Reference Manual

3 SERIES LCI

Technical Training

Technical training.
Product information.

3 Series LCI

Edited for the U.S. market by:
BMW Group University
Technical Training
ST1509 9/1/2015

BMW Service

General information

Symbols used

The following symbol is used in this document to facilitate better comprehension or to draw attention to very important information:

Contains important safety information and information that needs to be observed strictly in order to guarantee the smooth operation of the system.

Information status and national-market versions

BMW Group vehicles meet the requirements of the highest safety and quality standards. Changes in requirements for environmental protection, customer benefits and design render necessary continuous development of systems and components. Consequently, there may be discrepancies between the contents of this document and the vehicles available in the training course.

This document basically relates to the European version of left hand drive vehicles. Some operating elements or components are arranged differently in right-hand drive vehicles than shown in the graphics in this document. Further differences may arise as the result of the equipment specification in specific markets or countries.

Additional sources of information

.

Further information on the individual topics can be found in the following:

- Owner's Handbook
- Integrated Service Technical Application.

Contact: conceptinfo@bmw.de

The information contained in this document forms an integral part of the technical training of the BMW Group and is intended for the trainer and participants in the seminar. Refer to the latest relevant information systems of the BMW Group for any changes/additions to the technical data.

Information status: **March 2015**
BV-72/Technical Training

3 Series LCI

Content

3 Series LCI

1. Introduction

In July 2015, the model revision or Life Cycle Impulse (LCI) of the BMW 3 Series will be launched on the market.

The characteristic BMW proportions, the short overhang at the front, the long wheelbase and the extended hood transmits a dynamic image, even when the vehicle is stationary. The changes undertaken in the model revision add further emphasis to this impression.

F30 LCI/F31 LCI

To aid understanding, the model revision of the BMW 3 Series is referred to in this document as the "BMW 3 Series LCI", or the individual development series "F30 LCI" and "F31 LCI".

The most important changes with the BMW 3 Series LCI are:

- Modified front and rear bumpers
- More premium feel to the vehicle interior, e.g. through the use of chrome inlays
- New engine generation
- ConnectedShift
- LED headlights
- Modified halogen headlight with LED daytime driving lights
- Modified rear lights
- Enhanced Parking Manoeuvring Assistant
- New headunit
- New telematics control unit

In addition to the wide range of optional equipment available, the BMW 3 Series LCI can also be individualized through the following equipment packages:

- M Sport Package
- Luxury Package
- Track Handling Package

The BMW Modern Line equipment package will no longer be available.

3 Series LCI

1. Introduction

1.1. History

The first 3-Series BMW was introduced in 1975 as a technical further development of the 2-Series. This means that the BMW 3 Series can celebrate 40 years on the road this year.

Outlined below are the six generations of the 3 Series. The data is based on the four-door Saloon (with the exception of the two-door E21).

Explanation	E21	E30	E36	E46	E90	F30
Sales period	1975 and 1983	1983 and 1990	1991 and 1998	1997 and 2005	2005 and 2012	since 2012

1.2. Models

The following models will be available for the market introduction as a Sedan and Sport wagon version:

Gasoline models	Diesel models
• BMW 320i / 320xDrive • BMW 328i / 328i xDrive • BMW 340i / 340i xDrive.	• BMW 328d / 328d xDrive

3 Series LCI

2. Equipment Level

2.1. Exterior

3 Series LCI exterior trim

The following features of the exterior trim have been redesigned for the BMW 3 Series LCI:

- Front bumper:
  - New design with Line elements
  - Improved integration of the ACC sensor
- Rear bumper:
  - New design with Line elements
- New design of the Line badges (stronger 3D effect)
- Exhaust tailpipe with larger diameter
  - Entry-level engine: one exhaust tailpipe, dia. 75 mm
  - From BMW 328i: two adjacent exhaust tailpipes, dia. 70 mm each
  - BMW 340i: one exhaust tailpipe on the left and right, dia. 80 mm each
- New design and function of the rear lights.

3 Series LCI

2. Equipment Level

2.2. Interior

3 Series LCI interior equipment

The vehicle interior of the BMW 3 Series LCI has been enhanced with the following modifications:

- Front fresh air grille with chrome inlays
- New trim strips for Luxury Line
- New stitching on leather upholstery with Lines (2nd contrasting-color stitching)
- Chrome barrette trim for rear fresh air grille (vehicles with dual-zone air conditioning only)
- Center console refinement (upper section, center stack)
  - Trim in glossy black
  - Chrome inlay for radio controls as well as heating and air conditioning controls
  - Climate control display refinement (starting with dual-zone air conditioning upwards)
  - Enhanced ambient lighting (with optional light package)
- Center console refinement (lower section)
  - With sliding cover for cup holder
  - Removable ashtray insert (in cup holder)
- Power window switch with chrome inlay

To offer improved accommodation of child seats, the seat belt buckles of the outer rear seats have been moved 10 mm closer to the middle. The seat belt buckles have also been redesigned.

3 Series LCI

3. Powertrain

3.1. Overview of engines

The BMW 3 Series LCI features a new engine generation 6 cylinder engine with a modular design (Bxx).

In adopting the new engine generation, certain model designations have also been changed:

- The BMW 335i is now the BMW 340i
  (with an increase in performance from 300 hp to 326 hp)

3.1.1. Gasoline engines

The following table shows the gasoline engines that will be used in the BMW 3 Series LCI:

Engine	Model	Power output [kW (HP)]	Torque [Nm (lb-ft)]
N20B20U0	320i / 320i xDrive	135 (184)	270 (200)
N26B20O0	328i xDrive	180 (245)	350 (255)
N26B20O0	328i	180 (245)	350 (258)
B58B30M0	340i / 340i xDrive	240 (326)	450 (332)

More information about the new engine generation can be found in the Training Reference Manual ST141 "B38/48 Engine" and ST1505 "B58 Engine".

3.1.2. Diesel engines

The following table shows the diesel engines that will be used in the BMW 3 Series LCI:

Engine	Model	Power output [kW (HP)]	Torque [Nm (lb-ft)]
N47D20O1	328d	135 (180)	380 (280)

More information about the diesel engine can be found in the Training Reference Manual ST1305 N47TU Engine".

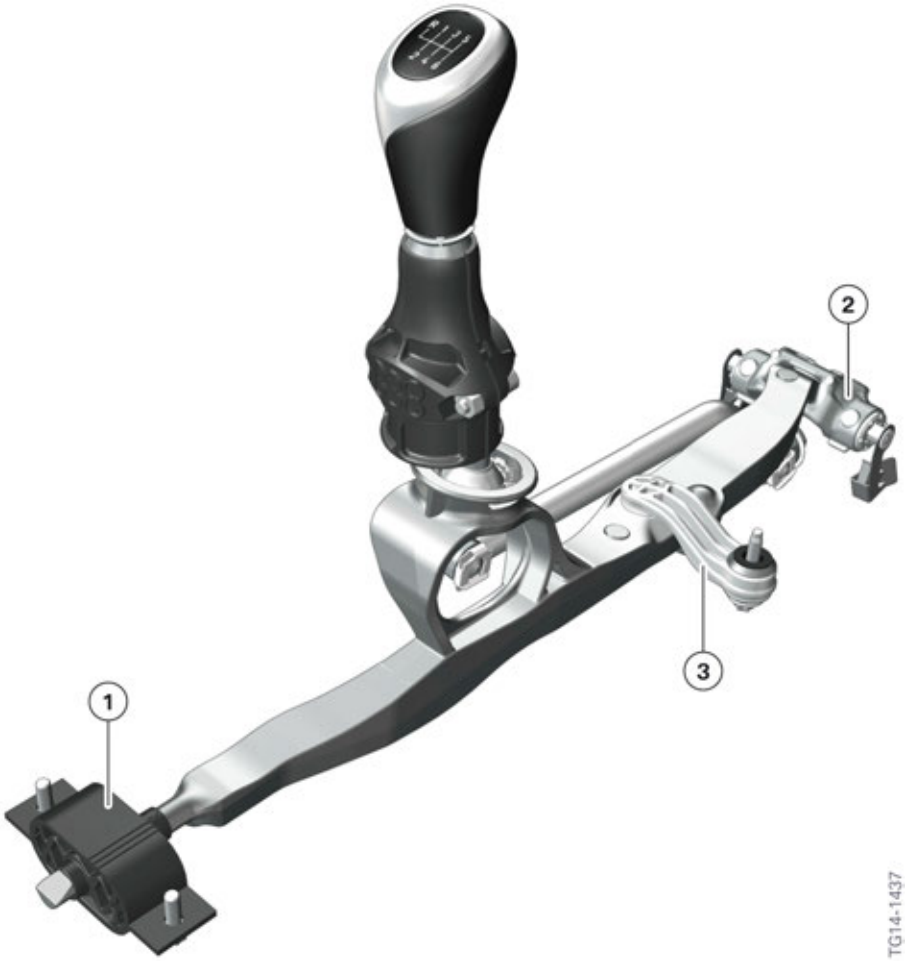
3 Series LCI

3. Powertrain

3.2. Manual transmission

3.2.1. Gearshift arm bearing

To minimise vibrations at the gearshift lever during an engine start and when idling, a wishbone has been fitted to the gearshift arm. The rear gearshift arm bearing as well as the gearshift arm linkage have been modified.

