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E83 Electronic Systems

Model: E83

Production: All

OBJECTIVES

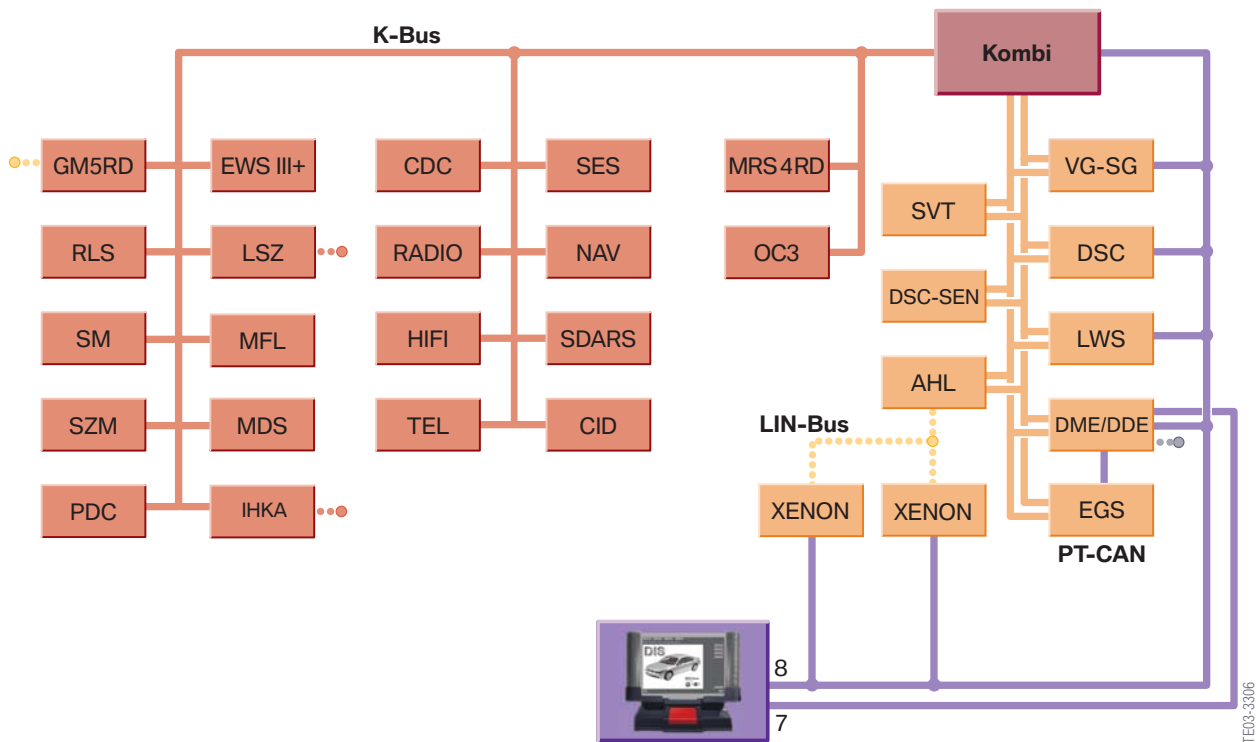
After completion of this module you will be able to:

- Identify and locate electrical components on the E83
- Understand bus system configuration
- Understand various audio system configurations

Voltage Supply and Bus Systems

The E83 electrical system is based on the E46 electrical system and uses many of the components from the E85. The systems have been adapted to the vehicle and their functions improved and extended.

The bus systems configuration of the E83 includes the K-bus, PT-CAN, D-Bus and the LIN bus. The instrument cluster handles the gateway functions.



Bus Systems

The Bus system of the E83 is based on the E46 with minor upgrades.

The following Bus Systems are used on the E83:

- K-Bus
- PT-CAN
- Diagnosis Bus
- Sub-Bus Systems (BSD, LIN, M, Data Interface)

K-Bus

The K-bus links the components of the general vehicle electrical system, the information and communications systems and the safety system. The majority of the systems and components has been taken from other models and adapted to the E83.

A new feature is the control system for the new panorama sunroof (MDS) and the safety system (MRS4RD).

The satellite radio (SDARS) has been adapted to the connection to the K-bus.

The data transfer rate is 9.6 kbit.

PT-CAN

The PT-CAN links the components of the control units for the drive and chassis systems.

Newly incorporated is the VG-SG control unit for the transfer case.

The data transfer rate is 500 kbit.

Diagnosis Bus

The diagnosis bus is connected with two leads to the overall bus system. The PIN 7 diagnostic connector lead is directed to the DME and transfers all the emissions-related data from the engine management system and from the automatic gearbox.

The PIN 8 diagnostic connector is connected to the remaining control units either directly or via the instrument cluster as gateway.

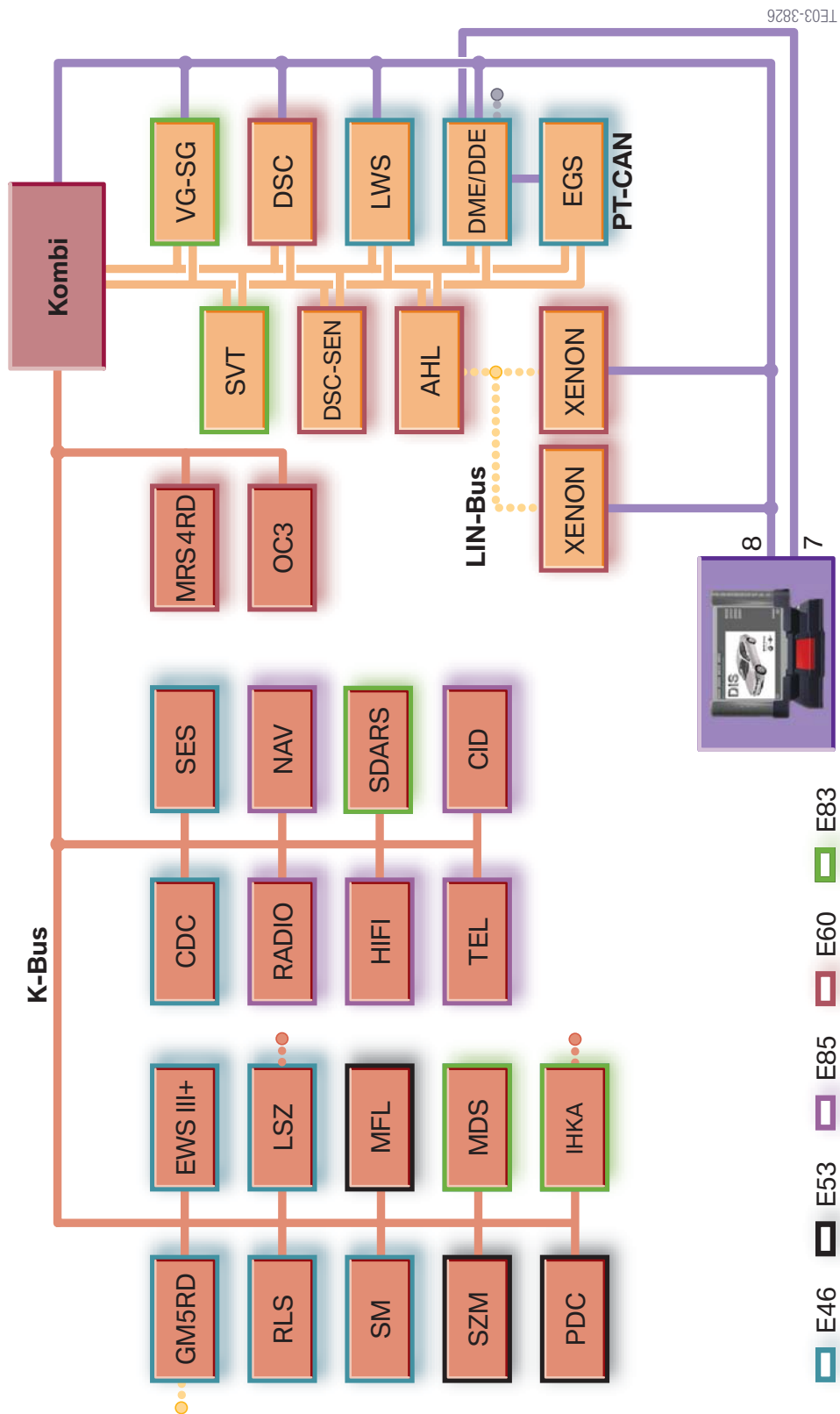
The data transfer rate is 9.6 kbit. The rate of transfer of emissions related data KWP2000* (E-OBD and OBD) is 10.4 kbit.

Sub-Bus Systems

The following sub-buses are used in the E83:

- BSD Bit-serial data interface - connection of electronic engine management and alternator
- LIN Local Interconnected Network - connection of AHL and bi-xenon headlights, connection of GM5 and driver's or door mirror switch block
- M-bus - connection of IHKA/IHKR and stepper motors

E83 Bus Origin Chart



General Vehicle Electrical

Power Supply

Battery

Different vehicle batteries with different capacities are used depending on the engine and equipment specification. The battery is located in the luggage compartment in the spare-wheel recess.

Battery Lead

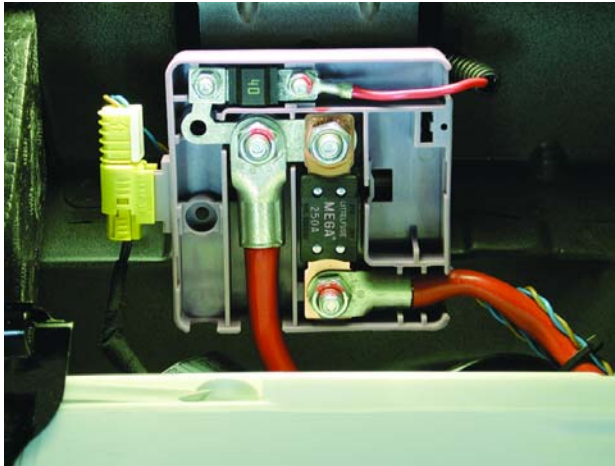
The E83 has different battery leads depending on the engine variant. The B+ battery cable is routed through the interior of the X3, along the floor on the passenger side. The B+ cable is made of aluminum and has a diameter of 80mm².

Fuses

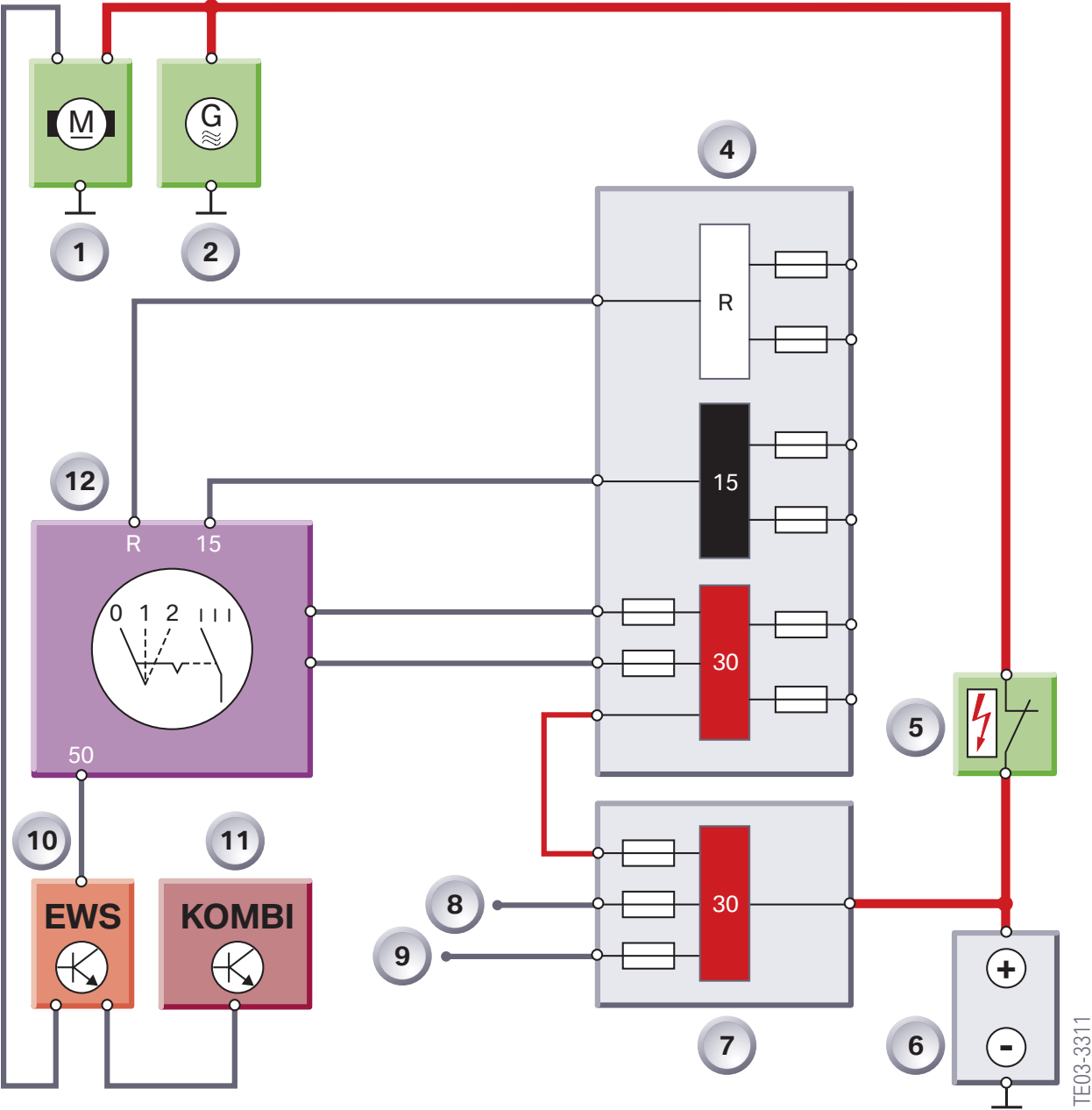
The E83 is equipped with two fuse holders. The luggage compartment fuse holder with the fuse of the front fuse holder is located next to the vehicle battery in the spare wheel recess.

