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TOWBAR (G2342586)

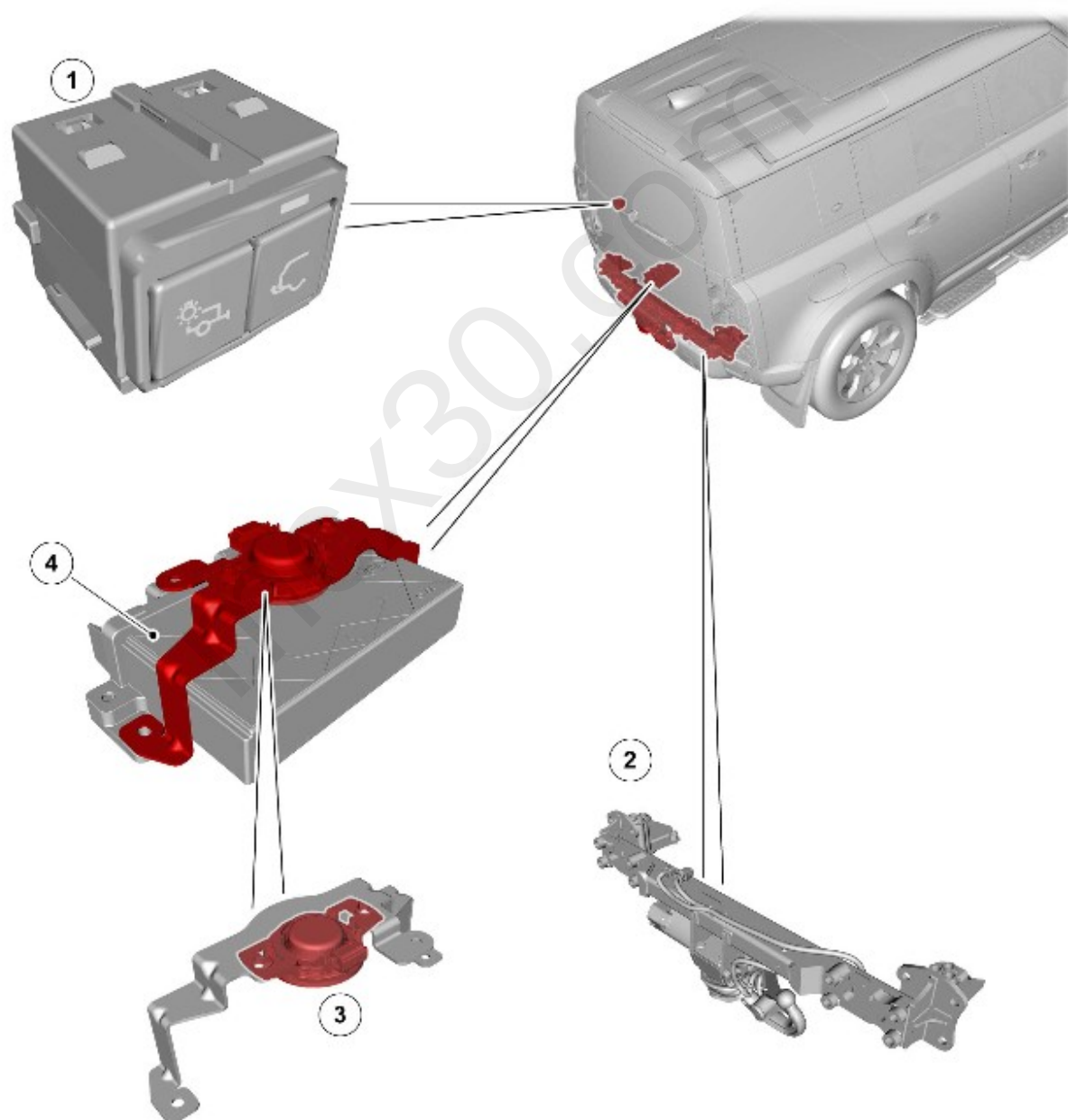
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COMPONENT LOCATION

COMPONENT LOCATION - 1 OF 1

NOTE:

Vehicle with 5 doors is shown, vehicle with 3 doors is similar.



E251979

ITEM	DESCRIPTION
1	Deployable towbar and trailer lamp test switch
2	Deployable towbar assembly
3	Deployable towbar speaker
4	Towbar Control Module (TBM)

OVERVIEW

The deployable towbar is located behind the rear bumper. The deployable towbar assembly replaces the armature behind the bumper.

The electrically operated deployable towbar is stowed under the vehicle. The deployable towbar can be deployed using a deployable towbar switch or the deployable towbar soft key on the Touch Screen (FCDIM).

The deployable towbar switch or the deployable towbar soft key sends a signal to the TBM to deploy/stow the towbar.

The deployable towbar system is integrated into the vehicle electrical systems and controlled by the TBM. The TBM communicates with other vehicle control modules through the High Speed (HS) Controller Area Network (CAN) body systems bus. The TBM receives signals from the Body Control Module (BCM)/ Gateway Control Module (GWM) and controls the trailer lamps through the trailer socket.