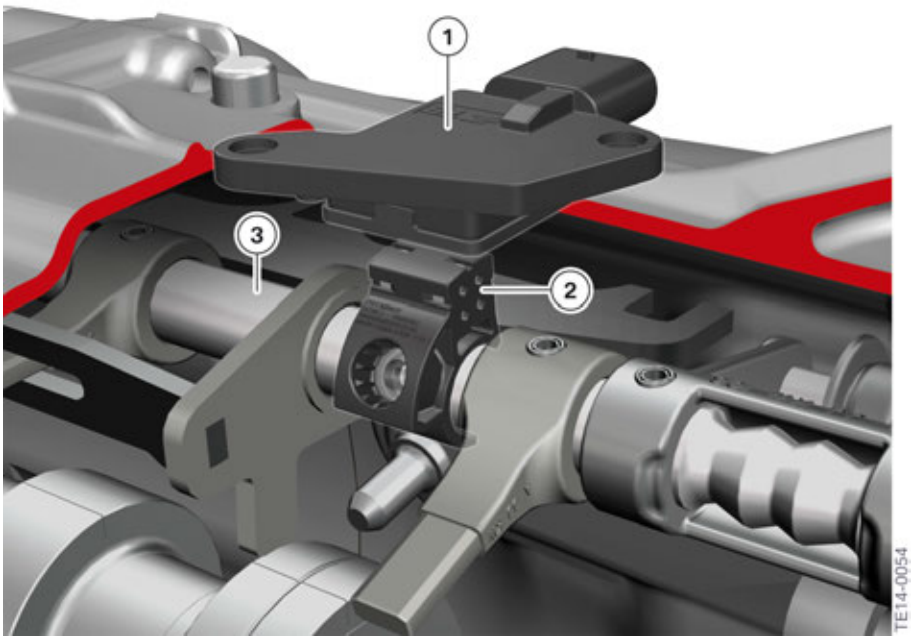


3 Series LCI gearshift arm

Index	Explanation
1	Rear gearshift arm bearing
2	Gearshift arm linkage
3	Wishbone

3.2.2. Engine speed adaptation for a gear change

During a gear change the engine speed is automatically adapted to the new transmission ratio. The engine and the transmission input shaft have the same speed when engaging the clutch. This ensures the clutch is always engaged smoothly.



Gear sensor in the manual gearbox

Index	Explanation
1	Gear sensor
2	Magnetic clip
3	Gearshift shaft

3.2.3. Gear sensor

In the 3 series LCI manual transmission a gear sensor is used, which detects the correct position of the individual gears as well as the neutral position. This information is transmitted to the DME .
A mechanical reverse gear switch is no longer required.

There is a magnetic clip secured on the gearshift shaft. The alignment of the magnetic field lines of the magnetic clip are evaluated by the gear sensor, which is screwed to the transmission housing from the outside.

The ‘3D magnetic field sensor system” is integrated in the gear sensor. This type of gear sensor measures magnetic fields which are aligned parallel to the chip surface. This ensures that every gear shift and engaged gear is recognized.

The sensor is capable of self-diagnosis and can input a fault in the system.

The information from the neutral sensor is also used for the MSA function as well as the shift point indicator, and engine speed adaptation during a gear change.

The corresponding engine speed is calculated by the DME and held for a maximum of 2 seconds.

The engine speed is adapted in varying degrees depending on the driving mode selected.

For the control the clutch pedal must be fully pressed when shifting.

The engine speed adaptation for the gear change is not active:

- When the DCS is switched off
- At driving speeds < 12 mph
- When switching to 1st gear

The engine speed adaptation can be permanently deactivated by the diagnosis system.

After replacement of the sensor it must be calibrated with the BMW diagnosis system.

3.3. Automatic transmission

The new GA8HP50Z automatic transmission is used in the BMW 3 Series LCI with the new engine generation (B58). This is a further development of the already established automatic transmission GA8HP45Z used with the N20 and N26 engines..

It is characterized above all by improved efficiency as well as enhanced driving and shifting comfort. These improvements have been achieved by the following measures, to name a few:

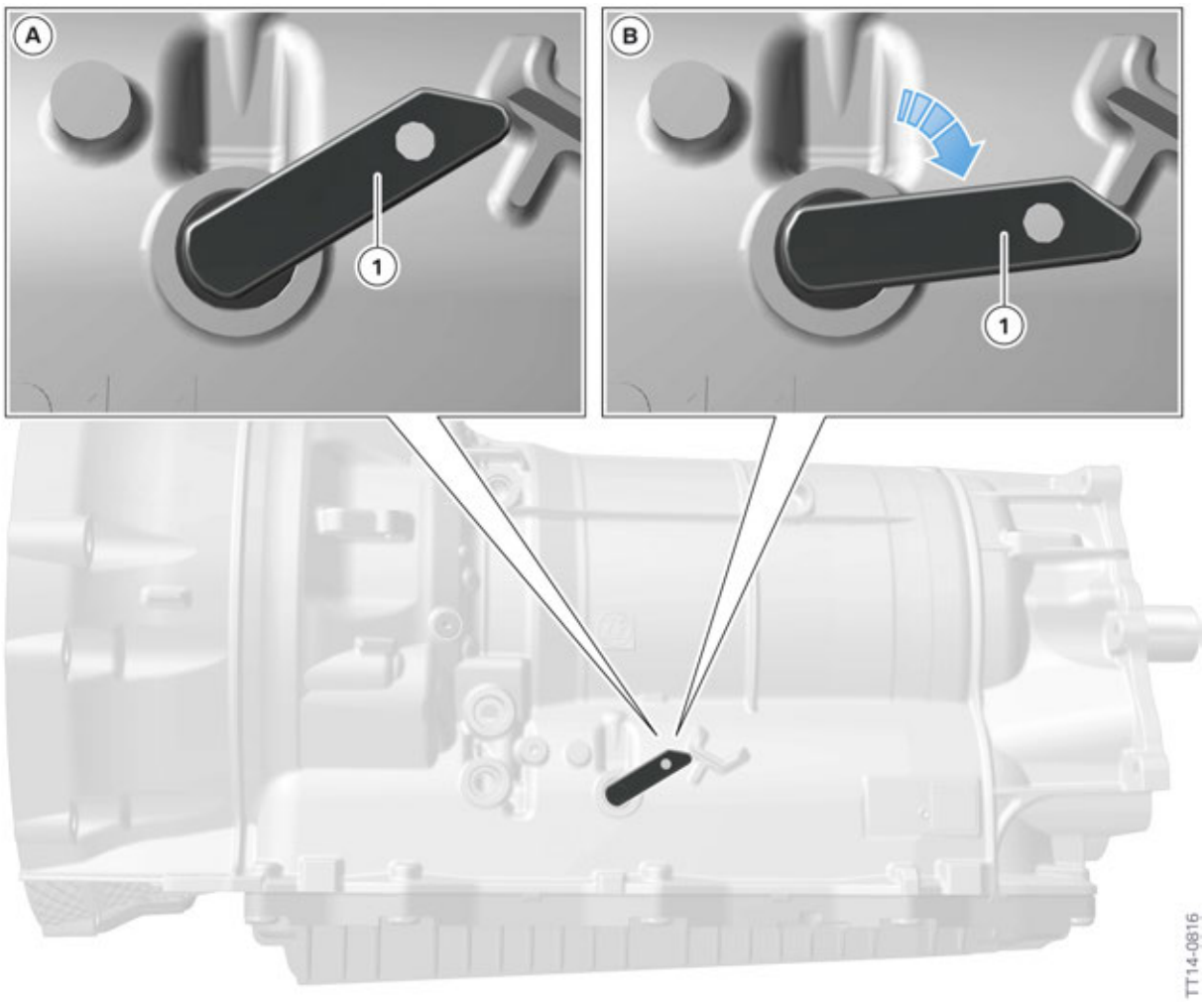
- Greater spread thanks to two changed gear sets
- Mechanical disc separation by undulated expander springs in brakes A and B in the not actuated state
- Additional spring assembly for the opening of brake B.

