FTD-FTD-SBT2004-610404094 V.2 Footwell module, VIN: L663164

ISTA system version	**4.03.21.18572**	Data version	**R4.03.21**	Programming data	**-**
VIN	**L663164**	Vehicle	**X'/E70/off-road vehicle/X5 xDrive35d/M57/AUTO/US/LL/2011/08**		
Int.lev.works	**-**	Int.lev.(cur.)	**-**	Int.lev.(tar.)	**-**
Mileage	**0 km**				

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Footwell module

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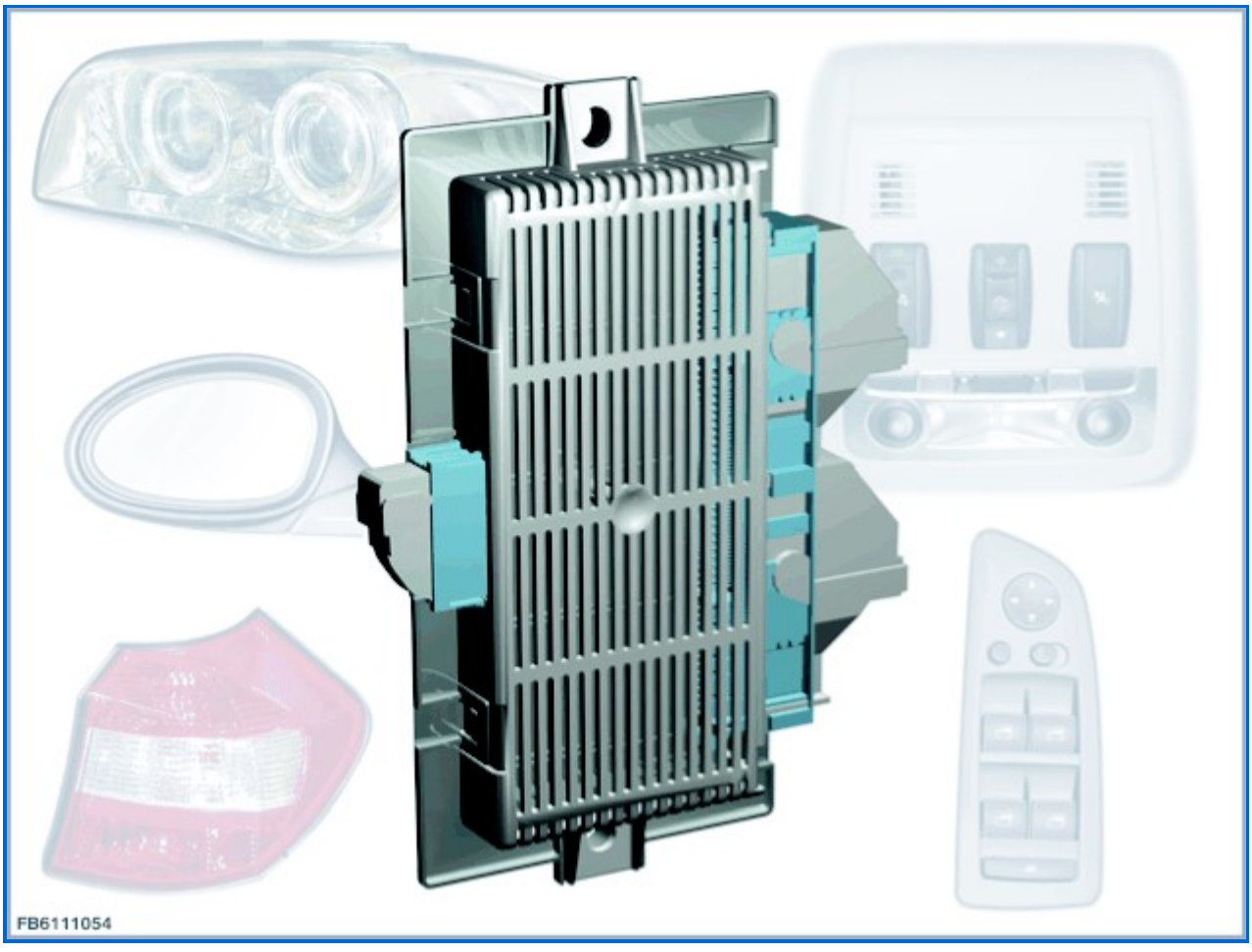

Introduction

The footwell module (FRM) is an electrical nodal point in the footwell on the drivers side. The footwell module picks up the signals from the doors and controls the lighting. The footwell module also controls the adaptive headlights. The footwell module is also the interface to the dashboard. [System overview ...]