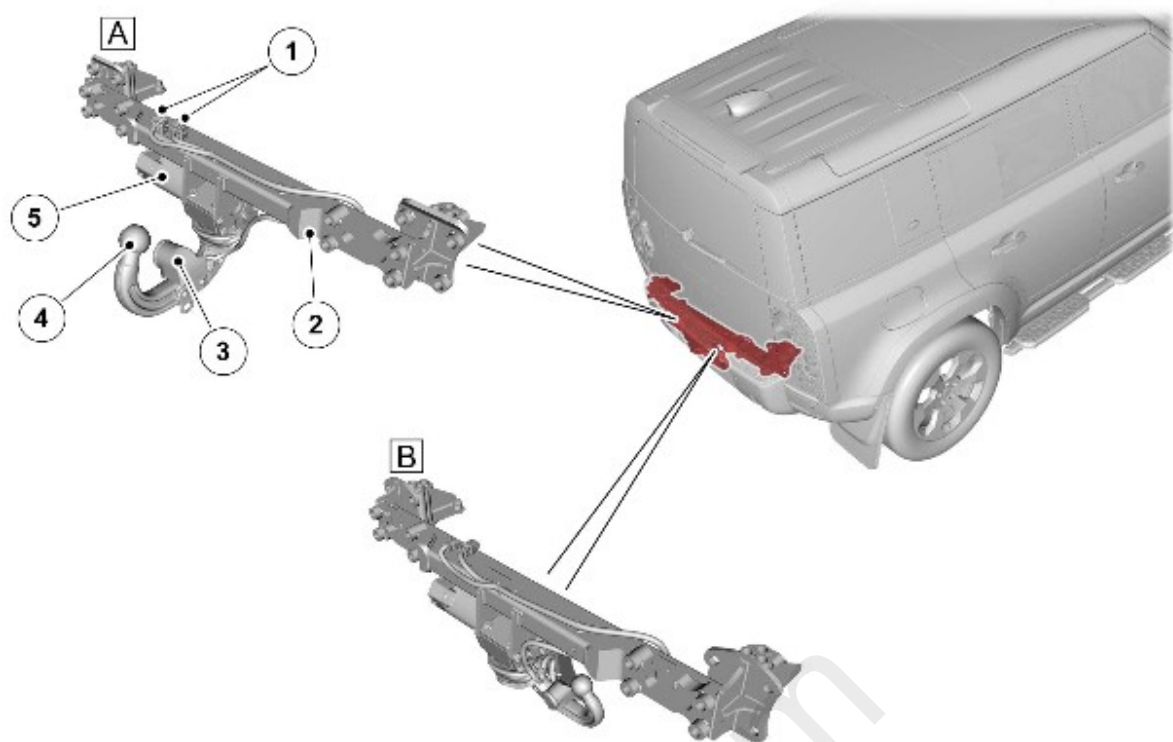
DESCRIPTION

DEPLOYABLE TOWBAR



NOTE:

Vehicle with 5 doors is shown, vehicle with 3 doors is similar.



E251980

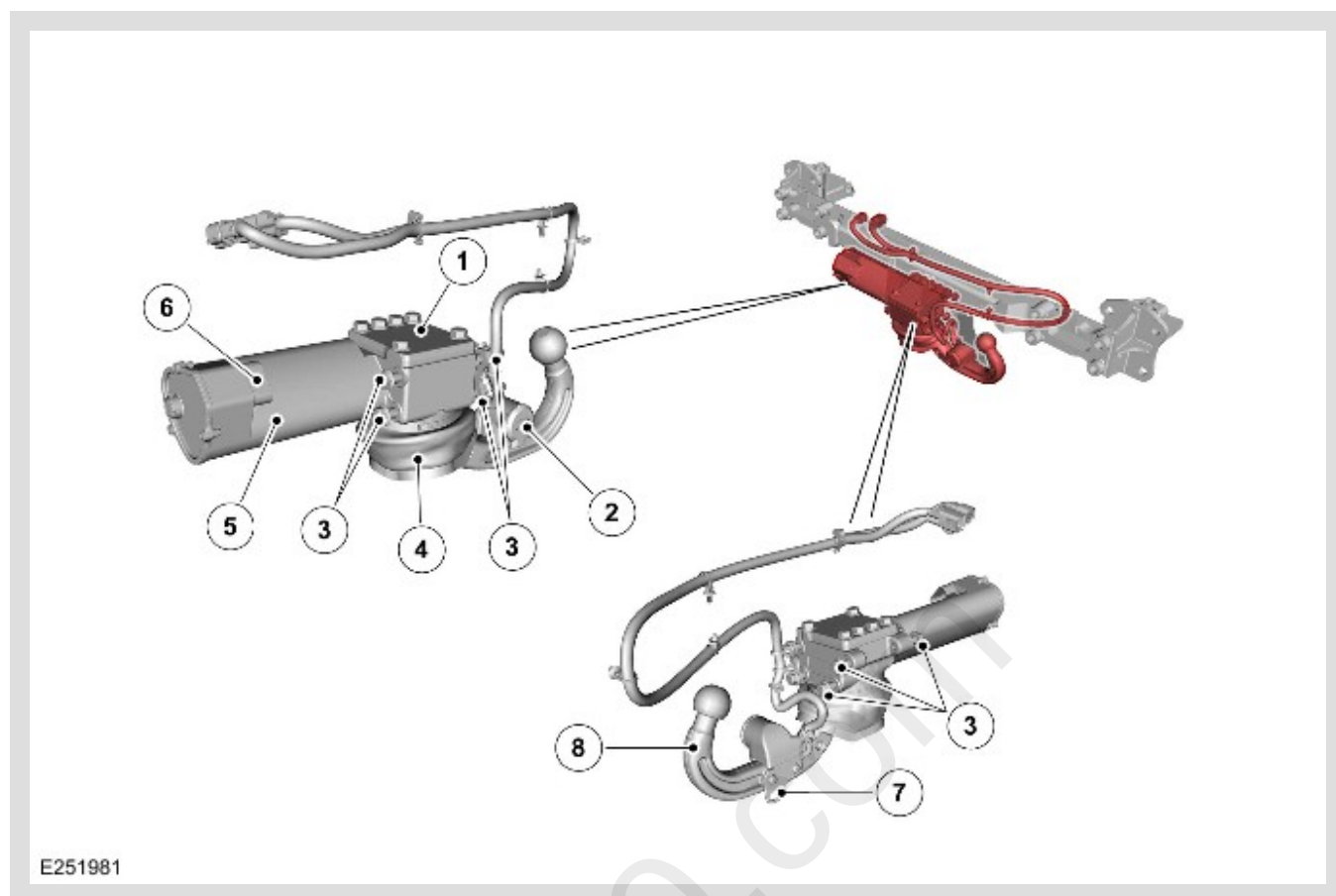
ITEM	DESCRIPTION
A	Deployed position
B	Stowed position
1	Electrical connector (quantity 2)
2	Cross beam
3	Trailer socket
4	Towbar arm
5	Deployable towbar mechanism

The deployable towbar comprises a fabricated steel cross beam which replaces the armature located behind the rear bumper cover. The cross beam is attached at each end to the vehicle body with 16 bolts and washers. The bolts are screwed into threaded holes in the vehicle body.

