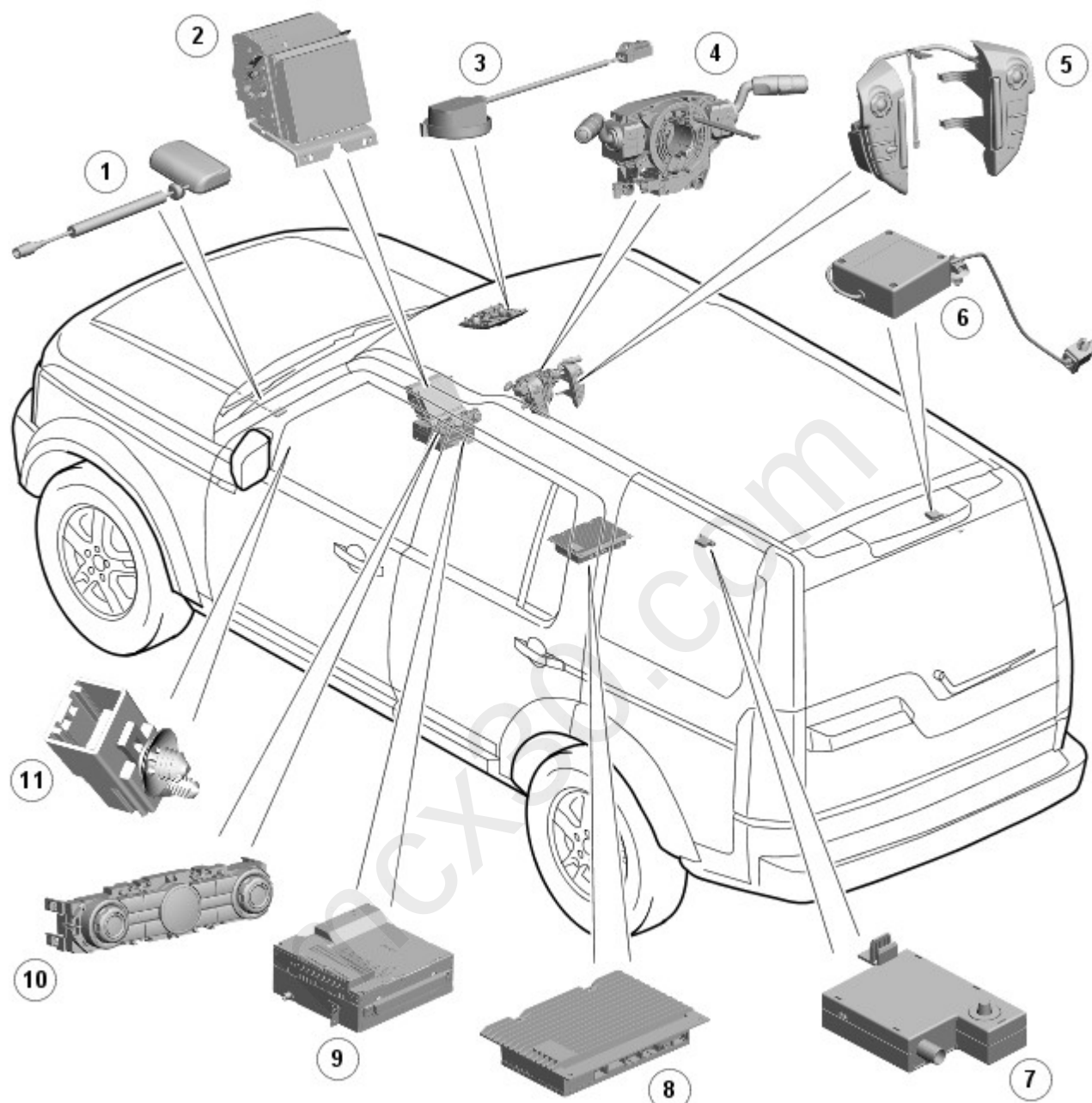


Navigation System - Navigation System

Description and Operation

COMPONENT LOCATION



E124878

Item	Part Number	Description
1	-	VICS (vehicle information and communication system) beacon antenna - Japan only
2	-	TSD (touch screen display)
3	-	Microphone - voice recognition
4	-	Clockspring
5	-	Steering wheel switches
6	-	GPS (global positioning system) antenna
7	-	'TMC (traffic message channel) tuner' or 'VICS receiver - Japan only'
8	-	Power amplifier
9	-	IHU (integrated head unit)
10	-	Integrated control panel, incorporating navigation switch
11	-	Navigation update socket

