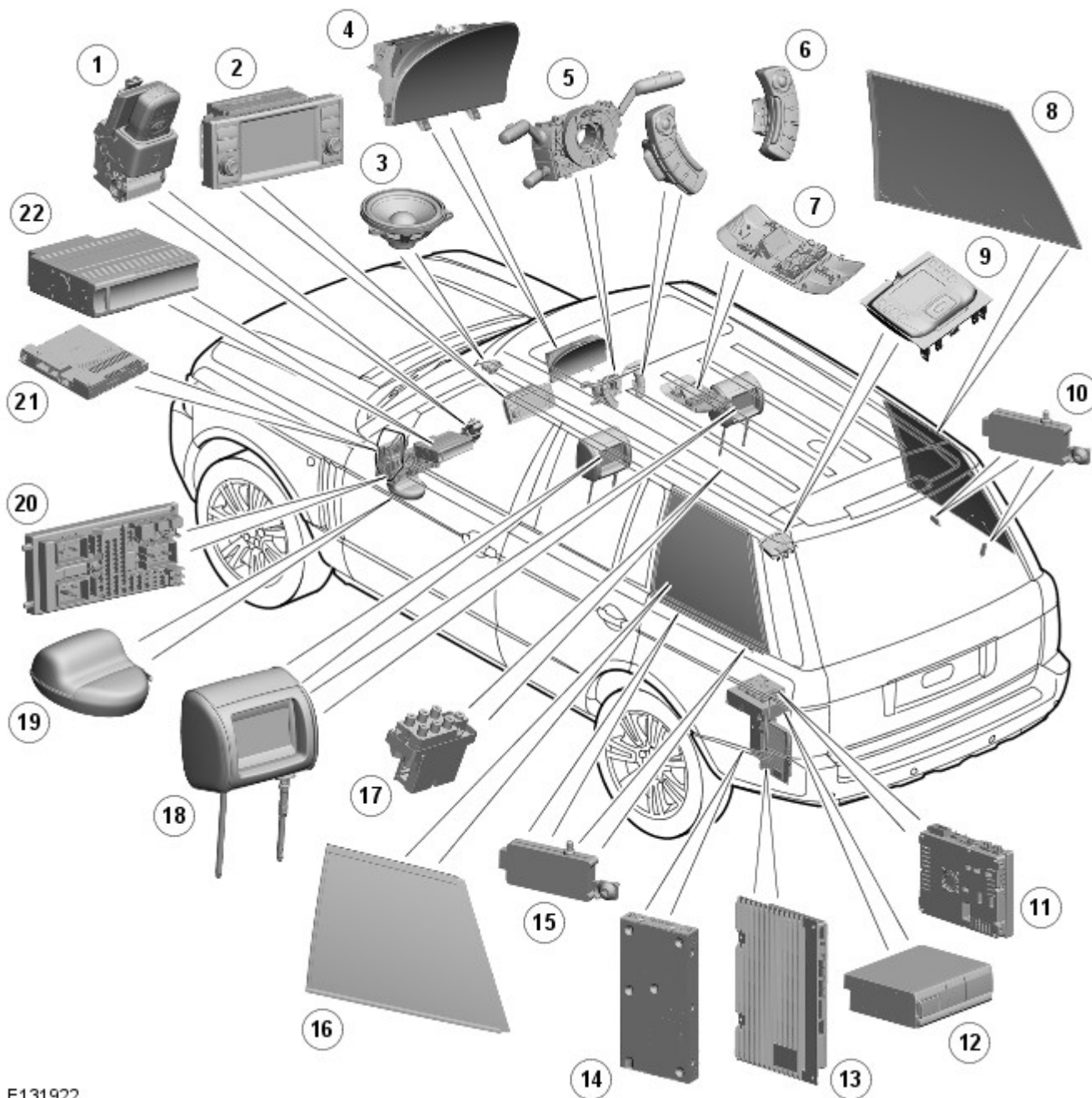


Video System - Video System

Description and Operation

Entertainment System - Component Location



E131922

Item	Description
1	VentureCam™
2	TSD (touch screen display)
3	Speakers
4	Instrument cluster
5	Clockspring
6	Steering wheel switches
7	Headphone transmitter module
8	TV RF antenna - right-hand (RH)
9	RSE remote control and docking station
10	TV antenna RF amplifiers
11	TV tuner

12	digital versatile disc (DVD) autochanger
13	Audio amplifier
14	Rear Seat Entertainment (RSE) module
15	TV antenna RF amplifiers
16	TV RF antenna - LH (left-hand)
17	Audio Visual Input Output (AVIO) panel
18	liquid crystal display (LCD) screens
19	Headphones
20	CJB (central junction box)
21	IHU (integrated head unit)
22	CD (compact disc) autochanger

General

The fibre optic, Media Orientated System Transport (MOST) based system provides video and audio entertainment for the rear seat occupants. The system allows DVD video and TV to be viewed on two RSE LCD screens, listen to audio output via the vehicle speakers or cordless headphones or display video images on the RSE LCD screens from an external source, such as a video player or games console. The video images can also be displayed on the Touch Screen Display (TSD) if the vehicle is below a predetermined speed threshold or has dual view TSD fitted.

