

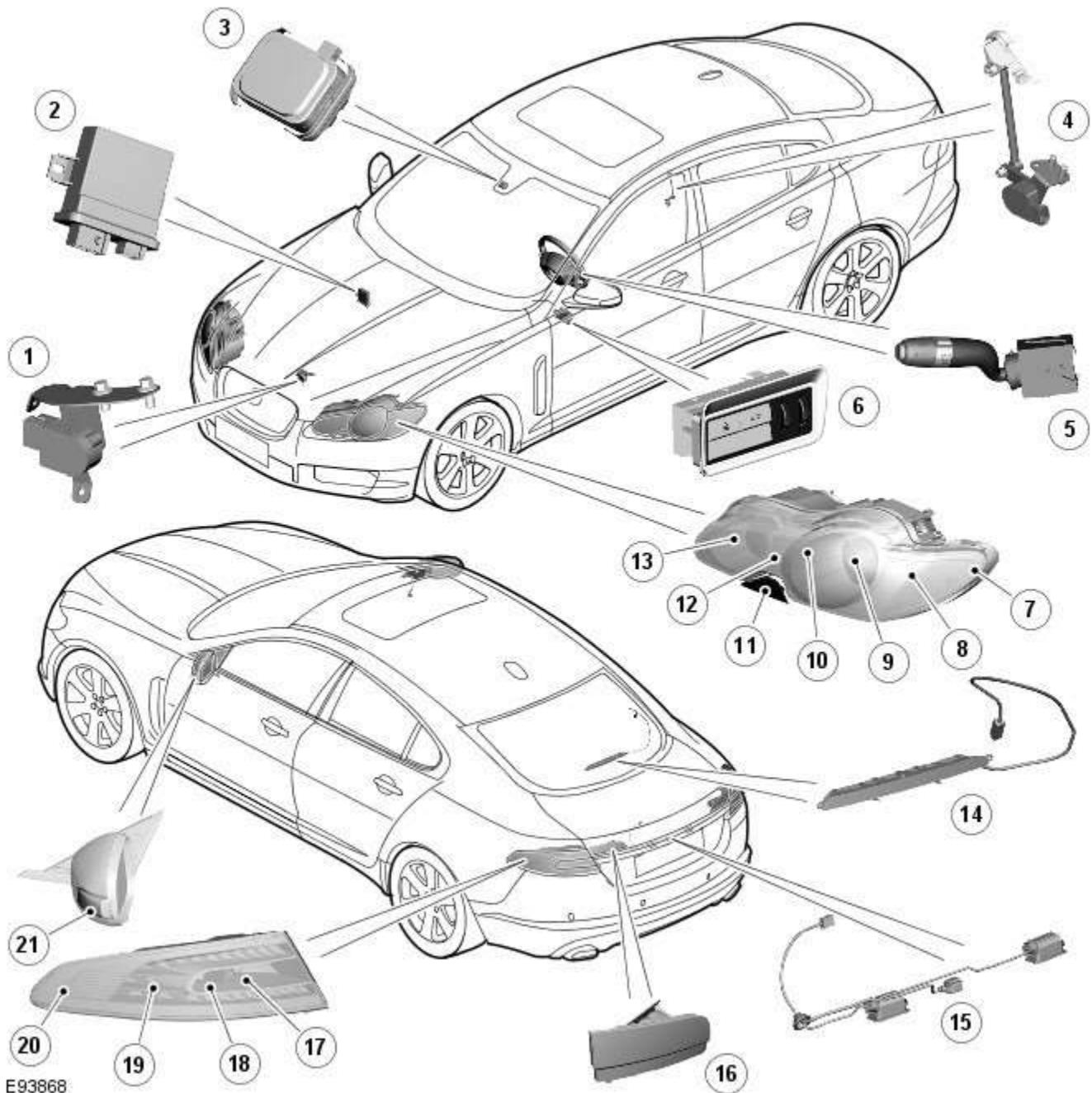
Exterior Lighting -

General Specifications

Item	Specification
Low beam headlamp bulb - Vehicles with conventional headlamps - non Federal	H7
Low beam headlamp bulb - Vehicles with conventional headlamps - Federal	H11
Low beam headlamp bulb - Vehicles with xenon headlamps	D1S
High beam headlamp bulb	H7
Cornering lamp bulb	H8
Side repeater lamp bulb	WY5W
Side marker lamp bulb - Federal	W5W
Front turn signal lamp bulb - non Federal	PY21W
Front turn signal lamp bulb - Federal	3457 AK
Rear turn signal lamp bulb	PY19W
Front side/parking lamp bulb - Vehicles built up to 01/2009	W5W halogen cool blue
Front side/parking lamp bulb - Vehicles built 02/2009 onwards	W5W
Reversing lamp bulb	PS19W

Exterior Lighting - Exterior Lighting - Component Location

Description and Operation



E93868

Item	Description
1	Front height sensor
2	Headlamp leveling module
3	Rain/light sensor
4	Rear height sensor
5	Light switch - LH (left-hand) steering column multifunction switch
6	Auxiliary lighting switch
7	Side marker lamp (NAS only) (2 off)
8	Front turn signal indicator (2 off)
9	Halogen or xenon headlamp projector module (2 off)
10	Cornering/Static bending lamp (where fitted) (2 off)
11	Front fog lamp
12	Front fog lamp
13	Front fog lamp
14	Rear fog lamp
15	Rear fog lamp
16	Rear fog lamp
17	Rear fog lamp
18	Rear fog lamp
19	Rear fog lamp
20	Rear fog lamp
21	Rear fog lamp

11	Headlamp telescopic power washer (2 off)
12	Front side lamp (2 off)
13	High beam only halogen lamp (2 off)
14	High Mounted Stop Lamp (HMSL) LED (light emitting diode) 's
15	License plate lamps (2 off)
16	Rear fog lamp (2 off)
17	Rear turn signal indicator (2 off)
18	Reverse lamp (2 off)
19	Side lamp/stop lamp LED 's (2 off)
20	Side marker LED 's (All markets) (2 off)
21	Side repeater lamp (2 off)

Exterior Lighting - Exterior Lighting - Overview

Description and Operation

OVERVIEW

The lighting systems are controlled by the [EJB \(engine junction box\)](#), [RJB \(rear junction box\)](#) and the [CJB \(central junction box\)](#). The two boxes contain fuses, relays and microprocessors to control the power supply and functionality of the lighting systems.

Driver lighting selections using the [LH \(left-hand\)](#) steering column multifunction switch or the auxiliary lighting switch are passed to the [CJB](#) via the instrument cluster.

The lighting system has an 'auto' lights function which is controlled by the [CJB](#) on receipt of signals from the rain/light sensor located at the top of the windscreen. The exterior lights are turned on or off in response to ambient light signals from the rain/light sensor on a [LIN \(local interconnect network\)](#) bus connection to the [CJB](#). The auto lights can also be activated when the windshield wipers are activated by signals from the rain sensor, which is located at the top of the windshield or when the driver activates the wipers in the fast wipe position.

Two levels of headlamp specification are available; halogen or xenon. In certain markets the headlamps feature a cornering lamp or a static bending lamp which illuminates the area at the side of the vehicle when turning into driveways for example. North American Specification (NAS) vehicles have a side marker lamp installed in the headlamp assembly. Replacement of any of the headlamp bulbs requires removal of the headlamp assembly.

The tail lamp comprises two separate lamp assemblies. The turn signal indicator, side and stop lamps and reverse lamps are located in each rear fender tail lamp assembly. The rear fog lamps are located in separate units attached to the luggage compartment lid. A side marker lamp is fitted to the rear fender tail lamp assembly and is fitted in all markets.

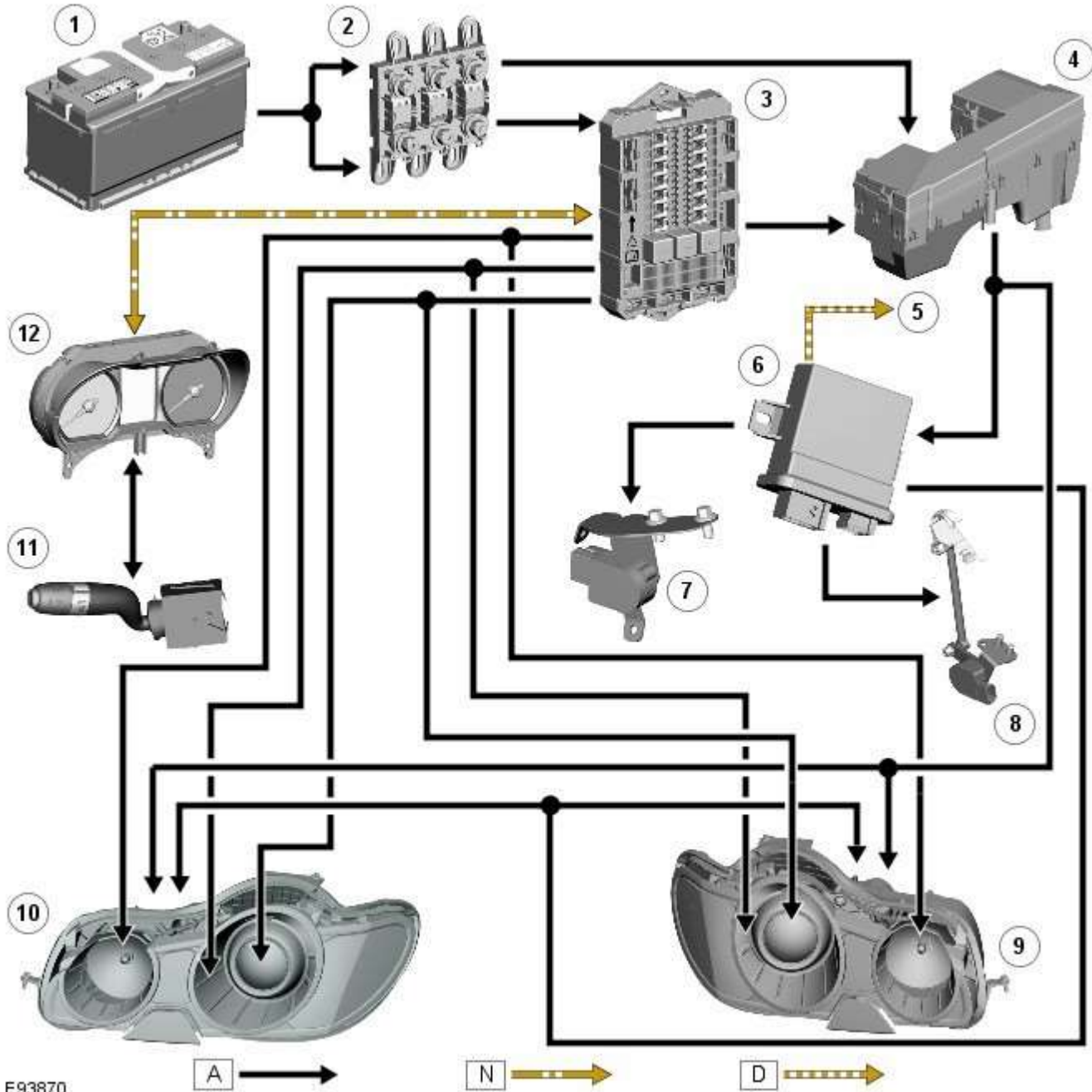
Two systems of headlamp leveling are available; manual leveling which is only available on halogen headlamps and static dynamic leveling which is available on xenon headlamps. The manual system uses a thumbwheel rheostat to adjust the vertical alignment of the headlamps to compensate for differing vehicle loading. The static dynamic system uses height sensors fitted to the front and rear suspension and a headlamp leveling module which periodically monitors the vehicle attitude and adjusts the headlamp vertical alignment accordingly.

Exterior Lighting - Exterior Lighting - System Operation and Component Description

Description and Operation

Control Diagram

XENON HEADLAMPS - CONTROL DIAGRAM

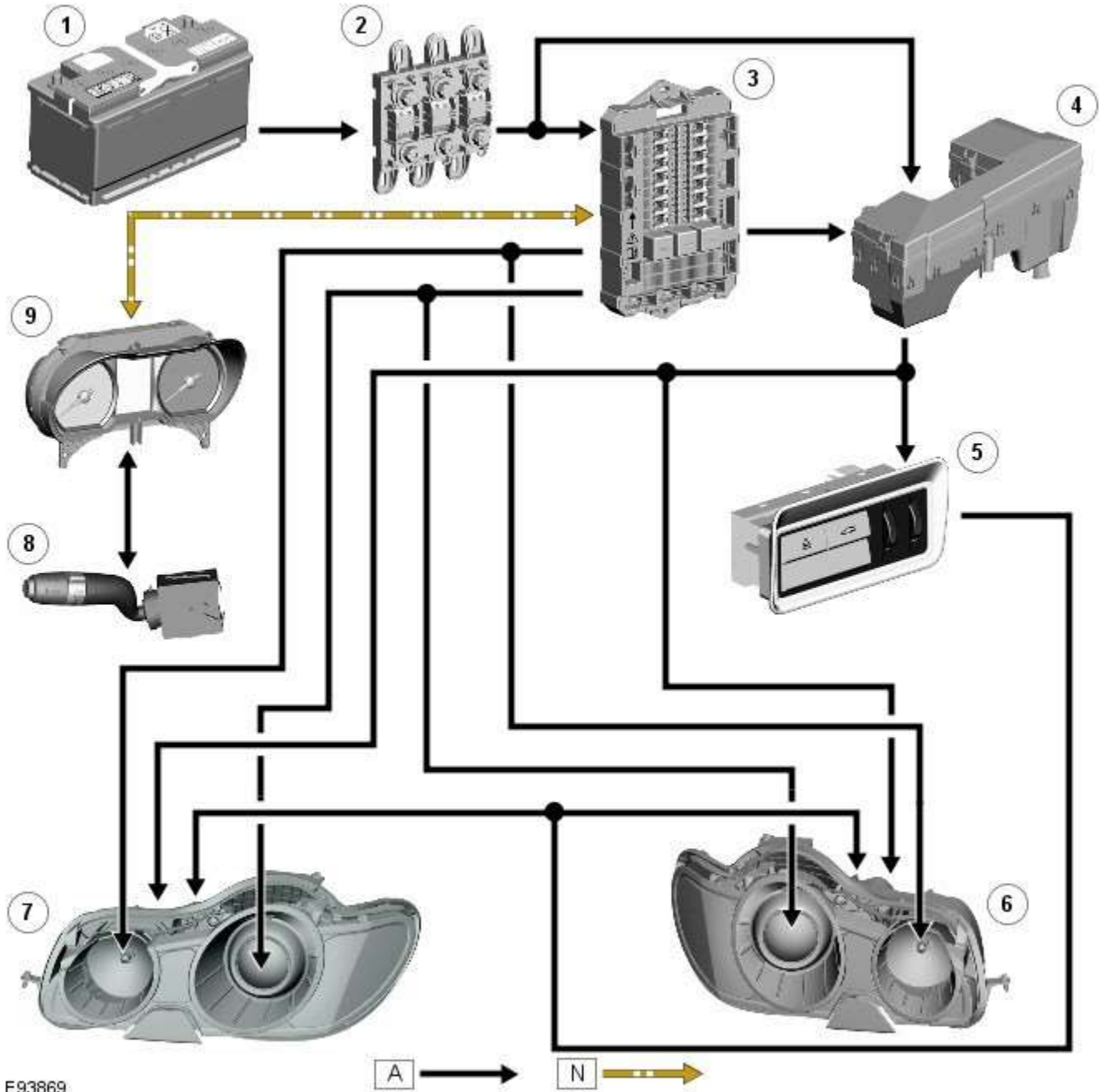


E93870

Item	Description
A = Hardwired; D = High speed CAN bus; N = Medium speed CAN bus	
1	Battery
2	BJB (battery junction box)
3	CJB (central junction box)
4	EJB (engine junction box)
5	Medium speed CAN (controller area network) bus to other vehicle systems
6	Headlamp leveling module

