Participant's Manual

BMW Diagnosis, Programming and Information Systems

BMW Service

The information contained in this Participant's Manual is intended solely for the participants of this seminar run by BMW Aftersales Training.

Refer to the latest relevant "BMW Service" information for any changes/supplements to the Technical Data.

Information status: January 2005

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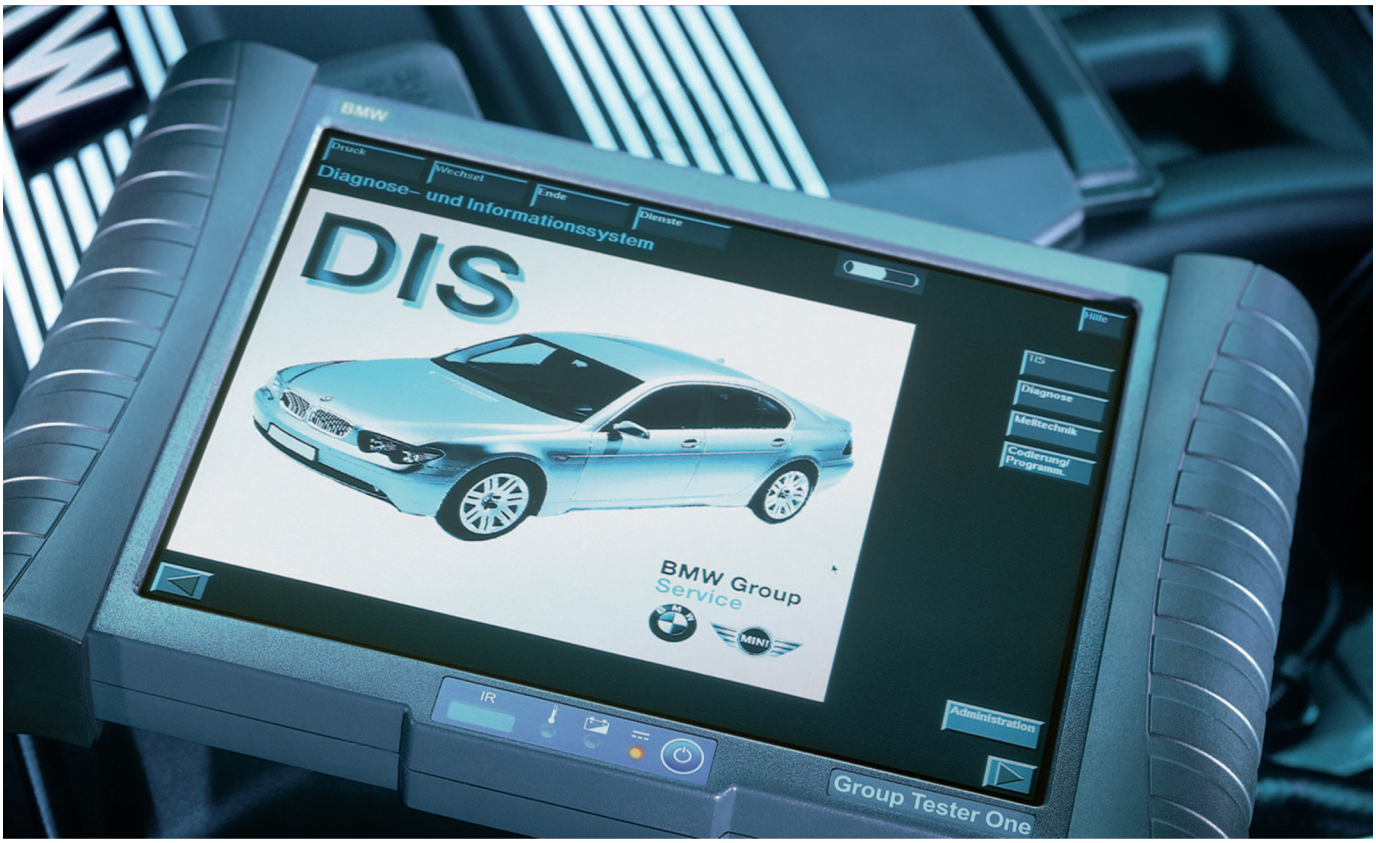
Participant's Manual
BMW Diagnosis System

Structured troubleshooting

All information on one user interface

Troubleshooting with test modules

Measuring system inclusive



Notes on this Participant's Manual

Symbols used

The following symbols are used in this Participant's Manual to facilitate better comprehension and to draw attention to important information.

⚠ contains information for better understanding of the described systems and their functions.

◄ identifies the end of an item of information.

Current content of Participant's Manual

In view of the constant further developments in the design and equipment of BMW vehicles deviations may arise between this Participant's Manual and the vehicles made available as part of the training course.

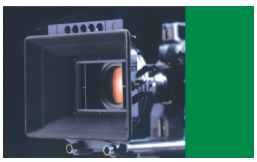
The background material refers exclusively to left-hand drive vehicles. The controls are in part arranged differently in right-hand drive vehicles than shown on the graphics in the Participant's Manual.

Additional information sources

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

- BMW diagnosis system
- Workshop Systems Documentation
- SBT BMW Service Technology.

Contents
BMW Diagnosis System



Objectives
BMW Diagnosis System

Reference material for practical applications to accompany you throughout the training course

This Participant's Manual is intended to explain the structure and operation of the DIS diagnosis software.

The manual is designed as an accompaniment throughout the training course and supplements the seminar content specified by BMW Aftersales Training. It is suitable for private study and also as a reference work. In preparation for the technical training and in conjunction with the practical exercises in training, it is designed to enable the participant to carry out diagnosis work in conjunction with the BMW diagnosis system.

It is essential to have completed the Diagnosis and Programming Systems module section before being able to attend all further vehicle- and system-specific seminars in technical training.

TE04-5832

Please do not forget to work through the Training and Information Program (SIP) on this topic. Basic knowledge ensures competence in theory and practical applications.

DIS Diagnosis and Information System

Communication in diagnosis

The sequence of diagnosis communication, i.e. the rules for transmitting and receiving data telegrams, is identical for all control units in BMW vehicles.

The speed of data transmission has increased since the launch of the E65. Since then communication between diagnosis system and control units has followed the rules of the cross-manufacturer KWP2000 protocol (Key Word Protocol 2000). This specification lays down all the time conditions and commands required for data communication. The BMW Group has extended this specification with the BMW FAST protocol (fast access for service and testing).

This BMW FAST protocol has made it possible to increase the transmission rate between diagnosis system and control unit from 9,600 bits/second to 115,000 bits/second.

The increase in data transmission, the standardized behaviour of the control units in diagnosis mode and the use of a gateway module between diagnosis system and data buses in the vehicle enable all the diagnosis functions to work reliably and quickly in spite of the increase in the number of control units and the wealth of data buses.

Diagnosis sequence - General

1 - BMW Diagnosis and Information System

The established diagnosis systems BMW DISplus and Group Tester One GT1 are available for diagnosing the model series.

The basic diagnosis sequence proceeds via the brief test to fault pattern/symptom selection and then to the test schedule. Test modules, wiring diagrams, function descriptions, pin assignments, installation locations and plug views are available to support troubleshooting.

As of the E65 all the selection pages have been adapted to the system structure of the "Distributed Functions". In addition, the following modifications have been made:

- Control unit functions:
  Standard structure of the fault memories in the control unit functions through all systems.
- Function descriptions:
  Standard structure of the function descriptions for all "Distributed Functions".
- Installation locations:
  Depiction of the installation locations with overview and detailed view.

Only the basic sequence of a diagnosis in conjunction with the BMW diagnosis system is described in this Participant's Manual. The hardware (connections, components, etc.) are described on the "Workshop Systems Documentation" CD.

DIS as information system

As well as its function as a tester, the BMW diagnosis system is also available in its capacity as an information system. The matching vehicle type can be selected by means of manual selection without a vehicle having to be connected via an interface. All the information contained in the BMW diagnosis system (DIS and TIS), such as e.g. wiring diagrams, function descriptions, plug and pin assignments, is then available.

Sequence of BMW diagnosis

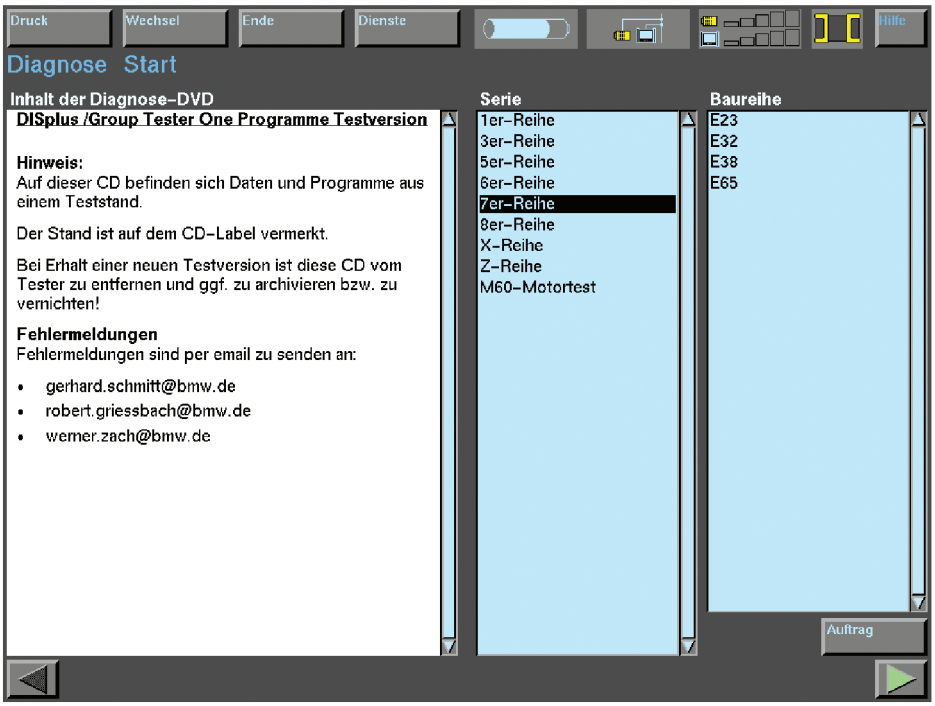
Diagnosis start

Before diagnosis is started, an interface must be connected to the vehicle access. The diagnostic head, the optical testing and programming system OPPS and the optical programming system OPS are available as interfaces.

The access to the vehicle is either the diagnosis socket or the standardized OBD plug for all manufacturers.

The diagnosis can then be started. For this purpose, the corresponding vehicle must be selected in the "Diagnosis start" screen.

⚠ The vehicle must always be supplied with external voltage during diagnosis (connect charger). ◄



1 - Diagnosis Start model selection

First the vehicle is identified. Identification is made either by means of the "Central coding code" (ZCS) or in the vehicle order (VO). In each case vehicle identification data permitting type allocation of the vehicle are stored.

Once the vehicle order is used (from E65) a large part of the equipment can also be automatically detected.

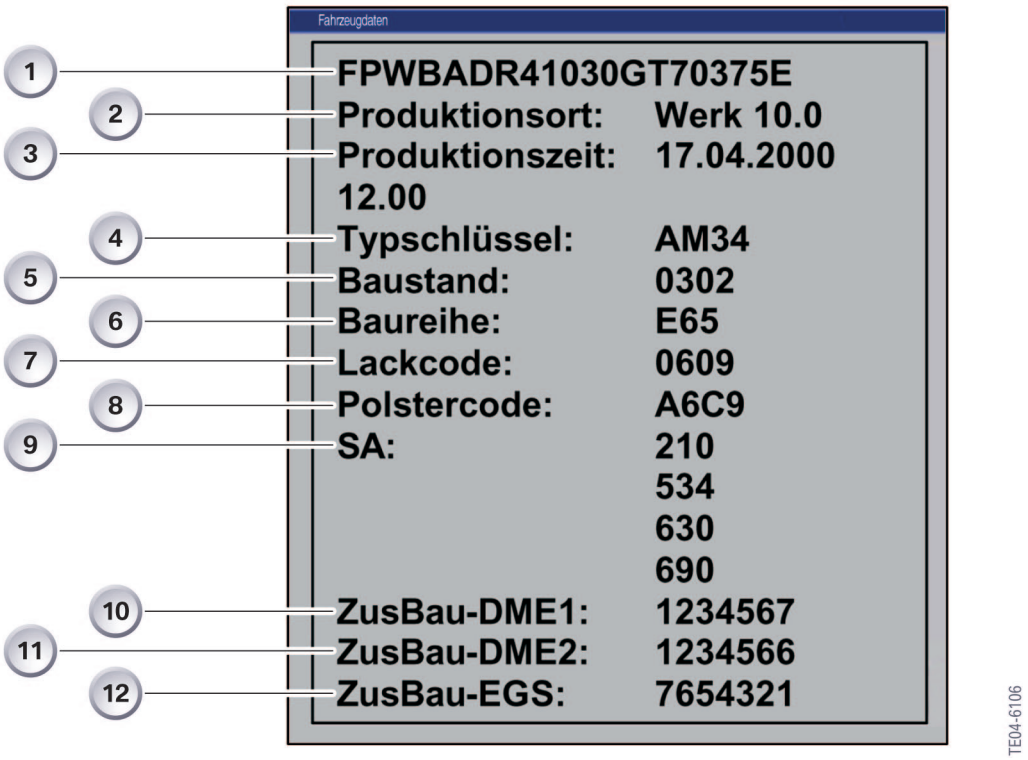
The ZCS is stored in the control unit for the electronic immobilizer (EWS) while the vehicle order is stored in the Car Access System (CAS) (or footwell module FRM E87, E90).

If communication with the EWS or CAS is not possible due to a fault, the vehicle order is read out from the light module (LM).

If the vehicle order cannot be read out, it is possibly the select the vehicle type manually.

