
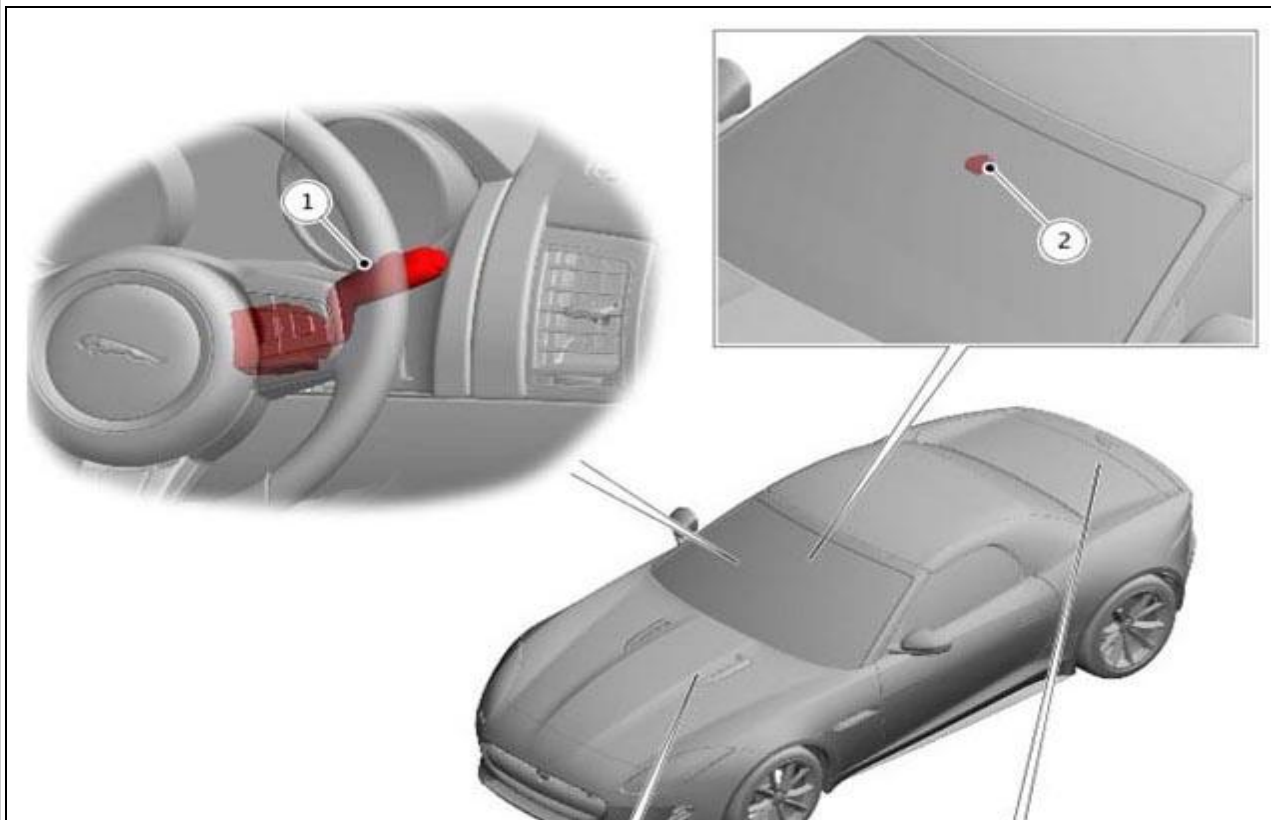
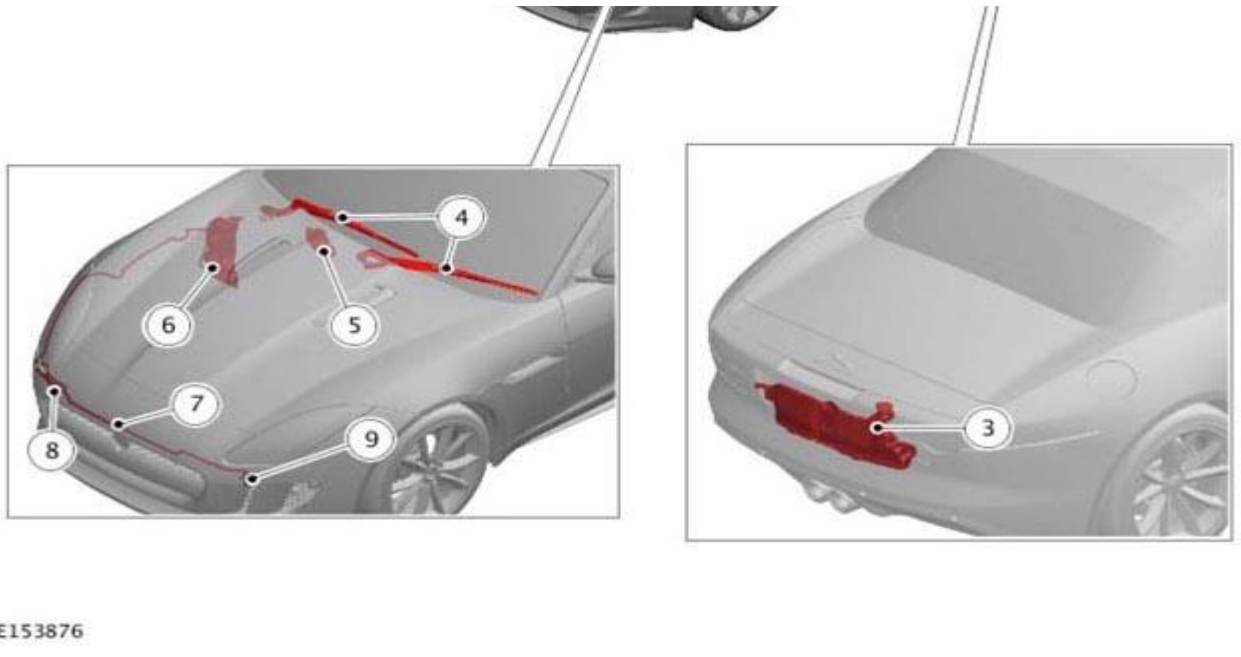


DESCRIPTION AND OPERATION

COMPONENT LOCATION

 **NOTE:** RHD (Right Hand Drive) vehicle shown, LHD (Left Hand Drive) vehicle is similar.





ITEM	DESCRIPTION
1	Wipers and washers control switch
2	Rain/light sensor
3	Windshield washer reservoir - rear
4	Windshield wiper arm and windshield washer jets
5	Windshield wiper motor
6	Windshield washer reservoir - front
7	Washer fluid hose
8	Right headlamp washer jet
9	Left headlamp washer jet

OVERVIEW

Windshield wiper and washer operation is controlled by the CJB (Central Junction Box) in response to driver input and signals from the rain/light sensor. The windshield wipers will park automatically irrespective of their position, when the ignition or the wipers and washers control switch is selected off. Wiper functions are suspended during engine cranking to reduce battery power consumption under high load conditions. A timed washer jet function eliminates the trail of washer fluid left on the windshield after a wiping action and reduces fluid consumption by only operating the washer jets on the up stroke of the wiper arms. This function can be configured using Jaguar approved diagnostic equipment.