Note: System description for the adaptive headlight

There is a separate system description for the adaptive headlights.

[For further information, please refer to BMW Service Technology (SBT) 63 02 03 007]

Brief component description

The following components deliver signals for the footwell module:

- Height sensors
- Reversing light switch
- Brake light switch
- Hazard warning flasher switch
- Light switch
- Driver's door switch block
- Door contacts in rear doors
- Door contacts in front doors
- Driver's door lock

A number of control units are involved in the lighting system. In a stricter sense, the following control units are involved in the lighting (in alphabetical order):

- **ACSM or MRS: Crash safety module / multiple restraint system**

  > E81, E82, E87, E89, E90, E91, E92: multiple restraint system

  > E70, E71, E93: ACSM stands for ”Advanced Crash Safety Module”, also known as the Crash Safety Module

  The footwell module is connected to the crash safety module / MRS control unit via the K-CAN. In the event of an accident with corresponding severity, the footwell module switches on the interior light and the hazard warning lights automatically.

  > E92

  The crash safety module sends a message regarding the front passenger seat occupation detection on the K CAN.

  The belt handover on the passengers side is only activated when the front passenger seat is occupied.

- **AHM: Trailer module**

  The trailer module delivers the signal indicating whether a trailer is attached to the vehicle. The trailer module also controls the trailer lighting. During trailer towing, the trailer module automatically disables e.g. the rear Park Distance Control (PDC) and the rear fog lamp on the vehicle.

  If a trailer is detected, the automatic parking function is disabled. Automatic parking function: To

improve the view of the kerb, the outside mirror glass is folded downwards when reverse gear is engaged. This brings the lower area immediately around the vehicle, i.e. the kerb, into the field of vision.

The trailer module (AHM) is connected to the footwell module via the K‐CAN.

- **DSC: Dynamic Stability Control**

  When cruise control is in operation, the brake lights are actuated during automatic braking (legal requirement). To do this, a signal must be sent from the DSC to the accelerator pedal module via the PT‐CAN.

- **FLA: High-beam assistant**

  In accordance with the traffic situation, the high-beam assistant sends a switch-on recommendation or a switch-off recommendation for the high-beam headlights to the footwell module (FRM). On the basis of this recommendation and various other the input variables, the footwell module decides whether the main-beam headlights should be switched on or off.

  [for more information, please refer to SI Technology (SBT) 63 01 05 140]

- **FRM: Footwell module**

  The footwell module is connected to the vehicle with 3 plug connections. Two 51-pin connector connect the main wiring harness. Another 26-pin connector is for the connection to the dashboard. [more ...]

- **FZD: Roof function centre**

  The roof function centre is responsible for the components of the interior lighting in the roof area. The Basic variant of the roof function centre has its own control unit. The interior light and the rear-compartment interior light are activated via the footwell module (FRM).

  The High variant of the roof function centre has its own control unit, the FZD control unit.

  The footwell module is connected to the FZD control unit via the K‐CAN.

  [for more information, please refer to SI Technology (SBT) 61 02 04 091]

- **JBE: Junction Box Electronics**

  The lighting for the luggage compartment and the glove box lighting are connected to the junction box electronics.

  [for further information, please refer to BMW Service Technology (SBT) 61 05 04 095]

- **LDM: Longitudinal dynamics management**

  In conjunction with the LDM, the option ”Active Cruise Control” uses the ”turn signal” from the footwell module to help when changing lanes. In other words, if a left turn indicator is given before overtaking, the distance to the vehicle in front is reduced. The vehicle to be overtaken is then ”lost” more quickly. On the other hand, when changing to the right-hand driving lane, a vehicle moving there is picked up more quickly.

  [for more information, please refer to SI Technology (SBT) 66 03 04 086]

- **RLS / RLSS: Rain/light sensor or rain/light solar sensor**

  > E81, E82, E87, E89, E90, E91, E92, E93: Rain/light sensor

  > E70, E71: rain/light solar sensor

The rain/light sensor measures the ambient brightness outside the vehicle.