Vehicle identification

Vehicle order



2 - Vehicle order data

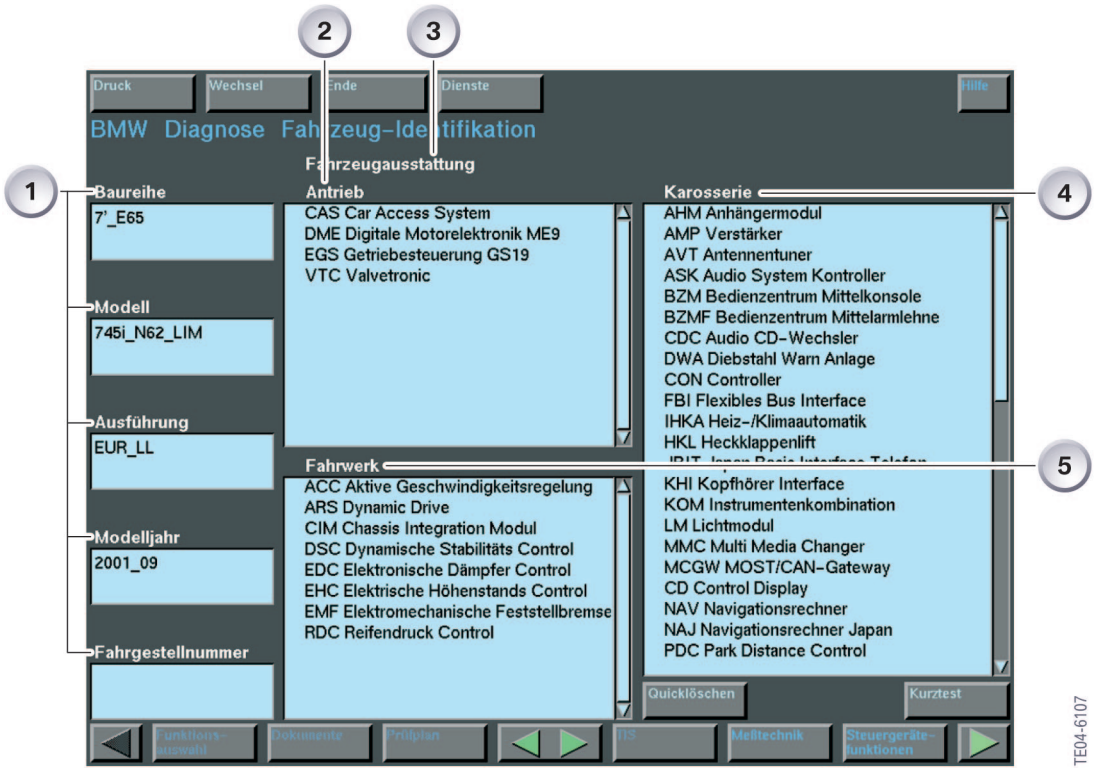
Index	Explanation	Index	Explanation
1	Vehicle identification number	7	Paint code
2	Production location	8	Upholstery code
3	Production time	9	Optional extras (SA)
4	Type code	10	Assembly number DME1
5	Build date	11	Assembly number DME2
6	Model series	12	Assembly number EGS

The vehicle order contains all the important equipment features of the vehicle in addition to the type code.

⚠ The advantage of the vehicle order is that it can store considerably more equipment features than the central coding code (ZCS). This makes it possible to make a reliable and detailed vehicle identification. ◄

The **assembly numbers** of the drive control units are stored in the vehicle during assembly and can no longer be altered. It is therefore possible at any time to identify which part numbers of the control units were allocated to the vehicle during production.

Vehicle equipment



3 - BMW Diagnosis Vehicle Identification

Index	Explanation
1	Identification data
2	Drive
3	Vehicle equipment
4	Body
5	Chassis

Once the vehicle order has been evaluated, the identification data are output in the "BMW Diagnosis Vehicle Identification" screen.

The read-out data are output in the following order:

- Model series
- Model
- Version
- Model year
- Vehicle identification number

In addition, all the control units installed according to the vehicle order are marked with a black bar in the three vehicle equipment windows (Drive, Chassis, Body). This function is known as "Preassignment of vehicle equipment".

The function is possible from CD V 28.0!

Only the preassigned control units are interrogated during the quick test.

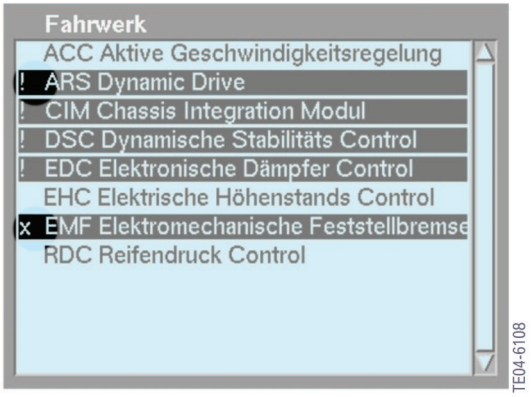
If a control unit installed in the vehicle is not displayed in the preassignment, an individual quick test must be carried out for this control unit after the quick test. The individual quick test is initiated by touching the text line featuring the control unit name on the screen.

No preassignment

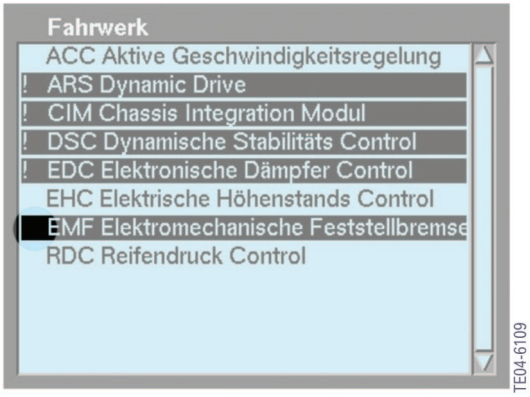
Reasons for no preassignment may be:

- Control unit has been retrofitted but not programmed. The programming must be carried out.
- Fault during evaluation of the vehicle order.

Quick test



4 - List of control units



5 - Control unit not found

The quick test is also carried out in the "BMW Diagnosis Vehicle Identification" screen.

All the preassigned control units are addressed and identified in the quick test. Then the fault memory of the control unit is read out.

The result of the quick test is displayed with one of the following two symbols:

- **!** Control unit could be identified and no fault is stored in the control unit.
- **X** A fault is stored in the control unit.

⚠ In view of the "Networked Functions" it is absolutely necessary to carry out the quick test for the subsequent diagnosis sequence. The quick test is the only way of identifying connected faults and faults in the data buses. ◄

Furthermore a quick test must be carried out so that a control unit can be recorded in the "Check control unit/Control unit functions" program section. The control unit version must be determined before the control unit is recorded in the control unit functions.

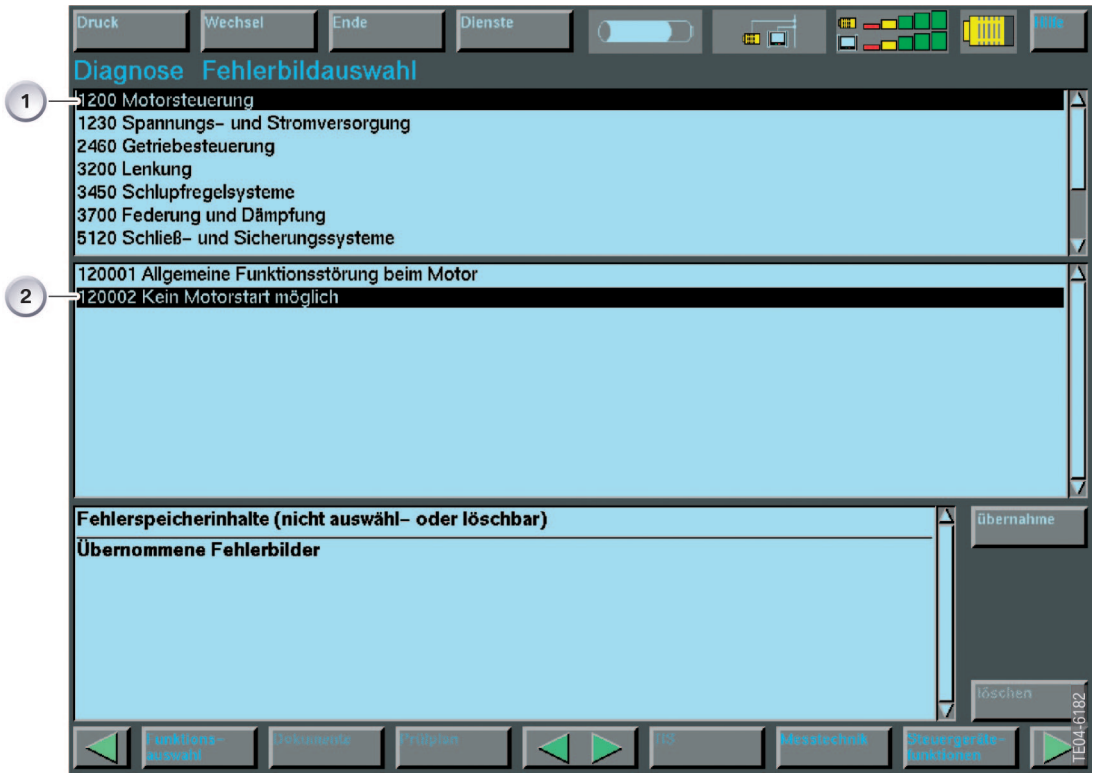
If in the quick test a preassigned control unit is not marked with "**!**" or "**X**", diagnosis communication cannot be established with the control unit. Diagnosis mode with the control unit is thus not possible.

In the above example, diagnosis mode is not possible with the **EMF Electromechanical parking brake** control unit.

Causes of no diagnosis communication being possible may be:

- Voltage supply to the control unit faulty
- Bus connection faulty
- Control unit is not activated/woken (terminal 15WUP to EMF)
- Internal control unit fault

Input of fault patterns/symptoms



6 - Symptom selection diagnosis

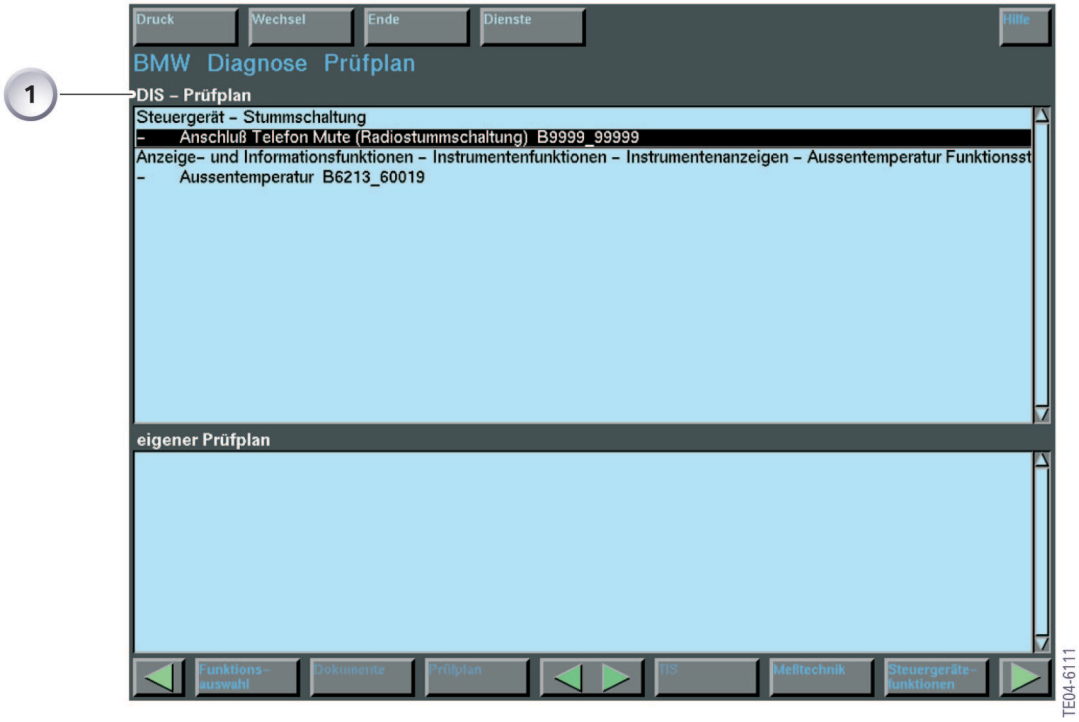
Index	Explanation
1	Vehicle subsystem
2	Perception

Vehicle systems and faulty functions can be selected in symptom selection.

The BMW diagnosis system draws up a test schedule, which is to lead to the fault cause.

The most probable fault causes are listed by priority and enable the most important test steps to be worked through in a structured manner in the relevant system.

Test schedule



7 - BMW Diagnosis test schedule

Index	Explanation
1	DIS test schedule

After the fault patterns/symptoms are entered, the test schedule is accessed by touching the "right arrow button". Before the screen is output, test modules are assigned and sorted for all the stored faults and for the input fault patterns/symptoms of symptom selection. The list of test schedules can be supplemented with personally created test schedules. These test schedules are selected in the "Function selection" menu.

When the "BMW diagnosis test schedule" screen is output, this brings up an overview of all the test modules which must be carried out in order to check all the components which have an influence on the existing faults.

The test module is started by touching the text line on the screen.

Work-through status

The work-through status of the test modules is constantly displayed in the test schedule. There is an "end marker" in the test module for this purpose. This end marker is only set when the test module has been fully carried out.

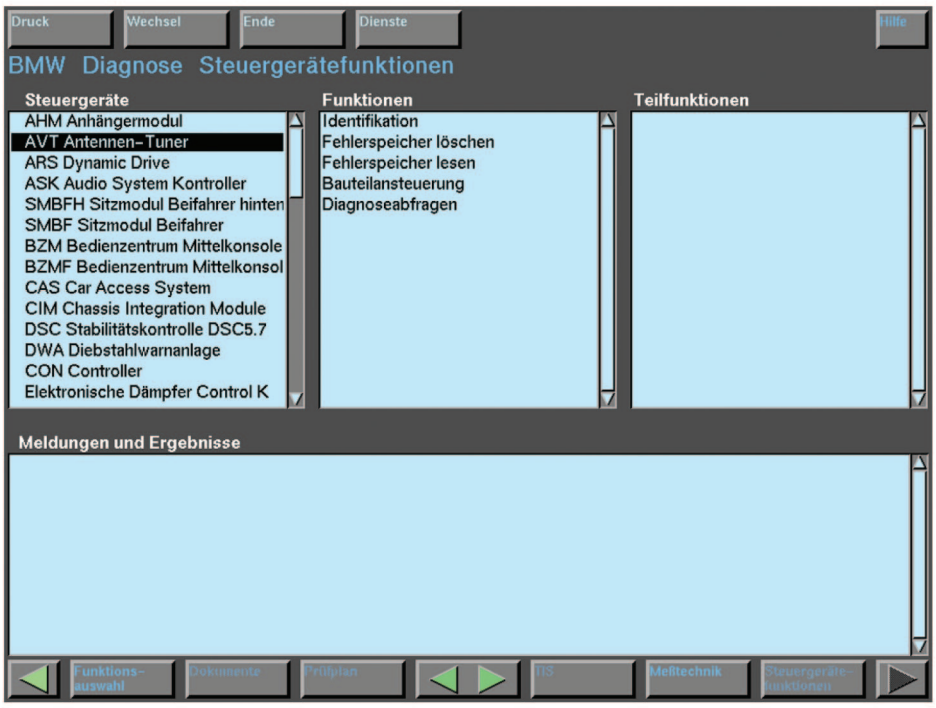
The last page of a test module generally features the following text:

"Test module is ended
Continue with testing schedule"

The end marker is set if after this page the user returns to the test schedule by touching the "right arrow button". In the test schedule the marker "indicates" that the test module has been properly completed.