A pair of brackets are welded centrally on the cross beam. The deployable towbar mechanism is located between the brackets and secured with 7 bolts. The deployable towbar arm comprises of the ball arm and the ball.

The trailer socket is attached to the deployable towbar arm with 2 bolts. The trailer socket moves together with the deployable towbar arm during the deploying and stowing process.

DEPLOYABLE TOWBAR MECHANISM



ITEM	DESCRIPTION
1	Gear and lock housing
2	Trailer socket
3	Bolt (quantity 7)
4	Boot
5	Motor housing
6	Electrical connector
7	Breakaway cable attachment point
8	Towbar arm

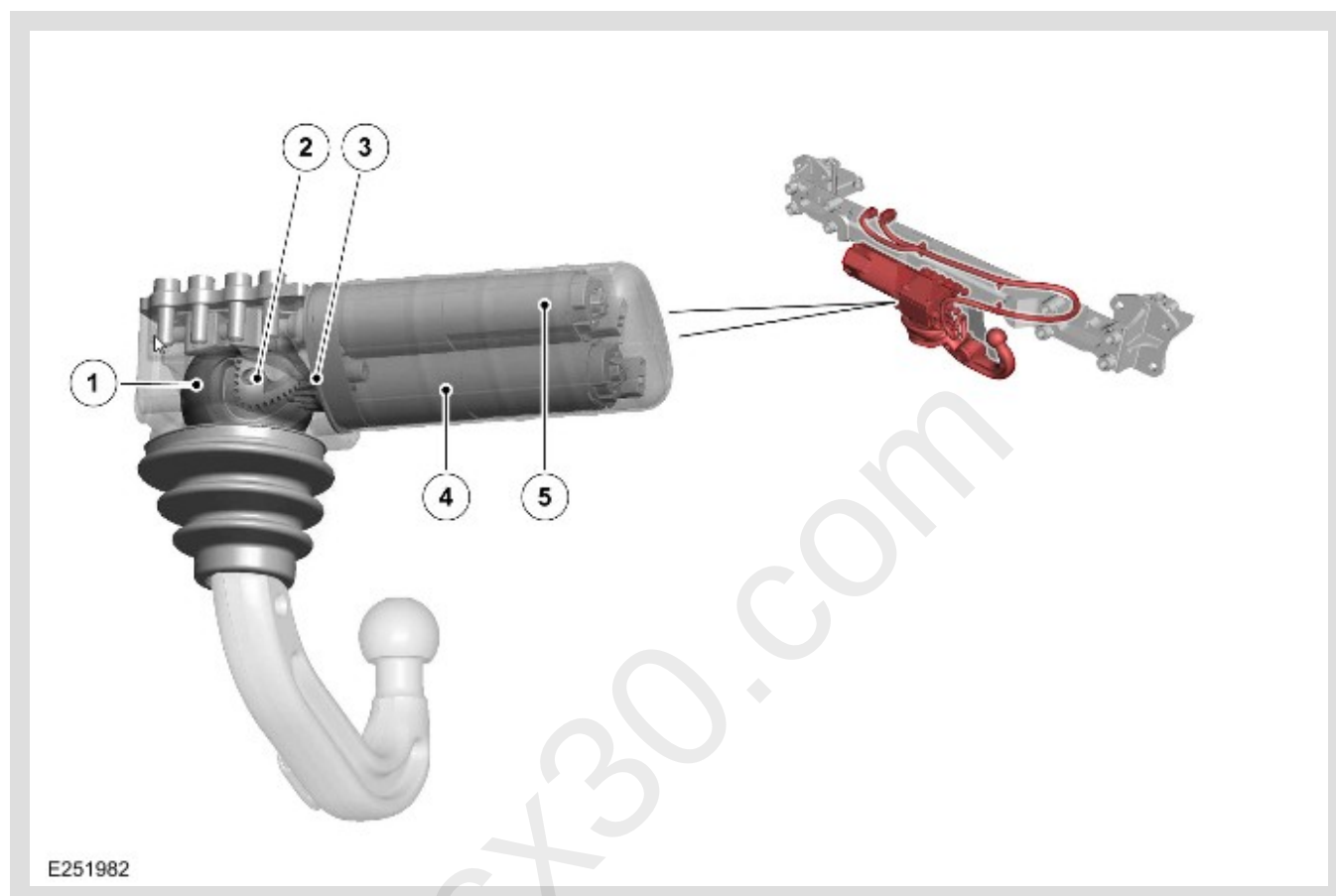
The deployable towbar mechanism comprises 2 motors and the towbar arm assembly.

The first motor controls the stow and deploy movement functions. The second motor controls the locking and unlocking of the towbar arm.

DEPLOYABLE TOWBAR MOTOR – STOW/DEPLOY

NOTE:

The procedure contains some variation in the illustrations depending on the vehicle specification, but the essential information is always correct.



ITEM	DESCRIPTION
1	Towbar arm
2	Towbar arm gear
3	Motor gear
4	Deployable towbar motor - Stow/deploy
5	Deployable towbar motor - Lock/unlock