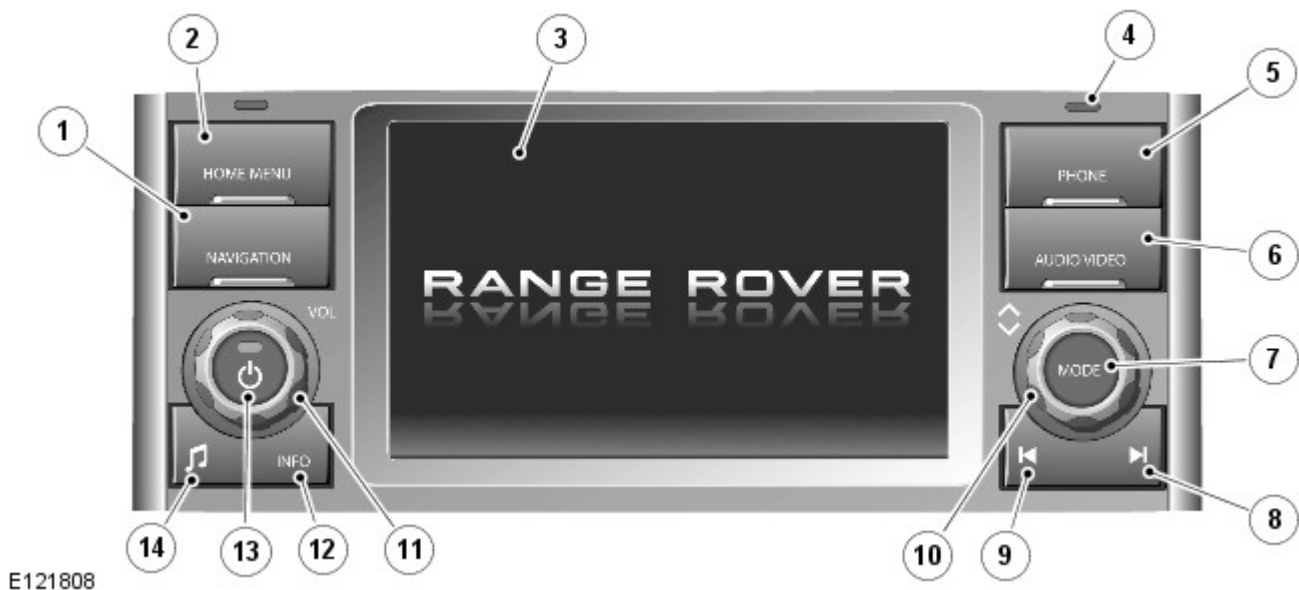
The system comprises the following components:

- RSE Module
- TV Tuner
- Four TV Antennae
- Four TV Antenna amplifiers
- Two RSE LCD screens
- DVD autochanger
- RSE remote control
- Headphone transmitter module
- Cordless headphones
- AVIO panel.

The RSE system also uses other components which form part of the audio system as follows:

- TSD
- Steering wheel switches
- compact disc (CD) autochanger
- Audio amplifier
- Vehicle speakers
- IHU

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
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 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 TSD also 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 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.



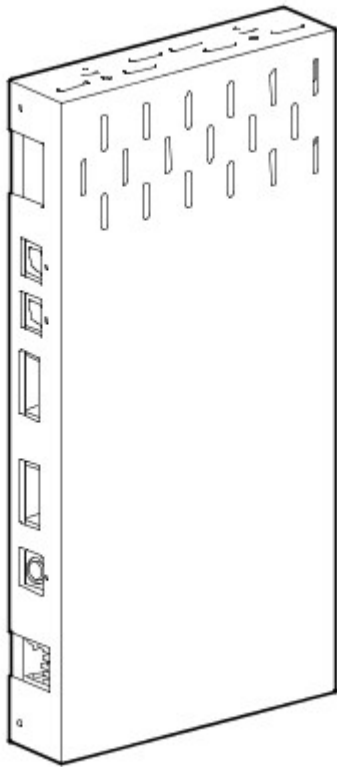
NOTE: Due to legislation, the NAS markets do not receive this dual-view option. A single view display is available in these markets.

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.

Rear Seat Entertainment Module



M866142

The Rear Seat Entertainment (RSE) module is located in the left-hand (LH) rear corner of the luggage compartment. The RSE module is an interface between the video and audio inputs from other system components and the video display and audio outputs.

The RSE module communicates with the audio systems via the MOST connection. Audio output from the DVD autochanger and the AVIO panel is processed by the module and passed on the MOST ring to the audio amplifier to allow audio output to be played on the vehicle speakers or on the cordless headphones.

Video input from the TV tuner, DVD autochanger and the Audio Video Input/Output (AVIO) panel is also processed by the module and passed to the two RSE LCD screens and the TSD on separate video connections. The RSE module also controls the power supplies to the RSE LCD screens and relays the infra-red remote control signals received by the RSE LCD screen infra-red sensors to the DVD autochanger. The infra-red signals are passed from the RSE LCD screens to the RSE module on a bus system known as the IS bus.

The DVD autochanger outputs some of its information to the RSE module on an Alpine proprietary bus known as the Ai Net. The Ai Net is a bus system used to communicate between the RSE module and the DVD autochanger.

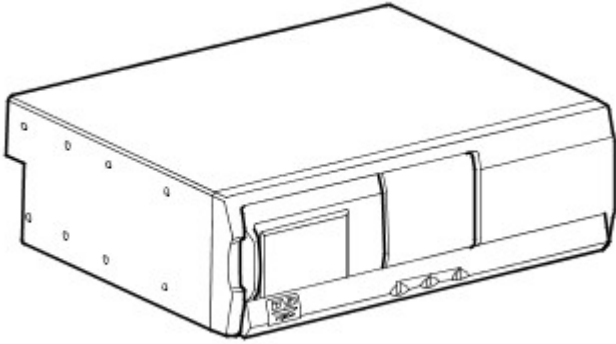
The RSE module has two modes of operation; engine running mode and reduced operation mode. With the engine running the RSE module has full functionality. When the engine is not running the RSE module has reduced functionality to prevent excessive drain on the vehicle battery. The reduced functionality comprises a reduced audio volume and time limit on system operation.

The reduced audio volume is only active when the engine is not running. The audio volume is limited to a maximum of setting of 12 to reduce battery consumption. If the volume was set at a higher level than this when the engine was running, when the engine is subsequently started, the volume level will gradually increase to the previously selected setting. This prevents the user being distracted by a sudden increase in volume.