The glovebox fuse holder carries the majority of the fuses. The main fuses for the DME and the ignition/starter switch are located on the rear side of the glovebox fuse holder.

The luggage compartment houses the vehicle battery and the luggage compartment fuse holder. The luggage compartment fuse holder supplies the glovebox fuse holder.



Voltage Supply Schematic



TE03-3311

Legend for Voltage Supply Schematic

Index	Explanation	Index	Explanation
1	Starter	7	Luggage compartment fuse holder
2	Alternator	8	Valvetronic (future use)
3	Not for US Models	9	Top Hifi Amplifier
4	Glovebox fuse holder	10	EWS
5	Battery Safety Terminal (BST)	11	Instrument Cluster
6	Vehicle battery	12	Ignition/Starter Switch

Energy Management

Energy management for the E83 is taken from the E46. The software for regulating the charging voltage is in the DME. In the event of an increased current consumption in the vehicle electrical system, the charging voltage specification can be increased. The charging voltage specification is issued by the DME via the bit-serial data interface to the alternator.

The charging voltage can be regulated as a function of the outside temperature. Thus the battery can be charged to optimum effect. At low temperatures, the charging voltage can be increased to obtain a higher capacity. At high temperatures, the charging voltage is reduced to avoid excessive gassing. The maximum charging voltage is 14.8 V.

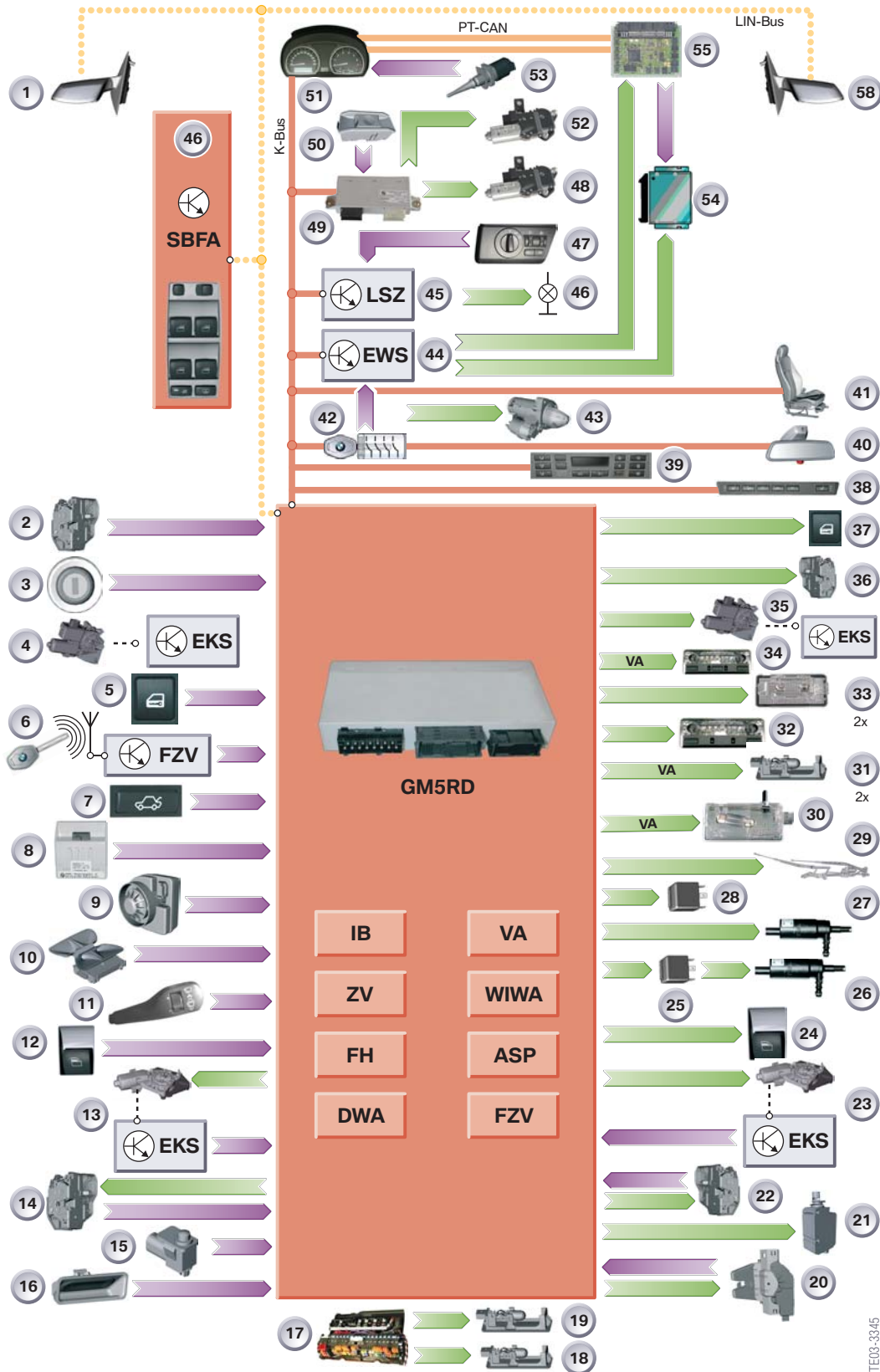
A battery change does not have to be communicated to the DME control unit.

Energy management also features the option of load/consumer shutdown. In the event of excessive current consumption in the vehicle, the power output of the heated rear window can be reduced.

Starter Control

EWS III plus is used in the E83. The basic function of starter control and enabling of DME and EGS has remained the same. With EWS III plus the terminal 50 information is forwarded not from the starter motor but rather directly from the EWS control unit to the instrument cluster. A circuit is hard-wired from the output of the starter relay in the EWS III plus control unit directly to the instrument cluster. In order to avoid erroneous measurements, no sensor values are stored during the starting process.

E83 Electrical System Overview



TE03-3345

Legend for System Overview

Index	Explanation	Index	Explanation
1	Door mirror, left-hand side	33	Footwell lights
2	Central locking, driver's side	34	Ambient lights
3	Lock cylinder, driver's door	35	Power-window motor passenger side front with anti-trap
4	Power window, driver's side with anti-trap protection	36	Central locking, passenger side, front
5	Center-lock button	37	Power-window switch, passenger side, front
6	Central locking system remote control	38	Center console switch center
7	Interior tailgate opening button	39	Integrated automatic heating and air conditioning
8	Tilt sensor	40	Rear-view mirror with rain/light sensor
9	Siren	41	Seat adjustment
10	Ultrasonic interior movement detector	42	Ignition/starter switch
11	Wiper switch	43	Digital motor electronics
12	Power-window switch, driver's side, rear	44	Electronic immobilizer
13	Power-window motor, driver's side rear with anti-trap	45	Light switch cluster
14	Central locking, driver's side, rear	46	Exterior lighting WIWA Wipe/wash system
15	Bonnet contact switch	47	Lights operating unit FH Power windows
16	Exterior tailgate opening button	48	Panorama glass sunroof drive motor
17	Power distributor, front	49	Panorama glass sunroof control unit
18	Vanity mirror light	50	Panorama glass sunroof switch IB Interior Lights
19	Vanity-mirror light	51	Instrument cluster VA Consumer shutdown
20	Central locking, boot lid	52	Panorama glass sunroof drive motor
21	Fuel filler flap central locking	53	Outside temperature sensor
22	Central locking, passenger side, rear	54	EGS
23	Power-window motor, passenger side rear with anti-trap	55	Engine management
24	Power-window switch, passenger side, rear	58	Door mirror, right
25	Headlight cleaning system relay	K-Bus	Body bus
26	Headlight cleaning system pump	LIN	Local Interconnected Network bus
27	Washer fluid pump	PT-CAN	Powertrain CAN
28	Relay, wipe/wash system	ZV	Central locking
29	Wipe/wash system	DWA	Anti-theft alarm system
30	Glovebox light	FZV	Central locking system remote control
31	Luggage-compartment light	CKM	Car and Key Memory
32	Interior/reading lights, front		

General Vehicle Electrical

Introduction

The general vehicle electrical system of the E83 is for the most part based on the central body electronics 5 ZKE 5 of the E46.

The functions of the general vehicle electrical system are comparable to those of the general vehicle electrical system on the E46:

- Central locking
- Power windows, different to the E46
- Wipe/wash system
- Anti-theft alarm system
- Interior Lights
- Consumer shutdown
- Remote control operation
- Door mirror control
- Car and Key Memory

The GM5RD communicates with the following components on the LIN bus:

- Door mirror, driver
- Door mirror, passenger side
- Switch block, driver

The stored positions of the door mirrors are lost if the GM5RD is replaced.

GM5 Redesign

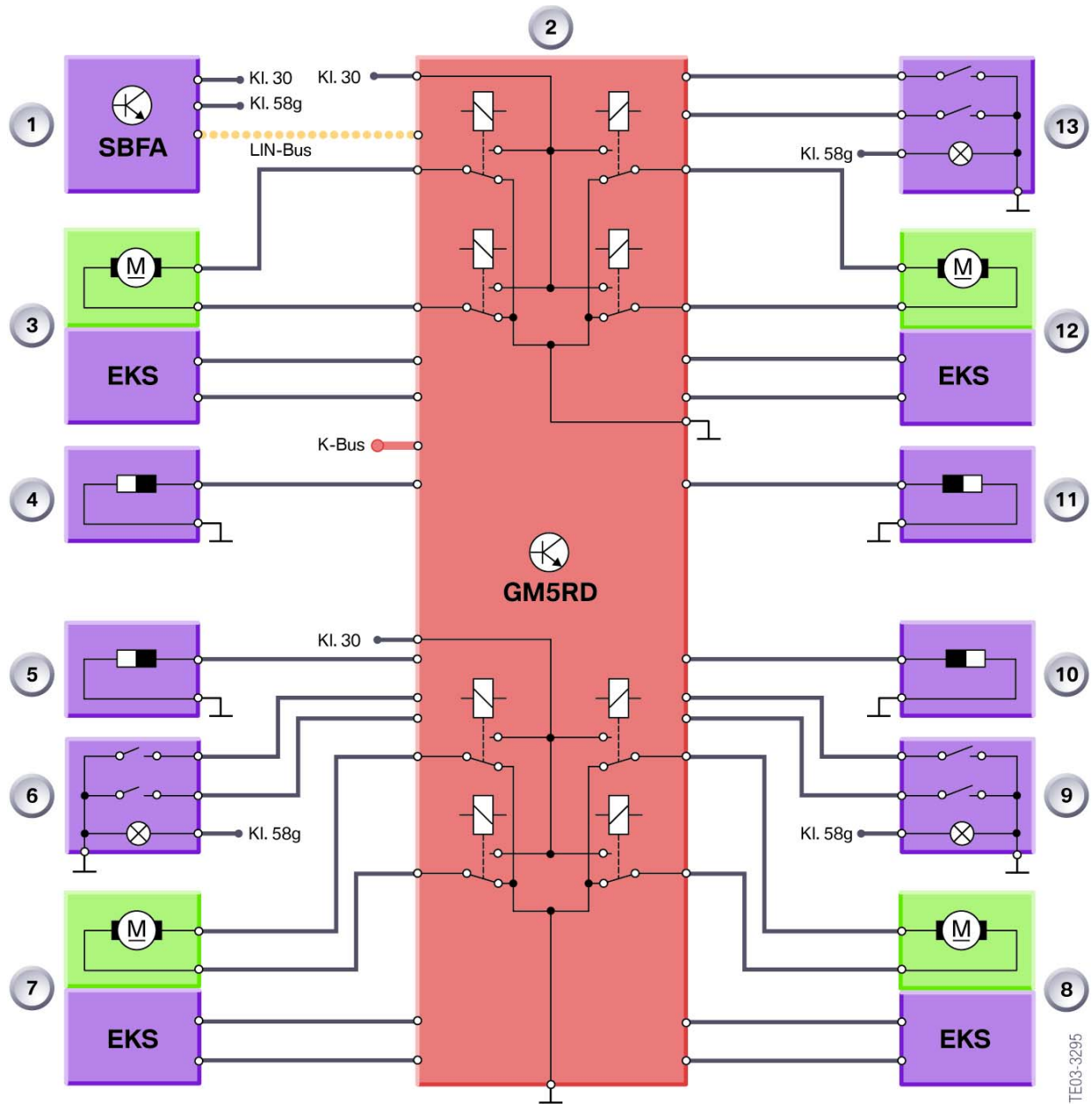
The General Module 5 Redesign (GM5RD) is the heart of the general vehicle electrical system. The GM5RD, which was used on the E85, has been further developed for the E83 with a combined K-/LIN bus module. The K-/LIN bus module is integrated in the GM5RD for operation of the door mirrors.

Power Windows

The power windows of the E83 are controlled by the GM5RD similar to the operation in the E46. The anti-trapping feature has been modified and the anti-trap strip is not used in the E83. Anti-trapping is provided by the EKS electronics included in the individual window motors.

The SBFA (drivers door switch block assembly) is connected to the GM5RD via the LIN Bus. The passenger door switch and both rear door switch assemblies are connected directly via hard-ware to the GM5RD.