7	Front height sensor
8	Rear height sensor
9	RH (right-hand) headlamp assembly
10	LH (left-hand) headlamp assembly
11	Lighting control switch - LH steering column multifunction switch
12	Instrument cluster

HALOGEN HEADLAMPS - CONTROL DIAGRAM

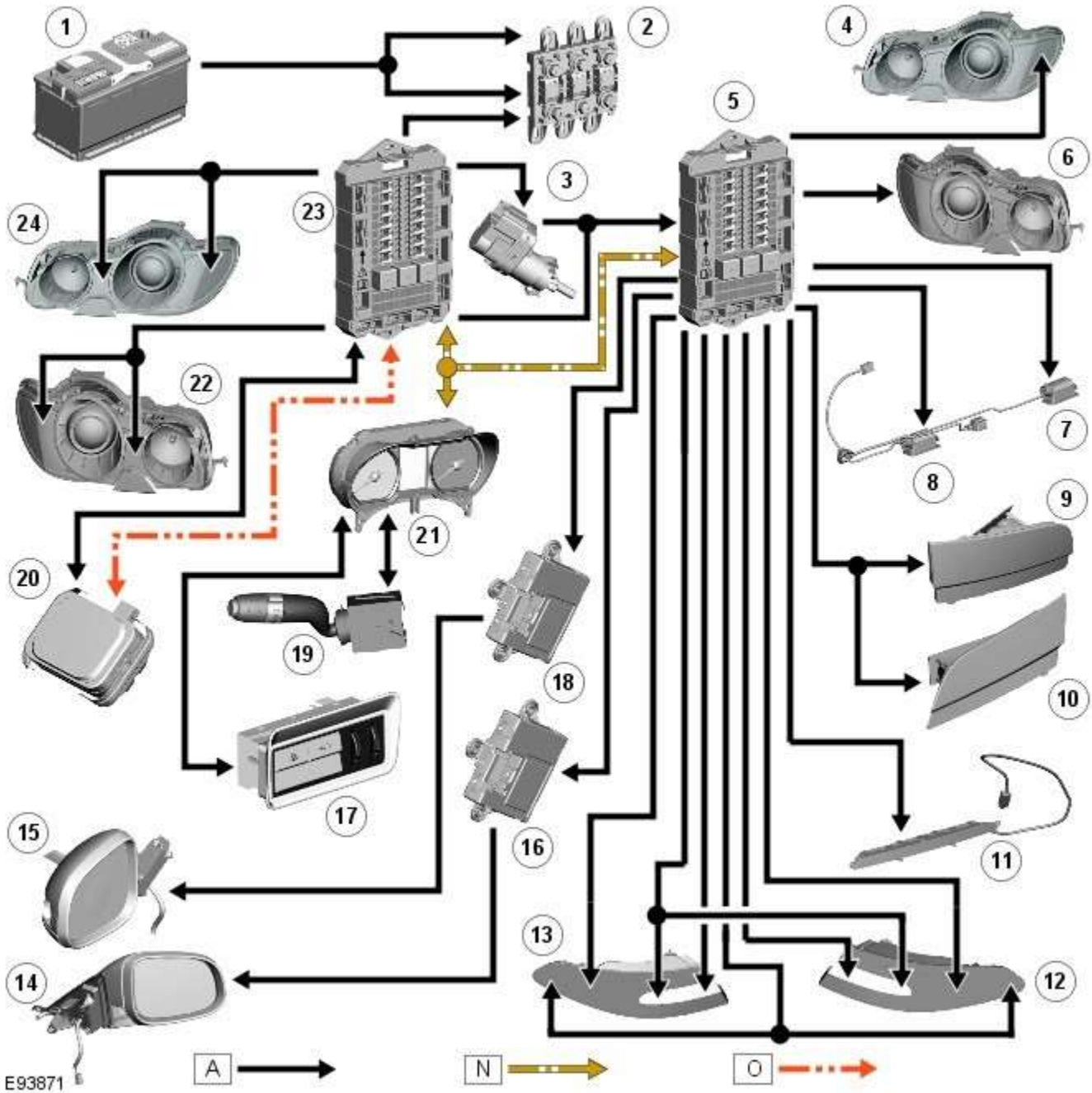


E93869

Item	Description
	A = Hardwired; N = Medium speed CAN bus
1	Battery
2	BJB
3	CJB
4	EJB
5	Auxiliary lighting switch

6	RH headlamp assembly
7	LH headlamp assembly
8	Lighting control switch - LH steering column multifunction switch
9	Instrument cluster

SIDE LAMPS/TURN SIGNAL INDICATORS/FOG LAMPS - CONTROL DIAGRAM



Item	Description
A = Hardwired; N = Medium speed CAN bus; O = LIN bus	
1	Battery
2	BJB - Megafuse
3	Stop lamp switch
4	LH turn signal indicator
5	RJB (rear junction box)
6	RH turn signal indicator
7	RH licence plate lamp

8	LH licence plate lamp
9	LH fog lamp
10	RH fog lamp
11	High mounted stop lamp
12	RH tail lamp assembly
13	LH tail lamp assembly
14	RH door mirror side repeater
15	LH door mirror side repeater
16	RH front door module
17	Auxiliary lighting switch
18	LH front door module
19	Lighting control switch - LH steering column multifunction switch
20	Rain/light sensor
21	Instrument cluster
22	RH headlamp assembly - side lamp and side marker lamp (if fitted)
23	CJB
24	LH headlamp assembly - side lamp and side marker lamp (if fitted)

System Operation

CENTRAL JUNCTION BOX (CJB) AND REAR JUNCTION BOX (RJB)

The [CJB](#) is an integrated unit which controls body functions and power distribution. The [CJB](#) is located on the [RH](#) 'A' pillar.

The [RJB](#) also controls body functions and power distribution and is located in the [RH](#) side of the luggage compartment.

Central Junction Box

The [CJB](#) receives inputs from the following switches via the instrument cluster and the medium speed [CAN](#) bus:

- [LH](#) Steering column multifunction switch
 - Side lamp position
 - Headlamp position
 - Automatic (AUTO) position
 - Timer delay positions
 - Turn signal indicators
 - Headlamp flash and main beam positions.

The [CJB](#) receives direct inputs from the following components:

- Stop lamp switch
- Rain/light sensor.

The [CJB](#) provides power supplies to the following lamps:

- [LH](#) and [RH](#) front side lamps
- [LH](#) and [RH](#) front side marker lamps (if fitted)
- [LH](#) and [RH](#) static bending lamp (if fitted)
- [LH](#) and [RH](#) low beam headlamp
- [LH](#) and [RH](#) high beam headlamp.

Rear Junction Box

The [RJB](#) provides power supplies to the following lamps:

- [LH](#) and [RH](#) tail lamps
- [LH](#) and [RH](#) stop lamps
- [LH](#) and [RH](#) front turn signal indicators
- [LH](#) and [RH](#) rear turn signal indicators
- [LH](#) and [RH](#) licence plate lamps
- [LH](#) and [RH](#) side marker lamps
- High mounted stop lamp
- Rear fog lamps
- Reverse lamps.

The [RJB](#) also provides a power supply to the [LH](#) and [RH](#) door modules. The door modules use the power supply to activate the turn signal indicator side repeater lamps located in the door mirrors, on receipt of a medium speed [CAN](#) bus message from the [RJB](#).

Circuit Protection

The [CJB](#) and the [RJB](#) provide circuit protection for their respective lighting circuits. The exterior lighting circuits are protected

by Field Effect Transistors (FET's). The FET's can detect overloads and short circuits and respond to heat generated by increased current flow caused by a short circuit.

On a normal conventionally protected circuit this would cause a fuse to blow. The FET's respond to the heat increase and disconnect the power supply to the affected circuit. When the fault is rectified or the FET has cooled, the FET will reset and operate the circuit normally. If the fault persists the FET will cycle, disconnecting and reconnecting the power supply.

The [CJB](#) and the [RJB](#) store fault codes which can be retrieved using a Jaguar approved diagnostic system. The fault code will identify that there is a fault on a particular output circuit which will assist with fault diagnosis and detection.

Alarm Indications

The exterior lighting system is used for alarm arm and disarm requests to show alarm system status.

When the driver locks and arms the vehicle, a visual indication of a successful lock and arm request is displayed to the driver by a single flash of the hazard flashers. If the vehicle is superlocked, then the hazard flashers will flash a second time (200 ms off and 200 ms on) to confirm the superlock request.

If the alarm is activated, the hazard flashers are operated for 10, 30 second cycles of 200 ms on and 200 ms off, with a 10 second delay between each cycle.



NOTE: On North American Specification (NAS) vehicles, the delay between the cycle when the alarm is activated is 60 seconds.

Lights on Warning

When the ignition is in the off power mode 0 or accessory power mode 4 and the lighting control switch is in the side lamp or headlamp position, a warning chime will sound if the driver's door is opened. This indicates to the driver that the exterior lights have been left switched on.

The chime is generated from the instrument cluster sounder on receipt of a lights on signal, a driver's door open signal and an ignition off power mode 0 or accessory power mode 4 signal via a medium speed [CAN](#) bus signal from the [CJB](#).

Headlamp Timer

The [RJB](#) controls the headlamp timer function which allows the headlamps to remain on for a period of time after leaving the vehicle. This is a driver convenience feature which illuminates the driveway after leaving the vehicle.

To operate the timer function the lighting control switch must be in one of the three headlamp timer positions when the ignition status is changed from ignition on power mode 6 to the off power mode 0. The timer function will then be initiated and the low beam headlamps will be illuminated for the selected timer period.



NOTE: If the lighting switch is in the AUTO position, the headlamp timer will not function when the ignition is changed to off power mode 0.

When the lighting control switch is in the autolamp exit delay position, the lighting control switch reference voltage flows through 4 of the resistors. The returned signal voltage is detected by the instrument cluster which outputs a message on the medium speed [CAN](#) bus to the [RJB](#) that autolamps has been selected.

Depending on the selected exit delay position, the reference voltage to the autolamp exit delay switch is routed through 3, 2 or 1 resistors which is detected by the instrument cluster. The cluster outputs a message on the medium speed [CAN](#) bus to the [RJB](#) that autolamp exit delay period has been selected at 30, 60 or 120 seconds respectively.

Crash Signal Activation

When a crash signal is transmitted from the [RCM](#) (restraints control module), the [RJB](#) activates the hazard flashers. The hazard flashers continue to operate until the ignition is in the off power mode 0 or accessory power mode 6. Once this ignition state has occurred, the [RCM](#) will cease to transmit the crash signal.

LIGHTING CONTROL SWITCH

The instrument cluster outputs 2 reference voltages to the rotary lighting control switch; one feed being supplied to the light selection function of the switch and the second feed being supplied to the auto headlamp exit delay function. The switch position is determined by instrument cluster by the change in returned signal voltage which is routed through up to 4 resistors in series depending on the selection made.

OFF - When the lighting control switch is in the off position, the reference voltage flows through 1 of the resistors. The returned signal voltage is detected by the instrument cluster which outputs a message on the medium speed [CAN](#) bus to the [CJB](#) that no lighting selection is made. The reference voltage to the auto headlamp exit delay switch is routed through 4 resistors which is detected by the instrument cluster which outputs a message on the medium speed [CAN](#) bus to the [CJB](#) that auto headlamp or exit delay has not been selected.

SIDE LAMPS - When the lighting control switch is in the side lamp position, the reference voltage flows through 2 of the resistors. The returned signal voltage is detected by the instrument cluster which outputs a message on the medium speed [CAN](#) bus to the [CJB](#) to activate the side lamps. The reference voltage to the autolamp exit delay switch is routed through 4 resistors which is detected by the instrument cluster which outputs a message on the medium speed [CAN](#) bus to the [CJB](#) that auto headlamp or exit delay has not been selected.

HEADLAMPS - When the lighting control switch is in the headlamp position, the reference voltage flows through 3 of the

resistors. The returned signal voltage is detected by the instrument cluster which outputs a message on the medium speed [CAN](#) bus to the [CJB](#) to activate the headlamps. The reference voltage to the auto headlamp exit delay switch is routed through 4 resistors which is detected by the instrument cluster which outputs a message on the medium speed [CAN](#) bus to the [CJB](#) that auto headlamp or exit delay has not been selected.

AUTOLAMPS - When the lighting control switch is in the auto headlamp position, the reference voltage flows through 4 of the resistors. The returned signal voltage is detected by the instrument cluster which outputs a message on the medium speed [CAN](#) bus to the [CJB](#) to activate the autolamp function. The reference voltage to the autolamp exit delay switch is routed through 4 resistors which is detected by the instrument cluster which outputs a message on the medium speed [CAN](#) bus to the [CJB](#) that auto headlamp has been selected.

AUXILIARY LIGHTING SWITCH

Headlamp Leveling Rotary Thumbwheel (Halogen headlamps only)

A power supply is passed to the headlamp leveling thumbwheel from the ignition relay in the [EJB](#). Depending on the position of the thumbwheel, the voltage passes through 1, 2 or 3 resistors connected in series. The voltage through the resistors is passed to the headlamp leveling motor controller in each headlamp. The received voltage is determined as a request for the appropriate level position and the controller powers the headlamp level motors to the applicable position for each headlamp.

Rear Fog Lamp Switch

The instrument cluster supplies a reference voltage and return to the rear fog lamp switch. The fog lamp switch is a non-latching, momentary switch.

When the fog lamp switch is off the reference voltage is passed through a 1Kohm resistor. The voltage through the resistor is returned to the instrument cluster that determines that no request for fog lamp operation has been made.

When the driver presses the fog lamp switch, the reference voltage is passed through a 330 ohm resistor. The change in return voltage is sensed by the instrument cluster which determines fog lamp operation has been requested. The instrument cluster transmits a medium speed [CAN](#) bus signal to the [RJB](#) providing the lighting control switch is in the correct position. The [RJB](#) reacts to the message and provides a power supply to the 3 [LED \(light emitting diode\)](#)'s in each rear fog lamp. A fog lamp warning lamp in the instrument cluster will also be illuminated when the fog lamps are operating.

The [RJB](#) will only activate the rear fog lamps if the headlamps are selected on or are active with auto headlamp activation. When the headlamps are turned off the fog lamps are also turned off. When the headlamps are next switched on, the fog lamps will not be activated until the driver requests fog lamp operation.



NOTE: The fog lamps do operate when DRL (daytime running lamps) are active.

HEADLAMP LEVELING

Manual Headlamp Leveling - Halogen headlamps only

A power supply is passed to the headlamp leveling motor in each headlamp from the ignition relay in the [EJB](#). When a signal voltage is received from the headlamp leveling rotary thumbwheel, the headlamp leveling motor controller in each headlamp uses the power supply to operate the motors and move the headlamp to the requested position.

Static Dynamic Headlamp Leveling - Xenon headlamps only

The headlamp leveling module receives a power supply from the ignition relay in the [EJB](#). The same power supply is also supplied to the headlamp leveling motor in each headlamp assembly. The front and rear height sensors are connected to the headlamp leveling module and receive a power and ground from the module. Each sensor has a signal line to the headlamp leveling module to return height information to the module. The module uses the height signals from the sensors to calculate the vehicle attitude and supplies a signal to each motor to power the headlamp to the required position.