The time limit operation is active when the key is removed from the ignition and the system is manually switched on using the TSD. The system will operate for a maximum of one hour. The battery voltage is continually monitored by the IHU. If the IHU detects that the battery voltage has fallen to a predetermined level, the IHU will shut the infotainment system down to prevent further battery drain. Once the system has shut down due to low battery voltage, it can only be restarted when the engine is running and the battery voltage has risen above the threshold level for more than one minute.

The module is connected into the infotainment system with five harness connectors.

DVD Autochanger



M866141

The DVD autochanger is located in the LH rear corner of the luggage compartment. The DVD player is a six disc design which will accept DVD movies, video CD (VCD) and music CD on CD-R or CD-RW. The discs are housed in a magazine to allow six discs to be stored in the unit. Additional magazines can be purchased to allow greater flexibility. The magazine is accessible via a sliding door on the front of the unit. An eject button, located behind the door automatically ejects the magazine from the unit when pressed.

The DVD autochanger is operated using a remote control unit supplied with the vehicle. The remote control is an infra-red unit which transmits the infra-red signal to receivers located in each RSE LCD screen.

The DVD autochanger receives the remote control information from the RSE LCD screens on a bus system known as the IS bus to the RSE module. The information is then passed from the RSE module on an Alpine proprietary bus known as the Ai Net to the DVD autochanger. The Ai Net is a bus system used to communicate between the RSE module and the DVD autochanger.

A Sony Philips Digital Interface Format (SPDIF) is used to output the audio from the DVD autochanger to the audio amplifier. The SPDIF is an optical system connected between the DVD autochanger and the audio amplifier. SPDIF is a standard audio file transfer format which allows the transfer of digital audio signals from one device to another without having to be converted first to an analog format which maintains the viability of the digital audio signal.

Rear Seat Entertainment (RSE) Remote Control



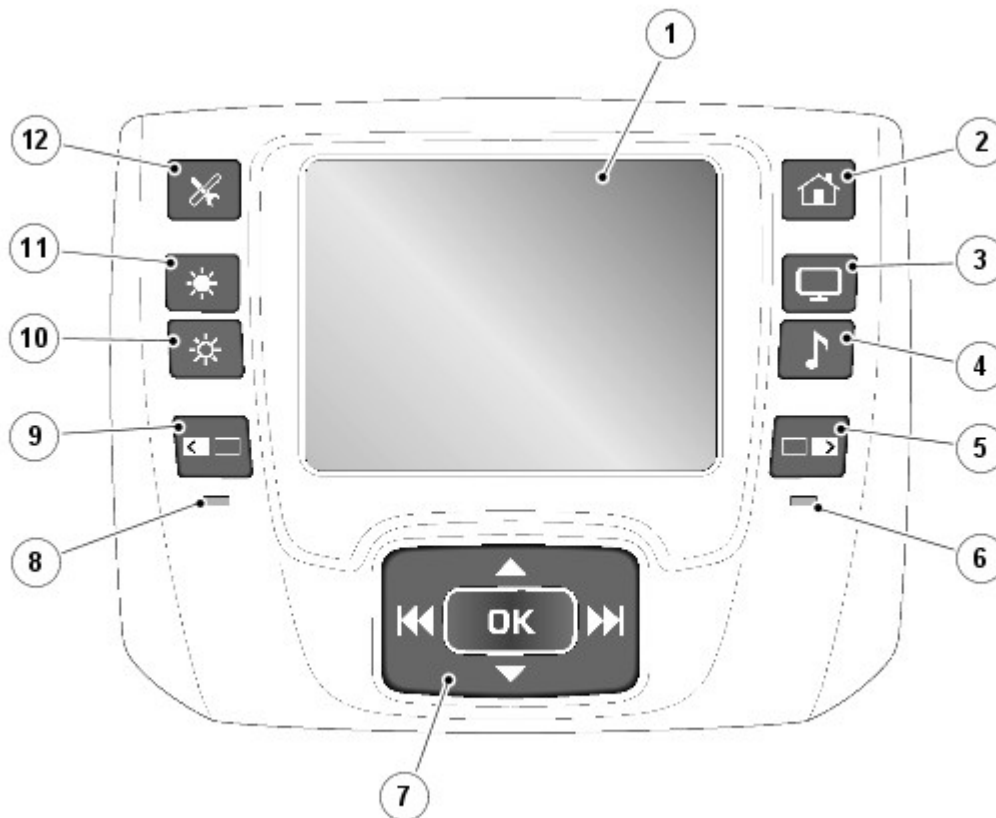
E121835

The RSE remote control allows independent multimedia control for left and right rear seat passengers.

The remote control is a dockable unit with a small TSD and a number of buttons to control the audio/video functions. The remote control is stored in the rear center armrest and can be used in the docked position or hand held. When the unit is docked charging is provided to the 3.7 volt 1200mAh Li-ion battery. When fully charged the remote control can have up to 3 hours 20 minutes of continuous use. The remote control is charged when in the armrest docking station. From empty to 90% charge takes approximately 2.5 hours.

The charging is powered via an infotainment relay which is located in the [CJB](#) directly to the RSE docking station. Part of the transmission encoding from the remote control includes the battery status which is passed to the RSE module. If the battery charge becomes low a message is displayed advising to dock and recharge the remote control. The remote control has three power modes as follows:

Power Mode	Operating Condition
Operation mode	Fully operational
Sleep mode	Screen and backlight illumination off
Shut down mode	Internal sleep mode (will take approximately 3 seconds to reboot)



E 129907

Item	Description
1	Touch Screen Display (TSD)
2	Home button
3	Video button
4	Audio button
5	Right Hand (RH) screen select button
6	RH screen selection indicator
7	Five-way switch - Cursor movement and option selection button
8	Left Hand (LH) screen selection indicator
9	LH screen select button
10	Touch screen display brightness decrease button
11	Touch screen display brightness increase button
12	Touch screen display settings button

The remote control controls for example radio, CD/DVD, plug-in audio devices and TV selection by displaying options on the remote control TSD. The options then activate menus in the RSE headrest mounted screen which can be navigated using a five-way switch on the remote control. For example, the user can select and press a soft key on the remote control TSD to activate a list of available radio stations in the RSE screen and then use the five-way switch to browse the list and select a radio station.

