

Exterior Lighting -

Sealants

Item		Land Rover Kit Part No.
High mounted stop lamp (HMSL) sealant		BHM 705L
Bulb	Type	Rating
* Halogen headlamps - Low beam	Halogen H7	55W
* Halogen headlamps - High beam	Halogen H7	55W
+* Xenon headlamps - Low/High beam	Xenon D2S	35W
Front fog lamps	Halogen H11	55W
Rear fog lamps	Bayonet	21W
Turn signal indicators - Front	Bayonet	21W
Turn signal indicators - Rear	Bayonet	21W
Turn signal indicators - Side Repeaters	Capless	5W
Side lamps - Front	Bayonet	5W
** Stop/Tail lamps	Bayonet - Twin filament	21W/5W
High mounted stop lamp (HMSL)	LED's	-
License plate lamps	Festoon	5W
Reverse lamps	Bayonet	21W
Cornering lamp/Static bending lamp	Halogen H8	35W
NAS - Side marker lamps - front/rear	Capless	3W



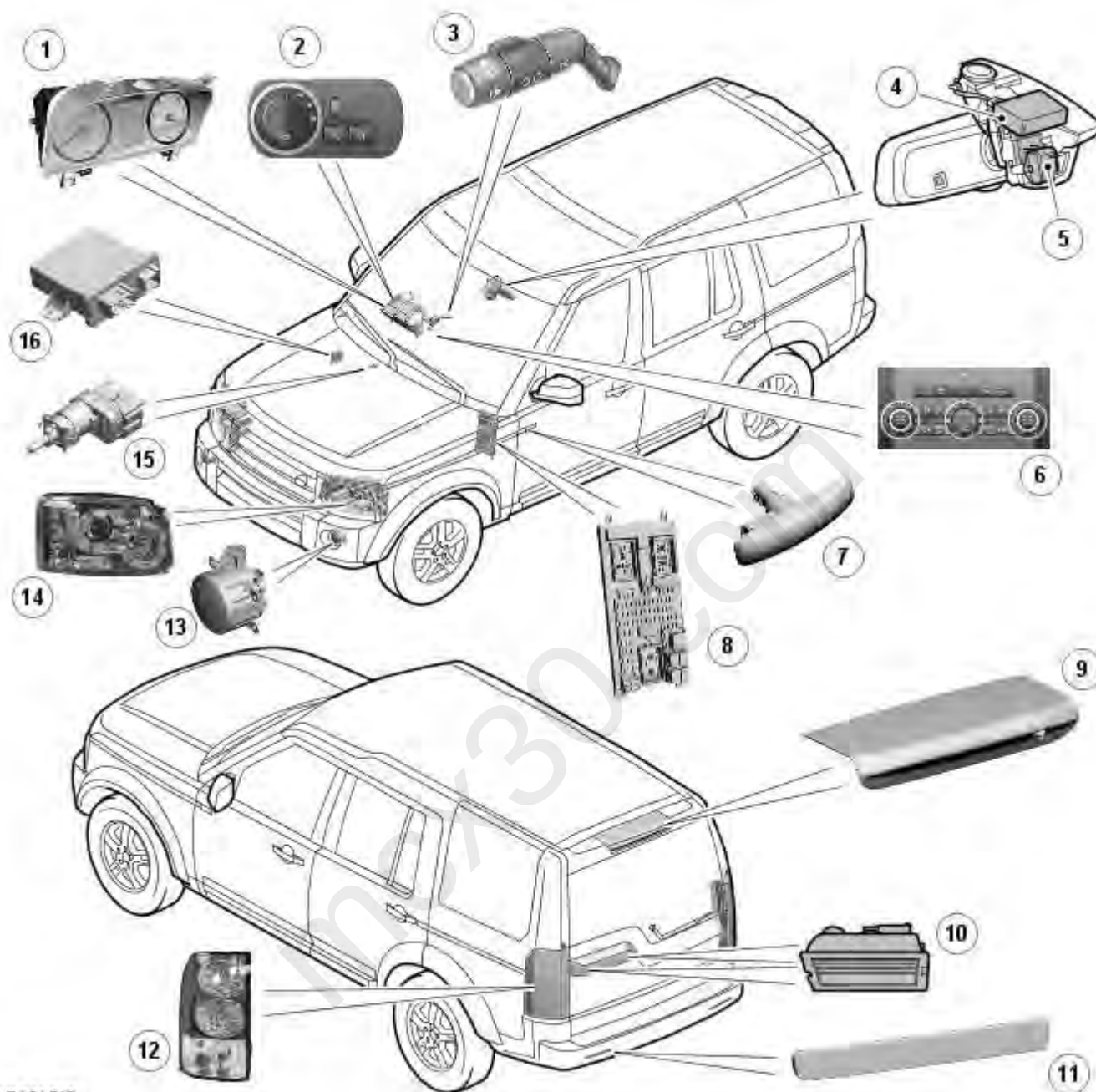
WARNING: + Refer to the General Information - Electrical Precautions section of this manual prior to carrying out any procedures on the Xenon headlamp system fitted to certain vehicles.

- NOTE: * NAS vehicles - Cornering lamps are not fitted to these vehicles.
- NOTE: ** Note: 21W filament is not functional on lower tail lamp.

Exterior Lighting - Exterior Lighting

Description and Operation

Exterior Lighting Component Location



E121548

Item	Part Number	Description
1	-	Instrument cluster
2	-	Lighting control switch
3	-	Left Hand (LH) steering column multifunction switch
4	-	Rain/light sensor
5	-	Auto high beam control module and image sensor
6	-	Hazard warning lamp switch
7	-	Side repeater turn signal indicator lamp
8	-	Central Junction Box (CJB)
9	-	High mounted stop lamp
10	-	License plate lamps
11	-	Reflector
12	-	Rear lamp assembly
13	-	Front fog lamp
14	-	Headlamp assembly
15	-	Stop lamp switch
16	-	Adaptive Front lighting System (AFS) control module

GENERAL

The exterior lighting system comprises the following exterior lamps:

- Front and rear side lamps
- License plate lamps
- Side marker lamps (if fitted)
- Front and rear turn signal indicator lamps
- Side turn signal indicator lamps
- Stoplamps and high mounted stop lamp
- Reversing lamps
- Rear fog lamps
- Front fog lamps (if fitted)
- Cornering/Static bending lamps (if fitted) - All except NAS
- Low and high beam headlamps.

Exterior Bulb Type /Rating and LED Table

The following table shows the bulbs/LED's used for the exterior lighting system and their type and specification (where applicable).

Bulb	Type	Rating
Halogen Headlamps - Low beam	Halogen H7	55W
Xenon headlamps - Low/High Beam	Xenon D3S	35W
Headlamps - High Beam	Halogen H7	55W
Front fog lamps	Halogen H11	55W
Rear fog lamps	Bayonet P21	21W
Turn signal indicator lamps - Front	PY24W	24W
Side repeater turn signal indicator lamps	Capless W5W	5W
Turn signal indicator lamps - Rear	12 LED's	-
Side lamps - Front - Xenon headlamps	10 LED's	-
Side lamps - Front - Halogen headlamps	Capless W5W	5W
Stop lamps	12 LED's	-
Side lamps - Rear	12 LED's (each side lamp)	-
High mounted stop lamp	LED's	-
License plate lamps	Capless W5W	5W
Reverse lamps	Bayonet P21	21W
Cornering lamp/Static bending lamp	Halogen H8	35W
NAS - Side marker lamp - Front	Capless W3W	3W
NAS - Side marker lamp - Rear	Capless W5W Rear	5W

The bulbs and the Light Emitting Diode (LED)'s are driven by Metal Oxide Semiconductor Field Effect Transistors (MOSFET's) within the Central Electronics Module (CEM) which is an integral component of the Central Junction Box (CJB). An exception to this is the front and rear position lamps, front fog lamps and the reversing lamps which are supplied with power via relays within the CJB and are protected by conventional fuses.

CENTRAL JUNCTION BOX

The CJB is located behind the glove compartment and is connected to the vehicle wiring harness with 8 multiplugs.

The CJB receives four permanent battery power supplies via the Engine Junction Box (EJB).

The lighting circuits are not all protected by conventional fuses as some are protected by MOSFET's. The control circuitry within the CJB for each individual circuit can detect and isolate a problem circuit.

Failure of a lamp is not notified to the driver. If a turn signal indicator fails the turn signal warning indicator in the instrument cluster will flash at double speed.

Input Signals for Lamp Control

The CJB receives inputs from the following switches:

- Lighting control switch for side lamps, headlamps and auto headlamps (if fitted)
- Momentary push switches for front and rear fog lamps
- Left hand steering column multifunction switch for turn signal indicators and high beam/headlamp flash and Auto High Beam system
- Brake pedal switch
- Momentary push switch for hazard warning.

The switches are supplied with a 10mA supply from the CJB and switch to ground when operated. The CJB detects that a switch has been operated (ON) when its closing resistance is less than 100 Ohm and is detected as OFF when its resistance is more than 10K Ohm.

The lighting control switch uses a binary system which is detected by the CJB which determines the selected position. The output from the lighting control switch is shown in the following table:

Switch State	Switch 1	Switch 2
Off	1	1
Side lamps	1	0
Headlamps	0	0
Auto headlamps	0	1

The CJB also receives ignition status via hard wired connections from the stop/start switch.

A reverse gear engaged signal is also received on the high speed Controller Area Network (CAN) bus from the Transmission Control Module (TCM) to enable the CJB to activate the reverse lamps.

The CJB can receive a hazard warning indicator activation message from the Restraints Control Module (RCM), via the high speed CAN bus, in the event of a crash. The CJB can also activate the hazard warning indicators to signify vehicle locking to the driver.

On vehicles with Auto High Beam, the auto high beam control module outputs signals on the medium speed CAN bus to the CJB to control the high beam headlamps. Power for the auto high beam control module is supplied via a relay located in the EJB.

Circuit Protection

Operation of the lamps is performed using overload proof Metal Oxide Semiconductor Field Effect Transistors (MOSFETs). The MOSFETs can detect overload, load interruption with the lamps switched on and short circuit to positive with the lamps switched off.

The MOSFETs are protected against short circuits, removing the requirement for the lamps circuits to be protected by fuses. The MOSFETs respond to heat generated by increased current flow caused by a short circuit. Normally this would cause the fuse to blow. The MOSFETs react to the heat increase and cut the supply to the affected circuit. Once the fault has been rectified or the MOSFET has cooled, the MOSFET will automatically reset and operate the circuit normally.

If an overload occurs, the current flow is dependant on the temperature of the related MOSFET and can be up to 20 times the rated current of the lamp. The MOSFET heats up and deactivates the load applied to the circuit. When the MOSFET cools the circuit is once again reactivated. This thermal cycling occurs continuously in the event of an overload occurring.

A number of lamps are controlled by relays and these circuits are protected by conventional fuses.

Bulb Monitoring

Bulb failure monitoring is performed by the CJB processor. The lamps are cold and warm monitored by the MOSFETs in order to detect bulb failure.

- **NOTE: Relay controlled lamps have no diagnostic monitoring.**

The CJB processor provides outputs to each MOSFET. The output switches the MOSFET to supply the required output to power the applicable lighting circuit. The microprocessor evaluates the circuits by detecting the returned signals from the controlling MOSFET.

When the bulb or LED is functioning normally, the output signal voltage from the controlling MOSFET is 0V. If a bulb or LED in the circuit fails, an open circuit occurs and the MOSFET outputs a signal of 5V to the processor. The signal is interpreted as a bulb or LED failure and generates a Diagnostic Trouble Code (DTC) which can be retrieved using an approved Land Rover diagnostic system.

Warm monitoring is performed continuously when the lights are switched on by evaluating the diagnostic output of the MOSFET switches. Cold monitoring is performed at 32 second intervals when the lights are switched off. The MOSFETs briefly switch on the lights for approximately 1 millisecond (this is insufficient to illuminate the bulb or LED) and checks the bulb or LED as per warm monitoring.

Cold monitoring is not possible for the low/high beam headlamps of vehicles using xenon bulbs. On these vehicles the cold monitoring of the low/high beam headlamps is switched off in the CJB. The CJB detects a failed xenon bulb via a reduction in current flow to the affected headlamp's xenon control module.

When a xenon bulb fails, the control module's current consumption falls to 60mA, which the CJB detects as unsuccessful bulb illumination.

Alarm Indications

The CJB can also display alarm visual indications for alarm arm, disarm and triggered conditions.

If the hazard warning lamps are active when a lock or unlock request is made, the hazard warning cycle is interrupted to allow the visual indication of the requested lock cycle. When visual indication is completed, the hazard warning operation will continue.

If the vehicle is involved in crash of a severity for the RCM to initiate deployment of the airbags, the control module outputs a hazard warning lamps on request on the medium speed CAN bus to the CJB. The hazard warning lamps will be activated and will continue until the RCM outputs a message to deactivate the hazard warning lamps.

Redundant Data Storage

The CJB stores data relating to the Vehicle Identification Number (VIN), total mileage and service interval indicator. This data is received by the CJB from the instrument cluster and used as a back-up in the event of instrument cluster replacement.

If the CJB is to be replaced, an approved Land Rover diagnostic system must be connected to the vehicle and the CJB replacement procedure followed to ensure that the stored data is transferred to the new unit.

Low Voltage Operation

If the battery voltage falls below 11.2V, the CJB operates the minimum lighting to preserve the remaining battery charge.

Crash Signal Activation

In the event of an accident of a severity to activate and deploy the airbags, the RCM requests various electrical operations to assist with the crash situation. The RCM requests via the bus systems to the CJB to activate the hazard warning lamps.

Security System Activation

In the event of the security system being triggered, the CJB requests activation of the hazard warning lamps.

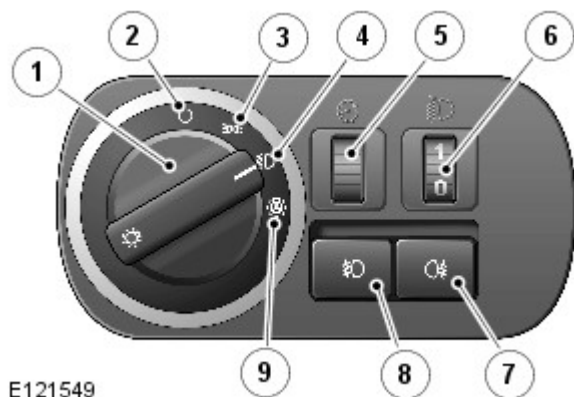
Instrument Panel and Switch Illumination Dimming

The CJB controls the instrument cluster backlighting illumination and also illumination of all instrument panel switches.

The CJB supplies a power output to all switch illumination bulbs at a voltage determined by the position of the manual dimmer rheostat. The switch illumination is activated when the lighting control switch is in the side lamp or headlamp position.

LIGHTING CONTROL SWITCH

The lighting control switch is located in the driver's side of the instrument panel, below the outer fresh air vent. The switch contains a rotary switch for selecting the vehicle exterior lighting functions, a rheostat for instrument illumination dimmer, a front fog lamp switch and a rear fog lamp switch.



Item	Part Number	Description
1	-	Lighting rotary control switch
2	-	OFF position
3	-	Side lamps position
4	-	Headlamps position
5	-	Instrument illumination dimmer control
6	-	Headlamp leveling control (if fitted)
7	-	Rear fog lamp switch
8	-	Front fog lamp switch
9	-	Auto headlamps position

The rotary side and headlamp control switch has 2 connections to the CJB. These 2 connections supply a hardwired binary code to the CJB which correspond to the switch position selection made.

The front and rear fog lamp switches operate by completing earth paths for a reference voltage from the CJB when the switch is pressed. The fog lamp switches are momentary, non-latching switches which briefly complete an earth path which is sensed by the CJB.

Lighting Control Switch Illumination

The switch legends on the lighting control switch are illuminated at the same brightness as the instrument panel switches when the lighting control switch is moved from the 'O' (off) position to the side, headlamp or AUTO position.

Manual Headlamp Leveling Control (if fitted)

The manual headlamp leveling control is only available on vehicles with coil spring suspension and is used to lower the headlamps when an excessive load is placed on the rear of the vehicle, altering the vehicle attitude and raising the headlamp beam.

The control uses a rotary thumbwheel which is connected to a rheostat which gives a variable output to the leveling Direct Current (DC) motors. The motors respond to the output and move to adjust the headlamp position as required.

The control has three marked positions; 0 to 3. The rotary wheel moves in 6, half positions to give fine adjustment control over the headlamp position. The positions relate to vehicle loading or driving conditions as follows: Position 0 is the normal position for unladen driving. Positions 1 to 3 lower the headlamp beam to compensate for a drop in height of the rear of the vehicle.