OVERVIEW

The navigation system provides audible and visual route guidance information to enable the driver to reach a desired destination. The system allows the driver to choose the route to the destination using minor or major roads or highways with the option of three routes. Directions to hospitals, museums, monuments and hotels are also available. Map information stored on a hard-drive located within the TSD (touch screen display) is used to determine the best route for

the journey and provide the driver with details of directions and approaching junctions.

If the vehicle requires a map upgrade or a new region loading, an enabling code along with the map data must be purchased. Map upgrades to the hard-drive unit need to be carried out by a Land Rover dealer using Land Rover approved diagnostic equipment.

TRAFFIC MESSAGE CHANNEL

The TMC (traffic message channel) traffic data is received via the **FM (frequency modulation)** radio antenna and broadcast in many European countries.

TMC is a function of the FM, **RDS (radio data system)**, which broadcasts real-time traffic and weather information. Data messages are received and decoded by the TSD and passed onto the navigation system to inform the driver of impending traffic congestion and if possible provide an alternative route.

TMC conforms to a global standard that has been adopted by:

- Traffic data gatherers
- Information service providers
- Broadcasters
- Vehicle/receiver manufacturers

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

VEHICLE INFORMATION AND COMMUNICATION SYSTEM

VICS (vehicle information and communication system) is broadcast in the Japanese market.