Component Description

EXTERIOR BULB TYPE/RATING

The following table shows the bulbs used for the exterior lighting system and their type and specification.

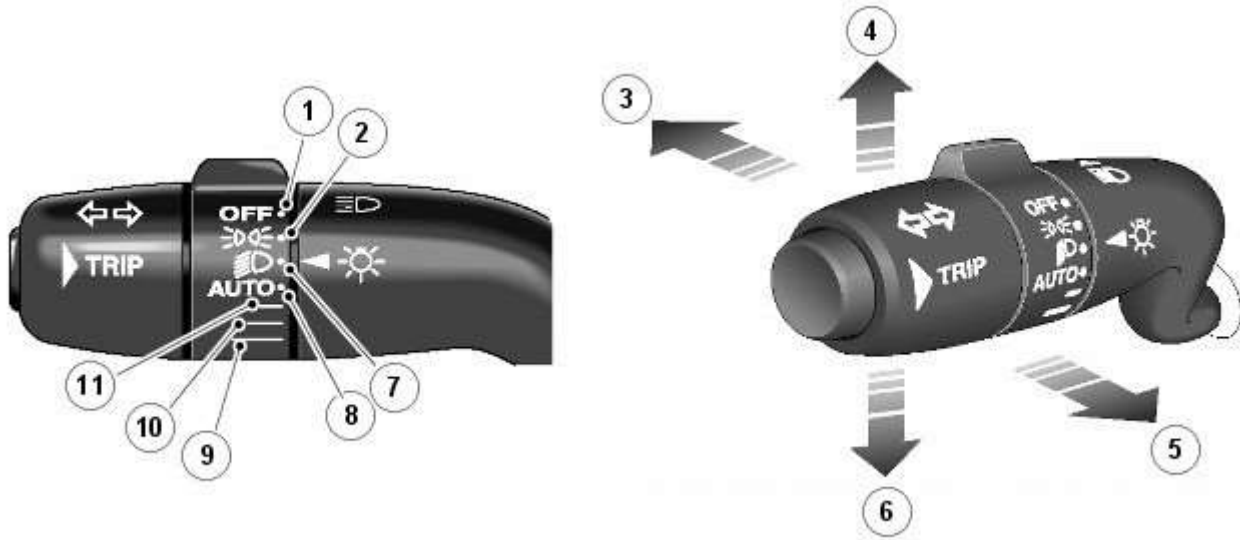


NOTE: The tail lamps, side marker lamps, stop lamps, high mounted stop lamp and rear fog lamps are illuminated by [LED](#)'s and are non-serviceable components.

Bulb	Type	Rating
Halogen headlamp - Projector module low/high beam - Not NAS	H7	55W
Halogen headlamp - Projector module low/high beam - NAS only	H11	60W
Xenon headlamp - Projector module low/high beam - All markets	D1S	35W
High beam only (halogen) - High/low beam (xenon) - All markets	H7	55W
Front side lamps - all markets	W5W Halogen cool blue (HCB)	5W
Front turn signal indicators - Not NAS	PY21W	21W
Front turn signal indicators - NAS only	3457AK	27W
Rear turn signal indicators - All markets	PSY19W	19W
Turn signal indicator side repeaters - All markets	WY5W	5W

Bulb	Type	Rating
Reverse lamps - All markets	PS19W	19W
Licence plate lamps - All markets	W5W	5W

LIGHTING CONTROL SWITCH



E82943

Item	Description
1	Off position
2	Side lamp position
3	High beam position
4	RH turn signal indicator
5	Headlamp flash/high beam off position
6	LH turn signal indicator
7	Headlamp position
8	AUTO headlamp position
9	Headlamp timer 120 second delay position
10	Headlamp timer 60 second delay position
11	Headlamp timer 30 second timer delay position

The lighting control switch is located on the [LH](#) steering column multifunction switch. The lighting control switch is a rotary control with positions for the following lighting functions:

- Off
- Side lamps
- Headlamps
- AUTO headlamps
- Headlamp timer (3 time period selections).

The [LH](#) steering column multifunction switch also provides for the following functions:

- Low beam headlamps
- High beam headlamps
- Headlamp flash
- [LH](#) and [RH](#) turn signal indicators
- Trip computer function button.

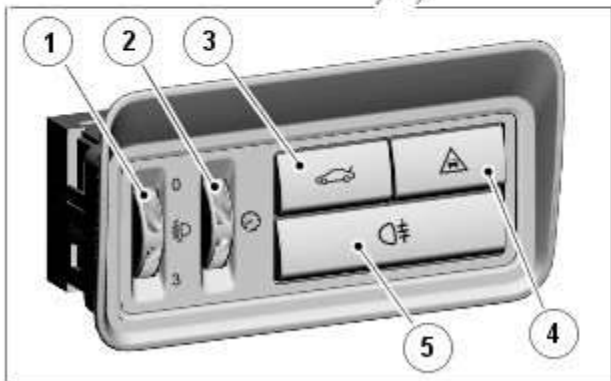
Refer to: [Information and Message Center](#) (413-08 Information and Message Center, Description and Operation).

The switch has a turn signal indicator lane change function. If the switch is gently pushed to either turn signal indicator position and then released, the applicable turn signal indicators will flash 3 times and then will be automatically cancelled. If a turn signal indicator bulb fails, the green turn signal warning indicator in the instrument cluster will flash at twice the normal rate and the audible ticking from the instrument cluster sounder will also be at twice the normal rate.

AUXILIARY LIGHTING SWITCH



NOTE: RHD (right-hand drive) switch shown



E98399

Item	Description
1	Headlamp leveling rotary thumbwheel (halogen headlamps only)
2	Instrument panel illumination dimmer thumbwheel
3	Luggage compartment lid release switch
4	Forward alert switch (if fitted)
5	Rear fog lamp switch

The auxiliary lighting switch is located in the instrument panel, adjacent to the steering column. The switch has a rear fog lamp switch and a rotary thumbwheel to adjust headlamp leveling on vehicles with halogen headlamps. The auxiliary lighting switch also has a forward alert switch (if fitted) and a rotary thumbwheel for instrument panel illumination dimming.

The rear fog lamp switch is a non-latching switch which provides a momentary signal to the instrument cluster. The fog lamps can only be activated if the ignition is in power mode 6 and the headlamp or auto headlamps are selected on. If the fog lamp switch is pressed when the fog lamps are operating, they will be switched off. If the lighting control switch is moved to the side lamp or off position or if the auto headlamps turns off the headlamps the rear fog lamps will be extinguished. If the headlamps are subsequently turned on the rear fog lamp operation will not be active and the rear fog lamp switch must be pressed to activate the lamps.

HEADLAMP ASSEMBLY

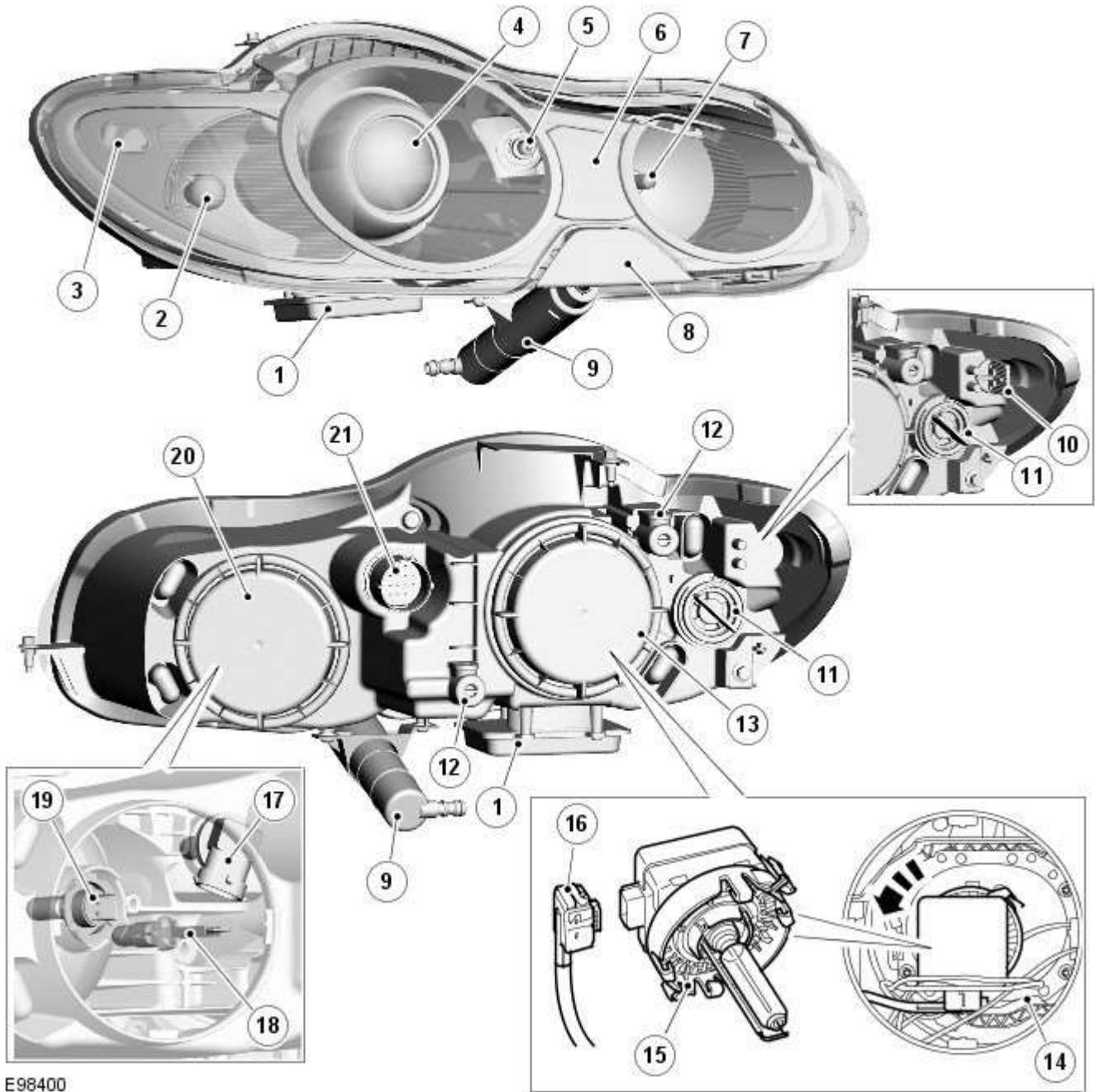
Two types of headlamp are available; xenon or halogen. The headlamp is secured in the front of the vehicle with three bolts; one outboard bolt is screwed into the front upper cross member, one inboard bolt in the front upper body gusset and one bolt located at the rear of the headlamp assembly which locates in the front fender reinforcing panel. Bulb replacement requires the removal of the 3 bolts and the headlamp assembly.

The rear of the headlamp has removable panels which allow access to the bulbs for replacement. A large cover can be rotated counter-clockwise for removal allows access the headlamp low beam halogen or xenon D1S bulb. Another large removable cover can be rotated for removal to provide access to the high beam bulb, side lamp bulb and cornering/static bending lamp bulb (if fitted).

The headlamps have 2 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' aiming. The adjustment screws must 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 and procedures.

Each headlamp has an integral 16 pin connector which provides inputs and outputs for the various functions of the headlamp assembly.



E98400

Item	Description
1	Xenon control module (not fitted on halogen low beam headlamps)
2	Turn signal indicator
3	Side marker lamp (NAS only)
4	Projector module - Low beam headlamp(Halogen) – Low/High beam headlamp (xenon)
5	Cornering/static bending lamp (if fitted)
6	Side lamp
7	High beam headlamp
8	Power wash jets trim cover
9	Headlamp powerwash
10	Side marker lamp bulb (NAS only)
11	Turn signal indicator bulb
12	Headlamp adjuster screw (2 off)
13	Cover - Low beam headlamp projector module bulb
14	Mounting collar

15	Xenon igniter unit and bulb
16	Xenon igniter electrical connector
17	Cornering/static bending lamp bulb (if fitted)
18	Side lamp bulb
19	High beam headlamp bulb
20	Cover - Side lamp, cornering/static bending lamp (if fitted) and high beam headlamp bulbs
21	Electrical connector

Bi-Xenon Headlamp

The bi-xenon headlamp uses a projector lens, similar to the halogen headlamp. The projector module comprises an ellipsoidal lens and a reflector. The projector reflector collects the light produced by the halogen bulb and projects the light into a focal plane containing a shield. The contour of the shield is projected onto the road by the lens. A complex surface reflector is used for the halogen fill in high beam lamp. This type of reflector is divided into separate parabolic segments, with each segment having a different focal length. 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.

A tourist lever mechanism is located on the right hand side of the projector module. This mechanism moves a flap 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.



NOTE: The tourist lever is not fitted to NAS vehicles.



WARNING: The Xenon system generates up to 30000 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 adhered to when working on the xenon low beam headlamp system:

- **DO NOT** attempt any procedures on the xenon headlamps when the lights are switched on.
- Handling of the D1S xenon bulb must be performed using suitable protective equipment; for example gloves and goggles. The glass part of the bulb must not be touched.
- Xenon bulbs must be disposed of as hazardous waste.
- Only operate the bulb in a mounted condition in the projector module installed in the headlamp.

The xenon headlamp is known as 'bi-xenon' because it operates as both a low and high beam headlamp unit. The xenon lamp, or High Intensity Discharge (HID) lamp as they are sometimes referred to, comprises an ellipsoidal lens with a solenoid controlled shutter to change the beam output from low to high beam.



NOTE: If the lighting control switch is in the 'off' position, both the xenon lamp and the halogen high beam lamp will operate 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 bulbs through their start-up phases of operation.

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 bulb, which together forms an assembly known as the projector module. The reflector is curved and provides the mounting point for the xenon bulb. The bulb locates in a keyway to ensure the correct alignment in the reflector and is secured by a plastic mounting ring. The bulb is an integral component of the igniter and is electrically connected by a connector located in the igniter unit.

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

The xenon bulbs illuminate when an arc of electrical current is established between 2 electrodes within the bulb. The xenon gas sealed in the bulb reacts to the electrical excitation and the heat generated by the current flow to produce the characteristic blue/white light.

To operate at full efficiency, the xenon bulb goes through 3 full stages of operation before full output for continuous operation is achieved. The 3 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 up to 30000 volts to establish the arc. This is produced by the igniter. The warm-up phase begins once the arc is established. The xenon control module regulates the supply to the bulb 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 module changes to continuous phase. The supply voltage to the bulb is reduced and the operating power required for continual operation is reduced to 35W. The process from start-up to continuous phase is completed in a very short time.

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 the regulated power supply from the control modules.

Halogen Low/high Beam Headlamp

The halogen low/high beam headlamp uses a projector lens, similar to the xenon headlamp. The projector module comprises an ellipsoidal lens and a reflector. The projector reflector collects the light produced by the halogen bulb and projects the light into a focal plane containing a shield. The contour of the shield is projected onto the road by the lens. The low/high beam bulbs are quartz halogen and are retained in the headlamp unit with conventional wire retaining clips.

A tourist lever mechanism is located on the right hand side of the projector module. This mechanism moves a flap 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.

Halogen High Beam Headlamp - Xenon and Halogen

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

The high beam headlamp bulbs are quartz halogen and are retained in the headlamp unit with conventional wire retaining clips.

Cornering Lamps



NOTE: The cornering lamps are not fitted to NAS 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 headlamp assembly and shares the same housing as the low beam headlamp. The cornering lamp uses a 35W Halogen H8 bulb which is permanently located in an integral 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 on the base of the headlamp housing.