3 Series LCI

3. Powertrain

3.3.1. Emergency release

The mechanical transmission emergency release has also been modified. For this purpose the parking lock lever must be secured using a new special tool (order number 83 30 2 355 850) in the position pictured below.



BMW 3 Series LCI mechanical transmission emergency release GA8HP50Z

Index	Explanation
A	Transmission parking lock engaged
B	Transmission parking lock released
1	Parking lock lever

⚠

The mechanical transmission emergency release may only be operated by specially trained Service personnel.

3.3.2. ConnectedShift

ConnectedShift uses navigation data for a forward-thinking shift strategy of the automatic transmission. If, for example, a sharp curve is detected ahead, the automatic transmission shifts down early and the gear is retained in the bend.

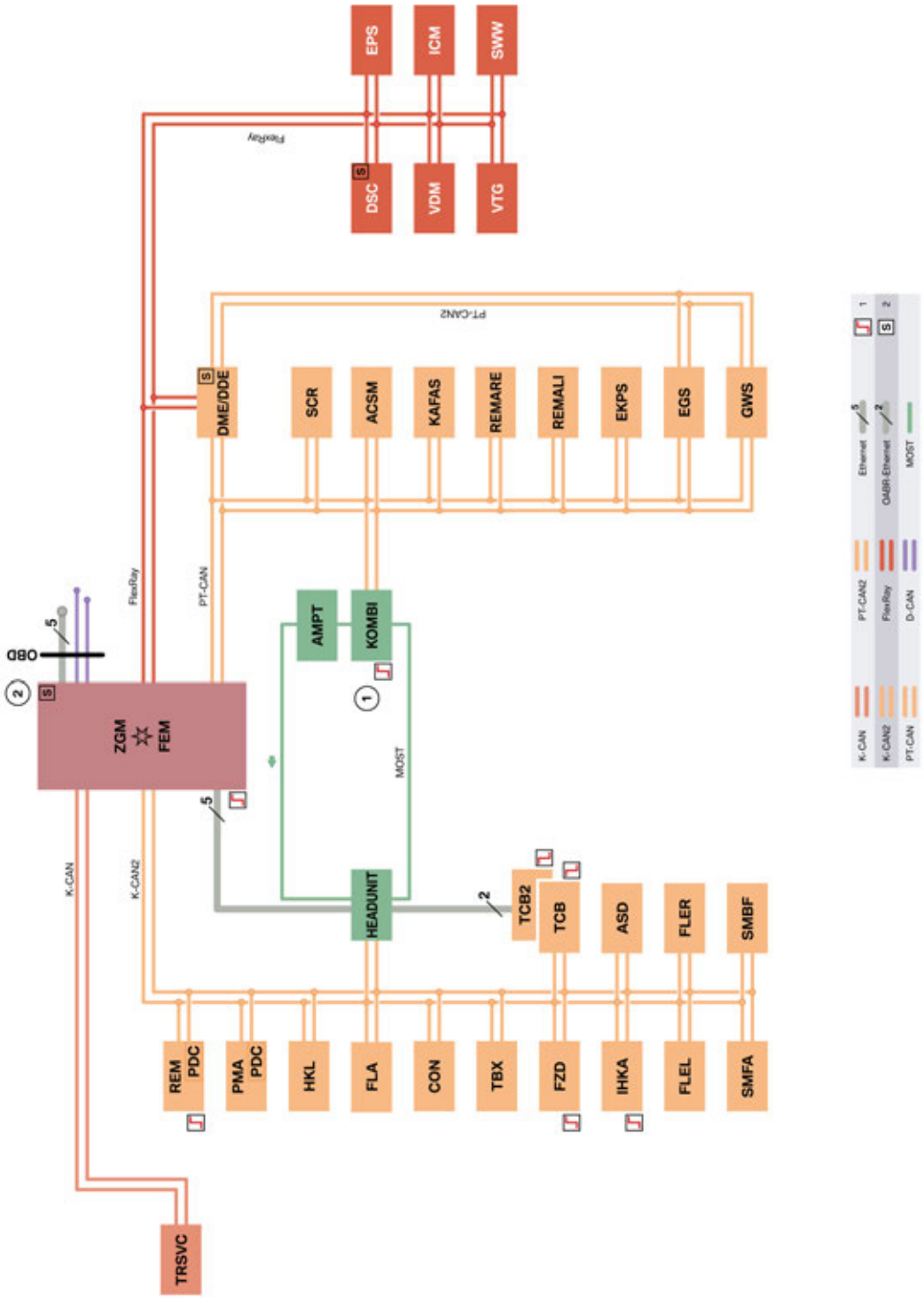
The route guidance of the navigation system does not need to be activated for the function. However, the identification of a turn-off request, for example by the active route guidance or operation of the turn indicator, helps to control the system more accurately. Up-to-date navigation map data also influences the control accuracy.

More information on ConnectedShift can be found in the Training Reference Manual ST1312 "F15 Complete Vehicle".

3 Series LCI

4. General Vehicle Electronics

4.1. Bus overview



TE14-1442_2

3 Series LCI bus overview

3 Series LCI

4. General Vehicle Electronics

Index	Explanation
1	Control units with wake-up authorisation
2	Start-up nodes; control units for starting and synchronizing the FlexRay bus system
ACSM	Crash Safety Module
AMPT	Amplifier Top (top high fidelity amplifier)
ASD	Active Sound Design
CON	Controller
DDE	Digital Diesel Electronics
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
EGS	Electronic transmission control
EKPS	Electronic fuel pump control
EPS	Electronic Power Steering
FEM	Front Electronic Module
FLA	High-beam assistant
FLEL	Frontal Light Electronics Left
FLER	Frontal Light Electronics Right
FZD	Roof function center
GWS	Gear selector
HEADUNIT	Head unit
HKL	Automatic tailgate operation (F31 only)
ICM	Integrated Chassis Management
IHKA	Integrated automatic heating / air conditioning
KAFAS	Camera-based driver support systems
KOMBI	Instrument panel
OBD	Diagnostic socket
PDC	Park Distance Control (with OE 5DP, Parking Manoeuvring Assistant integrated in the PMA control unit; otherwise integrated in the Rear Electronic Module)
PMA	Parking manoeuvring assistant
REM	Rear Electronic Module
REMAFA	Reversible electric-driven reel, left
REMABF	Reversible electric-driven reel, right
SCR	Selective Catalytic Reduction
SMBF	Seat module, passenger
SMFA	Seat module, driver
SWW	Lane change warning

Index	Explanation
TBX	Touchbox
TCB	Telematic Communication Box
TCB2	Telematic Communication Box 2
TRSVC	Control unit for rear view camera and SideView
VDM	Vertical Dynamics Management
VTG	Transfer box
ZGM	Central gateway module

4.2. Lighting, front

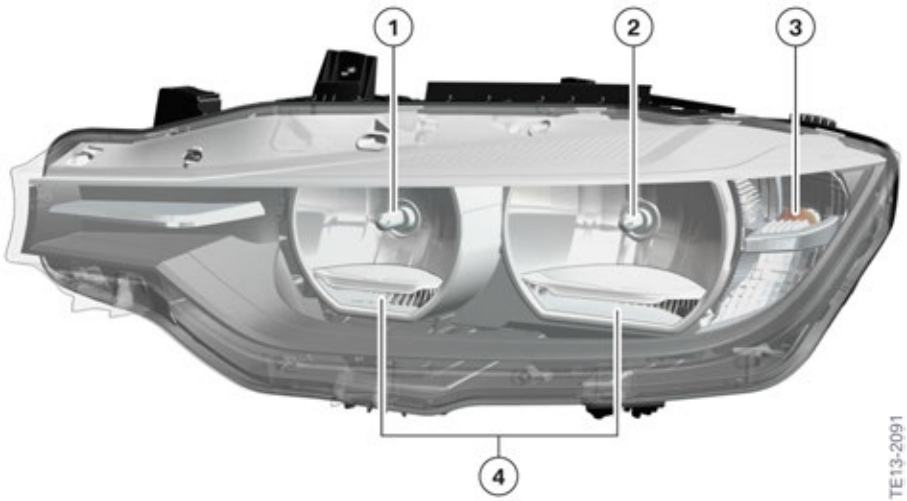
The BMW 3 Series LCI has halogen headlights as basic equipment. LED headlights (OE 5A2) and LED headlights with extended scope (OE 552) are available as optional equipment.

Xenon headlights will no longer be available following the model revision.

A high-beam assistant (OE 5AC) is available as optional equipment.

LED fog lights are installed in the BMW 3 Series LCI as standard.