The windshield wiper have 4 operational states:

- Flick wipe
- Auto mode
- Normal (slow) speed continuous
- Fast speed continuous.

The auto, normal and fast speeds are affected by road speed. The auto mode delay periods change with the road speed, with the delay decreasing as the road speed increases. The normal continuous operation changes to auto operation when the vehicle is stationary.

The wiper and washer system comprises:

- A windshield wiper motor
- A windshield wiper linkage
- Two windshield wiper arms and blades
- Two windshield washer jets
- Two headlamp washer jets
- The front windshield washer fluid reservoir
- The windshield washer pump, a headlamp washer pump and the washer fluid level sensor
- The rear windshield washer fluid reservoir with a transfer pump and a fluid level sensor
- The wipers and washers control switch
- The rain/light sensor

The 'Auto' function requires an input from the rain/light sensor. The rain/light sensor is mounted on the inner surface of the windshield and transmits an infra-red signal to determine the amount of water on the outer surface of the windshield. A value is then transmitted to the CJB over the LIN (Local Interconnect Network) bus.

DESCRIPTION

CENTRAL JUNCTION BOX (CJB)

The CJB is an integrated unit mounted at the base of the left 'A' pillar. The CJB contains fuses, relays and a number of microprocessors, which control the power supply and functionality of the washer and wiper system and other vehicle systems.

The CJB receives and sends the following wiper and washer system inputs and outputs:

Inputs

- Flick wiper switch
- Auto mode switch
- Rain/light sensor
- Normal (slow) speed continuous switch
- Fast speed continuous switch
- Wipers and washers control switch
- Stop/start switch
- Lighting switch
- Front washer fluid level sensor
- Rear washer fluid level sensor
- Vehicle speed information from the Anti-lock Brake System (ABS) control module via the HS (High Speed) CAN (Controller Area Network) powertrain systems bus
- Windshield wiper motor park switch
- Ambient air temperature information from the ECM (Engine Control Module) via the HS CAN powertrain systems bus.

Outputs

- Windshield wiper motor (normal)
- Windshield wiper motor (fast)
- Windshield washer pump
- Washer fluid transfer pump
- Headlamp power wash pump.

COMPONENT DESCRIPTION

WIPER ASSEMBLY

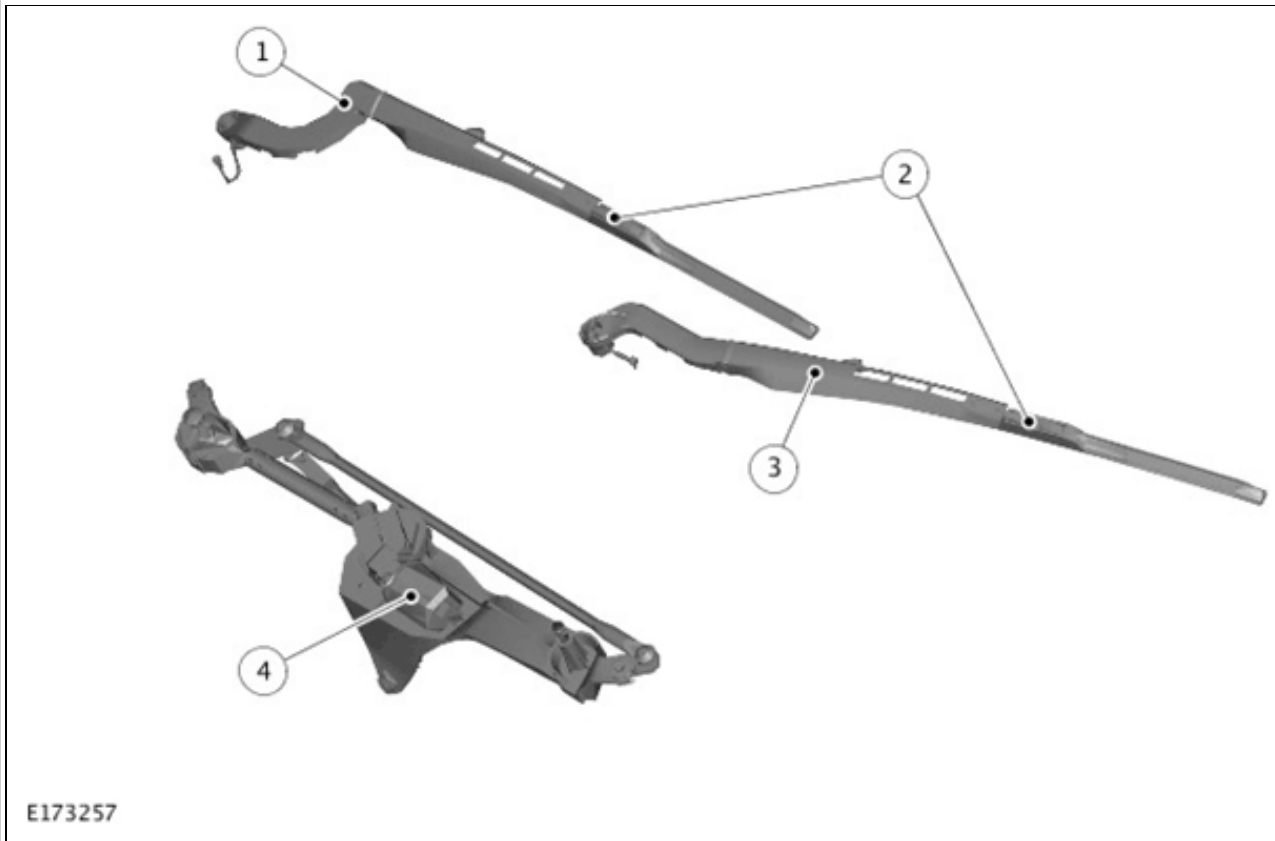
The wiper assembly comprises:

- Windshield wiper motor and linkage
- Wiper arms and blades (windshield washer jets located on wiper arms)

WINDSHIELD WIPER LINKAGE



NOTE: RHD (Right Hand Drive) variant shown, LHD (Left Hand Drive) variant is similar.