The cornering lamps are controlled by the [LH](#) steering column multifunction switch with the lighting control switch in the headlamp position and the ignition in 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 vice versa, providing the vehicle speed and lighting control switch positions are correct.

Static Bending Lamps



NOTE: The static bending lamps are not fitted to NAS vehicles.

The static bending lamps are designed to illuminate the direction of travel when cornering at low speeds. The static bending lamp functionality, which is controlled by the [CJB](#) and the headlamp leveling module, operates using inputs from the steering angle sensor and vehicle speed information from the [ABS \(anti-lock brake system\)](#) module. The static bending lamp is incorporated into the headlamp assembly and shares the same housing as the low beam headlamp. The design of the lens projects a spread of light from the vehicle at approximately 45 degrees to the vehicle axis. The 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.

The static bending lamps operate with a steering angle sensor [CAN](#) bus signal which is received by the [CJB](#). The [CJB](#) monitors this signal and vehicle speed and activates the static bending lamp bulb. When the operation parameters of the lamp are reached, the [CJB](#) fades the static bending lamp bulb on using a [PWM \(pulse width modulation\)](#) 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 in a linear manner depending on steering angle and vehicle speed. The cornering lamps can only be active for a maximum of 3 minutes.



NOTE: Static bending lamps only operate when the transmission is in DRIVE or in SPORT.

Turn Signal Indicators

The turn signal indicator lamp is incorporated into the outer part of the headlamp assembly. The turn signal indicator lamp uses a PY21W bayonet orange colored bulb in ROW markets, a S8W 27/7W wedge bulb is used in NAS markets. The bulb is fitted into a holder which connects with contacts in the headlamp housing. The holder is fitted into an aperture in the headlamp housing and rotated to lock into position.

When active, the turn signal indicator lamps will flash at a frequency cycle of 380ms on and 380ms off. If a bulb fails, the remaining turn signal lamps bulbs continue to flash at normal speed. The turn signal indicators in the instrument cluster will flash at double speed to indicate the bulb failure to the driver.

Side Lamps

The side lamp is located between the headlamp projector module and the high beam headlamp. The side lamp uses a W5W wedge fitting bulb which locates in a holder which 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 by removal of the inner cover on the rear of the headlamp housing. Access to the bulb requires removal of the headlamp from the vehicle. The side lamps are operated by selecting side lamps or headlamps on the lighting control switch. The side lamps are functional at all times and are

dependant on a particular ignition mode status. 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 Marker Lamps (NAS only)

The side marker lamp is located in the outer part of the headlamp assembly. The side marker lamp uses a W5W wedge fitting bulb. The bulb is fitted into a holder which connects with contacts in the headlamp housing. The holder is fitted into an aperture which connects with contacts in the headlamp housing. The side marker lamp is active at all times when the side lamps are active.

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 a [LIN \(local interconnect network\)](#) bus to control the headlamp functionality. The 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.

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. If the rain sensor signal activates the fast speed wipers, the low beam headlamps are activated, providing the lighting control switch is in the 'AUTO' position.

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 dynamic.

Manual Headlamp Leveling

The manual system uses a thumbwheel rheostat to adjust the vertical alignment of the headlamps to compensate for differing vehicle loading. The rotary thumbwheel is located on the auxiliary lighting switch, adjacent to the illumination dimmer thumbwheel. Three positions are available to adjust the headlamps to a position to prevent glare to other road users.

Static Dynamic Headlamp Leveling

The static dynamic headlamp leveling system uses the following components:

- Front and rear vehicle height sensors
- Two headlamp leveling, vertical adjustment motors
- Headlamp leveling module
- Ignition in mode 6
- Vehicle speed information from [ABS](#) module.

The static dynamic system uses height sensors fitted to the front and rear suspension and a headlamp leveling module which periodically monitors the vehicle attitude and adjusts the headlamp vertical alignment accordingly.

Static dynamic headlamp leveling is controlled by a headlamp leveling module located in the lower instrument panel, behind the glovebox.

The height sensors are both located on the [RH](#) side of the vehicle. The front sensor is attached to the front suspension lower arm with a strap and to the front sub frame with a bracket and 2 bolts. The rear sensor is attached to the rear suspension upper control arm with a cable tied clip and to the rear sub frame with a bracket and 2 bolts. Each sensor has 3 connections to the headlamp leveling module; power, ground and signal.

DAYTIME RUNNING LAMPS (DRL)

Refer to [DRL](#) section for details.

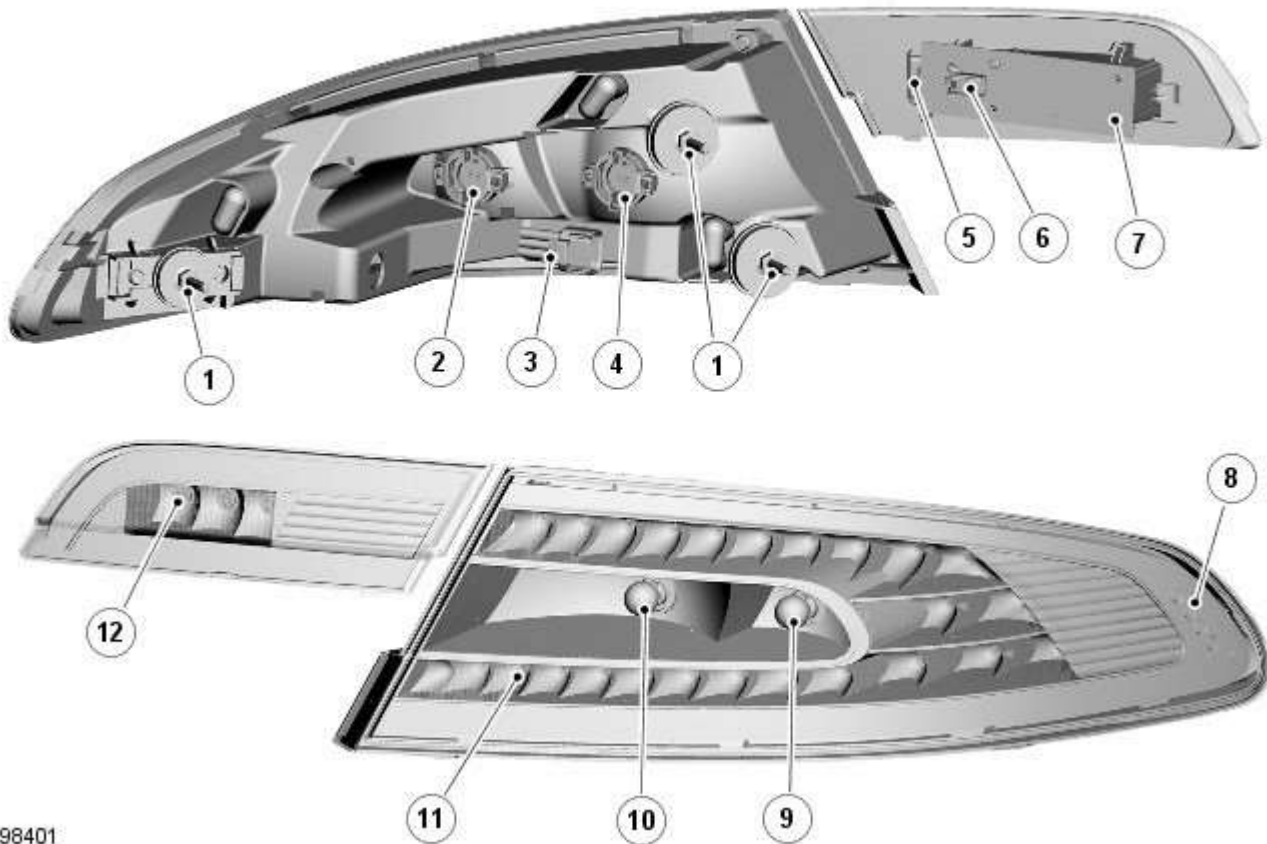
Refer to: [Daytime Running Lamps \(DRL\)](#) (417-04 Daytime Running Lamps (DRL), Description and Operation).

REAR LAMP ASSEMBLY

The rear lamp assembly is a 2 piece unit, with one part located in the rear quarter panel and the second part attached to the luggage compartment lid. The outer rear lamp assembly is located in a recess in the vehicle body. The lamp is secured with 2 studs inboard studs on the lamp body which are secured to the vehicle body with 2 nuts. A third outboard stud and nut secures

a clip to the vehicle body. To remove the lamp assembly, only the 2 inboard nuts require removal. The outboard nut retains a sliding clip in position on the vehicle body. To remove the rear lamp assembly, remove the 2 inboard nuts and slide the lamp rearwards to release the outboard clip.

The inner rear lamp is located in a recess in the luggage compartment lip and secured with a clip.



E98401

Item	Description
1	Nut (3 off)
2	Reverse lamp bulb and holder
3	Rear lamp electrical connector
4	Turn signal indicator bulb and holder
5	Securing clip
6	Rear fog lamp electrical connector
7	Rear fog lamp LED's and Printed Circuit Board (PCB)
8	Side marker LED's (4 off - all markets)
9	Reverse lamp
10	Turn signal indicator lamp
11	Side lamp/stop lamp LED's (24 off)
12	Rear fog lamp LED's (3 off)

Rear Stop and Side Lamp

The turn signal indicator, side and stop lamps and reverse lamps are located in each outer rear lamp assembly. The side lamps and stop lamps use 24 LED's. The 24 LED's are illuminated at a higher intensity than the side lamp when the stop lamp switch is operated by pressing the brake pedal. A side marker lamp is fitted to the outer rear lamp assembly and is fitted in all markets. The side marker lamp also uses 4 LED's and are active at all times when the side lamps are selected on.

The stop lamps can also be activated by the adaptive speed control system. A signal from the adaptive speed control module is sent via the high speed CAN bus to the RJB which activates the stop lamps until an off message is received.

Turn Signal Indicator

The turn signal indicator lamp uses a Phillips Hypervision glass filament bulb. The bulb is located in a holder which has contacts which mate with contacts on lamp body. The holder locates in the lamp body and is rotated to lock.

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

Reverse Lamp

The reverse lamp also uses a Phillips Hypervision glass filament bulb. The bulb is located in a holder which has contacts which mate with contacts on lamp body. The holder locates in the lamp body and is rotated to lock.

The reverse lamps are activated on receipt of a reverse selected message sent on the medium speed [CAN](#) bus to the [RJB](#).

Rear Fog Lamp

The rear fog lamps are located in separate units attached to the luggage compartment lid. The rear fog lamps each use 3 high intensity [LED](#)'s. The fog lamp locates in a recess in the luggage compartment lid has a seal to prevent the ingress of water into the luggage compartment. The lamp is secured in the recess with a metal securing clip. The rear fog lamp is activated using a button located on the auxiliary lighting switch in the instrument panel.

LICENCE PLATE LAMPS

Two licence plate lamps are located in the luggage compartment lid trim finisher. One is located adjacent to the emergency luggage compartment lid release key barrel cover and the other is adjacent to the rear view camera (if fitted). The licence plate lamps are active at all times when the side lamps are operating. Each lamp can be removed from the finisher by inserting a wide, flat screwdriver blade or similar tool in a slot between the lamp lens and the finisher and gently levering the lamp from the surround. The bulb is a push fit in a holder which in turn is a press fit in the lamp housing.

HIGH MOUNTED STOP LAMP

The high mounted stop lamp is located at the bottom of the rear windshield. The lamp is secured to a bezel in the parcel shelf with 2 screws.

The high mounted stop lamp uses 12, red colored [LED](#)'s which illuminate through a clear lens. The high mounted stop lamp functionality is the same as that described for the stop lamps.

TURN SIGNAL INDICATOR SIDE REPEATER LAMPS

The turn signal indicator side repeaters are located in each door mirror. On vehicles from 10MY the lamp is an [LED](#) unit which illuminates in an orange color. The [LED](#) unit is secured to the mirror bezel with 2 screws and is connected to the mirror wiring harness with a 2 pin connector.

The side repeaters have the same functionality and operate in conjunction with the front and rear turn signal indicators and the hazard warning flashers.

HAZARD FLASHERS

The hazard flashers are activated by a non-latching switch located in the switch pack located in the center of the instrument panel. The hazard flashers operate at all times when selected and operate independent of the ignition mode.

When the hazard flashers are selected on by the driver, a ground path is momentarily completed to the [CJB](#) which activates the front and rear and side repeater turn signal indicators. A second press of the switch is sensed by the [CJB](#) and the hazard flasher are deactivated. When the hazard flashers are active, they override any request for turn signal indicator operation.

The hazard flashers can also be activated by a crash signal from the [RCM](#).

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

Exterior Lighting - Headlamps

Diagnosis and Testing

Principles of Operation

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

[Exterior Lighting](#) (Description and Operation),

[Exterior Lighting](#) (Description and Operation),

[Exterior Lighting](#) (Description and Operation).

Safety Information

WARNINGS:



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 lead to fatality.



The following safety precautions must be followed when working on the Xenon Headlamp system:

- DO NOT attempt any procedures on the Xenon Headlamps or circuits when the system is energized.
- 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.
- Only operate the lamp in a mounted condition in the reflector.
- All safety procedures and precautions must be followed to prevent personal injury.



CAUTION: Xenon bulbs must be disposed of as hazardous waste.

There are instructions on the correct procedures for Xenon Headlamp System repairs in the manual, refer to section 100-00 - General Information, Standard Workshop Practices of the workshop manual.

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 tested and/or the donor vehicle.

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

Visual Inspection

Electrical

- Headlamp Leveling Module (HLM)
- Bulb(s)
- Photocell(s)
- Ballast
- Wiring harness/electrical connectors
- Fuse(s)

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, check for Diagnostic Trouble Codes (DTCs) and refer to DTC Index.

Symptom Chart

Symptom	Possible Causes	Action
Low beam lamp(s) inoperative	<ul style="list-style-type: none"> • Bulb failure • Fuse(s) blown • Circuit fault • Lighting control switch fault 	Check the bulb and fuse condition (see visual inspection). 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	<ul style="list-style-type: none"> • Left-hand steering column multifunction switch fault 	

Symptom	Possible Causes	Action
Low beam lamp(s) dim	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Fuse(s) blown • Lighting control switch fault • Left-hand steering column multifunction switch inoperative • Circuit fault • Instrument cluster fault 	Check the fuse(s) (see visual inspection). 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.
Headlamp Wet - Internal	<ul style="list-style-type: none"> • Condensation • Water Ingress 	Check for outstanding Technical Service Bulletins (TSBs) relating to 'Headlamp Internal Condensation'. Carry out the instructions in the service bulletin to determine if the fault is related to condensation or water ingress.

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 \(HCM\)](#) (100-00 General Information, Description and Operation).

Exterior Lighting - Headlamp Adjustment

General Procedures



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

1.
 - Make sure to check and adjust the tyre pressures to the correct level.
 - Park the vehicle on a horizontally level surface.

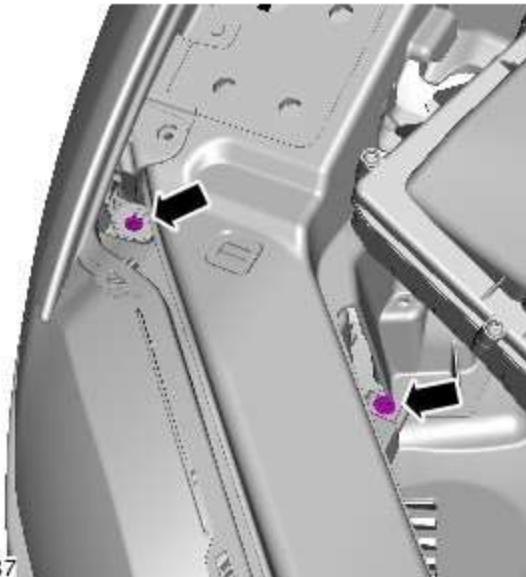
2.
 - Align the headlamp beam setting equipment to one headlamp. [Headlamp beam setter](#)



3. NOTE: The headlamp setting is 1 % below horizontal and parallel.

- Check the headlamp beam alignment.