4.2.1. Halogen headlights



3 Series LCI halogen headlight

Index	Explanation
1	High-beam headlight
2	Low-beam headlight
3	Turn indicator
4	Parking/daytime lights (LED Tubes)

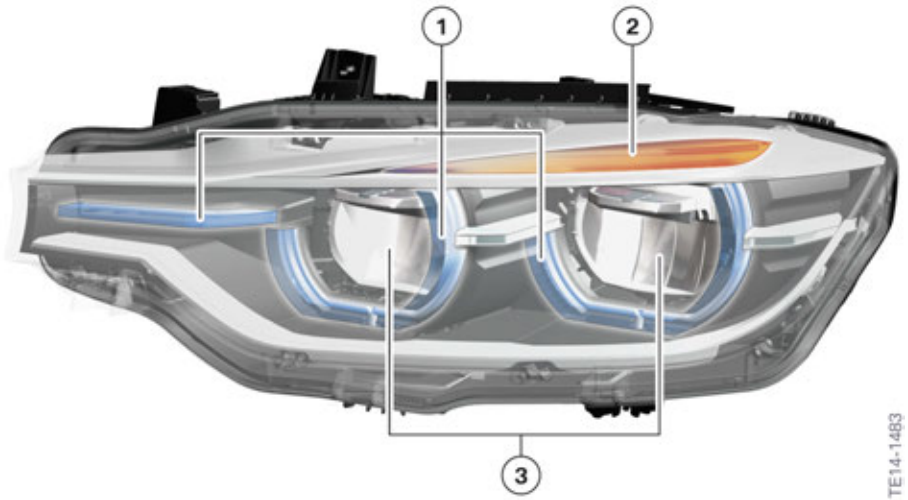
3 Series LCI

4. General Vehicle Electronics

4.2.2. LED headlights

LED headlights

LED headlights are standard on the 340i and as optional equipment (OE 5A2) for the other 3 Series LCI models. The low-beam and high-beam headlights are incorporated into a single reflector.



3 Series LCI LED headlight

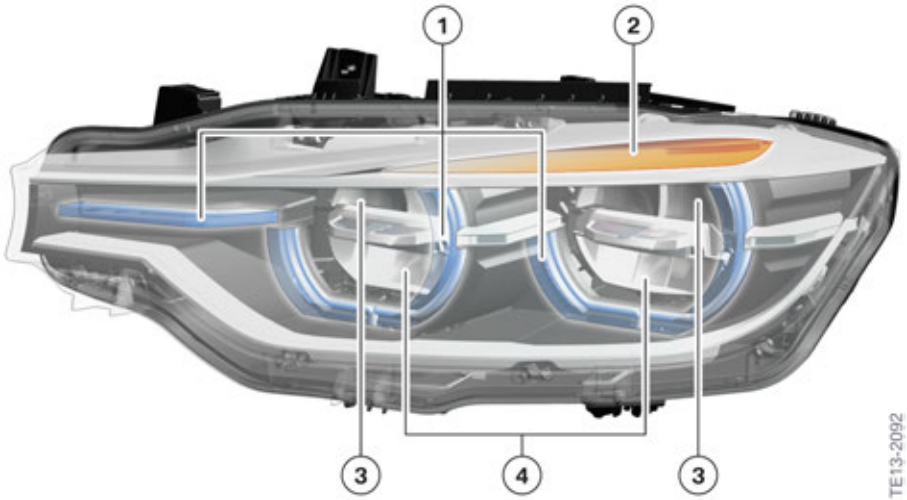
Index	Explanation
1	Side light/daytime driving light
2	Turn indicator
3	Low-beam and high-beam headlight

Adaptive Full LED headlight

The full-LED headlights with extended scope option code (OE 552) include an , Adaptive Headlight, cornering light and LED fog light.

3 Series LCI

4. General Vehicle Electronics



3 Series LCI full-LED headlight with extended scope

Index	Explanation
1	Side light/daytime driving light
2	Turn indicator
3	Low-beam headlight
4	High-beam headlight

The LED fog lights are standard on all LCI 3 series.

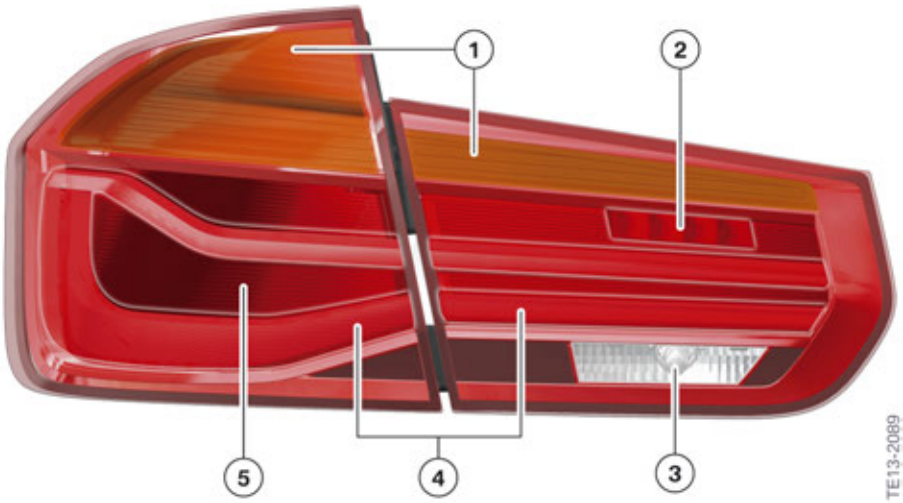
3 Series LCI

4. General Vehicle Electronics

4.3. Rear lights

In the newly designed rear lights, every lighting function - with the exception of the reversing lights - is done using LEDs.

The turn indicators stretch across the entire width of the rear lights to make them easier to see by other drivers.



F30 LCI rear lights

Index	Explanation
1	Turn indicator
2	Fog light
3	Reversing light (H21W bulb)
4	Tail light
5	Brake light

3 Series LCI

4. General Vehicle Electronics

4.4. Assistance systems

4.4.1. Overview

The BMW 3 Series LCI has the following assistance systems:

- Active Driving Assistant (SA 5AS)
  - Lane departure warning
  - Pedestrian warning with city braking function
  - Collision warning with city braking function.
- Parking Assistant (OE 5DP)
- Park Distance Control front and rear (OE 508)
- Surround View (option 5DL)
- High-beam assistant (OE 5AC)
- ACC Stop&Go (SA 5DF)
- Active blind spot detection (option 5AG)
- Speed limit info (OE 8TH)
- Dynamic Cruise Control with braking function (OE 544)

4.4.2. Lane change warning

Thanks to new radar sensors, vehicles can now be detected at speeds of 30 km/h / 18 mph and above.

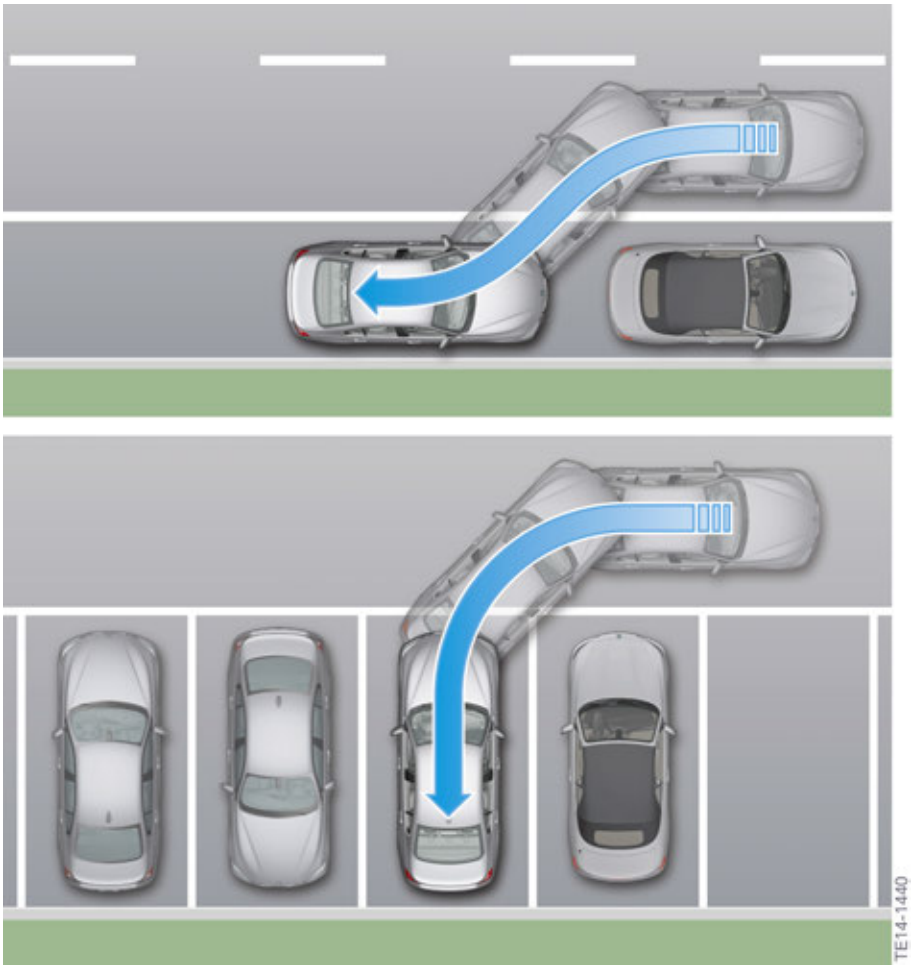
4.4.3. Parking assistant

The first generation of the Parking Assistant (PMA) (OE 5DP) could only park parallel to the roadway between two vehicles (parallel parking), the second generation of PMA can also park perpendicularly (cross parking) to the roadway.