Part of the Pre-Delivery Inspection (PDI) procedure includes an initial set-up of the remote control (for example language selection). This can be performed with the remote control docked in the armrest. The remote handset battery can then be inserted by the dealer prior to delivery. Located behind the battery cover is a reset button which restores the default settings.

The remote control transmits an infra-red digital signal in response to operation of a button or soft key. The infra-red signal is received by a receiver sensor located on each RSE LCD screen and is passed, via an IS bus to the RSE module and from the RSE module on an Alpine proprietary bus known as the Ai Net, to the DVD autochanger. The remote control also allows selection of an auxiliary input from the AVIO panel (video or games console) or selection of audio (radio or CD).

When docked, communication from the remote handset takes place via two data lines into the RSE module. This link also enables software updates and configurations sent from the RSE module, for example, a language change requested by the user. This link from the RSE module to the docking station is a basic two-wire interface designed for remote control data rates (approx 38Kbit/sec.). It is protected against short to battery or ground on the output pin.

The remote control is powered by a rechargeable battery located in the rear of the control and is accessible by removing a sliding cover. When inserting the battery it is important that the battery polarity is observed as marked in the battery compartment.

Whitefire® Digital Wireless Headphones and Transmitter



E121826

Item	Description
1	Whitefire® digital wireless headphones
2	Whitefire® digital infrared transmitter

The RSE headphone transmitter is located in a central position in the rear roof console. The transmitter comprises a printed circuit board and sixteen infra-red light emitting diode (LED) transmitters positioned radially facing the rear of the vehicle.

The headphone transmitter is connected to the audio amplifier. Audio output is passed from the amplifier on a harness to the transmitter. The audio signals are then converted by the transmitter into infra-red signals which are passed via the sixteen transmitters and received by the headphones infra-red sensors.

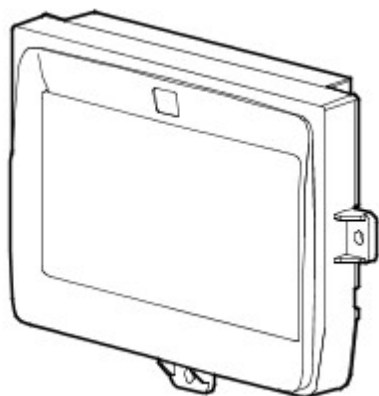
The transmitter is connected to the infotainment system using an 8 pin harness connector.

The system can support up to two pairs of cordless headphones. The headphones have an adjustable headband which operates on a ratchet mechanism.

The LH side of the headphone houses the infra-red receiver sensors which collect the transmitted signals from the RSE headphone transmitter, two AAA batteries located below a sliding cover and the power on/off switch. When inserting the batteries it is important that the battery polarity is observed as marked in the battery compartment.

The RH side of the headphone houses the volume control, a channel switch and a power 'ON' LED. The volume control is a rotary control to allow the user to adjust the volume output of the headphones. The channel switch allows the source frequency to be changed preventing interference with other infra-red systems. The power 'ON' LED is illuminated when the on/off switch on the LH headphone is pressed. This will remain on and the headphones powered until the switch is pressed for a second time. If the headphones have not received an infra-red signal from the transmitter for several minutes, they will automatically switch off to prevent battery drain.

LCD Screens



M866194

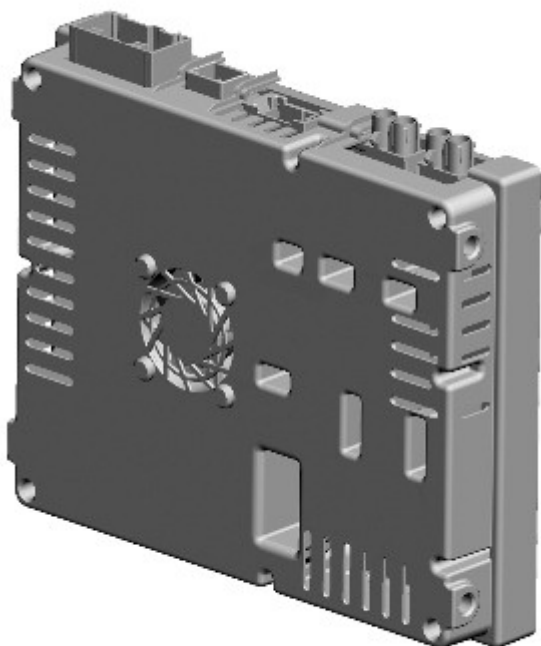
The RSE LCD screens are located in the rear of the front seat head restraints. The screen is secured in the head restraint with three screws which are covered by a removable surround. The screen is a 6.5 inch, auto dimming, high resolution LCD monitor, manufactured by Alpine

An infra-red receiver sensor is located centrally in the upper screen surround. The receiver sensor receives infra-red transmissions from the DVD remote control and passes them to the DVD autochanger, via the RSE module on a bus system known as the IS bus. All screen settings can be changed using the RSE remote control.

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.

Each RSE LCD screen is connected to the infotainment system using a 20 pin harness connector.