4. Open the hood.



5.
 - Adjust the headlamps with an Allen Key.

6.
 - To adjust the second headlamp, repeat the above procedure.

Exterior Lighting - Approach Lamp

Removal and Installation

Removal

NOTES:



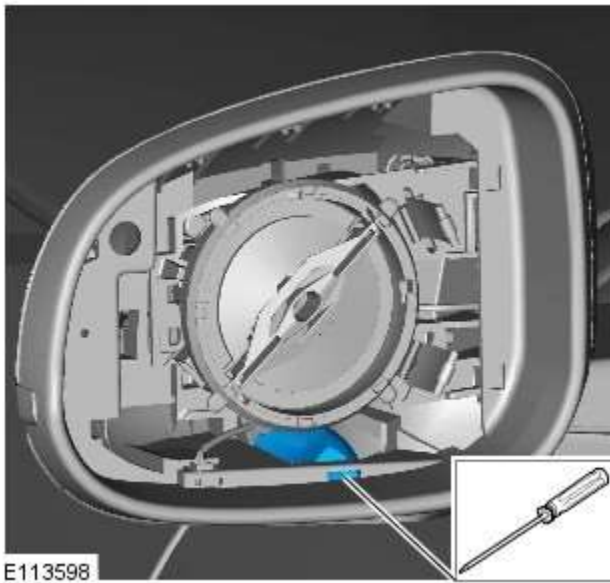
Removal steps in this procedure may contain installation details.



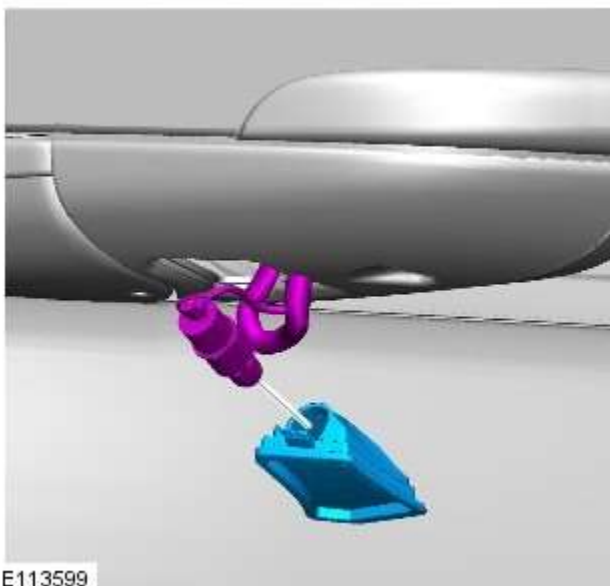
Some variation in the illustrations may occur, but the essential information is always correct.

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

2.



3.



Installation

1. To install, reverse the removal procedure.

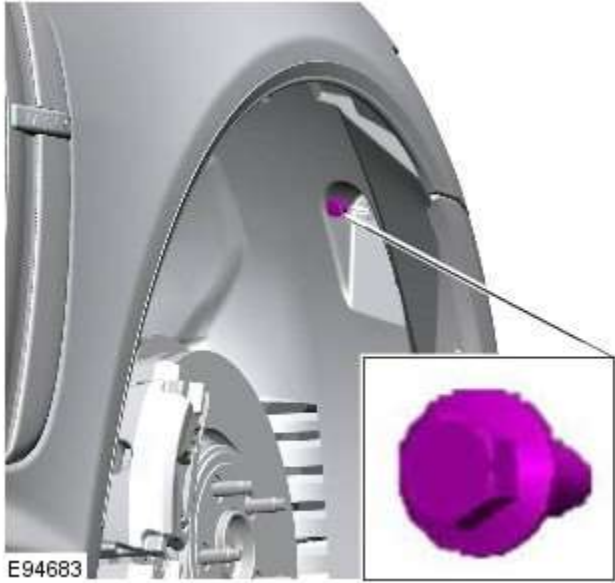
Exterior Lighting - Headlamp Assembly

Removal and Installation

Removal



NOTE: RH illustration shown, LH is similar.



1.



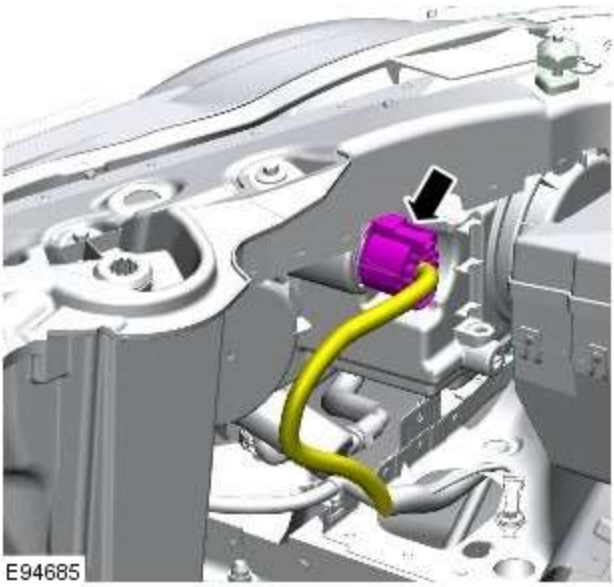
NOTE: Turn the steering wheel to full LH lock.



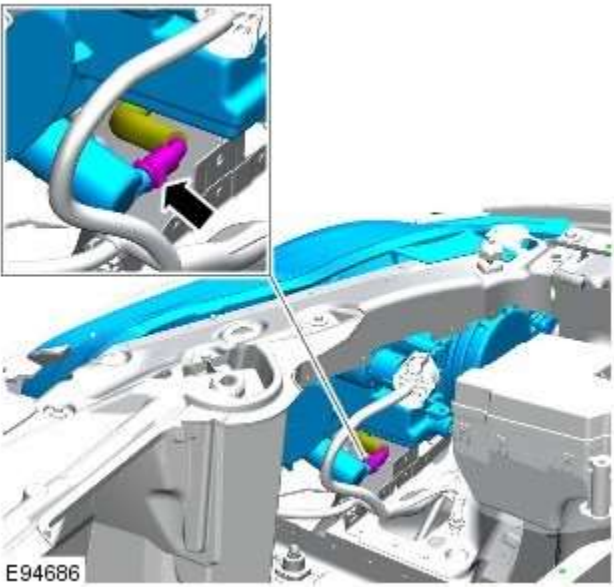
2.

E94684

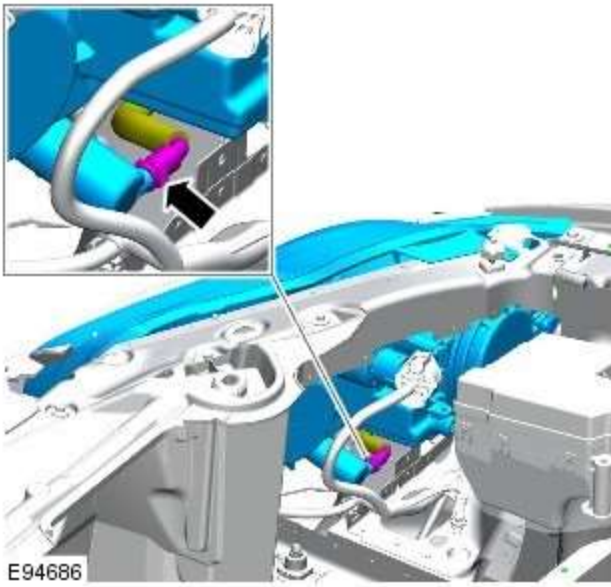
3.



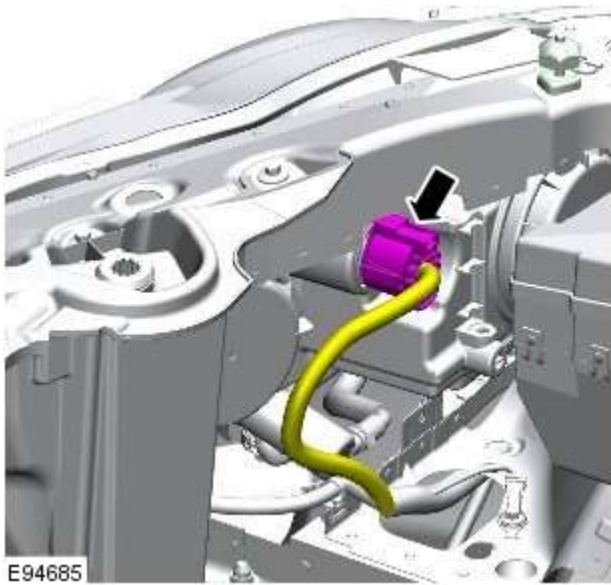
4.



Installation

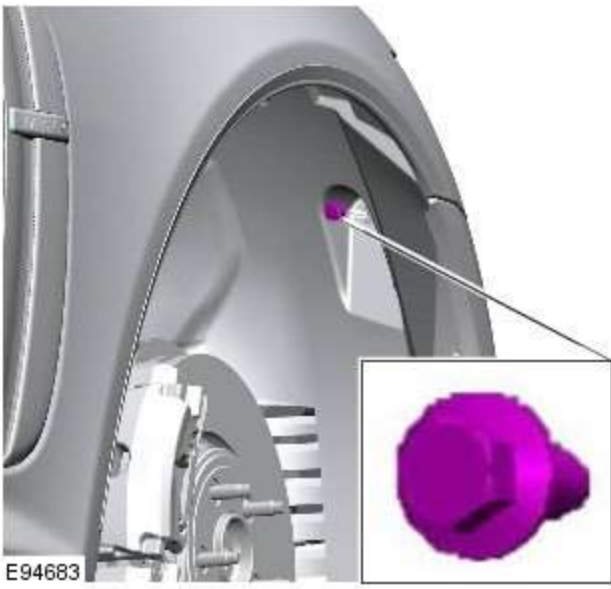


1.



2.

3. *Torque:* 5 Nm




4. *Torque:* 5 Nm



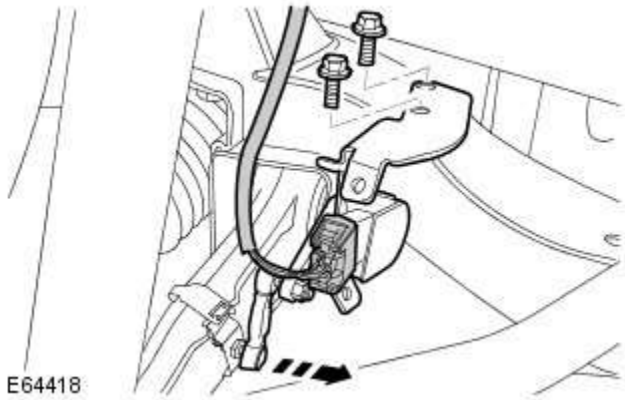
Exterior Lighting - Headlamp Leveling Front Sensor

Removal and Installation

Removal

1.  **WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

Raise and support the vehicle.




2. Remove the headlamp leveling sensor.
 - Disconnect the height sensor link.
 - Disconnect the electrical connector.
 - Remove the 2 bolts.

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

Remove the height sensor link.




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

Remove the bracket.

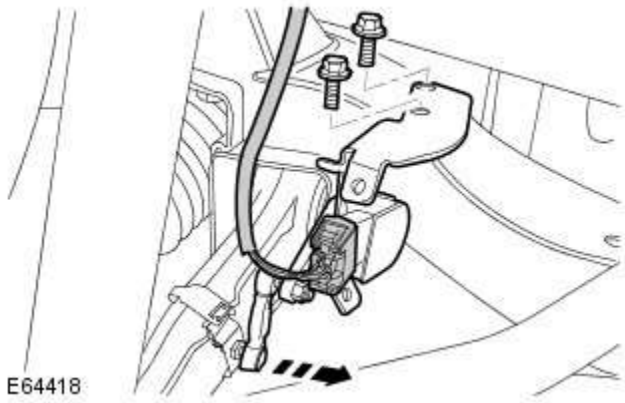
- Remove the 2 Allen bolts.

Installation



1.  NOTE: Align to the position noted on removal.
Install the bracket.
 - Tighten to 5 Nm.

2. Install the height sensor link.




3. Install the headlamp leveling sensor.
 - Tighten to 25 Nm.
 - Connect the electrical connector.
 - Connect the height sensor link.

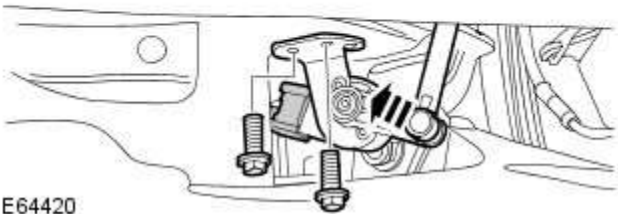
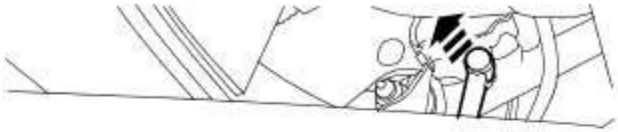
Exterior Lighting - Headlamp Leveling Rear Sensor

Removal and Installation

Removal

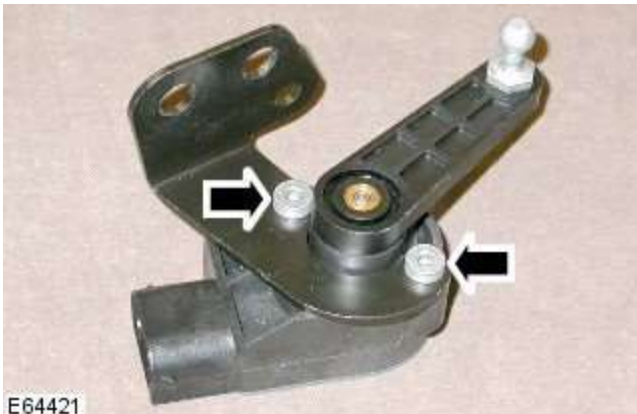
1.  **WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

Raise and support the vehicle.



E64420

2. Remove the headlamp leveling sensor.
 - Disconnect the height sensor link.
 - Release and disconnect the electrical connector.
 - Remove the 2 bolts.



E64421

3. **NOTES:**



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

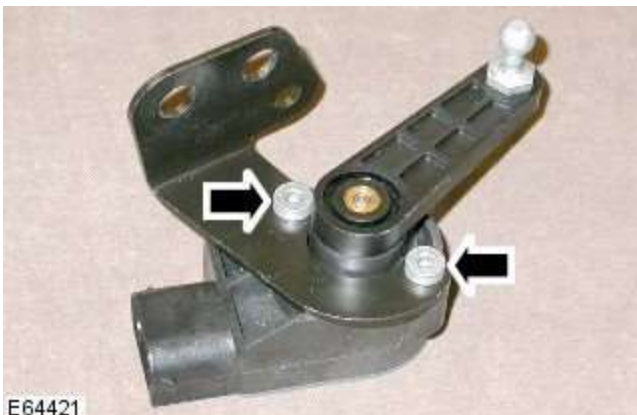


Note the fitted position.

Remove the bracket.

- Remove the 2 Allen bolts.