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

Radio Frequency Transmission

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

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

Infra-red Transmission

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

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

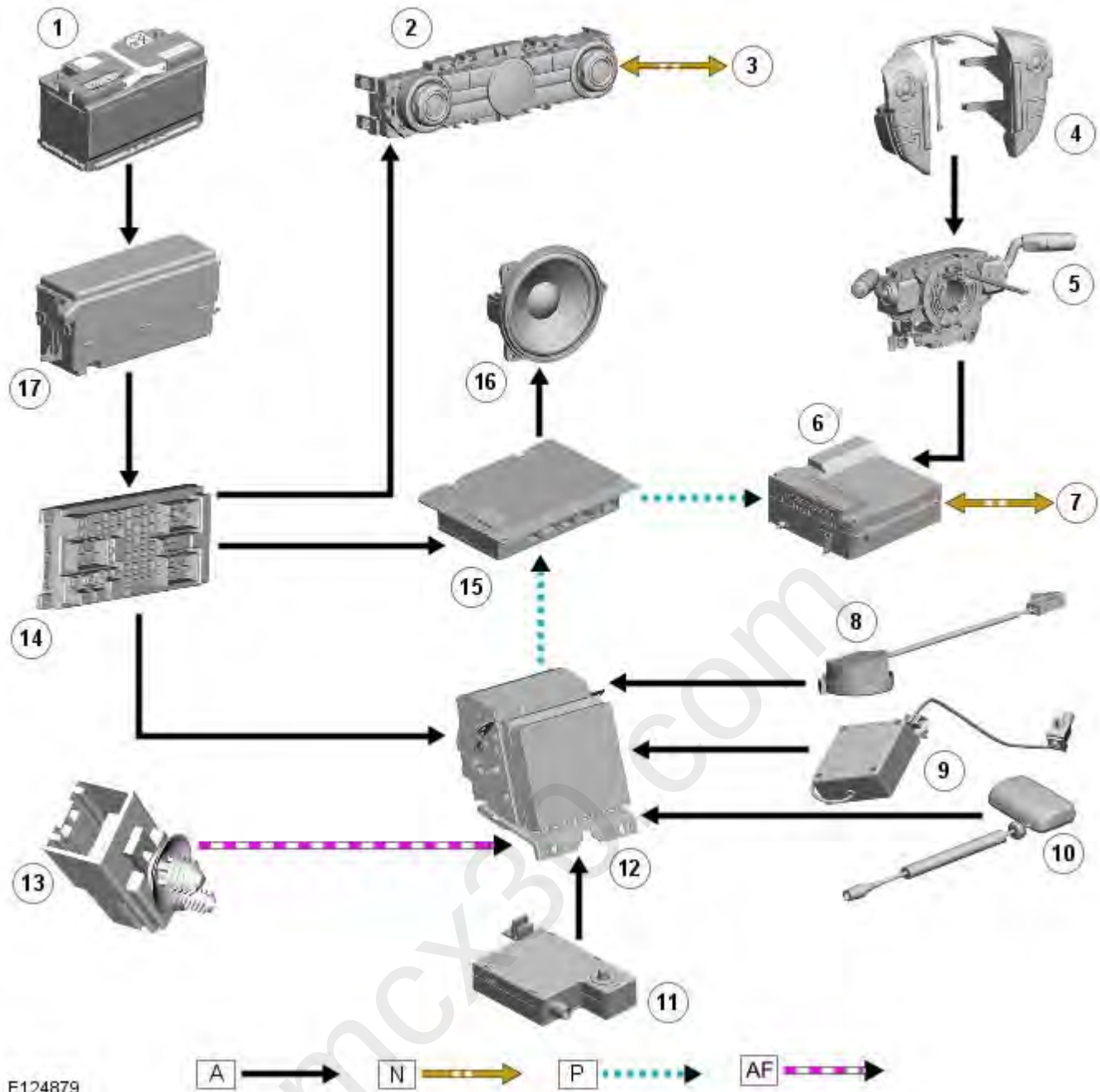
FM Transmissions

FM transmissions are received via the FM antenna and broadcast as part of the normal RDS FM transmission. The information transmitted is:

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

CONTROL DIAGRAM

- **NOTE:** **A** = Hardwired; **N** = Medium Speed CAN; **P** = MOST; **AF** = Firewire.



Item	Part Number	Description
1	-	Battery
2	-	Integrated control panel, incorporating navigation switch
3	-	Medium speed CAN bus connection to other vehicle systems
4	-	Steering wheel switches
5	-	Clockspring
6	-	IHU (integrated head unit)
7	-	Medium speed CAN bus connection to other vehicle systems
8	-	Microphone - voice recognition
9	-	GPS antenna
10	-	VICS beacon antenna - Japan only
11	-	'TMC (traffic message channel tuner' or 'VICS receiver - Japan only'
12	-	TSD (touch screen display)
13	-	Navigation update socket
14	-	CJB (central junction box)
15	-	Power amplifier
16	-	Speakers
17	-	EJB (engine junction box)

PRINCIPLES OF OPERATION

The system used to calculate the current position of the vehicle is called the [GPS](#). Satellites transmit radio signals to provide information about the satellite's position, for example the latitude, longitude, altitude, almanac data and an accurate time signal generated by an on-board atomic clock. Each satellite contains four atomic clocks.

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

position.

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

The GPS signal is also known as the PPS (precision positioning signal).

PPS predictable accuracy is:

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

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

The navigation system is accessed by pressing the navigation switch on the integrated control panel.

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

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

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

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

- TMC (traffic message channel – Europe only.
- VICS (vehicle information and communication system) - Japan only.

Limited Satellite Contact

It is possible to maintain the vehicle's positional information when there is limited or no satellite contact, for example when the vehicle is in a:

- tunnel or underpass
- covered car park
- street lined with tall buildings
- or dense forest.

When the vehicle is in one of these conditions the vehicle's position is maintained by both the gyroscope sensor contained in the TSD and the vehicle speed signal. The speed signal is supplied by the ABS module and transmitted via the high-speed CAN to the CJB it is then transmitted by a hard-wired signal to the TSD.

NAVIGATION SYSTEM COMPONENTS

Touch Screen Display (TSD)



E124877

Item	Part Number	Description
1	-	Touch screen display
2	-	Access Audio/Video Menu
3	-	Scroll up down (menu control)
4	-	Mode
5	-	Traffic/News information
6	-	Access Phone Menu
7	-	Search up/increase
8	-	Search down/increase
9	-	Access Navigation Menu
10	-	Tone hard key
11	-	Audio on/off
12	-	Volume
13	-	Access touch screen Home Menu

The TSD (touch screen display) and Integrated Control Panel are located in the center of the instrument panel and are the driver's control interface for the navigation system. The TSD is connected to the MOST ring and communicates with the other components in the audio/infotainment system.