TV Tuner



E128344

The TV tuner is located in the left hand rear corner of the luggage compartment. The TV tuner allows the rear seat occupants to view television transmissions on the RSE LCD screens. The front seat occupants can also view the TV transmissions on the TSD but only if dual view TSD is installed or the vehicle is stationary. The TV tuner is capable of receiving local terrestrial TV transmissions in most locations.

The TV tuner is connected on the MOST ring which it uses to output its audio signals to the amplifier. Video output from the tuner is on a screened co-axial cable to the RSE module. Four further connections provide for the signal input from four TV antenna amplifiers and four antennae.

The TV tuner contains three internal tuners. Two of the tuners are connected to the antennae. These tuners receive the audio and visual signals. The tuner with the strongest signal is automatically used to display the required TV channel.

The third internal tuner is connected to only one of the antennae and is used to scan the locality for receivable channels. The tuner can detect different frequencies transmitting the same channel and can select the strongest signal for use.

To cope with changes in technology, the TV tuner is able to receive both analogue and digital TV signals. In certain areas both analogue and digital signal strengths will vary. When in an area of weak reception, you may experience a break-up in picture and sound quality, or a blank screen and audio muting. It may be of benefit to retune the viewed station, and possibly switch between analogue and digital TV stations.

The TV tuner is connected to the infotainment system using four harness connectors.

TV Antennae

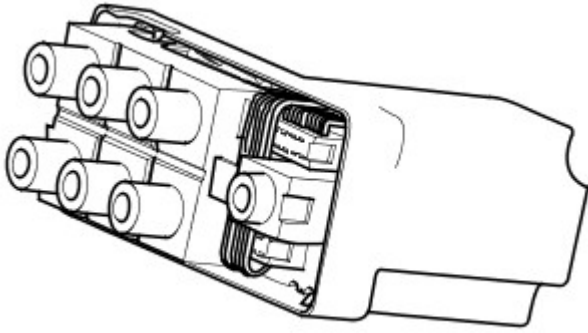


NOTE: On vehicles with remote park heating, the RH rear antenna is fitted with a combined remote park heating/TV antenna amplifier.

Two TV antennae are located in each rear side quarter window. There are three antennae in each window; the forward antenna is a high frequency antenna and the rearward antenna is a low frequency antenna. A third antenna, located between the two TV antennae is for radio reception.

Each antenna is connected directly to a TV RF antenna amplifier which is located just below the rear quarter panel, behind the trim. The four TV antenna amplifiers boost the received RF signal before it is collected and processed by the TV tuner. The TV antennae can receive RF signals of between 48 and 860 MHz.

Audio Visual Input Output Panel



E83062

The AVIO panel is located at the rear of the floor console. The panel provides for the connection of auxiliary audio and video inputs from an external source, such as a games console, via seven plugs on the panel. The plugs are covered by a lift up panel.

Two sets of video and audio phono plugs are provided and are designated as AV1 and AV2. The plugs are connected to the RSE module and allow the auxiliary input video to be played on the RSE LCD screens and the audio to be played on the vehicle speakers or on the cordless headphones. The auxiliary input video cannot be displayed on the TSD.

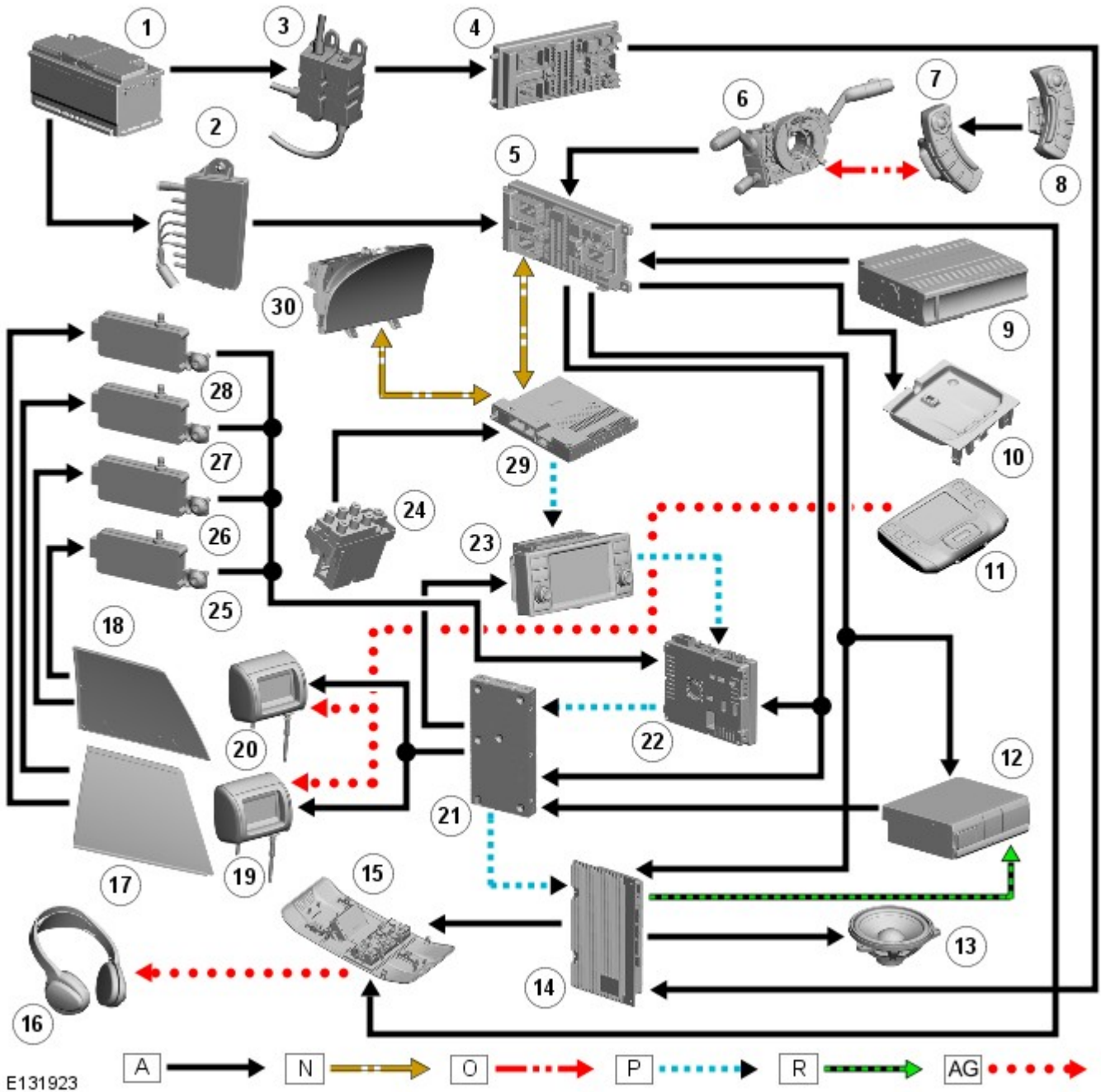
An additional single, 3.5mm jack plug allows for the attachment of an auxiliary audio input, such as a personal stereo or MP3 player. This plug is connected directly to the IHU and allows audio to be played on the vehicle speakers.