- 0 = Driver only or driver and front seat passenger
- 0.5 = Driver, front seat passenger
- 1 = All seats occupied
- 1.5 = All seats occupied and maximum rear axle loading
- 2 = Driver only and maximum rear axle loading
- 3 = Can be used under certain driving conditions, i.e. off-road

Dimmer Control

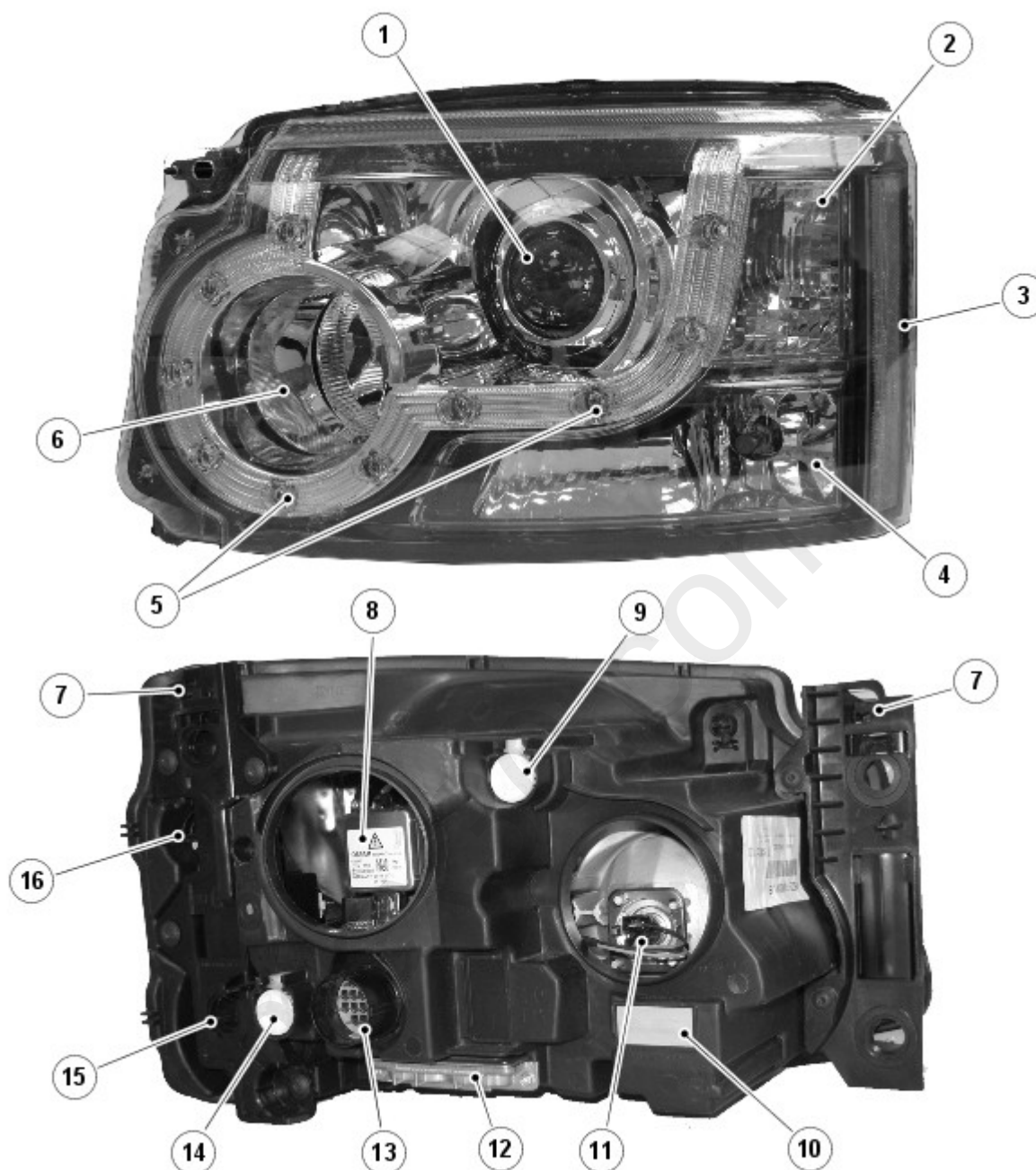
The CJB provides a Pulse Width Modulation (PWM) output to control the illumination brightness of the instrument panel and other fascia illumination. The dimmer switch operates using a rotary thumbwheel which is connected to a rheostat.

The rheostat is a variable resistor which provides a high or low resistance according to its set position. The CJB provides an output to the rheostat measure the voltage passing through to ground. The CJB measures this voltage and uses it to calculate a PWM output of between 8 and 12V to determine the brightness of the illumination.

Automatic Headlamps

Refer to Automatic Headlamps in this section.

HEADLAMP ASSEMBLY



E121550

Item	Part Number	Description
1	-	Low beam headlamp
2	-	Turn signal indicator lamp
3	-	Side marker lamp (NAS only)
4	-	Side lamp (halogen headlamps), cornering lamp (Xenon headlamps) or cornering/static bending lamp (AFS headlamps)
5	-	Side lamp LED's (xenon headlamps only)
6	-	High beam halogen 'fill-in' headlamp
7	-	Locking plate
8	-	Low beam halogen bulb (halogen headlamps) or xenon bulb (xenon headlamps)
9	-	Vertical adjuster
10	-	Waterproof breather
11	-	High beam 'fill-in' lamp bulb
12	-	Xenon control module (not fitted to halogen headlamps)
13	-	Electrical connector
14	-	Horizontal adjuster
15	-	Side lamp or cornering/static bending lamp cover (hidden)
16	-	Turn signal indicator lamp access cover (hidden)

Three types of headlamp are available; Halogen, Xenon or Xenon with Adaptive Front lighting System (AFS). The headlamps share a common, clear lens.

The headlamps are located behind the front carrier assembly. Each headlamp is secured to the front carrier assembly with two locking plates. The locking plate slides in grooves in the rear of the headlamp and two holes in each plate locate on pins on the carrier. Each locking plate is pressed down to lock the pins in the locking plate holes. The locking plates allow removal of the headlamp from the carrier for bulb changing without the requirement for special tools.

The rear of the headlamp unit has removable access panels which allow access to the bulbs for replacement. A large rubber cover allows access to the low/high beam bulb on both halogen and xenon headlamps. Another removable rubber cover provides access to the high beam only halogen bulb which is retained by a push fit. A smaller cover can also be rotated anti-clockwise to provide access to the turn signal indicator lamp bulb. The indicator bulb is a PH24WY orange bulb and is clipped into the cover and is pulled to remove. Below this cover is a removable cover which provides access to the side lamp bulb on halogen headlamps or the cornering lamp/static bending lamp bulb on xenon headlamps and the side marker lamp bulb on NAS models. On xenon headlamps the side lamps are LED's and therefore are not serviceable components.

The headlamps have two adjustment screws on the rear which allow for the manual setting of the vertical and horizontal alignment. On NAS vehicles the headlamp is regarded as Visual Optically Left (VOL) aiming. The adjustment screws have to be turned equal amounts to maintain the correlation in the vertical axis only. There is no horizontal adjustment. Refer to the Service Repair Procedures manual for headlamp alignment data.

Each headlamp has an integral sixteen pin connector which provides inputs and outputs for the various functions of the headlamp assembly. The usage of the pins differs between model variants, refer to the Electrical Reference Library (ERL) for pin details.

The low beam headlamps are switched on when the ignition is in ignition mode 6 and:

- the lighting control switch is in the headlamp position
- the lighting control switch is in the AUTO position and a 'lights on' signal is received by the CJB from the rain/light sensor.

The low beam headlamps can also be operated by the headlamp delay feature.

The high beam headlamps are switched on when the ignition is in ignition mode 6 and:

- the low beam headlamps are selected on in the headlamp position or activated via the AUTO feature
- The left hand steering column multifunction switch is pushed forward away from the driver
- The auto high beam system (if fitted) has switched on the high beam headlamps.

The high beam headlamps will be switched off when:

- The left hand steering column multifunction switch is moved rearward towards the driver
- The low beam headlamps are switched off
- The ignition mode is changed to the accessory mode 4 or ignition off
- The auto high beam system (if fitted) has switched off the high beam headlamps.

Common Headlamp Features

Turn Signal Indicator Lamp

The turn signal indicator lamp is incorporated into the outer part of the headlamp assembly. The lamp is located above the side lamp on halogen headlamps and the static bending/cornering lamp on Xenon headlamps. The turn signal indicator lamp uses an PH24W orange colored bulb module. The module is fitted into a holder which is connected via contacts on the headlamp housing to the main connector in the headlamp housing. The module is a snap fit in the holder and needs to be pulled sharply to remove. The holder is fitted with a seal and is located into an aperture in the headlamp housing and rotated to lock into position. Access to the holder requires removal of the headlamp from the front carrier assembly and removal of the outer locking plate from the headlamp.

The turn signal indicator lamps are operated by the left hand steering column multifunction switch or by the hazard flasher switch. The steering column multifunction switch is only active with the ignition in ignition mode 6, the hazard flasher switch is active at all times. When active, the turn signal indicator lamps will flash at a frequency cycle of 400ms on and 400ms off.

If a bulb fails, the remaining turn signal indicator lamps bulbs continue to flash at normal speed. The turn signal indicators in the instrument cluster will flash at double speed to indicate the failure to the driver.

Side Lamp - Halogen Headlamps

The side lamp is incorporated into the outer part of the headlamp assembly and is located below the turn signal indicator lamp.

The side lamp uses a capless W5W wedge fitting bulb which locates into a holder which is connected via wires to the main connector on the headlamp housing. The holder is a push fit into a receptacle in the headlamp housing. The bulb is accessible via a removable cover at the rear of the headlamp housing. Access to the cover requires removal of the headlamp from the front carrier assembly and removal of the outer locking plate from the headlamp.

The side lamps are operated by selecting side lamps or headlamps on the lighting control switch. The side lamps are operational at all times and are not dependant on the ignition switch position. The side lamps will also be illuminated when the lighting control switch is in the AUTO position and a 'lights on' signal is received by the CJB from the rain/light sensor.

Side Lamp - Xenon Headlamps

The side lamps on all Xenon headlamps are LED's. The 10 LED's are arranged around the outer part of the halogen fill-in lamp and the xenon projector module.

The side lamps are operated by selecting side lamps or headlamps on the lighting control switch. The side lamps are operational at all times and are not dependant on the ignition switch position. The side lamps will also be illuminated when the lighting control switch is in the AUTO position and a 'lights on' signal is received by the CJB from the rain/light sensor.

Cornering Lamp - Xenon (non-AFS headlamps only)

- **NOTE:** The cornering lamps are not fitted to NAS market vehicles

The cornering lamps are an optional feature designed to illuminate the direction of travel when cornering at low speeds. The design of the lens projects a spread of light from the vehicle at approximately 45 degrees to the vehicle axis.

The cornering lamp is incorporated into the outer part of the headlamp assembly and shares the same housing and reflector as the side lamp.

The cornering lamp uses a 35W Halogen H8 bulb which locates in a holder which is connected on the headlamp housing. The holder is located in an aperture in the headlamp housing and rotated to lock. The bulb is accessible via a removable cover at the rear of the headlamp housing.

The cornering lamps are controlled by the left hand steering column multifunction switch with the lighting control switch in the headlamp position and the ignition in ignition power mode 6. The cornering lamps are supplied power via the ignition circuit to ensure that they do not function with the headlamp delay feature. The cornering lamps are deactivated if the vehicle speed exceeds 25 mph (40 km/h).

Only one cornering lamp will illuminate at any one time. If the left hand turn signal indicators are selected on, the left hand cornering lamp will be illuminated and visa versa, providing the vehicle speed and lighting control switch positions are correct. Cornering lamps are disabled when reverse gear is selected.

Cornering / Static Bending Lamps (Xenon AFS headlamps only)

- **NOTE:** The cornering/static bending lamps are not fitted to NAS market vehicles

The cornering/static bending lamps are a standard feature on AFS headlamps designed to illuminate the direction of travel when cornering at low speeds. The design of the lens projects a spread of light from the vehicle at approximately 45 degrees to the vehicle axis. The static bending lamps are powered by the CJB and controlled by the AFS control module. The cornering lamp functionality is controlled by the CJB as described for non-AFS headlamps.

The cornering lamp and static bending lamp is incorporated into the outer part of the headlamp assembly.

The cornering/static bending lamp uses a 35W Halogen H8 bulb which locates in a holder which is connected via wires to the main connector on the headlamp housing. The holder is located in an aperture in the headlamp housing and rotated to lock. The bulb is accessible via a removable cover at the rear of the headlamp housing.

AFS Control

On headlamps with AFS, the cornering lamp function is as described previously for the Xenon non-AFS headlamps.

The static bending lamps operate with a steering angle sensor signal which is received by the AFS control module. The AFS control module sends a static bending lamp on request to the CJB which activates the static bending lamp bulb.

The static bending lamp operation is variable with the speed of the vehicle and the steering wheel angle. The static bending lamps illuminate at 0 mph (0 km/h) when the steering wheel rotation reaches 20 degrees. At 43 mph (70 km/h) the static bending lamps will illuminate when the steering wheel angle reaches 10 degrees. The static bending lamps will be switched off when the vehicle speed exceeds 43 mph (70 km/h).

The operation of the static bending lamps is controlled by the AFS control module. When the operation parameters of the lamp are reached, the CJB fades the static bending lamp bulb on using a PWM voltage over a period of approximately 2 seconds. When the lamp is switched off, the CJB fades the bulb off by decreasing the PWM voltage.

Halogen Headlamps

The halogen headlamps use a projector module for the low beam headlamp and a complex surface reflector for the halogen high beam lamp. The low and high beam bulbs are quartz halogen H7, with a rating of 55W. The bulbs are retained in the headlamp unit with conventional wire retaining clips.

The projector module comprises a reflector, the lens and the halogen bulb. The projector module only operates as a low beam halogen headlamp.

The high beam lamp reflector is divided into separate parabolic segments, with each segment having a different focal length.

The halogen headlamp uses a side lamp bulb which is located in the position used by the cornering/static bending lamp on xenon headlamps. The lens pattern for the side lamp in this position differs from the lens pattern used for the cornering/static bending lamp.

The halogen headlamps do not require adhesive decals to be applied to the clear outer lens to mask the beam cut-off when driving in opposite drive hand markets. A tourist lever mechanism is located on the right hand side of the projector module. This mechanism moves to blank off a portion of the beam spread to enable the vehicle to be driven in opposite drive hand markets without applying blanking decals to the headlamp lens. The beam is changed by removing the access cover at the rear of the lamp assembly and moving a small lever located near the bulb holder, at the side of the projector module. Make sure that the headlamps are off before removing the access cover.



CAUTION: This lever can be very hot if the lamps have been operating. Allow sufficient time to cool before operating the lever.

Xenon Headlamps

Safety Precautions

⚠ WARNING: The Xenon system generates up to 28000 volts and contact with this voltage could lead to fatality. Make sure that the headlamps are switched off before working on the system.

The following safety precautions must be followed when working on the xenon headlamp system:

- **DO NOT** attempt any procedures on the xenon headlamps when the lights are switched on.
- Handling of the D3S Xenon bulb must be performed using suitable protective equipment, e.g. gloves and goggles. The glass part of the bulb must not be touched.
- Only operate the lamp in a mounted condition in the reflector.

The xenon headlamps use a complex surface reflector for the Halogen fill in high beam lamp only lighting unit, which is of the same design as the high beam unit used on the Halogen headlamps. This type of reflector has the reflector divided into separate parabolic segments, with each segment having a different focal length.

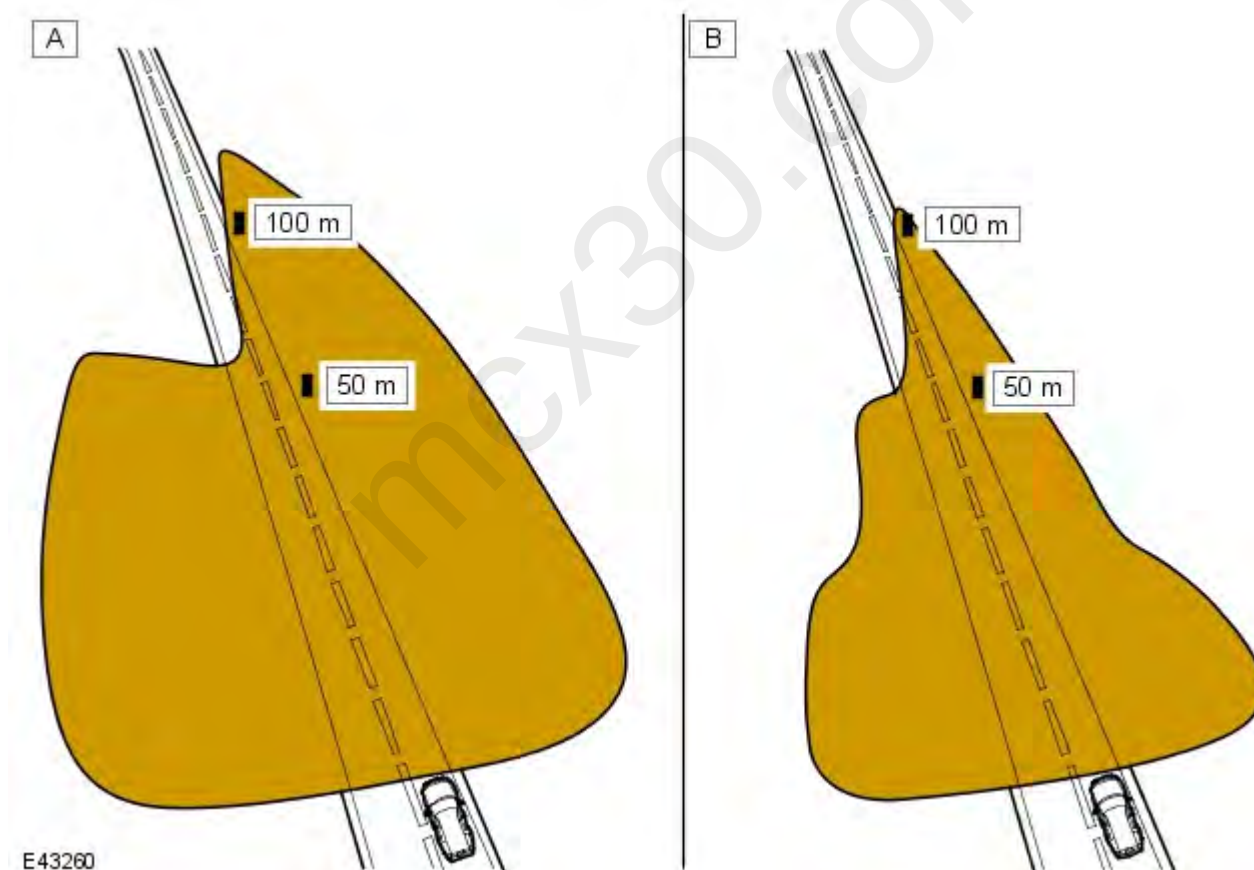
The high beam bulbs are quartz halogen H7, with a rating of 55W. The bulbs are retained in the headlamp unit with conventional wire retaining clips.

The Bi-Xenon™ (the Bi-Xenon™ trademark is the property of Hella KGaA Hueck & Co., Germany) projector module headlamp operates as both low beam and high beam headlamp unit. The Xenon lamp (or High Intensity Discharge (HID) lamp), comprises an ellipsoidal lens with a solenoid controlled shutter to change the beam output from low to high beam. The bulb is retained with a locking ring which must be rotated to facilitate removal of the D3S bulb.

• **NOTE:** If the lighting control switch is in the OFF position, the xenon lamps do not operate when the high beam 'flash' function is operated. If the lighting switch is in the headlamps position or AUTO position with the low beam lamps active, the xenon low beam will remain on when the high beam 'flash' function is operated.

The xenon headlamp system is controlled by the CJB using a control module for each headlamp and an igniter. The control modules and the igniters provide the regulated power supply required to illuminate the xenon bulbs through their start-up phases of operation.

