (CJB)
5	Clockspring
6	RH steering wheel switch module
7	Left Hand (LH) steering wheel switch module
8	Compact Disc (CD) autochanger
9	Portable audio module
10	Portable audio interface
11	Roof pod (SDARS/DAB)
12	SDARS/HD/DAB module
13	DAB Antenna amplifier
14	RH side window DAB antenna
15	TV module
16	Telephone module
17	Rear Seat Entertainment (RSE) module
18	Rear Junction Box (RJB)
19	Audio amplifier
20	Speakers
21	Left Hand (LH) glass antenna (AM/FM/Diversity/TV)
22	Integrated Head Unit (IHU)

ITEM	DESCRIPTION
23	Touch Screen Display (TSD)
24	AM/FM antenna amplifier
25	AM/FM diversity antenna amplifier
26	FM antenna amplifier
27	Right Hand (RH) glass antenna (DAB/TV/Auxiliary park heating)