Power Window Schematic

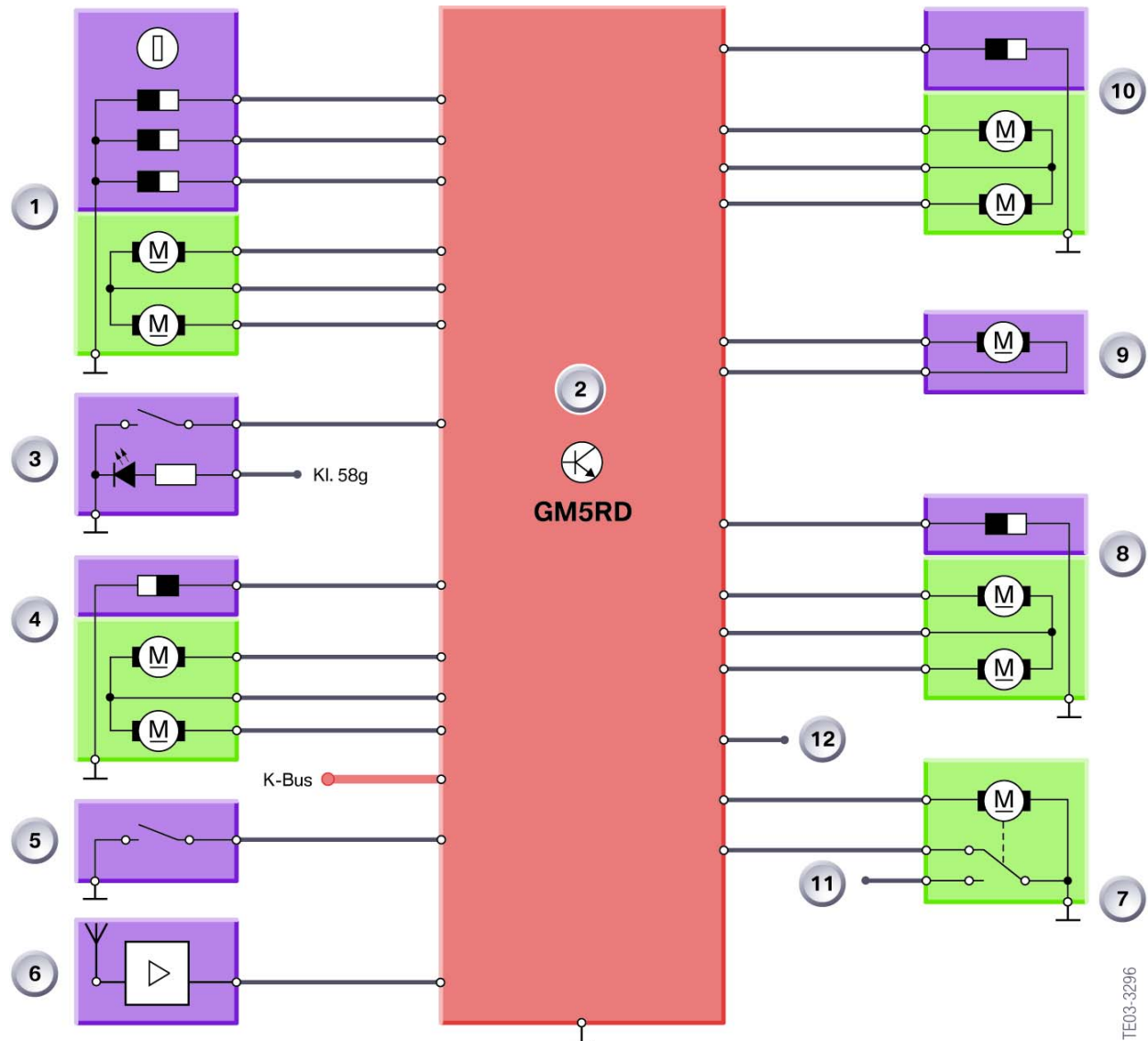


Index	Explanation	Index	Explanation
1	SBFA	8	Passenger rear door power window motor
2	GM5RD	9	Passenger rear window switch
3	Driver's power window motor	10	Passenger rear door contact switch
4	Driver's side door contact	11	Passenger door front contact switch
5	Driver's side rear door contact	12	Passenger front power window motor
6	Driver's side rear window switch	13	Passenger front window switch
7	Driver's side rear power window motor		

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Central Locking

The functions of the Central Locking system is the same as those on the E46. The GM5RD is the master control unit for the central locking system, and all requests are processed through the GM5RD.

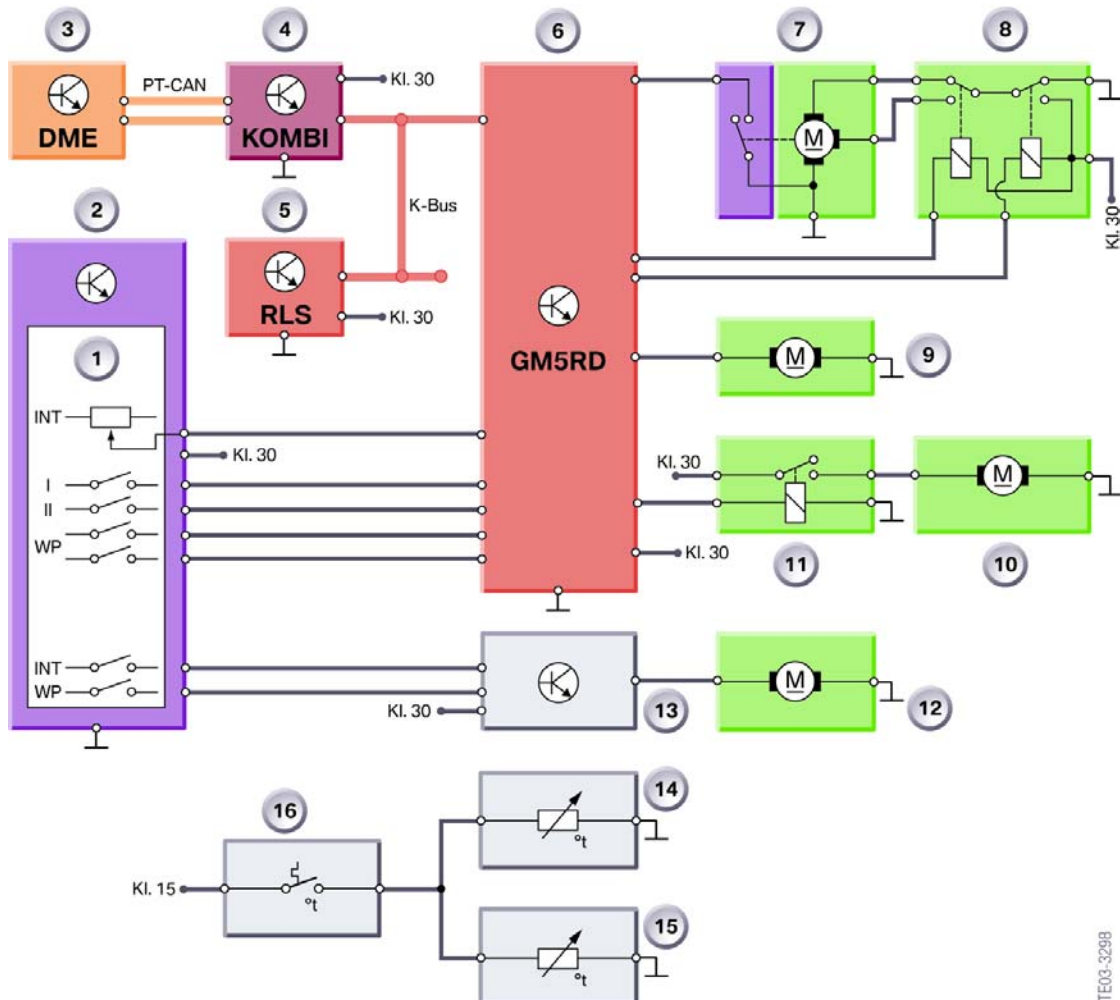


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Index	Explanation	Index	Explanation
1	Central locking, driver's door w/Hall sensors	7	Tailgate lock assembly
2	GM5RD	8	Passenger door rear w/ Hall sensor
3	Tailgate release button	9	Fuel filler flap locking
4	Central locking, driver's rear door w/Hall sensors	10	Passenger door front, w/Hall sensor
5	Central lock button	11	Luggage compartment light
6	Remote control antenna		

Wipers

The wiper system has been modified for use in the E83. The GM5RD controls front wiper and washer operation as well as headlight washer operation. The rear wiper and rear washer are controlled by a wiper module with operation requested directly by the wiper switch.



Index	Explanation	Index	Explanation
1	Wiper switch	9	Windshield washer pump
2	Wiper switch electronics	10	Headlight washer pump
3	DME (ECM)	11	SRA relay
4	Instrument cluster	12	Tailgate washer pump
5	RLS	13	Tailgate wiper electronics
6	GM5RD	14	Driver' side heated washer
7	Wiper motor reset contact	15	Passenger side heated washer
8	Dual mode relay	16	Ambient temperature switch

Wiper Relay

The dual relay is located in the E-Box.

SRA Relay

The SRA (headlight washing system) relay is located in the glove box fuse carrier.

Heated Wiper Nozzles

The heating element of the front washer nozzles are switched by an inline ambient temperature sensor via terminal 15. The current draw of the heating elements is controlled by a PTC resistor as a function of temperature.

Headlight Washer System

The headlight washer system is switched on and off using the windshield washer switch.

The GM5RD switches the headlight washer pump on if terminal 58g is active, every fifth time the windshield is washed.

Rear Window Wiper

The rear window wiper is controlled by the rear wiper module. The rear wiper module is the same as used on the E46 sportwagon.

Door Mirrors

There are two door mirror versions fitted to the E83. The low version(standard) door mirrors have the following functions:

- Electric mirror adjustment
- Mirror heating

The high version (optional) door mirrors have the following functions:

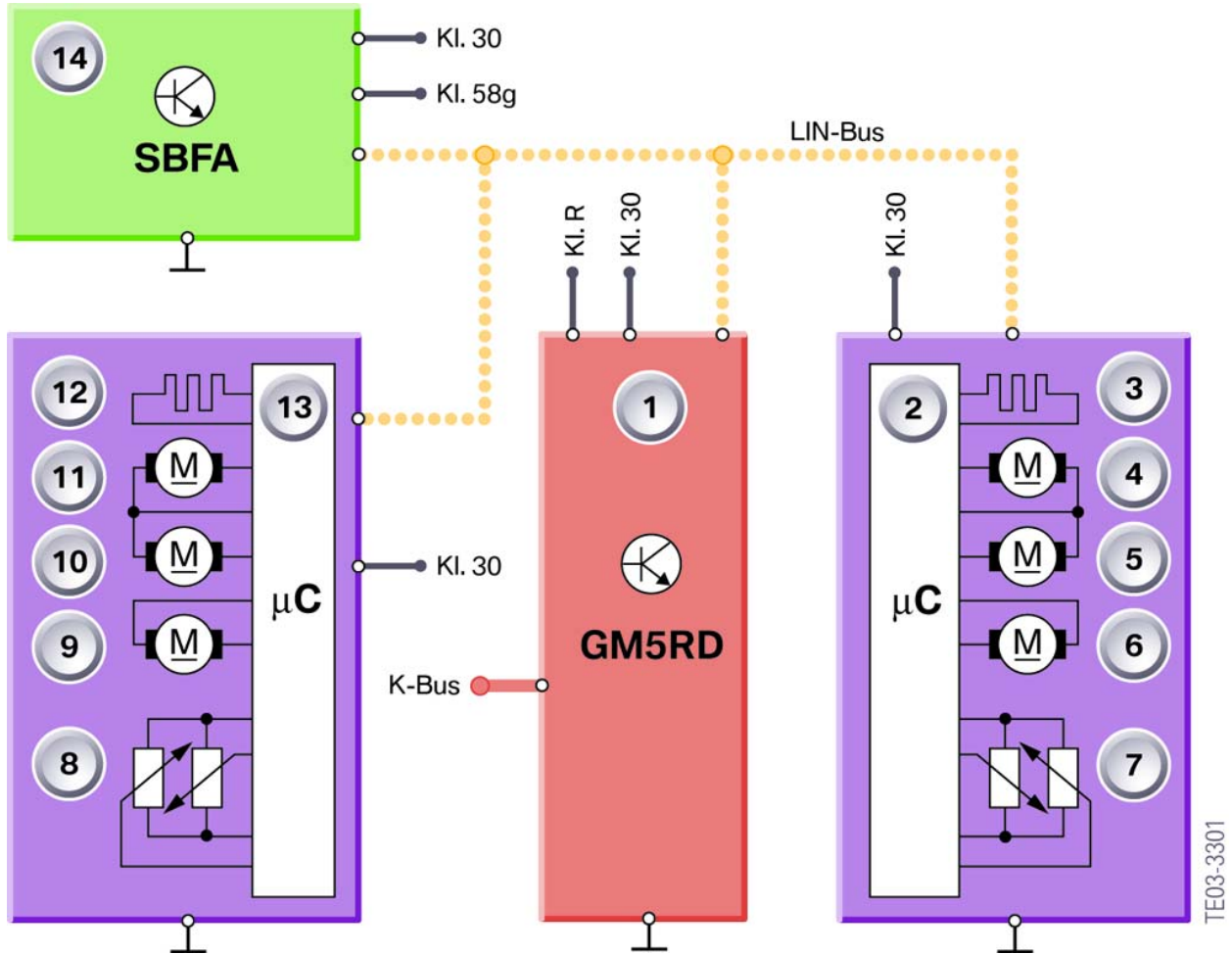
- Electric mirror adjustment
- Mirror heating
- Mirror folding

All mirror functions for both exterior mirrors are controlled by the GM5RD. The GM5RD makes all decisions concerning mirror movement and passes instructions to the mirror electronics (contained in the mirrors) via the LIN bus.

