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**Technical training.**  
**Product information.**

## **F30 Driver Assistance Systems**



**BMW Service**

Edited for the U.S. market by:  
**BMW Group University**  
**Technical Training**

ST1113

5/1/2012

## General information

### Symbols used

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



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

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### 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 a 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.

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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: **September 2011**  
VH-23/International Technical Training

# F30 Driver Assistance Systems

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# F30 Driver Assistance Systems

## 1. Introduction

BMW has long since offered a comprehensive range of driver assist systems. The driver assist systems facilitate driving of the vehicle by

- Providing the driver with information
- Giving the driver suggestions
- Automatically intervening in the driving process.

This section contains an overview of all driver assist systems available in the F30. There are also new features such as lane change warning.

The centralization of many control units in the FEM and REM. However, the basic principle and the functions of the driver assist systems correspond for the most part to the counterpart systems in the current BMW models.

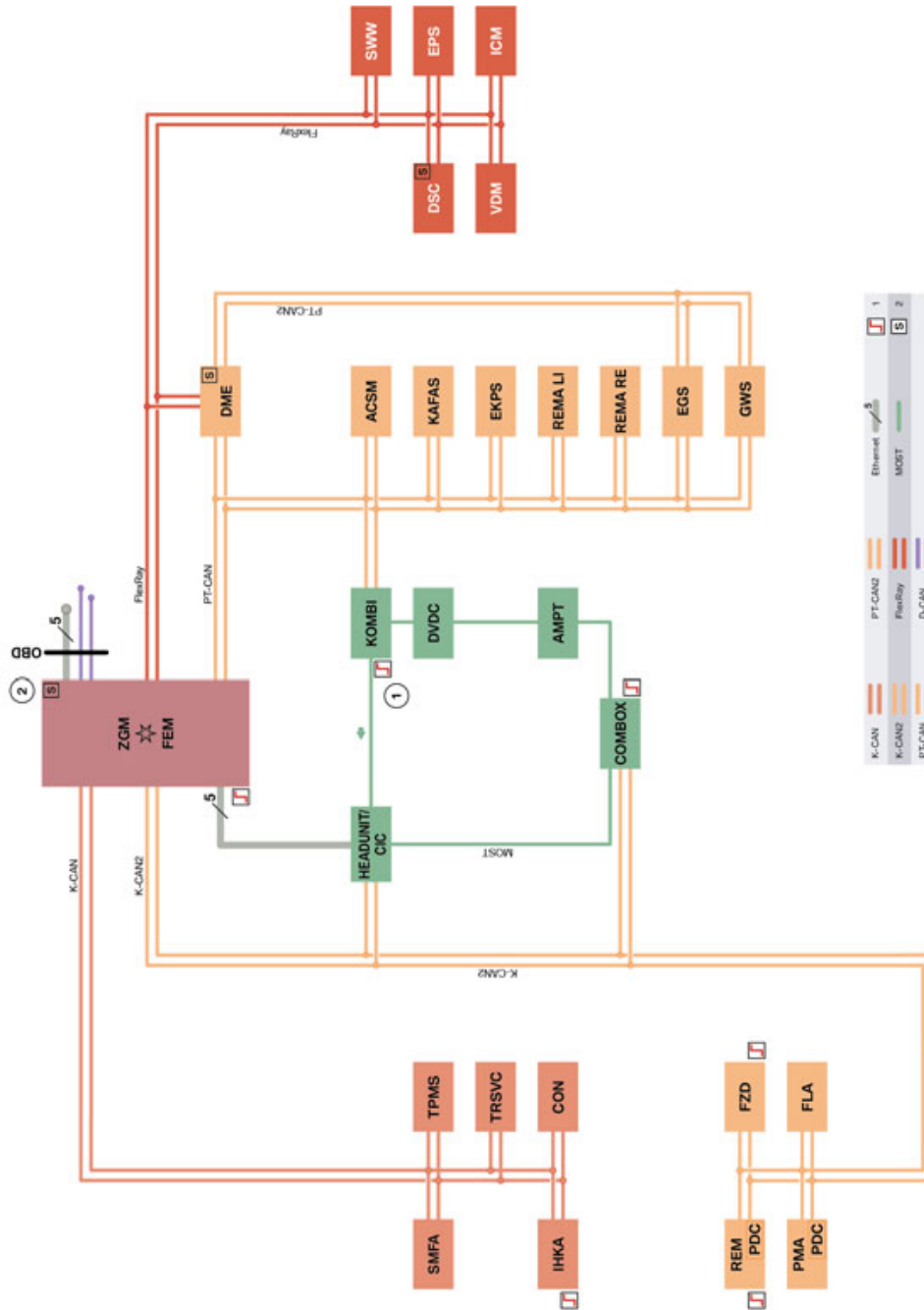
For further information on the individual systems, please refer to the training material for the F01/F02:

- DCC F01/F02
- KAFAS F01/F02.

# F30 Driver Assistance Systems

## 1. Introduction

### 1.1. Bus overview



F30 Bus overview

# F30 Driver Assistance Systems

## 1. Introduction

Index	Explanation
1	Control units with wake-up authorization
2	Start-up node control units for starting and synchronizing the FlexRay bus system
ACSM	Advanced Crash Safety Module
AMPT	Top-HiFi amplifier
COMBOX	Combox (Combox emergency call, Multimedia Combox)
CON	Controller
D-CAN	Diagnosis-on-Controller Area Network
DME	Digital Engine Electronics (DME)
DSC	Dynamic Stability Control
DVDC	DVD changer
EGS	Electronic transmission control
EKPS	Electronic fuel pump control
EPS	Electromechanical Power Steering
Ethernet	Cable-based data network technology for local data networks
FEM	Front Electronic Module
FLA	High-beam assistant
FlexRay	Fast, preset and fault-tolerant bus system for use in automotive sector
FZD	Roof function center
GWS	Gear selector lever
HEADUNIT/CIC	Headunit (Car Information Computer or Basic headunit)
ICM	Integrated Chassis Management
IHKA	Integrated automatic heating / air conditioning
K-CAN	Body controller area network
K-CAN2	Body controller area network 2
KAFAS	Camera-based driver assistance systems
KOMBI	Instrument cluster (MOST only with option 6WA)
MOST	Media Oriented System Transport
OBD	On-board diagnosis (diagnostic socket)
PDC	Park Distance Control (with option 5DP, parking manoeuvring assistant: integrated in the parking manoeuvring assistant control unit, otherwise integrated in the Rear Electronic Module control unit)
PMA	Parking manoeuvring assistant
PT-CAN	Powertrain controller area network
PT-CAN2	Powertrain controller area network 2
RAD	Radio

# F30 Driver Assistance Systems

## 1. Introduction

<b>Index</b>	<b>Explanation</b>
REM	Rear Electronic Module
REMA LI	Reversible electromotive automatic reel, left (not US)
REMA RE	Reversible electromotive automatic reel, right (not US)
SMFA	Seat module, driver
SWW	Lane change warning
TPMS	Tire Pressure Monitoring System
TRSVK	Control unit for all-round vision camera
VDM	Vertical Dynamics Management
ZGM	Central gateway module



# F30 Driver Assistance Systems

## 2. KAFAS

The following camera-based driver support systems are available as optional equipment in the F30:

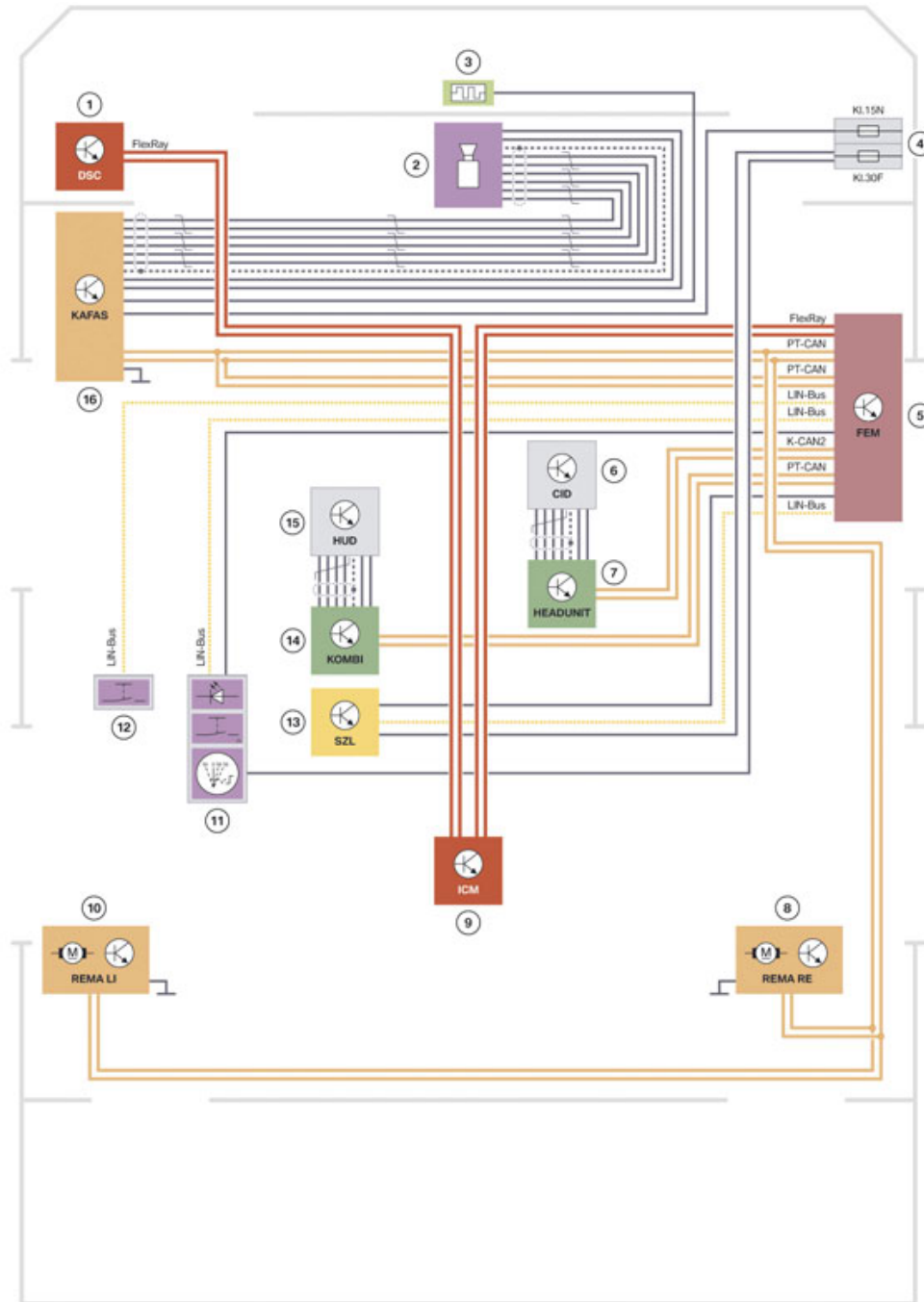
- Lane departure warning including collision warning (option 5AD)
- Road sign recognition (option 8TH Speed Limit Information)
- High-beam assistant (FLA) (option 5AC)

If the customer chooses exclusively the high-beam assistant (FLA) from the optional equipment range, the system is implemented with its own FLA video camera and its own FLA control unit electronics in the inside mirror.