The TSD is a seven inch touch sensitive, 1280 X 480 pixels LCD (liquid crystal display) VGA screen.

In addition to the navigation system the TSD and the Integrated Control Panel provides the driver with display and control of various other vehicle functions.

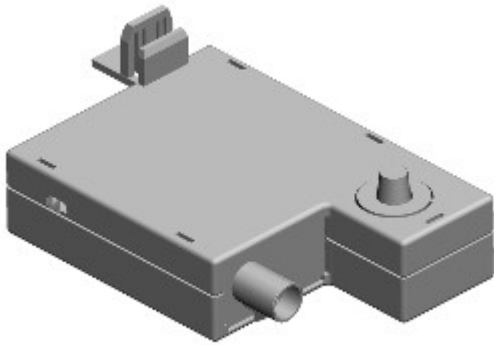
Microphone



E124819

The microphone is located in the front interior lamp console. The standard, directional type microphone is connected to the Touch Screen Display (TSD) for voice recognition of the navigation system and the telephone. The microphone has an integrated noise suppression system for hands-free telephone use.

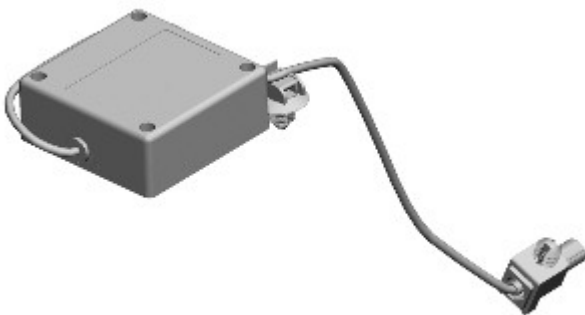
TMC Antenna Amplifier



E124881

The TMC (traffic message channel) antenna amplifier is located above the rear left-hand-side window and is connected to the FM antenna which is integrated into the window. The TMC signals are received through the normal radio signals via the RDS (radio data system) and are routed separately from the radio signals via the TMC antenna amplifier to the Touch Screen Display unit.

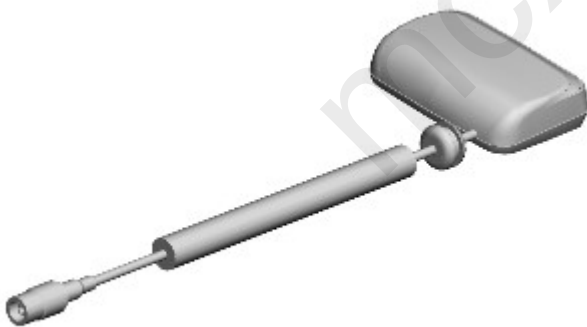
Global Positioning System Antenna



E124882

The [GPS](#) antenna is located in the rear spoiler and connected to the Touch Screen Display unit.

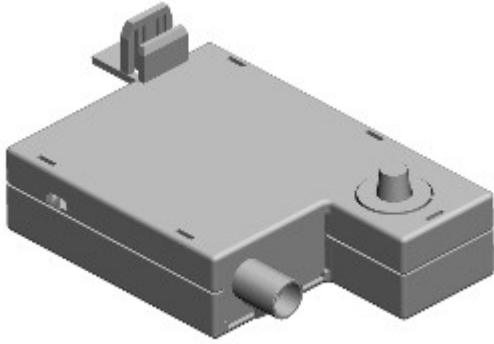
VICS Beacon Antenna (Japan only)



E 124822

The VICS beacon is located on top of the instrument panel on the left-hand-side. The beacon is connected to the TSD via a screened co-axial cable.

VICS Antenna Amplifier (Japan only)



E124881

The VICS antenna amplifier is located above the rear left-hand-side window. The amplifier is connected to the TSD unit.

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Navigation System - Navigation System Display Module

Removal and Installation

Removal

1.