Xenon/Halogen Headlamp Beam Comparison



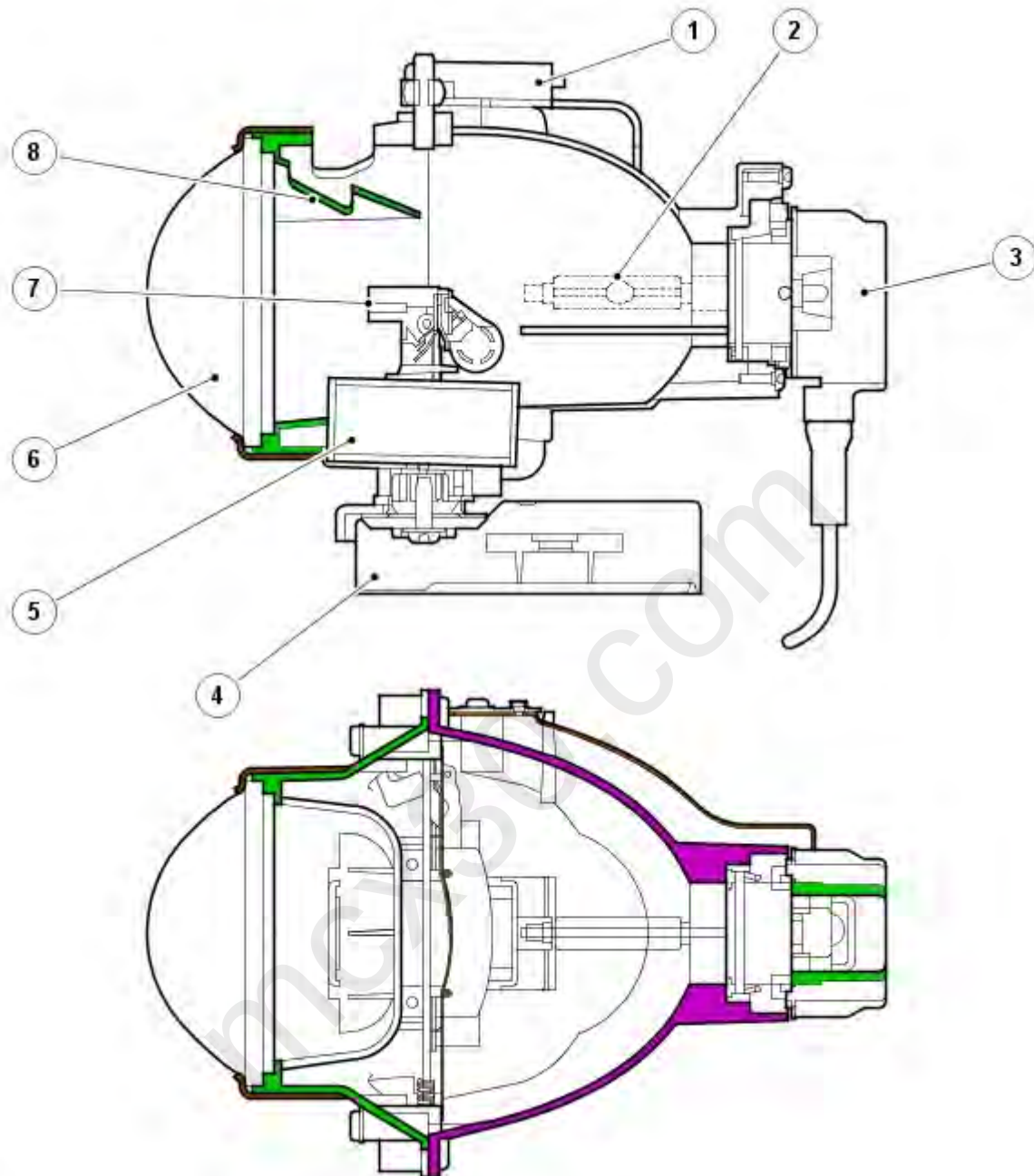
Item	Part Number	Description
A	-	Xenon
B	-	Halogen

The Xenon low/high beam headlamps use ellipsoidal technology for the lens and reflector providing improved night time visibility compared to conventional halogen headlamps. The Xenon headlamps provide the following benefits when compared to halogen headlamps:

- Longer bulb life - Approximately 3 to 5 times longer than a halogen bulb
- Increased light output - Xenon headlamps output 3 to 4 times more light on the road surface than halogen headlamps
- Blue/White light which is closer to natural daylight - Xenon lamps produce a blue/white light compared to a yellow light produced by a halogen bulb
- Improved night time driving visibility - Xenon lamps produce a wider and brighter beam in front of the vehicle than

- conventional halogen bulbs
- Lower running temperatures
- Lower power consumption
- Mercury free.

Xenon Headlamp Construction



E43261

Item	Part Number	Description
1	-	Bracket
2	-	D3S xenon bulb
3	-	D3S connector
4	-	Swivel actuator (AFS lamp only)
5	-	Solenoid
6	-	Aspheric lens
7	-	Shade
8	-	Shade
9	-	Lens support

The Xenon headlamp is a self contained unit located within the headlamp assembly. The unit comprises a reflector, an adaptor ring, the lens, a shutter controller and the Xenon 35W D3S bulb, which as an assembly is known as the projector module.

The reflector is curved and provides the mounting for the xenon bulb. The bulb locates in a keyway to ensure correct alignment in the reflector and is secured by rotating a locking ring on the projector module to lock. The bulb has a pin connector which is a push to lock fitting.

The shutter controller is a solenoid which operates the shutter via a lever mechanism. The shutter is used to change the beam projection from low beam to high beam and visa versa.

A tourist lever mechanism is located on the right hand side of the projector module. This mechanism moves to blank off a portion of the beam spread to enable the vehicle to be driven in opposite drive hand markets without applying blanking decals to the headlamp lens. The beam is changed by removing the access cover at the rear of the lamp assembly and moving a small lever located near the bulb holder, at the side of the projector module. Make sure that the headlamps are off before removing the access cover.

The Xenon bulbs illuminate when an arc of electrical current is established between two electrodes within the bulb. The xenon gas sealed in the bulb reacts to the electrical excitation and the heat generated by the current flow. The xenon gas reaction to the controlled current flow between the electrodes produces the blue/white light.

To operate at full efficiency, the xenon bulb goes through three stages of operation before full output for continuous operation is achieved. The three phases are; start-up phase, warm-up phase and continuous phase.

In the start-up phase, the bulb requires an initial high voltage starting pulse of 18000 to 28000 volts to establish the arc. This is produced by the igniters. The warm-up phase begins once the arc is established. The Xenon control modules regulate the supply to the bulbs to 2.6A which gives a lamp output of 75W. During this phase, the Xenon gas begins to illuminate brightly and the environment within the bulb stabilizes ensuring a continual current flow between the electrodes. When the warm-up phase is complete, the xenon control modules change to continuous phase. The supply voltage to the bulb is reduced and the operating power required for continual operation is reduced to 35W.

The Xenon system is controlled by the CJB, the two xenon control modules and the two igniters. The xenon control modules (one per headlamp) receive an operating voltage from the CJB when the headlamps are switched on. The modules regulate the power supply required through the phases of start-up.

The igniters (one per headlamp) generate the initial high voltage required to establish the arc. The igniters have integral coils which generate high voltage pulses required for start-up. Once the xenon bulbs are operating, the igniters provide a closed circuit for regulated power supply from the control modules.

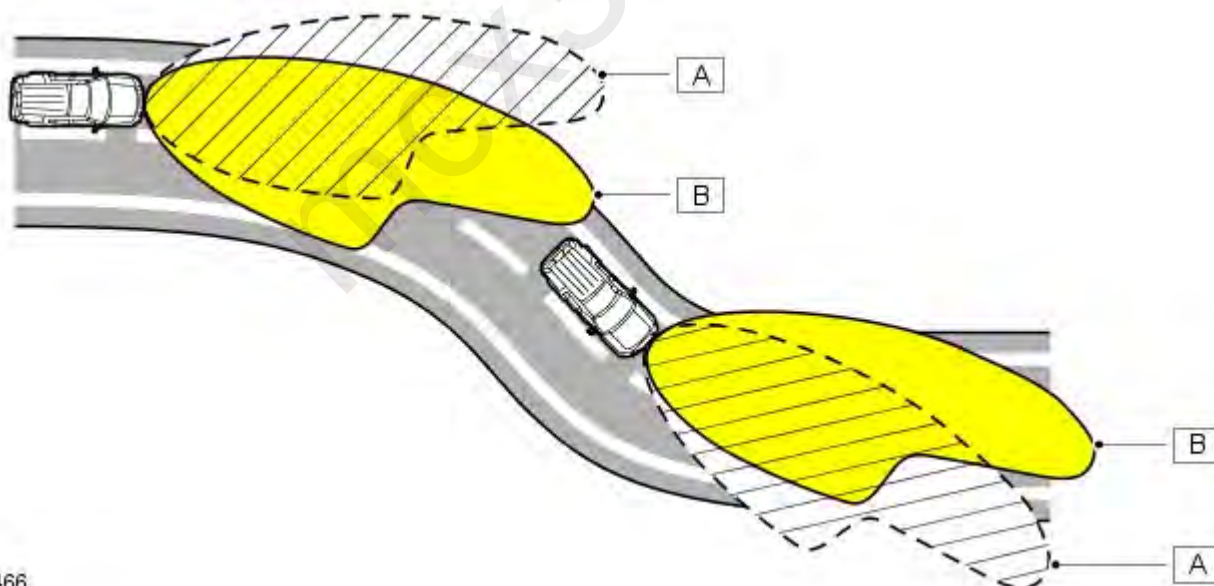
ADAPTIVE FRONT LIGHTING SYSTEM (AFS)

The AFS is a system to improve driver visibility under differing driving conditions. AFS provides a larger visible area which is illuminated when cornering by adjusting the position of the beam distribution on the road. Horizontal adjustment is made automatically to the most suitable orientation for the driving conditions using steering angle and information from other vehicle sensors.

AFS is only available with adaptive Bi-Xenon™ headlamps. The 'Xenon' module within the headlamp is controlled by actuator motors which rotate the projector module on its horizontal axis to adjust the beam output to suit the cornering conditions and vehicle inclination. Only the adaptive bi-xenon™ lamp projector module swivels, the non adaptive xenon and halogen high beam lamp units remains static.

The AFS system is controlled by an AFS control module which is located at the bottom of the passenger side 'A' pillar. The control module controls the horizontal alignment of the adaptive Bi-Xenon™ projector module. The operation of the static bending lamp is controlled by the AFS control module, but powered by the CJB.

AFS Concept



E43466

Item	Part Number	Description
A	-	Conventional headlamp beam distribution
B	-	AFS swivel headlamp beam distribution

AFS Control Module

The AFS control module is connected to the high speed CAN bus and receives inputs from other vehicle systems on the status of the following parameters:

- Steering angle - from steering angle sensor
- Vehicle speed - from ABS module
- Low beam status - from instrument cluster
- Suspension height - from air suspension control module
- Odometer value - for diagnostics only

- Engine running - from ECM
- Gear position - From transmission control module or transfer box control module
- Engine crank - from ECM
- Exterior/interior temperature - for diagnostics only.

The AFS will only operate when the AFS control module receives an engine running signal on the CAN bus. When the engine running signal is received, the AFS control module performs an initialization routine which is only performed at engine crank (power mode 9).

The AFS will also function when the lighting control switch is in the AUTO position and the AFS control module receives a lights on signal from the rain/light sensor and an engine running signal.

The AFS control module then monitors the inputs from the other vehicle systems to control the AFS functionality according to cornering angles and vehicle speed.

The AFS control module is connected to each headlamp on a private Local Interconnect Network (LIN) bus. The AFS control module then drives the DC motor actuators inside the headlamp assembly.

The AFS control module controls the swiveling angle of each projector module using speed and steering angle signals. The angles of each projector module differ to give the correct spread of light, For example, when turning left, the Left Hand (LH) projector module will have a greater swiveling angle than the Right Hand (RH) projector module

Reverse mode disables the swivel function when reverse gear is selected. The AFS projector modules move to their central straight ahead position and the static bending lamp, if active, will go off. When reverse gear is deselected, the AFS projector modules will move to a position to match the steering angle and the static bending lamp will illuminate if the operating conditions are correct (for example vehicle speed above 1.86 mph (3 km/h)).

Xenon Headlamp Assembly with AFS Construction

The AFS xenon headlamp construction is similar to the non-AFS xenon headlamp assembly. The AFS assembly contains an additional carrier frame which provides the location for the AFS components. The remaining lamps are as described previously for the Xenon headlamp assembly. The functionality of the static bending lamp on the AFS headlamp is different from the functionality of the cornering lamp on the xenon headlamp.

The carrier frame has a radial bearing at the top and a thrust washer at the bottom which provide the horizontal pivot points for the xenon projector module. The lamp module lower pivot has a splined end which locates in the mating splines of the AFS horizontal actuator motor. The carrier frame is suspended on two flexible mountings at the top which provide for the vertical pivot points for the xenon projector module which allow for the vertical adjustment of the projector module. The bottom of the carrier frame is attached to the AFS vertical actuator motor.

The AFS actuator motors are dc motors which are driven by a power output from the CJB in response to signals from the AFS control module.

The actuators contain a potentiometer which is connected via wires with gold plated connector pins to the AFS control module. The two wires to each actuator provide a feedback signal to the AFS control module to give the precise position of the xenon projector module.

The AFS control module receives vehicle speed signals from the ABS module to adjust the projector module vertically to increase the beam range as the vehicle speed increases.

Initialization

When the AFS control module receives an engine running signal, the control module performs the initialisation procedure which ensures that the headlamps are correctly aligned on their horizontal axis.

The AFS swivel initialization is completed in less than 1 second. The LH and RH AFS motors flick the headlamps to calibrate the centre position of the headlamps.

Failure Mode

In the event of a failure of the AFS system, a warning indicator in the instrument cluster is illuminated to warn the driver. The AFS warning indicator illuminates when the ignition is in accessory power mode 4 or ignition power mode 6 and will flash continuously until the fault is rectified. The AFS warning indicator will also be illuminated if a failure of the steering angle sensor or the vehicle speed signal is detected.

Illumination of the AFS warning indicator does not necessarily mean that there is a fault with the AFS system. The fault may be caused by a failure of another system preventing the AFS system operating correctly.

The AFS control module performs a diagnostic routine every time AFS is requested. If any fault is found, the AFS control module will suspend the operation of the AFS function.

If the AFS system has failed with the xenon projector module in a position other than the correct straight ahead position, the AFS control module will attempt to drive the xenon projector module to the zero (straight ahead) position. If this is not possible, the AFS control module will lower the projector module using the leveling actuator motors to prevent excess glare to oncoming vehicles.

The AFS control module software can detect an internal failure of the control module control circuits. The control module will power the projector modules to the zero position and prevent further operation.

Faults can be investigated by interrogating the AFS control module using an approved Land Rover diagnostic system to check for fault codes.

AUTOMATIC HEADLAMP OPERATION

The automatic headlamp function is a driver assistance system. The driver can override the system operation by selection of side lamp or headlamp on if the ambient light conditions require front and rear lighting to be active. The automatic

headlamp system uses a light sensor and the CJB, which are connected via the LIN bus to control the headlamp functionality.

A light sensor is incorporated in the rain/light sensor located on the inside of the windshield, below the rear view mirror. The wiper system also uses the rain/light sensor for automatic wiper operation.

For additional information, refer to: [Wipers and Washers](#) (501-16 Wipers and Washers, Description and Operation).

The light sensor measures the ambient light around the vehicle in a vertical direction and also the angular light level from the front of the vehicle. The rain/light sensor uses vehicle speed signals, wiper switch position and the park position of the front wipers to control the system.

The automatic headlamp operation uses ambient light levels which are monitored by photodiode incorporated in the rain/light sensor. The rain/light sensor sends a lights on/off request to the CJB on the LIN bus, which responds by switching on the low beam headlamps, front side lamps and rear tail lamps.

The automatic headlamps are activated under the following conditions:

- Twilight
- Darkness
- Rain
- Snow
- Tunnels
- Underground or multistoried car parks.

Operation of the automatic headlamps requires the ignition to be in ignition mode 6, the lighting control switch to be in the 'AUTO' position and a lights on request signal from the light sensor.

HEADLAMP LEVELING

Headlamp leveling provides for the adjustment of the vertical aim of the headlamps. The leveling system is primarily required to minimise glare to other road users when a heavy load is in the rear of the vehicle.

Two systems of headlamp leveling are available; manual and static.

Manual Headlamp Leveling

Manual headlamp leveling is only available on vehicles with halogen headlamps and coil spring suspension.

The manual system comprises the following components:

- Two headlamp leveling motors
- Headlamp leveling rheostat rotary control.

When the ignition is in ignition mode 6, power is supplied to the lighting control switch via the ignition relay in the battery junction box and to the headlamp leveling motor in each headlamp assembly via the CJB. When the lighting control rotary switch is moved to the side lamp or headlamp position, the supply from the ignition relay is passed to the leveling rotary control.

Movement of the leveling rotary control produces a variable voltage output, which is sensed by the motors. The motors react to the supplied voltage and move the headlamp to the requested position which relates to the supplied voltage from the leveling rotary control.

The headlamps can only be lowered from their unladen position to compensate for changes in vehicle attitude due to loading.

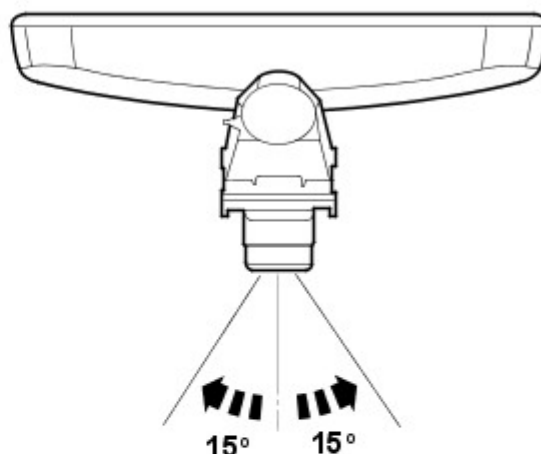
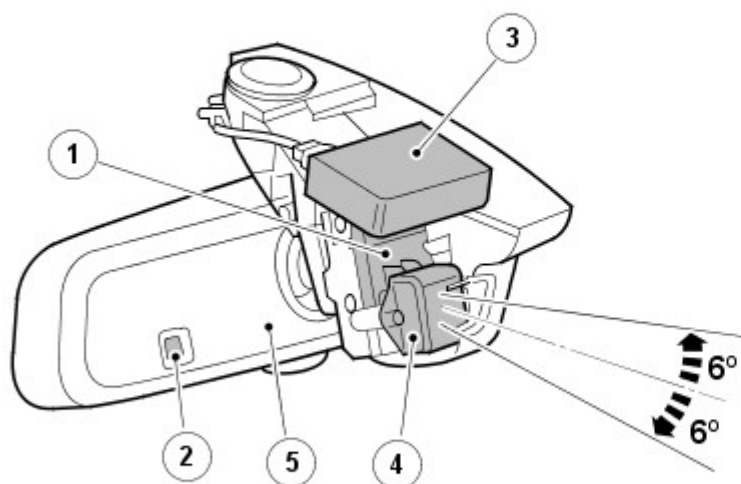
Vehicle Headlamp Leveling

Vehicle headlamp leveling is only available on vehicles with air suspension.

Vehicle headlamp leveling is performed by the air suspension system and the air suspension control module. The suspension system constantly monitors the vehicle attitude and adjusts the height of the front and/or rear of the vehicle accordingly. This maintains the correct vehicle attitude and consequently maintains the correct headlamp beam alignment.