# F30 Driver Assistance Systems

## 2. KAFAS

### 2.1. System wiring diagram



F30 System wiring diagram, KAFAS

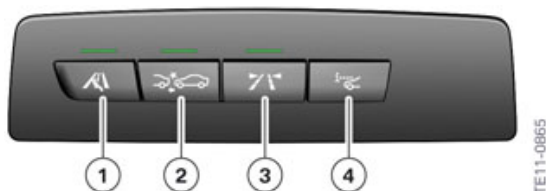
TE11-0863

# F30 Driver Assistance Systems

## 2. KAFAS

Index	Explanation
1	Dynamic Stability Control (DSC)
2	KAFAS video camera
3	Video camera heater
4	Power distribution box, front
5	Front Electronic Module (FEM)
6	Central information display (CID)
7	Headunit
8	Reversible electromotive automatic reel, right REMABF (not US)
9	Integrated Chassis Management (ICM)
10	Reversible electromotive automatic reel, left REMAFA (not US)
11	Operating facility, light switch
12	Operating facility, driver assist systems
13	Steering column switch cluster (SZL)
14	Instrument cluster (KOMBI)
15	Head-Up Display HUD
16	KAFAS control unit
KI.15N	Ignition (after-run)
KI.30F	Terminal 30, fault-dependent

### 2.2. Operating facility



F30 Operating facility, driver assist systems

Index	Explanation
1	Lane change warning
2	Collision warning
3	Lane departure warning
4	Head-Up Display (HUD) button not installed, now in the CIC under "Settings" "Head-Up Display"

# F30 Driver Assistance Systems

## 2. KAFAS

### 2.3. Lane departure warning

The lane departure warning (option 5AD) warns the driver by vibrations in the steering wheel of the inadvertent departure from a given lane. The prerequisite for this is the presence of suitable roadway or lane markings, that can be recognized with the KAFAS video camera of the control unit. The KAFAS video camera is accommodated in the mirror base.

The system can thus support the driver in maintaining his attention. The responsibility for the vehicle remains exclusively with the driver.

The system is designed to support the driver on highways and high-quality country roads. Warnings are therefore only issued at speeds greater than 70 km/h or 43 mph.

The system is activated or deactivated by pressing the button "Lane change warning" in the operating facility of the driver assist systems:

- Activate: LED lights up over the button
- Deactivate: LED goes out over the button.

The state is saved for the ID transmitter currently used.

You can obtain more information on the lane departure warning system in the "KAFAS F01/F02" training information.



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The system cannot replace a personal assessment of the roads and traffic situation. If the warning is issued, do not respond by moving the steering wheel with unnecessary force as this could result in control over the vehicle being lost.

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### 2.4. Collision warning

The collision warning for equipment without ACC is an integral part of the lane departure warning system (option 5AD) and warns the driver of a possible risk of collision. The collision warning is realized with help of the KAFAS system.

#### 2.4.1. Operation

The system is activated or deactivated by pressing the button "Collision warning" in the operating facility of the driver assist systems:

- Activate: LED lights up over the button
- Deactivate: LED goes out over the button.

The state is saved for the ID transmitter currently used.

A display on the CID is opened upon activation of the function. Here the driver can configure the time of the early warning in two stages, or deactivate and reactivate the early warning. The state is saved for the ID transmitter currently used.

# F30 Driver Assistance Systems

## 2. KAFAS

### 2.4.2. Operating principle

The system warns of a possible collision from a speed of approx. 15 km/h or 10 mph in two stages.

The KAFAS video camera records the scenery ahead of the vehicle and uses image processing to detect vehicles and stationary objects in the field of view. The corresponding warning stages are output in critical situations on the basis of the calculated positions, distances and relative speeds of the other vehicles. In addition to the warnings, the vehicle's brakes are prepared for emergency braking in the event of an acute warning. In contrast to forward collision warning with braking function, there is, however, no brake intervention by the system.

When an object is deliberately approached/driven into, the collision warning is issued later so as to avoid unauthorized warnings.

### 2.4.3. Warning function

The warning function corresponds to the collision warning with brake function. The warning function is divided into two stages. It is displayed in the instrument cluster.



Collision warning display in the instrument cluster

#### Early warning

The early warning is issued for example in the event of an approaching risk of collision or if the vehicle is very close to the vehicle in front.

The early warning is indicated by a vehicle permanently illuminated in red in the instrument cluster.

The time of the early warning can be configured in the CID.

#### Acute warning

The acute warning is issued in the event of an immediate risk of collision when the vehicle is approaching another object at a relatively high differential speed. The acute warning cannot be deactivated.

An acute warning is indicated to the driver by a red flashing vehicle in the instrument cluster. In addition, an acoustic warning signal is sounded. The acute warning is a prompt for braking intervention and if necessary for an evasive maneuver.



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The acute warning does not relieve the driver of their responsibility to adapt their driving speed and driving style to the road and traffic conditions.

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# F30 Driver Assistance Systems

## 2. KAFAS



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System limitations mean that warnings may under certain circumstances not be issued or are issued too late or without authorization. The driver must therefore always remain alert and observant so that they can actively intervene at any time so as to avoid the risk of an accident.

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### 2.5. Speed Limit Information

The Speed Limit Detection system is introduced for the first time to the US market with the launch of the F30 in 2012. The option 8TH Speed Limit Information is only available in combination with ZDA option.

**Note: The Driver Assistance (ZDA) option is necessary because it includes the KAFAS control unit. The KAFAS system also incorporates LDW, SLI, Front Collision Warning and High Beam Assistant.**

The current posted speed limit signs are displayed in the instrument cluster and in the Head-Up Display in order to remind the driver not to exceed the legal speed limit. Speed Limit Information function works in combination with the Navigation system (option 609).

**Note: Remember that the driver assumes full responsibility for the vehicle and the speed at which it is operated at all times.**

The control unit for the Speed Limit Information function is the KAFAS control unit.

The KAFAS video camera monitors the road signs at the side of the road and takes into account the information from the Navigation system (when necessary). The display of the top speed limit signs is based on the evaluation of data from the navigation system and the evaluation of image data recorded by the KAFAS video camera.

The KAFAS unit will request the speed limit information from the Navigation only if there are no speed limit signs detected. If the data is not available 3 dashes will be displayed.

The maximum speed allowed of the road currently driven is displayed in the instrument cluster and in the Head-Up Display. If the vehicle does not have HUD, the end user can display the speed limit info by using the BC button. This is similar to how the mpg or miles to empty is displayed (in the same cluster display). If the vehicle has HUD, then it has to be activated in the HUD menu via iDrive. It is important to note here that the option 8TH Speed Limit Information pertains only to the maximum or top speed limit posted on the highway. This has nothing to do with ACC or the speed limit warning which can be set via the iDrive.

# F30 Driver Assistance Systems

## 2. KAFAS



Option 8TH Speed Limit Information displayed in HUD



Option 8TH Speed Limit Information displayed in Kombi



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The system cannot replace the driver's personal assessment of the road and traffic situation. Speed Limit Information supports the driver and does not replace the human eye.

This system was specially adapted to the US market to recognize road speed signs only and thus **will not** recognize stop signs, yield signs or any other signs.

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# F30 Driver Assistance Systems

## 3. High-beam Assistant

The high-beam assistant FLA (option 5AC) assists the customer in the use of the high-beam headlights. Depending on the traffic situation, the prevailing ambient light conditions and which lights on the vehicle have been switched on, the FLA switches on the high-beam headlights automatically and thereby relieves the driver of having to switch on the high-beam headlight manually.

The high-beam headlight can still be switched on and off manually as usual. The driver always has the capability, and indeed the obligation, to override the system whenever the situation requires it.

The high-beam assistant is only activated in the F30 if the light switch is in the switch position "A".

The identification of other road users for automatic dipping of the high-beam headlight is effected with help of a video camera. The video camera or control used depends on whether other KAFAS system components are installed:

- In the combination with a lane departure warning , the high-beam assistant function is realized with the KAFAS video camera and the KAFAS control unit.
- If the customer only selects the high-beam assistant option, this functionality is implemented with a separate FLA video camera and a separate FLA control unit. The video camera and the control unit are installed in a shared housing in the inside mirror.

The FLA video camera is a simplified image sensor that can identify the color and intensity of light.

For more information on the high-beam assistant system, please refer to the "KAFAS F01/F02" training information.



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The high-beam assistant cannot replace a personal decision on the use of the high-beam headlight. In some situations, manual dipping is required as otherwise there is a safety risk.