⚠ Test modules should always be worked through completely! ◄

Control unit functions



8 - BMW Diagnosis Check control unit/Control unit functions

The control unit functions provide a quick overview of all the diagnosis functions of the control units. They are selected by means of the "Check control unit/Control unit functions" screen button.

From the control unit functions the user can use the "left arrow button" to return to the start screen. It is important here to remember to cancel the activated diagnosis function before quitting the control unit function (activated functions are not automatically deactivated).

Diagnosis functions

The diagnosis functions of a control unit are basically subdivided into the following main groups:

- Identification
- Read fault memory
- Delete fault memory
- Component activation
- Diagnosis requests

In the case of control units for which a test code is documented in the diagnosis protocol, the following function is also provided:

- Read test code

In addition, further system-specific diagnosis functions may be provided, such as e.g.:

- Read alarm memory
- Read adaptation values
- etc.

Identification

9 - BMW Diagnosis Check control unit/Control unit functions

Index	Explanation
1	Identification data

All the identification data stored in the control unit can be read with the "Identification" control unit function. The data structure is identical for all the control units on account of the BMW FAST diagnosis protocol.

The results in detail:

BMW part number (part number, basic control unit)

Part number of the control unit.
In the case of drive control units, part number of the basic control unit without data record.

Coding index

The coding data dependent on the control unit software or hardware are denoted by means of the coding index. The coding index is evaluated by the coding program.

Date of manufacture (DD.MM.YYYY)

Date of manufacture of the control unit.
Displayed in Day.Month.Year format.

Diagnosis index

The diagnosis functions dependent on the control unit software or hardware are denoted by means of the diagnosis index. The diagnosis index is evaluated by the diagnosis program.

Hardware number

Hardware number of the control unit electronics.

Supplier

Manufacturer of the control unit (company name).

Function software

Software number of the function software. The function software is responsible for the sequence of system functions.

Message catalogue

Number of the message catalogue used. The message catalogue defines which information is sent over the data buses in the vehicle. It also specifies whether a message is sent only on request or in a fixed time base.

Operating software

Software number of the operating software (basic software).

Variant index

The different versions of a control unit are denoted by means of the variant index.

Long identification

For the engine control units, there is also an extended identification, the "Long identification".

The "Long identification" contains additional identifications. These identifications are set out in the table below:

Identification	Explanation
Assembly number	Part number of the programmed drive control unit with data record.
Authority number	Identification number of the control unit for authorities.
Programming date	Date when the control unit was last programmed.
Kilometre reading on programming	Kilometre reading when the last programming took place.
Program status number	A distinction is made between program and data when a drive control unit is programmed. The program status number is the version identification of the program part which was written to the control unit during programming.
Data record number	Version identification of the data record which was written to the control unit during programming.

Fault memory entries

Fault memory

Excerpt from the "BMW Diagnosis Check control unit/Control unit functions" screen:	
27A6 Fuel injector, cylinder 1	
Short circuit to positive (P0262)	
Fault currently not present	
Fault would cause warning lamp (MIL) to light up	
Frequency	15
Logistic counter	3
1st at kilometre reading	1413 km
1st at engine speed	2613 rpm
1st at engine temperature	91 °C
2nd at kilometre reading	1812 km
2nd at engine speed	3345 rpm
2nd at engine temperature	94 °C
Last at kilometre reading	2134 km
Last at engine speed	1645 rpm
Last at engine temperature	93 °C

The basic structure of the fault memory is the same for all the control units in the E65.

Fault location

- 27A6 Fuel injector, cylinder 1

The fault location indicates which fault a control unit has detected. The 4-figure code at the start of the text line is the fault number as a hexadecimal number. In the event of queries, the fault location can be clearly identified using the fault number.

Fault type

- Short circuit to positive (P0262)
- Fault currently not present
- Fault would cause warning lamp (MIL) to light up

For each fault the fault types are output as additional information. The fault types indicate which fault symptom and which fault status are present.

In the case of drive control units, the system also indicates whether a warning lamp is also activated when the fault occurs.

Fault symptom

Possible fault symptoms may be:

- Short circuit to positive
- Short circuit to ground
- Open circuit
- Signal or value above threshold (i.e. a setpoint value has been exceeded)
- Signal or value below threshold (i.e. a setpoint value has been undershot)
- No signal or value
- Implausible signal or value

In the case of drive control units, the P code (P0262) is also output with the fault symptom. The P code is stipulated by law for all exhaust-gas-related faults and is assigned to all manufacturers.

Fault status

The fault status indicates whether the fault is currently present or not. It must be borne in mind here that control units differ greatly when it comes to fault detection. Many control units detect a fault only when the corresponding function is being executed (e.g. door modules). Other control units use special test sequences to detect faults (e.g. DME). The fault status therefore does not indicate the fault status currently present in the vehicle but rather the status that existed when the last fault check was conducted by the control unit.

Warning lamp status

Is only displayed with drive control units.

Frequency counter

- Frequency 15

The control unit records in the frequency counter how often a sporadic fault has occurred. The frequency counter is increased by 1 each time the fault status changes from "currently not present" to "currently present".

Logistic counter (only partly)

- Logistic counter 3

In some control units the logistic counter is output as well as the frequency counter. The logistic counter indicates how long a fault after it has been entered in the fault memory has not occurred for. The logistic counter's method of counting is as follows:

The logistic counter is set to the value 40 when a fault occurs for the first time. When the control unit detects that the fault is no longer present, the value of the logistic counter is decreased by 1 when the control unit is deactivated. As long as the fault has the status "currently not present", the logistic counter is again decreased by 1 when the control unit is deactivated. If however the fault status changes to "currently present" again, the value 40 is stored in the logistic counter again.

A low value in the logistic counter therefore indicates that a fault has not occurred for some time.

Environmental conditions

For each fault, one or more conditions which were present at the point when the fault occurred are stored as additional information. The kilometre reading is also stored as an environmental condition for all faults. Further conditions can also be stored, e.g.:

- Outside temperature
- Engine speed
- Supply voltage
- etc.

These environmental conditions can also be stored twice or up to three times for each fault. In this case:

- Display 1st at environmental conditions when the fault occurred for the first time
- Display 2nd at environmental conditions when the fault occurred for the second time
- Display Last at environmental conditions when the fault occurred last

Because of the large memory space requirement for the environmental conditions, most of the control units only have the kilometre reading as an environmental condition. In addition, this is only stored once. If the kilometre reading is only present once, it is always the kilometre reading when the fault occurred last.

Diagnosis requests

The inputs and some of the internal control unit values can be read out from the control unit by means of diagnosis requests.

However, the distributed functions call for detailed system knowledge. It is for example not always clear to identify which control unit is processing the status of a switch. Thus, the central locking button in the E65 for operating the central locking may be integrated in the control panel of the heater/air conditioner but the switch status is recorded by the Car Access System (CAS).

Furthermore, there are no setpoint values for the analogue values in the diagnosis requests.

Therefore, in order to test components, the test modules should be used as a rule.

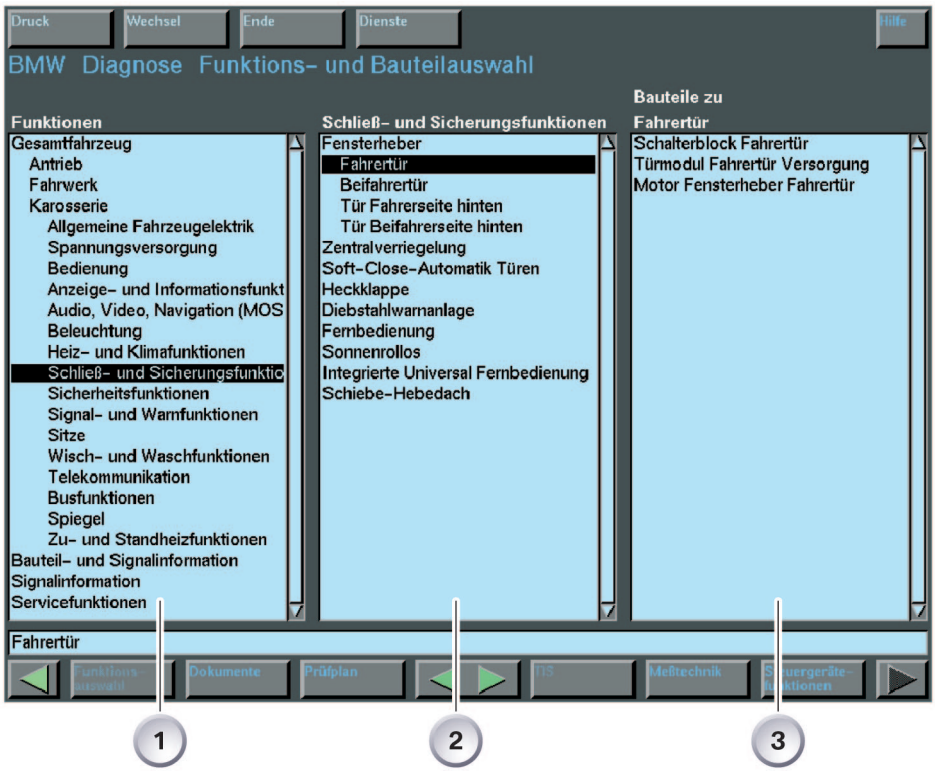
Component activation

Some of the outputs of the control units can be activated by means of component activation.

Because of the extensive function operations only few component activations can be carried out in the control unit functions.

Very many component activations can only be carried out within the test modules. The relevant notes and instructions on component activation must be observed without fail.

Function and component selection



10 - BMW Diagnosis Function and component selection

Index	Explanation
1	Main function groups
2	Subfunctions
3	Component groups

Function and component selection is the table of contents of all the diagnosis documents and test modules.

In Function and component selection the vehicle electrical system is "broken down" into its functions and subfunctions.

The left column on the screen lists the main function groups, such as e.g. locking and security functions.

The middle column lists the subfunctions, such as e.g. power window - driver's door. The right column list the component groups involved in the subfunction.

Component group, i.e. the combination of individual components (e.g. switch, leads, control unit input) into a group that can be tested by means of diagnosis or measurement.

Example: When the status of a switch is read by means of diagnosis, this enables the switch, the leads and the control unit input to be tested.

⚠ In the case of the individual subfunctions, all the component groups which make a significant contribution to the function are shown. The individual switches, drives or signals can be connected to different control units here.

The components of a component group are tested by means of the test module connected to the component group which is recorded by means of "Test schedule" selection in the "Test schedule" screen. ◄

"Supply" component group

The test module for testing the voltage supply, the bus connection and the internal faults of a control units called up by means of the "Supply" component group. The component group brings up a wiring diagram of this subsection and a function description for the control unit (component description).

If diagnosis communication is not possible for a control unit, the cause of the fault can be determined by means of the test module.

The "Supply" component group of a control unit (e.g. "Door module, driver's door, supply") is assigned to all the subfunctions in which the control unit makes a significant contribution to the function.

Bus functions

The data buses and gateway modules have been combined in the "Bus functions" selection. The function is subdivided into the following "subfunctions":

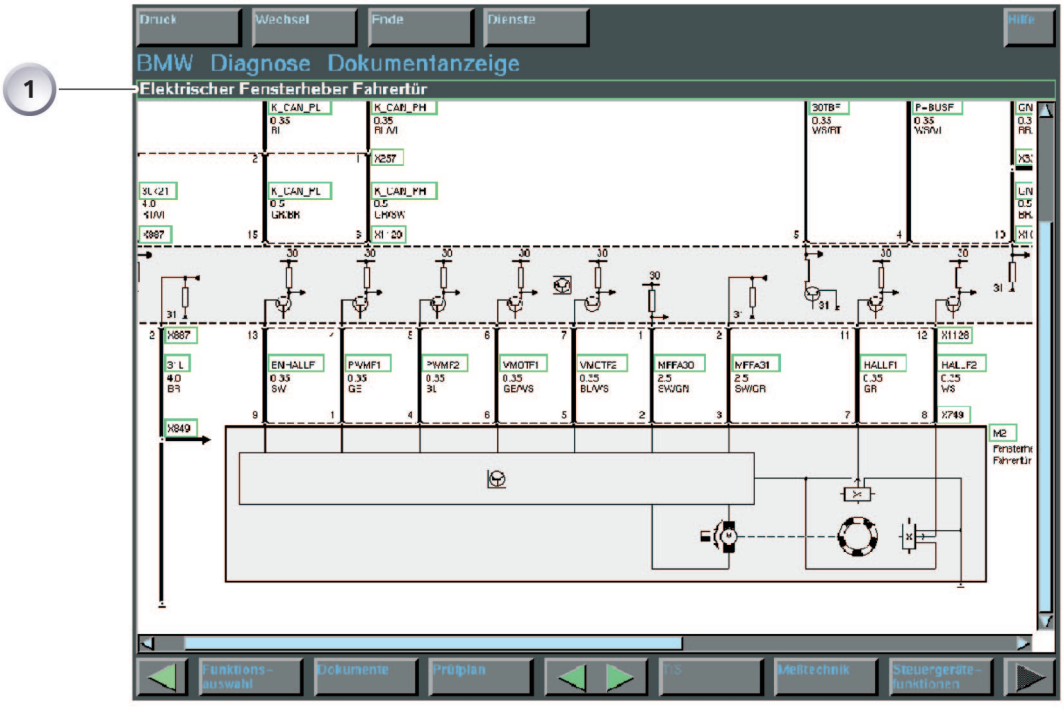
- K-CAN functions
- PT-CAN functions
- MOST functions
- Gateway functions
- ***byteflight***.

Block diagrams, function descriptions and test modules are provided for all the data buses.

The test modules for testing the optical fibres with the optical fibre tester are located under the subfunctions MOST functions and ***byteflight*** functions.

In addition, the MOST bus is provided with the "Ring break diagnosis" test module, which can be used to pinpoint the fault location in the event of a total failure of the MOST ring.

Wiring diagrams



11 - BMW diagnosis document display

Index	Explanation
1	Power window, driver's door

In contrast to the previous breakdown of the wiring diagrams, the wiring diagrams as of the E65 have been drawn up primarily for the subfunctions. A wiring diagram therefore features all the components which are required for the function.

These wiring diagrams are selected by selecting the subfunction in the middle column of Function and component selection. As previously, the display screen is then called up by selecting the "Documents" screen button.

Wiring diagrams for the component groups are only provided in the following cases:

- For the component groups in the engine management and transmission control functions
- For the "Supply" component groups
- For component groups which are used in several functions (e.g. switches on the steering wheel, brake light switch).