Potentiometers in the mirror electronics monitor position. Current position is sent to the GM5RD on a cyclical basis, and last mirror position is stored in the GM5RD.

The mirror switch in the SBFA communicates with the GM5RD via the LIN bus.

Door Mirror Schematic



Index	Explanation	Index	Explanation
1	GM5RD	8	Mirror potentiometer, left
2	Mirror electrics, right	9	Mirror fold motor, left
3	Mirror heating right	10	Mirror horizontal motor, left
4	Mirror vertical motor, right	11	Mirror vertical motor, left
5	Mirror horizontal motor, right	12	Mirror heating, left
6	Mirror fold motor, right	13	Mirror electrics, left
7	Mirror potentiometer, right	14	SBFA

Anti-Theft Alarm System

The DWA anti-theft alarm system is the same as used on the E46. The DWA has been modified for use on the E83. The alarm is not standard, but a dealer installed option.

Park Distance Control

The PDC Park Distance Control has been taken from the E53. The PDC has been modified for use on the E83.

Tire Pressure Control System

The E83 is equipped with the RPA tire defect (RDW) indicator as standard.

Exterior Lighting

The exterior lighting function has been taken from the E46. The control unit is the light switch cluster. The lamps have been modified to the design of the E83. RLS is standard on all E83's. Bi-xenon lights with AHL are optional.

Seats

The seat functions have been taken from the E46. The design has been modified for the E83. The following seat variants are fitted on the E83:

- Mechanical adjustment seats standard on some models
- Electric seat with memory
- Electric sports seat with memory

The memory function can only be used for the driver's seat. Seat heating with lumbar support is also optional.

Center Console Switch Center (SZM)

The SZM is used from the E53. Opening of the tailgate from the SZM is not possible. There are two variants:

- SZM Low with DSC, HDC and PDC
- SZM High with DSC, HDC, PDC and SHZ

The High variant may be used as a replacement for the Low version.

Displays and Controls

Displays and Controls includes the following individual sections:

- Instrument cluster
- Central Information Display
- Service Interval Indicator

Instrument Cluster

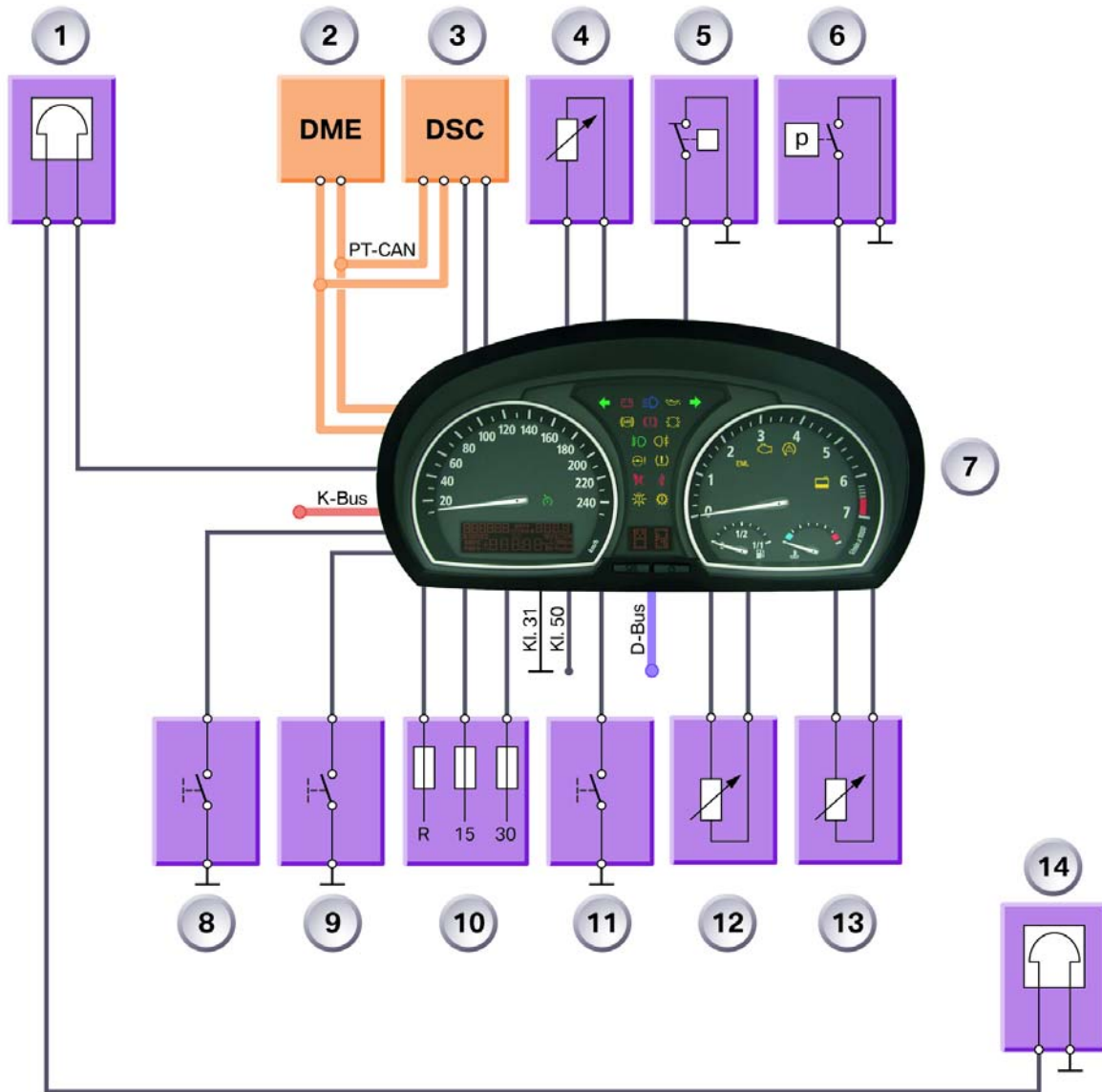
The instrument cluster in the E83 is similar to that of the E85. The following changes have been made to the E83 cluster:

- The end scale value (maximum speed reading) has been reduced to 155mph (250 km/h)
- There are no indicator lamps for the EPS or DTC
- A wiper fluid indicator lamp has been added.



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Instrument Cluster Schematic

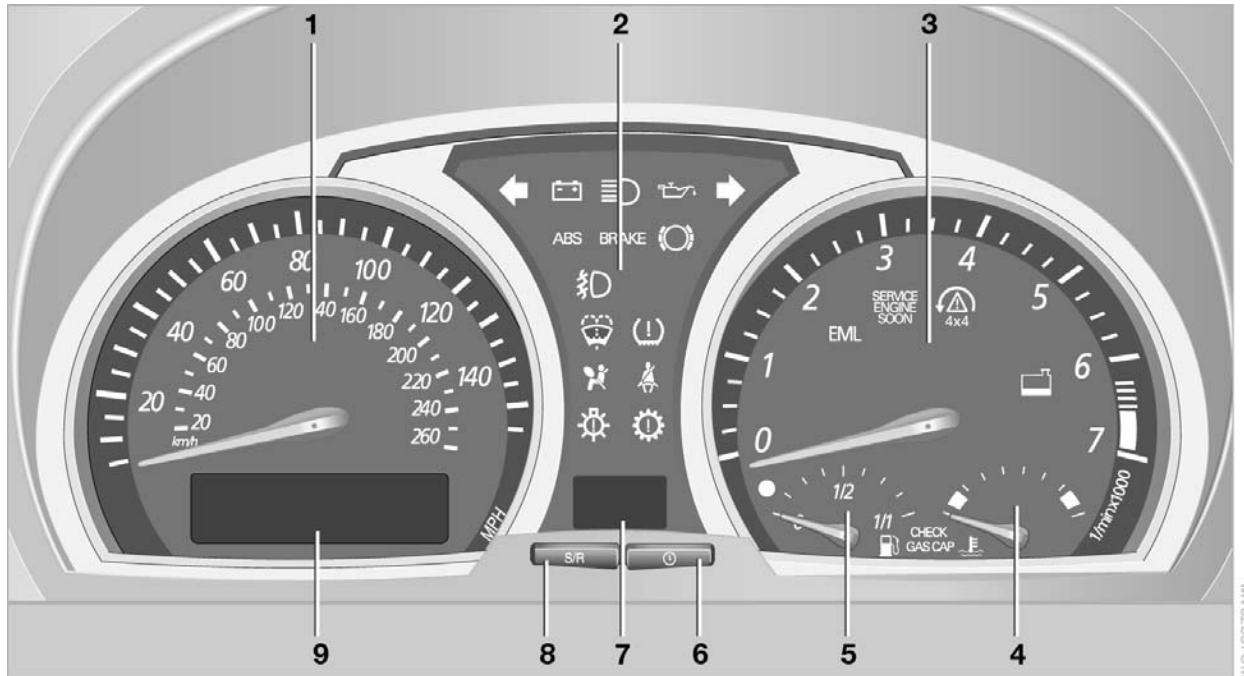


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Index	Explanation	Index	Explanation
1	Brake lining wear sensor, LF	8	On board computer button in turn signal stalk
2	DME (ECM)	9	Reverse light switch, manual trans only
3	DSC	10	Fuse box
4	Outside temperature sensor	11	Parking brake switch
5	Coolant level switch	12	Fuel level sensor 1
6	Not for US models	13	Fuel level sensor 2
7	Instrument cluster	14	Brake lining wear sensor, RR

Indicator and Warning Lamps

The indicator and warning lamps are activated by the processor in the instrument cluster. Important indicator and warning lamps are activated in the Predrive Check with terminal 15 "ON". The indicator lamps and warning symbols are illuminated by permanently wired-in LEDs (replacement of LEDs not possible).



Index	Explanation	Index	Explanation
1	Speedometer	6	Button for time display and service interval
2	Indicator warning lamps	7	Display for transmission range and program
3	Tachometer	8	Trip odometer reset button
4	Coolant temperature gauge	9	Display for time, service interval and OBC
5	Fuel gauge		

Predrive Check

The Predrive Check is a test of important indicator and warning lamps. In the Predrive Check, these indicator and warning lamps are activated for 2 seconds with terminal 15 "ON". All the indicator and warning lamps are deactivated at the end of the Predrive Check.

The following indicator and warning lamps are activated in the Predrive Check:

- Fuel reserve
- Coolant over-temperature
- Fasten seat belt (country-specific)
- Brake-lining wear
- General brake warning light (1 second yellow, 1 second red)
- RDW (1 second yellow, 1 second red)
- Oil pressure/oil level (1 second yellow, 1 second red)
- Gearbox limp-home program
- Washer fluid
- Lamp fault (Check Control)
- Battery charge

LC Display

The LC display is integrated in the speedometer. The LC display indicates the kilometer reading/mileage and time as well as the on-board computer functions. The service interval indicator is also shown in the LC display.

A tampering dot indicates if there are different vehicle identification numbers in the light switch cluster and in the instrument cluster.

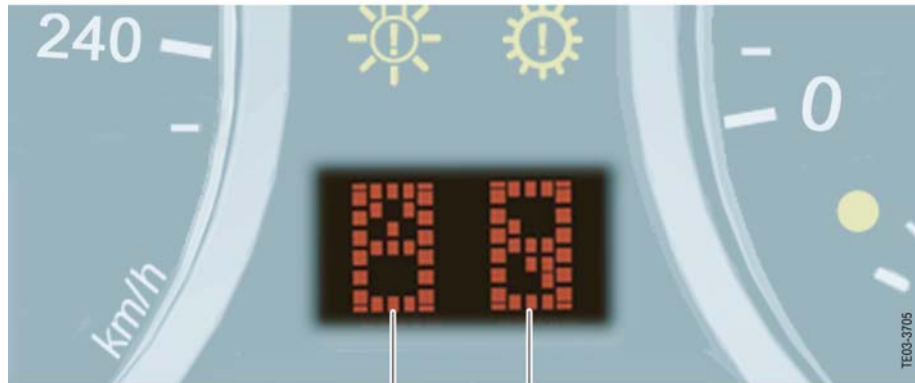
The LC display is made up of orange-colored segment characters (similar to a dot matrix). The brightness of the display is determined by the light switch cluster.

The LC display is activated with terminal R "ON".



Program and Gear Display

On vehicles fitted with an automatic gearbox, the program and gear display is featured in a separate LC display. The LC display is located between the speedometer and the rev counter. The program and gear display is activated with terminal 15 "ON".



1. Transmission Program Mode
2. Transmission range (PRND etc)

The LC display for the program and gear display is made up of orange colored segments (dot matrix). The brightness of the display is determined by the light switch cluster .

The information between the control units for the automatic gearbox and the instrument cluster is exchanged on the PT-CAN bus. A separate indicator lamp (see warning and indicator lamps) indicates the gearbox limp-home program in the event of a fault in the electronic transmission control.

The program and gear display shows letters and numbers. The program mode is displayed on the left and the drive position on the right.

Control Buttons

Two control buttons are located between the 2 large needle instruments. The left button (S/R for Set/Reset) is used to reset the trip-odometer reading, to call up the test functions and to call up the reset menu for the service interval indicator.

The right button (clock symbol) is used to set the time and to switch the service interval indicator (remaining distance/service date or vice versa).



1. Set/Reset button
2. Clock button

On-Board Computer

The on-board computer functions are indicated in the bottom line of the LC display. The software used in the instrument cluster of the E83 is the same as that used in the E85. All the functions are identical and are described in the vehicle documentation for the E85.