Furthermore, it is no longer necessary for the parking space to be confined by two vehicles. With the second generation of the system, it is also possible to park behind only one object.

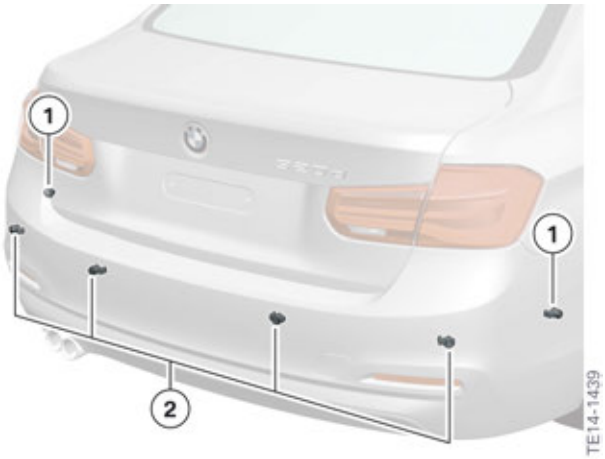
3 Series LCI

4. General Vehicle Electronics



3 Series LCI Parking Manoeuvring Assistant functions

In order to register a parking space perpendicular to the roadway, the 3 Series LCI needs two additional ultrasonic sensors. These ultrasonic sensors are built into the rear bumper on the left and right sides.



F30 LCI ultrasonic sensors, rear bumper

Index	Explanation
1	Ultrasonic sensors in rear bumper, side (PDC sensors)
2	Ultrasonic sensors in rear bumper (PDC sensors)

The acoustic warning of the Parking Manoeuvring Assistant (PMA) is only issued if the detected object lies in the vehicle's path and poses a risk of collision. A continuous alarm is output once the object is closer than 25 cm away.

More information on the new generation of the Parking Assistant (PMA) can be found in the Training Reference Manual ST1502 "F23 Complete Vehicle".

4.4.4. Park Distance Control

Auto PDC

The visual and acoustic warning of obstacles has been optimized in the BMW 3 Series LCI. Park Distance Control (PDC) cuts in with the Auto PDC function automatically, even when the vehicle is driving forwards.

More information on the Auto PDC function is available in the Training Reference Manual ST1502 “F23 Complete Vehicle".

Side protection

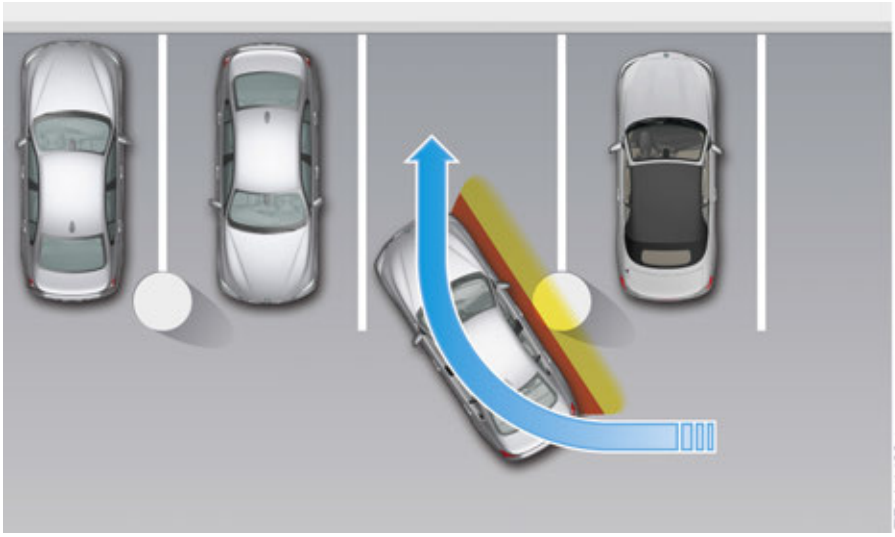
With the side protection, it is now possible to monitor the entire side of the vehicle rather than just the front side and rear side.

The side protection is not a separate optional equipment package, but is included in the 3 Series LCI if the vehicle has the Parking Manoeuvring Assistant (PMA) (OE 5DP) and a Professional navigation system (OE 609) installed.

The side ultrasonic sensors of the Parking Manoeuvring Assistant are used to provide the side protection function.

3 Series LCI

4. General Vehicle Electronics



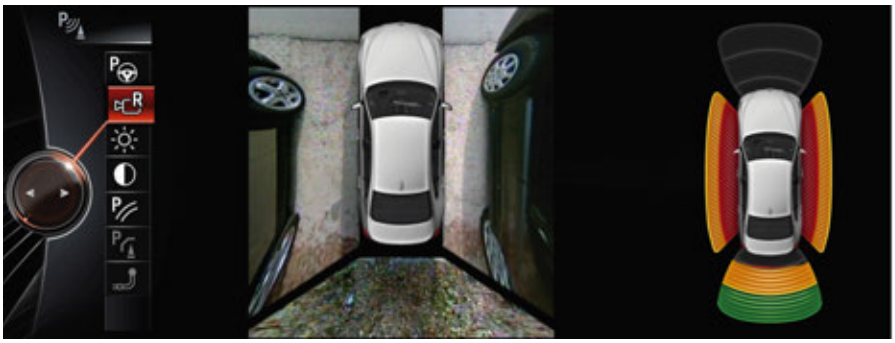
Operating principle of 3 Series LCI side protection

The side protection is activated using the PDC button. The side protection is also enabled any time that Auto PDC is activated. Once enabled, the side protection operates up to a speed of 10 km/h / 6 mph.

The measuring range around the B-pillar and parts of the doors is not monitored by the ultrasonic sensors. Instead this area is imaged using a computer model while the vehicle drives past.

The side protection is not active during an automatic parking manoeuvre by the Parking Manoeuvring Assistant (PMA).

An acoustic warning is only issued if the detected obstacle is lying in the path of the vehicle.
A continuous alarm is output once the obstacle is closer than 25 cm away.



F30 LCI side protection CID display

3 Series LCI

5. Information and Communication

5.1. Headunits

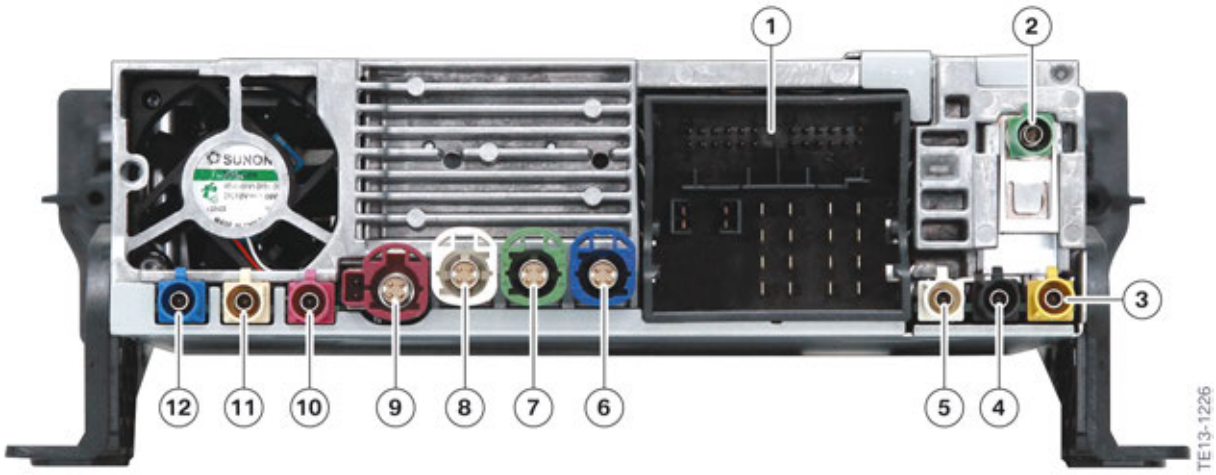
5.1.1. Overview of headunits

Equipment	Head unit	CID	Controller	Navigation
BMW Professional radio (standard equipment)	Head Unit Basis	6,5"	5-button	No
Navigation system Professional (OE 609)	Headunit-High 2	8,8"	7 buttons with touch control panel	Yes