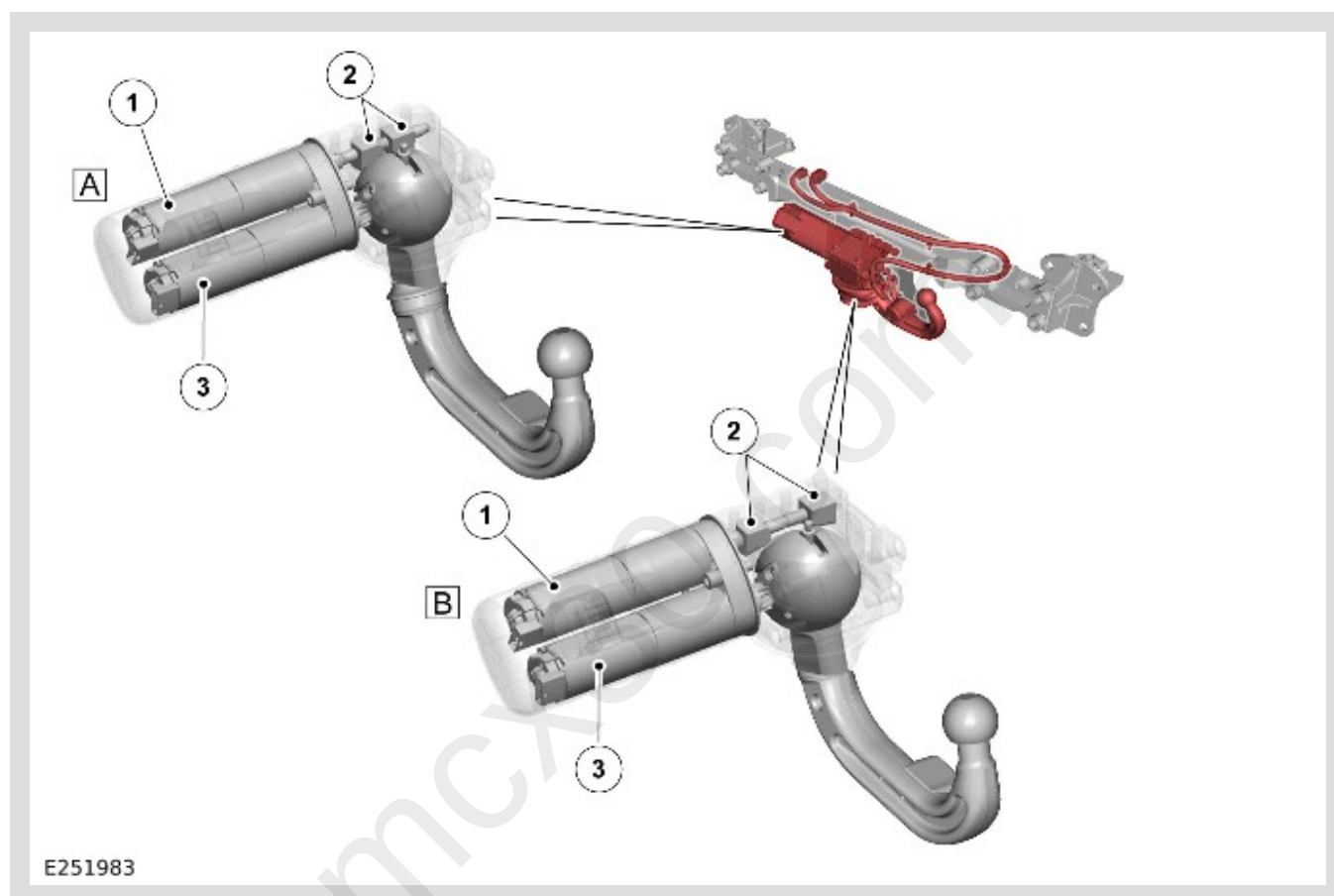
The deployable towbar motor - Stow/deploy has a tapered gear wheel attached to the motor spindle. The gear wheel meshes with gear teeth on the towbar arm. The gear teeth on the towbar arm are shaped in a way that which rotates and lowers the towbar arm as the motor operates. The deployable towbar motor - Stow/deploy is controlled by the TBM

The deployable towbar motor - Stow/deploy contains 2 Hall effect position sensors. The position sensors are used by the TBM to determine the position of the towbar arm. When the towbar arm approaches either the stowed or deployed positions, the TBM detects the position and stops the deployable towbar motor - Stow/deploy.

DEPLOYABLE TOWBAR MOTOR – LOCK/UNLOCK

NOTE:

The procedure contains some variation in the illustrations depending on the vehicle specification, but the essential information is always correct.



ITEM	DESCRIPTION
A	Towbar arm locked position
B	Towbar arm unlocked position
1	Deployable towbar motor - Lock/unlock
2	Locking blocks (quantity 2)
3	Deployable towbar motor - Stow/deploy

The deployable towbar motor - Lock/unlock operates a threaded spindle. The spindle has a left and a right threaded locking blocks which move along the 2 threads on the spindle. The 2 threads drive the locking blocks in opposite directions when the deployable towbar motor - Lock/unlock is operated. The locking blocks are engaged or disengaged with the grooves on the towbar arm.

The deployable towbar motor - Lock/unlock contains 2 Hall effect position sensors. The position sensors are used by the TBM to determine the position of the locking blocks.

The position of the locking blocks when unlocking is monitored by the TBM using the following:

- The current measurement of the deployable towbar motor - Lock/unlock.
- The pulses from Hall effect position sensors.

The deployable towbar motor - Lock/unlock is operated, driving the locking blocks to the outer sides of the motor housing. When the locking blocks become near to the end of the spindle, the TBM stops the deployable towbar motor - Lock/unlock. Then the TBM operates the deployable towbar motor - Lock/unlock to deploy the towbar arm.

When the towbar arm moves to the deployed position, the TBM determines that the towbar arm is in the fully deployed position. The TBM uses the pulses from the position sensors. When the fully deployed position is reached, a mechanical catch holds the towbar in the deployed position and the TBM initiates locking.

The TBM operates the deployable towbar motor - Lock/unlock, which rotates the spindle. The spindle moves both locking blocks towards the center of the spindle. The TBM monitors the current rise in the deployable towbar motor - Lock/unlock and measures the pulses from the position sensors. The TBM determines that the towbar arm is fully locked.