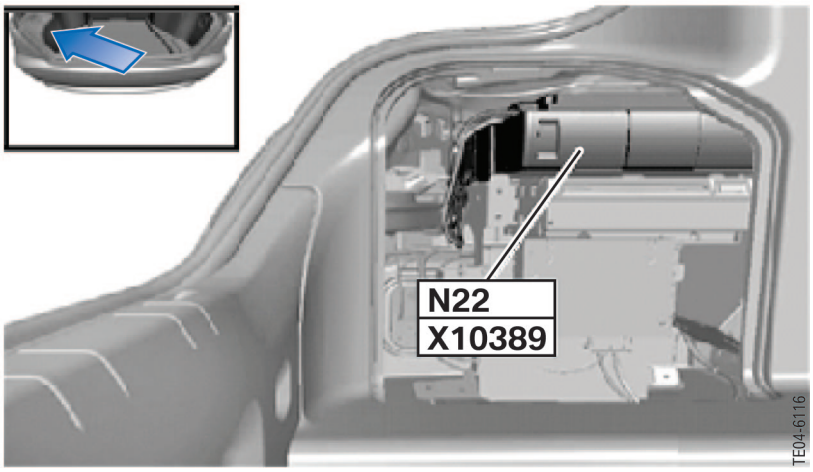
In addition, wiring diagrams for connectors, ground connections and components for the control units and storage locations of the adapter plugs can be called up by means of "hotspots".

Function descriptions and notes

The function descriptions of the systems have since the E60 been included in the "Technical Information System" TIS. The test modules of the systems feature notes and information on these function descriptions (SI Technik).

In addition to the function descriptions, notes and background information on the corresponding test modules are featured in the DIS.

Installation locations



12 - Depiction of installation location

The way is which the installation locations are depicted has been changed in order to make it easier to find components. These installation location pictures are also created directly from the virtual space data (CAD data). It is thus possible to respond very quickly to changes in the vehicle electrical system.

The installation location picture shows the location of components, plugs and connectors.

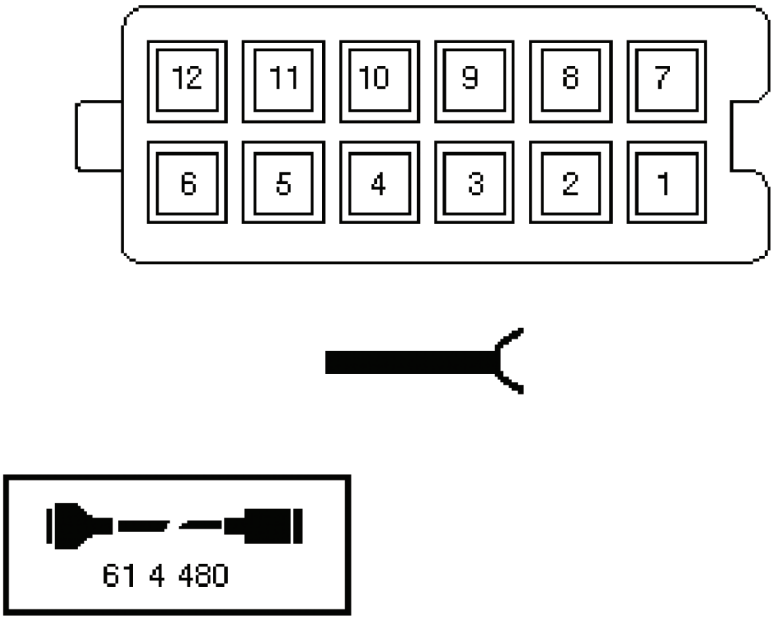
The large picture shows the detailed view in the vehicle. The numbers provide a reference to the wiring diagram.

The small picture in the top left corner shows the installation location from a larger perspective (arrow) so that the position in the vehicle can be identified.

The installation locations are selected as before by means of the "hotspots" in the wiring diagram.

In addition, installation locations, pin assignments, plug views and wiring diagrams can be selected by selecting "Component and signal information" from the "Function and component selection" screen. However, it is important to bear in mind that all the components and signals of a model series are always listed in this overview. Components which are not installed are not blanked out.

Plug views



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13 - Depiction of pin assignment

All plugs with more than 2 pins are provided with plug views which show the shape of the plug and the numbering of the pin sockets. The plug views are called up by means of the "hotspots" in the wiring diagram.

The picture in the top left corner is an adapter symbol. The number is the adapter number of the adapter cable matching the connector.

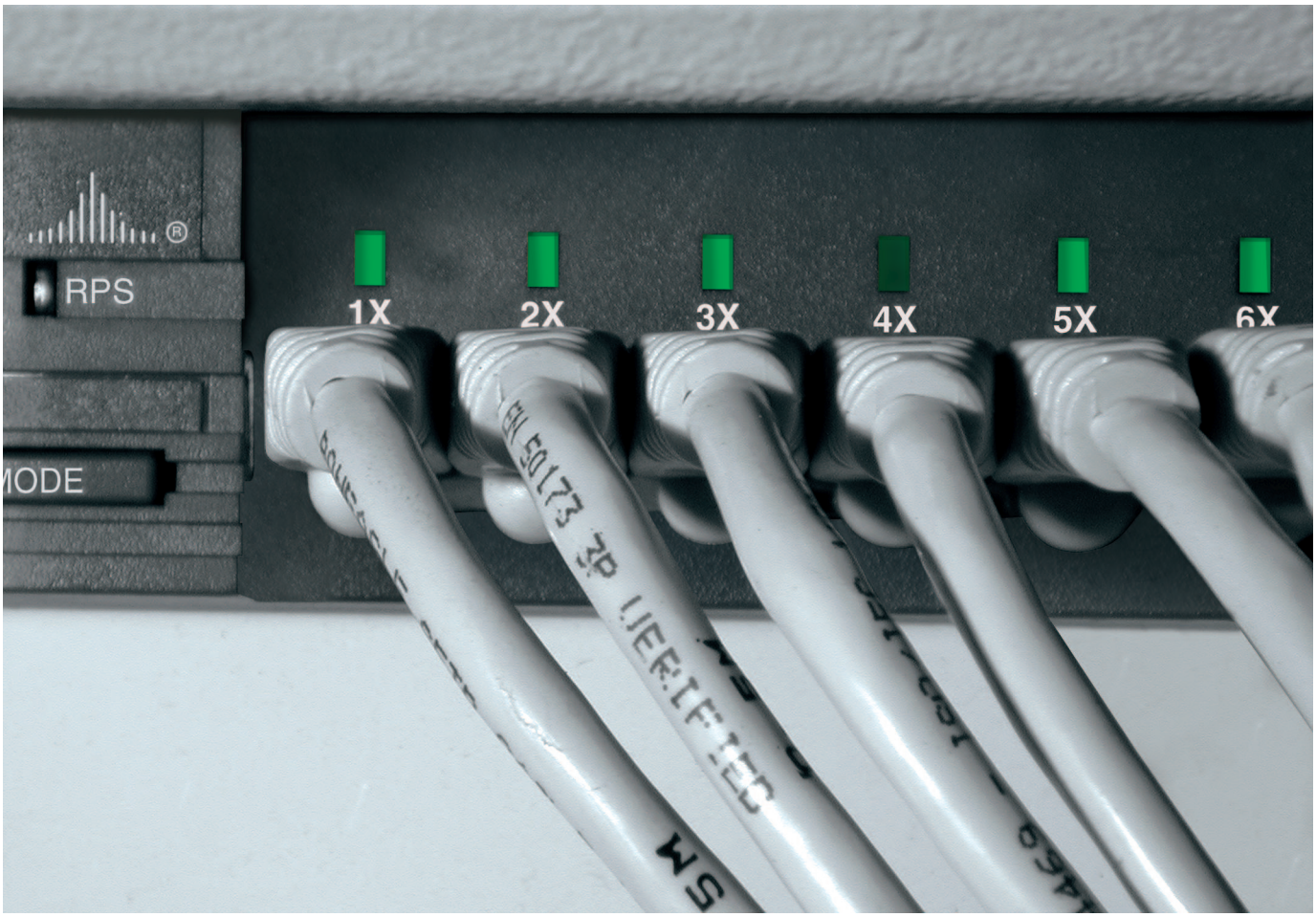
Participant's Manual
BMW Programming System

Software creates flexibility in the vehicle

Interfaces to BMW and our vehicles

Reliability ensured by efficient programming preparation

Programming – standard procedure in every BMW workshop



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Current content of Participant's Manual

In view of the constant further developments in the design and equipment of BMW vehicles deviations may arise between this Participant's Manual and the vehicles made available as part of the training course.

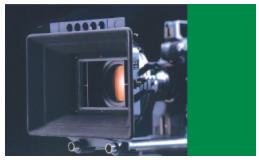
The background material refers exclusively to left-hand drive vehicles. The controls are in part arranged differently in right-hand drive vehicles than shown on the graphics in the Participant's Manual.

Additional information sources

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

- SBT programming with CIP and Progman
- Workshop Systems Documentation

Contents
BMW Programming System



Introduction
BMW Programming System

Software applications in control units

After leaving the production line, it is possible to adapt the software of an ever increasing number of control units in our vehicles. The stock of vehicles will rapidly grow to a multiple of today's 350,000 vehicles worldwide.

The provision of software and programming vehicles will therefore become core processes in every BMW service workshop. Today, retrofits and conversions as well as servicing and repairs of electronic components can be correspondingly adapted by programming in the current BMW series.

In this context, a distinction is made between three different options. Each of these options represents a change or adaptation to the software and functions. However, different procedures are implemented for this purpose:

A distinction is made between three measures:

- Coding
- Individualization
- Programming

Coding

Control units are adapted to the respective control unit as part of the coding procedure. This means functions and characteristic maps are enabled or activated, depending on:

- The country-specific version
- The vehicle equipment
- The vehicle type

Individualization

As part of individualization, e.g. car and key memory, certain customer-specific settings are implemented in electrical systems. This option is becoming ever more widespread in the control and operation of our vehicles. However, settings relevant to safety will, also in the future, be implemented by the BMW programming system.

Programming

Programming (also known as flash programming) loads a new program in the control unit. A distinction can be made between control units with:

- Program status and
- Program and data status

The program status of the control unit corresponds to the operating system and controls the computer program in the control unit. The data status involves the characteristic maps and characteristic curves specific to the vehicle, engine and transmission. The CIP programming program makes the correct selections automatically while programming the respective control unit. After programming the control unit, any necessary coding procedures are implemented automatically.

In this participant's manual, the coding, individualization and programming procedures are referred to collectively as "programming".

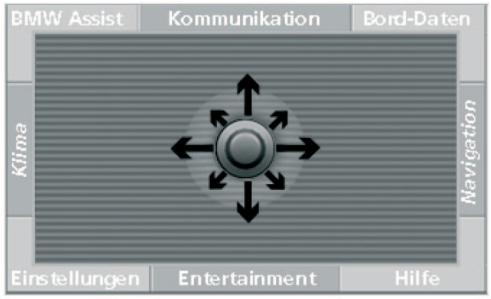
Advantages of software adaptation

- Simple and fast option for retrofits and conversions without the need to replace control units
- Improvement of existing functions
- Introduction of new functions
- Reduction of hardware variants
- Fast response to market requirements

Example

The display range of the E65 control display was improved. The software necessary for this purpose was loaded in connection with model year change 2004.

This example clearly shows how a function can be simply and quickly improved by reprogramming. There was no need to change the hardware, in this case the control display.



1 - E65 control display, old version

2 - E65 control display, new version

New system structure

A new program structure has been implemented with the introduction of Progman based on the Software Service Station platform.

The advantage of Progman is that several vehicles can be programmed simultaneously with one Software Service Station (SSS). This feature ensures that software updates can be implemented in the ever greater volumes of vehicles also in the future. The BMW diagnosis systems used to date can be used as operator control terminals.

Hardware necessary for using CIP In the workshop

Control units can now only be programmed with the Software Service Station.

Various hardware components are required for coding, individualization and programming procedures in the dealership network. The Software Service Station functions as the central computer.

Coding, individualization or programming procedures will only be possible with the Software Service Station.

The prerequisite for programming procedures is at least one programming station per workshop with the following equipment:

- 1 Software Service Station (SSS)
- 1 OPPS (optical testing and programming system) or OPS (optical programming system)
- 1 Battery charger
- Workshop network (printer)

The following devices can be additionally used in connection with Progman:

- DISplus
- GT1

An overview of the workshop network and its components is provided in the fold-out page at the end of this document.

A detailed description of the workshop network and all hardware components can be found on the "Documentation Workshop Systems" CD.

General preconditions

To avoid unnecessary problems caused by external intervention and interruptions in the programming procedure, the programming station must not be made accessible to customers. The cables must not cross through-traffic.

⚠ The programming procedure may be terminated if a bus signal is generated as the result of activation of electric loads during programming. The programming procedure should be repeated following termination. In exceptional cases it may be necessary to replace the control unit if communication is no longer possible. ◄

Consequently, valuable time is lost where the programming station could be used for other purposes. The SSS does not need to be placed directly at the vehicle. It can be installed in any protected position provided it has a network connection.

In addition, a battery charger must be available per programming station.

A network printer should be connected in the vicinity of the programming stations so that hard copies can be created if necessary.

To avoid damage, the network cables should be routed to the vehicle in such a way that they are completely protected.

The programming stations should generally be installed inside the workshop. If this is not possible the programming station installed outdoors must be protected from the influences of weather and made inaccessible for customers.

⚠ Generally the interfaces must be connected by cable during programming. ◄

Hardware operating conditions

Device	Operating temperature	Relative humidity
GT1	+3 °C - +43 °C	10 - 80 % (no condensation)
OPPS/OPS	+3 °C - +43 °C	10 - 90 % (no condensation)
SSS	+10 °C - +35 °C	10 - 90 % (no condensation)
Monitor SSS	+3 °C - +35 °C	10 - 90 % (no condensation)

Software Service Station

The Software Service Station (SSS) replaces the DISplus and Group Tester One diagnosis systems as the programming system. Together with the optical programming systems (OPPS/OPS), the Software Service Station offers a powerful and scalable platform for programming, coding and individualization of the vehicles of the BMW Group.

In the first expansion stage, the Software Service Station can be used on all BMW and MINI model series and for all Rolls-Royce models as from late 2004.

As on the DISplus and GT1, data is supplied to the Software Service Station by means of DVD-ROM and CD-ROM. Additional data is provided by online updates with JETstream. The application software SGS (control unit coding for older model series) and CIP (coding, individualization, programming) can be used in the first expansion stage.

1 - Software Service Station

OPPS/OPS/diagnostic head

OPPS

The optical testing and programming system OPPS, the optical programming system OP and the diagnostic head can be used together with the software Service Station to serve as the interface to the vehicle. The OPPS was used for diagnosis of the ***byteflight*** and MOST bus systems used for the first time in the E65 (fibre optics).

2 - Optical testing and programming system

Corresponding to the model and equipment (see information diagnosis coding IDC), in addition to the OBD socket, MOST Direct Access is used in connection with the OPPS to shorten the programming time required for MOST control units compared to programming via the OBD socket only (30 to 60 percent depending on the control unit).