The vehicle leveling system is fully automatic, therefore the lighting control switch does not have the manual leveling rotary control.

HIGH BEAM ASSIST



E117701

Item	Part Number	Description
1	-	Rear view mirror calibration bracket
2	-	Ambient light sensor (High beam assist)
3	-	Rain/light sensor (Auto headlamps)
4	-	Image sensor
5	-	High beam assist control module (inside mirror body)

High beam assist is a driving aid which automatically controls the high beam function. If required, the system can be overridden by the driver.

CAUTION: The high beam assist system is designed as a driving aid only. Should the road conditions require, it is the driver's responsibility to consider other road users and operate the high beam headlamps in a safe manner. In certain circumstances the driver will be required to intervene.

High Beam Assist Warning Indicator



E117699

Item	Part Number	Description
1	-	Warning indicator (green)

The high beam assist system is controlled by a high beam assist control module which is located in the interior rear view mirror body and by the CJB. The module and the CJB are connected via the medium speed CAN bus.

The high beam assist control module receives a power supply from the CJB when the ignition is in power mode 6 (ignition on). The rear view mirror also includes a low resolution camera (image) sensor which detects headlamps and tail lamps of preceding vehicles. The sensor is connected to the control module which evaluates the image data, checking for light intensity and location.

If conditions are correct, the control module will activate the high beam assist by sending a high or low beam request message to the CJB via the medium speed CAN bus. The CJB then controls the shutter in the Xenon projector module

together with the high beam fill-in lamp.

High Beam Assist Operation

The high beam assist operates as part of the automatic headlight system. When driving at night with the lighting control switch in the automatic position and the LH steering column multifunction switch in the central position, with sufficient darkness (approximately 1 lux or less) and a suitable road speed, the high beam assist will automatically operate the high beam lighting when necessary. A warning symbol in the instrument cluster confirms to the driver when the high beam assist system is selected and enabled.

• **NOTE:** The function of the normal 'blue' high beam indicator remains unchanged and it always reflects the actual status of the high beam lamps

• **NOTE:** The exterior lighting 'on' threshold for the auto headlamps system is approximately 100 lux which is measured by the rain/light sensor. At light levels below this value the low beam headlamps and exterior lights will be switched on. The high beam assist will not function until the light level has reached approximately 1 lux. At light levels above 1 lux high beam is not required and therefore is not activated.

Activation (system ready)

High beam assist will only activate and illuminate the warning indicator to show system is ready or 'primed' for high beam control, when the following conditions are met:

- High beam assist has been first 'enabled' via the instrument cluster menu
- Lighting control switch is in the 'Auto' position
- LH steering column multifunction switch in the central position
- The ambient light level is below 100 lux – refer to 'Light Levels' section that follows
- The system has not been overridden or cancelled – refer to 'Override' section that follows
- The camera (image) sensor view is not blocked.

High Beam Control

When activated, high beam assist will switch the headlamps to high beam when all the following conditions occur:

- No relevant oncoming traffic
- No relevant preceding traffic
- In non-urban environment, i.e. with no street lighting
- Ambient light level is below 1 lux – refer to 'Light Levels' section that follows
- Road speed is suitable – refer to 'Road Speed' section that follows.

Low Beam Control

When activated, high beam assist will switch the headlamps to low beam when any of the following conditions occur:

- Relevant Oncoming traffic is present
- Relevant Preceding traffic is present
- In urban environment, i.e. with street lighting
- Ambient light level is above 1 lux – refer to 'Light Levels' section that follows
- Road speed is not suitable – refer to 'Road Speed' section that follows
- Unrecognisable reflective inputs from road signs or markings – refer to 'System Limitations' section that follows.

Light Levels

The exterior lighting 'on' threshold for the normal 'auto headlamps' feature is approximately 100 lux and is measured by the windscreen mounted 'rain/light' sensor. When the light level falls to this value the low beam headlamps and exterior lights will be switched on together with the high beam assist warning indicator.

This warns the driver that the system is activated and ready to automatically switch on the high beam headlamps when the light level falls a little further to approximately 1 lux, as measured by the 'ambient light sensor' located in the mirror body. High beam is generally not required with light levels above 1 lux.

Road Speed

A road speed signal is received by the CJB from the Anti-lock Braking System (ABS) module via the high speed CAN bus. When the other activation conditions are correct, the CJB will switch the headlamps to high beam when the road speed has increased above 40 km/h (25 mph).

When the road speed falls to below 24 km/h (15mph), the CJB will switch the headlamps to low beam. The 10 mph (15 km/h) difference between the on and off road speed thresholds prevents the system continually switching between high and low beam at low speeds.

Override

The driver can manually override the high beam assist system at any time. When the high beam assist system is activated, pulling the LH steering column multifunction switch to the high beam 'flash' position or pushing it forward to the high beam position will de-activate the system and the high beam assist warning indicator in the instrument cluster will extinguish.

When the multifunction switch is returned to the central position, from a forward high beam position, the system is re-activated and the high beam assist warning indicator will illuminate again.

Correct Performance

In addition, high beam assist will only exhibit best performance if all of the following conditions are met:

- No false inputs are received by the camera (image) sensor, such as reflected light from certain static signs – refer to 'System Limitations' section that follows

- Headlamps are correctly aligned
- High beam assist system has been set for correct 'hand of traffic' via the driver menu settings – refer to 'Setting Hand of Traffic' section that follows
- Headlamps have been set for correct 'hand of traffic' via the mechanical tourist lever in headlamp casing – refer to 'Setting Hand of Traffic' section that follows
- Camera (image) sensor has been through a self learning 'auto aim' calibration procedure if any components have been replaced – refer to 'Calibration' section that follows
- There are no large reflective items, white papers, etc., sitting on top of the dash board in near view of the camera (image) sensor, or stickers placed directly in front of the camera (image) sensor

Driver Menu Features

The high beam assist feature must first be enabled using the configuration menu available in the instrument cluster. However if required, the high beam assist system can be permanently disabled leaving the basic 'Auto Lamps' system still operative.

Within this menu the system can also be configured for driving on the alternate side of the road (Hand of Traffic). This enables the system to be used in different regions and it's setting is important for correct operation.

Setting 'Hand of Traffic' and High Beam Assist 'Enable'

To set the high beam assist options the following steps must be sequenced:

- With the ignition in power mode 6 (ignition on), and the engine not running, use the controls on the steering wheel to select on the instrument cluster menu:
 - Menu > Vehicle Set-up > High Beam Assist
 - Configure the 'Hand of Traffic' setting by selecting the appropriate 'Drive on Left' (of road) or 'Drive on Right' (of road) to the applicable Market condition
 - Enable the feature by setting 'Activate Assist' if not already selected.
- NOTE: Enabling or disabling high beam assist will not affect the 'Hand of Traffic' settings once set.
- NOTE: The headlamps still require manual adjustment using the tourist lever for driving abroad in countries where the alternate side of the road is used.

The instrument cluster menu also includes a 'High Beam Assist Sensitivity' selection. This is a requirement option for NAS market vehicles only but it is not recommended for normal use and has been superseded.

- NOTE: In other markets the 'Sensitivity' selection is greyed out and cannot be selected.

For additional information, refer to: [Instrument Cluster](#) (413-01 Instrument Cluster, Description and Operation).

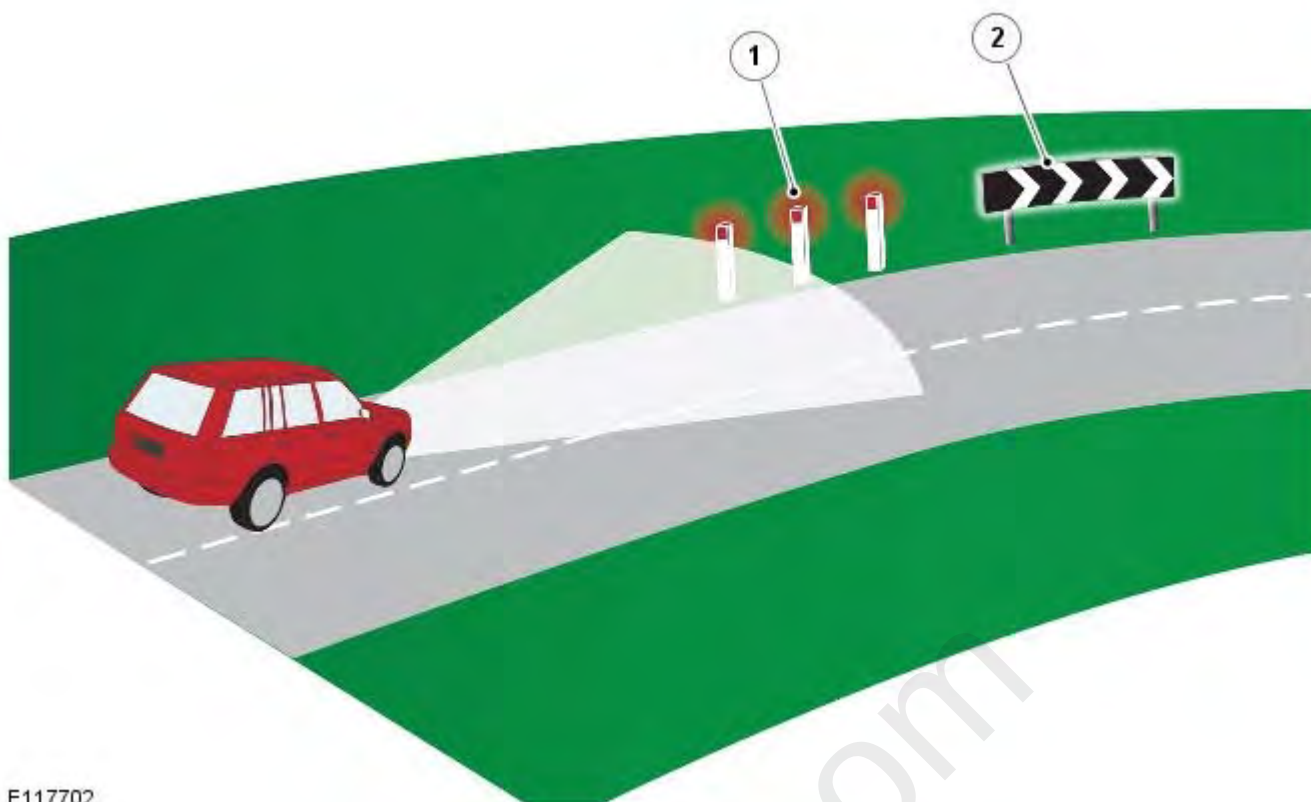
System Limitations

The high beam assist system can occasionally have difficulty distinguishing between light from other vehicles or reflected light from static highly reflective road signs.

These situations may cause the high beam assist system to undesirably operate the high beam headlamps or take no action at all. Examples of these situations are as follows:

- Dips, hollows or crests in the road
- Highly reflective static Road signs
- Tight bends
- Poorly illuminated vehicles e.g. cyclists or small mopeds
- Motorway central barriers
- Extreme weather conditions e.g. Fog, heavy snow
- Exterior domestic or industrial lighting

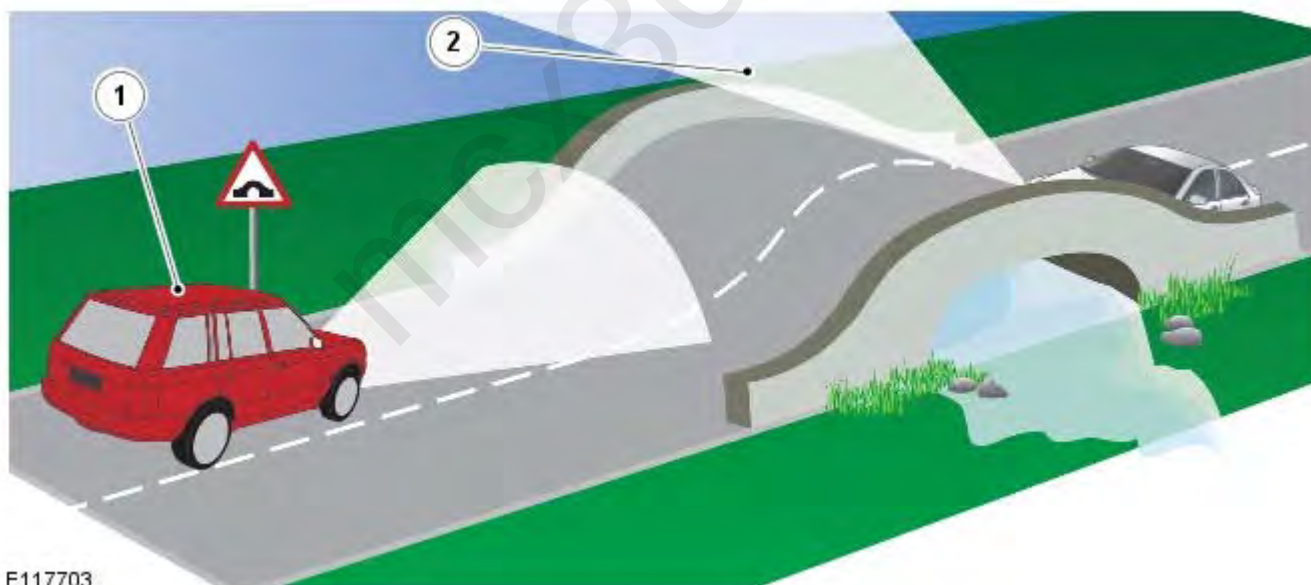
Reflective Static Signs



E117702

Item	Part Number	Description
1	-	Red reflective signs could be detected as rear tail lamps
2	-	Large reflective signs could affect the system

Manual Deactivation



E117703

Item	Part Number	Description
1	-	Vehicle equipped with high beam assist
2	-	Oncoming vehicle headlamps can be seen by the driver before the high beam assist image sensor detects the oncoming light input

There are situations when a driver is able to judge if a high beam deactivation is desirable before the high beam assist system actually operates, for example over a crest of a hill. Headlamps from an oncoming vehicle can sometimes be seen on the horizon prior to the detection sensor receiving an input. It is the driver's preference to determine if early intervention is desired in this and similar situations.

System Diagnosis

- NOTE: Windshield stickers, stone chips, dirt and general road film will affect the successful operation of the image sensor if sufficient blocking is present. Avoid placing reflective objects on the instrument panel, for example white paper which can affect the image sensor.

High beam assist has a self diagnosis capability by comparing data from the ambient light sensor input (located in the rear view mirror) to light levels detected by the image sensor. If a deviation is detected it is assumed that the ambient light available to the image sensor is being restricted by dirt or other blockage and the system will be deactivated. Diagnostic Trouble Code (DTC)'s are stored in the control module's memory and can be accessed using an approved Land Rover diagnostic system. Within the diagnostic system is a procedure to test the basic operation of the camera function.

In the event of a fault, the warning strategy to the driver is as follows:

- Image sensor internal fault - green icon will extinguish with no additional message to driver
- CJB has lost all communication with image sensor - green icon will extinguish with no additional message to driver
- Image sensor blocked - green icon will extinguish with an additional "High Beam Assist Sensor Blocked" message within the message centre

System Calibration

To achieve effective operation of the high beam assist system, a calibration routine is performed on vehicle build and system tolerances are set to an accuracy of +/- 0.2 degrees.

This initial calibration is a 'one time only' procedure. Should the high beam assist components or the windshield require replacement at the dealership, an automatic calibration routine will be performed. This 'auto aim' calibration procedure is a continual process that takes place during a normal drive cycle at night and could take between 10 - 30 minutes dependant on the following driving conditions:

- If sufficient road markings (lane markings) are visible to the image sensor - approximately 10 minutes
- If insufficient road markings are visible, the system uses the tail lights of preceding vehicles - approximately 30 minutes.

• NOTE: Until this calibration is complete the system may not react correctly during operation. This should be made clear to the customer before vehicle handover. During any calibration or rectification work the headlamps should be checked for correct alignment.

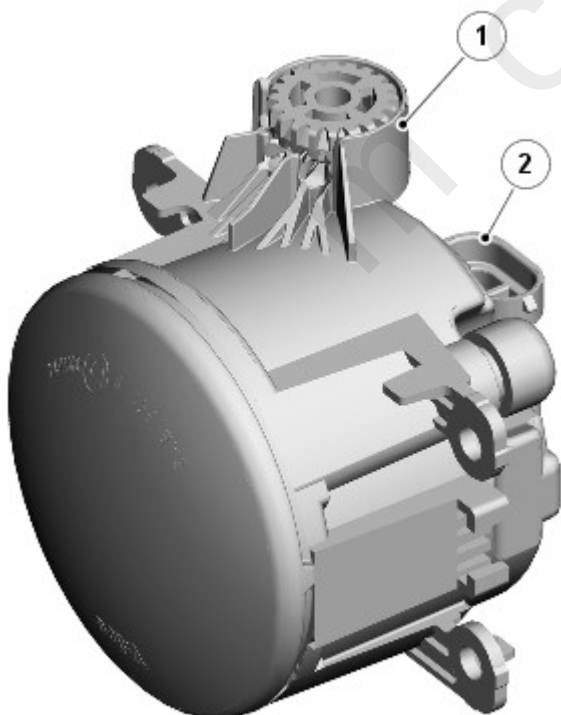
• NOTE: Due to mechanical calibration tolerance the correct mirror assembly must be used for the vehicle model types in question and it is not exchangeable with other vehicle model types.

• NOTE: After any rectification work and before any calibration drives, the headlamps should be checked for correct alignment.

DAYTIME RUNNING LAMPS (DRL)

For additional information, refer to: [Daytime Running Lamps \(DRL\)](#) (417-04 Daytime Running Lamps (DRL), Description and Operation).

FRONT FOG LAMP (If Fitted)



E120184

Item	Part Number	Description
1	-	Vertical adjustment wheel
2	-	Electrical connector

Front fog lamps are an optional fitment on low specification vehicles and a standard fitment on high specification vehicles.

Two front fog lamps are located in apertures in the front bumper. The front fog lamps are located in the front bumper. Each lamp is secured to three lugs in the bumper and retained with self tapping screws and fasteners. Each lamp has an adjustment wheel which provide for the vertical alignment of the beam. Access to the adjustment wheel requires removal of the lamp bezel.

The fog lamp uses a 55W halogen H11 bulb which is located in a holder. The holder is located in a hole in the rear of the fog lamp housing and is turned to lock in position.

The front fog lamps are controlled by the lighting control switch. When the ignition is in ignition mode 6 and the lighting control switch is in the side lamp or headlamp position, the lighting control fog lamp switch can be pushed to activate the front fog lamps.

If the switch is pushed a second time the front fog lamps are switched off. A front fog lamp warning indicator is illuminated in the instrument cluster when the front fog lamps are active.