Installation



E64421

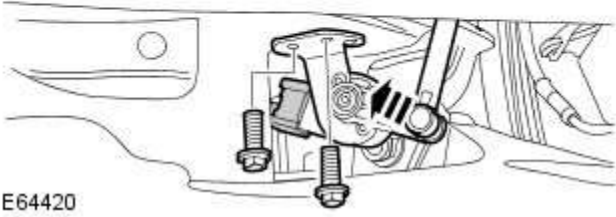
1.  **NOTE:** Align to the position noted on removal.

Install the bracket.

- Tighten to 5 Nm.



2. Install the headlamp leveling sensor.
 - Tighten to 25 Nm
 - Connect the electrical connector.
 - Install the height sensor link.



E64420

Exterior Lighting - High Mounted Stoplamp

Removal and Installation

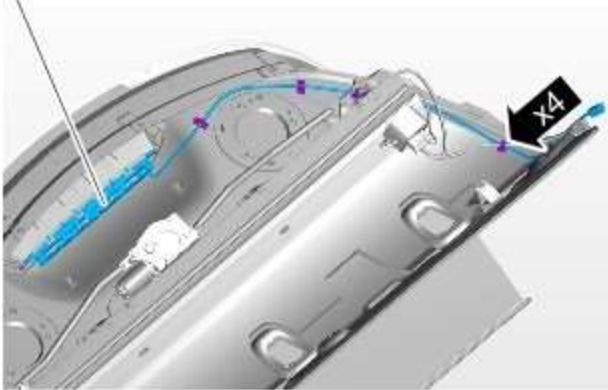
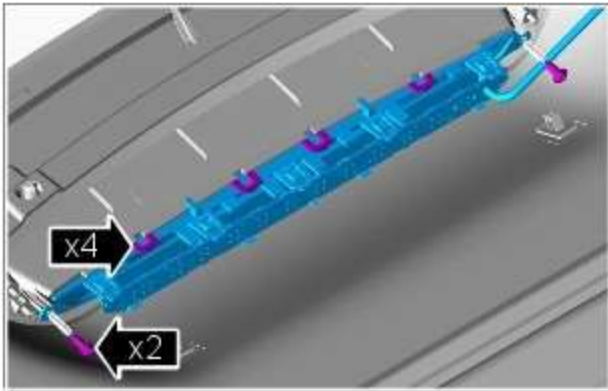
Removal



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

1. Refer to: [Parcel Shelf](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

2.



E99046

Installation

1. To install, reverse the removal procedure.

Exterior Lighting - Rear Fog Lamp

Removal and Installation

General Equipment

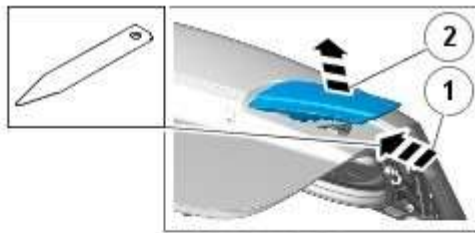
Spatula

Removal



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

1. Refer to: [Luggage Compartment Lid Moulding](#) (501-08 Exterior Trim and Ornamentation, Removal and Installation).



2. CAUTIONS:

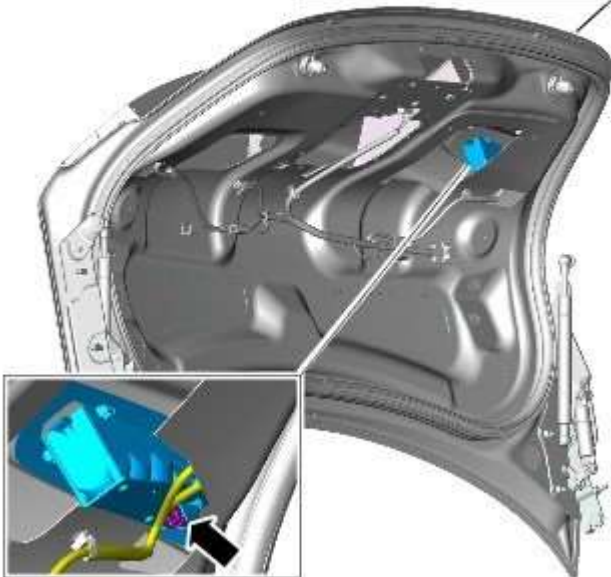


Protect the surrounding paintwork to avoid damage.



Take extra care not to damage the edges of the component.

General Equipment: [Spatula](#)



E93231

Installation

1. To install, reverse the removal procedure.

Exterior Lighting - Rear Lamp Assembly

Removal and Installation

Removal

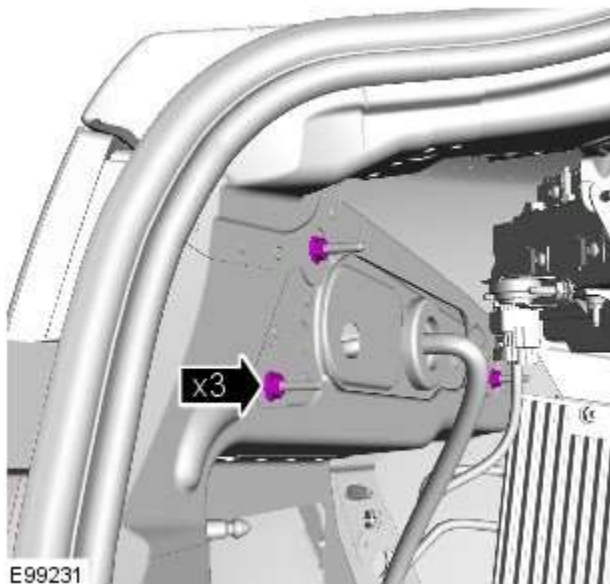



NOTE: Removal steps in this procedure may contain installation details.

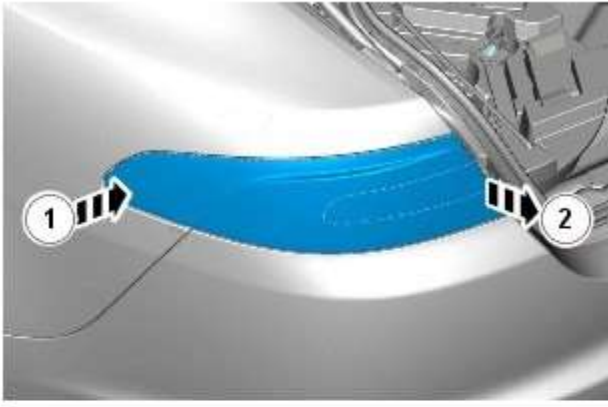
1. Refer to: [Loadspace Scuff Plate Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).



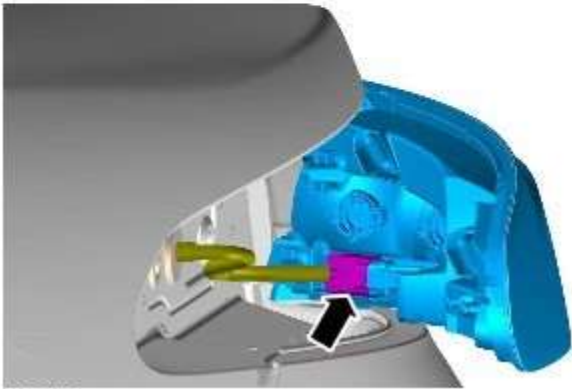
2.  NOTE: LH illustration shown, RH is similar.



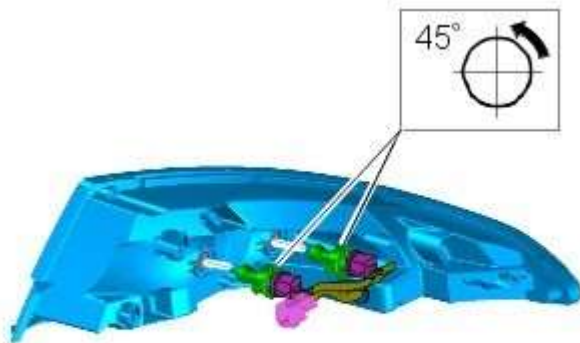
3.  NOTE: LH illustration shown, RH is similar.
 - Torque: 3 Nm




4.  CAUTION: Take extra care not to damage the edges of the component.



E93318



E93319

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

Installation

1. To install, reverse the removal procedure.

Exterior Lighting - Side Turn Signal Lamp

Removal and Installation

Removal

NOTES:



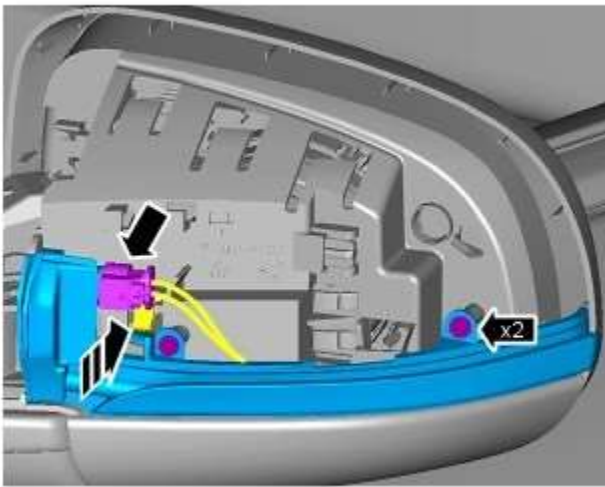
Removal steps in this procedure may contain installation details.



Some variation in the illustrations may occur, but the essential information is always correct.

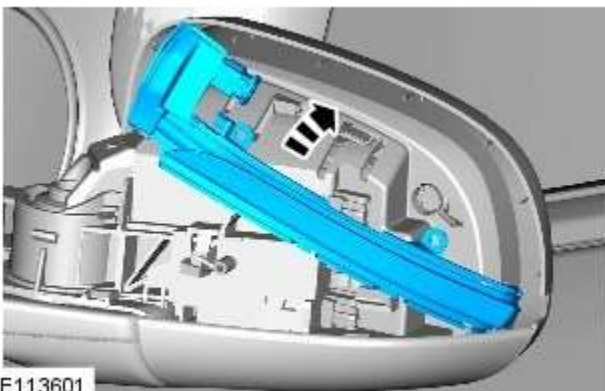
1. Refer to: [Exterior Mirror Cover](#) (501-09 Rear View Mirrors, Removal and Installation).

2.



E113600

3.



E113601

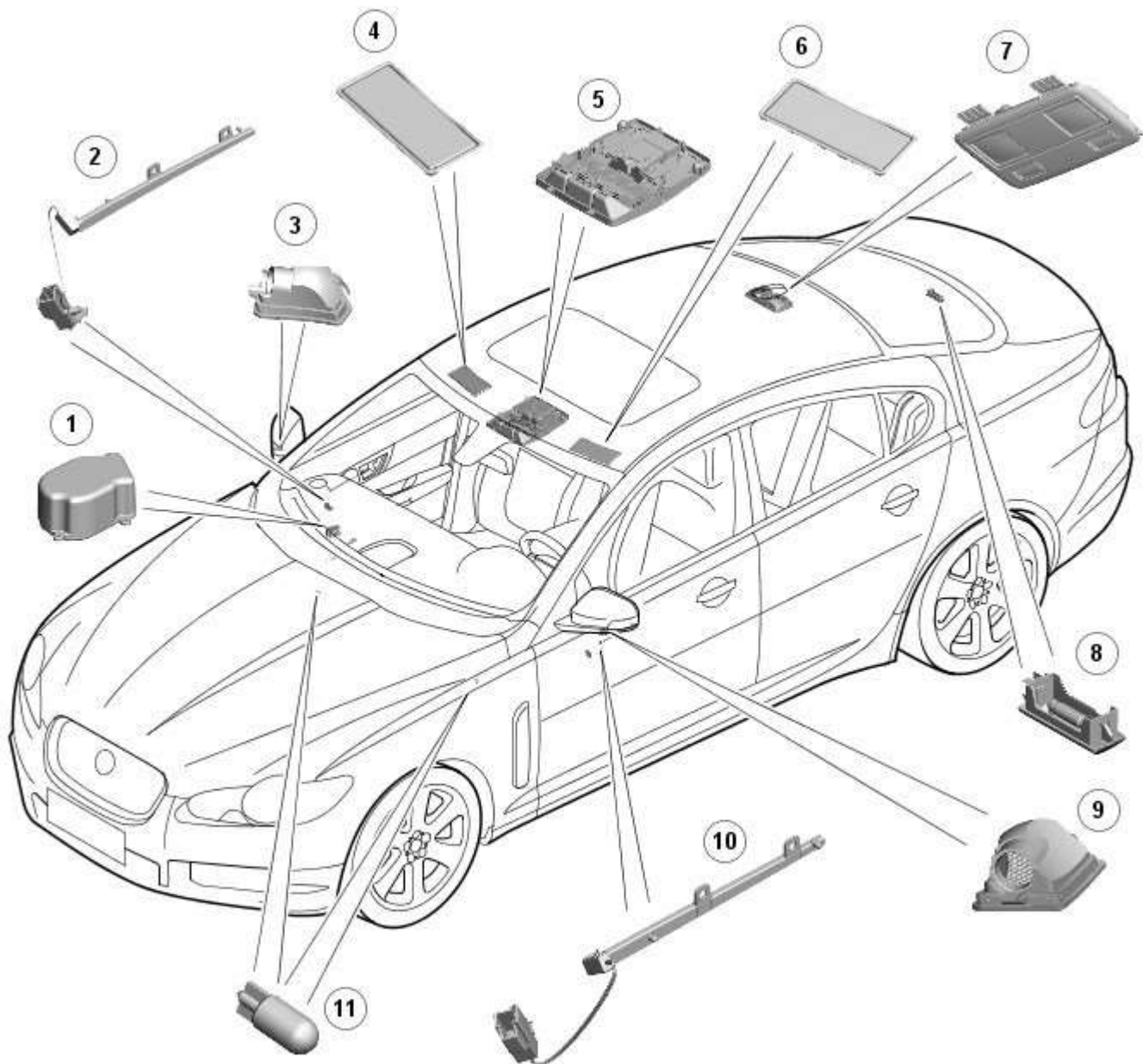
Installation

1. To install, reverse the removal procedure.

Interior Lighting - Interior Lighting - Component Location

Description and Operation

INTERIOR LIGHTING COMPONENT LOCATION



E93973

Item	Description
1	Glovebox lamp
2	Door casing LED (light emitting diode) illumination
3	Approach lamp
4	Vanity mirror illumination
5	Overhead console
6	Vanity mirror illumination
7	Rear overhead console
8	Luggage compartment lamp
9	Approach lamp
10	Door casing LED illumination
11	Footwell lamps

Interior Lighting - Interior Lighting - Overview

Description and Operation

OVERVIEW

Interior lighting is provided to enable the safe entry and departure from the vehicle for the driver and passengers in low ambient light conditions, without any manual switching of the lights.



NOTE: The term interior lamps also includes the door mirror approach lamps.

The interior lamps are controlled by the [CJB \(central junction box\)](#) and the [RJB \(rear junction box\)](#) and have 2 modes of operation: manual and automatic. The front interior lamps in the front overhead console are operated using the 'JaguarSense' system. The system uses capacitive proximity sensor technology for the switch operation which is integral with the overhead console. The rear overhead console interior lamps have conventional switches.

In the manual mode the interior lamps can be switched on and off with the JaguarSense system. Positioning your hand adjacent to each lamp in the front overhead console will switch interior lamps on or off and completely disable the interior lamp system. In the automatic mode the interior lamp functionality is controlled by the [CJB](#) and the [RJB](#) and reacts to the vehicle being locked or unlocked and opening the vehicle doors.