The AVIO panel is connected to the infotainment system using two harness connectors.

Control Diagram



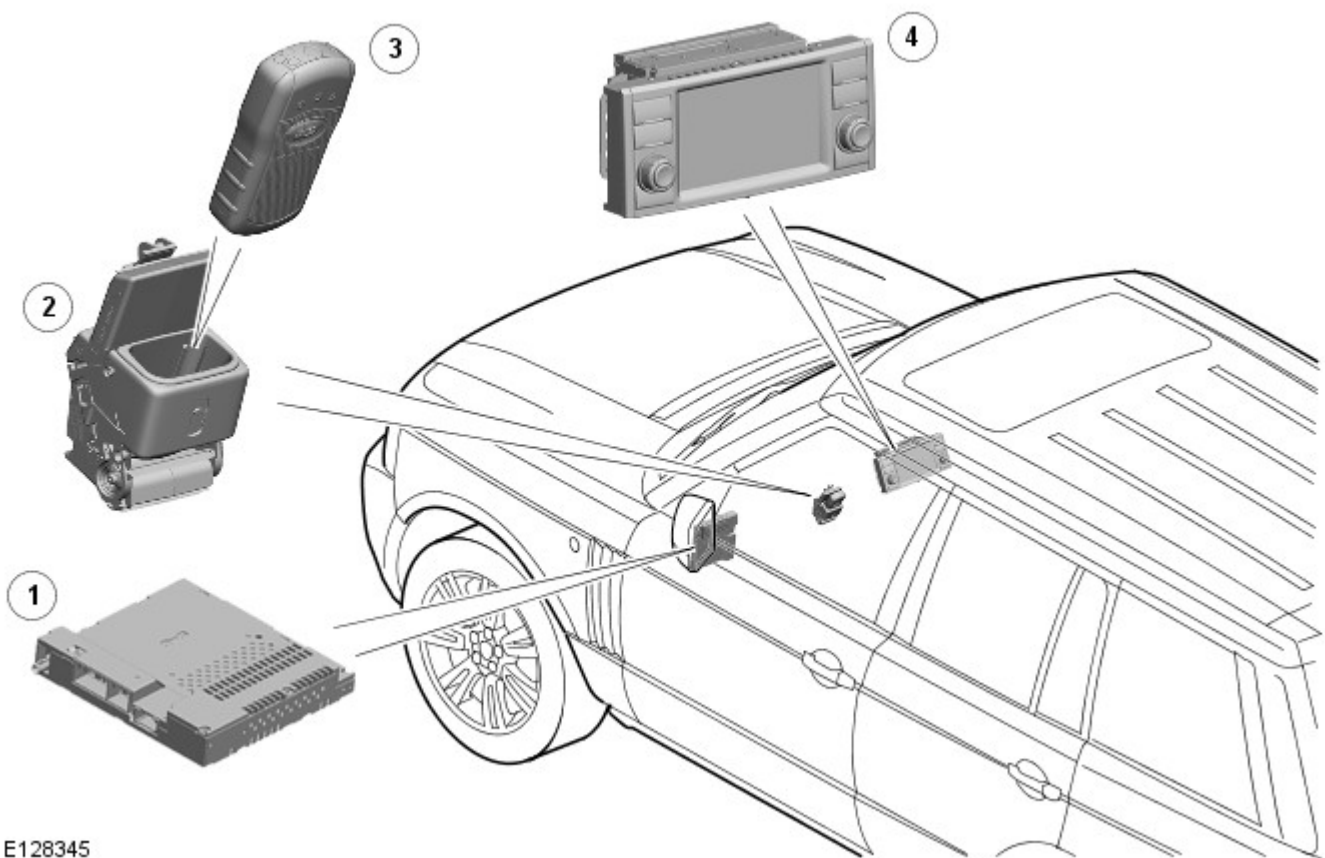
NOTE: **A** = Hardwired; **N** = Medium Speed CAN Bus; **O** = Lin Bus; **P** = MOST **R** = SPDIF (Sony); **AG** = Infra Red



Item	Description
1	Battery
2	BJB (battery junction box)
3	BJB2 (battery junction box 2)
4	RJB (rear junction box)
5	CJB
6	Clockspring
7	LH steering wheel switch
8	RH (right-hand) steering wheel switch
9	CD autochanger
10	RSE remote control docking station
11	RSE remote control
12	DVD autochanger
13	Speakers
14	Audio amplifier
15	Headphone transmitter module
16	Whitefire® Headphones (cordless)

17	TV RF antenna - LH
18	TV RF antenna - RH
19	LHLCD screen
20	RHLCD screen
21	RSE module
22	TV tuner
23	TSD
24	AVIO panel
25	TV antenna RF amplifier
26	TV antenna RF amplifier
27	TV antenna RF amplifier
28	TV antenna RF amplifier
29	IHU
30	Instrument cluster

VentureCam™ - Component Location



E128345

Item	Description
1	IHU (integrated head unit)
2	VentureCam™ docking station
3	VentureCam™
4	TSD (touch screen display)

General

VentureCam™ consists of one or more remote cameras which transmit their images onto the Touch Screen Display (TSD) to provide the driver with a number of benefits, for example manoeuvring the vehicle or connecting a trailer. Additionally, the system can receive video transmissions from other compatible camera units such as a home CCTV camera. The system can support up to sixteen VentureCam's and an additional four external video input units.