In addition to the optical testing and programming system OPPS, the optical programming system OP has been available since mid-2003. In the same way as the OPPS, the optical programming system OPS can be used for connecting the Software Service Station to the vehicle.

⚠ The connection cables for the OBD socket and MOST Direct Access can be connected in any order. As soon as the OPPS/OPS detects the connection to MOST Direct Access, programming data are sent via this access link as required.

No error message is displayed if MOST Direct Access is disconnected during the programming procedure. The programming data are still sent via the MOST output. A message indicating that a fault occurred during programming is then provided in the final report. ◄

Description of the LEDs

LED next to the mains power connection:

Index	Explanation
Green, flashing light	OPPS/OPS free
Green, steady light	OBD connection
Green, flashing rapidly	Software update activated
Orange, steady light	Self-test active/fault

LEDs next to the MOST connection:

Index	Explanation
Red LED	Voltage supply
Yellow LED	Data transfer
Green LED	Bus lock

Differences between OPPS and OPS

Optical testing of the ***byteflight*** is not possible with the optical programming system OPS. The OPS does not feature the pc-board and the set of adapters necessary for testing the ***byteflight***.

3 - Optical programming system

The optical programming system OPS cannot be used for optical testing applications and is employed solely for optical programming of the MOST. The set of adapters necessary for testing MOST control units is not included in the standard OPS equipment. However, the OPS can be used to test the MOST when used together with the set of adapters provided with each OPPS.

Diagnostic head

The OPPS/OPS is not necessary on vehicles with no fibre optics conductors (e.g. E83, E85). The diagnostic head is still used on vehicles with no MOST bus to serve as the interface to the vehicle.

4 - Diagnostic head

⚠ The diagnostic head must not be used for programming on vehicles with MOST Direct Access. The optimum programming times are achieved only with the OPPS or the OPS. ◄

Multichannel programming

The CIP decides what data paths are to be used for programming depending on the type of vehicle.

The options for using various channels differ depending on the model and equipment configuration. The following variants are possible:

Type of programming	Explanation
Single-channel programming	All programming data are routed via the OBD socket in connection with single-channel programming.
Multichannel programming, sequential	In connection with sequential multichannel programming, the programming data are sent sequentially (one after the other) via the OBD socket and via MOST Direct Access.
Multichannel programming, parallel	In connection with parallel multichannel programming, the programming data are sent simultaneously via the OBD socket and via MOST Direct Access.

During the programming procedure, the display screen shows whether programming is performed on one or two channels.

The graphic below shows parallel multichannel programming.

5 - Multichannel programming

Index	Explanation
1	Connection, OBD socket
2	Connection, MOST Direct Access
3	Connection, BMW programming system

The final report indicates whether the control units were programmed via the OBD socket or MOST Direct Access.

Group Tester One/DISplus

As from 09/2004, the BMW diagnosis systems GT1 and DISplus will be used as operator control terminals for programming procedures. The BMW diagnosis systems will then be used only to control the programming sequences. The actual programming will be performed solely by the Software Service Station. There will be no data for programming procedures on the BMW diagnosis systems. The two BMW diagnosis systems use different connections.

The DISplus is integrated in the workshop network by means of a network cable. The GT1 can be incorporated in the workshop network by way of a radio remote interface providing increased flexibility in everyday workshop operation as no cable connections are necessary.

TE04-4983

6 - Group Tester One

Workshop network

The workshop network plays a key role in the expansion of the CIP programming software. All devices for programming, control/operation and the interfaces to the vehicles are incorporated in the workshop network. All future expansions will be based on a network operable in the workshop. In addition to the perviously described devices, the workshop network comprises the following elements:

- 19" cabinet and patch panel
- Switch
- Access point
- Printer
- Cabling and network sockets

19" Cabinet

The 19" cabinet serves the purpose of accommodating the switch, patch panel and the socket strip for powering these components. The 19" cabinet must be secured against a wall in a central, protected location in the workshop.

The patch panel accepts the network cables. The network cables installed in the workshop are connected to terminal strips at this panel. From the patch panel, the individual cable looms are connected via flexible patch cables to the switch. This arrangement prevents cable breaks and connections can e changed quickly and simply.

Switch

The 19" cabinet also houses several switches. The switch is the central distributor in the overall BMW workshop network. The switch establishes the data exchange between the individual devices, the connection to the interfaces in the vehicles and ultimately the connection to BMW.

Access point

The access point establishes with wireless connection of the diagnostic head and GT1 control elements with the workshop network. The access point is also connected to the switch.

Vehicle access

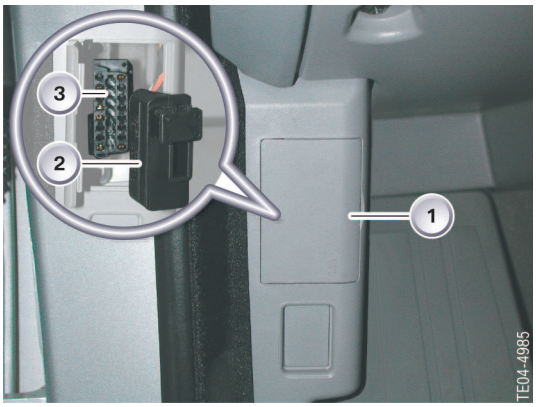
Depending on the vehicle model and equipment configuration, various access points are provided on the vehicle for connecting the OPPS/OPS/diagnostic head interfaces.

- OBD socket
- MOST Direct Access

OBD socket

The OBD socket is standardized for all manufacturers. The OBD socket must be located in the vehicle interior and be accessible from the driver's seat.

The OBD socket is closed off by a cap. The pins 7 and 16 are bridged on the end cap so that the diagnosis link (TxD line) is connected to terminal 30 and protected from interference pulses. A resistor (820 ohms) is installed in the jumper (bridge) for the purpose of attenuating voltage peaks.

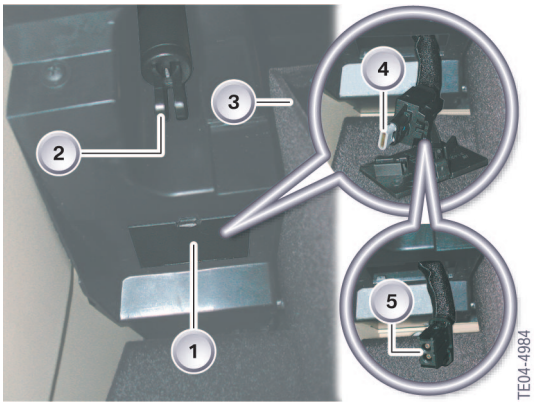


7 - OBD socket (E60)

Index	Explanation
1	End cover
2	End cap
3	OBD socket

MOST direct access

MOST Direct Access is always installed on vehicles equipped with a MOST bus. In addition to the OBD socket, the MOST Direct Access must be connected for programming purposes.



8 - MOST Direct Access (E60)

Index	Explanation
1	End cover
2	Left mounting bracket, glove compartment
3	Glove compartment
4	Protective cap for MOST Direct Access
5	MOST Direct Access (flash connector)

Access to the vehicle differs corresponding to the model. A detailed description can be found in the BMW Service Information - Technical SBT 00 03 03 (054).

TE04-4837

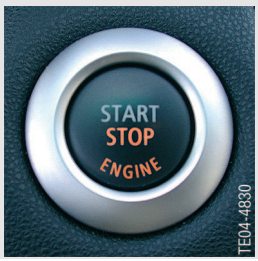
Correct preparation of the vehicle avoids errors during programming.

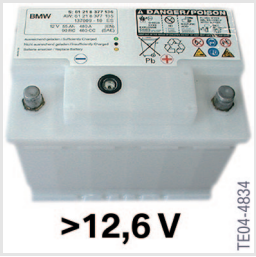
Procedure for changing the software

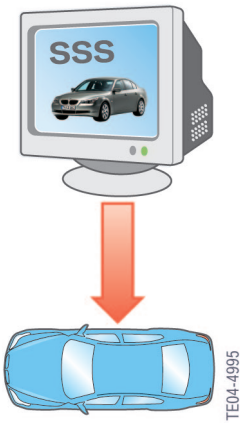
An important prerequisite for ensuring trouble-free programming is the correct preparation of the vehicle. Special requirements apply to the individual BMW models. These requirements are described under the IDCs (information, diagnosis and coding). The measures that apply to all BMW models are described in the following.

⚠ A diagnostic procedure must first be performed on the vehicle prior to any programming. Programming must not be started before faults in the vehicle electrical system are ruled out. ◄

Preparatory measures

Attention	Points to be observed
 TE04-4830	**Engine** Turn off engine, ignition key turned to terminal 0
 TE04-4831	**Manual gearbox/SMG** - Transmission in neutral - Parking brake applied
 TE04-4832	**Automatic transmission** - Transmission in position P - System temperature below 80 °C Attention: Do not apply parking brake on vehicles equipped with the electromechanical parking brake.
 TE04-4833	**Electric loads** All electric loads, lights and direction indicator lights switched off. Wipe/wash system switched off. Make sure that the wipers can move freely. The wipers may be activated during programming. On no account block the wipers.

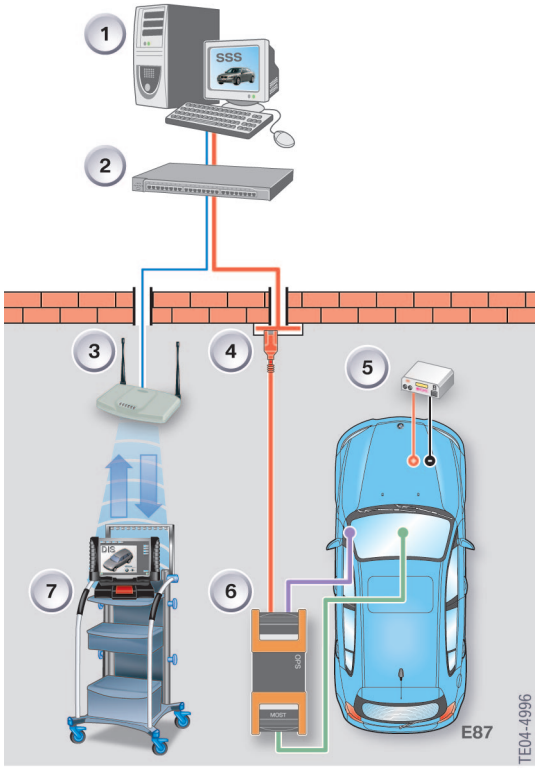
Attention	Points to be observed
 TE04-4834	**Battery** The battery should be sufficiently charged at the start of the programming procedure (12.6 V).
 TE04-4835	**Battery charger** Connect battery charger (see Service Information - Special tools/ equipment 02 03 098 350). Do not connect or disconnect the charger during programming. The system voltage must not drop below 12.6 V during the programming procedure.
 TE04-4836	**Diagnosis** Perform quick test. Using the diagnosis system, rectify any problems before programming and clear stored fault codes.
 TE04-4837	**Programming** Check CKM values, also observe individual settings on the vehicle (function specific to model series) if applicable, start programming procedure. Attention: The data status of the Software Service Station must always be kept updated!
 TE04-6286	**Vehicle with MOST bus** Program with OPS/OPPS only. Make sure that the current firmware is installed.
 TE04-5311	**Make sure that no switches, radio etc. are operated during programming as this could terminate the programming procedure.**



The workshop network is a basic prerequisite for programming. The actual programming procedure is executed solely by the Software Service Station.

Data flow during programming

Data flow in the workshop network



9 - Data flow in the workshop network

The entire communication with the control units in the vehicle takes place from the Software Service Station (red data route).

The BMW diagnosis systems GT1 and DISplus can be used as operator control terminals. The processes in the Software Service Station can be monitored and controlled on the display screens of the BMW diagnosis systems (blue data route). The BMW diagnosis systems are not directly connected to the vehicle.

⚠ The programming data are sent exclusively by the Software Service Station via the workshop network to the vehicle. ◄

Index	Explanation
1	Software Service Station
2	Switch
3	Data route between BMW diagnosis system and Software Service Station
4	Data route between Software Service Station and vehicle
5	Battery charger
6	Interface (here OPS)
7	BMW diagnosis system (here GT1)

Data flow in the vehicle

The data exchange between the Software Service Station and the individual control units takes place via different routes in the various vehicle models.

The first step in all cases is to read out the vehicle order, the vehicle data status and the kilometre reading. Depending on the vehicle model, the vehicle order and the vehicle data status are stored in the car access system or in the electronic vehicle immobilizer. this data is also stored redundantly in the following control units corresponding to the vehicle model:

- Light module - E6x, E52, E53, E38, E39
- Light switch cluster - E46, E83, E85
- Footwell module - E87

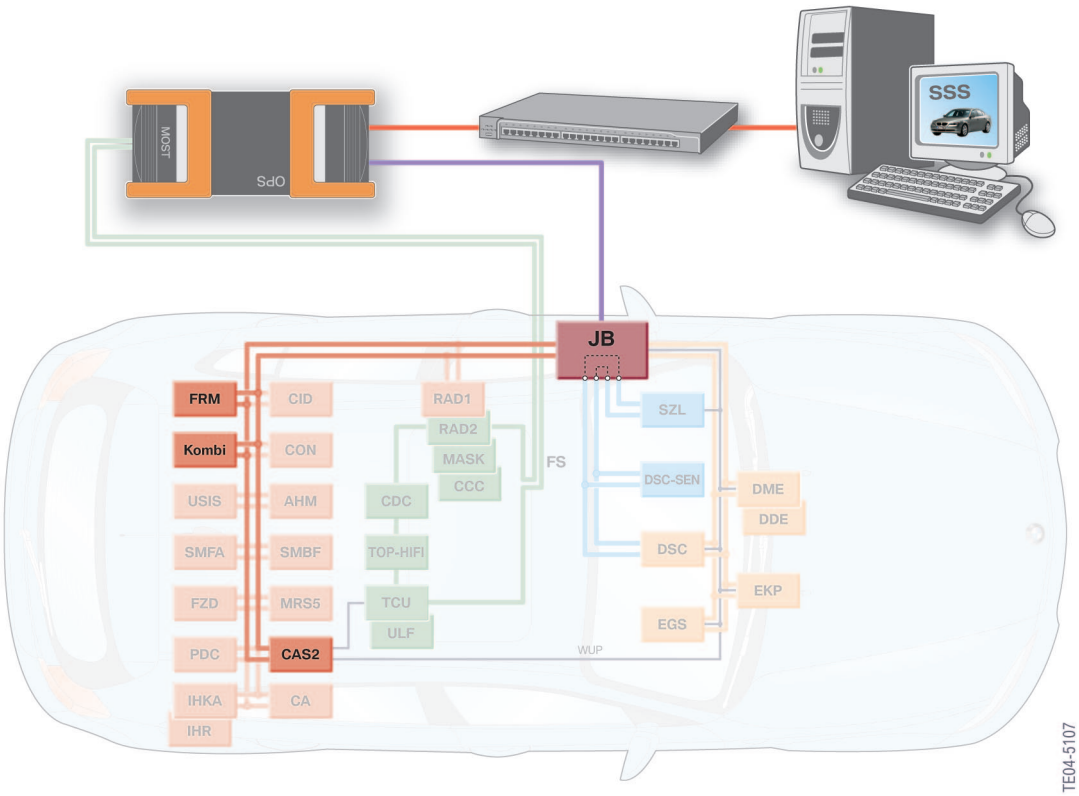
The vehicle order is essential for programming. The vehicle order must be requested and obtained if not available or damaged.