5.1.2. Head Unit Basis

The Head Unit Basic is installed in the BMW 3 Series LCI as standard equipment:

- BMW Professional radio (without navigation)



Rear view, Headunit Basis

Index	Explanation
1	Connection, main connector
2	DAB L band aerial (not US) SADARS in the US
3	DAB Band III aerial (not US) SADARS in the US
4	AM/FM1 aerial
5	FM2 aerial
6	USB2 connection; customer's smartphone via the telephone base plate
7	USB3 connection; connection to the Telematic Communication Box (TCB)
8	USB1 connection; customer access to USB audio interface

Index	Explanation
9	APIX connection to central information display (CID)
10	Preparation of WLAN aerial
11	Connection for Bluetooth aerial
12	GPS aerial

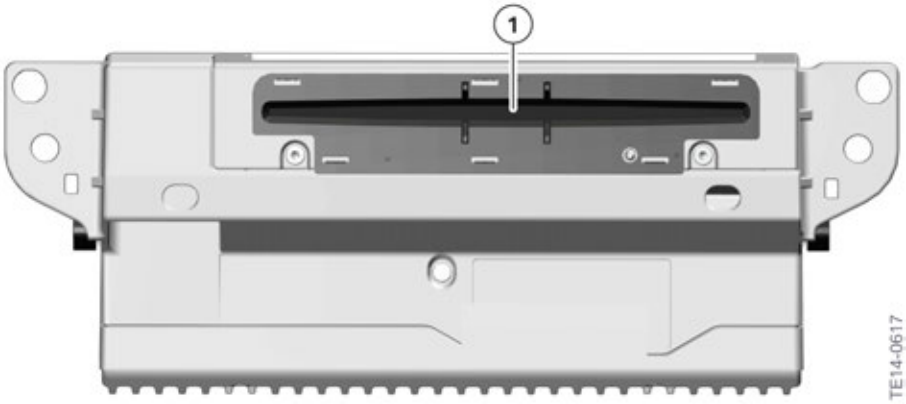
5.1.3. Head Unit High 2

The Headunit High 2 is the model that succeeds the highly successful Headunit High. The operating principle and screen interface in the BMW 3 Series LCI are taken over from the existing Head Unit High.

The Head Unit High 2 is characterized by the following features:

- 1.5" DIN device
- Hard disk with 200 GB storage capacity (adopted from Headunit High)
- Automatic update of map data
- New telematic control unit Telematic Communication Box 2 (TCB2).

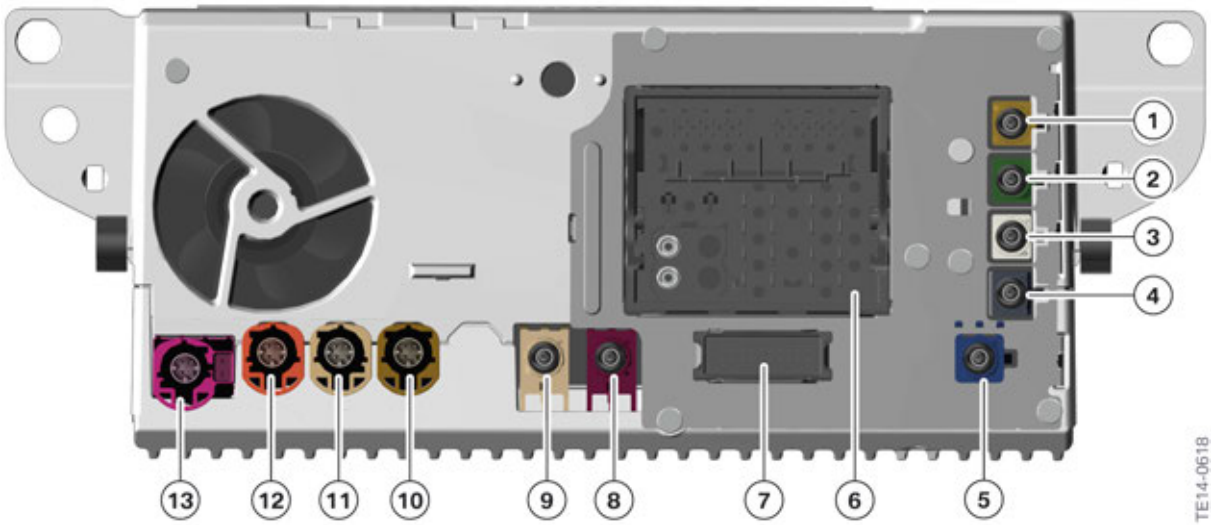
Front view



Front view, Headunit High 2

Index	Explanation
1	DVD drive

Rear view



Rear view of Head Unit High 2

Index	Explanation
1	DAB Band III aerial (not US) SADARS in the US
2	DAB L band aerial (not US) SADARS in the US
3	FM2 aerial
4	AM/FM1 aerial
5	GPS aerial
6	Connection, main connector
7	Ethernet connection; connection to the Telematic Communication Box 2 (TCB2)
8	Connection for WLAN aerial
9	Connection for Bluetooth aerial
10	USB2 connection; customer's smartphone via the telephone base plate
11	USB1 connection; customer access to USB audio interface
12	APIX connection to the instrument cluster (KOMBI) (not assigned in BMW 3 Series LCI)
13	APIX connection to central information display (CID)

More information on the new Head Unit High 2, the updating of map data and the ConnectedDrive Store can be found in the information bulletin "Information and Communication System News I/15".

3 Series LCI

5. Information and Communication

5.2. Telematic Communication Box 2

In combination with a Head Unit High 2 (HU-H2), the BMW 3 Series LCI contains the Telematic Communication Box 2 (TCB2).

Vehicles with a Head Unit Basic continue to be fitted with the TCB.

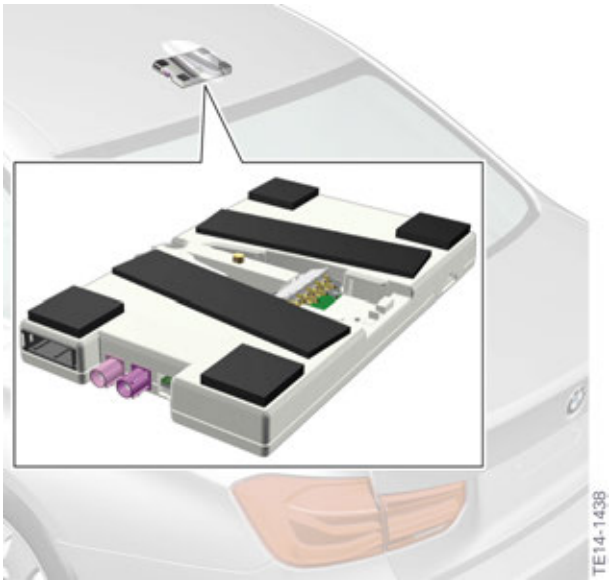
More information on the functions of the TCB2 can be found in the Training Reference Manual "Information and Communication System News I/15".

5.2.1. F31 LCI

The TCB2 in the F31 LCI is exactly the same size as the TCB, which is why the TCB2 is installed in the luggage compartment.

5.2.2. F30 LCI

The TCB2 in a F30 LCI is installed near the roof-mounted aerial between the roof and roofliner, allowing it to be directly connected to the roof-mounted aerial. This makes it possible to reduce conduction losses and electrical interference.