In manual mode the interior lamps can be operated by placing your finger(s) close to, or touch, the surface of the appropriate lamp. The courtesy light and map reading lamps can be operated manually by the 'JaguarSense' system. When in automatic mode, the courtesy lamp functionality is also controlled by the [CJB](#) and the [RJB](#) and reacts to the vehicle being locked or unlocked and opening the vehicle doors. To deactivate or activate automatic illumination, touch the front courtesy lamp for approximately 2 seconds

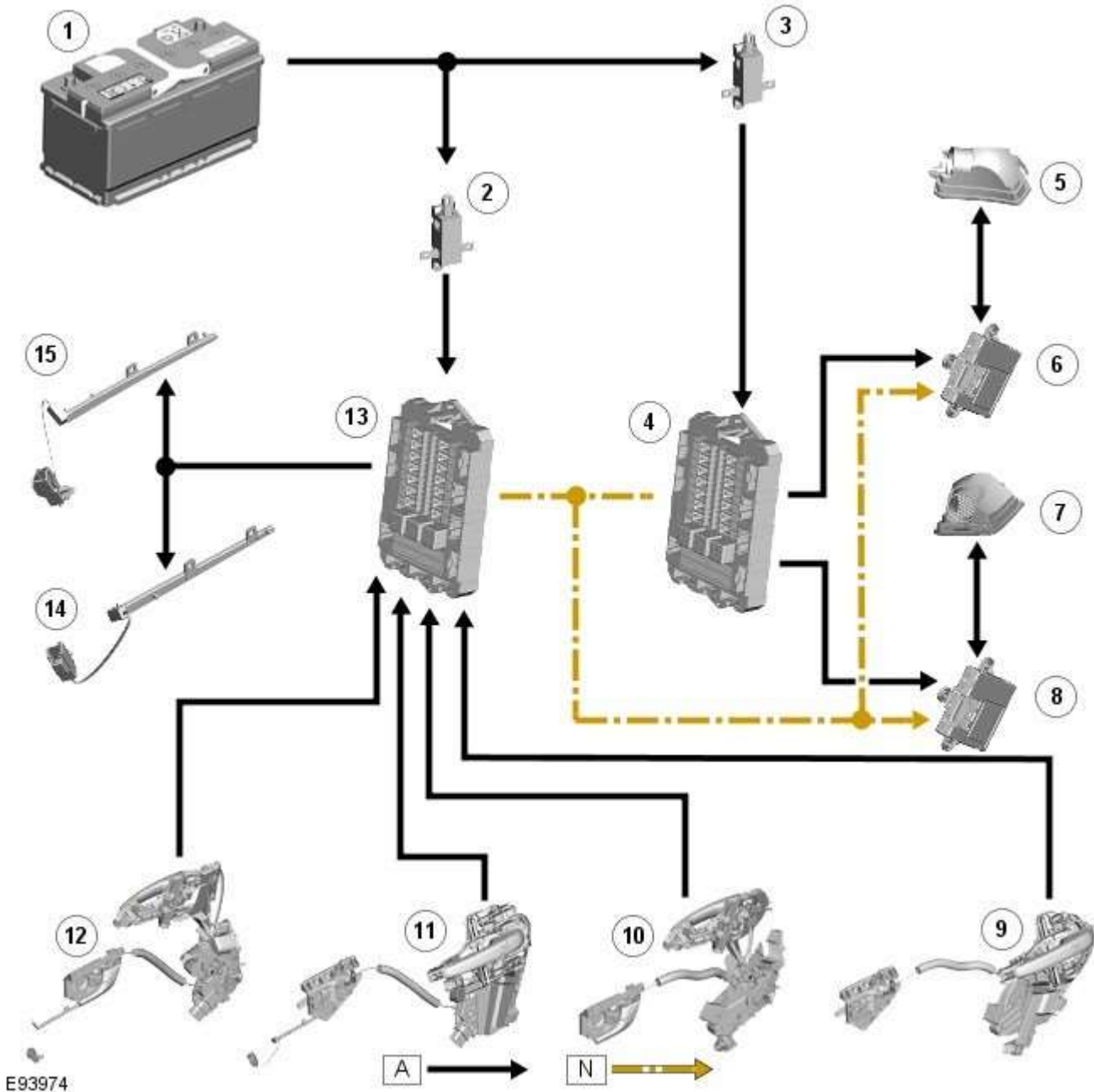
The driver's and passenger door approach lamps are controlled by the driver's door module and the passenger door module respectively and operate with the automatic mode. The door modules receive a power supply from the [RJB](#) and receive information to illuminate the approach lamps on the medium speed [CAN \(controller area network\)](#) bus from the [RJB](#) and the [CJB](#).

Interior Lighting - Interior Lighting - System Operation and Component Description

Description and Operation

Control Diagram

CONTROL DIAGRAM (SHEET 1 OF 2)

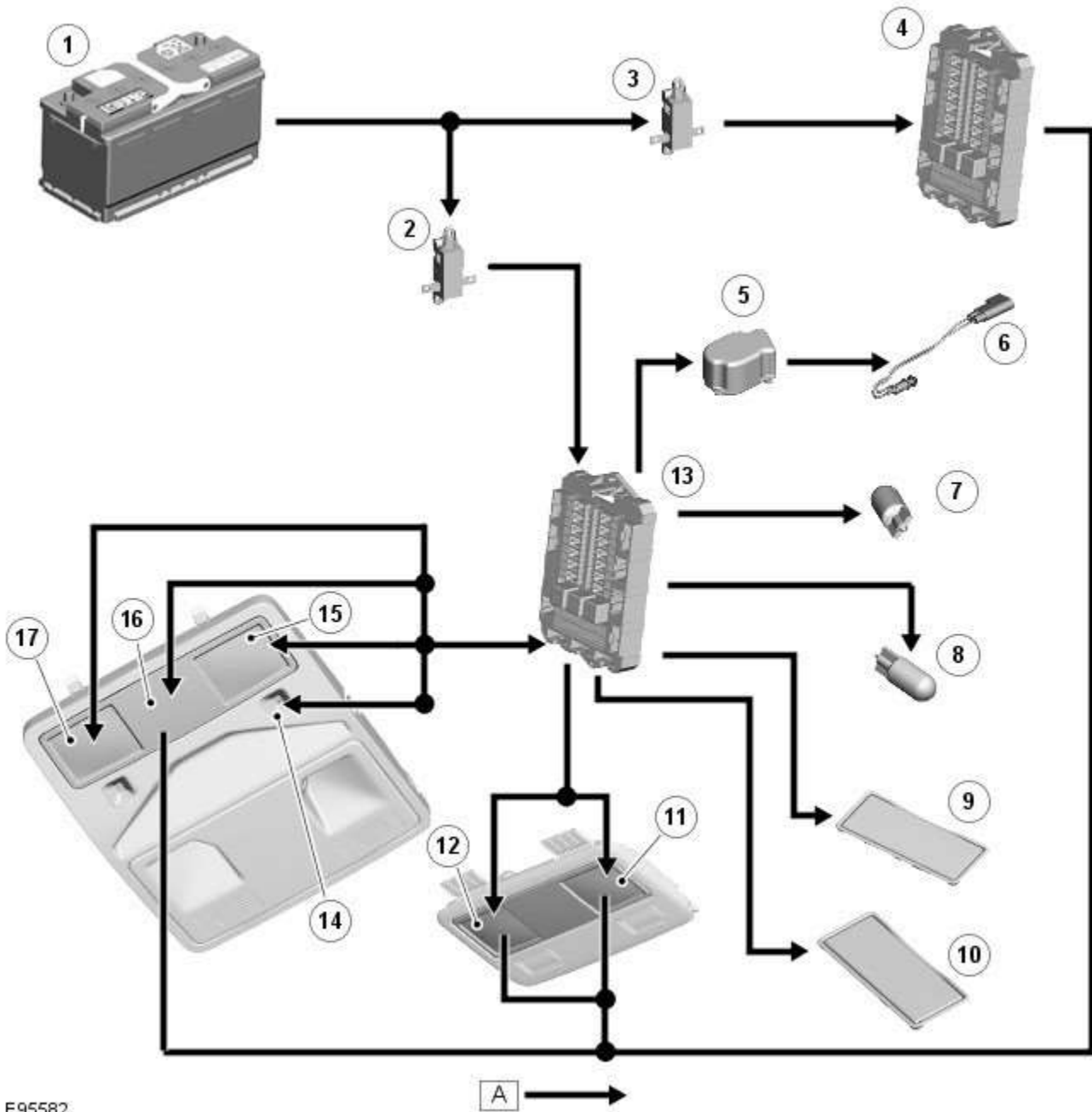


E93974

Item	Description
A = Hardwired; N = Medium speed CAN Bus	
1	Battery
2	BJB (battery junction box) - Megafuse
3	BJB - Megafuse
4	RJB (rear junction box)
5	Driver's door mirror approach lamp
6	Driver's door module

7	Passenger door mirror approach lamp
8	Passenger door module
9	LH (left-hand) rear door latch
10	RH (right-hand) rear door latch
11	LH front door latch
12	RH front door latch
13	CJB (central junction box)
14	LH front door handle LED (light emitting diode) illumination
15	RH front door handle LED illumination

CONTROL DIAGRAM (SHEET 2 OF 2)



E95582

Item	Description
	A = Hardwired
1	Battery
2	BJB - Megafuse

3	BJB - Megafuse
4	RJB
5	Glovebox lamp
6	Glovebox lamp switch
7	LH footwell lamp
8	RH footwell lamp
9	LH vanity mirror
10	RH vanity mirror
11	LH rear interior lamp
12	RH rear interior lamp
13	CJB
14	Ambience lighting LED 's
15	LH map reading lamp
16	Courtesy lamp
17	RH map reading lamp

System Operation

JUNCTION BOXES

Inputs

The [CJB](#) receives the following inputs which affect the operation of the interior lamps:

- Ignition mode
- Lock/unlock
- Luggage compartment lid latch switch
- Door latch switches.

Outputs

The [RJB](#) outputs the following for the interior lighting system:

- Luggage compartment lamp power supply
- Driver and passenger door module power supplies
- Fade on and off grounds for front and rear overhead console interior lamps and footwell lamps
- [PWM \(pulse width modulation\)](#) power output for the ambience lighting.

Interior Lamp Time-Out

The interior lamps are controlled by a timer within the [CJB](#) which allows a 60 second delay period for the lamps to remain active after the ignition mode has been changed to off power mode 0 or the vehicle has been unlocked. The interior lamp fade off is controlled by the [RJB](#) via a delayed power off relay in the [CJB](#). The following interior lamps are subject to the delay period:

- Front overhead console interior lamp
- Rear interior lamps
- Footwell lamps
- Door mirror approach lamps.

The timer delay is activated when the [CJB](#) receives one of the following signals:

- An unlock signal from the Smart Key via the keyless vehicle module.
- Ignition mode is changed from the crank power mode 9 or ignition power mode 6 to the accessory power mode 4 to the off power mode 0.

If a second occurrence of the above actions occurs within the timer period, the timer will be reset and the delay period timer will restart.

The timer delay is deactivated when the [CJB](#) receives one of the following signals:

- A lock signal from the Smart Key via the keyless vehicle module
- Ignition mode is changed from the off power mode 0 to the accessory power mode 4 or ignition power mode 6
- The [CJB](#) receives a door opened signal (even if that door is subsequently closed).

Battery Saver

The battery saver provides an automatic shut-off of the interior lamps after a period of 15 minutes in order to prevent excessive power drain on the battery.

When the ignition mode is changed from the ignition power mode 6 or accessory power mode 4 to the off power mode 0, the [CJB](#) starts a timer which de-energizes a delayed power off relay in the [CJB](#), removing the power supply to the interior lamps after a period of 15 minutes, switching off all or any interior lamps which have remained on for any reason.

Once the timer has expired and the lamps are off, any one of the following will 'wake up' the battery saver and the interior lamps will function again. The timer will be restarted as soon as an input is received by the [CJB](#) from one of the following:

- Ignition mode changed from off power mode 0 to accessory power mode 4, ignition power mode 6 or crank power mode 9.
- Any door, including the luggage compartment lid is opened
- An unlock request is received from the Smart Key via the keyless vehicle module
- Overhead console interior lamp is switched on via the JaguarSense function.

INTERIOR LAMPS

When the interior lighting system switches the interior lamps on, the [CJB](#) ramps the lamps up to full power over a period of 1.3 seconds. When the system switches the lamps off, after the time-out period has expired, the [CJB](#) fades the lamps off over a period of 2.6 seconds.

The interior lighting system will illuminate the interior lamps when one of the following events occurs:

- The [CJB](#) receives an unlock signal from the Smart Key via the keyless vehicle module
- Any door is opened including the luggage compartment lid
- The ignition mode is changed from ignition power mode 6 or accessory power mode 4 to off power mode 0.

The interior lighting system will turn off the interior lamps when one of the following events occurs:

- Once the time-out timer delay has expired since the lamps were either activated or the last door is closed and the vehicle is not locked
- The ignition is in off power mode 0 and an external lock is requested (using either the door lock buttons or the Smart Key) with all doors closed
- The ignition mode is changed from the off power mode 0 or the accessory power mode 4 to the ignition power mode 6
- The last door is closed and the vehicle is externally locked, on receipt of an unlock request from the Smart Key or door handle operation detected when the time-out timer is still active.

DELIVERY MODE

Delivery mode is set at the factory on vehicles to minimize battery drain. The mode enables the switching off of non-critical electrical components, including the interior lighting system. The delivery mode feature is cancelled by the dealer during the Pre-Delivery Inspection using an approved Jaguar diagnostic system.

CRASH ILLUMINATION

When a crash signal is received from the [RCM \(restraints control module\)](#), the [CJB](#) activates the interior lamps once the vehicle speed has reduced to 5 km/h (3.1 mph). The hazard flashers are also activated and the doors are prevented from being locked. The lamps remain on until the crash signal is removed, they cannot be switched off using the JaguarSense feature. The crash signal is removed by completing one ignition on and off cycle.

Component Description

INTERIOR BULB TYPE/RATING

The following table shows the bulbs used for the interior lighting system and their type and specification.



NOTE: The front overhead console and the front door ambience lighting is illuminated by [LED's](#) and are non-serviceable components.