⚠ The vehicle order can be called up only when there is a data link set up to the control units and the control units are operating correctly. ◄

Reading out vehicle order

By way of example of the E87, the graphic below shows the data link necessary for reading out the vehicle order, the vehicle data status and the kilometre reading. In addition to the components in the workshop network, the following components in the vehicle are involved in the communication procedure:

- Diagnosis bus
- Junction box (gateway function)
- K-CAN
- Car access system
- Instrument cluster
- Footwell module



10 - Data flow in the vehicle

Programming the control units

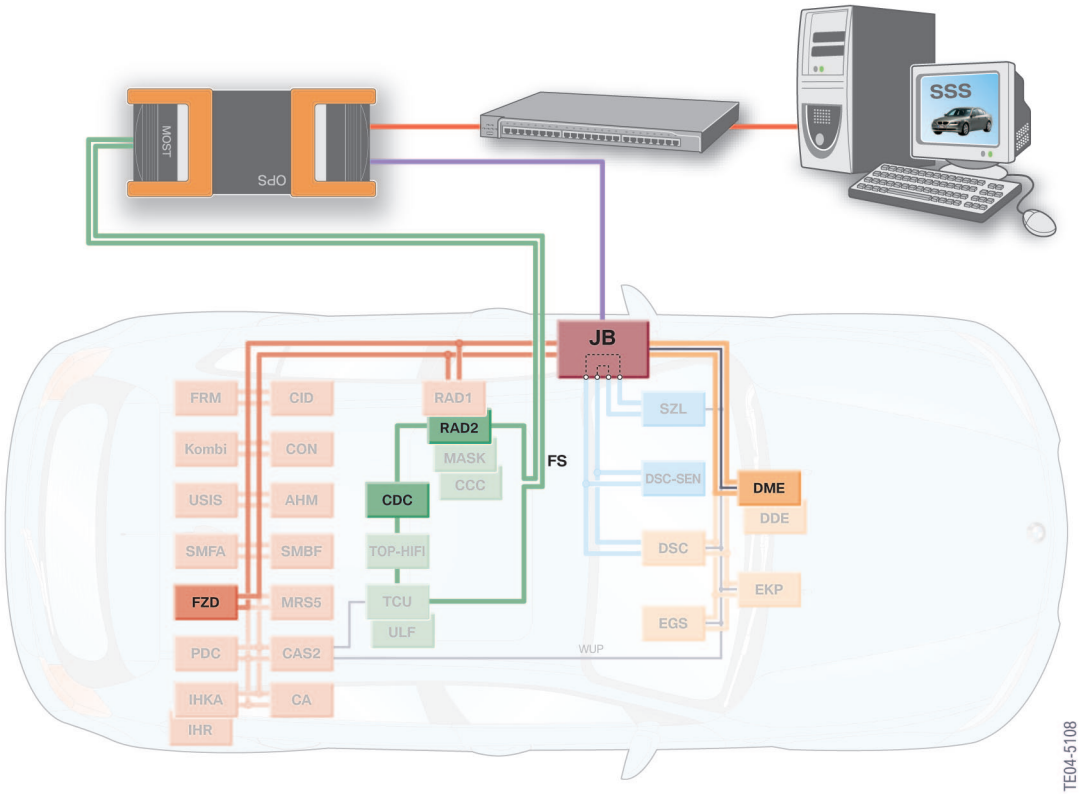
Various access points can be used for programming the control units in the vehicle. The control units in the MOST system network are programmed via MOST Direct Access (flash connector).

The remaining control units in the K-CAN, PT-CAN and F-CAN bus systems are programmed via the OBD interface.

The DME, FZD and CDC control units are programmed in the following example.

In addition to the components in the workshop network, the following components in the vehicle are involved in the communication procedure:

- Diagnosis bus
- Junction box (gateway function)
- K-CAN
- Roof functions centre
- PT-CAN
- Digital Motor Electronics
- MOST bus
- CD changer
- Top-HiFi amplifier
- Universal charging and hands-free facility
- Radio 2



11 - Data flow in the vehicle

Problems involved in the case of fault

Vehicle diagnosis cannot be performed with the programming system.

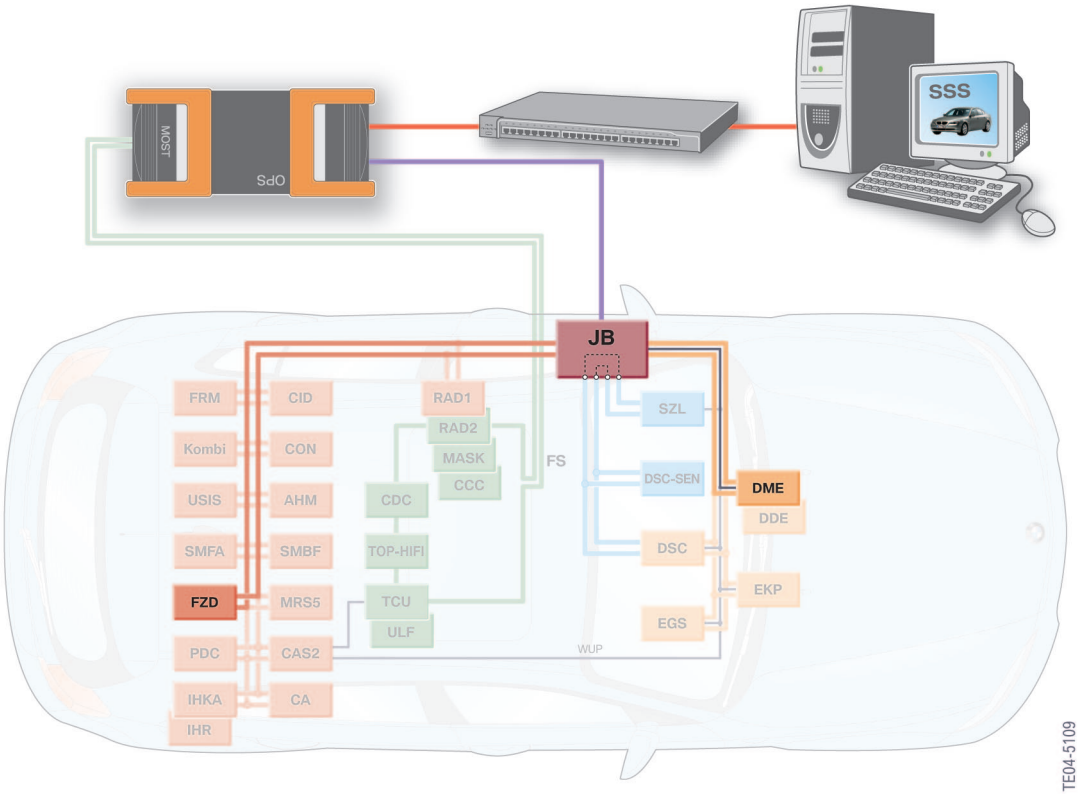
In the following example, there is a break in the power supply to the radio 2 (fuse defective). As a result, communication is down in the entire MOST bus. All MOST bus users are shown as "did not respond/incorrect response" in the action plan. A diagnostic procedure must be started if this situation occurs during programming.

In addition to the components in the workshop network, the following components in the vehicle are involved in the communication procedure:

- Diagnosis bus
- Junction box (gateway function)
- K-CAN
- Roof functions centre
- PT-CAN
- Digital Motor Electronics

The entire MOST bus is inoperative due to failure of the radio 2. Consequently, programming data cannot be sent via this bus system.

⚠ If several control units are indicated as "did not respond/incorrect response", this normally points to a fault in the area of the gateway or bus systems. ◄



12 - Data flow in the vehicle

Operation

TE04-4837

Modified operating procedure through new functions. New menus for multiple vehicle programming.

Explanation of terms - Progman and CIP

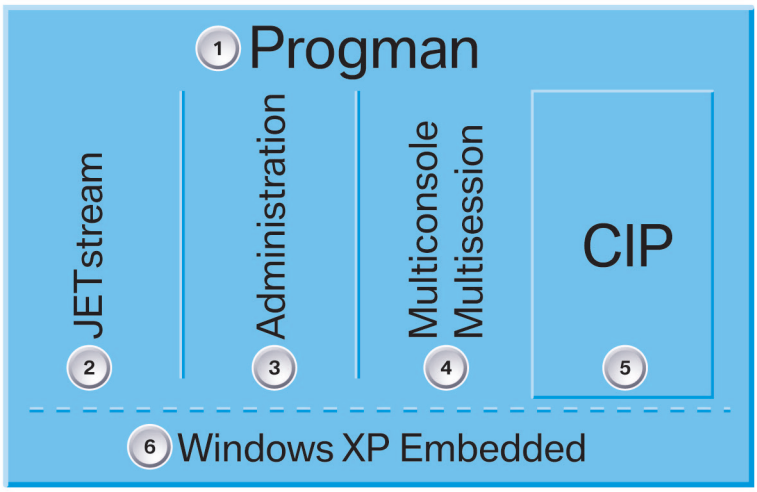
As from 09/2004, Progman (programming manager) will adopt functions from the BMW diagnosis and programming systems and provide new operating and control options. The software will still be available on a CD and DVD. The CD contains a new operating system (Windows XP Embedded). The current operating system of the BMW diagnosis systems will no longer be used.

The DVD contains CIP and all administration and configuration tools in connection with programming procedures.

Progman involves a new program structure. With the Software Service Station functioning as the platform. The necessary data are sent via CD/DVD and JETstream.

Platform: Software Service Station

Software Update



CIP DVD
or Delta via
JETstream

Progman basic CD

TE04-4873

Index	Explanation
1	Progman - programming system
2	JETstream - online data update
3	Administration - basic settings and administration interfaces Progman
4	Multiconsole/multisession - operation via various devices/management of several vehicles
5	CIP - program part for programming BMW vehicles
6	Windows XP Embedded - operating system

Progman

The new programming manager (Progman) facilitates parallel programming of up to five vehicles (different model series and different vehicle data statuses) that are programmable with CIP.

JETStream

JETStream is the basic application for the online data update of the diagnosis and programming systems DISplus, GT1 and SSS.

With the introduction of JETstream it is possible for the first time to make data available online for the diagnosis and programming systems. It forms the basis for considerably faster and more efficient information exchange from and tot he workshops of the worldwide dealership network.

Administration tool

The administration tool provides the same setting options as before with the BMW diagnosis systems. Progman, however, gives rise to several changes and additions:

- Installation of JETStream printer
- Administration of OPPS/OPS/diagnostic head

Multiconsole/Multisession

Progman makes it possible to simultaneously program several vehicles with different operating units (GT1/DISplus). Consequently, it is therefore necessary to manage several vehicles on the display screen of the Software Service Station or of the operating units (GT1/DISplus).

With Progman it is possible to distinguish between vehicles by using various features (e.g. vehicle number plate). The selected vehicles are ultimately released for programming. The CIP software is responsible for the actual programming procedure. Operation and control of the administration program is described in the following chapter.

Index	Explanation
Multiconsole	The multiconsole function makes it possible to control programming procedures both via the Software Service Station as well as via the BMW diagnosis systems GT1 and DISplus.
Multisession	The multisession function makes it possible to program several vehicles simultaneously.

Operating system

Progman is a new tamper-proof operating system for programming applications at BMW. Progman utilizes Windows XP Embedded which, from now on, will serve as the basis for all further programs required for programming applications. No changes can be made to the operating system of this Windows variant and it can be used only in connection with the corresponding hardware (Software Service Station).

The change in operating system gives rise to changes in the operation and control procedures in Progman. The OPPS/OPS/ diagnostic head must be assigned either to diagnosis or to programming. A detailed description of the operation and control procedures is provided in the next chapter.

CIP

The program part CIP is responsible for the actual programming tasks. This program part defines what data statuses are to be assigned to what vehicles. The actual vehicle programming procedure runs via CIP.

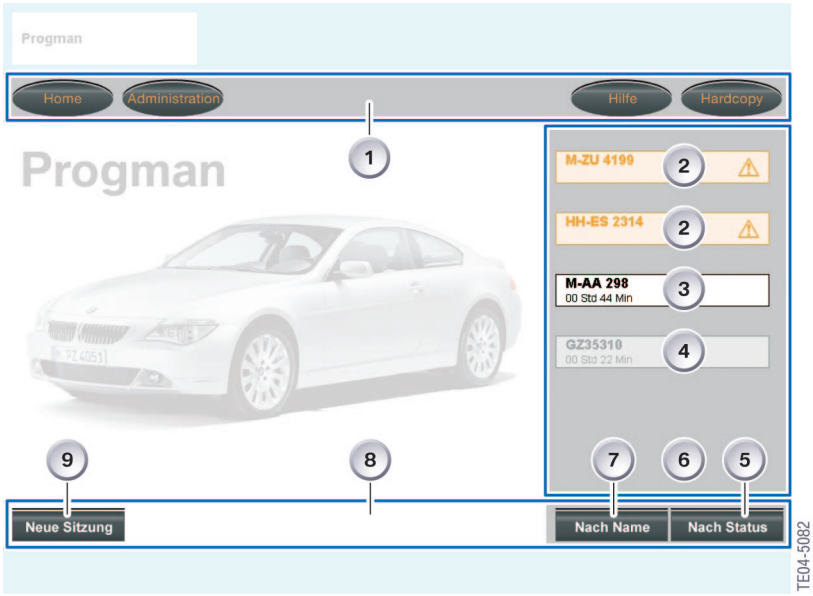
Progman operation and control

The possibility of simultaneously programming several vehicles with one Software Service Station and the new operating system have resulted in changes in operating and control procedures.

Administration - Vehicle interfaces

After connecting the interface (OPPS/OPS/ diagnostic head) to the vehicle, the interface is displayed in the corresponding menu and can be selected.