Depending on the ambient lighting conditions, the footwell module will switch the driving lights on or off. To do this, the automatic driving lights control must be activated (light switch in switch position ”A”).

- At dusk, the rain-light sensor sends the message ”dusk”. The footwell module switches the low-beam headlight on. The automatic headlight-range adjustment for the dipped-beam headlights is actuated.
- In darkness, the rain/light sensor transmits the message ”Darkness”. The adaptive headlights are then activated when the vehicle is cornering.

- **SZL: Steering column switch cluster**

  The switch signals from the turn-signal/high-beam switch are picked up and evaluated by the SZL. The evaluated switch signals are forwarded as resistance-coded by the SZL via direct lines to the footwell module

  [for more information, please refer to SI Technology (SBT) 61 07 04 103]

The following components are controlled:

- Exterior mirrors
- Power window drive
- Headlight
- Tail lights
- Fog lights
- Centre high-mount stop lamp
- Auxiliary turn indicator light
- Front courtesy lighting
- Rear courtesy lighting
- Number-plate light
- 2 stepper motor controllers for the adaptive headlight stepper motors
- 2 belt feeder controllers (only E92)

Seatbelt extender controller (only E92)

The footwell module (FRM) activates the two belt hand-over controllers for the drivers and passengers side. The belt hand-over controllers are connected across an LIN bus on the footwell module.

The belt hand-over controller activates the drive of the belt hand-over.

The position of the drive is reported back to the belt feeder controller by a Hall sensor in the drive.

The end position of the extended belt feeder is recorded by another Hall sensor. The end position is indicated to the belt feeder controller.

The belt feeder controller transmits both signals to the footwell module (FRM) via the LIN bus. The actuation circuit is located in the footwell module.

The belt handover on the passengers side is only activated when the front passenger seat is occupied.

System functions

The following functions are executed by the footwell module:

- Gateway between LIN bus and K‐CAN
- Waking by means of various signals
- Storing vehicle order
- Other functions

Gateway between LIN bus and K‐CAN

The footwell module (FRM) enables communication to take place between the LIN bus and the K‐CAN.

The footwell module transfers the messages to the relevant recipient bus.

Components on the LIN bus:

- Special equipment exterior mirrors
- Switch block in driver's door, High variant
- 2 stepper motor controllers for the adaptive headlight stepper motors
- 2 belt feeder controllers (only E92)

Waking by means of various signals

The footwell module (FRM) can be wakened via the following signals:

- K-CAN active
- Terminal 15 ON
- Hazard-warning switch ON
- Change in status of door contacts
- Anti-theft alarm system triggered

Storing vehicle order

The vehicle order is stored in the footwell module (FRM). For the order to be stored, terminal 15 must be ON and the vehicle must be travelling at a road speed of less than 5 km/h.

The vehicle order enables the vehicle to be identified. Besides the type code number, the vehicle order contains all important equipment features on the vehicle.

Other functions

The footwell module (FRM) influences various functions in the vehicle. The following components are controlled by the footwell module:

- Exterior mirrors
- Exterior lighting
- Interior lighting
- Central locking system
- Power window regulator

Exterior mirrors

There are 2 versions of the switch block in the driver's door:

- Switch block in the driver's door, basic variant

  The switch block sends its signals directly to the footwell module (FRM).

- Switch block in driver's door, High variant

  The switch block is connected to the LIN bus. The requests to adjust the mirror are sent via the LIN bus. The footwell module (FRM) receives and processes the signals via the LIN bus. Every 20 milliseconds, the footwell module queries whether there are requests from the switch block. In the Sleep mode, the power supply is switched off. The outside mirrors cannot be actuated. The mirror heating is controlled by the footwell module. The corresponding information is forwarded to the evaluation electronics in the mirror via the LIN bus.

  If a mirror memory is installed, the footwell module saves the memory position of the mirrors. [more ...]