ITEM	DESCRIPTION
1	Driver side windshield wiper arm and windshield wiper blade
2	Windshield washer jets
3	Passenger side windshield wiper arm and windshield wiper blade
4	Windshield wiper motor and linkage

The windshield wiper motor and the windshield wiper linkage are available as separate components. The windshield wiper linkage and motor differs between LHD and RHD models. The assembly is located below the leafscreen in the engine compartment and is secured with bushes, sleeves and bolts. The rubber bushes isolate the assembly from the body mountings.

The windshield wiper linkage comprises a main tube, with a spindle housing at each end. A windshield wiper motor crank is positively attached to the windshield wiper motor output shaft. One link rod links the windshield wiper motor crank to the driver spindle crank. The other link rod links the driver spindle crank to the passenger spindle crank. Drive is supplied from the windshield wiper motor to the driver spindle crank and then to the passenger spindle crank.

The windshield wiper motor crank converts rotary motion from the motor output shaft into linear movement of the link rods. The cranks, connected between each link rod and spindle, convert the linear motion to reciprocating motion at the spindle. This reciprocating motion is passed to the windshield wiper arms and blades causing the blades to wipe an arc on the windshield.

WINDSHIELD WIPER MOTOR

The windshield wiper motor comprises a DC (Direct Current) motor, and attached to the wiper linkage with three screws. A 5 pin electrical connector (only 4 are used for this application) provides the connection to the vehicle harness. The connector provides two switched battery voltage feeds to the windshield wiper motor. The motor has three brushes with one brush connected to ground. One feed is direct to the windshield wiper motor brush opposite the ground brush and operates the windshield wiper motor at normal (slow) speed. The second feed is connected to a windshield wiper motor brush, which is offset from the ground brush and operates the windshield wiper motor at fast speed. With the power supplied through this brush, the current flows through fewer coil windings. This results in a lower resistance to the current flow to the ground brush and gives a higher windshield wiper motor rotational speed.

Output control of the windshield wiper motor is through a double contact relay, which is located in the EJB (Engine Junction Box).

The windshield wiper motor has an internal track switch, which signals the CJB when the windshield wipers have reached the park position. The park signal is closed circuit when the windshield wipers are in the park position. When the windshield wipers are switched off and the CJB receives the park position signal from the windshield wiper motor, the CJB shorts the windshield wiper motor via a relay bridge circuit. This short circuit has the effect of applying a brake to the windshield wiper motor, giving precise positioning of the windshield wiper blades in the park position.

WINDSHIELD WIPER ARMS

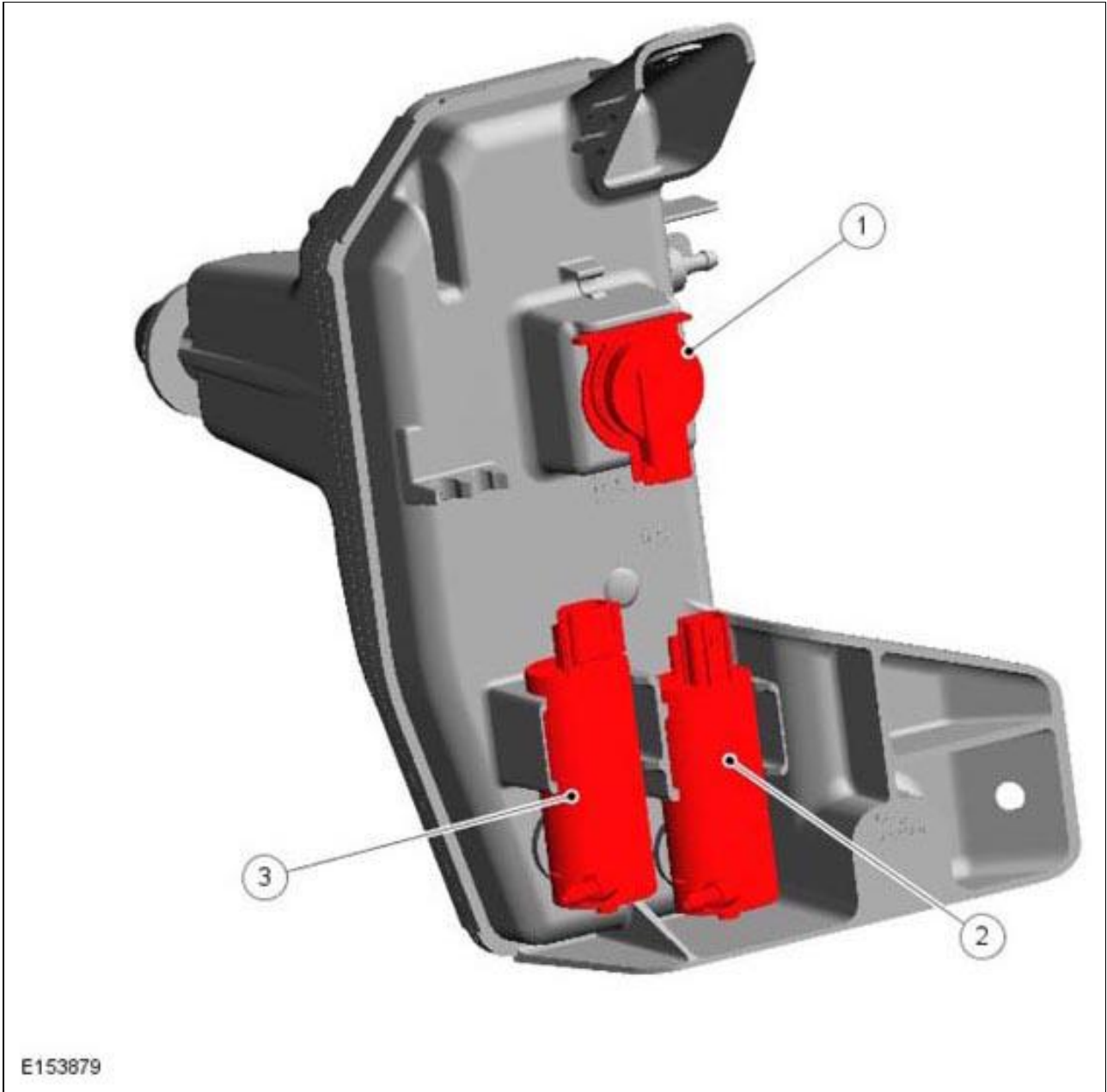
The windshield wiper arms are positively located on tapered splines on the windshield wiper linkage spindles. A coil spring within each wiper arm generates a downward pressure to maintain the wiper blade contact to the windshield. The windshield wiper blades are attached to the windshield wiper arms with clips that allow the windshield wiper blade to pivot. The windshield wiper blades comprise a sprung steel curved backbone which applies pressure

evenly to the windshield.