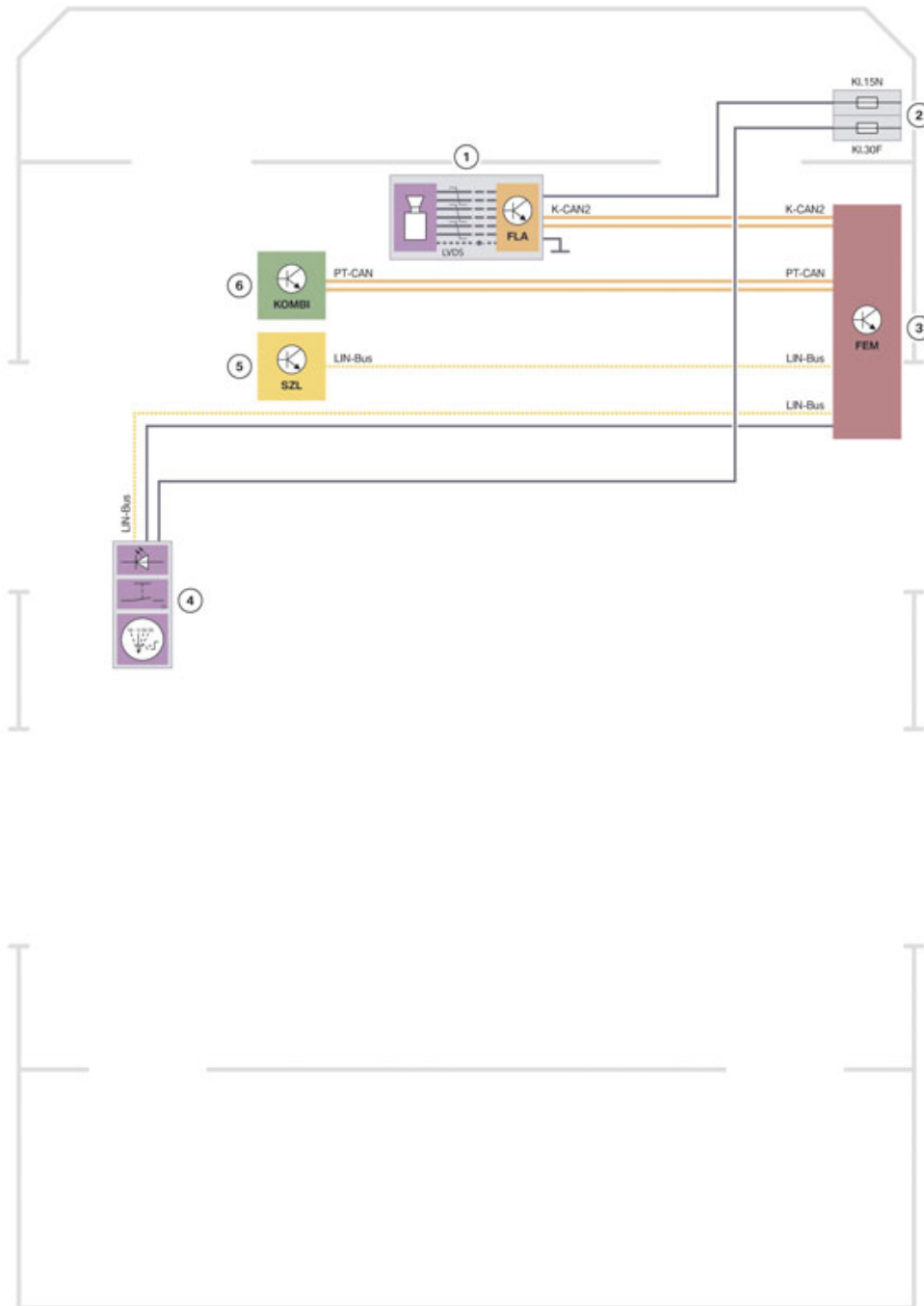
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# F30 Driver Assistance Systems

## 3. High-beam Assistant

### 3.1. System wiring diagram, high-beam assistant without KAFAS control unit



F30 System wiring diagram, high-beam assistant without KAFAS control unit

TE11-0146

# F30 Driver Assistance Systems

## 3. High-beam Assistant

Index	Explanation
1	FLA video camera and FLA control unit in the inside mirror
2	Power distribution box, front
3	Front Electronic Module (FEM)
4	Operating facility, light switch
5	Steering column switch cluster (SZL)
6	Instrument cluster (KOMBI)
KI.15N	Ignition (after-run)
KI.30F	Terminal 30, fault-dependent

The system wiring diagram for the high-beam assistant function with KAFAS is included in the KAFAS system wiring diagram in this training information.

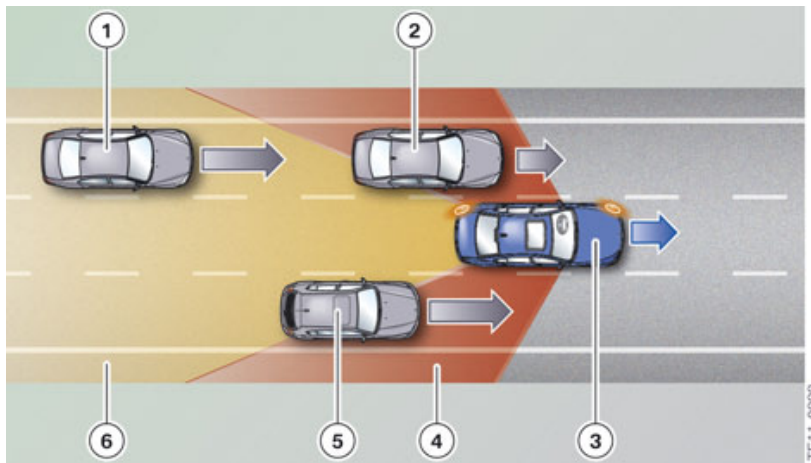
# F30 Driver Assistance Systems

## 4. Lane Change Warning

The lane change warning (option 5AG) informs the driver at speeds above 50 km/h or 31 mph of possible collisions in the event of a lane change.

### 4.1. Operating principle

Two 24 GHz radar sensors located under the rear bumper monitor at speeds above 50 km/h or 31 mph the space behind and beside the vehicle. The radar sensors are largely weather-dependent and can reliably identify vehicles up to a distance of approx. 60 m. In the blind spot range, the radar sensors for the lane change warning identify other vehicles on the Neighboring lane up to roughly the center of own vehicle.



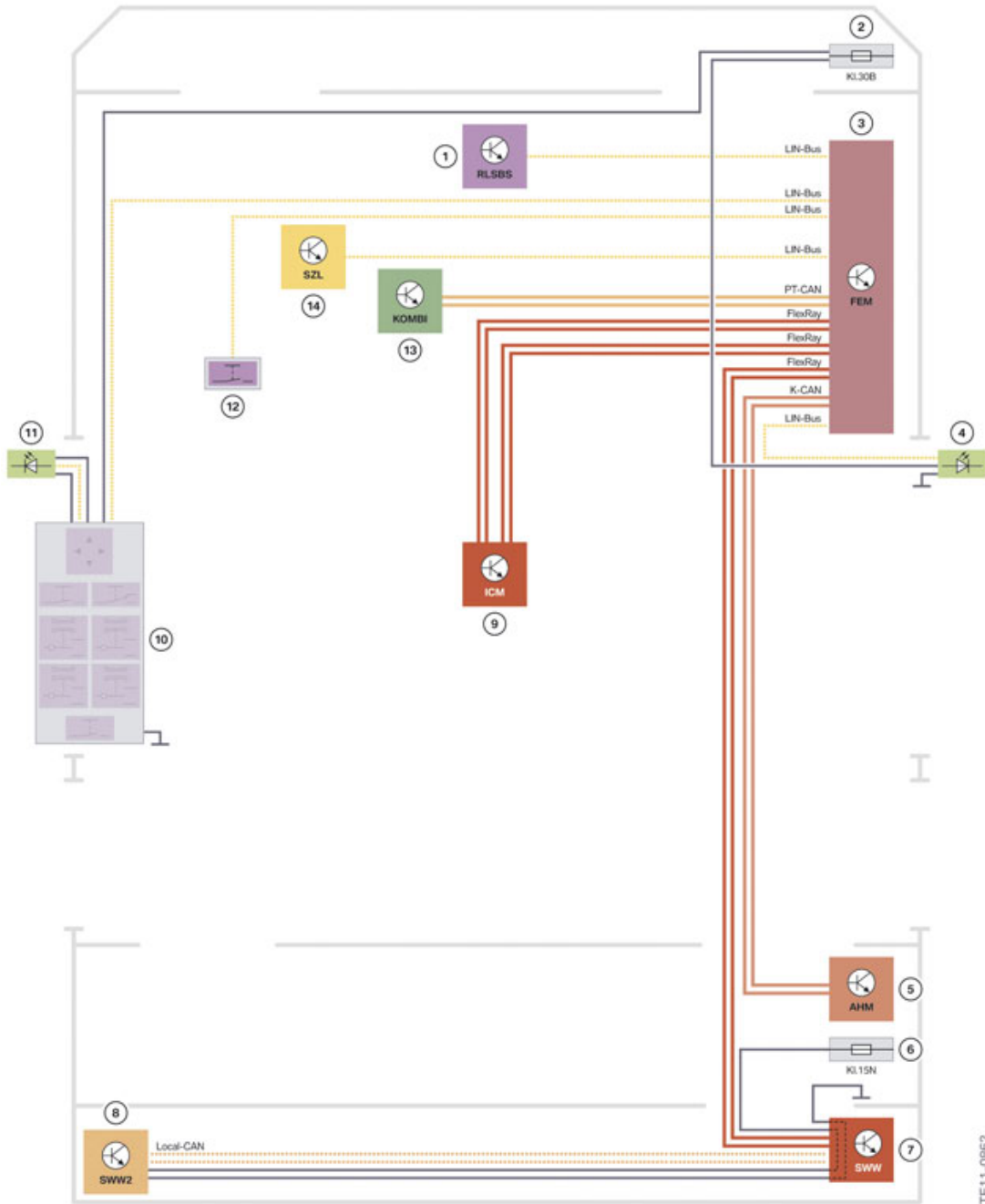
Typical traffic situation for lane change warning

Index	Explanation
1	Approaching vehicle in the left neighboring lane
2	Vehicle in the left neighboring lane driving at the same speed
3	Own vehicle planning to change lane to the left
4	Identification range of the lane change warning in the area of the blind spot (left/right)
5	Faster vehicle in the neighboring lane to the right
6	Identification range of the lane change warning behind the F30

# F30 Driver Assistance Systems

## 4. Lane Change Warning

### 4.2. System wiring diagram



F30 System wiring diagram for lane change warning

TE11-0862

# F30 Driver Assistance Systems

## 4. Lane Change Warning

Index	Explanation
1	Rain-light-solar-condensation sensor (RLSBS)
2	Power distribution box, front
3	Front Electronic Module (FEM)
4	Light in the exterior mirror on front passenger side
5	Trailer module AHM (not US)
6	Power distribution box, luggage compartment
7	Lane change warning radar sensor, SWW master control unit
8	Lane change warning radar sensor, slave control unit SWW2
9	Integrated Chassis Management (ICM)
10	Switch block for driver's side door
11	Light in the exterior mirror on driver's side
12	Operating facility for driver assist systems
13	Instrument cluster (KOMBI)
14	Steering column switch cluster (SZL)
Kl.15N	Ignition (after-run)
Kl.30B	Terminal 30 basic operation

### 4.3. Operation

The system is activated or deactivated by pressing the button "Lane change warning" in the operating facility of the driver assistant systems:

- Activate: LED lights up over the button
- Deactivate: LED goes out over the button.