The displays of the on-board computer can be displayed and scrolled through in the instrument cluster using the button in the turn indicator and High beam switch.

Test Functions

The test functions are used by service mechanics to check the coding. The test functions are also tools for fault finding without a diagnostic tester. The test functions are only shown in the LC display of the instrument cluster. The test functions are activated by pressing the left control button in the instrument cluster (S/R, 5 seconds) with terminal R or terminal 15 "ON".

In addition, the test functions can still be called up by pressing the left control button S/R for Set/Reset) in the instrument cluster with simultaneous activation of terminal R.

Locking and Unlocking Test Functions

Only the first two test functions are freely accessible. All test functions after the third test function are locked. Unlocking can only be carried out removed by means of test function 19. In test function 19, the display switches in intervals of 1 second from L_on to L_off (Lock on and Lock off). The test functions are unlocked or locked by pressing the left control button (S/R for Set/Reset).

If the left control button (S/R for Set/Reset) in the instrument cluster is pressed while L_off is displayed, the test functions remain unlocked or are unlocked. The display jumps to test function 0.

If the left control button (S/R for Set/Reset) in the instrument cluster is pressed while L_on is displayed, the test functions remain locked or are locked. The test functions can be locked by means of test function 19.

Diagnosis

There are three possible combinations for replacing the instrument cluster/light switch cluster:

- Instrument cluster faulty, light switch cluster OK
- Light switch cluster faulty, instrument cluster OK
- Light switch cluster and instrument cluster must be replaced

Simultaneous replacement of the light switch cluster and the instrument cluster must be avoided. The odometer reading will be lost. In principle it is also possible to carry out a trial replacement of the instrument cluster/light switch cluster.

Central Information Display (CID)

The Central Information Display on the E83 is located in the center of the instrument panel immediately above the ventilation grille. The Central Information Display is identical in design to the CID fitted in the E85.

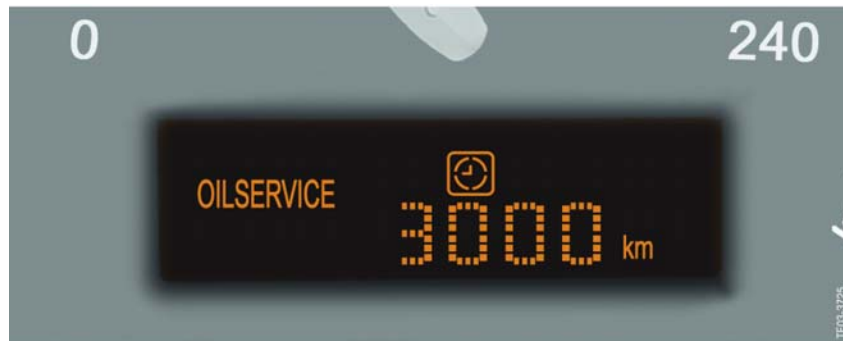
The software used in the Central Information Display in the E83 is the same as that used in the E85. All the functions are identical and are described in the vehicle documentation for the E85.



SIA IV Service Interval Indicator

The BMW maintenance system SIA IV (service interval indicator) is used in the E83. The service interval indicator is a system subject to constant development which in its development stages has been integrated in various model series such as the E85 and E46.

The service interval indicator appears in the LC display in the instrument cluster's speedometer. The indicator is shown for five seconds in the LC display after terminal R "ON".



Resetting Service Interval Indicator

Resetting the service interval indicator for the oil service and inspection can only be performed by pressing the left button in the instrument cluster.

Information and Communication

The BMW X3 is a premium vehicle in the SAV (Sports Activity Vehicle) range. The X3 information and communication systems also offer current technology which meets the highest standards. For example, DVD navigation with color screen, Bluetooth telephone technology (not at SOP) and audio systems with digital sound improvement are all offered in the X3.

Radio and CD Changer

The radios in the E83 are identical to those in the E85 except for the color of the front finisher panel. The controls and functional efficiency also correspond to those of the E85 radio systems.

The E83 does come with a BMW Business Radio w/CD as Standard.

Additionally available is the BMW Central Information Display CID radio w/ navigation.

All radios are new generation radios (NG radios). The radios feature a K-bus connection via which they communicate with other control units. Radios with a cassette deck are no longer available.

A 6-CD changer is also available for the E83. The CD changer audio signals have a level of 2.0 V (increased interference voltage distance). New generation radios detect whether they are communicating with a 0.5 V CD changer (old) or a 2.0 V CD changer (new) and switch over the input accordingly.



BMW Business Radio w/CD



BMW CID Radio w/Navigation

The BMW Business Radio with CD comes with the Hifi Audio system as standard. The Top Hifi system is optional as is the 6-disc CD changer.

The CID radio with Navigation comes with the Hifi Audio system as standard. The Top Hifi system is optional as is the 6-disc CD changer.

CD Changer

The CD changer is a standard 6 disc CD changer as fitted on the E46. The CD changer is suitable for the new generation radios (2.0 V audio output).

CDC Location

For the first time in a BMW model, the CD changer is located in a user friendly position between the driver's seat and front passenger's seat in the front armrest (optional). The snap-in adapter for the mobile phone is housed in a flap above the CD changer.



Aerial System

The E83 has up to 6 aerial systems depending on the options installed, not including the aerial for the remote control services (FBD).

The E83 features the following aerial systems:

- FM 1 - 3 window aerials in the rear window
- FM aerial 4 in the rear spoiler
- AM aerial in the rear spoiler
- Telephone aerial (roof-mounted aerial)
- GPS aerial for the navigation system (roof-mounted aerial)
- SDARS aerial for the digital radio in the USA (roof-mounted aerial)

AM and FM Aerials

The aerial structures for the FM aerials 1 - 3 are integrated in the rear window. The rear window is made of toughened safety glass (ESG) and is approximately 3.1 mm thick.

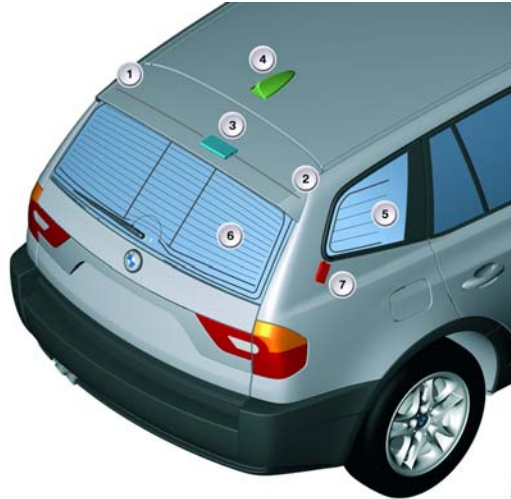
The AM aerial is in the rear spoiler. To avoid disturbances in AM reception through the third brake light in the rear spoiler, there is a suppressor filter in the feed line to the third brake light.

The power supply to the AM and FM aerial amplifier comes from the radio via terminal Rad_on.

Aerial Amplifier

The aerial amplifier for AM, FM and (FBD) as well as the aerial diversity module are built into a housing. The module is fitted on the inside of the tailgate.

Aerial Systems Installation Locations

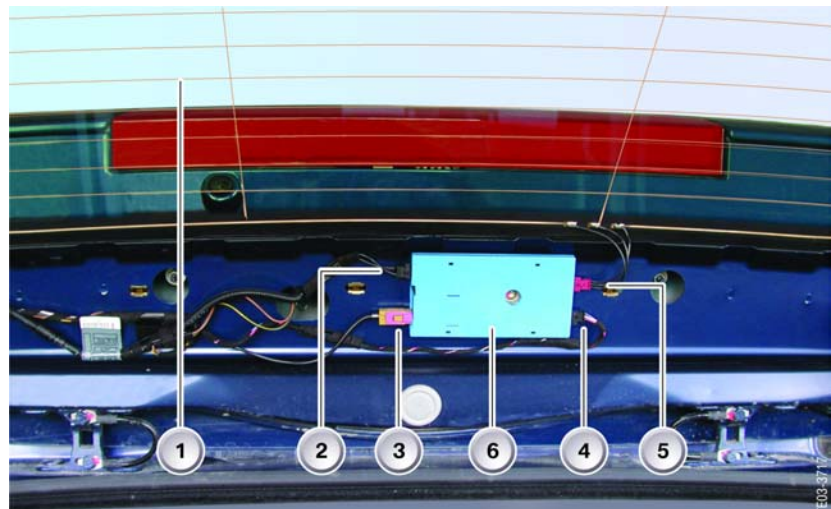


Index	Explanation	Index	Explanation
1	AM Aerial	5	Not for US models
2	FM Aerial 4	6	Heated rear window with FM 1-3
3	Amplifier with diversity module	7	Not for US models
4	Roof mounted shark fin with phone aerial, NAV and SDARS		

FM Aerial Diversity

The tuner is connected to the aerial diversity module via an aerial connector (Fakra) and a coaxial cable. The antenna diversity switches to the next aerial as soon as the signal quality of the active FM aerial exceeds a defined threshold value. No interruption can be heard when the diversity module switches over. Evaluation of the signal quality and the switch over only occur in the aerial diversity module.

1. Heated rear window wires with built in FM aerials
2. Input: KL30, Radio ON, FBD output
3. Input/output: Coaxial cable
4. Input: FM 4 Aerial, FBD input, AM
5. Input: FM Aerial 1-3
6. Aerial amplifier with diversity



Service Mode

BMW Business CD

The following procedure applies to BMW CD radio and Business CD:

- Switch on the radio
- Press the "m" button within 8 seconds and hold for at least 8 seconds
- The functions listed in the following table are now possible via the service menu
- Switch off the radio to exit service mode

CID Radio

The following procedure applies to BMW CID Radio:

- Switch on the radio
- Press the "SEL" button within 8 seconds and hold for at least 8 seconds
- Switch off the radio to exit service mode

Car and Key Memory

The following functions are stored in car and key memory:

- Sound settings
- Audio source
- The last station accessed is stored

Service Mode Table

Menu	Screen Contents	Explanation
Serial Number	e.g. X1001035	Serial number of device
Software Version	e.g. 37-99 30	Software status of device (calender week 37, year 99, version 3.0)
GAL	e.g. 3	Set stage of speed dependent volume control can be adjusted with the station buttons 1 to 6.
FM	Frequency	Frequency of station currently received
	Station Identifier	Station identifier of station currently received
	F...	Field strength of station currently received
	Q...	Quality of station currently received
	e.g.D210	RDS identifier of station currently received
DSP	0	Information as to whether DSP is available; display 1 shows DSP is fitted. (The radio receives information via the K-Bus).
TP Volume	e.g. 0	Setting of minimum volume for traffic information in range from -9 to +9 with the station buttons 1 and 2
AF Alternative Frequencies	e.g. AUTO	Corresponding AF tracking can be set with the station buttons 1-4 1 = RDS OFF 2 = AF OFF (RDS ON, AF OFF according to country) 3 = AF MAN (RDS ON, AF manual according to country) 4 = AF AUTO (RDS ON, AF automatic)
Area	e.g. EUROPE	The corresponding variants can be set with the station buttons 1-4 1 = Europe 2 = USA 3 = Japan 4 = Oceania
Index	e.g. 03	Revision index, e.g. 03

Audio Systems

The various audio systems of the E83 are described in this technical documentation. The radio systems originate from the E85. The loudspeaker systems are new developments and are adapted to the acoustic and technical dimension requirements of the E83.

The E83 is available with the HiFi audio system and standard equipment and the Top HiFi audio system as an option.

The BMW audio standards which have been applied since the E85 are also being applied to the E83. They apply to the HiFi and Top HiFi systems with regard to symmetry of the sound field, sound pressure and linearity of the frequency response.

New Features

New features by comparison with the E85:

- Central woofers for the HiFi and Top HiFi audio systems are fitted. The central bass principle applies to the systems in the E65/E60.
- The HiFi amplifier in the E83 luggage compartment is a modified version of the HiFi amplifier from the E85/E46. A 6 channel amplifier is adapted from the 10 channel hifi amplifier via internal switch changes.
- A fuse is added to the Carver Top HiFi amplifier from the E85 but is otherwise installed in the E83 without further modifications.

HiFi System

The HiFi audio system features a 6 channel analog amplifier that is connected directly to the 4 speaker outputs of the radio. The loudspeakers are connected to the 6 HiFi amplifier output channels. The tweeters are protected from overload by capacitors in the supply lead and connected in parallel to the broadband speakers.

All sound controlling functions such as volume, bass, treble, fader, and GAL are performed in the radio.