WINDSHIELD WASHER RESERVOIRS AND WASHER PUMPS

FRONT WINDSHIELD WASHER FLUID RESERVOIR





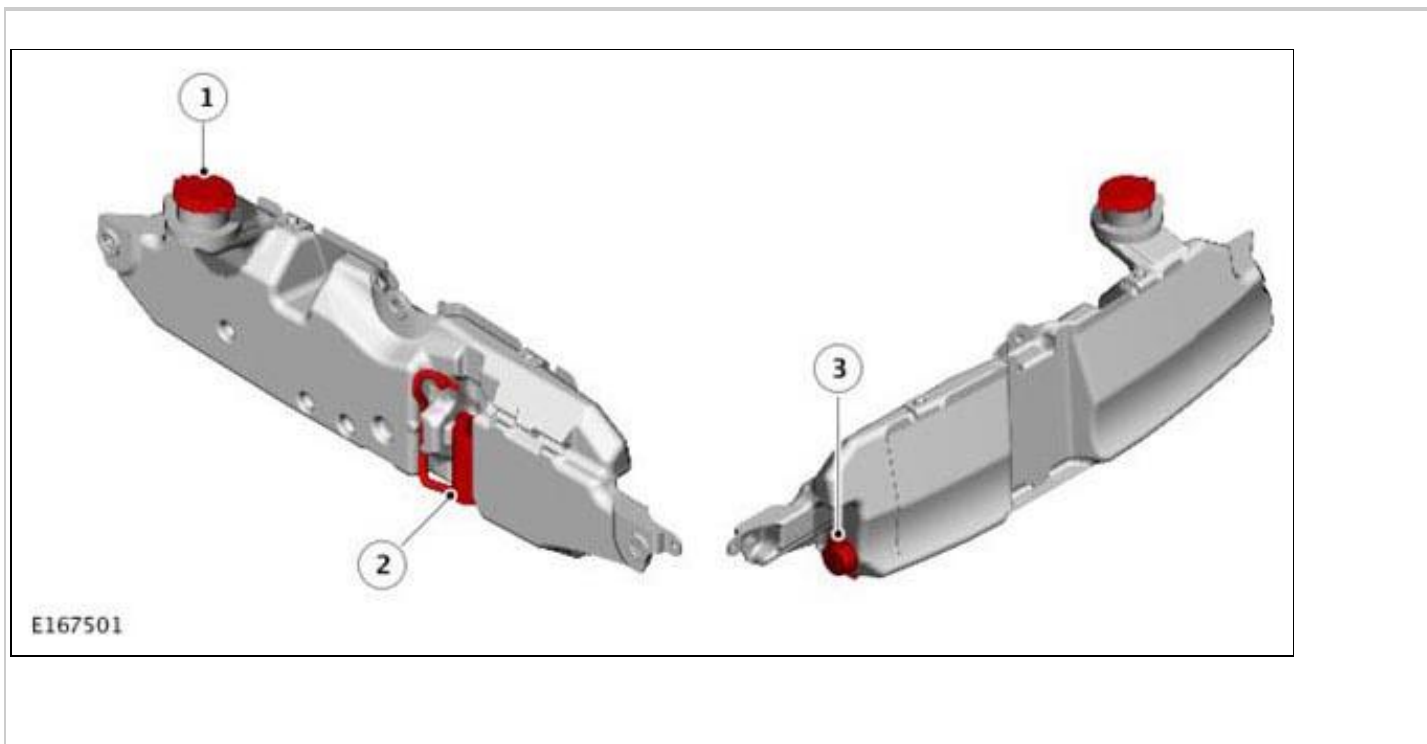
ITEM	DESCRIPTION
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1	Washer fluid level sensor
2	Windshield washer pump
3	Headlamp washer pump

The moulded plastic front windshield washer reservoir is located in the right wheel arch, behind the liner and secured to the body and the front panel with two bolts. A boss on the windshield washer reservoir locates into a bracket, mounted of the A-pillar casting and provides additional support.

The windshield washer reservoir has two recessed holes in the side, which provide location for the windshield and headlamp washer pumps. The washer pumps are push fitted into grommets, which seal the washer pumps in their locations. The washer fluid hose is integrated into the harness and follows it's routing. The headlamp washer hose from the windshield washer reservoir is routed over the wheel arch and across the body between the headlamps. A hole with a grommet in the side of the windshield washer reservoir provides the location for the washer fluid level sensor.

REAR WINDSHIELD WASHER FLUID RESERVOIR



ITEM	DESCRIPTION
1	Filler neck
2	Washer fluid transfer pump
3	Washer fluid level sensor

The moulded plastic rear windshield washer reservoir is located on the rear panel, behind the rear bumper and secured to the rear panel with three nuts.

The windshield washer reservoir has a recessed hole, which provides location for the washer fluid reservoir transfer pump. The washer fluid transfer pump is push fitted into a grommet, which seals the pump in location. A hole in the top of the windshield washer reservoir allows for the fitment of the filler neck. The washer fluid reservoir transfer pump hose is integrated into the harness and follows its routing.

A hole with a grommet in the side of the windshield washer reservoir provides the location for the washer fluid level sensor.

WASHER FLUID LEVEL SENSORS

The washer fluid level sensors have a float with integral magnet. Each sensor has a contact, which is normally open when the windshield washer reservoir is full. When the washer fluid level reduces to approximately 1 liter, the magnetic float pivots down, and close the switch contacts. This closed circuit is sensed by the CJB, which controls the rear washer fluid transfer pump relay located in the EJB. The washer fluid transfer pump will transfer the washer fluid, until the front windshield washer reservoir level sensor sends a signal to the CJB that the front reservoir is full. The fluid transfer takes approximately 10 seconds, if the pump is still running after 15 seconds it will be disabled for 10 minutes to protect the pump. This timer is reset following an ignition cycle.

The CJB monitors the washer fluid level sensors continuously. The CJB checks the rear washer fluid level sensor when the ignition is switched on to give the driver an early warning of the low fluid level.

The CJB then monitors the sensor value over a 25 second period when the ignition is on to prevent invalid messages due to fluid 'sloshing' in the windshield washer reservoir. When the washer fluid level is low, the CJB sends a message to the GWM (Gateway Module) via the MS (Medium Speed) CAN (Controller Area Network) body systems bus. The GWM then transmits the message to the IC (Instrument Cluster) via the MS CAN comfort systems bus, then the 'WASHER FLUID LOW' message is displayed in the IC message center.