The state is saved for the ID transmitter currently used.

### 4.4. Warning function

#### 4.4.1. Information level

The LED warning light in the mirror housing displays if vehicles are in the blind spot or are approaching from behind.

# F30 Driver Assistance Systems

## 4. Lane Change Warning



LED warning light in the mirror housing

### 4.4.2. Warning

If the turn indicator is set, while a vehicle is in the critical area, the steering wheel vibrates temporarily and the light in the mirror housing flashes brightly. The warning ends if the turn indicator is reset to the initial position or the other vehicle leaves the critical area.

### 4.5. System limits



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The system cannot replace the driver's personal assessment of the road and traffic situation.

If warnings are issued, do not respond by moving the steering wheel with unnecessary force as this could result in control over the vehicle being lost.

The function can be restricted in the following situations for example:

- Sharp bends or on narrow roadways
  - Heavy fog, rain or snow
  - Dirty or frozen bumper
  - Labels are attached to the bumper
  - The speed of the approaching vehicle is a great deal higher than own speed.
-

# F30 Driver Assistance Systems

## 5. TRSVC

Surround View provides support for parking, manoeuvring and for complex exits and junctions. In the F30 the Surround View optional equipment (option 5DL) is only available in conjunction with the following optional equipment (option 3AG, option 430 and option 508).

The Surround View optional equipment comprises the following systems:

- Reversing camera
- Side View
- Top View.

Top View and Side View are part of the Surround View (option 5DL) optional equipment and are not available individually. The reversing camera can be ordered separately as optional equipment (option 3AG).

The video cameras are connected to the TRSVC control unit via 4-pole low-voltage differential signalling lines. The control unit is connected to the FEM via K-CAN.

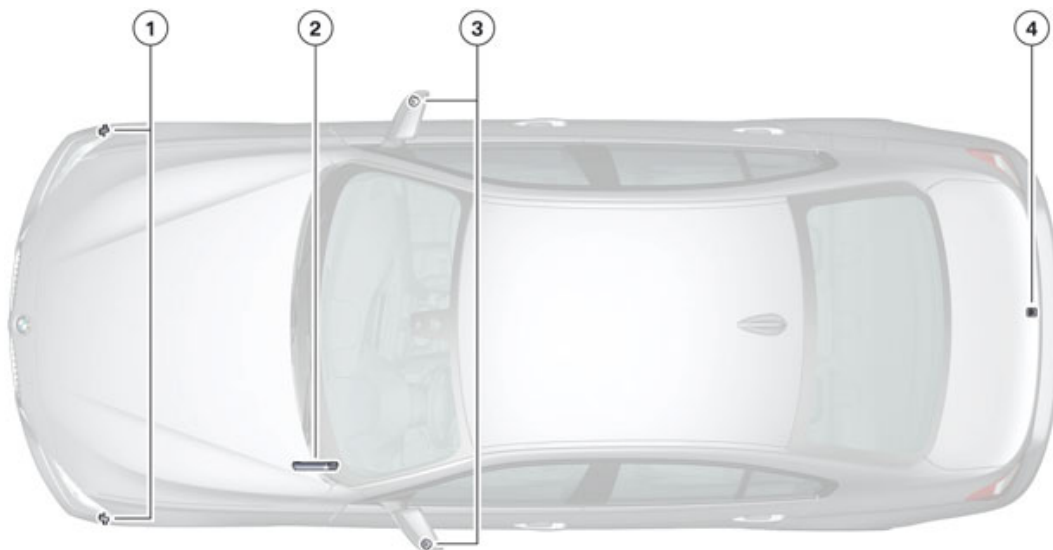
The TRSVC control unit is integrated in the dashboard.

There are two variants of the TRSVC control unit:

- Control unit with a connection for reversing camera
- Control unit with five connections.

The Surround View (SA5DL) optional equipment with five video cameras requires the control unit with five connections. If only one reversing camera (option 3AG) without Surround View (option 5DL) is installed, a control unit with one connection is used.

### 5.1. Installation locations



Installation places of TRSVC components

TE11-0867

# F30 Driver Assistance Systems

## 5. TRSVC

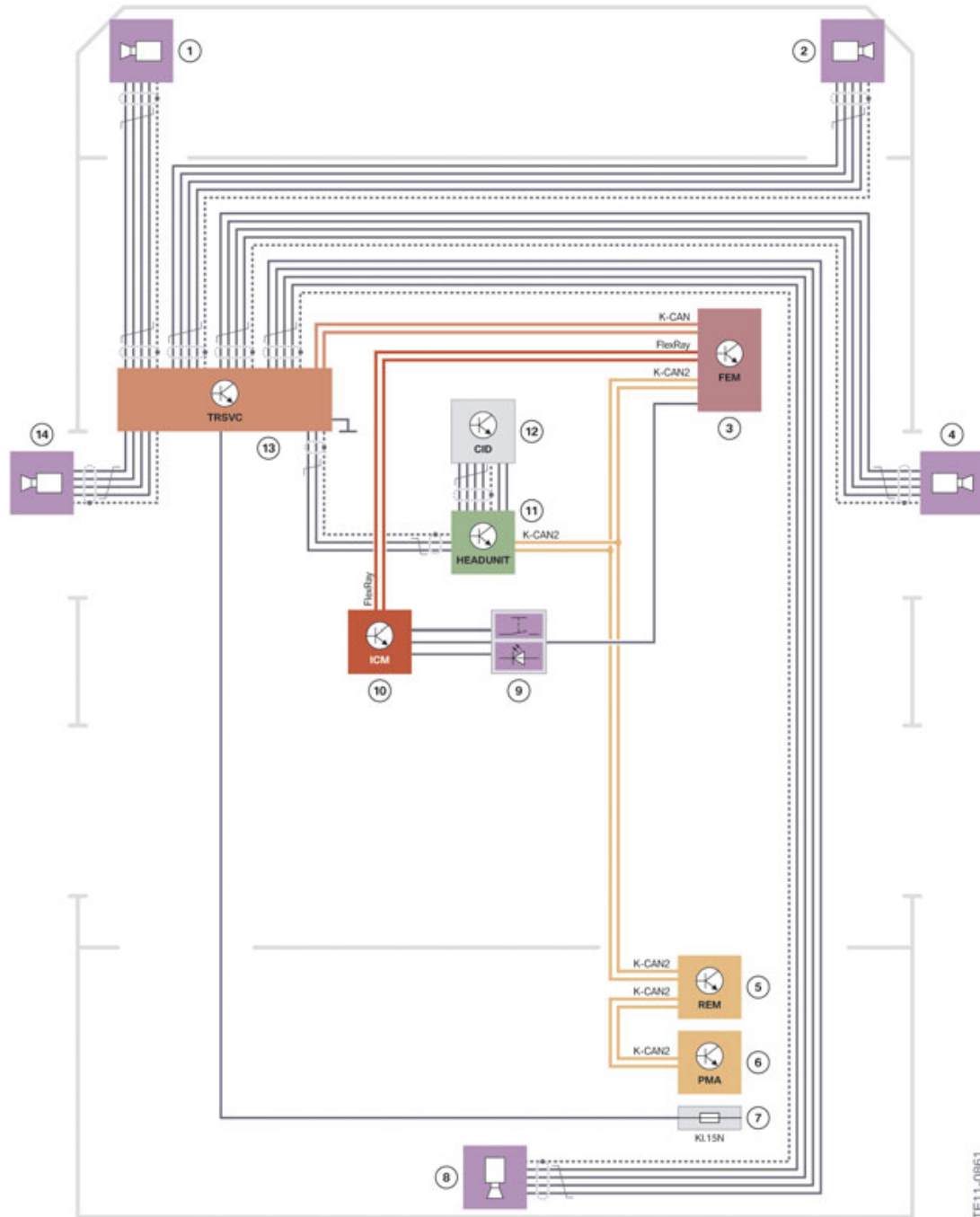
<b>Index</b>	<b>Explanation</b>
1	Bumper camera
2	TRSVC control unit
3	Exterior mirror camera
4	Reversing camera



# F30 Driver Assistance Systems

## 5. TRSVC

### 5.2. System wiring diagram



System wiring diagram for Surround View

TE11-0861

# F30 Driver Assistance Systems

## 5. TRSVC

Index	Explanation
1	Bumper camera, right
2	Bumper camera, left
3	Front Electronic Module (FEM)
4	Exterior mirror camera, right
5	Rear Electronic Module (REM)
6	Parking Manoeuvring Assistant (PMA)_ control unit (only vehicles with option 5DP Parking Manoeuvring Assistant)
7	Power distribution box, luggage compartment
8	Reversing camera
9	Parking assistance button in the center console
10	Integrated Chassis Management (ICM)
11	Headunit
12	Central Information Display (CID)
13	TRSVC control unit
14	Exterior mirror camera, left
KI.15N	Ignition (after-run)