The system comprises one or more VentureCam's and a docking station. The system is connected into the infotainment system and the video images are displayed on the TSD.

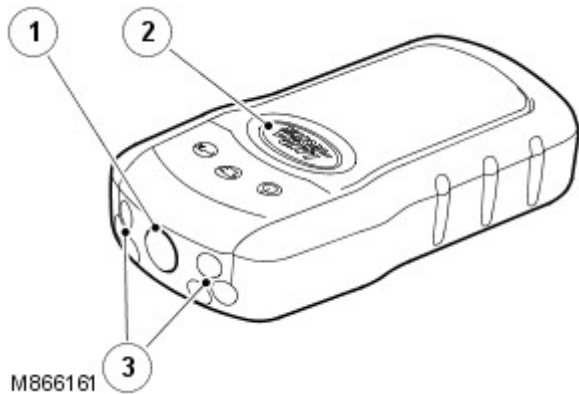
The VentureCam™ receives signals via a UHF transmission from the docking station for remote operation of the camera. The frequencies can be 433 MHz or 915 MHz depending on the market. The VentureCam™ transmits its video images to the docking station on a 2.4 GHz RF microwave transmission. The video is provided in an NTSC format at 25 frames per second. The microwave transmission is limited to an output of 10 mW to avoid conflicting with broadcasting legislation in most countries.

The VentureCam™ can receive and transmit signals at a distance of between 20 and 30 meters (65 and 98 feet). This range is dependant on the surrounding environment, i.e. the signals may be blocked or limited by buildings, vehicles etc.

The VentureCam™ system is connected to the TSD for video display by a co-axial cable. A controller area network (CAN) connection allows the Integrated Head Unit (IHU) to communicate with the docking station for transmission of infotainment relay energized signals etc.

VentureCam™ can be accessed by selecting 4X4i information™ on the TSD using a physical button or an icon on the screen. VentureCam™ is then selected by pressing the camera icon on the TSD.

VentureCam™



Item	Description
1	Camera lens
2	Control switch
3	LED

The VentureCam™ is a compact unit containing hardware and software for control of video image capture and transmission, six red LED for an additional light source and a control button.

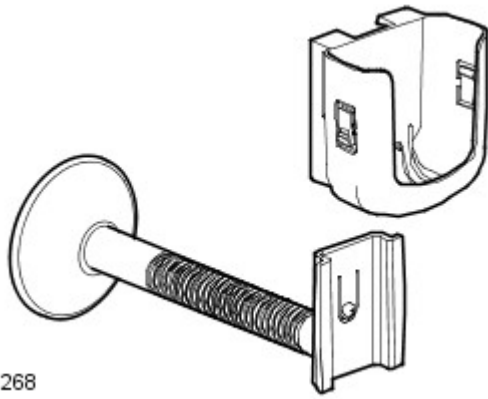
The control button allows the VentureCam™ to be switched on or off and to activate the LED. The selections are made sequentially with the button, e.g.; the first press switches the camera function on, the second press switches the camera off and switches the LED on (torch function) and a third press switches the whole unit off. Using this button on the VentureCam™, only the camera or the torch function can be selected, they cannot be selected to work together at the same time. However, when in the camera function mode, the LED can also be made active by pressing the torch icon visible in the TSD. This will allow the LED to enhance the VentureCam™ view in low ambient light levels.

When the camera mode is selected, by pressing the button once, the area around the 'Land Rover' logo button is illuminated in a green color. If the illumination flashes, this indicates that the camera is awaiting a command from the TSD.

The VentureCam™ has an integral re-chargeable battery which, when fully charged, allows approximately 3 hours continuous use of video transmission. If the unit is used solely as a torch with only the LED illuminated, the battery will provide approximately 4 hours continued use. The VentureCam™ battery has a serviceable life of approximately 8 to 10 years, depending on its usage. The battery cannot be replaced separately, so if the battery fails, the VentureCam™ must be replaced.

The VentureCam™ is an electronic device and therefore should be handled with care. If the unit becomes dirty, clean only with a damp cloth, do not use detergents or solvent based cleaners. Avoid high temperatures, do not store the VentureCam™ in direct sunlight, always store in the docking station, glovebox or door pocket.

VentureCam™ Mount



M866268

An accessory mount is available with a suction cup which allows the VentureCam™ to be located inside or outside the vehicle. The holder has a removable holster into which the VentureCam™ is secured. The holster has a standard camera thread which allows it to be mounted on a tripod for instance. The suction cup has a control lever which creates a vacuum to provide the suction to secure the mount. To release the suction cup, lower the lever to release the vacuum.

Battery Charging

The battery is re-charged when the unit is in the docking station. Two spring loaded pins in the docking station connect with contacts on the VentureCam™. The charging will occur only when the VentureCam™ is in the docking station and the ignition switch is in position II. Power is supplied direct from the vehicle battery via a fuse in the central junction box (CJB) and is permanently live. However, charging will only occur when the IHU receives an ignition on signal via the CAN. The IHU then sends a charge message to the docking station via its CAN connection. The docking station software will allow further charging of the battery for a period of 30 minutes after an ignition off signal is received from the IHU.