WINDSHIELD WASHER JETS

A windshield washer jet is located on each windshield wiper arm. The washer fluid feed hose from the windshield pump is connected to a 3-way valve connector located between the two jets. The 3-way valve acts to prevent washer fluid draining back to the windshield washer reservoir and also to limit the amount of washer fluid, which can be forced by gravity from the washer jets during cornering.

Each washer jet has a nozzle, which directs the washer fluid along the length of the windshield wiper blade and a jet, which sprays washer fluid to the heel of the windshield wiper blade to ensure good distribution of fluid.

When the wipers and washers control switch is pressed and held, the windshield washer pump operates until the button is released, or for a maximum of 10 seconds. The windshield wipers operate in conjunction with the washers, at normal speed, then for a further 3 wipes followed by a drip wipe.

The drip wipe function operates the windshield wipers 4 seconds after a wash/wipe cycle has finished, to clear any remaining drips from the windscreen. The drip wipe function can be configured using Jaguar approved diagnostic equipment.

RAIN/LIGHT SENSOR





The rain/light sensor is located at the upper edge of the windshield, behind the rear view mirror. The sensor is mounted with a clip onto a bracket, which is bonded to the inner surface of the windshield during manufacture. If

damage occurs to the bracket or the windshield, then a new windshield will be required.

The rain/light sensor is secured to the bracket and windshield with a metal clip, which latches onto formed tags on the bracket.

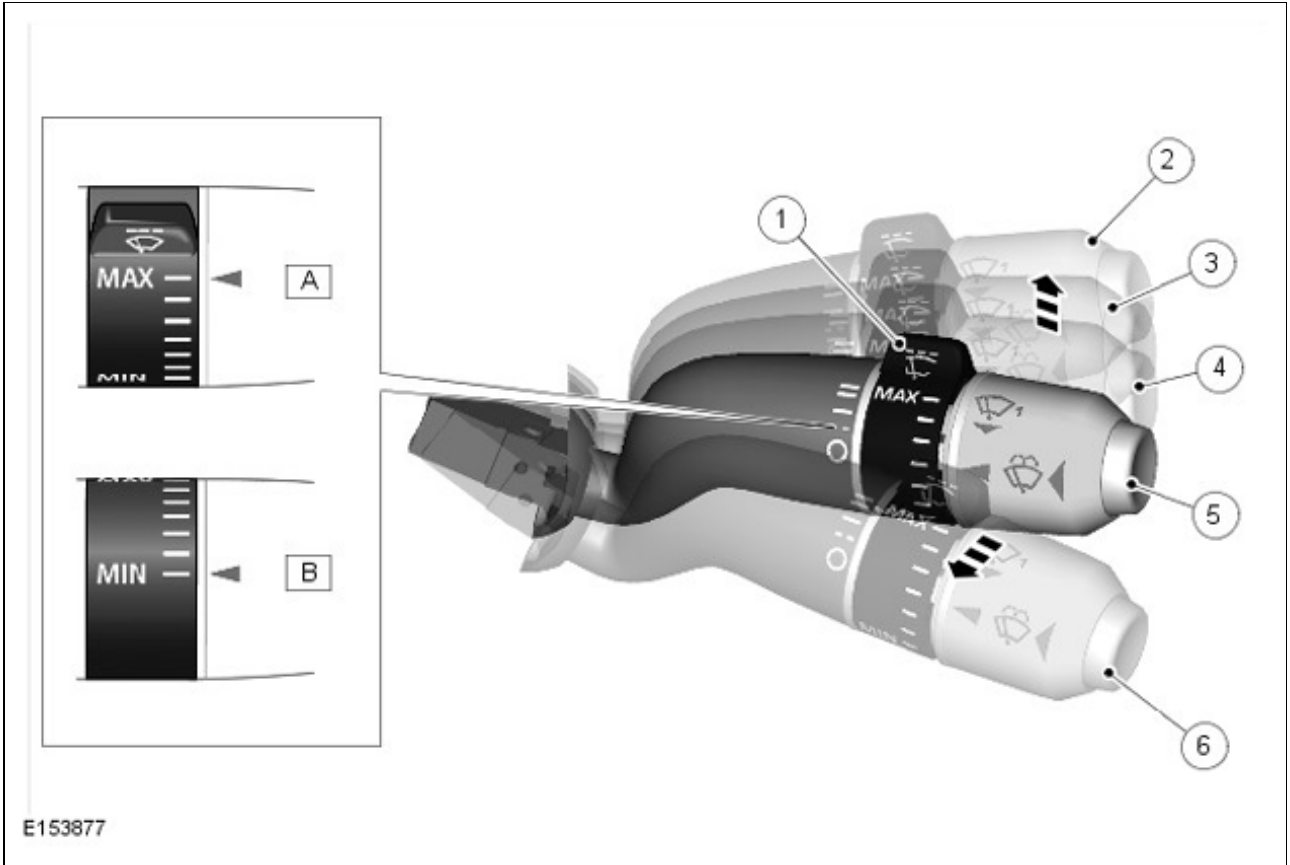
The rain/light sensor provides information via LIN bus to the CJB for the optimum windshield wiper operation for the prevailing conditions to maintain the windshield in a clear condition at all times. The rain/light sensor is an optical unit, which operates on an infrared waveband. The sensor uses the principle of the laws of reflection on interfacing surfaces between materials with differing refraction properties.



NOTE: *A separate light sensor is used for operation of the automatic headlamps.*

WIPERS AND WASHERS CONTROL SWITCH





E153877

ITEM	DESCRIPTION
A	Rain/light sensor maximum sensitivity
B	Rain/light sensor minimum sensitivity
1	Rain/light sensor sensitivity
2	Fast speed wipe
3	Normal speed wipe
4	Rain/light sensor activated wipe

5	Windshield washer
6	Flick wipe

The windshield wipers and washers control switch is located on the right hand side of the steering column and controls all windshield wiper functions. The windshield wipers only operate with the ignition on.

The switch comprises 5 switch positions (including off), a rain/light sensor sensitivity switch and a windshield washer switch. The switch positions each complete a combination of ground paths to connections on the CJB. The CJB interprets the selected combination of switches and operates the respective function accordingly.

The rain/light sensor function can be enabled and disabled using the 'Vehicle Set-up' menu in the IC message center. If the rain/light sensor function is disabled and the auto position is selected on the control switch, the wipers will default to intermittent wipe mode. In the intermittent wipe mode the delay period is adjustable using the rotary collar on the wiper control switch.

For additional information, refer to: Information and Message Center (Description and Operation).

OPERATION

HEADLAMP WASHERS

The headlamp washers are only active when the headlamps and ignition are switched on and the windshield wash is requested. If the windshield washer reservoir fluid level becomes low, the washer fluid sensor sends a message via the hardwired connection, to the CJB, which suspends headlamp wash operation to preserve washer fluid in the windshield washer reservoir.