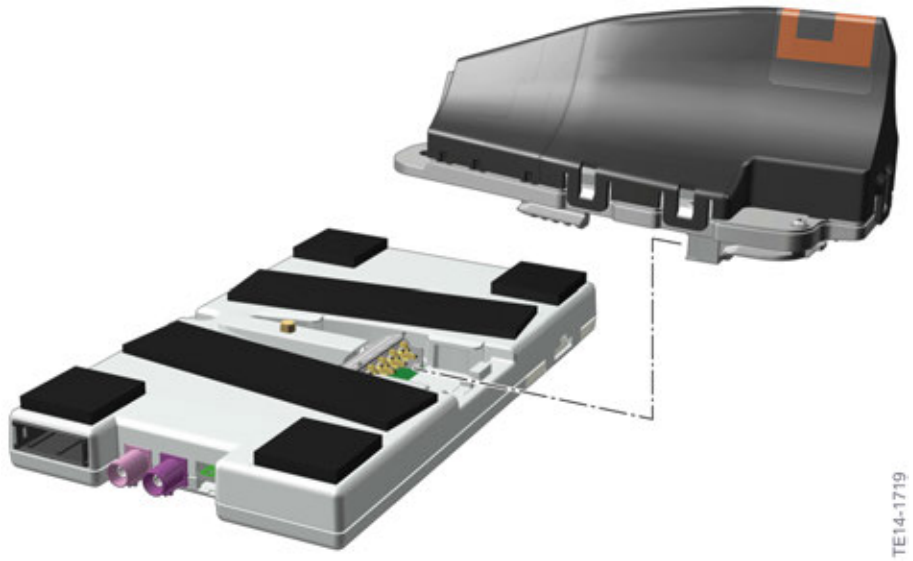


Installation location of Telematic Communication Box 2 (TCB2) in F30 LCI

The TCB2 is locked onto the roof-mounted aerial. In doing so the aerial contacts of the roof-mounted aerial are connected to the connection faces in the Telematic Communication Box 2 (TCB2).

3 Series LCI

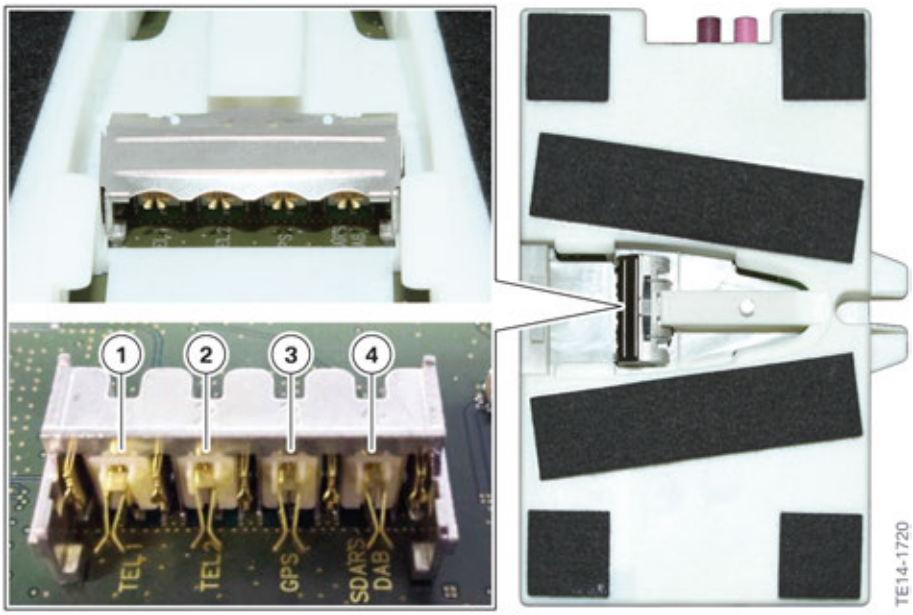
5. Information and Communication



Connection between roof-mounted aerial and Telematic Communication Box 2 in F30 LCI

The emergency GSM aerial is a fixed component of the TCB2 (roof variant).

Connector contacts

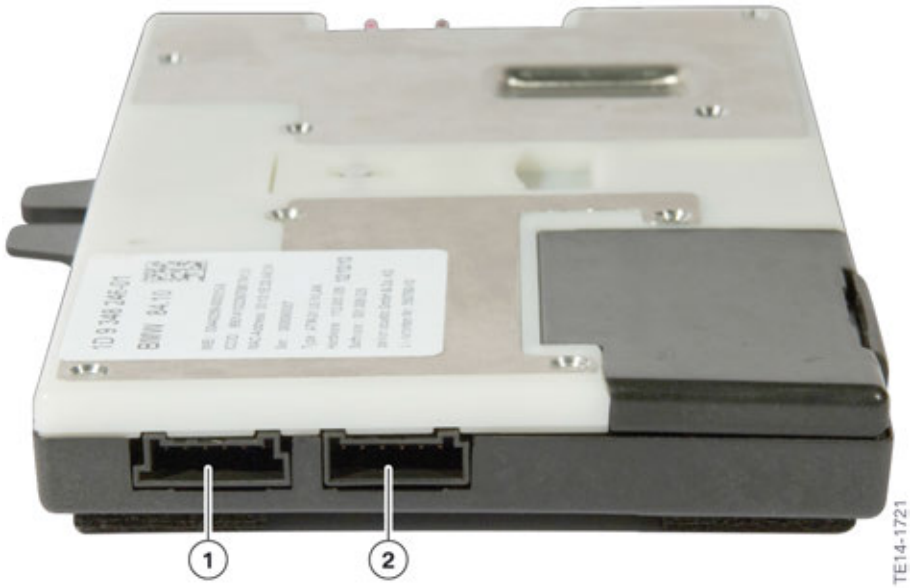


TCB2 contacts

Index	Explanation
1	TEL1 (telephone connection base plate)
2	TEL2 (telematics connection)
3	GPS (navigation)
4	SDARS

Front view

The following graphic shows the front view of the TCB2, including the pin assignment:

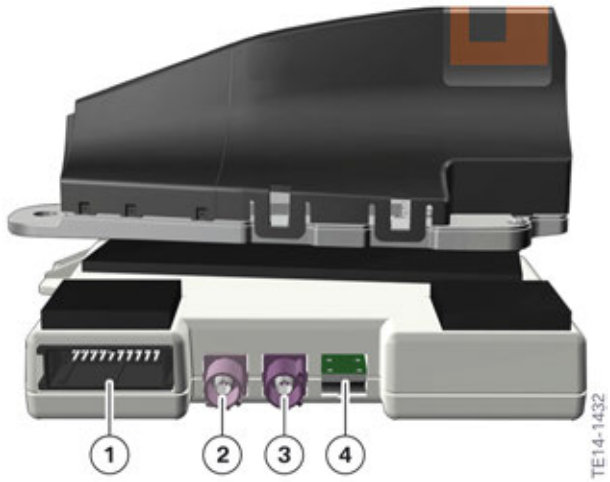


TCB2 Front view

Index	Explanation
1	Emergency call LED; emergency call button; crash signal
2	Emergency loudspeaker; voltage supply

Rear view

The following graphic shows the rear view of the TCB2, including the pin assignment:



F30 LCI TCB2 rear view

3 Series LCI

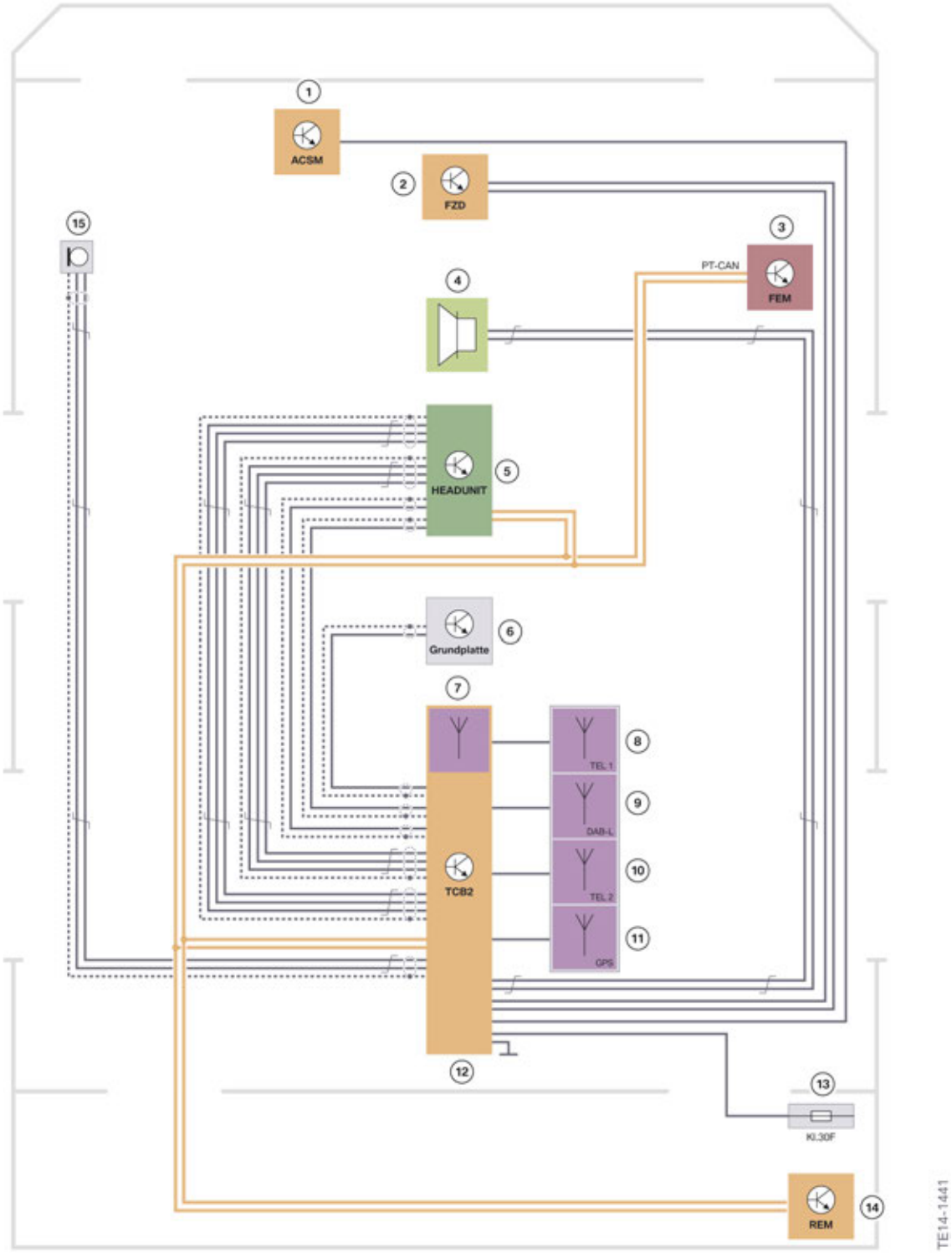
5. Information and Communication

Index	Explanation
1	OABR Ethernet; K-CAN4; driver's microphone (input/output)
2	SDARS
3	Telephone base plate
4	Not assigned

3 Series LCI

5. Information and Communication

System wiring diagram



F30 LCI Telematic Communication Box 2 TCB2, roof variant

Index	Explanation
1	Crash Safety Module (ACSM)
2	Roof function Center (FZD)
3	Front Electronic Module (FEM)
4	SOS speaker
5	Head unit
6	Center console telephone base plate
7	Emergency GSM aerial (in the TCB2)
8	Telephone aerial base plate (roof-mounted aerial)
9	SDARS
10	Telematics service telephone aerial (roof-mounted aerial)
11	GPS aerial (roof-mounted aerial)
12	Telematic Communication Box 2 (TCB2)
13	Fuse
14	Rear Electronic Module (REM)
15	Microphone, driver's side

Long Term Evolution (LTE)

Long Term Evolution (LTE) is a 4th generation (4G) mobile radio standard. LTE can achieve a significantly higher download rate with up to 100 MBit/s. The basic diagram of UMTS is retained for LTE. A quick and reasonable changeover of the infrastructures of the UMTS technology (3G standard) to LTE Advanced (4G standard) is therefore possible.

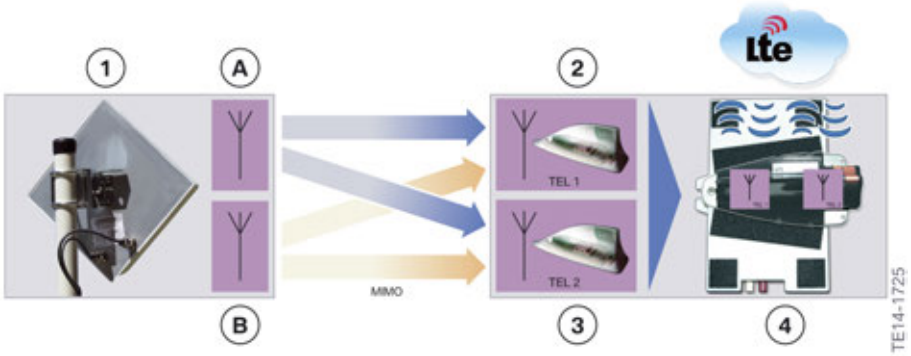
The frequency ranges used differ depending on the region, and vary from about 700 to 2600 MHz. The term "Frequency Division Duplex" is understood as transmission and receiving from cell and base stations on tow different frequency bands: The mobile device transmits, in the Uplink channel, while the base station transmits, in the Downlink channel. Each of the two frequency ranges have a bandwidth of 5 MHz. Expressed simply, this means that 2 transmitters and 2 receivers in each case transmit and receive simultaneously with 2 different frequencies.

With MIMO technology **(Multiple Input Multiple Output)**, it is possible for mobile radio providers to offer data speeds with a low error rate. MIMO is the basis for a special encoding procedure which uses both temporal and also spatial dimensions for information transfer (Space-Time Coding).

As a result, the quality (bit error frequency) and data rate of a wireless connection can be improved significantly. MIMO systems can transmit considerably more Bit/s per Hz bandwidth used, and are thus more efficient than conventional systems. In order to realise the MIMO technology at BMW **bothdata antennas** present in the vehicle area used simultaneously for the first time for the LTE connection. MIMO operates similar to the antenna diversity in the radio system. The signal of both antennas is sent, evaluated and combined to minimize errors and optimize data speed.

3 Series LCI

5. Information and Communication



3 Series LCI LTE reception

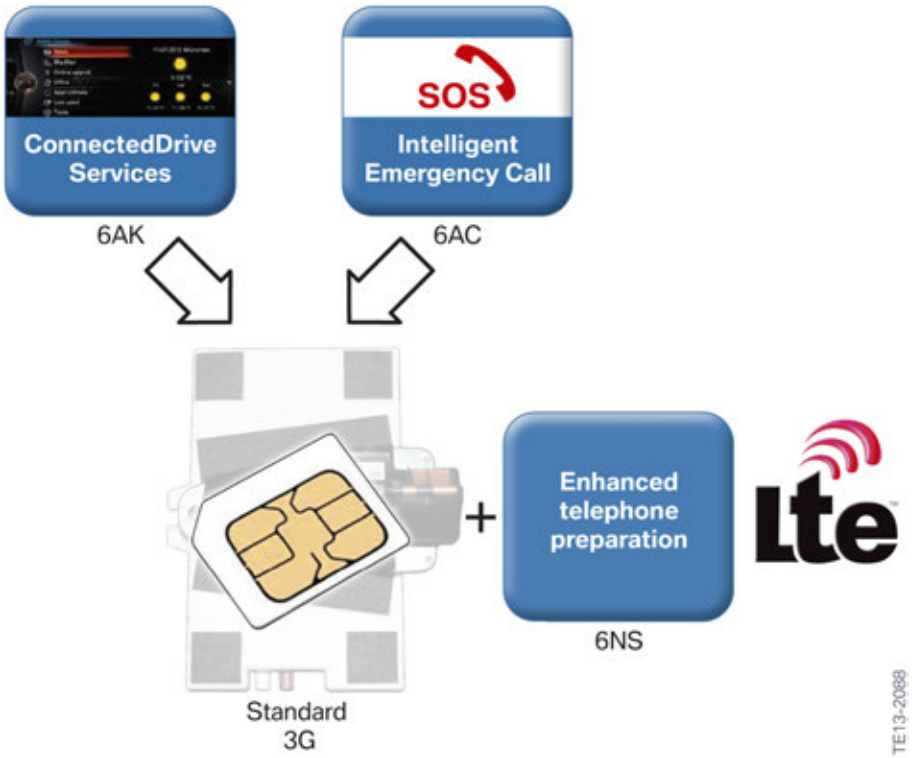
Index	Explanation
A	LTE aerial 1
B	LTE aerial 2
1	LTE transmitter system
2	F30 LCI roof-mounted aerial/F31 LCI emergency GSM aerial for LTE reception
3	Roof-mounted aerial (telematic aerial) for LTE reception
4	Telematic Communication Box 2 (TCB2)

LTE requires two transceiver aerials for the faster data transfer (MIMO principle). Vehicles with a TCB2 in the luggage compartment use the emergency GSM aerial next to the telematics aerial as the second LTE aerial. As the emergency GSM aerial in the F30 LCI is a fixed component of the TCB2, all the aerials needed for LTE reception are built into the roof-mounted aerial.

UMTS reception (3G) is standard equipment in the 3 Series LCI. The 3 Series LCI is only equipped with LTE reception (4G) in vehicles with the optional equipment convenient telephone with extended smartphone connection (OE 6NS).

3 Series LCI

5. Information and Communication



Prerequisite for LTE reception in 3 Series LCI

Bayerische Motorenwerke Aktiengesellschaft
Qualifizierung und Training
Röntgenstraße 7
85716 Unterschleißheim, Germany