Exterior lights

The lighting function are integrated in the footwell module (FRM). These lighting function are:

- Parking lamps
- High-beam headlight
- Headlamp flasher
- Turn indicator
- Hazard warning flashers
- Brake light
- Low-beam headlights
- Reversing lights
- Fog lights
- Rear fog light
- Parking lamps

Besides the lighting functions, other exterior lighting functions are also integrated in the footwell module:

- Lighting system monitoring
- Headlamp range control
- Emergency operating mode if the footwell module fails
- Lamp replacement

  (important lighting functions are substituted by other lights being actuated in the event of individual lights failing.)

- "Follow-me-home" lighting
- Visual alarm after anti-theft alarm has been triggered

  (the visual alarm is given as per encoding with hazard warning lights, turn signals with dipped headlights or turn signals with main-beam headlights.)

- Actuation of bi-xenon headlamps
- Activation of the step motor controller for the adaptive headlights
- Cornering light

  The cornering light is coupled to the Adaptive Headlight.

All lighting functions except the additional brake light are supplied with a pulse-modulated signal by the footwell module (FRM). This PWM signal enables a uniform brightness of the exterior lights.

Interior lights

On vehicles without roof function centre (FZD), the footwell module actuates the interior lighting in the roof area directly.

All footwell module outputs for interior lighting are pulse-width modulated. This ensures that the interior lighting maintains constant brightness despite voltage fluctuations.

With standard equipment, the interior lighting comprises the following components:

- Front interior light
- Luggage compartment lights
- Glove compartment lighting
- Footwell lighting

The following components can also be installed as special equipment for the interior lights:

- Rear interior light
- Ground lights

Central locking system

The footwell module evaluates the status of the Hall effect sensors in the door contacts.

When the vehicle is locked or unlocked with the mechanical key element, the footwell module will recognise this request. The footwell module transmits a message on the K‐CAN to the CAS (Comfort Access System):

[for more information, please refer to SI Technology (SBT) 61 01 04 072]

Power window regulator

The footwell module (FRM) and the junction box electronics (JBE) control the power window drives.

The relays for the front power windows motors are located in the footwell module. The relays for the rear power window drives are fitted in the junction box electronics.

[more ...]

Switch-on conditions

The footwell module (FRM) receives a large number of input signals that switch on the interior lighting. The input signals are directly read into the footwell module or are received via the K-CAN.

The following signals switch the interior lighting ON:

- Interior lighting button pressed
- Door opened
- Unlocking the driver's door with the door lock

- Unlocking using remote control
- Terminal R OFF, if terminal 58g was ON no more than 2 minutes earlier
- Crash signal present
- Lock button on remote control pressed when central locking system has been in central double-locking for at least 10 seconds

The interior lighting is switched off under the following preconditions:

- Central locking system set to thiefproof mode, all doors and the tailgate closed
- Interior lighting button pressed for longer than 3 seconds
- Terminal 58g ON and terminal R OFF
- Terminal R ON with doors closed
- The vehicle is unlocked with the remote control and no door is opened with the space of 20 seconds
- Terminal R OFF and a car door left open for longer than 1 minute
- Via diagnosis ”Power Down”
- 8 minutes after terminal R OFF

When terminal R is switched OFF, the footwell module (FRM) will switch the interior lighting off after 8 minutes. To do so, the footwell module sends the message for consumer shutdown via the K CAN. The roof control panel (FZD) receives this message and switches off the interior lighting in the roof area. Interior lights that are switched on directly by the footwell module are also switched off.

The footwell module provides terminal 58g via the K CAN or via conventional wiring. Terminal 58g is pulse-width modulated and has 2 brightness stages.

- Brightness level for locating lights

  The brightness for the locating lights can be set individually with the rocker switch on the steering-column stalk.

- Brightness level for function lighting

  The brightness level for function indicator light is not dimmed and is switched on at full intensity.

As soon as the hazard warning switchhas been pressed, the lighting of the hazard warning switch is switched to full brightness by the footwell module. The hazard warning switch is not illuminated at maximum brightness when Terminal 58g is active. The brightness depends on the setting for the locator lighting.

Notes for Service department

The following information is available for service staff:

- General information:
- Diagnosis: ---
- Encoding/programming: - - -
- Nearly all Car and Key Memory functions are programmed inside the vehicle itself. (Please refer to the ”Personal profile” section of the Owner's Handbook: Individual settings for up to 3 remote controls via the display in the instrument panel or via the Central Information Display)

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