If the fog lamps are active when the lighting control switch is moved to the off position or the ignition is switched off, the fog lamps are de-activated and will need to be reselected on (if required) when the side lamps or headlamps are next selected on.

Front Fog Lamps Functionality (NAS and Canadian Markets Only)

The front fog lamps are powered by an additional relay (relay 5) which is located in the EJB in the engine compartment.

The front fog lamps operate as described previously but with the following differences which cover local laws governing lamp usage.

If the low beam headlamps and the front fog lamps are on at the same time, when the high beam headlamps are switched on, the front fog lamps will be automatically switched off. When the high beam headlamps are switched off, the front fog lamps will be switched back on automatically.

- **NOTE:** The front fog lamps will also be switched off if the headlamp high beam flash function is operated.

REAR LAMP ASSEMBLY



E121551

Item	Part Number	Description
1	-	Turn signal indicator lamp LED's
2	-	Stop lamp LED's
3	-	Side lamp LED's
4	-	Side marker lamp (NAS only)
5	-	Reverse lamp
6	-	Fog lamp
7	-	Side marker lamp bulb holder (NAS only)
8	-	Location studs
9	-	Attachment hole
10	-	Attachment hole
11	-	Electrical connector
12	-	Reverse lamp bulb holder
13	-	Fog lamp bulb holder

The rear lamp assembly is a one piece unit which contains a stop lamp, a rear side lamp, a turn signal indicator lamp, a second rear side lamp, a reversing lamp and a fog lamp. Light Emitting Diode (LED)'s are used for the tail lamp, stop lamp and turn signal indicator lamp. Reversing lamp and fog lamp use bayonet fitting bulbs. These are located in holders which fit into the applicable hole in the lamp housing and are locked by rotating. Each bulb holder is connected by wires to a connector on the rear of the lamp housing.

The rear lamp assembly is located in a recess in the vehicle body. Two studs on the outer edge of the lamp housing locate in the vehicle body. The lamp is secured with two screws which are located on the inner edge of the lamp housing, near the tailgate aperture.

Rear Stop Lamp

The upper lamp is the inner section of the upper of the two main lamps and uses 12 LED's.

The stop lamp is activated when the ignition is in ignition mode 6 and the brake pedal switch is active (by depressing the brake pedal). The high mounted stop lamp will also be activated when the brake pedal is pressed.

The stop lamps can also be activated by the ABS when Hill Descent Control (HDC) is active. A signal from the ABS module energises a relay which supplies power to the stop lamps and high mounted stop lamp. For additional information, refer to: [Anti-Lock Control - Traction Control](#) (206-09A Anti-Lock Control - Traction Control, Description and Operation).

Turn Signal Indicator Lamp

The turn signal indicator lamp is the inner section of the lower of the two main lamps and uses 12 LED's.

The turn signal indicator lamps are operated by the LH steering column multifunction switch or by the hazard flasher switch. The steering column multifunction switch is only active with the ignition switch is in ignition mode 6, the hazard flasher switch is active at all times. When active, the turn signal indicator lamps will flash at a frequency cycle of 400ms on and 400ms off.

Side Lamp

The side lamp is the outer ring of both upper lamps and use 12 LED's in each lamp.

The lamps are operated by selecting side lamps or headlamps on the lighting control switch. The lamps are operational at all times and are not dependant on the ignition switch position. The lamps will also be illuminated when the lighting control switch is in the AUTO position and a 'lights on' signal is received by the CJB from the rain/light sensor.

On NAS market vehicles a side marker lamp is incorporated into the side of the lamp assembly and uses a 5W capless wedge bulb.

Reversing Lamp

The reversing lamp is located below the tail lamp and uses a 21W bayonet fitting bulb.

The reverse lamp is active when the ignition is in ignition mode 6 and the CJB receives a reverse selected signal on the CAN bus. Both manual and automatic transmissions have a reverse switch which senses when reverse is selected.

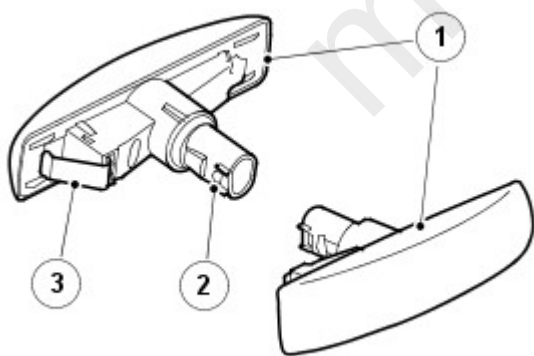
Rear Fog Lamp

The rear fog lamp is located at the bottom of the rear lamp and uses a 21W bayonet fitting bulb.

The rear fog lamp is controlled by a non-latching switch on the lighting control switch. When the ignition is in ignition mode 6 and the lighting control switch is in the side lamp or headlamp position, the rear fog lamp switch can be pressed to activate the rear fog lamps. A second press of the switch will de-activate the rear fog lamps. A rear fog lamp warning indicator is illuminated in the instrument cluster when the rear fog lamps are active.

If the rear fog lamps are active when the lighting control switch is moved to the off position or the ignition is switched off, the fog lamps are de-activated and will need to be reselected on (if required) when the side lamps or headlamps are next selected on.

SIDE REPEATER LAMP



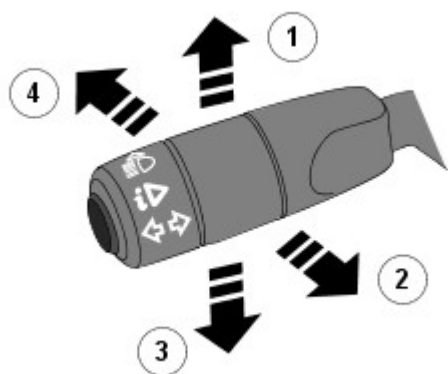
E43272

Item	Part Number	Description
1	-	Side repeater
2	-	Bulb holder
3	-	Clip

The side repeater turn signal indicator lamps are located in the driver and passenger doors, below each door mirror. The lamps are clipped into an aperture in the door panel and can be removed by sliding rearwards and releasing the front edge of the lamp from the door. The side repeater lamps use a W5W capless bulb which is located in a holder.

The side repeater lamps have the same functionality as the front and rear turn signal indicator lamps and are operated by the LH steering column multifunction switch or by the hazard flasher switch. The steering column multifunction switch is only active with the ignition is in ignition mode 6, the hazard flasher switch is active at all times. When active, the side repeater lamps will flash at a frequency cycle of 400ms on and 400ms off. If a lamp bulb fails, the remaining turn signal indicator lamps continue to flash at the normal rate.

LEFT HAND STEERING COLUMN MULTIFUNCTION SWITCH



E43273

Item	Part Number	Description
1	-	RH turn signal lamp
2	-	Headlamp flash
3	-	LH turn signal lamp
4	-	Headlamp high beam

The steering column multifunction switch is located on the left hand side of the steering column and controls the following functions:

- Headlamp low/high beam
- Auto high beam function
- Headlamp high beam flash
- Left/right turn signal indicator lamps
- Trip computer functions.

For additional information, refer to: [Information and Message Center](#) (413-08 Information and Message Center, Description and Operation).

The high beam on and flash functions are connected on separate wires to the CJB. When the switch is operated in either position an earth path is completed which is sensed by the CJB which activates the selected function.

The turn signal indicator lamps are connected and operate in a similar way with the earth path completed through a separate wire which is sensed by the CJB which activates the applicable turn signal indicator lamps. The turn signal indicators have a 'lane change' feature which operates the turn signal indicators 3 times when the LH steering column switch is operated against spring pressure and released. This feature is controlled by the CJB.

HAZARD FLASHERS

The hazard flashers are controlled by a non-latching switch in the centre of the instrument panel. The hazard flashers operate at all times when selected and are not dependant on ignition mode.

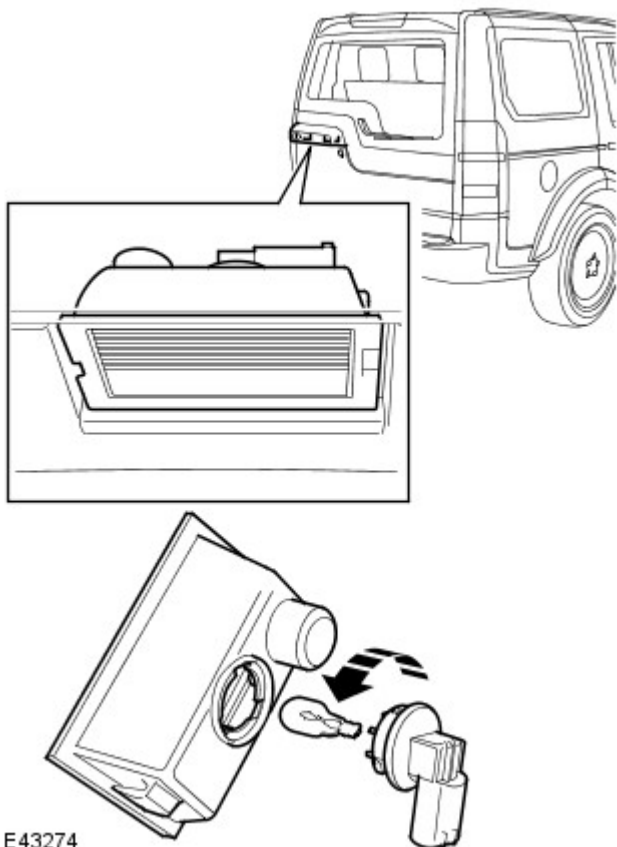
When the hazard flashers are selected on, all of the front, rear and side turn signal indicator lamps operate as previously described and both left and right turn signal warning indicator in the instrument cluster also flash. The hazard warning flashers flash at a rate of 380ms on and 380ms off. When the hazard flashers are active, they override any request for turn signal indicator lamp operation.

If a trailer is fitted, the trailer turn signal indicator lamps will flash at the same frequency as the vehicle indicators. The trailer warning indicator in the instrument cluster will also flash. If a trailer bulb is defective, the trailer warning indicator will not flash.

The hazard flashers can also be activated by a crash signal from the Restraints Control Module (RCM). This is received by the CJB which activates the hazard flashers. The hazard flashers can be cancelled by changing the ignition mode to accessory mode 4 or off or the crash mode is cancelled by the RCM.

For additional information, refer to: [Air Bag and Safety Belt Pretensioner Supplemental Restraint System \(SRS\)](#) (501-20B Supplemental Restraint System, Description and Operation).

LICENSE PLATE LAMPS

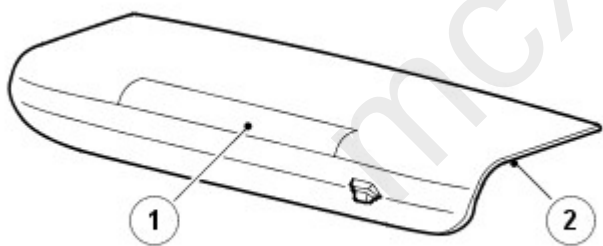


E43274

Two license plate lamps are fitted in the tailgate handle, above the license plate in the upper tailgate. Each lamp uses a 5W capless wedge type bulb. The lamps are secured in the upper tail gate handle with integral clips. The lamps can be released from the handle using a small, flat blade screwdriver.

The license plate lamps are active at all times when the side lamps or headlamps are switched on.

HIGH MOUNTED STOP LAMP



E43275

Item	Part Number	Description
1	-	High mounted stop lamp
2	-	Housing

The high mounted stop lamp is located in the upper tailgate. The stop lamp housing also provides location for the tail door window washer jet.

The lamp comprises a plastic housing with a red coloured lens. The lamp is illuminated by a number of LED's.

The high mounted stop lamp is activated, along with the stop lamps, when the ignition is in ignition mode 6 and the brake pedal switch is active (by depressing the brake pedal).

The high mounted stop lamp and the stop lamps can also be activated by the ABS when Hill Descent Control (HDC) is active. A signal from the ABS module energises a relay which supplies power to the stop lamps. For additional information, refer to: [Anti-Lock Control - Traction Control](#) (206-09A Anti-Lock Control - Traction Control, Description and Operation).

TRAILER LIGHTING

Several different types of trailer socket can be fitted to the vehicle depending on market specifications. Refer to the Electrical Reference Library for specific socket details.

The CJB monitors the turn signal lamps and can detect if more than two lamps are fitted (the side repeater turn signal indicator lamps are not monitored). When a trailer is detected, the trailer warning indicator in the instrument cluster will flash in synchronisation with the turn signal indicators.

If one or more of the turn signal indicator lamps on the vehicle or the trailer are defective, the trailer warning indicator will not flash to alert the driver to the bulb failure.

DIAGNOSTICS

The diagnostic socket is located in the lower instrument panel closing panel, on the driver's side, below the steering column. Various lighting system functions are monitored by different systems which can store fault information. This can be retrieved using an approved Land Rover diagnostic system or other suitable scan tool.

AFS Control Module Fault Monitoring

The AFS control module has the capability to monitor faults within the AFS. The control module can store Diagnostic Trouble Codes (DTC's) relating to the symptoms shown in the following table.

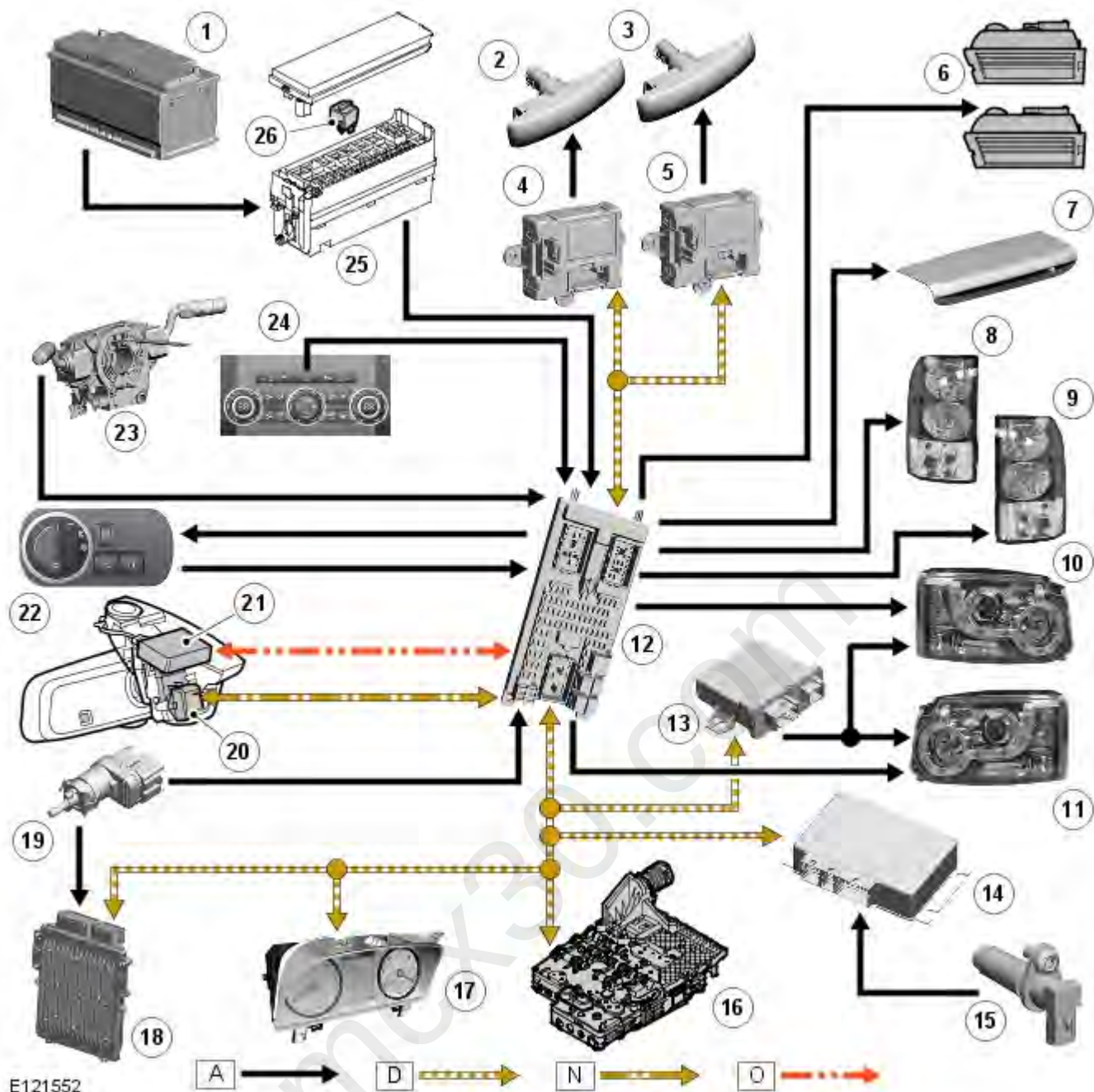
DTC Symptom Description	Customer Symptom	Possible Cause
LH or RH AFS actuator - Communication failure	Swivelling does not function	Open circuit or short circuit to earth
LH or RH AFS Actuator failure	Swivelling does not function	Open circuit or short circuit to earth
LH or RH Leveling Motor Failure	Leveling does not function	Open circuit or short circuit to earth or 12V
CAN bus failure	Swivelling and leveling do not function. Other vehicle system functions perhaps also inoperative	Open circuit or short circuit to earth or 12V

Central Junction Box (CJB)

The CJB monitors the status of the lighting circuits, relays and switches. If a fault occurs, the CJB stores a fault code applicable to the specific fault which can be retrieved using an approved Land Rover diagnostic system or other suitable scan tool.