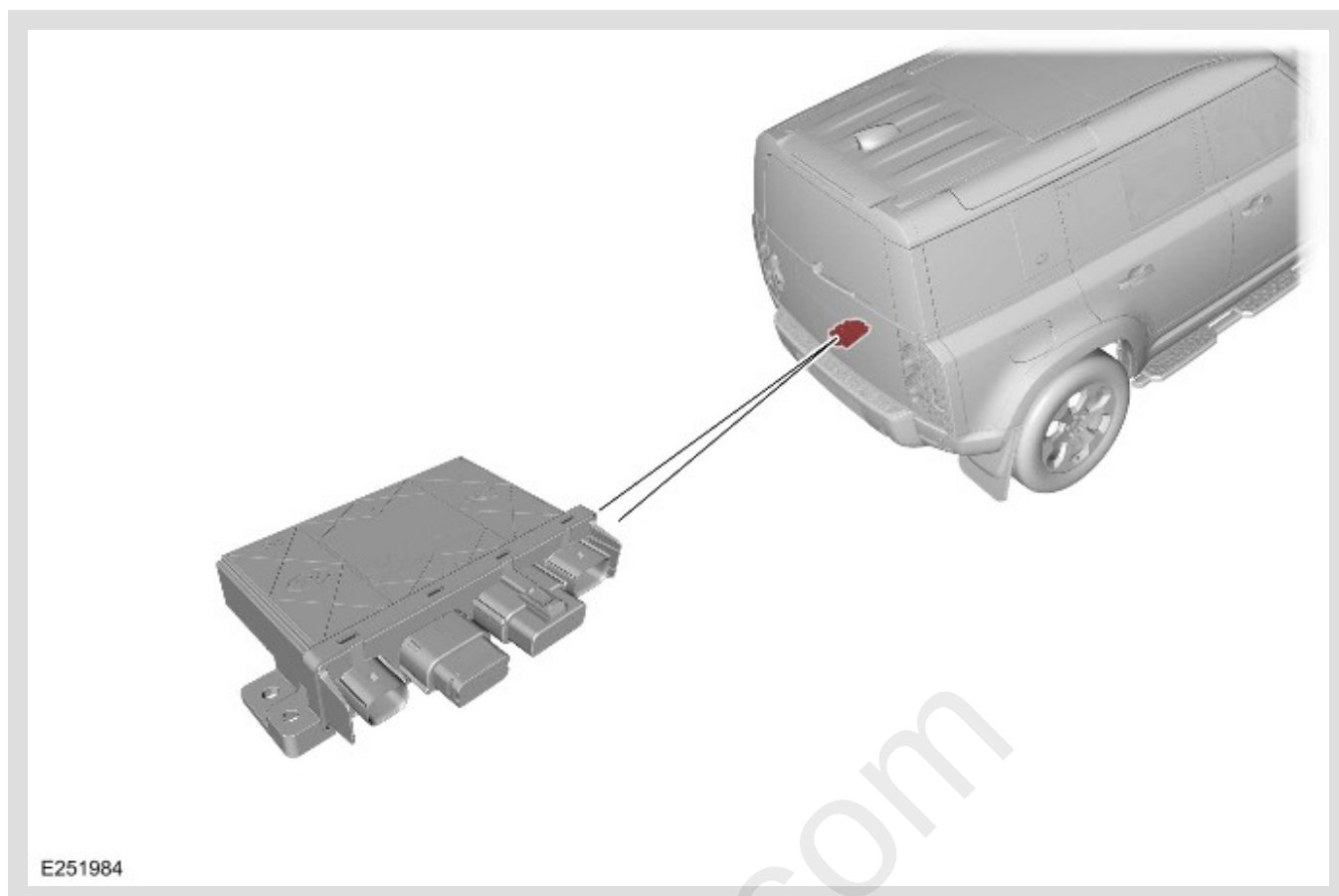
The above procedure is repeated for both stow and deploy functions.

TOWBAR CONTROL MODULE



NOTE:

Vehicle with 5 doors is shown, vehicle with 3 doors is similar.



The TBM is located in the loadspace, behind the loadspace floor trim panel. The TBM is located on 2 studs and secured with nuts.

All functions of the deployable towbar are controlled by the TBM which responds to user requests for stow and deploy from the deployable towbar switch. A Light Emitting Diode (LED) warning indicator on the deployable towbar switch is controlled by the TBM. The warning indicator is illuminated in various ways to advise the user that the towbar is operating correctly or a fault condition exists.

The TBM also controls the deployable towbar speaker, providing the user with audible warnings to advise on towbar operating or fault conditions.

Power supply for the TBM is through a fused connection from the rear junction box. The TBM is connected to the vehicle electrical system on the HS CAN body systems bus.

The Diagnostic Trouble Code(s) (DTC)s are stored in the TBM and can be read using the Jaguar Land Rover (JLR) approved diagnostic equipment.