### 5.3. Reversing camera

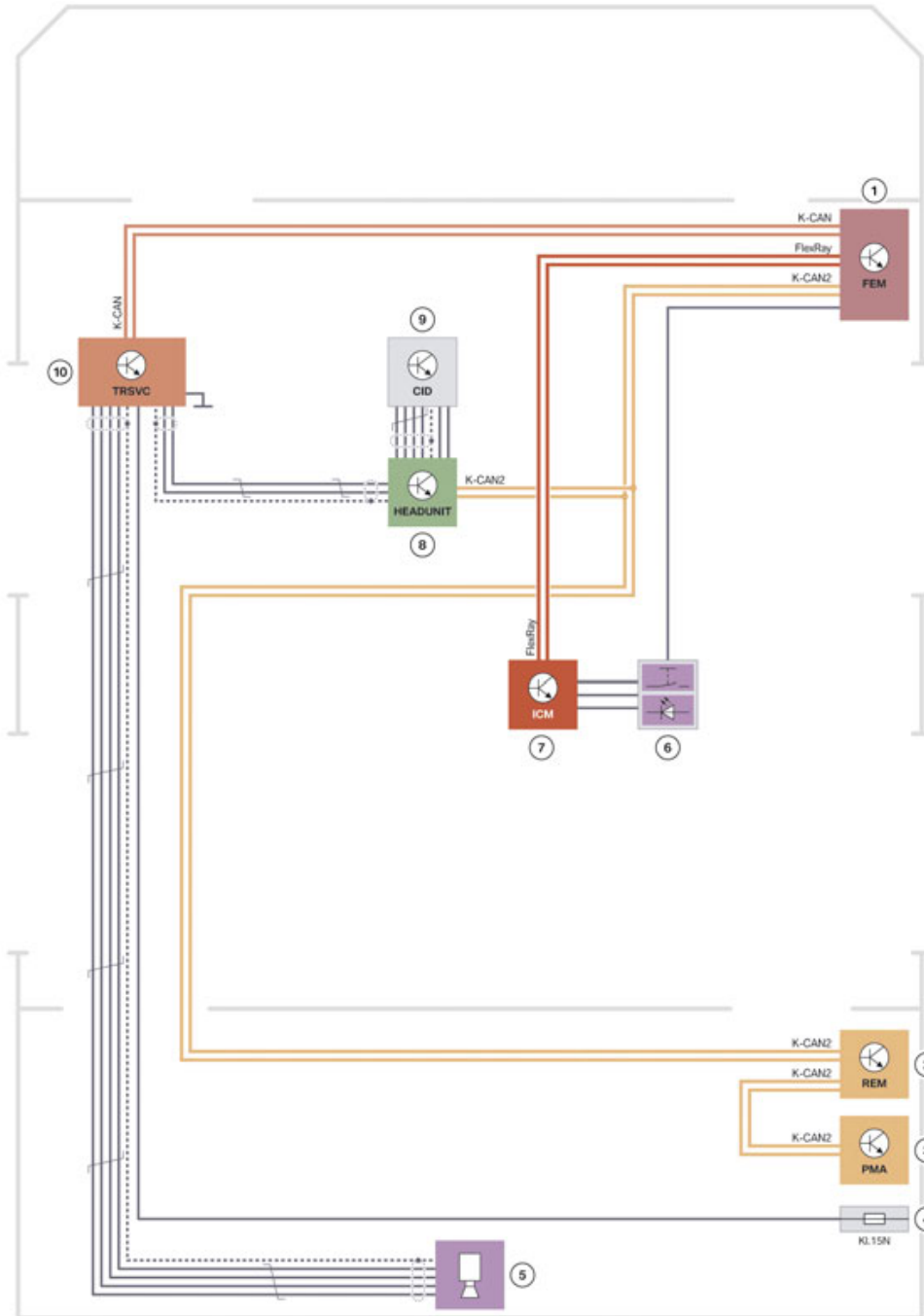
The reversing camera (option 3AG) supports the driver in parking and manoeuvring. The reversing camera is only available in connection with the Park Distance Control PDC (option 508).

The image from the reversing camera is displayed with additional extension lines in the CID.

# F30 Driver Assistance Systems

## 5. TRSVC

### 5.3.1. System wiring diagram



System wiring diagram, reversing camera

TE11-1171

# F30 Driver Assistance Systems

## 5. TRSVC

Index	Explanation
1	Front Electronic Module (FEM)
2	Rear Electronic Module (REM)
3	Parking Manoeuvring Assistant (PMA) control unit (only vehicles with option 5DP Parking Manoeuvring Assistant)
4	Power distribution box, luggage compartment
5	Reversing camera
5	Parking assistance button in the center console
7	Integrated Chassis Management (ICM)
8	Headunit
9	Central Information Display (CID)
10	TRSVC control unit
KI.15N	Ignition (after-run)

### 5.3.2. Camera replacement

These must be taught in after the reversing camera is replaced. The reversing camera of the F30 does not need to be calibrated after teaching-in, as it is self-calibrating. The calibration is effected during the journey by the TRSVC control unit by means of a steering angle sensor and known road markings. Calibration compensates for installation tolerances by shifting and rotating the image.

The maximum time required for a full calibration is five hours. A Check Control message is displayed in the CID if the reversing camera could not be successfully calibrated. Reasons for failed calibration may be incorrect installation, dirt contamination or a defect with the reversing camera. The reversing camera is also constantly readjusted after a full calibration in order to ensure an optimum image.

The opening angle of the reversing camera's lens is 130°.

# F30 Driver Assistance Systems

## 5. TRSVC

### 5.3.3. Installation location



Installation location, reversing camera

Index	Explanation
1	Reversing camera

### 5.4. Top View

Top View provides support when parking and manoeuvring. For this the door and road area of the vehicle is shown on the CID.

The Top View function is realized with the reversing camera and the two exterior mirror cameras.

The opening angle of the lens of the exterior mirror camera, which is installed in the two exterior mirrors, is 173°.

#### 5.4.1. Operation

The operation is effected similar to the reversing camera. The function is automatically switched on if the reverse gear is engaged when the engine is running. The images of the exterior mirror camera and PDC are shown when the system has been switched on via iDrive. The system automatically switches off after 20 m travelled or a speed above 20 km/h or 12 mph. The function can also be manually switched on and off via the PDC button.

#### 5.4.2. Display

The images of the reversing camera and the exterior mirror camera are shown on the CID. In addition, the turning circle lines and driving lane lines known from the reversing camera view are also shown.

# F30 Driver Assistance Systems

## 5. TRSVC



Also check the traffic situation around the vehicle by looking directly. Otherwise there is a risk of accidents for example from road users or objects that lie outside the image range of the camera.

### 5.4.3. Camera replacement

These must be taught in after the exterior mirror camera is replaced. The exterior mirror camera of the F30 does not need to be calibrated after teaching-in, as it is self-calibrating. The calibration is effected during the journey by the TRSVC control unit. Installation tolerances are compensated by the calibration.

## 5.5. Side View

Side View makes possible an early view of the transverse traffic at complex exits and junctions.

Two bumper cameras, which are installed in the wheel arches of the front bumper, record the traffic space at the front side. The two video images of these bumper cameras are shown at the same time on the CID (split screen display). Extension lines on the lower edge of the image show the position of the front of the vehicle.

The bumper camera is a common part for the exterior mirror camera with another lens. The opening angle of the lens is 55°.

### 5.5.1. Operation

To activate the function press the Side View button of the controller. To deactivate press the button again. At speeds above 20 km/h or 12 mph the Side View function is automatically deactivated.



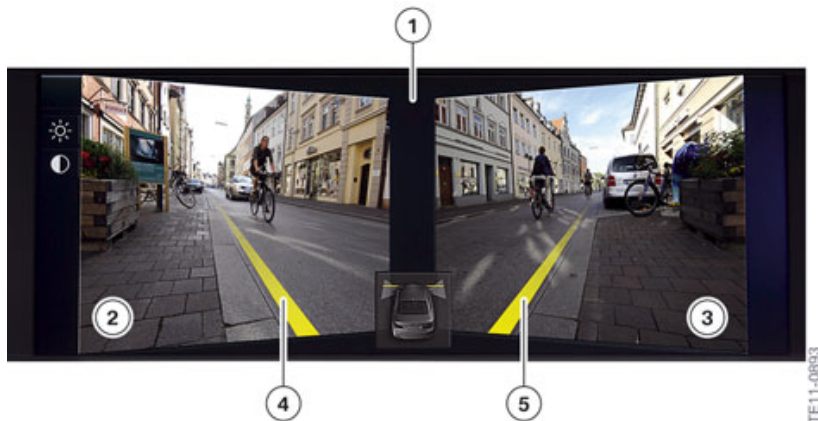
Side View button

Index	Explanation
1	Side View button

# F30 Driver Assistance Systems

## 5. TRSVC

### 5.5.2. Display



F30 screen Side View on the CID

Index	Explanation
1	Split Screen display of the bumper cameras
2	Screen display of the bumper camera, left
3	Screen display of the bumper camera, right
4	Projected front of vehicle in the left view
5	Projected front of vehicle in the right view



Objects may be outside the range of the bumper camera.

For this reason, also check the traffic situation at exits in complex locations by taking a direct look.

### 5.5.3. Camera replacement

These must be taught in after the bumper camera is replaced. The bumper camera of the F30 does not need to be calibrated after teaching-in, as it is self-calibrating. The calibration is effected during the journey by the TRSVC control unit. Installation tolerances are compensated by the calibration.

# F30 Driver Assistance Systems

## 6. Park Distance Control

Park Distance Control (PDC) assists the driver when manoeuvring in and out of a parking space. The current distance from an obstruction is indicated by acoustic signals and on a visual display. PDC is available in the F30 in two variants:

- The PDC front and rear (option 508) utilizes the measured data from four ultrasonic sensors on both the front and rear bumpers.

For vehicles with Parking Manoeuvring Assistant (option 5DP) the PDC sensors are evaluated by the PMA control unit and not the REM.

The PDC is activated by engaging the reverse gear or by operation of the PDC button next to the gear selector switch.

The driver obtains the results of the distance measurement and the distance warning acoustically via the speaker system and optically via the display in the CID.

Further information on the PDC can be found in the training information titled "PDC, TRSVC F01/F02".



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The PDC cannot replace the driver's personal judgement of the traffic situation. Also check the traffic situation by taking a look around the vehicle. Otherwise there is a risk of accidents occurring, due to other road users or objects that are outside the detection range of the PDC for example. Loud sound sources outside and inside the vehicle could drown out the PDC signal.