2. Torque: 2.5 Nm



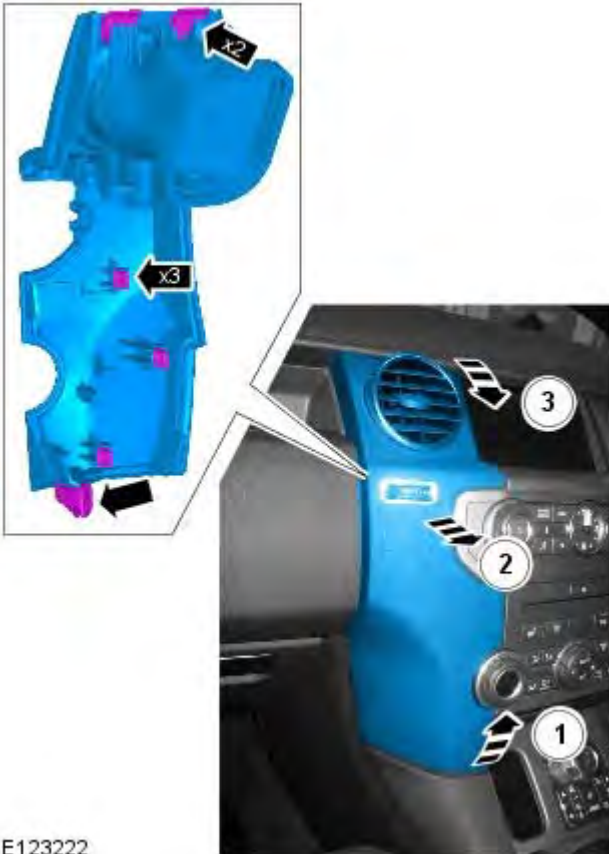
3.



4. 4. NOTE: LHD illustration shown, RHD is similar.



5.

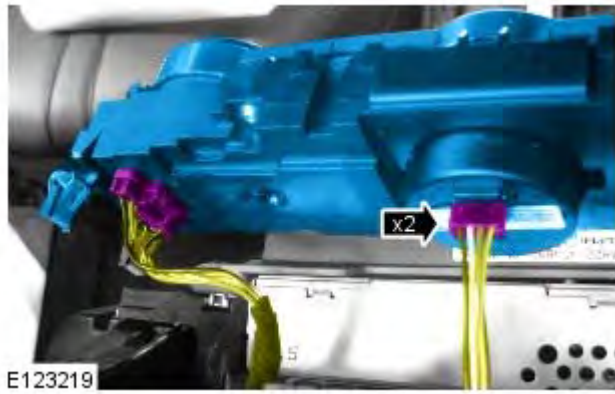


E123222

6.



E123218



7.



8. Torque: 2.5 Nm





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

Installation

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

Navigation System - Navigation System Traffic Amplifier

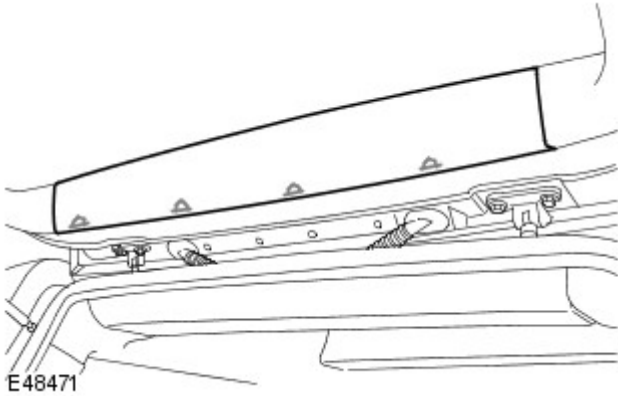
Removal and Installation

Removal

• NOTE: The navigation system traffic amplifier is located on the LH side of the liftgate. The diversity amplifier is located on the RH side of the liftgate. The procedure is similar for both components.

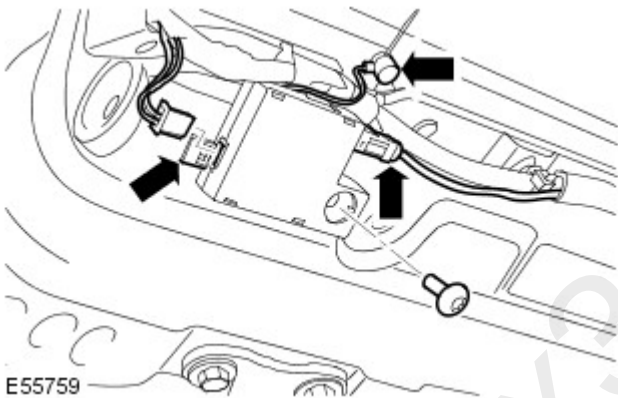
1. Remove the liftgate upper trim panel.