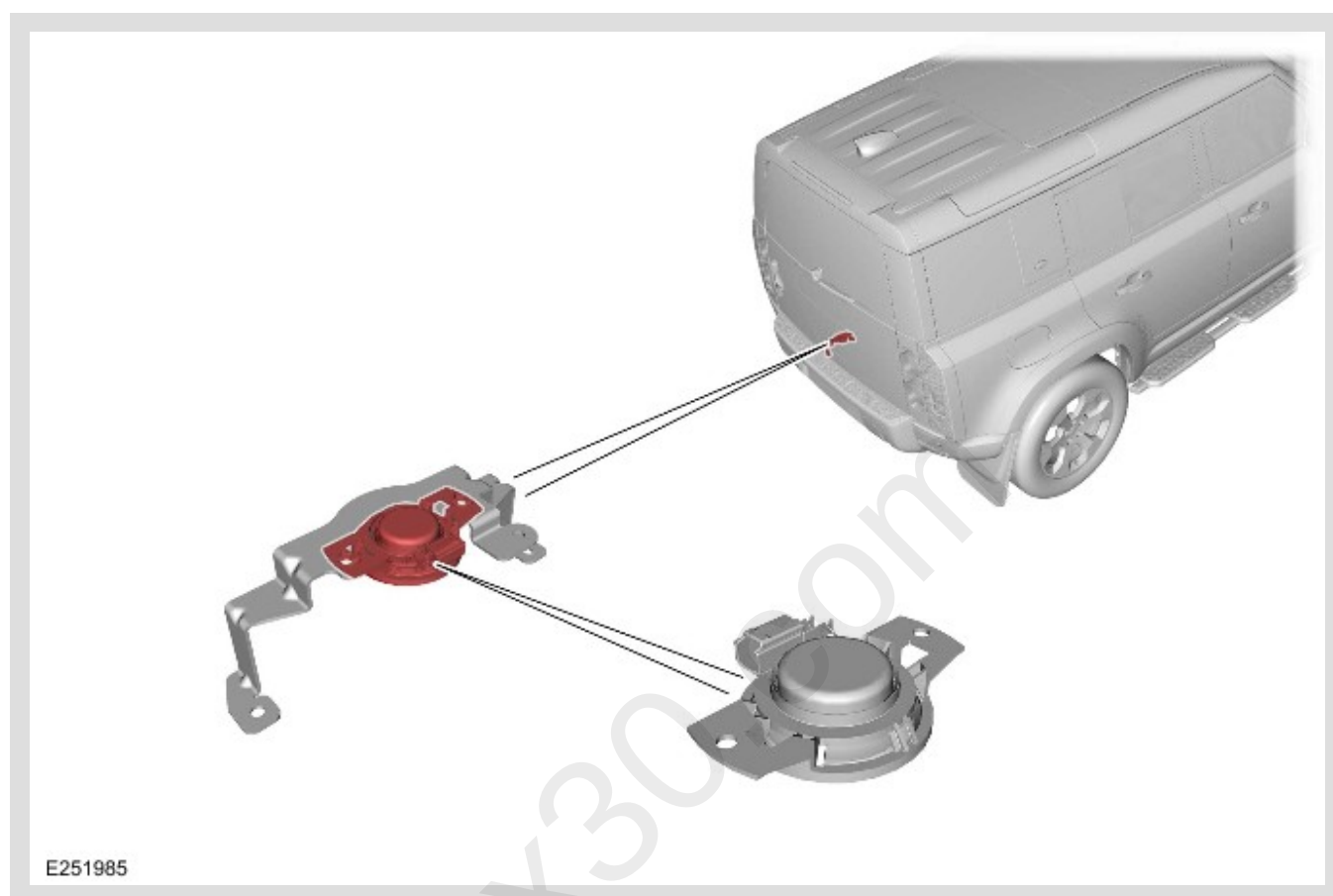
The TBM is able to communicate various status and fault indicators through the following:

- An audible warning from the deployable towbar speaker.
- The LED warning indicator on the deployable towbar switch.

DEPLOYABLE TOWBAR SPEAKER

NOTE:

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The deployable towbar speaker is located in the loadspace, behind the loadspace floor trim panel. The speaker is attached to the TBM bracket with 2 cross bolts and nuts.

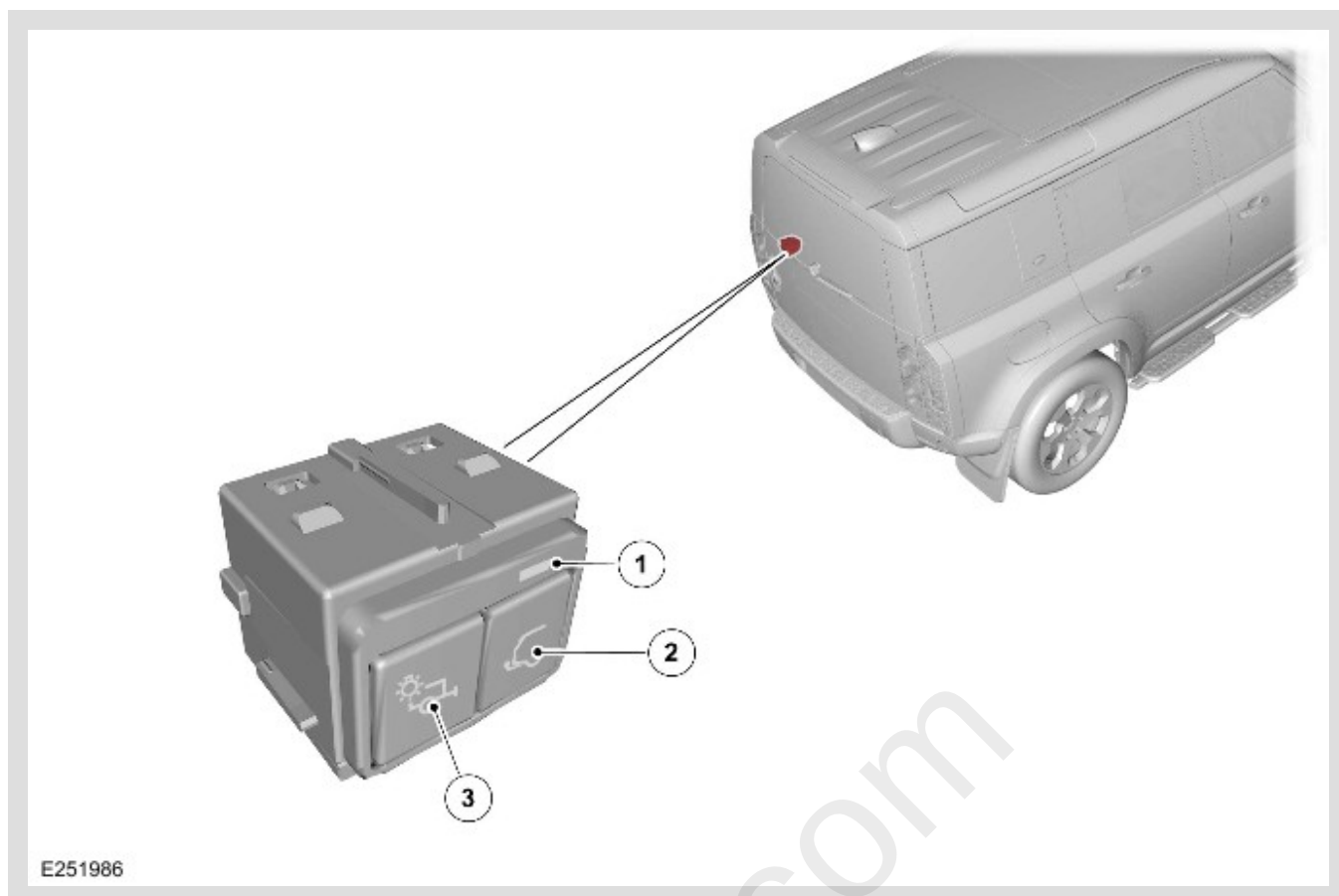
The deployable towbar speaker is connected to the TBM through hardwired connection. The TBM uses the deployable towbar speaker to give audible warning to the user when:

- The deployable towbar is operating.
- There is a system fault.