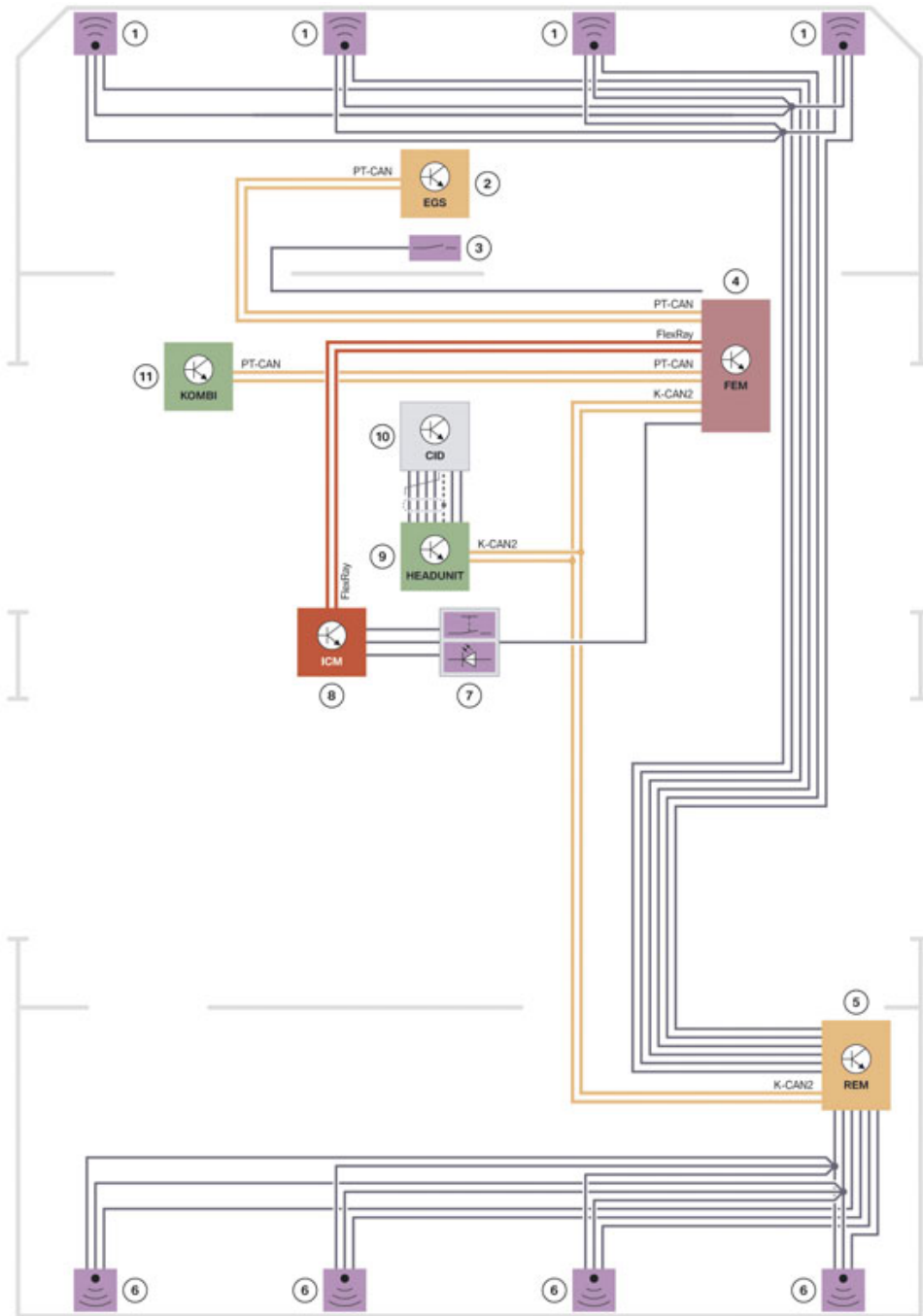
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# F30 Driver Assistance Systems

## 6. Park Distance Control

### 6.1. System wiring diagram



System wiring diagram, PDC

TE11-0149

# F30 Driver Assistance Systems

## 6. Park Distance Control

<b>Index</b>	<b>Explanation</b>
1	Ultrasonic sensors, front
2	Electronic transmission control (EGS) (automatic transmission)
3	Reversing switch (manual gearbox)
4	Front Electronic Module (FEM)
5	Rear Electronic Module (REM)
6	Ultrasonic sensors, rear
7	Parking assistance button in the center console
8	Integrated Chassis Management (ICM)
9	Headunit
10	Central information display (CID)
11	Instrument cluster (KOMBI)

# F30 Driver Assistance Systems

## 7. Parking Manoeuvring Assistant

In the F30 the Parking Manoeuvring Assistant (PMA) is available as optional equipment (option 5DP) in association with the optional equipment Park Distance Control front and rear (option 508).

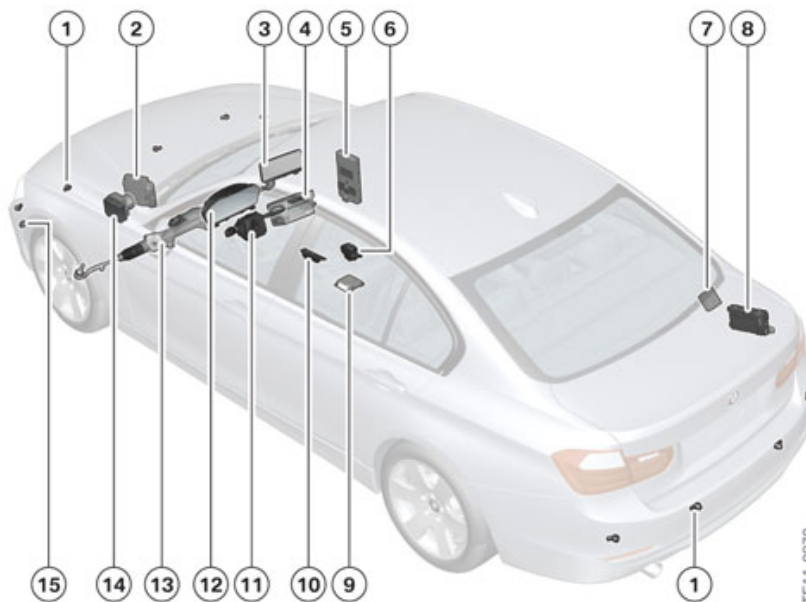
The Parking Manoeuvring Assistant facilitates parking in gaps between cars parallel to the roadway. In the case of straight forwards travel up to approx. 35 km/h or 22 mph, parking spaces are measured regardless if the PMA is activated or deactivated. As soon as a parking space that is approx. 1.2 m longer than the vehicle length is found and the system is already activated, this space is shown to the driver on CID. Later on in the parking process, the Parking Manoeuvring Assistant takes over the steering, with the driver remaining responsible for the acceleration and braking of the vehicle. With instructions and if applicable additional acoustic acknowledgements, the driver is guided through the parking procedure.



The Parking Manoeuvring Assistant does not relieve the driver of personal responsibility during parking.

Directly monitor gaps and the parking procedure and intervene if necessary, as otherwise there is a risk of accidents.

### 7.1. System components



F30 System components of the Parking Manoeuvring Assistant (PMA)

# F30 Driver Assistance Systems

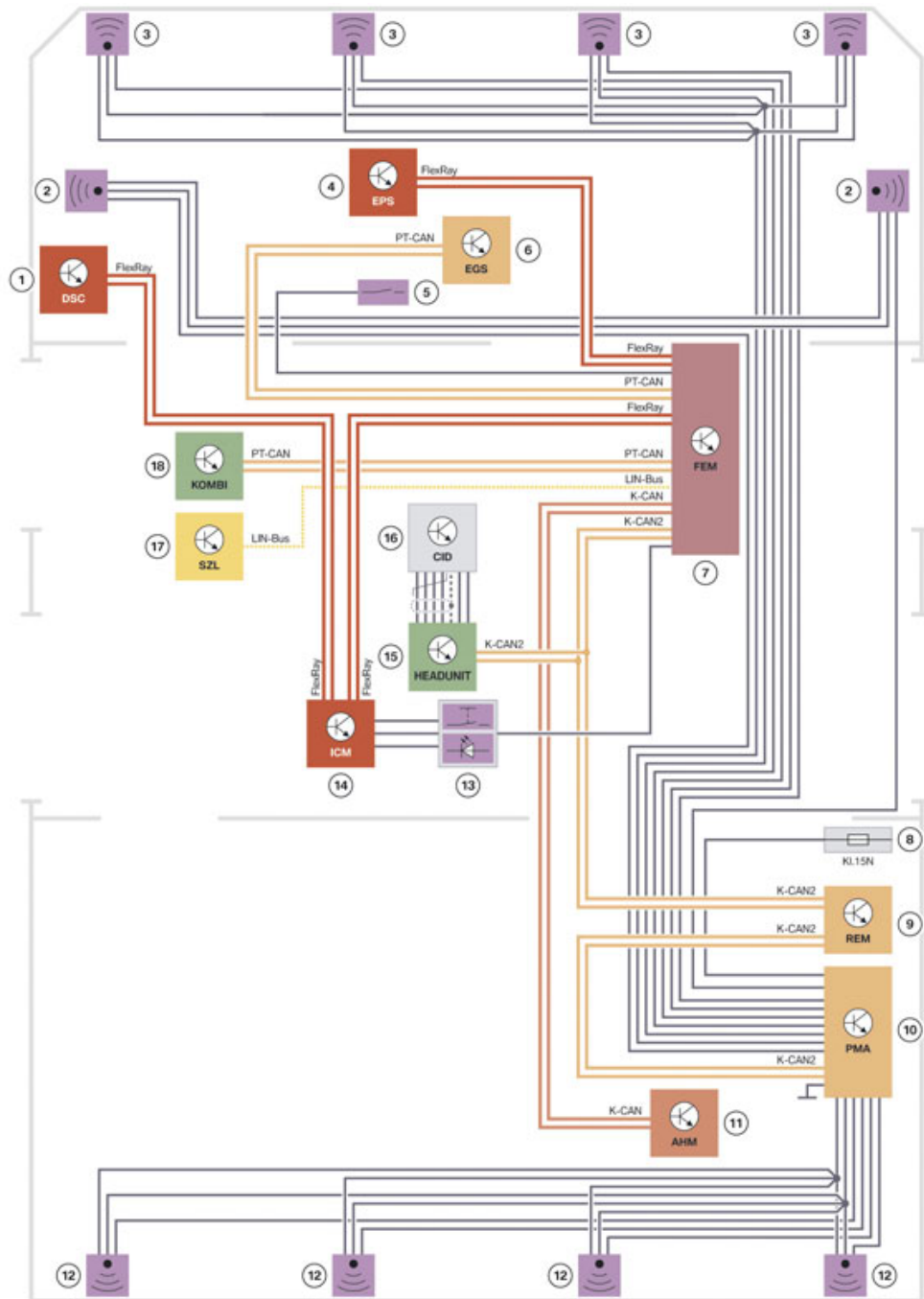
## 7. Parking Manoeuvring Assistant

<b>Index</b>	<b>Explanation</b>
1	Ultrasonic sensors of Park Distance Control
2	Digital Engine Electronics (DME)
3	Central information display (CID)
4	Car Information Computer
5	Front Electronic Module (FEM)
6	Controller
7	Parking Manoeuvring Assistant (PMA)
8	Rear Electronic Module (REM)
9	Integrated Chassis Management (ICM)
10	Operating facility, center console
11	Steering column switch cluster
12	Instrument cluster (KOMBI)
13	Electromechanical power steering
14	Dynamic Stability Control (DSC)
15	Ultrasonic sensor of PMA in wheel arch