HiFi Amplifier

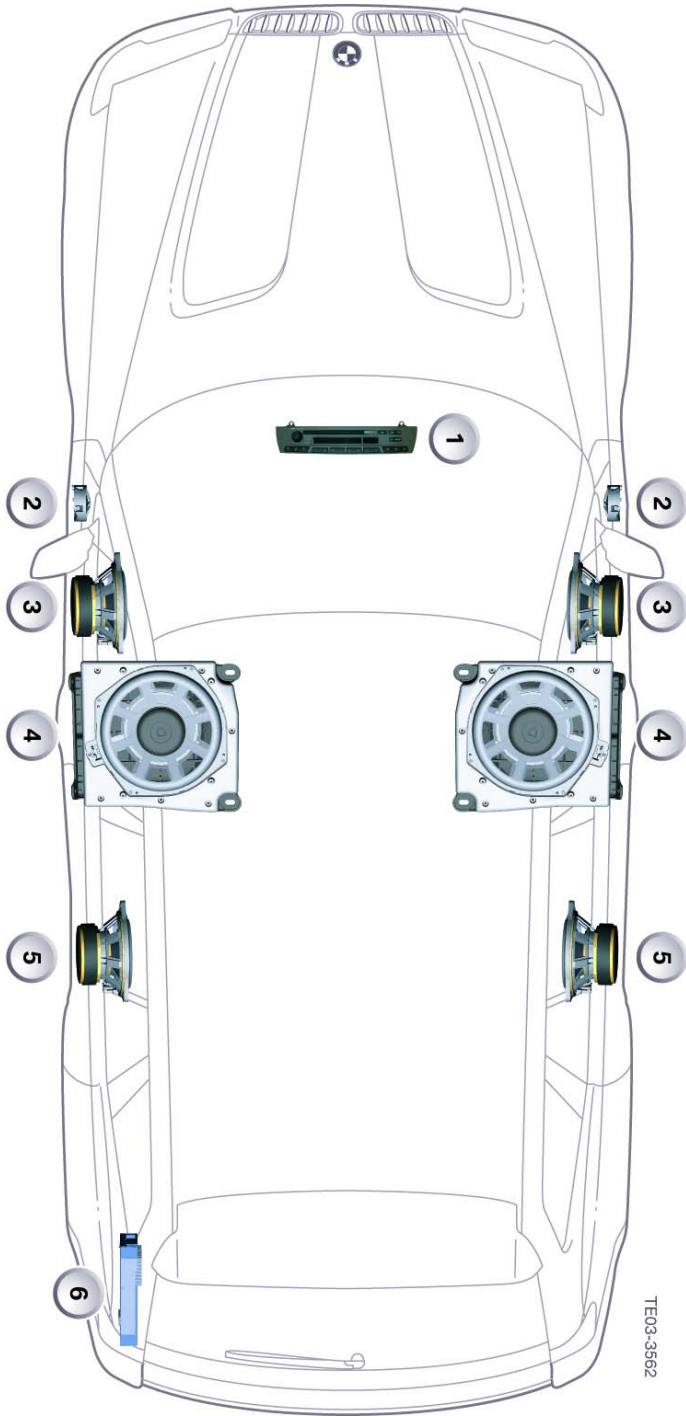
The 6 channel HiFi amplifier in the luggage compartment of the E83 is a modified version of the 10 channel HiFi amplifier from the E85/E46. Four channels are for the door loudspeakers (broad-band loudspeaker or broadband speaker with additional tweeter) and 2 channels are for the central woofers.

The housing is constructed in the same way as the 10 channel HiFi amplifier in the E85/E46. The HiFi amplifier has an output of 4 x 25 watts for the mid-range and high-ranges and 2 x 40 watts for the low frequency.



TEB3-3710

HiFi System Overview



TE03-3562

Index	Explanation	Index	Explanation
1	Business Radio	4	Central Woofers
2	Front Tweeters	5	Rear Broadband Speakers
3	Front Broadband Speakers	6	Hifi Amplifier

Top HiFi Audio System

The Top HiFi audio system features a 10 channel amplifier with DSP technology for sound control. The Top HiFi amplifier is controlled via the two radio analog audio signals.

The Top HiFi amplifier features a digital input for the CD changer. The digital input is only used for the BMW Business CD radio and CD changer combination. The 10 loudspeakers are directly connected to the 10 output channels of the Top HiFi amplifier. The active frequency gates for adaptation of the loudspeakers are built into the amplifier.

Depending on the radio, various functions can be called up. Sound control functions such as volume, bass, treble, fader, GAL, spatial sound simulation etc. are formed in the Top HiFi amplifier. The 7 band graphic equalizer can only be used in connection with the CID radio.

Top HiFi Amplifier

A fuse is added to the familiar Carver Top HiFi amplifier from the E85 but is otherwise installed in the E83 without further modifications.

However, special Carver woofers with increased cone excursion are used in the E83. The space available in the E83 and the resonance volume in the side sill enables the use of the central bass principle.

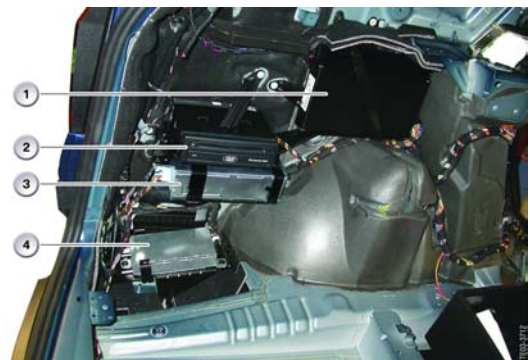
The central woofers in the Top HiFi audio system are simply adapted to the increased voltage level of the bass end levels (8 Ohm impedance). The amplifier delivers 6 x 20 watts, 2 x 40 watts and 2 x 100 watts.



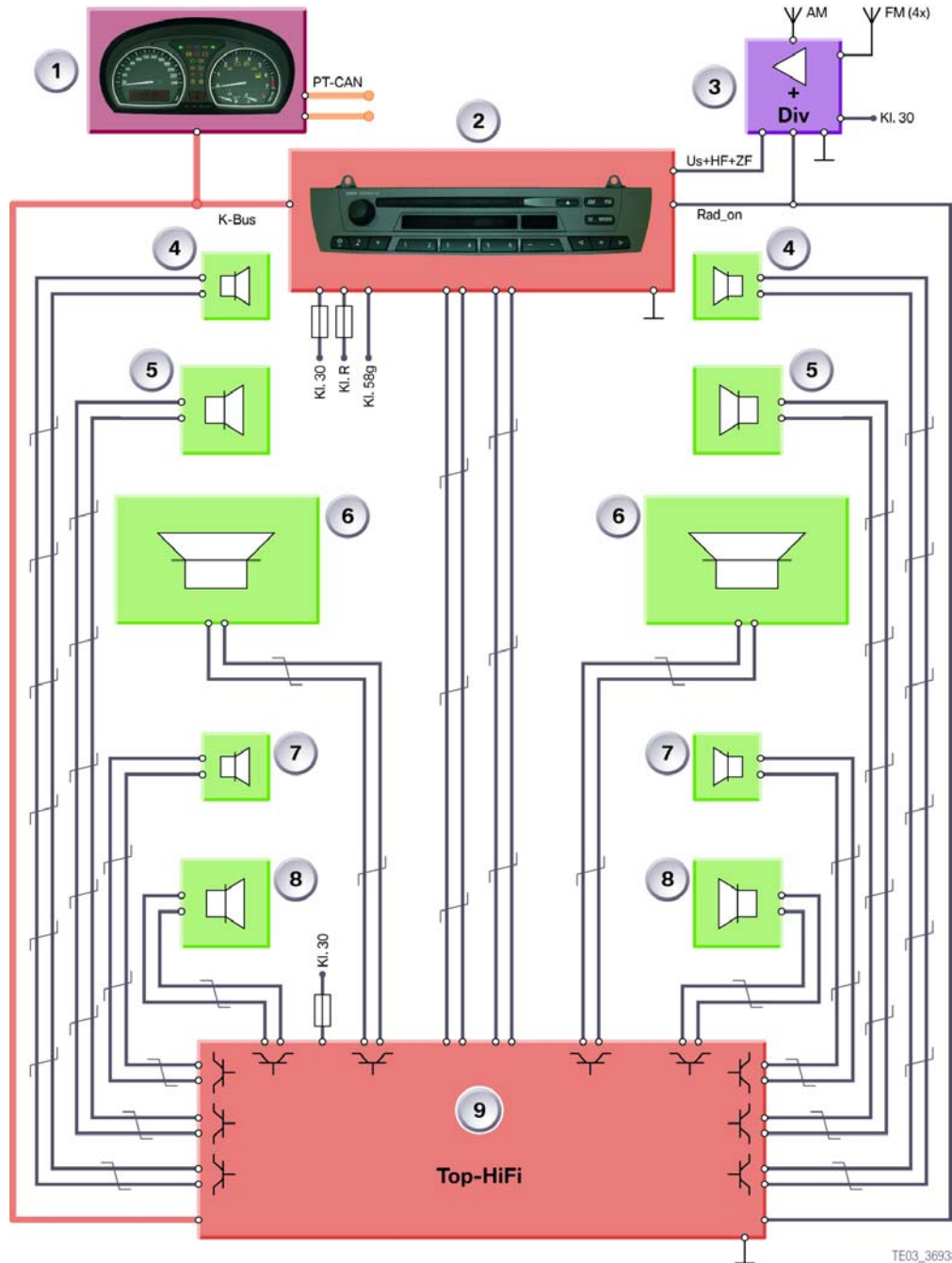
SPDIF

The digital connection between the Top HiFi amplifier and the CD changer is an SPDIF connection. SPDIF stands for Sony Philips Digital Interface and is a data transfer standard for digital audio data. The data can be transferred optically via fibre-optic cables or via coaxial cables depending on the unit.

Advantage: the digital data is read by the CD and transferred between the units with the highest possible quality, as no digital/analog conversion is necessary. The Top HiFi amplifier also no longer has to carry out analog/digital conversion. The digital data can therefore be processed directly from the DSP (Digital Sound Processor).

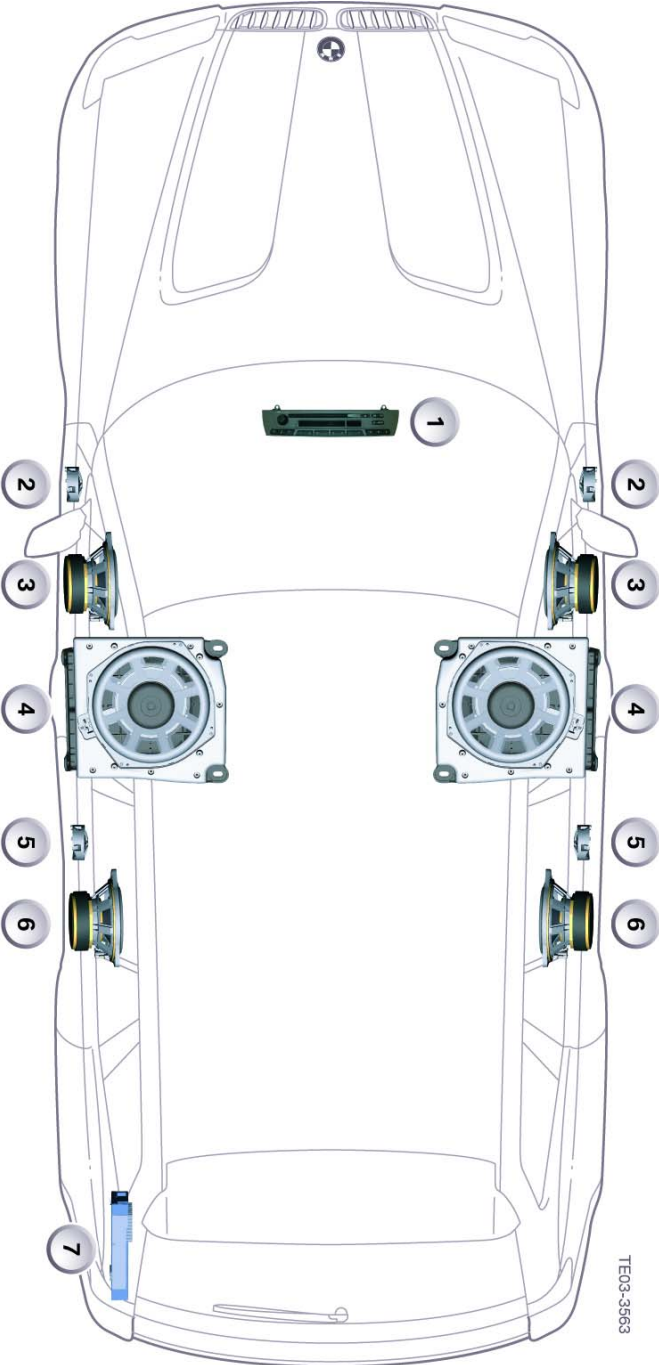


Top Hifi Schematic



Index	Explanation	Index	Explanation
1	Instrument Cluster	6	Central woofers
2	BMW Business CD radio	7	Rear Tweeters
3	Aerials for AM/FM and diversity module	8	Rear broadband speakers
4	Front tweeters	9	Carver Top Hifi amplifier
5	Front broadband speakers		

Top Hifi System Overview



Index	Explanation	Index	Explanation
1	Business CD radio	5	Rear Tweeters
2	Front tweeters	6	Rear broadband speakers
3		7	Carver Top Hifi amplifier
4	Central woofers		

Telephone System

The Everest platform for the telephone and telematics functions are used in the US version of the E83. For the American market, three different versions are offered:

- TCU only with telematics function emergency call (E-Call) and breakdown call (B-Call). Optional w/Premium Package
- TCU with telematic function emergency call and enabling by provider.
- TCU with telematics and telephone functions via hands-free unit or mobile phone (after retrofitting a telephone).

Telematic Control Unit TCU

The Telematic Control Unit TCU is optional equipment in US vehicles. This means that an emergency call can always be made(if the car is equipped with the TCU), also if the customer has not (yet) retrofitted a telephone.

The range of functions of the US version is as follows:

- TCU is always fitted in order to ensure the emergency call can be made even if no telephone is present
- Dual-band 800 MHz and 1900 MHz
- Combined transmit/receive module NAD (Network Access Device) for analog AMPS (American Mobile Phone Standard) for telephone calls and digital CDMA (Code Division Multiplex Algorithm) for telematics functions
- Eject box with charging unit for Motorola Phoenix V60
- Telematics functions (E/B call)
- GPS receiver for localization

Principle of Operation

In the US version, the Telematic Control Unit has a NAD (Network Access Device) that works in the AMPS/CDMA standard with the frequencies 800/1900 MHz. The TCU features a hands-free system with full-duplex transmission. This makes it possible to speak and listen simultaneously. The position of the vehicle is determined by the TCU by means of a built-in GPS receiver. In the event of a crash, the TCU sends an SMS with this location data to the provider. Furthermore, the TCU has an interface for the connection of an emergency call button (E/B Call). The emergency call button is a dual function switch with two keys: one for the emergency call and one for the breakdown call. The emergency call button is standard equipment.