DEPLOYABLE TOWBAR AND TRAILER LAMP TEST SWITCH

NOTE:

Vehicle with 5 doors is shown, vehicle with 3 doors is similar.



ITEM	DESCRIPTION
1	LED warning indicator
2	Deployable towbar switch - Stow/deploy
3	Trailer lamp test switch

The deployable towbar and trailer lamp test switch is located in the left loadspace trim panel. The switch is a press fit and secured with spring clips.

The switch is connected to the TBM directly through hardwired connection. The connections are for switch illumination, LED warning indicator, stow/deploy selection, trailer lamp test selection and ground. The ground is connected back to the TBM.

The trailer lamp test switch allows the vehicle lamps and the trailer lamps to be checked for correct operation by the user without assistance.

The deployable towbar switch has an LED warning indicator which is controlled by the TBM. The TBM can illuminate the warning indicator in a number of ways to provide visual indication to the user when:

- The deployable towbar is operating.
- There is a system fault.

DEPLOYABLE TOWBAR

The deployable towbar operates when the vehicle is stationary and the selected transmission gear position is PARK or NEUTRAL.

Press the deployable towbar switch to deploy the towbar. When the towbar is operating, an audible warning is emitted from the deployable towbar speaker. The LED warning indicator on the deployable towbar switch flashes slowly when the towbar is operating. When the deployable towbar is fully deployed, the audible warning stops and the LED warning indicator is permanently illuminated. The purpose is to indicate that the towbar has deployed and locked correctly.

When the deployable towbar is deployed, press the deployable towbar switch to stow the towbar under the vehicle. The LED warning indicator extinguishes after 2 seconds when the towbar is fully stowed.

Press the deployable towbar switch to stop movement of the deployable towbar at any time. Press the switch again to reset the towbar to the deployed position.

When an obstruction occurs during deployment of the deployable towbar, the towbar movement stops. The LED warning indicator flashes faster, accompanied by an audible warning sound. When the obstruction has been cleared, operate the deployable towbar switch to reset the towbar.

When the vehicle is put in gear or moves and the towbar is not fully locked, the warning sound occurs. The sound does not depend on a trailer being present.



NOTE:

Do not tow with the vehicle when the powered towbar is not fully deployed. When this action does occur, a warning sound is audible for 10 seconds.

In the event of an unexpected operation, pressing the deployable towbar switch resets the towbar. During the reset operation, the deployable towbar completes a full stow and deploy cycle.

The user also can operate the deployable towbar on the FCDIM.

The following functions of deployable towbar are available on the FCDIM menu:

- Stow
- Deploy
- Stop
- Recover
- Lamp test
- Nose load measurement.

The FCDIM shows the current towbar status and the warning signs for faults and obstructions. The FCDIM communicates with the BCM/ GWM on the HS CAN Human Machine Interface (HMI) systems bus. The BCM/ GWM transmits the signals to the TBM on the HS CAN body systems bus.

DEPLOYABLE TOWBAR WARNING INDICATOR

The TBM is able to communicate various status and fault indicators through the warning indicator on the deployable towbar switch.

Details of the warning indicator codes are shown in the following table:

DEFINITION	AUDIBLE ALERT	LED	USER ACTION REQUIRED
Towbar deploying	Slow warning sound until action complete	Slow flashing until action complete	None - Wait for action to complete
Towbar stowing			
Towbar running recovery cycle			
Towbar loaded when stow attempted	Fast warning sound - 2 seconds	Fast flashing - 2 seconds	Remove load or obstruction and operate the towbar to start recovery cycle
Towbar obstructed			
Inhibit not met error	Fast warning sound - 1 second	Fast flashing - 1 second	Make sure that the vehicle is not in gear and not moving. The tailgate has to be opened when operating the towbar from the switch in the loadspace.
Tailgate closed	None	Fast flashing - 1 second	Make sure that the vehicle is not in gear and not moving. The tailgate has to be opened when operating the towbar from the switch in the loadspace.
User requested stop	Fast warning sound - 1 second	Fast flashing - 1 second	When towbar action is to be restarted, operate towbar to start recovery cycle
Towbar not locked	Fast warning sound - 10 seconds	Rapid flashing - As long as vehicle systems are operating	Do not tow with towbar in this state. Operate towbar to start recovery cycle
Towbar fault	Fast warning sound - 5 seconds	Rapid flashing - As long as vehicle systems are operating	Do not tow with towbar in this state
Recovery cycle failed	Fast warning sound - 2 seconds	Rapid flashing - As long as vehicle systems are operating	Do not tow with towbar in this state
Deploy complete	None	ON - As long as the vehicle systems are operating	-
Recovery complete			

DEFINITION	AUDIBLE ALERT	LED	USER ACTION REQUIRED
Stow complete	None	ON - 2 seconds	-

TRAILER LAMP TEST SWITCH

A trailer lamp test switch is located beside the deployable towbar switch. A single press of the trailer lamp test switch initiates a 3 minute sequence, testing both the vehicle and trailer lamps.

When initiating the trailer lamp test, all the vehicle lamps and ignition must be switched OFF and the Electric Park Brake (EPB) must be engaged. During the trailer lamp test, each trailer lamp and the corresponding vehicle lamp operates in turn.

The 3 minute test sequence can be stopped by any of the following actions:

- Operate the trailer lamp test switch.
- Turn the vehicle lamps ON.
- The ignition switch is in Power Mode 6 (ignition ON).

OVERUSE PROTECTION

The overuse protection is used to prevent the towbar motors from overheating. The temperature is estimated by the TBM. When the temperature is over the programed value further operation of the deployable towbar is inhibited when the deployable towbar has reached the deployed position. When the overuse protection is active, the LED warning indicator flashes briefly when the deployable towbar switch is pressed.

It is safe to tow with the towbar in the inhibited condition.