CONTROL DIAGRAM

- NOTE: **A** = Hardwired; **D** = High Speed CAN Bus; **N** = Medium speed CAN bus; **O** = LIN Bus

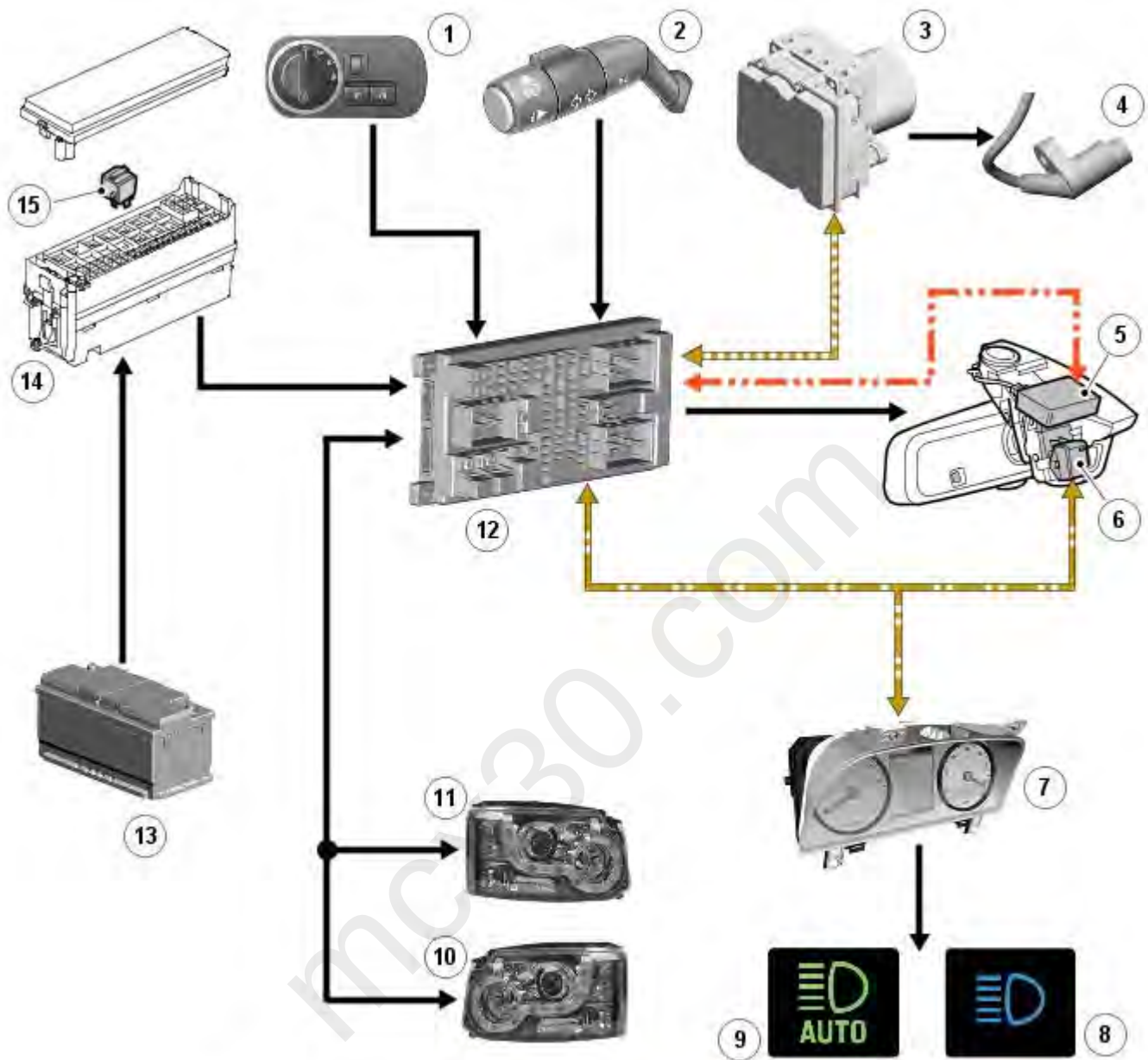


Item	Part Number	Description
1	-	Battery
2	-	LH side repeater turn signal indicator
3	-	RH side repeater turn signal indicator
4	-	LH Door module
5	-	RH Door module
6	-	License plate lamps (2 off)
7	-	High mounted stop lamp
8	-	LH rear lamp assembly
9	-	RH rear lamp assembly
10	-	LH headlamp assembly
11	-	RH headlamp assembly
12	-	Central Junction Box (CJB)
13	-	AFS control module
14	-	Transfer box control module
15	-	Transmission reverse switch (manual transmission only)
16	-	Transmission Control Module (TCM) (Automatic transmission only)
17	-	Instrument cluster
18	-	Engine Control Module (ECM)
19	-	Stop lamp switch
20	-	Auto high beam image sensor and control module
21	-	Rain/light sensor
22	-	Lighting control switch
23	-	LH steering column multifunction switch
24	-	Hazard warning indicators switch

25	-	Engine Junction Box (EJB)
26	-	Auto high beam relay

AUTO HIGH BEAM CONTROL DIAGRAM

• NOTE: **A** = Hardwired; **D** = High Speed CAN; **N** = Medium Speed CAN; **O** = LIN Bus



E121553



Item	Part Number	Description
1	-	Lighting control switch
2	-	LH steering column multifunction switch
3	-	Anti-lock Brake System (ABS) module
4	-	Wheel speed sensor
5	-	Rain/light sensor (Ref)
6	-	Auto high beam control module and image sensor
7	-	Instrument cluster
8	-	High beam warning indicator
9	-	Auto high beam warning indicator
10	-	LH headlamp assembly
11	-	RH headlamp assembly
12	-	Central Junction Box (CJB)
13	-	Battery
14	-	Engine Junction Box (EJB)
15	-	Auto high beam relay

Exterior Lighting - Headlamps

Diagnosis and Testing

Principle of Operation

For a detailed description of the exterior lighting system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Exterior Lighting](#) (417-01 Exterior Lighting, Description and Operation).

Safety Information



WARNING: The xenon headlamp system generates up to 28,000 volts. Make sure that the headlamps are switched off before working on the system. Failure to follow this instruction may result in personal injury.

The following safety precautions must be followed when working on the xenon headlamp system:

1. **1.** DO NOT attempt any procedures on the xenon headlamps when the lights are switched on.
2. **2.** Handling of the xenon bulb must be performed using suitable protective equipment, e.g. gloves and goggles. The glass part of the bulb must not be touched.
3. **3.** Xenon bulbs must be disposed of as hazardous waste.
4. **4.** Only operate the lamp in a mounted condition in the reflector.

There are comprehensive instructions on the correct procedures for xenon headlamp system repairs in the workshop manual, refer to section 100-00 - General Information, Standard Workshop Procedures.

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

- **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. **1.** Verify the customer concern.
2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
● Headlamp(s) condition and installation ● Bulb(s) and installation ● Bulb holder(s) and installation ● Lighting control switch and installation ● Left-hand steering column multifunction switch and installation	● Fuses ● Relays ● Wiring harness ● Loose or corroded connector(s) ● Battery Junction Box (BJB) ● Central Junction Box (CJB) ● Adaptive Front Lighting System (AFS) module ● Headlamp power modules ● Instrument Cluster (IPC) ● Steering Angle Sensor Module (SASM) ● Transmission Control Module (TCM) ● Engine Control Module (ECM) ● Anti-lock Brake System (ABS) control module ● Air Suspension Control module ● Local Interconnect Network (LIN) circuits ● Controller Area Network (CAN) circuits

3. **3.** If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. **4.** If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Low beam lamp(s) inoperative	● Bulb failure ● Fuse(s) blown ● Circuit fault ● Lighting control switch fault	Check the bulb and fuse condition. Check the headlamp circuits. Check the lighting control switch function. Check the left-hand steering column multifunction switch operation. Refer to the electrical guides. Check for DTCs indicating a headlamp or related circuit fault.
High beam lamp(s) inoperative	● Left-hand steering column multifunction switch fault	

Symptom	Possible Causes	Action
Low beam lamp(s) dim	● Incorrect bulb rating ● Tourist lever set in the wrong position ● Circuit fault ● Lighting control switch fault ● Left-hand steering column multifunction switch fault	Check the bulb condition and rating. Check the tourist lever is set correctly. Check the headlamp circuits. Check the lighting control switch function. Check the left-hand steering column multifunction switch function. Refer to the electrical guides.
High beam lamp(s) dim		
Low beam lamp(s) stuck on	● Circuit fault ● Lighting control switch fault ● Left-hand steering column multifunction switch fault ● Headlamp timer function fault	Check the headlamp circuits. Check the lighting control switch function. Check the left-hand steering column multifunction switch operation. Check the headlamp timer function. Refer to the electrical guides. Check for DTCs indicating a headlamp circuit fault.
High beam lamp(s) stuck on		
Headlamp low/high beam switching function inoperative	● Circuit fault ● Left-hand steering column multifunction switch fault ● Xenon lamp shutter mechanism fault	Check the headlamp circuits. Check the left-hand steering column multifunction switch operation. Check the xenon lamp shutter mechanism operation. Refer to the electrical guides. Check for DTCs indicating a headlamp circuit fault.
Warning lamp(s) inoperative	● Fuse(s) blown ● Lighting control switch fault ● Left-hand steering column multifunction switch inoperative ● Circuit fault ● Instrument cluster fault	Check the fuse(s). Check the lighting control switch function. Check the left-hand steering column multifunction switch function. Check the warning lamp circuits. Refer to the electrical guides. Check for DTCs indicating an instrument cluster or CAN system fault.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Headlamp Control Module A \(HCM\)](#) (100-00 General Information, Description and Operation) / [Diagnostic Trouble Code \(DTC\) Index - DTC: Headlamp Control Module B \(HCM2\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Headlamp Leveling

Diagnosis and Testing

Principle of Operation

For a detailed description of the headlamp leveling system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Exterior Lighting](#) (417-01 Exterior Lighting, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

- **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
● Headlamp leveling motor(s) and linkage(s) condition and installation ● Lighting control switch and installation ● Left-hand steering column multifunction switch and installation	● Fuses ● Wiring harness ● Loose or corroded connector(s) ● Battery Junction Box (BJB) ● Central Junction Box (CJB) ● Adaptive Front Lighting System (AFS) module ● Headlamp power modules ● Engine Control Module (ECM) ● Anti-lock Brake System (ABS) control module ● Air suspension control module ● Local Interconnect Network (LIN) circuits ● Controller Area Network (CAN) circuits

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Headlamp leveling system inoperative	● Fuse(s) blown ● Leveling motor/linkage fault	Check the fuse(s) condition. Check the headlamp leveling motor and linkage condition. Check the headlamp leveling circuit. Refer to the electrical guides. Check for DTCs indicating headlamp leveling circuit and air suspension system fault(s).
Headlamp alignment incorrect	● Headlamp leveling circuit fault ● Air suspension system fault	

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Headlamp Control Module A \(HCM\)](#) (100-00 General Information, Description and Operation) / [Diagnostic Trouble Code \(DTC\) Index - DTC: Headlamp Control Module B \(HCM2\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Stoplamps

Diagnosis and Testing

Principle of Operation

For a detailed description of the exterior lighting system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Exterior Lighting](#) (417-01 Exterior Lighting, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

- **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
● Stoplamp condition and installation ● Bulbs and installation ● Bulb holders and installation ● Stoplamp switch condition and installation	● Fuses ● Wiring harness ● Loose or corroded connector(s) ● Hill descent relay ● Battery Junction Box (BJB) ● Central Junction Box (CJB) ● Anti-lock Braking Control module (ABS) ● Controller Area Network (CAN) circuits

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Stoplamp(s) inoperative	● Bulb failure ● LED lamp failure ● Fuse(s) blown ● Circuit fault ● Stoplamp switch fault	Check the bulb, LED lamp and fuse condition. Check the stoplamp circuits. Check the stoplamp switch function. Refer to the electrical guides. Check for DTCs indicating a stoplamp circuit fault.
Stoplamp(s) dim	● Incorrect bulb rating ● Circuit fault	Check the bulb condition and rating. Check the stoplamp circuits. Refer to the electrical guides.
Stoplamp(s) stuck on	● Stoplamp switch fault ● Circuit fault ● Hill descent relay circuit fault	Check the stoplamp switch function. Check the stoplamp circuits. Refer to the electrical guides. Check for DTCs indicating a stoplamp circuit fault.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Central Junction Box \(CJB\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Turn Signal, Cornering and Hazard Lamps

Diagnosis and Testing

Principle of Operation

For a detailed description of the exterior lighting system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Exterior Lighting](#) (417-01 Exterior Lighting, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

- **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
• Turn signal lamp(s) condition and installation • Cornering lamp(s) condition and installation • Bulbs and installation • Bulb holders and installation • Lighting control switch and installation • Left-hand steering column multifunction switch and installation • Hazard lamp switch condition and installation	• Fuses • Wiring harness • Loose or corroded connector(s) • Battery Junction Box (BJB) • Central Junction Box (CJB) • Steering angle sensor • Anti-lock Braking Control Module (ABS) • Instrument Cluster (IPC) • Adaptive Front Lighting System (AFS) module • Restraints Control Module • Controller Area Network (CAN) circuits

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Turn signal/hazard lamp(s) inoperative	• Bulb failure • Fuse(s) blown • Circuit fault • Left-hand steering column multifunction switch fault • Hazard lamp switch fault	Check the bulb and fuse condition. Check the turn signal/hazard lamp circuits. Check the left-hand steering column multifunction switch function. Check the hazard lamp switch function. Refer to the electrical guides. Check for DTCs indicating a turn signal/hazard lamp circuit fault.
Turn signal/hazard lamp(s) dim	• Incorrect bulb rating • Circuit fault • Left-hand steering column multifunction switch fault • Hazard lamp switch fault	Check the bulb condition and rating. Check the turn signal/hazard lamp circuits. Check the left-hand steering column multifunction switch function. Check the hazard lamp switch function. Refer to the electrical guides.
Turn signal/hazard lamp(s) stuck on	• Left-hand steering column multifunction switch fault • Hazard lamp switch fault • Circuit fault	Check the turn signal/hazard lamp circuits. Check the left-hand steering column multifunction switch function. Check the hazard lamp switch function. Refer to the electrical guides. Check for DTCs indicating a turn signal/hazard lamp circuit fault.
Warning lamp(s) inoperative	• Fuse(s) blown • Left-hand steering column multifunction switch inoperative • Hazard lamp switch inoperative • Circuit fault • Instrument cluster fault	Check the fuse(s). Check the left-hand steering column multifunction switch function. Check the hazard lamp switch function. Check the warning lamp circuits. Refer to the electrical guides. Check for DTCs indicating an instrument cluster or CAN system fault.

Symptom	Possible Causes	Action
Cornering lamp(s) inoperative	● Bulb failure ● Fuse(s) blown ● Circuit fault ● Left-hand steering column multifunction switch fault ● Lighting control switch fault	Check the bulb and fuse condition. Check cornering lamp circuits. Check the lighting control switch function. Check the left-hand steering column multifunction switch function. Refer to the electrical guides. Check for DTCs indicating a cornering lamp circuit fault.
Cornering lamp(s) dim	● Incorrect bulb rating ● Circuit fault ● Left-hand steering column multifunction switch fault ● Lighting control switch fault	Check the bulb condition and rating. Check the cornering lamp circuits. Check the left-hand steering column multifunction switch function. Check the lighting control switch function. Refer to the electrical guides.
Cornering lamp(s) stuck on	● Left-hand steering column multifunction switch fault ● Lighting control switch fault ● Circuit fault	Check the cornering lamp circuits. Check the left-hand steering column multifunction switch function. Check the lighting control switch function. Refer to the electrical guides. Check for DTCs indicating a cornering lamp circuit fault.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00.
REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Central Junction Box \(CJB\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Parking, Rear and License Plate Lamps

Diagnosis and Testing

Principle of Operation

For a detailed description of the exterior lighting system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Exterior Lighting](#) (417-01 Exterior Lighting, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

• **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. **1.** Verify the customer concern.
2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
● Rear lamp(s) condition and installation ● License lamp(s) condition and installation ● Bulbs and installation ● Bulb holders and installation ● Lighting control switch and installation ● Rain/Light sensor condition and installation	● Fuses ● Relays ● Wiring harness ● Loose or corroded connector(s) ● Battery Junction Box (BJB) ● Central Junction Box (CJB) ● Rain/Light sensor control module ● Local Interconnect Network (LIN) circuits ● Controller Area Network (CAN) circuits

3. **3.** If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. **4.** If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Rear/License lamp(s) inoperative	● Bulb failure ● Fuse(s) blown ● Circuit fault ● Lighting control switch fault	Check the bulb and fuse condition. Check the rear/license lamp circuits. Check the lighting control switch function. Refer to the electrical guides. Check for DTCs indicating a rear/license lamp circuit fault.
Rear/License lamp(s) dim	● Incorrect bulb rating ● Circuit fault ● Lighting control switch fault	Check the bulb condition and rating. Check the rear/license lamp circuits. Check the lighting control switch function. Refer to the electrical guides.
Rear/License lamp(s) stuck on	● Circuit fault ● Lighting control switch fault	Check the rear/license lamp circuits. Check the lighting control switch function. Refer to the electrical guides. Check for DTCs indicating a rear/license lamp circuit fault.
Rear/License lamp(s) inoperative when the automatic headlamp switch option is selected	● Fuse(s) blown ● Lighting control switch fault ● Circuit fault ● Rain/Light sensor fault ● LIN circuit fault	Check the fuse(s). Check the lighting control switch function. Check the automatic headlamp circuit. Refer to the electrical guides. Check for DTCs indicating a rain/light sensor or LIN system fault.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Central Junction Box \(CJB\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Front Fog Lamps

Diagnosis and Testing

Principle of Operation

For a detailed description of the exterior lighting system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Exterior Lighting](#) (417-01 Exterior Lighting, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

• **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. **1.** Verify the customer concern.
2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
● Front fog lamp condition and installation ● Bulb and installation ● Bulb holder and installation ● Adjuster screw ● Fog lamp switch condition and installation	● Fuses ● Wiring harness ● Loose or corroded connector(s) ● Fog lamp relay ● Fog lamp warning indicator ● Fog lamp switch ● Battery Junction Box (BJB) ● Central Junction Box (CJB)

3. **3.** If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. **4.** If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Fog lamp inoperative	● Bulb failure ● Fuse(s) blown ● Circuit fault ● Switch inoperative	Check the bulb condition. Check the fuse(s). Check the fog lamp circuits. Check the switch function. Refer to the electrical guides.
Fog lamp dim	● Incorrect bulb rating ● Circuit fault ● Switch fault	Check the bulb condition and rating. Check the fog lamp circuits. Check the switch function. Refer to the electrical guides.
Fog lamp lighting coverage poor	● Fog lamp alignment incorrect	Check and adjust fog lamp alignment.
Warning lamp inoperative	● Fuse(s) blown ● Switch inoperative ● Circuit fault ● Instrument cluster fault	Check the fuse(s). Check the switch function. Check the warning lamp circuits. Refer to the electrical guides. Check for DTCs indicating an instrument cluster fault.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Central Junction Box \(CJB\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Rear Fog Lamps

Diagnosis and Testing

Principle of Operation

For a detailed description of the exterior lighting system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Exterior Lighting](#) (417-01 Exterior Lighting, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

- **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
• Rear fog lamp condition and installation • Bulb holder and installation • Bulb and installation • Fog lamp switch condition and installation	• Fuses • Wiring harness • Loose or corroded connector(s) • Fog lamp relay • Fog lamp warning indicator • Fog lamp switch • Battery Junction Box (BJB) • Central Junction Box (CJB)

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Fog lamp inoperative	• Bulb failure • Fuse(s) blown • Circuit fault • Switch inoperative	Check the bulb condition. Check the fuse(s). Check the fog lamp circuits. Check the switch function. Refer to the electrical guides.
Fog lamp dim	• Incorrect bulb rating • Circuit fault • Switch fault	Check the bulb condition and rating. Check the fog lamp circuits. Check the switch function. Refer to the electrical guides.
Warning lamp inoperative	• Fuse(s) blown • Switch inoperative • Circuit fault • Instrument cluster fault	Check the fuse(s). Check the switch function. Check the warning lamp circuits. Refer to the electrical guides. Check for DTCs indicating an instrument cluster fault.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Central Junction Box \(CJB\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Reversing Lamps

Diagnosis and Testing

Principle of Operation

For a detailed description of the exterior lighting system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Exterior Lighting](#) (417-01 Exterior Lighting, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

- **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
● Reversing lamp condition and installation ● Bulb and installation ● Bulb holder and installation	● Fuses ● Wiring harness ● Loose or corroded connector(s) ● Reversing lamp relay ● Battery Junction Box (BJB) ● Central Junction Box (CJB) ● Transmission Control Module (TCM) ● Controller Area Network (CAN) circuits

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Reversing lamp(s) inoperative	● Bulb failure ● Fuse(s) blown ● Circuit fault ● Missing reversing switch signal	Check the bulb and fuse condition. Check the reversing lamp circuits. Refer to the electrical guides. Check for DTCs indicating a reversing lamp circuit fault.
Reversing lamp(s) dim	● Incorrect bulb rating ● Circuit fault	Check the bulb condition and rating. Check the reversing lamp circuits. Refer to the electrical guides.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Central Junction Box \(CJB\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Trailer Lamps

Diagnosis and Testing

Principle of Operation

For a detailed description of the exterior lighting system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Exterior Lighting](#) (417-01 Exterior Lighting, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

- **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.
- **NOTE:** Prior to carrying out fault diagnosis of the trailer lamp system, verify the operation of the towing vehicle lighting system with the trailer lighting plug(s) disconnected from the vehicle socket(s).