With the ignition and lights on, headlamp wash is activated on the first operation of the windshield washer switch.

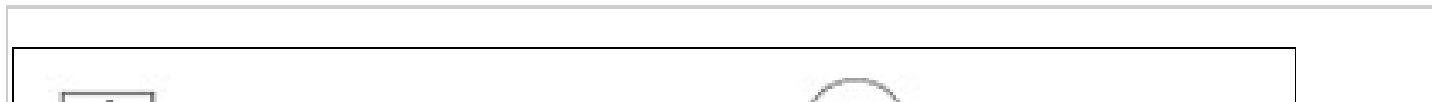
When headlamp wash is active, the CJB energizes the headlamp washer pump for 3 seconds.

The CJB monitors the operation of the washer switch and maintains a counter to restrict headlamp washer operation to every fourth operation of the washer switch in conjunction with a 10 minute timer. The timer prevents a second operation of the headlamp washers within a 10 minute period. If the windshield washer switch is operated for more than 4 programmed wipe requests during the 10 minute period, the headlamp washer will remain disabled. After the 10 minute timer has expired, the headlamp washers will be enabled only on the next consecutive programmed wipe request.

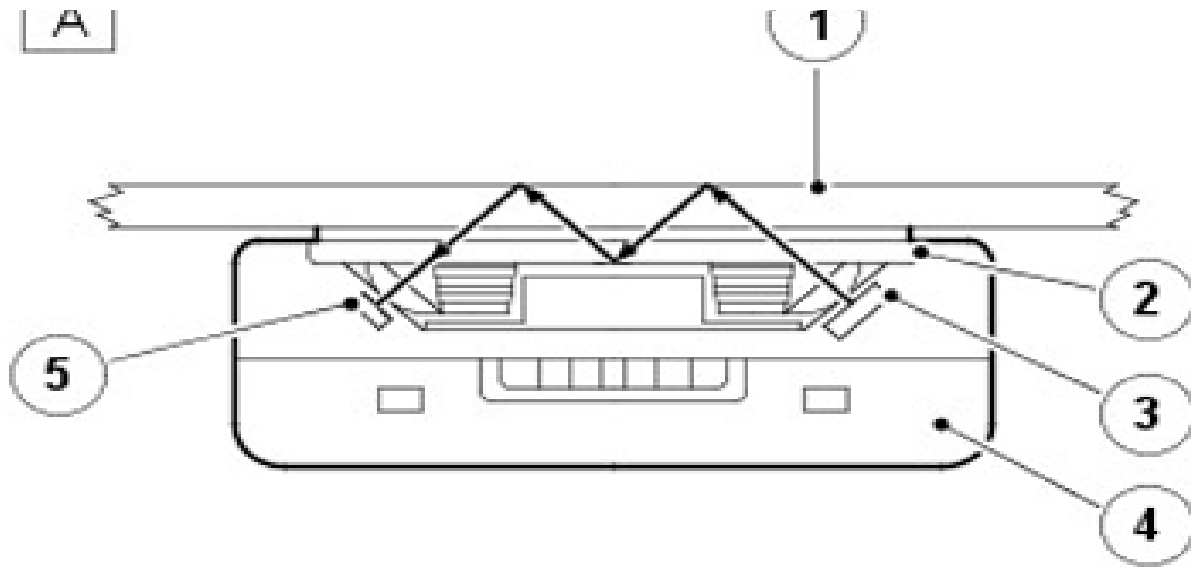
The counter and timer are reset when:

- the ignition is switched off;
- the lightning control switch is turned from 'OFF' to 'ON' position within the same ignition cycle;
- the headlamps are switched off and back to on in 'AUTO' mode

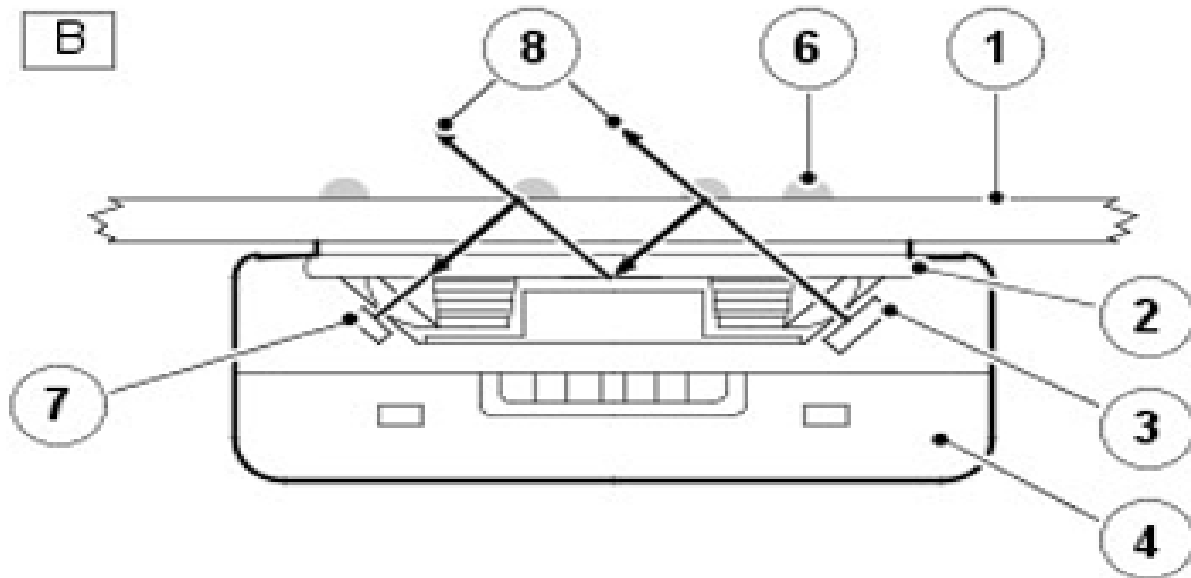
RAIN/LIGHT SENSOR



A



B



E43326

ITEM	DESCRIPTION
A	Clean and dry windshield
B	Wet and dirty windshield
1	Windshield - Outside surface
2	Optical element
3	Transmitter diodes (100% light transmitted)
4	Rain/light sensor assembly
5	Receiver diodes (100% received)
6	Water droplets/film
7	Receiver diodes (less than 100% light received)
8	Lost light

The rain/light sensor contains transmitter and receiver diodes, which transmit and receive infrared light. This is directed onto the windshield via an optical element. The light is directed at an angle so that light is reflected 100% on the outside surface of the shield and is transmitted back into the optical unit. To receive a 100% reflection, the outer shield surface must be clean and dry.