# F30 Driver Assistance Systems

## 7. Parking Manoeuvring Assistant

### 7.1.1. System wiring diagram



F30 System wiring diagram for Parking Manoeuvring Assistant

TE11-0147

# F30 Driver Assistance Systems

## 7. Parking Manoeuvring Assistant

Index	Explanation
1	Dynamic Stability Control (DSC)
2	Ultrasonic sensor of Parking Manoeuvring Assistant in wheel arch
3	Ultrasonic sensors, Park Distance Control, front
4	Electronic Power Steering (electromechanical power steering) EPS
5	Reversing switch (manual gearbox)
6	Electronic transmission control (EGS) (automatic transmission)
7	Front Electronic Module (FEM)
8	Power distribution box, luggage compartment
9	Rear Electronic Module (REM)
10	Parking Manoeuvring Assistant (PMA)
11	Trailer module (AHM)
12	Ultrasonic sensors, Park Distance Control, rear
13	Parking assistance button in the center console
14	Integrated Chassis Management (ICM)
15	Headunit
16	Central information display (CID)
17	Steering column switch cluster (SZL)
18	Instrument cluster (KOMBI)
KI.15N	Ignition (after-run)

### 7.1.2. Sensors

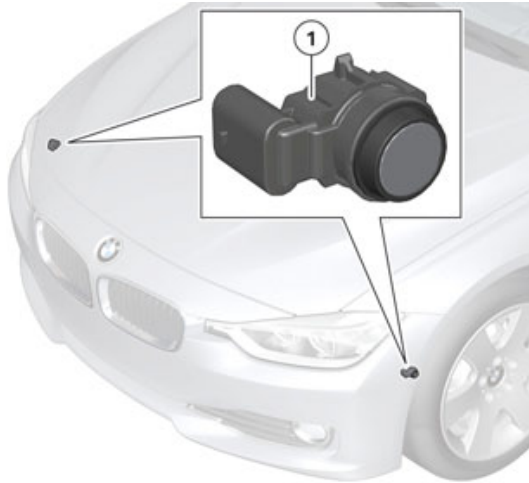
The two ultrasonic sensors for the PMA are integrated in the front wheel arches.

The function of the two ultrasonic sensors is similar to that of the PDC. Ultrasonic pulses are transmitted and echo signals are received. The signals are evaluated by the PMA. The length and width of the gap is calculated from the distance travelled data from the DSC.

In the F30 the ultrasonic sensors for the Parking Manoeuvring Assistant are connected individually to the PMA.

# F30 Driver Assistance Systems

## 7. Parking Manoeuvring Assistant



F30 Installation location of ultrasonic sensor for Parking Manoeuvring Assistant

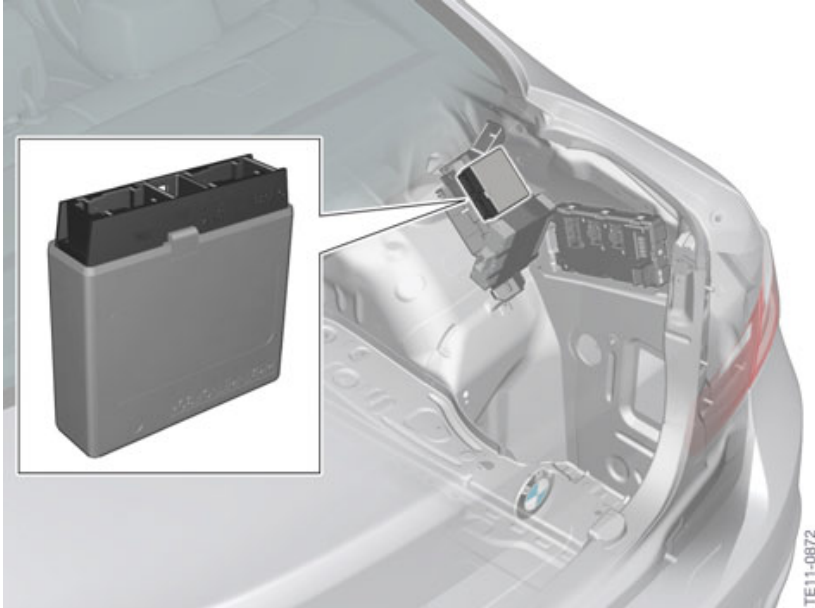
Index	Explanation
1	Ultrasonic sensor for Parking Manoeuvring Assistant

### 7.1.3. Control unit

The control unit for the Parking Manoeuvring Assistant is the PMA. The PMA is located in the luggage compartment behind the side trim panel. It evaluates signals from the sensor and thus identifies possible parking gaps. It also calculates the optimum path into a gap and monitors the parking process. In addition, it controls the electromechanical steering via the ICM.

# F30 Driver Assistance Systems

## 7. Parking Manoeuvring Assistant



F30 Installation location of PMA

### 7.2. Notes for Service

After the PMA or an ultrasonic sensor has been replaced no start-up is necessary. However, the PMA checks with every start-up procedure whether the sensor software is compatible with the control unit software. If this is not compatible, a corresponding fault code is set in the PMA control unit. In this case the service function "update software of ultrasonic sensors" must be performed.

The PMA itself monitors faults and if required makes the corresponding fault code entries. In exceptional cases, this is not always possible. Thus the control unit cannot determine if the ultrasonic sensors (including of the sealing ring) are incorrectly installed or connected, or if there is damage in the vicinity of the ultrasonic sensors. This can lead to customer complaints without fault entries:

- Small gaps are rarely identified
- During parking, the vehicle drives too close or far away from the vehicle in front
- The vehicle is either too far away, too close or against the kerb after the parking procedure
- The vehicle is parked in the gap at an angle.

In this case it must be ensured that the ultrasonic sensors are correctly installed and the possibility of damage of the bumper panel in the vicinity of the ultrasonic sensors must be excluded.



# F30 Driver Assistance Systems

## 7. Parking Manoeuvring Assistant

The Parking Manoeuvring Assistant relieves the driver in two ways. On the one hand, from the task of having to estimate the size of the gap and on the basis of this estimate of deciding whether the gap is large enough. On the other hand, from the task of having to steer into the gap itself. The vehicle is directed solely by the driver. When looking for a parking space and during the actual parking process, all relevant information is made available to the driver via the PDC picture in an integrated screen mask. This includes:

- Results of the parking space measurement
- Status of the Parking Manoeuvring Assistant and corresponding handling information
- Distances to other objects.

This makes it especially easy to monitor the parking procedure and at the same time to check the acceleration.

# F30 Driver Assistance Systems

## 8. DCC

The cruise control with braking function has been used in many BMW models since the BMW 3 Series (E9x). It is also referred to as "Dynamic Cruise Control" (DCC). It relieves the burden on the driver on quiet roads by maintaining a constant speed regardless of the resistance to vehicle motion (gradient, payload). The driver is still responsible for driving the vehicle when using this support. The driver can override the DCC function at any time by braking or accelerating.

The operation is effected via a keypad in the left steering wheel spoke. The current speed is saved by pressing the SET button. The speed is increased or reduced by 1 km/h or .6 mph by touching the rocker switch. Each time the rocker switch is pressed above the pressure point the speed is increased or reduced by 10 km/h or 6 mph

DCC constantly maintains a selected speed from approx. 30 km/h or 18 mph

The brakes are activated during steep downhill driving if sufficient deceleration is not achieved by engine drag torque alone.

In the F30 the cruise control with braking function is implemented in the ICM control unit.

# F30 Driver Assistance Systems

## 9. Head-Up Display

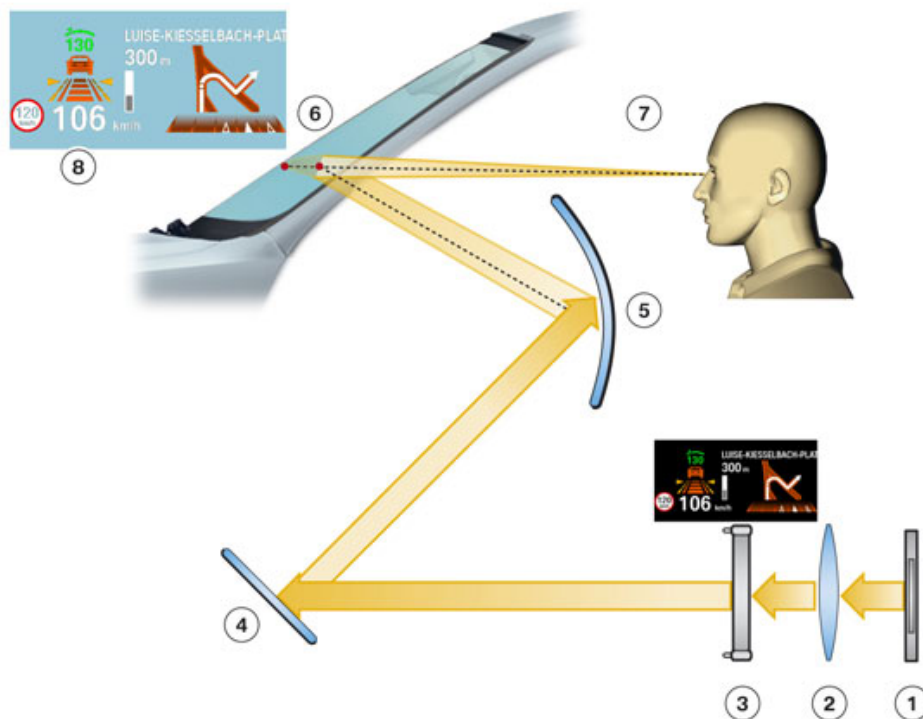
The name "Head-Up" describes the principle benefit of this system. The Head-Up Display (HUD) projects a virtual image into the driver's field of view.