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
● Trailer lamp(s) condition and installation ● Bulbs and installation ● Bulb holders and installation ● Trailer socket(s), plug(s) and installation	● Fuses ● Relays ● Stop lamp switch ● Wiring harness ● Loose or corroded connector(s) ● Trailer socket(s) ground circuit(s) ● Battery Junction Box (BJB) ● Central Junction Box (CJB) ● Trailer fuse box ● Trailer relay box ● Instrument Cluster (IPC) ● Controller Area Network (CAN) circuits

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Trailer brake lamp(s) inoperative	● Bulb failure ● Fuse(s) blown ● Circuit fault ● Brake lamp switch fault	Check the bulb and fuse condition. Check the trailer brake lamp circuit. Check the brake lamp switch function. Refer to the electrical guides.
Trailer brake lamp(s) dim	● Incorrect bulb rating ● Circuit fault ● Brake lamp switch fault	Check the bulb condition and rating. Check the trailer brake lamp circuit. Check the brake lamp switch function. Refer to the electrical guides.
Trailer brake lamp(s) stuck on	● Circuit fault ● Brake lamp switch fault	Check the trailer brake lamp circuits. Check the brake lamp switch function. Refer to the electrical guides.
Trailer fog lamp(s) inoperative	● Bulb failure ● Fuse(s) blown ● Circuit fault	Check the bulb and fuse condition. Check the trailer fog lamp circuit. Refer to the electrical guides.
Trailer fog lamp(s) dim	● Incorrect bulb rating ● Circuit fault	Check the bulb condition and rating. Check the trailer fog lamp circuit. Refer to the electrical guides.
Trailer fog lamp(s) stuck on	● Circuit fault	Check the trailer fog lamp circuit. Refer to the electrical guides.
Trailer tail and number plate lamp(s) inoperative	● Bulb failure ● Fuse(s) blown ● Circuit fault ● Trailer side lamp relay fault	Check the bulb and fuse condition. Check the trailer tail and number plate lamp circuit. Check the trailer tail and number plate lamp relay function. Refer to the electrical guides.

Symptom	Possible Causes	Action
Trailer tail and number plate lamp(s) dim	● Incorrect bulb rating ● Circuit fault ● Trailer side lamp relay fault	Check the bulb condition and rating. Check the trailer tail and number plate lamp circuit. Check the trailer side lamp relay function. Refer to the electrical guides.
Trailer tail and number plate lamp(s) stuck on	● Circuit fault ● Trailer tail and number plate lamp relay fault	Check the trailer tail and number plate lamp circuit. Check the trailer tail and number plate lamp relay function. Refer to the electrical guides.
Trailer turn signal lamp(s) inoperative	● Bulb failure ● Fuse(s) blown ● Circuit fault	Check the bulb and fuse condition. Check the trailer turn signal lamp circuit. Refer to the electrical guides.
Trailer turn signal lamp(s) dim	● Incorrect bulb rating ● Circuit fault	Check the bulb condition and rating. Check the trailer turn signal lamp circuits. Refer to the electrical guides.
Trailer turn signal lamp(s) stuck on	● Circuit fault	Check the bulb and fuse condition. Check the trailer turn signal lamp circuit. Refer to the electrical guides.
Trailer reverse lamp(s) inoperative	● Bulb failure ● Fuse(s) blown ● Circuit fault ● Trailer reverse lamp relay fault	Check the bulb and fuse condition. Check the trailer reverse lamp circuit. Check the trailer reverse lamp relay function. Refer to the electrical guides.
Trailer reverse lamp(s) dim	● Circuit fault ● Trailer reverse lamp relay fault	Check the bulb condition and rating. Check the trailer reverse lamp circuit. Check the trailer reverse lamp relay function. Refer to the electrical guides.
Trailer reverse lamp(s) stuck on	● Circuit fault ● Trailer reverse lamp relay fault	Check the trailer reverse lamp circuit. Check the trailer reverse lamp relay function. Refer to the electrical guides.
Warning lamp(s) inoperative	● Fuse(s) blown ● Circuit fault ● Instrument cluster fault	Check the fuse(s). Check the warning lamp circuit. Refer to the electrical guides. Check for DTCs indicating an instrument cluster or CAN system fault.
Trailer socket battery feed missing	● Fuse(s) blown ● Circuit fault	Check the fuse condition. Check the trailer battery feed circuit. Refer to the electrical guides.
Trailer socket ignition feed missing	● Fuse(s) blown ● Circuit fault ● Trailer socket relay faulty	Check the fuse condition. Check the trailer ignition feed circuit. Check the trailer ignition feed relay operation. Refer to the electrical guides.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Central Junction Box \(CJB\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Autolamps

Diagnosis and Testing

Principle of Operation

For a detailed description of the exterior lighting system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Exterior Lighting](#) (417-01 Exterior Lighting, Description and Operation).

Inspection and Verification



CAUTION: Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle.

• **NOTE:** Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. **1.** Verify the customer concern.
2. **2.** Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection

Mechanical	Electrical
● Lighting control switch and installation ● Rain/Light sensor condition and installation ● Wiper control switch and installation	● Fuses ● Relays ● Wiring harness ● Loose or corroded connector(s) ● Battery Junction Box (BJB) ● Central Junction Box (CJB) ● Rain/Light sensor control module ● Local Interconnect Network (LIN) circuits ● Controller Area Network (CAN) circuits

3. **3.** If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. **4.** If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the relevant DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Side and headlamp(s) inoperative when the automatic headlamp switch option is selected	● Fuse(s) blown ● Lighting control switch fault ● Wiper control switch fault ● Circuit fault ● Rain/Light sensor fault ● LIN circuit fault	Check the fuse(s). Check the lighting and wiper control switch functions. Check the automatic headlamp circuit. Refer to the electrical guides. Check for DTCs indicating a rain/light sensor or LIN system fault.
Automatic headlamp switch illumination inoperative	● Fuse(s) blown ● Lighting control switch fault ● Circuit fault ● Automatic headlamp relay fault	Check the fuse(s). Check the lighting control switch function. Check the automatic headlamp relay circuit. Refer to the electrical guides. Check for DTCs indicating an automatic headlamp fault.

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Central Junction Box \(CJB\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Brake Pedal Position (BPP) Switch Adjustment

General Procedures

1. Adjust the brake pedal position (BPP) switch.

- For vehicles with petrol engine,
For additional information, refer to: [Brake Pedal Position \(BPP\) Switch Adjustment](#) (303-14C Electronic Engine Controls - V6 4.0L Petrol, General Procedures) / [Brake Pedal Position \(BPP\) Switch Adjustment](#) (303-14D Electronic Engine Controls - V8 5.0L Petrol, General Procedures).
- For vehicles with diesel engine,
For additional information, refer to: [Brake Pedal Position \(BPP\) Switch Adjustment](#) (303-14A Electronic Engine Controls - TDV6 2.7L Diesel, General Procedures) / [Brake Pedal Position \(BPP\) Switch Adjustment](#) (303-14B Electronic Engine Controls - TDV6 3.0L Diesel, General Procedures).

mcx30.com

Exterior Lighting - Headlamp Adjustment

General Procedures

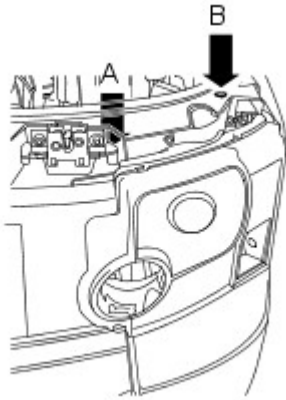
- NOTE: With self leveling suspension, make sure the vehicle is at the standard ride height.
- NOTE: The headlamp setting is 1.2 % below horizontal and parallel.
- NOTE: NAS vehicles have vertical adjustment only.

1. Align the headlamp beam setting equipment to one headlamp.
2. Switch the headlamps on and to dipped beam.

3. NOTE: NAS vehicles have vertical adjustment only.

Adjust the headlamps with a Philips screwdriver.

- Rotate the adjusters A and B by an equal amount for vertical alignment.
- Rotate the adjusters A or B for horizontal alignment.



E49808

4. To adjust the second headlamp, repeat the above procedure.

Exterior Lighting - Front Fog Lamp Adjustment

General Procedures

Check

- NOTE: With self leveling suspension, make sure the vehicle is at the standard ride height.

1. **1.** NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

- NOTE: The fog lamp setting is 2% below horizontal.



E123793

Adjustment

- NOTE: With self leveling suspension, make sure the vehicle is at the standard ride height.

1. **2.** NOTE: The procedure must be carried out on both sides.



E123499

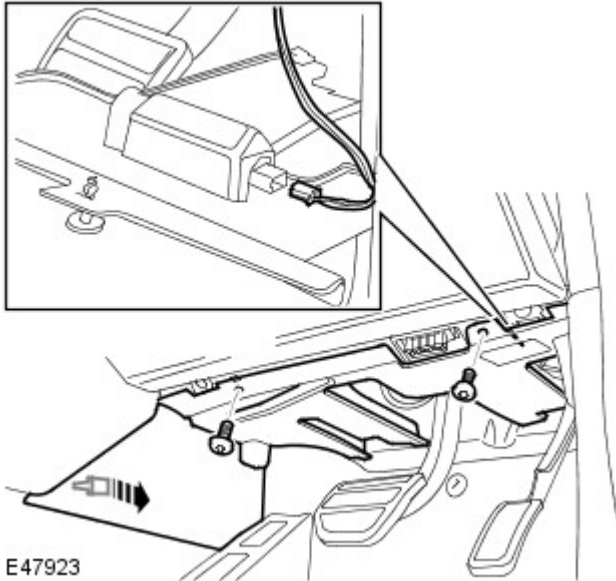
Exterior Lighting - Stoplamp Switch

Removal and Installation

Removal

1. Remove the closing trim panel.

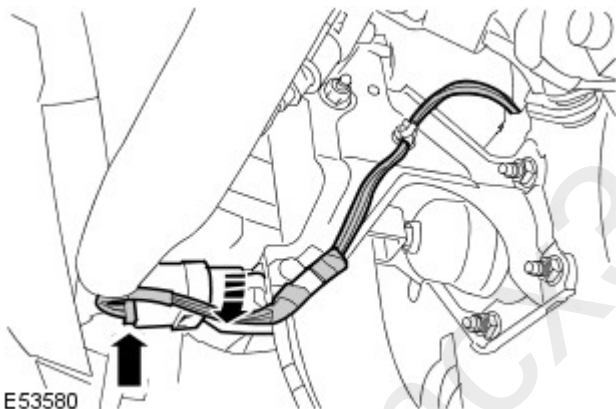
- Release the clip.
- Remove the 2 screws.
- Disconnect the electrical connector.



2. CAUTION: The brake pedal MUST NOT be depressed during this operation. Failure to comply will result in damage to the stoplamp switch.

Remove the stoplamp switch.

- Disconnect the electrical connector.
- Rotate the switch clockwise.



Installation

1. CAUTIONS:

 The brake pedal MUST NOT be depressed during this operation. Failure to comply will result in damage to the stoplamp switch.

 Make sure that excessive force is not used when installing the stoplamp switch. Failure to follow this instruction may result in damage to the stoplamp switch.

Install the stoplamp switch.

- Rotate the switch counterclockwise.
- Connect the electrical connector.

2. Install the closing trim panel.

- Connect the electrical connector.
- Secure the clip.
- Tighten the screws.

Exterior Lighting - Headlamp Assembly

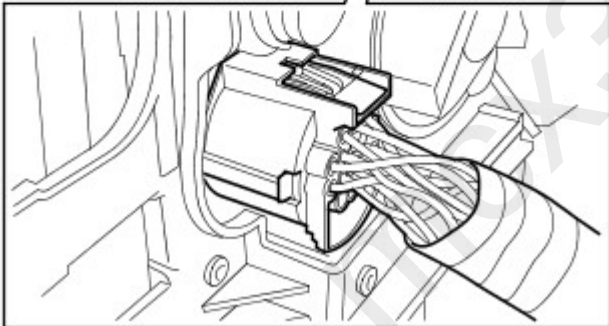
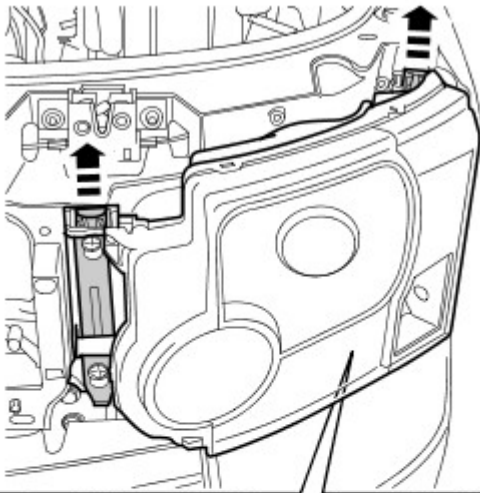
Removal and Installation

Removal



WARNING: Vehicles fitted with Xenon headlamps, the following precautions must be observed. Failure to comply may result in exposure to ultra violet rays, severe electric shock, burns or the risk of explosion. Ensure the headlamps are switched off at all times. Eye and hand protection must be worn. Never switch on the lamps or test the bulbs with the lamp holder released from the headlamp.

1. Disconnect the battery ground cable.
For additional information, refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).
2. Remove the radiator grille.
For additional information, refer to: [Radiator Grille](#) (501-08 Exterior Trim and Ornamentation, Removal and Installation).
3. Remove the headlamp assembly.
 - Release the 2 clips.
 - Disconnect the electrical connector.



E49565

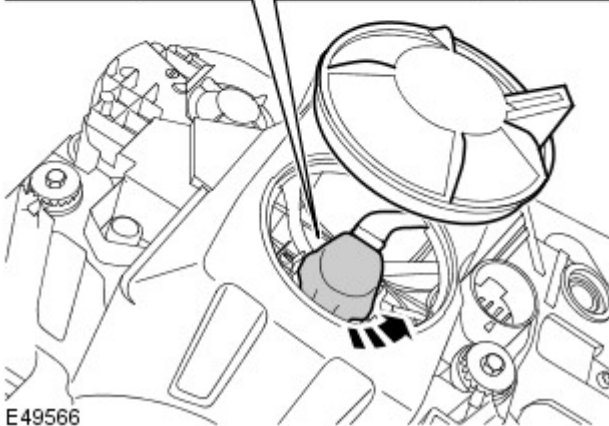
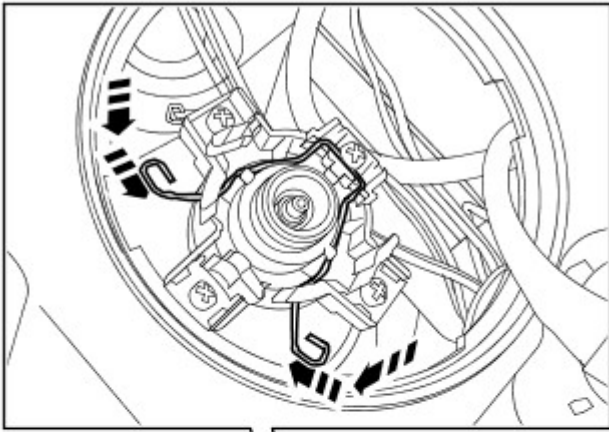
4. NOTE: High intensity discharge lamp bulb illustrated.

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

- NOTE: If installed, leave the Silica Gel sachet in place.

Remove the headlamp bulb.

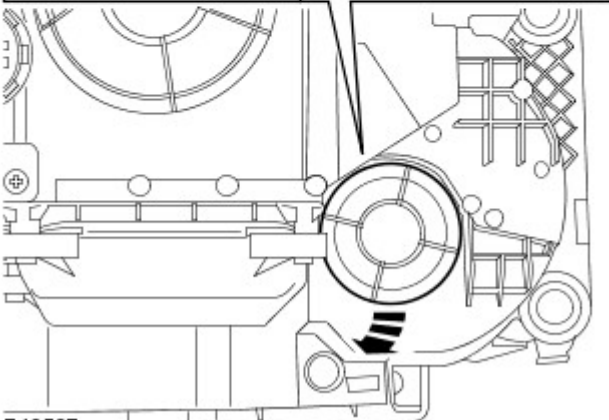
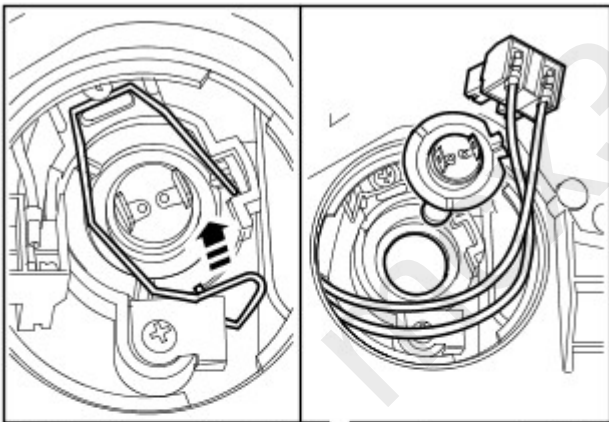
- Remove the cover.
- Disconnect the electrical connector.
- Release the clip.