Progman start screen



In the Progman start screen, functions can be selected in three areas:

- Upper screen bar
- Right-hand area of screen
- Lower screen bar

Index	Explanation
1	Upper screen area
2	Orange - interaction necessary
3	White - detailed view available
4	Grey - session in progress
5	Sorting according to name
6	Right-hand area of screen
7	Sorting according to name
8	Lower screen area
9	New session

Upper screen area

The following functions are available in the upper area of the screen:

- Administration
- Help - this menu contains online help to Progman
- Hardcopy - the screen view can be printed out by pressing the Hardcopy button
- Home - Home always brings the user back to the start screen

Right-hand area of screen

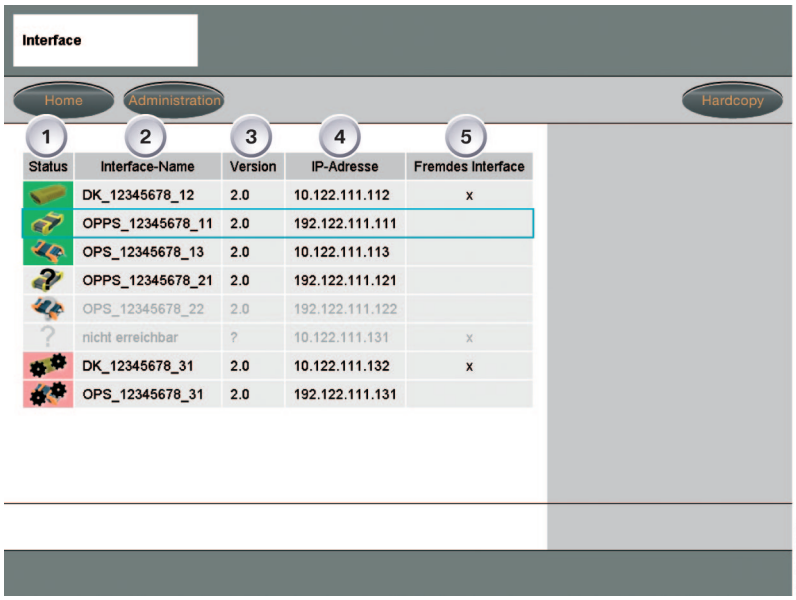
The right-hand area of the screen shows the vehicles already in the Progman system.

- Orange lettering means - interaction necessary, systems waiting for input (the symbol serves as an added indication)
- Black lettering means - input field can be maximized, details are then shown. The remaining run time of the current action is displayed.
- Grey lettering means - session being used and cannot be selected by another user.

Lower screen area

New sessions can be created in the lower area of the screen and existing sessions can be sorted according to name and status.

Interface



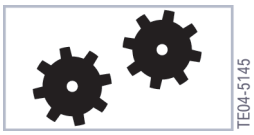
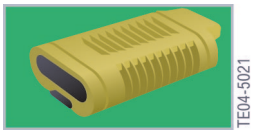
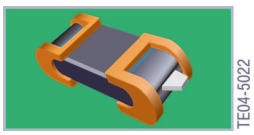
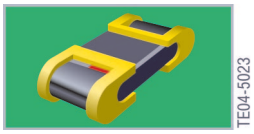
As soon as a new session is started, the interface previously connected to the vehicle can be selected from the list of three interfaces. The following information is shown in this screen:

- Status
- Interface name
- Version
- IP address
- External interface

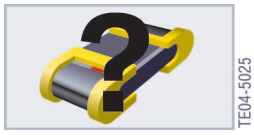
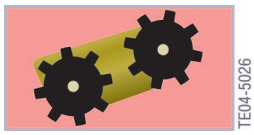
Index	Explanation
1	Status
2	Interface name
3	Version
4	IP address
5	External interface

Status

"Status" indicates the operating status of the corresponding interface. This is followed by the description of the colours and symbols.

Symbol	Description
 TE04-5138	**Green background - interface is free and can be selected**
 TE04-5139	**Grey background - interface not detected** - It is currently being shut down or started up - It is unconfigured referred to the sub-network in which it is located
 TE04-5140	**Red background - the interface is occupied and is not available for a session** It is possible to query the configuration and the current session.
 TE04-5141	**Black lettering - interface can be selected**
 TE04-5142	**Grey lettering - interface cannot be selected as it is not available or cannot be reached**
 TE04-5143	**Black question mark - interface is unconfigured referred to the sub-network in which it is located**
 TE04-5144	**Grey question mark - connection to interface is not possible, the device cannot be reached**
 TE04-5145	**Black gearwheels - the interface is currently being used exclusively. Only the configuration data can be queried.**
 TE04-5021	**Diagnostic head**
 TE04-5022	**OPS**
 TE04-5023	**OPPS**

Examples of possible combinations

Symbol	Description
 TE04-5024	**OPS with grey background and grey question mark** The OPS is in its own sub-network and is currently being started up or shut down. Interfaces in their own sub-network are indicated only when they are connected. Interfaces from external sub-networks are always shown. When they are not connected, they are indicated as a grey question mark on a grey background without the interface symbol.
 TE04-5025	**OPPS with grey background and black question mark** A black question mark means that the OPPS is unconfigured, referred to the sub-network in which it is used.
 TE04-5026	**Diagnostic head with red background and black gearwheels** The diagnostic head is currently being used. New firmware is loaded in this case. The diagnostic head is not available for a session. The configuration can be queried.

Interface name

An interface name can be freely assigned to each interface so as to simplify definition of the interface in the workshop.

Version

The firmware version indicates the software update the selected interface (OPPS/OPS/ diagnostic head) is currently using. Following the installation of a software update of a new software, the firmware version is transferred automatically after initial connection with the interface. The information shown in this field keeps the user updated with regard to the current status.

IP address

The IP address (internet protocol address) is a uniquely assigned address for each device in the workshop network.

This address consists of a number block which is normally structured as follows.

Example of a number block:

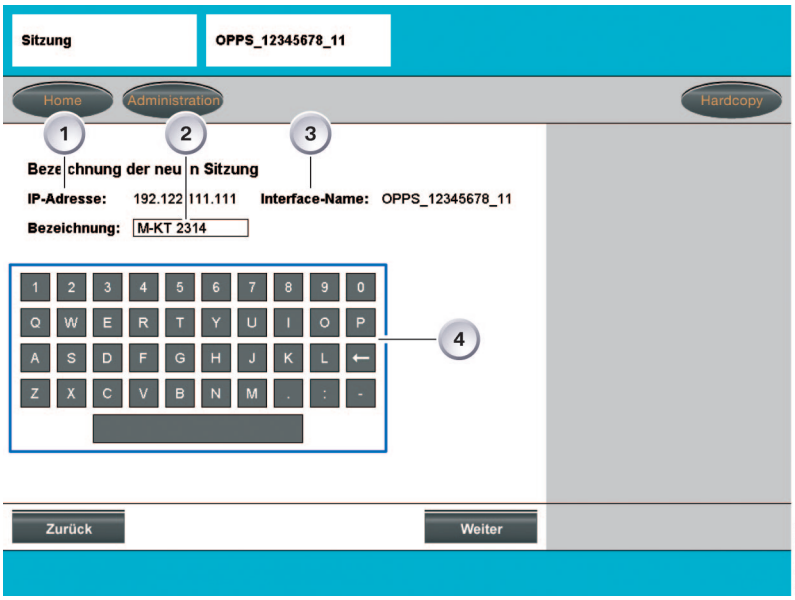
192.168.100.10

The addresses must be structured such that each device in the network is distinguished from all the others. In this way, it can be defined exactly and uniquely identified in the workshop network.

External interface

This column indicates whether the current interface is an external interface. External interfaces are located in external sub-networks and can be used in connection with this Software Service Station.

Session



The interfaces can be assigned to the vehicles on the "Session" screen. Freely selectable number and letter combinations can be used for this purpose. There are no restrictions in this case. Following examples are possible:

- Vehicle licence number
- Cone/guide number
- Vehicle identification number
- Type/colour

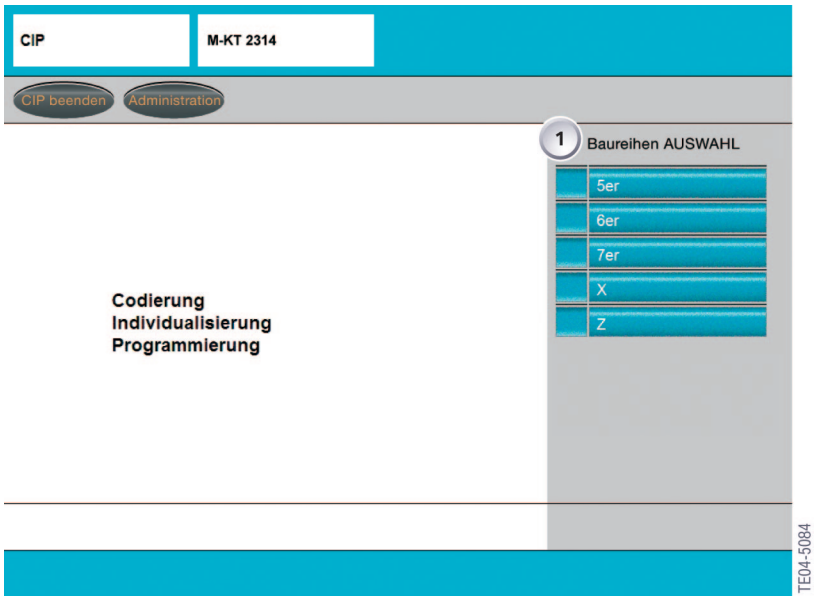
Index	Explanation
1	IP address of interface
2	Freely selectable identifier
3	Interface name
4	Keyboard

Depending on the workshop organization, vehicle licence plate numbers can be used that are assigned to the vehicles.

These licence plate numbers are assigned to the interfaces (OPPS/OPS/diagnostic head), thus ensuring the vehicle can be identified on the screen.

The screen keyboard can be operated either via touch-screen or a mouse. Information can be additionally entered via the keyboard in connection with the Software Service Station.

Model series SELECTION

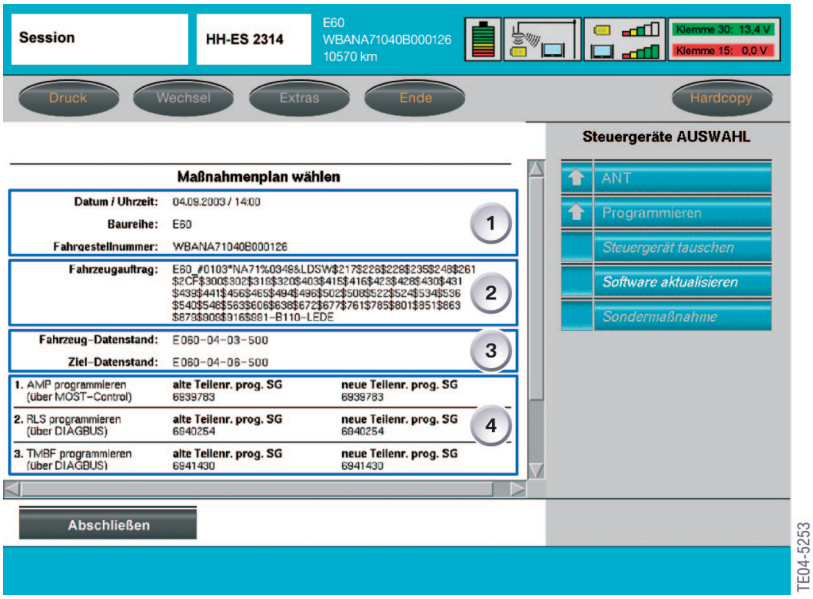


The corresponding BMW model is selected under model series selection.

The previously entered identification is shown in the upper area of the screen.

Index	Explanation
1	Model series selection

Action plan



The jobs or procedures necessary for creating a consistent vehicle are shown in the action plan based on the logic integrated in the CIP.

This means control units may be shown that need to be replaced, programmed or coded.

The aim is to ensure that control units of one vehicle can interact.

Index	Explanation
1	Vehicle data (model series and vehicle identification number) and time are shown.
2	Vehicle order - the optional equipment of the vehicle is defined in the vehicle order.
3	Vehicle data status - current data status of the vehicle. Target data status - data status after working through the action plan. Vehicle model (E060), data status year, data status months, data status description.
4	List of control units to be programmed, old and new part numbers of the control units, data path for programming.

⚠ An action plan must be worked through completely in all cases. ◄

Vehicle data status and compatibility management module

To ensure the consistency of the control units with respect to each other, the vehicle data status of the vehicle is compared with the data of the compatibility management module on the Software Service Station. The basis for the definition of the vehicle data status is the vehicle order that is read out of the car access system and the light module. Various vehicle data are stored in the vehicle order (vehicle data status, optional equipment etc.). The vehicle order is shown in the action plan.

The vehicle data status describes a constructional status that ensures all control units of a vehicle model are compatible with each other. The vehicle is therefore consistent. As soon as an action plan is created, the actual vehicle data status is compared to data in a database (compatibility management module). All hardware and software versions of control units are stored in the compatibility management module referred to the vehicle data status. The CIP assigns a specific measure to the vehicle if a hardware or software version does not agree with that of the vehicle. This measure may be a software update or a control unit replacement so that the vehicle then achieves the target data status.

⚠ In all cases, a trouble-free vehicle electrical system is assumed before a control unit replacement or software update! ◄

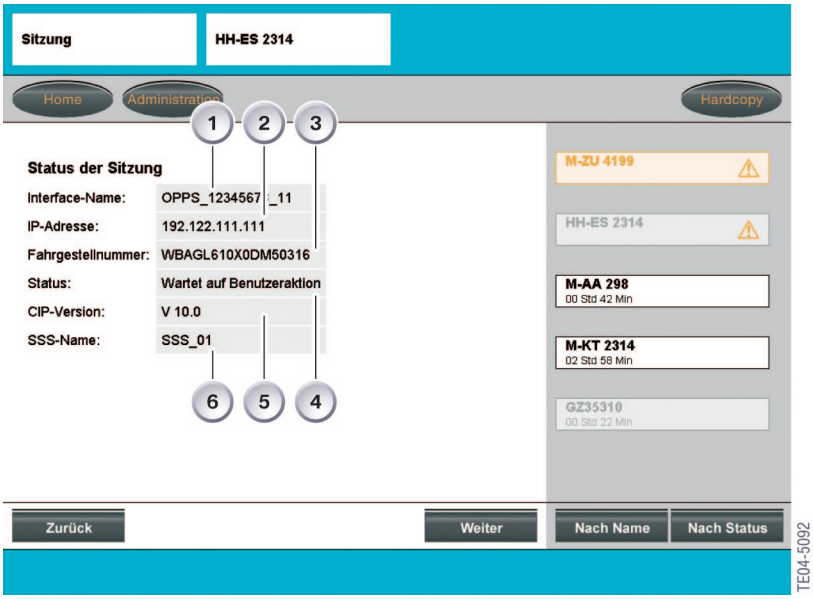
Loading software

As soon as the "Load Software" operation is activated, the window can be minimized to allow other vehicles to be processed. The following information and buttons are shown:

- Current operation
- Vehicle identifier
- Button to minimize the screen
- Time required to complete the action

After "Minimize" is selected, the Progman start screen reappears and a new session can be started.