The deployable towbar motors cool down fully in 90 minutes, irrespective of if the vehicle is used or not. No further action is required and normal operation is restored.

TRAILER LOAD CHECK

The trailer load check is performed every time when the deployable towbar stows the towbar arm. The TBM initiates a sequence to detect if there is any load on the towbar arm. The purpose is to determine if the trailer is connected. When the TBM detects a load, the stow operation is canceled.

NOSE LOAD MEASUREMENTS

When the towbar is deployed, the nose load that the trailer is putting on the towbar can be measured. The measurement is initiated from the FCDIM.

The conditions for measuring the load are the following:

- The vehicle is in NEUTRAL or PARK and is not moving.
- The vehicle is on level ground.
- The temperature is in the range -20°C (-4°F) to 60°C (140°F).
- The normal suspension height is selected.

The trailer nose load is measured by slightly unlocking and then relocking the towbar. The current taken to relock the towbar is accurately measured and the load calculated from that. The TBM sends a load signal to the FCDIM and the load is shown to the user. A range is displayed to allow for the tolerance in the readings.

When the load is very small or the trailer is pulling upwards on the towbar arm, the FCDIM shows 'less than 25 kg'. The deployable towbar cannot measure upward loads. When the load is very large, the FCDIM shows 'more than 200 kg'. The deployable towbar cannot accurately measure very large loads.

DIAGNOSTICS

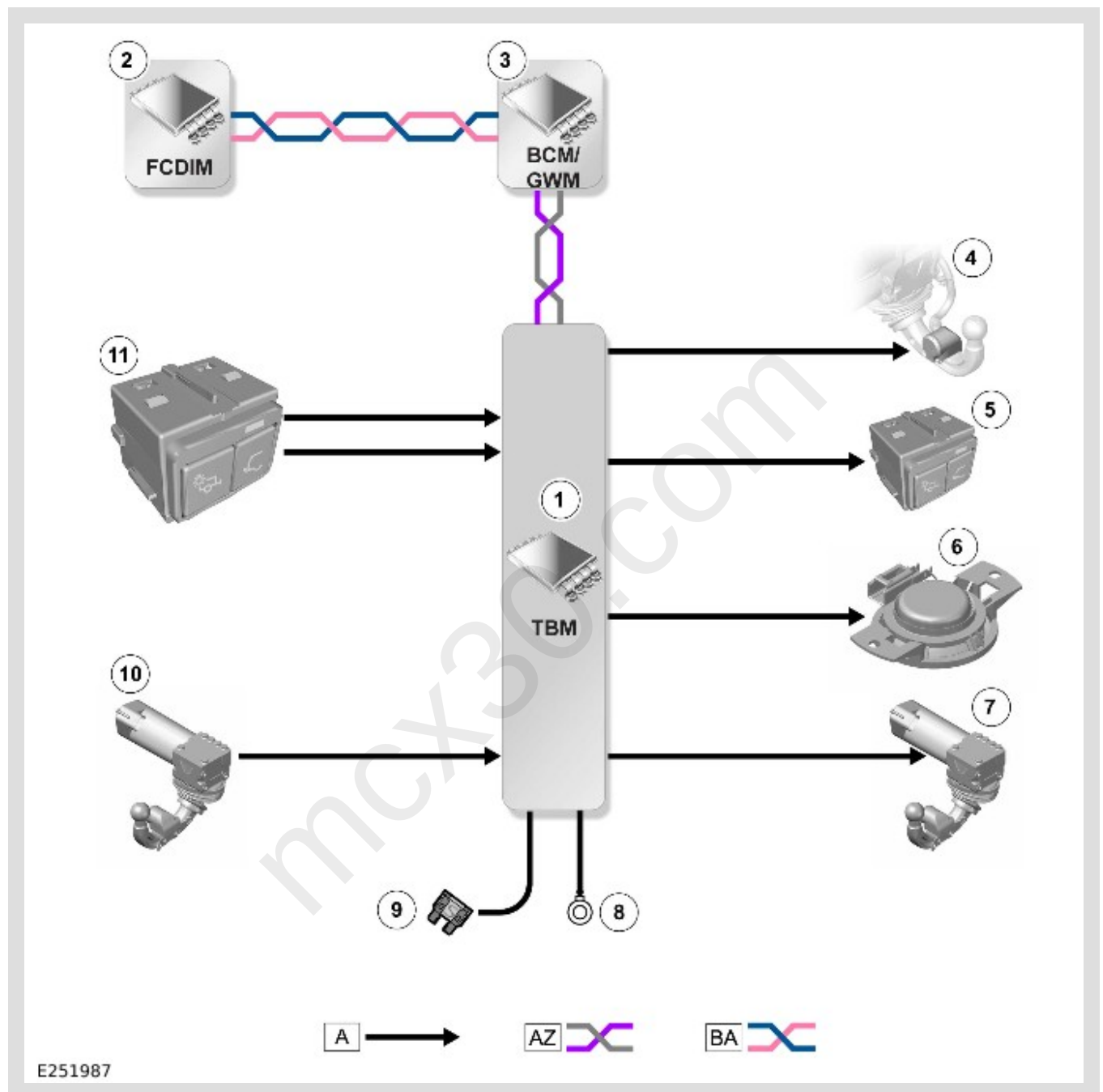
The TBM records any DTCs and related data. Read the DTCs and related data with the JLR approved diagnostic equipment.

The JLR approved diagnostic equipment can read live data and activate certain components.

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CONTROL DIAGRAM

CONTROL DIAGRAM - 1 OF 1



A = HARDWIRED: AZ = HS CAN BODY SYSTEMS BUS: BA = HS CAN HMI SYSTEMS BUS.

ITEM	DESCRIPTION
1	TBM
2	FCDIM
3	BCM/ GWM

ITEM	DESCRIPTION
4	Trailer socket
5	LED warning indicator - Deployable towbar
6	Deployable towbar speaker
7	Deployable towbar mechanism
8	Ground
9	Power supply
10	Hall effect sensor - Deployable towbar mechanism (quantity 4)
11	Deployable towbar and trailer lamp test switch

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