The Head-Up Display (option 610) offers the driver the option of viewing all information relevant for driving directly in the field of view freely floating over the roadway.

The Head-Up Display used in the F30 can project the colors red, green and blue and by mixing these colors enables the projection of image content in all colors of the red/green/blue spectrum. The HUD is not a slave in the K-CAN in the F30, but has no data bus systems. The HUD receives the control signals and the image content from the instrument cluster via an APIX interface. The power supply of the HUD is also effected in the F30 by the instrument cluster.

### 9.1. Operating principle

The HUD is similar to a projector. A light source is required to project the HUD information. Using 15 white LEDs the information is shown on a one color, transparent red/green/blue 1.8" display. The resolution is 480x240 pixels. The image obtained is projected into the area of vision of the driver using several deflection mirrors and the windshield.



HUD operating principle

TE10-1565

# F30 Driver Assistance Systems

## 9. Head-Up Display

Index	Explanation
1	Light source
2	Lens
3	TFT projection display
4	Plane mirror
5	Curved mirror
6	Windshield
7	Observer's point of vision
8	Projected image

The screen mask appears freely floating over the roadway.



F30 HUD screen mask

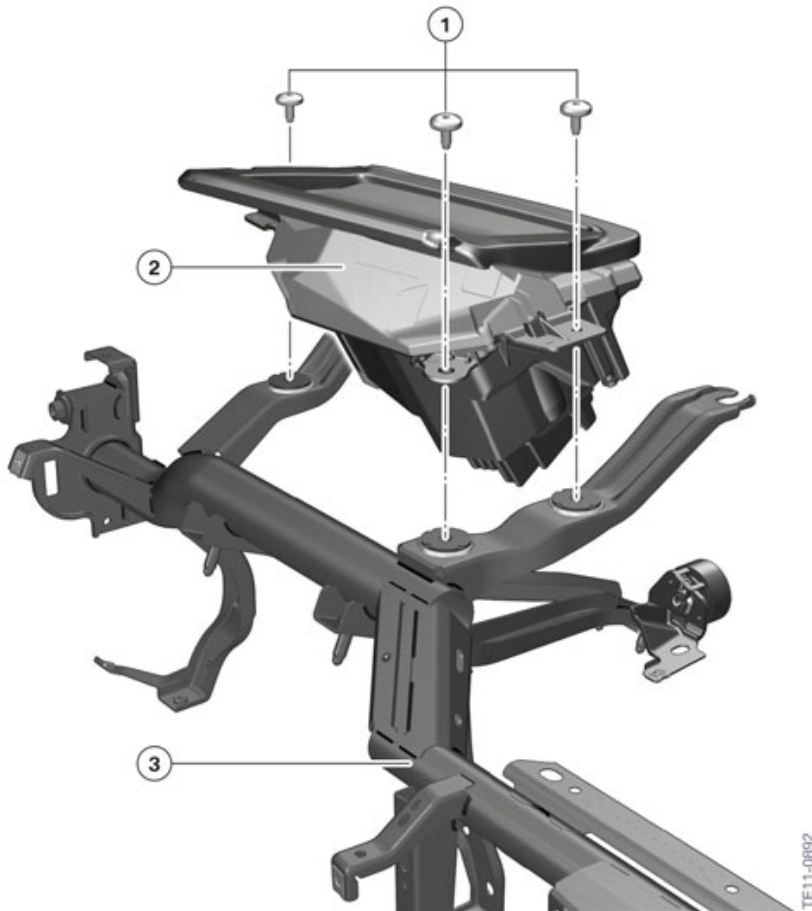
A special windshield is required for the system, whose form enables precise representation. A wedge-shaped windshield prevents the illustration of double images. If the standard windshield was used, double images would be displayed.

### 9.2. Installation location

The head-up display is fitted above the steering column, immediately behind the instrument cluster. It is secured to the bulkhead supporting structure using three screws.

# F30 Driver Assistance Systems

## 9. Head-Up Display



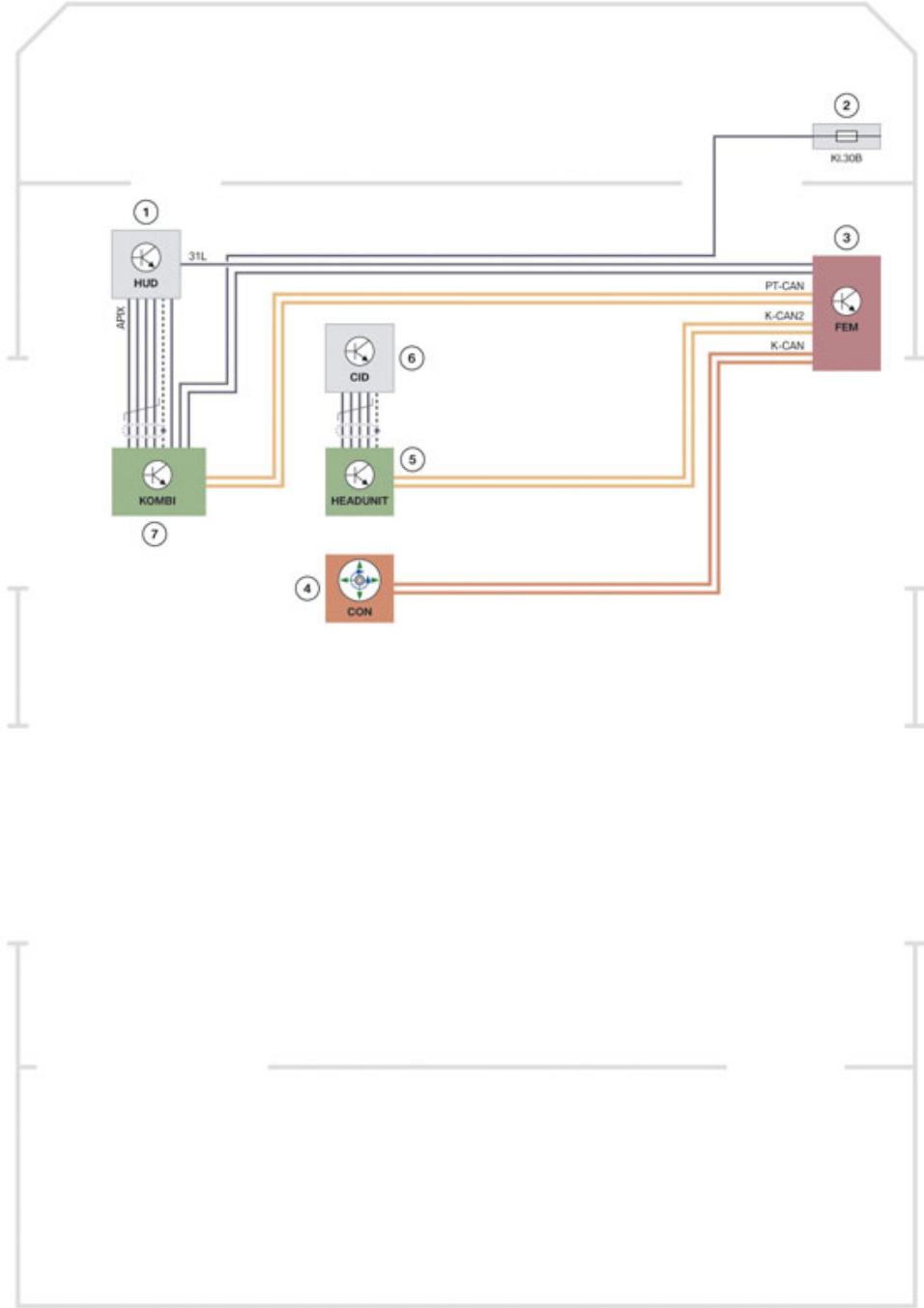
F30 Installation location of HUD

Index	Explanation
1	Screw
2	Head-Up Display (HUD)
3	Carrier bracket

# F30 Driver Assistance Systems

## 9. Head-Up Display

### 9.3. System wiring diagram



System wiring diagram of Head-Up Display

TE11-0850

# F30 Driver Assistance Systems

## 9. Head-Up Display

Index	Explanation
1	Head-Up Display (HUD)
2	Power distribution box, front
3	Front Electronic Module (FEM)
4	Controller (CON)
5	Headunit
6	Central Information Display (CID)
7	Instrument cluster (KOMBI)
Kl.30B	Terminal 30 basic operation

### 9.4. Operation

#### 9.4.1. Switching on/off

The system is activated or deactivated by accessing Settings then "Head-Up Display" in the CIC :

- Activate: with tick mark
- Deactivate: tick mark removed.

#### 9.4.2. Settings

The following settings can be changed using the controller:

- Head-Up Display ON/OFF
- Brightness of display
- Rotation of display
- Height of display
- Displayed information.

### 9.5. Display

The changeover of day design to night design is the same for the display in the instrument cluster.

The following content can be displayed:

- Speed
- Speed setting control of DCC
- Collision warning
- Navigation system
- Check Control messages

# F30 Driver Assistance Systems

## 9. Head-Up Display

- Speed limit information
- Lane departure warning.
- Entertainment lists.

With the exception of the current vehicle speed and the driver assist warning messages, the information displayed can be deselected by the controller.

### 9.5.1. Recognizability of the display

The recognizability of the displays in the Head-Up Display is influenced by:

- The seat position
- Objects on the cover of the Head-Up Display
- Sunglasses with certain polarizing filters
- Wet roadway
- Inadequate lighting conditions.

If the image is displayed blurred, the basic setting should be checked.







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