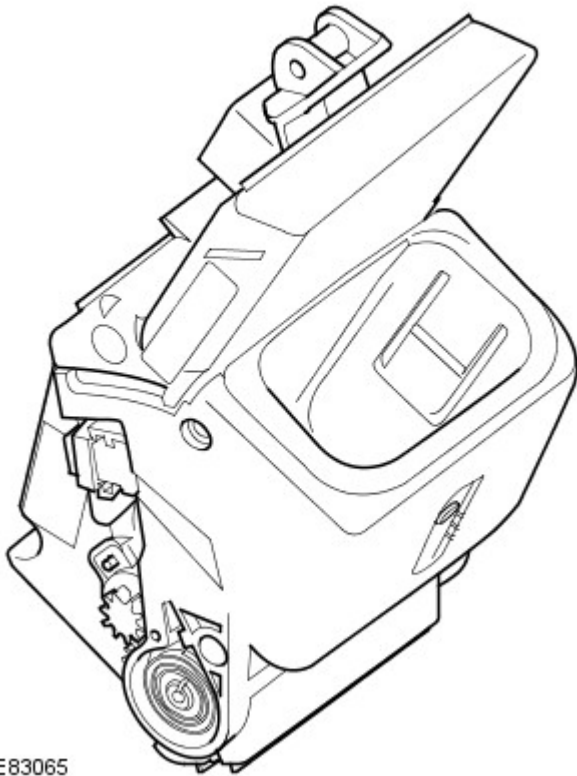
The battery condition is shown on the TSD VentureCam™ display. A charge level indicator is displayed to indicate the charge level of the VentureCam™ battery.

One segment on the battery display indicates that the battery is almost fully discharged. The docking station will apply a slow charge to the battery to ensure the battery charge is fully recovered and may stay in this mode for a long period of time, depending on how low the battery charge has become. If a rising row of segments is indicated on the battery display, the docking station is applying a fast charge to the battery and will fully charge the battery in the minimum period of time. A complete and stationary row of segments indicates a fully charged battery.

If the battery is completely discharged, it will take approximately 2 hours of continuous charging with the vehicle engine running to restore the battery to a fully charged condition.

It is recommended that the VentureCam™ is stored in the docking station when not in use. The docking station will ensure that the battery is kept at the optimum charge level. If the customer has more than one VentureCam™, it is recommended that the units are cycled on a weekly basis to ensure that the battery charge level is maintained.

Docking Station



E83065

The docking station is located in the upper glovebox. When the VentureCam™ is installed into the docking station, the illumination around the 'Land Rover' logo button changes to a green color to indicate that a good connection has been established with the charging contacts and that charging has commenced.

The docking station receives a permanent battery feed via a fuse in the CJB. A CAN connection provides a link with the IHU for transfer of information. A co-axial cable transmits the video signals from the docking station to the TSD.

The software contained within the docking station contains a power management strategy which monitors ignition status via CAN messages from the IHU and controls power operation for battery charging for a 30 minute period after the ignition is switched off.

VentureCam™ Operation

The VentureCam™ image is accessed using the 4X4 I off-road information screen on the TSD. Each VentureCam™ must be learnt and saved to the memory before it can be used. If more than one VentureCam™ is configured to the system, each one can be selected in turn using the camera selection icons.

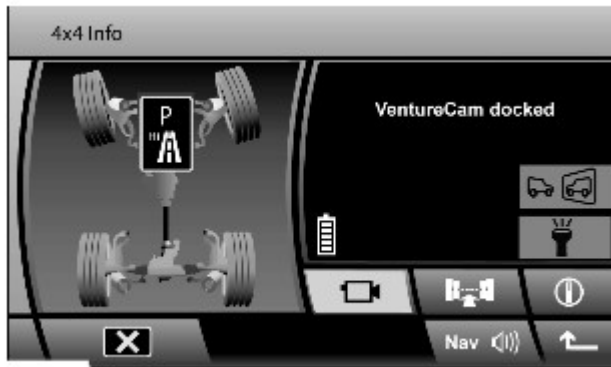
The VentureCam™ screen is accessed by pressing the VentureCam™ 'movie camera' icon at the bottom of the screen. The right hand side of the TSD will display a black screen with text stating 'VentureCam™ Docked' if a VentureCam™ is known to the system and located in the docking station. The chassis view will remain on the left hand side of the TSD until the VentureCam™ icon is pressed again. The chassis view will then be replaced with camera select information.



E128346

The currently selected camera icon is highlighted. Scrolling up or down the available camera's allows selection of a different VentureCam™ or an external video input.

A new VentureCam™ can be added to the system by placing the VentureCam™ into the docking station. A small window will appear prompting to 'Learn Camera'. Selecting 'OK' saves the VentureCam™ into the memory. A second window will appear asking if the user wants to use the new VentureCam™ now. Selecting 'Use Now' will use the new VentureCam™, selecting close will continue with the VentureCam™ highlighted in the camera select list. When a new VentureCam™ is added, it will be placed in the first numerically available position in the list.



VentureCam™s can also be deleted from the memory by selecting the applicable camera input to be deleted and pressing the 'Delete' icon on the TSD. A small window will appear asking for confirmation of the deletion. Selecting 'OK' deletes that VentureCam™ from the list and leaves that position empty.

If using the VentureCam™ to reverse the vehicle, the view seen on the screen can become confusing to the driver. To assist with this, a mirror view is available which reverses the image similar to that seen in the rear view mirror.

The VentureCam™ should not be used unless the vehicle is off-road. The VentureCam™ should only be used on the exterior of the vehicle. The mount could cause injury if attached to the vehicle interior and an accident occurs.