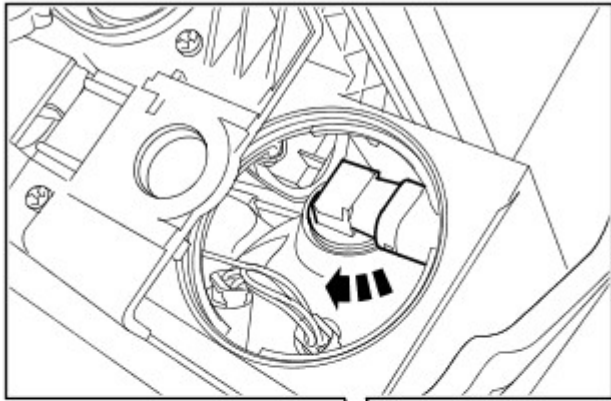
E49566

5. Remove the headlamp inner bulb.

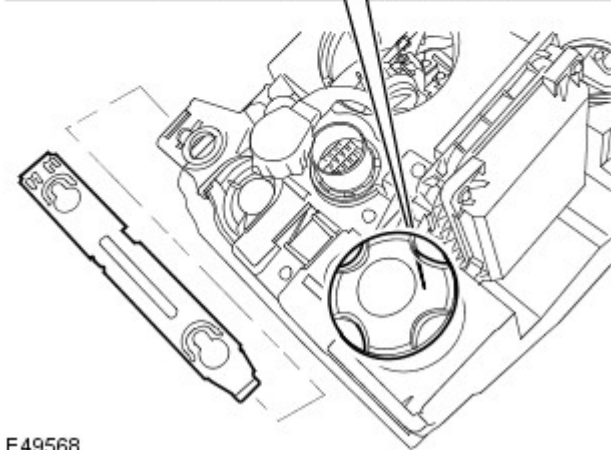
- Remove the cover.
- Disconnect the electrical connector.
- Release the clip.



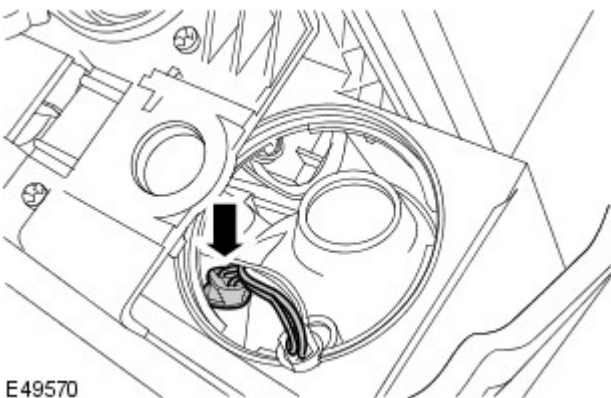
E49567



E49568



E49569



E49570

6. Remove the headlamp outer bulb.

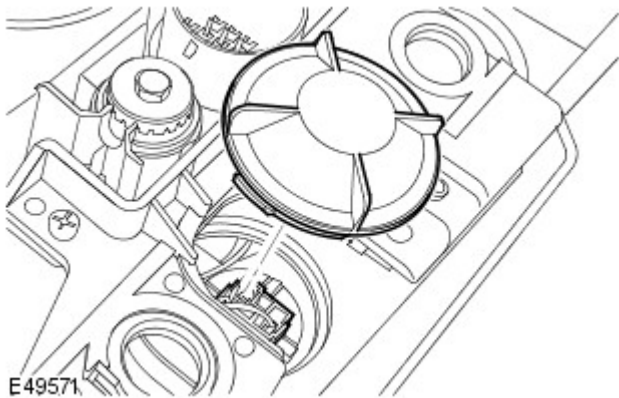
- Remove the headlamp outer retaining clip.
- Remove the cover.
- Release the electrical connector.

7. Remove the side lamp bulb.

- Release the bulb holder.

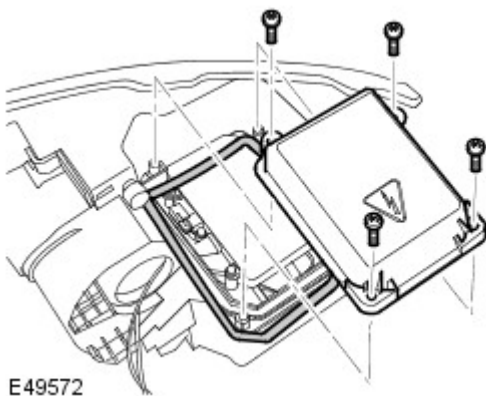
8. Remove the side marker bulb.

- Release the bulb holder.



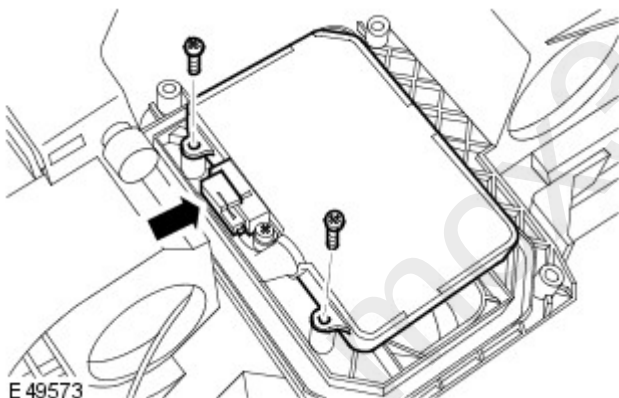
9. Remove the turn signal indicator bulb.

- Remove the cover.
- Release the bulb holder.



10. Remove the gas discharge module cover.

- Remove the 4 screws.
- Remove the seal.



11. Remove the gas discharge module.

- Remove the 2 screws.
- Disconnect the electrical connector.

Installation

1. Install the gas discharge module.

- Connect the electrical connector.
- Tighten the 2 screws.

2. Install the gas discharge module cover.

- Install the seal.
- Tighten the screws.

3. Install the turn signal indicator bulb.

- Secure the bulb holder.
- Install the cover.

4. Install the side marker bulb.

- Install the bulb holder.

5. Install the side lamp bulb.

- Install the bulb holder.

6. Install the headlamp outer bulb.

- Connect the electrical connector.
- Install the cover.
- Install the headlamp outer retaining clip.

7.  **CAUTION:** Make sure the seal is installed correctly.

Install the headlamp inner bulb.

- Secure with the clip.
- Connect the electrical connector.
- Install the cover.

8.  **CAUTION:** Make sure the seal is installed correctly.

Install the headlamp bulb.

- Secure with the clip.
- Connect the electrical connector.
- Install the cover.

9. Install the headlamp assembly.

- Connect the electrical connector.
- Secure with the 2 clips.

10. Install the radiator grille.

For additional information, refer to: [Radiator Grille](#) (501-08 Exterior Trim and Ornamentation, Removal and Installation).

11. Connect the battery ground cable.

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

12. **NOTE:** The headlamp setting is 1.2 % below horizontal and parallel.

Check the headlamp beam alignment.

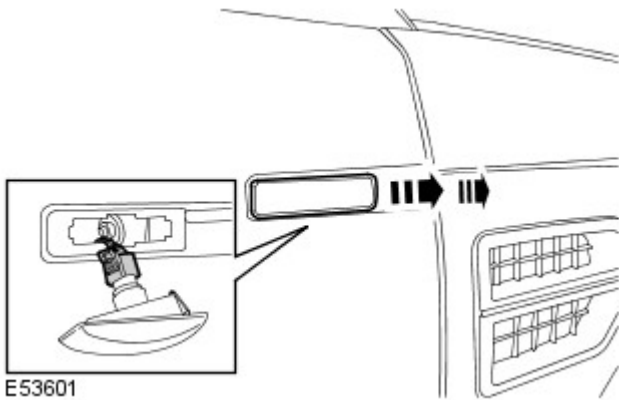
Exterior Lighting - Side Turn Signal Lamp

Removal and Installation

Removal

1. Remove the side turn signal lamp.

- Push the lamp forwards to release it from the door.
- Disconnect the electrical connector.



Installation

1. To install, reverse the removal procedure.

mcx30.com

Exterior Lighting - Rear Lamp Assembly

Removal and Installation

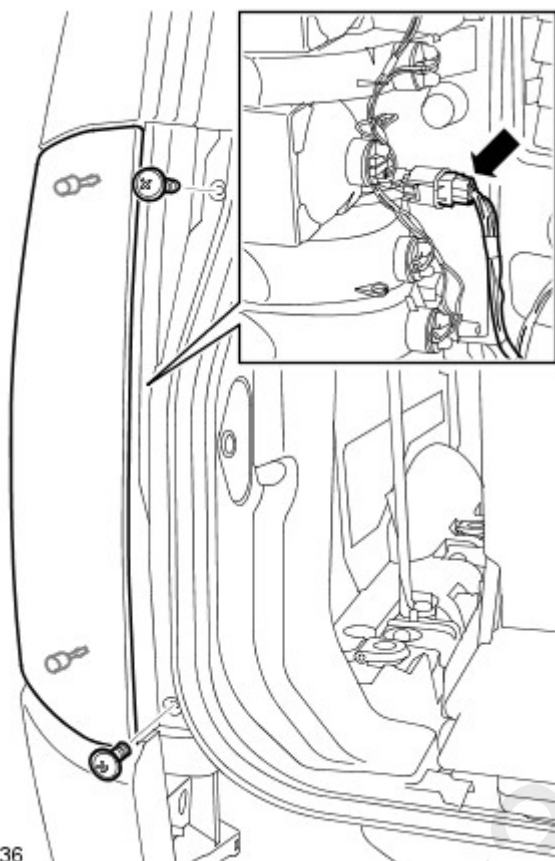
Removal

1. Open the liftgate and tailgate.

2.  **CAUTION:** Always protect paintwork and glass when removing exterior components.

Remove the rear lamp assembly.

- Remove the 2 screws.
- Release the 2 clips.
- Disconnect the electrical connector.



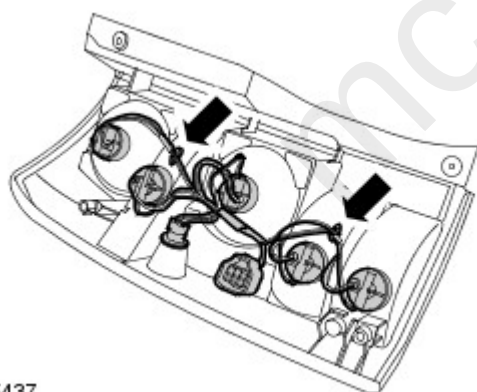
E45436

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

- **NOTE:** Note the fitted position.

Remove the wiring harness.

- Release the wiring harness from the 2 clips.
- Release the 6 bulb holders.
- Release the electrical connector.



E45437

Installation

1. Install the wiring harness.

- Install the 6 bulb holders.
- Install the electrical connector.
- Secure the wiring harness in the clips.

2. Install the rear lamp assembly.

- Connect the electrical connector.
- Secure with the 2 clips.
- Tighten the screws.

Exterior Lighting - Front Fog Lamp

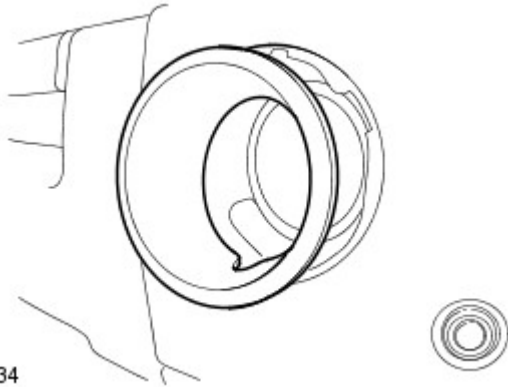
Removal and Installation

Removal

1. NOTE: Release each clip individually. Clips may fall off if care is not taken.

Remove the front fog lamp bezel.

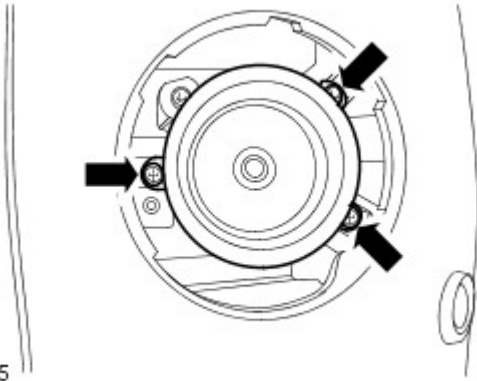
- Release the 6 clips.



E47034

2. Release the front fog lamp.

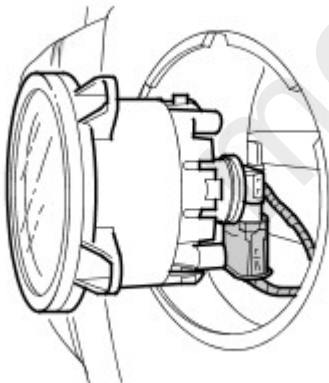
- Remove the 3 screws.



E47035

3. Remove the front fog lamp.

- Disconnect the front fog lamp electrical connector.



E47036

Installation

1. Connect the front fog lamp electrical connector.

2. Install the front fog lamp.

- Tighten the screws.

3. Install the front fog lamp bezel.

- Secure the clips.

4. Check the fog lamp beam alignment.

Exterior Lighting - High Mounted Stoplamp

Removal and Installation

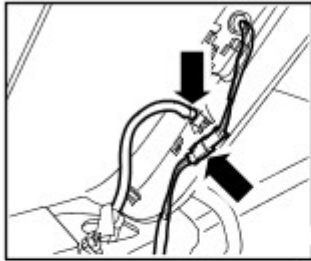
Removal

1. Disconnect the battery ground cable.
For additional information, refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2.  **CAUTION:** Always protect paintwork and glass when removing exterior components.

Remove the high mounted stoplamp.

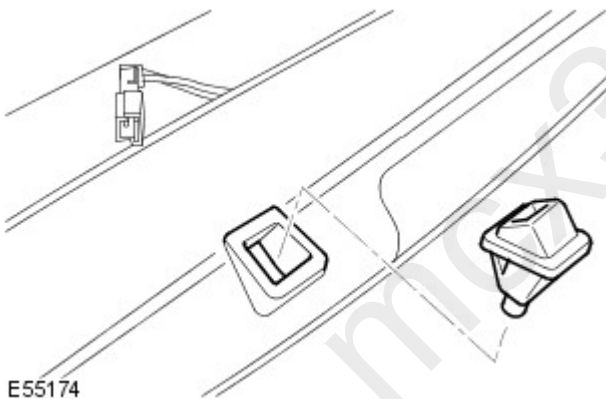
- Carefully cut through the sealant using a glazing knife.
- Disconnect the electrical connector.
- Disconnect the washer jet hose.



E55173

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

Remove the washer jet.

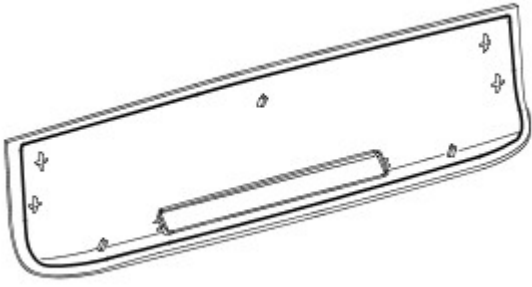


E55174

Installation

1. Install the washer jet.
2. Carefully remove the sealant from the body to leave a smooth surface.
3. Install the high mounted stoplamp.
 - Check for correct alignment.
4. Remove the high mounted stoplamp.
5. Apply etch primer to any bare metal.
6. Apply primer over the etch primer.
7. Apply activator to the high mounted stoplamp.
8. Fit a pre-cut nozzle to the sealer cartridge, remove the lid, shake out the crystals and fit the cartridge to the applicator gun.

9. Apply an 8.0 mm (0.30 in) wide continuous bead of sealant, 15.0 mm (0.60 in) in, from the outer edge of the high mounted stoplamp as shown.



E55183

10. Install the high mounted stoplamp.

- Connect the washer jet hose.
- Connect and secure the electrical connector.

11. Connect the battery ground cable.

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

Exterior Lighting - Adaptive Front Lighting Module

Removal and Installation

Removal

1. Passenger side: Remove the cowl side trim panel.
For additional information, refer to: [Cowl Side Trim Panel](#) (501-05 Interior Trim and Oramentation, Removal and Installation).
2. Remove the CJB.
For additional information, refer to: [Central Junction Box \(CJB\)](#) (418-00 Module Communications Network, Removal and Installation).
3. Remove the adaptive front lighting module.
 - Disconnect the electrical connector.
 - Remove the bolt.



E55696

Installation

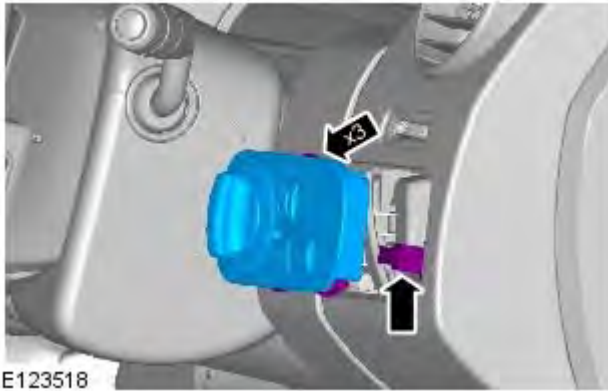
1. Install the adaptive front lighting module.
 - Tighten the bolt to 10 Nm (7 lb.ft).
 - Connect the electrical connector.
2. Install the CJB.
For additional information, refer to: [Central Junction Box \(CJB\)](#) (418-00 Module Communications Network, Removal and Installation).
3. Install the cowl side trim panel.
For additional information, refer to: [Cowl Side Trim Panel](#) (501-05 Interior Trim and Oramentation, Removal and Installation).

Exterior Lighting - Headlamp Switch

Removal and Installation

Removal

- NOTE: Removal steps in this procedure may contain installation details.



1.  CAUTION: Protect the surrounding trim to avoid damage.
- NOTE: The ignition must be switched off.

Installation

1. To install, reverse the removal procedure.

Exterior Lighting - Approach Lamp Vehicles With: Parking Aid Camera

Removal and Installation

Removal

- NOTE: Removal steps in this procedure may contain installation details.
- NOTE: RH illustration shown, LH is similar.
- NOTE: The ignition must be switched off.

1. Refer to: [Exterior Mirror Cover](#) (501-09 Rear View Mirrors, Removal and Installation).

2. CAUTIONS:



Take extra care not to damage the component.



Take extra care not to damage the wiring harnesses.

Torque: 0.5 Nm



Installation

1. To install, reverse the removal procedure.