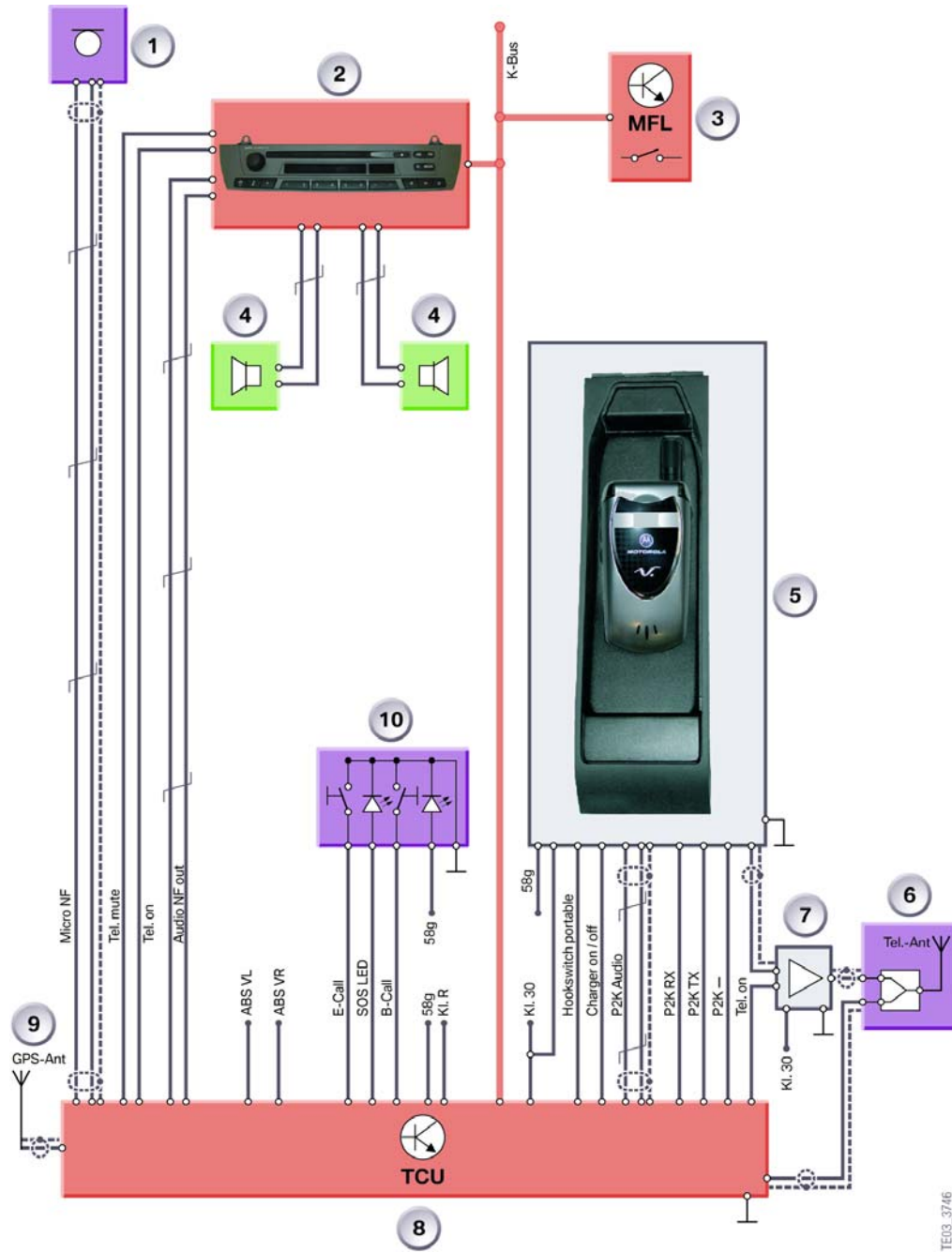
Telephone System Overview



TE03-3802

Index	Explanation	Index	Explanation
1	MFL with Telephone button	7	GPS Aerial
2	CID	8	Hands-free Microphone
3	Speaker	9	Emergency Call and Assistance Buttons
4	Motorola Mobile Phone	10	CID control panel (radio)
5	Compensator	11	TCU
6	Phone Aerial		

Telephone System Schematic



Index	Explanation	Index	Explanation
1	Hands-free Microphone	6	Phone Aerial
2	CID	7	Compensator
3	MFL with Telephone button	8	TCU
4	Speaker	9	GPS Aerial
5	Eject Box with Mobile Phone	10	Emergency Call and Assistance Buttons

Compensator

The compensator is connected in the aerial cable between the telephone and the roof aerial. It balances out the losses of the aerial cable. The compensator is fitted in the luggage compartment on the separating wall to the left of the TCU.

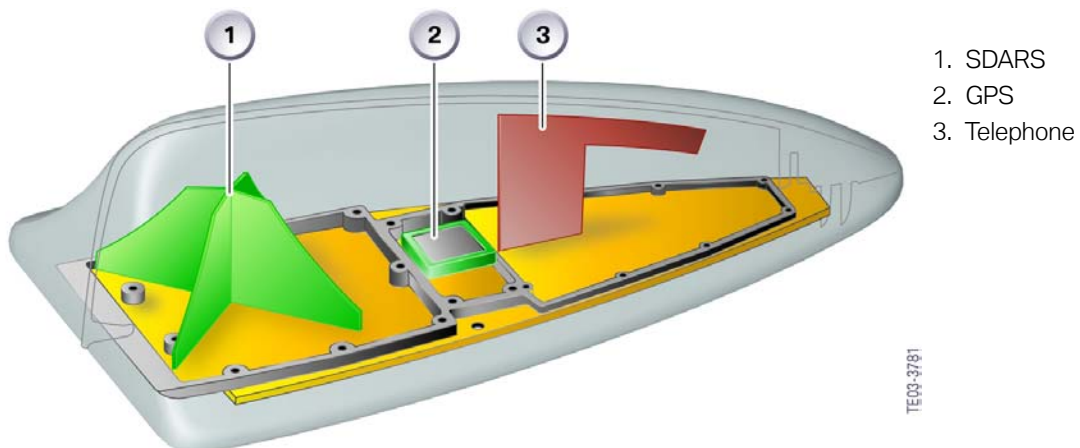


GPS Aerial

The GPS aerial permanently receives data regarding the current latitude and longitude from the satellites of the Global Positioning System, GPS. This data is transferred to the GPS receiver in the TCU, which uses it to determine each position of the vehicle. The GPS aerial is integrated in the roof aerial.

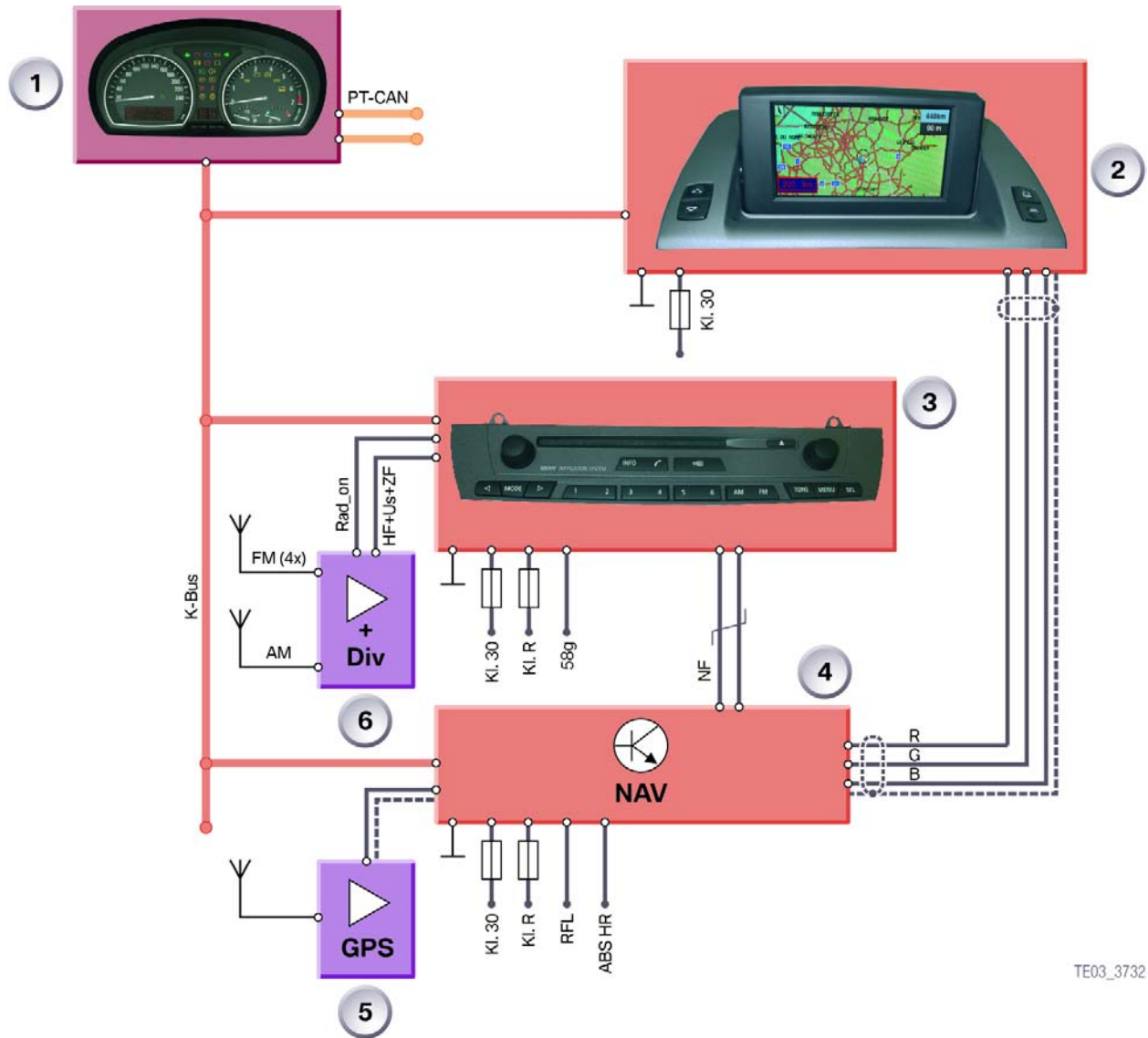
Telephone Aerial

The telephone aerial is part of the shark fin antenna.



Navigation

One navigation system is available optionally in the E83. The Professional Navigation with CID and Business Radio with CD(MK-3 Nav with widescreen monitor), is the only system available.



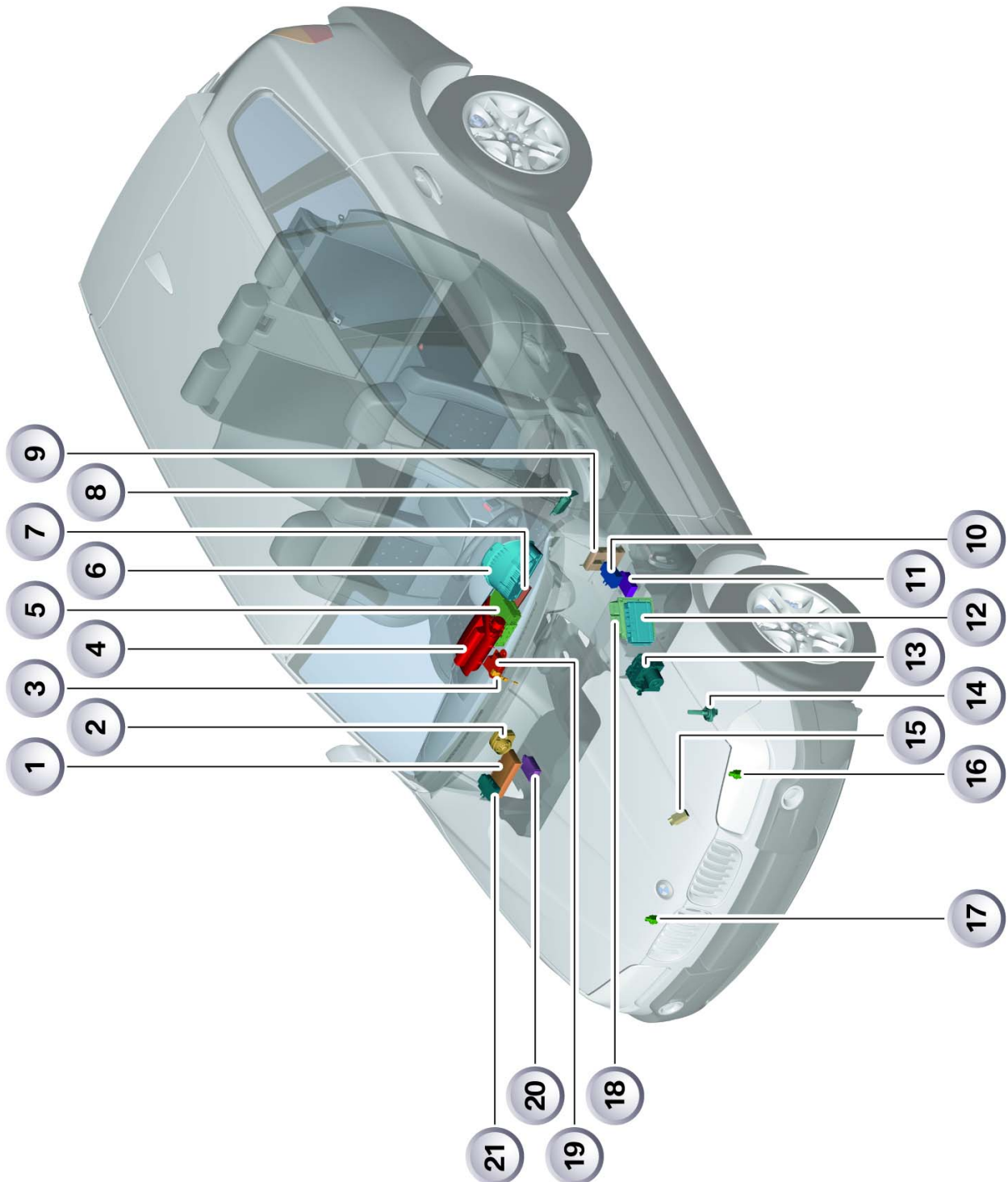
TE03_3732

Index	Explanation	Index	Explanation
1	Instrument Cluster	4	DVD Navigation Computer
2	CID	5	GPS Aerial
3	CID Control Panel (radio)	6	Am/FM Aerials with amplifier and diversity