- Release the 4 clips.



2. Remove the navigation system traffic amplifier.

- Disconnect the 2 antenna cables.
- Disconnect the electrical connector.
- Remove the Torx bolt.
- Release the clip.



Installation

1. Install the navigation system traffic amplifier.

- Secure the clip.
- Tighten the Torx bolt to 10 Nm (7 lb.ft).
- Connect the electrical connector.
- Connect the antenna cables.

2. Install the liftgate upper trim panel.

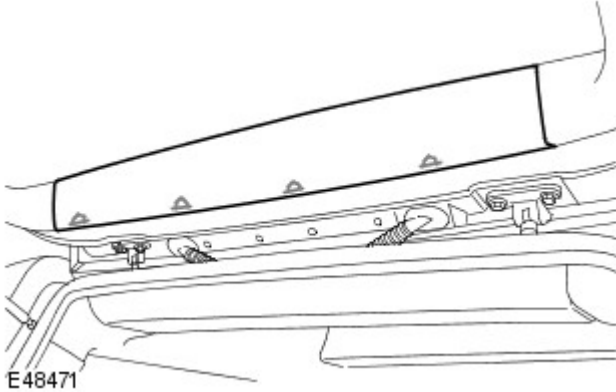
- Secure with the clips.

Navigation System - Navigation System Antenna

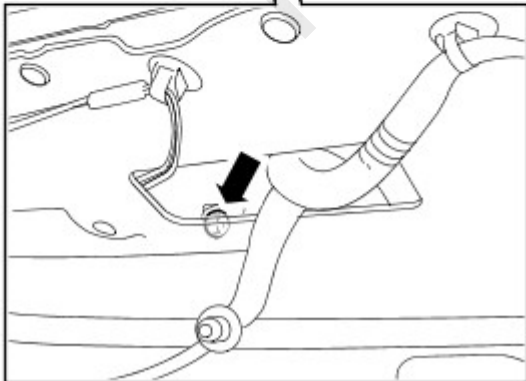
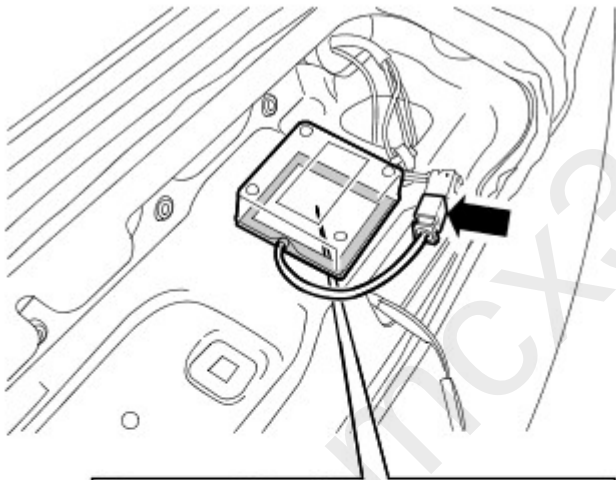
Removal and Installation

Removal

1. Remove the battery ground cable.
For additional information, refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).
2. Remove the high mounted stoplamp.
For additional information, refer to: [High Mounted Stoplamp](#) (417-01 Exterior Lighting, Removal and Installation).
3. Remove the liftgate trim panel.
 - Release the 4 clips.



4. Remove the navigation system antenna.
 - Remove the screw.
 - Release and disconnect the electrical connector.
 - Cut through the adhesive retaining pad.



Installation

1. Clean the adhesive contact area.
2. Install the antenna.
 - Connect and secure the electrical connector.
 - Tighten the screw.

3. Install the liftgate upper trim panel.

- Secure the clips.

4. Install the high mounted stoplamp.

For additional information, refer to: [High Mounted Stoplamp](#) (417-01 Exterior Lighting, Removal and Installation).

5. Connect the battery ground cable.

For additional information, refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

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