Bulb	Type	Rating
Front overhead console - interior lamp	W6WX	6W
Front overhead console - LH/RH map reading lamps	W6WX	6W
Rear interior lamps	W6WX	10W
Sunvisor lamps	TS1.3W	1.3W
LH/RH footwell lamps	W5W	5W
Glovebox lamp	W5W	5W
LH/RH door mirror approach lamps	W5W	5W
Luggage compartment lamp	S10W	10W

JUNCTION BOXES

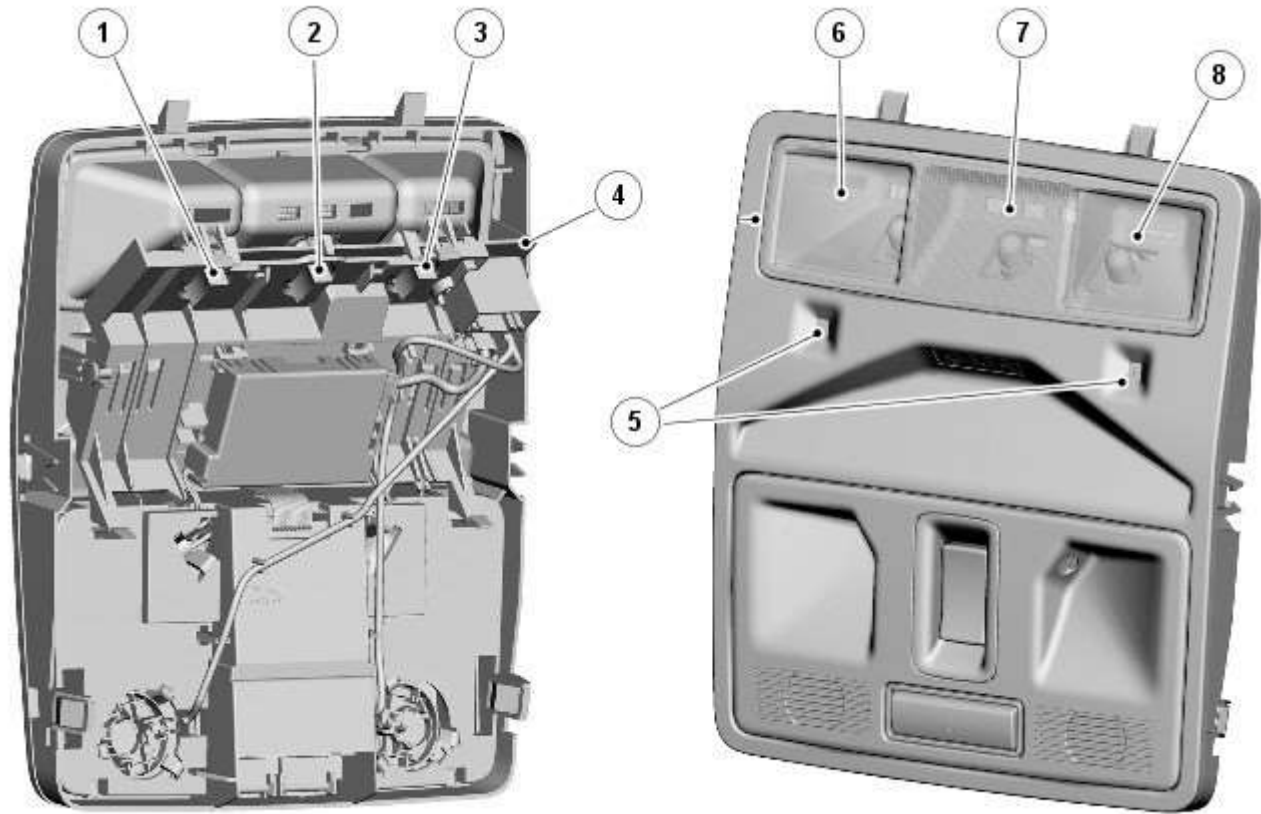
The [CJB](#) is an integrated unit located on the [RH](#) 'A' pillar, below the instrument panel. The [CJB](#) contains fuses, relays and number of microprocessors which control the power supply and functionality of the interior lighting system and other vehicle systems.

The [RJB](#) is located on the [RH](#) side of the luggage compartment. The [RJB](#) contains fuses, relays and microprocessors which in conjunction with the [CJB](#) control the interior lighting system and other vehicle systems.

Circuit Protection

The [CJB](#) and the [RJB](#) provide circuit protection for all interior lamp circuits. The lamps are protected by fuses in the [CJB](#) and the [RJB](#).

FRONT OVERHEAD CONSOLE



E98639

Item	Description
1	LH map reading lamp bulb
2	Interior lamp bulb
3	RH map reading lamp bulb
4	Printed Circuit Board (PCB) - JaguarSense
5	Ambience lighting LED's
6	RH map reading lamp
7	Interior lamp
8	LH map reading lamp

The overhead console is located near the windshield in the head lining. The console can be removed by carefully levering out the rear edge of the housing to release 2 spring clips, and then pulling the console rearwards to release 2 locating tabs. Removal of the console is required to replace any of the interior or map reading lamp bulbs.

The interior lamps and air bag off warning lamp in the front overhead console are common to all vehicles. The overhead console can also contain security system intrusion detection module and volumetric sensors, sunroof switch and a voice activation microphone depending on vehicle specification and market.

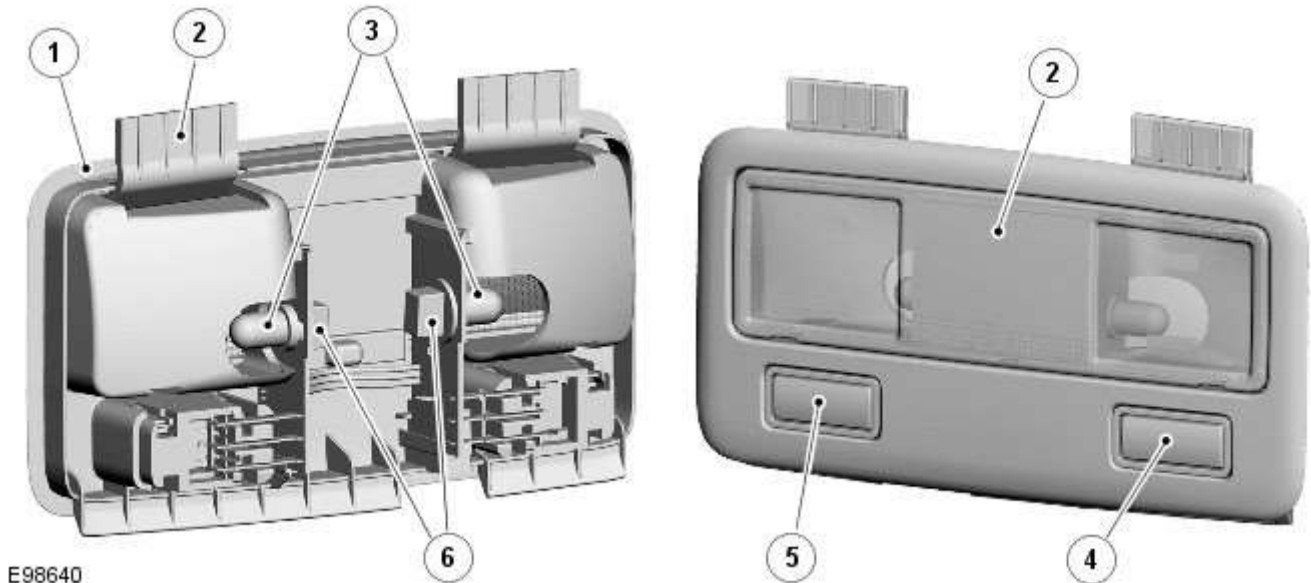
The interior lamp can operated manually using the JaguarSense feature to switch the lamp on and off. The lamp is also controlled as part of the automatic interior lighting system.

The map reading lamps only operate manually using the JaguarSense feature to activate the lamps.

The interior and map reading lamp bulbs are located in holders which locate in a PCB. The PCB also provides for the operation of the ambience lighting LED's, the air bag off warning lamp and the JaguarSense proximity sensors which are integral with the PCB.

The overhead console also contains 2 LED's for the ambience lighting system. The ambience lighting is part of the lighting control switch functionality and is subject to the setting of the instrument panel illumination dimmer control in the auxiliary lighting switch. The ambience lighting provides very limited illumination of the instrument panel and floor console when the vehicle is being driven without affecting the driver's visibility.

REAR OVERHEAD CONSOLE



E98640

Item	Description
1	Lamp body
2	Lamp lens
3	Interior lamp bulbs
4	LH lamp switch
5	RH lamp switch
6	Bulb holders

The rear overhead console is located in the head lining, at the rear of the vehicle. The console can be removed by carefully levering the lamp lens from the body. This releases 2 tabs which are integral with the lens allowing the body to be removed from the aperture in the head lining.

The lamp comprises the lamp body and lens and 2 separate lamps with 2 switches to operate each lamp individually.

The rear interior lamps can be operated manually using the 2 switches located on the lamp body. The lamp is also controlled as part of the automatic interior lighting system.

The bulbs are located in bulb holders which locate in a PCB connected to each switch. Removal of the rear overhead console is required to replace the bulbs.

GLOVEBOX LAMP

The glovebox lamp is located in the top of the glovebox housing in the instrument panel. The lamp is located in a cover on the outside, upper surface of the housing and projects the light into the top of the glovebox.

The lamp is operated by a switch located at the rear of the glovebox housing. The switch protrudes into the housing and is operated by the rear face of the glovebox lid tray when the glovebox is opened or closed.

The bulb is located in a holder which is fitted into the side of the glovebox lamp cover. Replacement of the bulb requires the removal of the glovebox housing.

The glovebox lamp is active at all times when the interior lamps are active and will illuminate only when the glovebox is opened.

FOOTWELL LAMPS

The footwell lamps are located under the instrument panel. Each lamp comprises a bulb and holder which is part of the instrument panel wiring harness. The bulb and holder is located in a hole in the front footwell air ducts. The footwell lamps are active at all times when the interior lamps are active.

LUGGAGE COMPARTMENT LAMP

The luggage compartment lamp is located in the luggage compartment trim, in a central position below the rear screen. The lamp comprises a molded lens and housing and two electrical contacts which locate the bulb.

The lamp is accessible by removing one end from the trim panel to gain access to the bulb. The lamp is active at all times when the interior lamps are active.

VANITY MIRROR LAMPS

Four vanity mirror lamps are fitted, two in each vanity mirror. The lamps are illuminated when the mirror cover is raised. The vanity mirror lamps operate at all times when the interior lamps are active.

The vanity mirrors use low voltage, 1.2W festoon type bulbs.

DOOR MIRROR APPROACH LAMPS

A door mirror approach lamp is located on the underside of each exterior door mirror.

The approach lamps are active at all times when the interior lamps are active.

Interior Lighting - Interior Lighting

Diagnosis and Testing

Principles of Operation

For a detailed description of the interior lighting system, refer to the relevant Description and Operation sections in the workshop manual. REFER to: (417-02 Interior Lighting)

[Interior Lighting](#) (Description and Operation),

[Interior Lighting](#) (Description and Operation),

[Interior 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 tested and/or the donor vehicle.

1. Verify the customer concern.
2. Visually inspect for obvious signs of damage and system integrity.

Visual Inspection

Mechanical	Electrical
<ul style="list-style-type: none"> • Bulbs 	<ul style="list-style-type: none"> • Fuses/relays (refer to electrical guide) • Wiring harness • Correct engagement of electrical connectors • Loose or corroded connections

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, check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

DTC Index



CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00

NOTES:



If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.



Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give extra information read by the manufacturer-approved diagnostic system).



When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places and with a current calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.



Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.



If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

DTC	Description	Possible Cause	Action
B116511	Left Front Puddle Lamp Output	<ul style="list-style-type: none"> • Left front puddle lamp control circuit - short to ground 	Refer to the electrical circuit diagrams and test left front puddle lamp control circuit for short to ground

DTC	Description	Possible Cause	Action
B116515	Left Front Puddle Lamp Output	<ul style="list-style-type: none"> Left front puddle lamp control circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test left front puddle lamp control circuit for short to power, open circuit
B116611	Right Front Puddle Lamp Output	<ul style="list-style-type: none"> Right front puddle lamp control circuit - short to ground 	Refer to the electrical circuit diagrams and test right front puddle lamp control circuit for short to ground
B116615	Right Front Puddle Lamp Output	<ul style="list-style-type: none"> Right front puddle lamp control circuit - short to power, open circuit 	Carry out any pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test right front puddle lamp control circuit for short to power, open circuit
B111E11	Boot/Trunk Lamps	<ul style="list-style-type: none"> Luggage compartment lamp control circuit - short to ground 	Carry out any pinpoint test associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check luggage compartment lamp control circuit for short to ground
B111E15	Boot/Trunk Lamps	<ul style="list-style-type: none"> Luggage compartment lamp control circuit - short to power, open circuit 	Carry out any pinpoint test associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and check luggage compartment lamp control circuit for short to power, open circuit
B112412	Lamp Fade Control	<ul style="list-style-type: none"> Interior lamp fade control circuit - short to power 	Refer to the electrical circuit diagrams and check interior lamp fade control circuit for short to power
B113C12	Hazard Switch Illumination	<ul style="list-style-type: none"> Hazard switch illumination control circuit - short to power 	Refer to the electrical circuit diagrams and check hazard switch illumination control circuit for short to power
B1A8596	Ambient Light Sensor	<ul style="list-style-type: none"> Light sensor internal electronic failure 	Check and install a new sensor as required
U201012	Switch Illumination	<ul style="list-style-type: none"> Switch/interior illumination PWM supply circuit - short to power 	Refer to the electrical circuit diagrams and check switch/interior illumination PWM supply circuit for short to power
U201014	Switch Illumination	<ul style="list-style-type: none"> Switch/interior illumination PWM supply circuit - short to ground, open circuit 	Refer to the electrical circuit diagrams and check switch/interior illumination PWM supply circuit for short to ground, open circuit

Daytime Running Lamps (DRL) - Daytime Running Lamps (DRL) - Overview

Description and Operation

OVERVIEW

[DRL \(daytime running lamps\)](#) use the full intensity low beam headlamps which are permanently illuminated when the vehicle is being driven.

Two [DRL](#) systems are available depending on market requirements.

Daytime Running Lamps (DRL) - Daytime Running Lamps (DRL) - System Operation and Component Description

Description and Operation

System Operation

CENTRAL JUNCTION BOX (CJB)

The [CJB](#) (central junction box) controls the operation of the [DRL](#) (daytime running lamps). The [DRL](#) are activated once the [CJB](#) detects an ignition on power mode 6 signal.

The [CJB](#) also monitors the lighting control switch and the auto lamps feature and overrides the [DRL](#) if required.

Component Description

DAYTIME RUNNING LAMPS - CANADA

The [DRL](#) for this market use full intensity low beam headlamps. The side marker lamps, tail lamps and license plate lamps will be on, but instrument cluster illumination will be off. [DRL](#) are active when the following parameters are met:

- PARK is not selected on the electronic transmission selector
- Electronic Parking Brake (EPB) is off
- Power mode 6 (ignition on) detected by the [CJB](#)
- The [CJB](#) receives an engine running signal
- The lighting control switch is in the off or side lamps position.

NOTES:



If the lighting control switch is moved to the headlamp position, [DRL](#) are deactivated and normal side lamp and headlamp functionality is operational.



When [DRL](#) are active, the headlamp flash function using the left hand steering column multifunction switch will operate normally.

The high beam headlamp function using the left hand steering column stalk switch will be deactivated. When the transmission is in PARK, [DRL](#) are turned off. This is to reduce battery discharge during long periods of engine idling in cold climate conditions. When the electronic transmission selector is moved from the PARK position, normal [DRL](#) functionality is restored.

DAYTIME RUNNING LAMPS - DENMARK, HOLLAND, NORWAY, SWEDEN, FINLAND AND POLAND



NOTE: [DRL](#) for Poland is on vehicles from 2008MY.

[DRL](#) for these markets use full intensity low beam headlamps. Side lamps and license plate lamps will be on, but instrument cluster illumination will be off. [DRL](#) are active when the following parameters are met:

- Power mode 6 (ignition on) detected by the [CJB](#)
- The [CJB](#) receives an engine running signal
- The lighting control switch is in the off position.



NOTE: When [DRL](#) are active, the headlamp flash function using the left hand steering column multifunction switch will operate normally. The high beam headlamp function using the left hand steering column stalk switch will be deactivated.

If the lighting control switch is moved to the side lamp or headlamp positions, [DRL](#) are deactivated and normal side lamp and headlamp functionality is operational.

AUTOMATIC HEADLAMPS

On vehicles fitted with the automatic headlamps feature, [DRL](#) are overridden if the lighting control switch is in the 'Auto' position and the [CJB](#) receives a signal from the rain/light sensor to activate the exterior lights.

When the [CJB](#) receives a signal to de-activate the automatic headlamps feature the [DRL](#) function is restored providing the parameters for [DRL](#) activation are met.