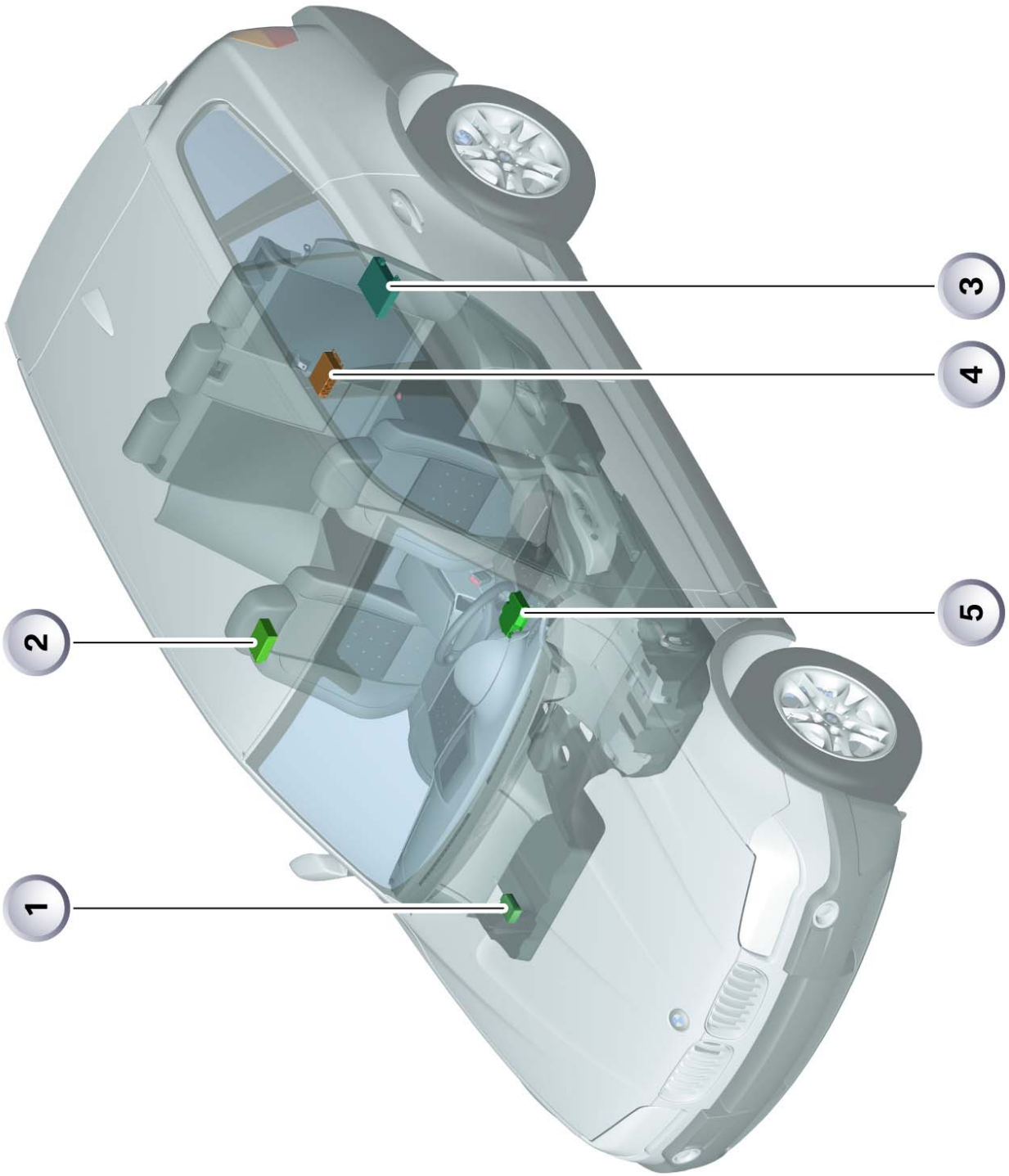


Workshop Exercise - E83 Component Location

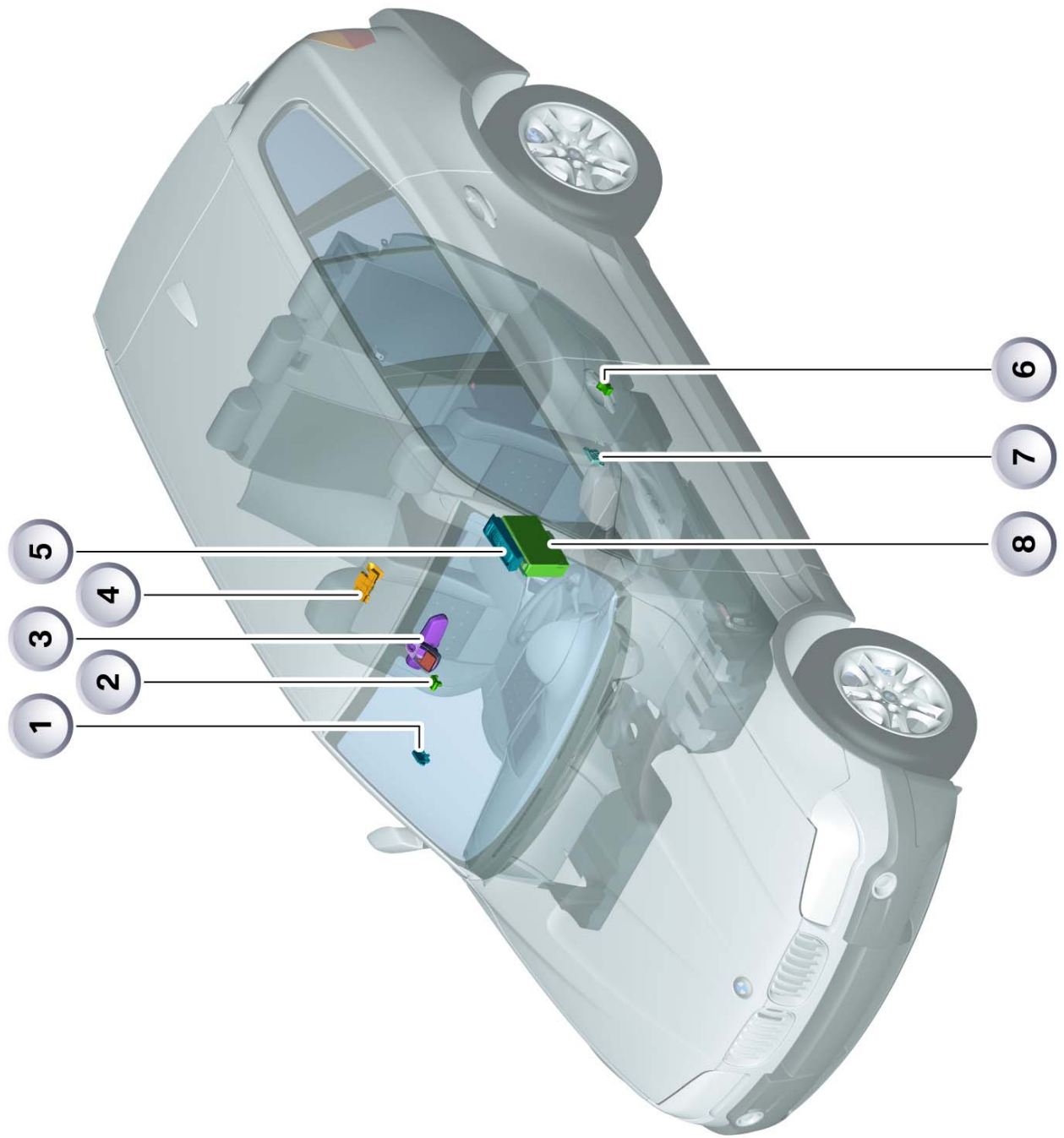
Using an instructor designated vehicle, locate and identify the following components. For reference use the proper ETM, WebTIS and training material.



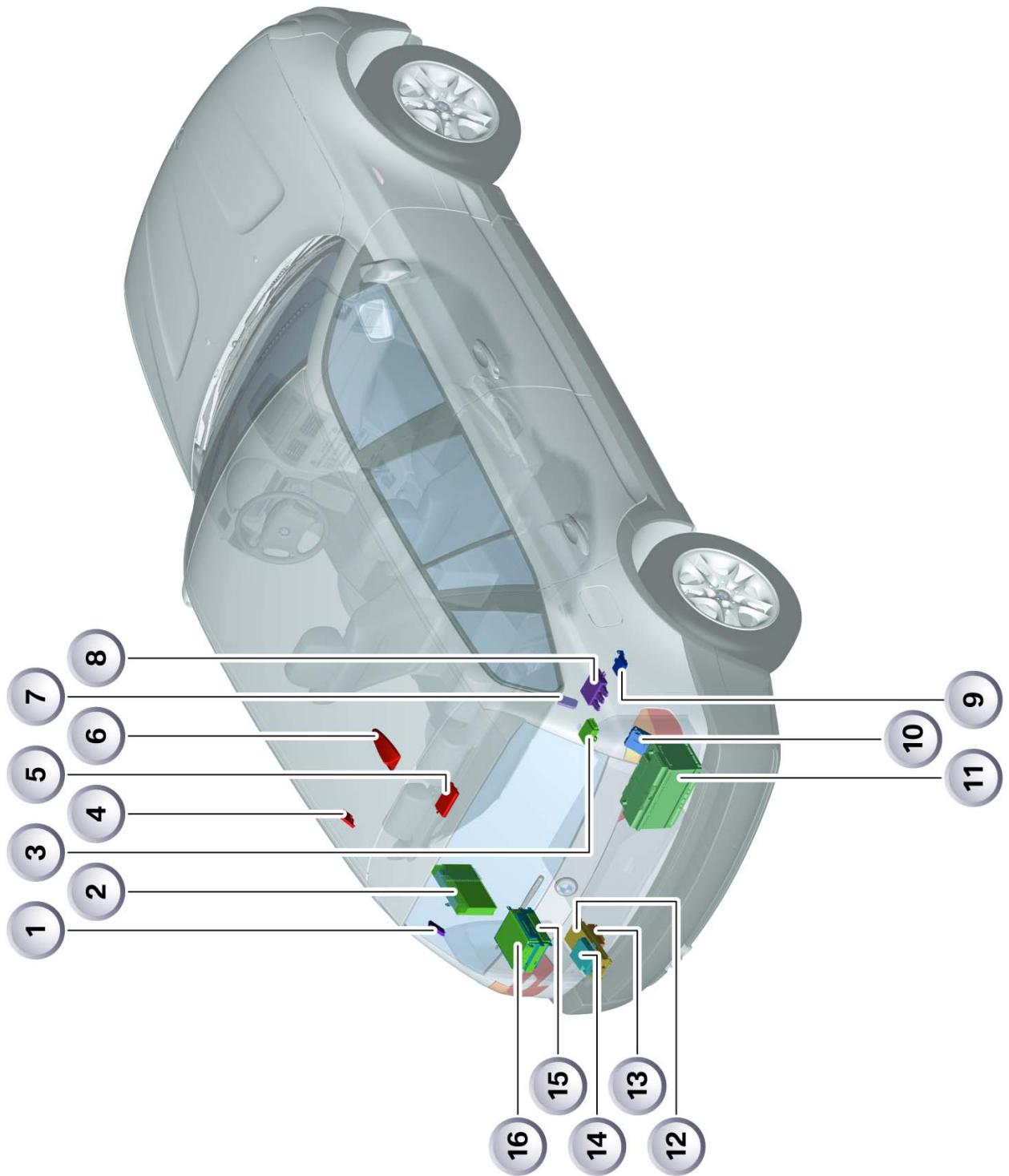
Index	Component Name	Acronym	Location
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Index	Component Name	Acronym	Location
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Index	Component Name	Acronym	Location
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Index	Component Name	Acronym	Location
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Workshop Exercise - Diagnosis

Vehicle: _____ Chassis # _____ Production Date: _____

Complaint: _____

Cause:

Correction:



Classroom Exercise - Review Questions

1. On the E83, What is the LIN bus used for?

2. What is SDARS?

3. How is the vehicle charge voltage regulated?

4. What is the difference between EWS III and EWS III plus?

5. What is the difference between the anti-trap feature of the power windows of the E83 as compared to the E46?

6. What is the difference between the standard door mirror and the optional door mirror?



Classroom Exercise - Review Questions

7. Describe how to enter into the the test function of the instrument cluster:

8. How is the Service Interval Indicator reset after and oil service or inspection?

9. What is SPDIF?

10. Where is the GPS antenna located on the E83?