The rain/light sensor via the CJB is active when the wipers and washers control switch is in the rain/light sensor activated position. The rain/light sensor communicates with the CJB via LIN bus. The rain/light sensor suspends windshield wiper operation when the area of the windshield for the rain/light sensor is dry and operates the windshield wipers continuously when the windshield is subject to heavy rainfall. The rain sensor function is disabled if either front door is open and the vehicle is stationary; vehicle speed input will override the door open inhibit feature.

The sensitivity of the rain/light sensor controlled operation can be adjusted using the rotary collar on the wipers and washers control switch.

SPEED DEPENDENT MODE

Speed dependent mode becomes active when the windshield wipers are operating and the vehicle speed exceeds 6 mph (10 km/h). If the vehicle subsequently comes to a stop, the windshield wiper automatically changes to the next lowest operating speed. When the vehicle starts moving again, the original windshield wiper speed setting is

automatically restored. Slow speed wiping will result in an intermittent delay period of 3 seconds when the next lowest operating speed is enabled.

Speed dependent mode can be configured using Jaguar approved diagnostic equipment.

WINDSHIELD WIPER MOTOR BLOCKING PROTECTION

The windshield wiper park signal is also used by the CJB for blocking protection of the front windshield wiper motor. This feature protects the windshield wiper motor in the event of the wiper operation being obstructed.

If the CJB does not receive a wiper park signal status change for a period of 6 seconds, when the windshield wiper motor is active, the CJB removes the power supply to the windshield wiper motor. The windshield wiper motor will remain disabled until either an alternative windshield wiper motor mode has been selected, or the ignition has been switched off and back on. Should a stall condition be achieved 3 times during a single ignition on, then the wiper relay will remain disabled, regardless of wiper switch positions, for 180 seconds. The CJB will not automatically switch the windshield wiper motor on, to prevent the risk of injury. The wipers and washers control switch must be moved off and then on to reactivate the windshield wiper motor. The blocking protection is active in all wiper switch positions and will automatically be reset when the ignition is switched off.

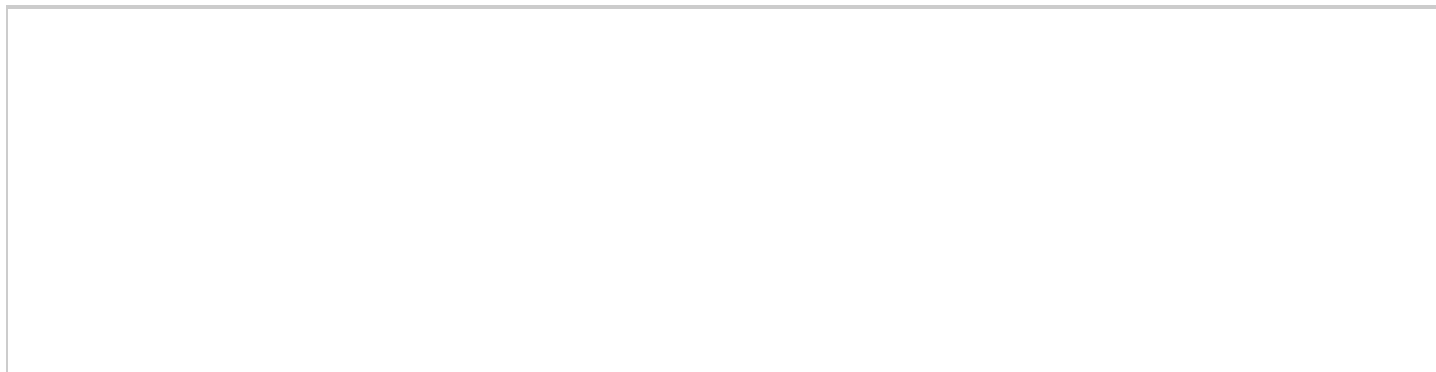
DIAGNOSTICS

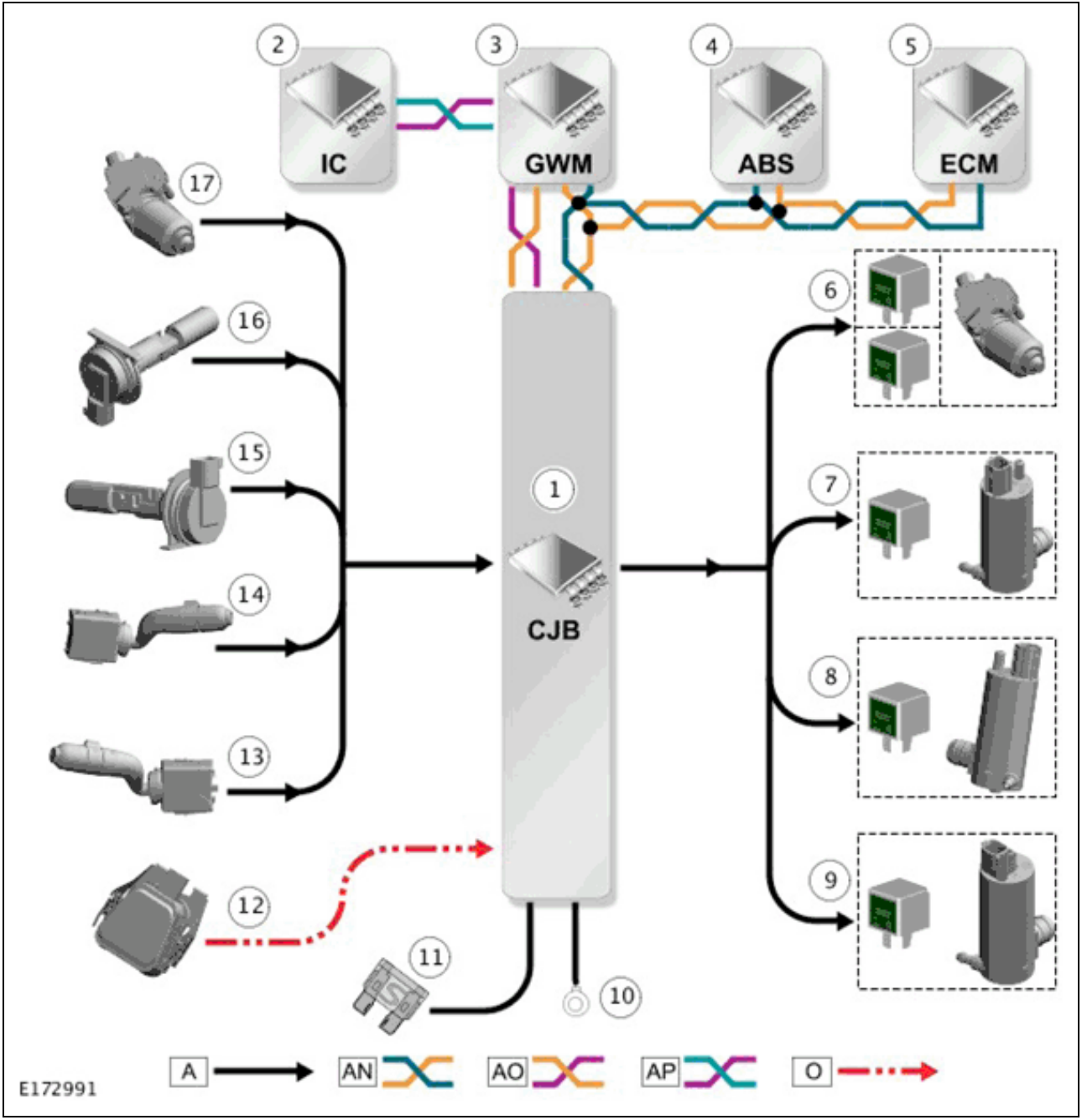
The diagnostic socket allows the transfer of information between the CJB and diagnostic equipment. The diagnostic socket is located in the lower instrument panel, on the driver's side, below the steering column.

The rain/light sensor performs an internal self-test when the ignition is switched on and can store fault codes, which can be used to diagnose faults or non-function of the rain/light sensor. The faults are stored in a non-volatile memory, which retains the logged fault codes even when the power supply is disconnected. If a rain/light sensor fault prevents the sensor from operating, the CJB will control wiper operation as if a rain/light sensor is not installed in the system.

The CJB monitors all inputs and outputs relative to the wiper system and other CJB controlled functions on the LIN bus. If a fault is detected, a code applicable to that fault is stored.

INPUT/OUTPUT DIAGRAM

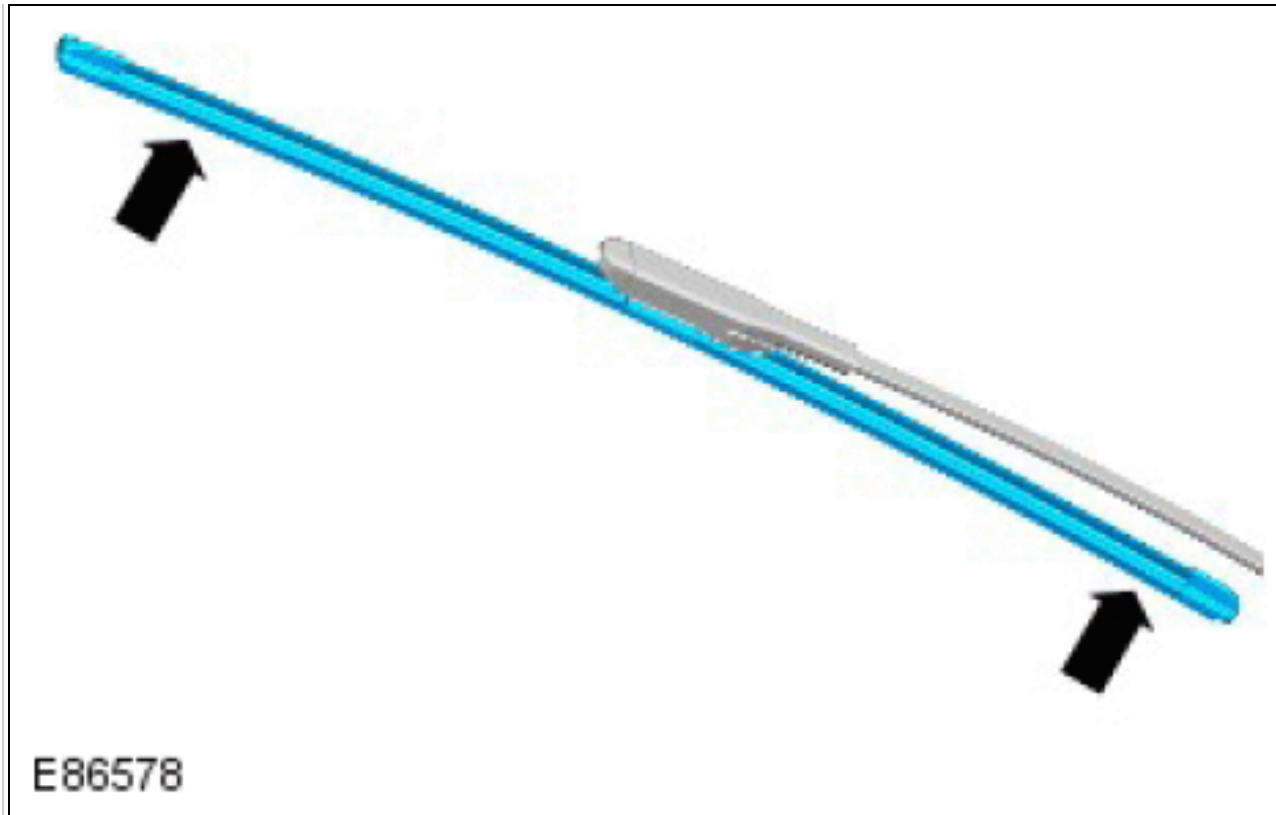




A = HARDWIRED; AN = HS (HIGH SPEED) CAN (CONTROLLER AREA NETWORK) POWERTRAIN SYSTEMS BUS; AO = MS (MEDIUM SPEED) CAN BODY SYSTEMS BUS; AP = MS CAN COMFORT SYSTEMS BUS; O = LIN (LOCAL INTERCONNECT NETWORK) BUS.

ITEM	DESCRIPTION
1	Central Junction Box (CJB)
2	Instrument Cluster (IC)
3	Gateway Module (GWM)
4	Anti-lock Brake System (ABS) control module
5	Engine Control Module (ECM)
6	Windshield wiper motor
7	Headlamp washer pump
8	Front washer pump
9	Washer fluid transfer pump
10	Ground
11	Power feed - Battery Junction Box (BJB)
12	Rain/light sensor
13	Left steering column multifunction switch
14	Wipers and washers control switch
15	Rear washer fluid level sensor
16	Front washer fluid level sensor
17	Windshield wiper motor-park signal

Washers And Wipers



1. Check all wiper blades for condition and signs of splits or damage.
2. Check security of wiper arms.
3. Operate front and rear screen washers, check that jets are clear and correctly aimed.
4. Operate front and rear wipers at all speeds and check for smooth, smear free operation.

PRINCIPLE OF OPERATION

For a detailed description of the wipers and washers, refer to the relevant description and operation service information, refer to DESCRIPTION AND OPERATION.