Session



The orange and white buttons in the list on the right-hand edge of the screen can be selected at any time. As soon as a vehicle is selected, the most important data of the vehicle and the programming tools are shown in the left-hand area of the screen.

Index	Explanation
1	Interface name
2	IP address
3	Vehicle identification number
4	Session status
5	CIP version used for programming
6	SSS name - name of Software Service Station

Session status

The status indicates what processes or operation are currently active in this session. In this case, the Software Service Station waits for a user action. Once this action has been executed, the programming can continue or be concluded.

Final report

The final report documents all executed jobs on completion of a measure. In addition to the executed jobs, it provides information on the time the action is executed and on the vehicle.

Index	Explanation
1	The time (date/time), vehicle (model series/vehicle identification number) and the data statuses (vehicle data status/target data status) are shown in this area of the action plan.
2	The programmed control units are shown in this area.
3	The executed actions are shown in this area.

The vehicle data status and the target data status should agree following successful programming.

The executed actions are shown in the following. Successful or terminated actions are indicated by a green tick or a red cross preceding the action.

Example

In this example, the following executed actions are indicated under Item 3:

Index	Explanation
Action plan selected	Indicates that an action plan was selected and executed.
CKM backup successful	Car and key memory values were stored on the programming system.
ANT programmed	Indicates what control units were programmed and how the part numbers changed.
Data status saved successfully	A new vehicle data status was stored in the control units responsible for this purpose.
CKM recreation successful	Car and key memory values were written back to the vehicle.
ASK adjustment successful	The installed control units and their sequence are stored in the registration file of the audio system controller.

Finally, a vehicle context test is performed in all cases and also shown in the final report.

General CIP operation and control

Special measures

The special measures function should only be used when the normal procedure for automatically determining and working through an action plan is not successful. In this case, individual control units can be programmed using the special measures function and in some cases software errors can be rectified.

After implementing the special measures, it may be necessary to work through further measures with the remaining control units. These measures must be performed in all cases otherwise an inconsistent vehicle will be created where fault can occur.

Complete coding

The complete coding function may be necessary when vehicle functions do not work or do not work correctly on completion of programming. The complete coding function overwrites all coding-relevant settings of all codable control units.

Retrofit

Assemblies such as the air conditioning system for instance can be retrofitted via the retrofit menu. This retrofit procedure with CIP adapts the systems to the overall vehicle electrical system and systems network.

The vehicle must be in a fault-free condition prior to implementing a retrofit/conversion. The vehicle order in the vehicle will not be changed if a fault is determined while working through the action plan (red cross in final report). In this case, the retrofit/conversion should be carried out again with CIP.

Conversion

A conversion involves changing individual functions in a control unit.

Car and key memory

The letter **I** stands for individualization of the vehicle and key settings for the customer. Since the market introduction of the E65, the options of individually adapting a vehicle to customer-specific requirements have been adopted from the operator interface of the BMW diagnosis system in the programming environment CIP.

Since the market introduction of the E60, it has been possible to implement various settings in the vehicle itself. The exact scope of settings can be found in the IDCs for the individual models.

Personal profile

As from the market introduction of the E87, the majority of settings can be implemented in the vehicle itself. The individualization of the vehicle is now known as "Personal Profile" (for a detailed description please refer to the Participant's Manual Personal Profile).

Only settings which are difficult to comprehend for the customer (e.g. anti-theft alarm system, tilt alarm sensor) are still implemented in the CIP under the retrofit/ conversion menus.

Subsequent measures

Individualization data may be lost as soon as a control unit is replaced or programmed. CIP consequently assigns measures for renewed learning of these individualization data. Depending on the system, this is implemented automatically by CIP, e.g.

- Power window characteristic curve

Other systems require intervention from the outside, e.g.

- Initialization of active steering (diagnosis)

Subfunctions of the systems operate only in connection with such initialization. For example, the control unit responsible for power window control must be relearned.

For instance, the degree of stiffness and end stops of the individual side windows are relearned. CIP activates this procedure automatically.

Quick test

In all cases, a quick test must be performed with the BMW diagnosis system after programming. With CIP it is not possible to ensure that all fault code memories are cleared reliably.

Bus rest

All control units must assume sleep mode after programming. For this purpose, allow the vehicle to rest for at least 5 minutes at terminal 0.

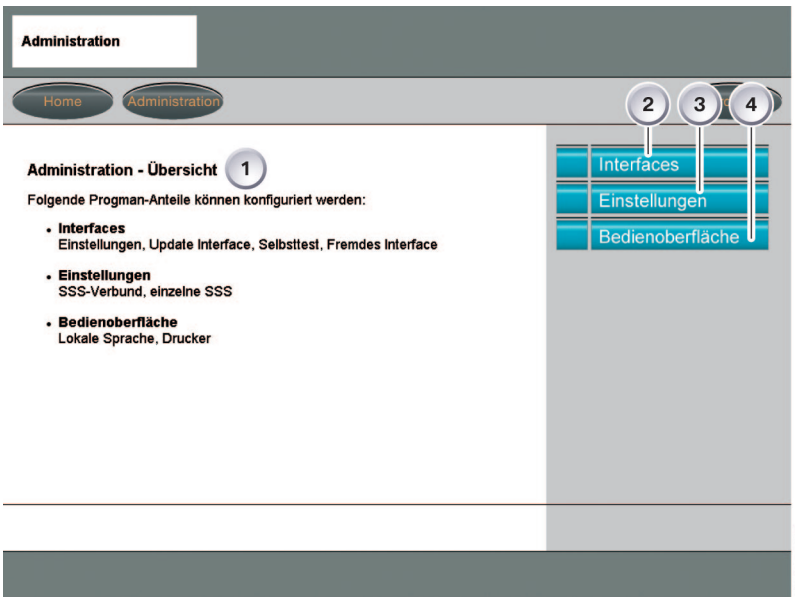
The following indicators show inactive bus systems in the various vehicle models.

- E65 -CAS slot
- E60/E61 - Child safety lock LED
- E87 - Start/Stop unit

The bus system is inactive as soon as the light goes out.

Administration Progman

Overview



The following setting options are provided in the "Administration" menu:

- Interfaces
- Settings
- User interface

Index	Explanation
1	Administration overview - the Software Service Stations and interfaces are configured here
2	Interfaces
3	Settings
4	User interface

Interfaces

The OPPS/OPS and diagnostic head can be managed and configured in the interfaces menu.

Settings

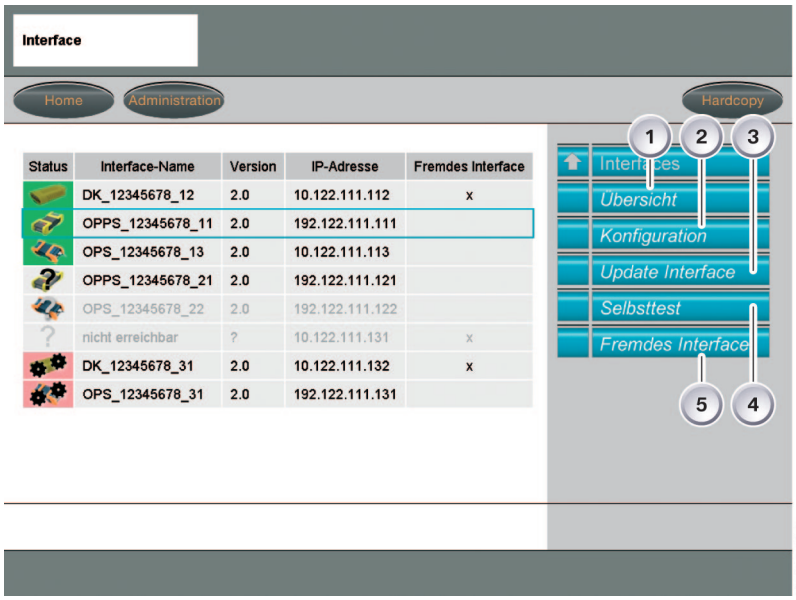
The Software Service Stations can be managed under the settings menu. The administration of more than one Software Service Station will be possible after the next update.

User interface

The languages can be set in Progman directly without the need for reinstallation in the administration.

The setting options in the interfaces menu are described in the following.

Interfaces

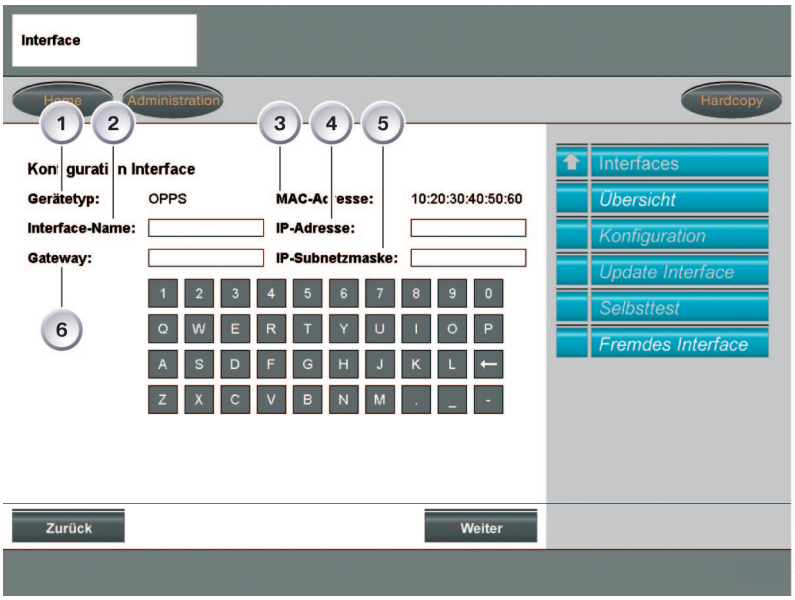


All active interfaces are shown as soon as the "interfaces" button is activated.

The buttons in the right-hand area of the screen are activated and can be selected by clicking on one of these interfaces.

Index	Explanation
1	Overview - the search for interfaces can be re-activated by pressing this button. The list of interfaces is not updated for as long as this screen is active. The list is updated when the "Overview" button is clicked again.
2	Configuration - interfaces can be configured by clicking on this button.
3	Update interface - the firmware of the interface can be checked and updated by clicking on this button.
4	Self-test - the interfaces (OPS/OPPS/diagnostic head) can be checked by means of this self-test.
5	External interface - external interfaces can be added or removed via this button.

Configuration



The interfaces for the individual BMW workshop network can be adapted in the "Configuration" menu.

The setting options are described in the following. The screen keyboard can be operated from the touch-screen or by means of the mouse.

Index	Explanation
1	Device type - OPPS in this case
2	Interface name
3	MAC address
4	IP address
5	IP sub-network screen
6	Gateway

Interface name

The interface name can be freely assigned. The interface name should have a unique nomenclature that makes it possible to define the individual interface and to assign it in everyday use in the workshop.

MAC address

The MAC address (Media Access Control) is the hardware address of each network device (network card, switches) that are used for unique identification of the device in the network.

IP address

Unique addresses must be assigned to the workshop devices to facilitate the exchange of data packages between them.

IP sub-network screen

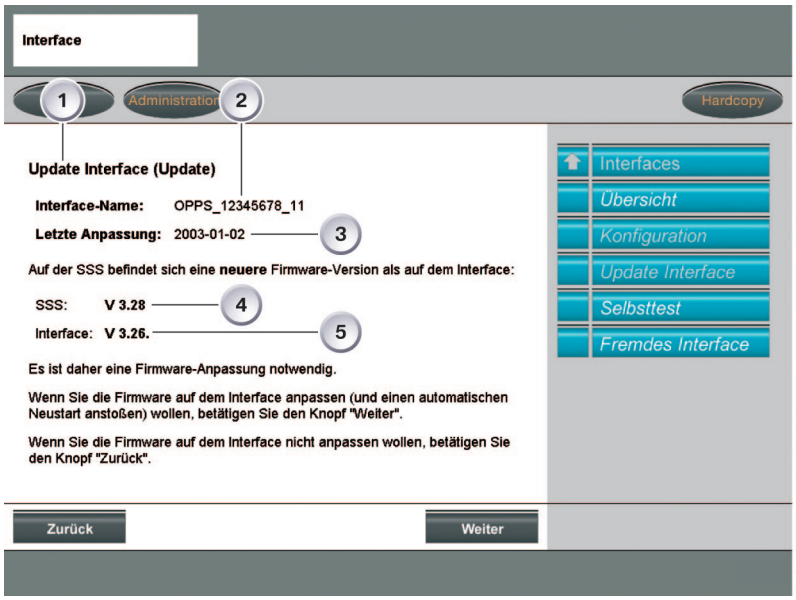
The IP sub-network screen indicates the part of the IP address that describes the sub-network. The standard address is 255.255.255.0.

The data in this area of the administration menu should be managed by a network administrator. After entry, the data are confirmed again. The interface then performs a reset. The settings are stored after the reset.

Gateway

The gateway represents an interface between the various networks.

Update Interface



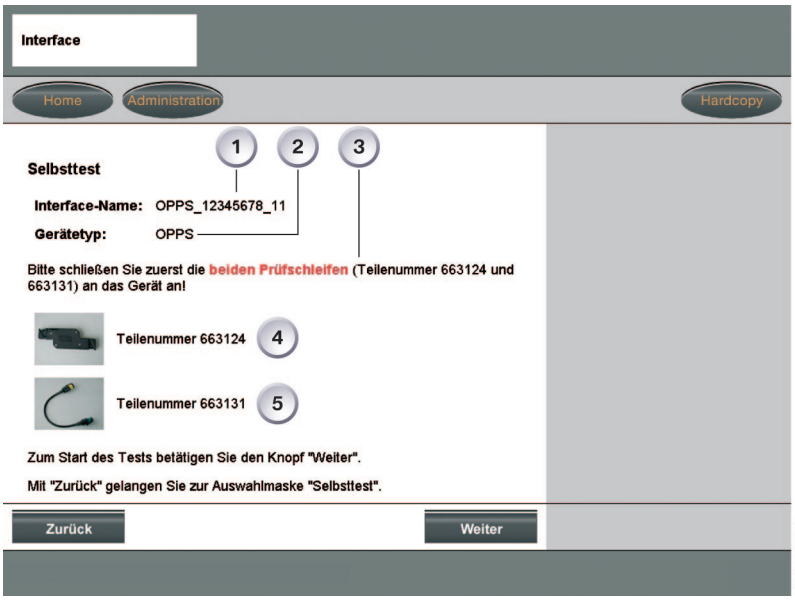
The firmware version of the interface and of the Software Service Station can be checked in the "Update Interface" menu.

An update is performed automatically if the firmware version is no longer the current one or if the versions of the interface and of the Software Service Station differ from each other.

This is then followed by a reset in order to start the new firmware.

Index	Explanation
1	Update Interface
2	Interface name
3	Last update - the date of the last update is shown here
4	Latest firmware status of Software Service Station
5	Latest firmware status of selected interfaces

Self-test

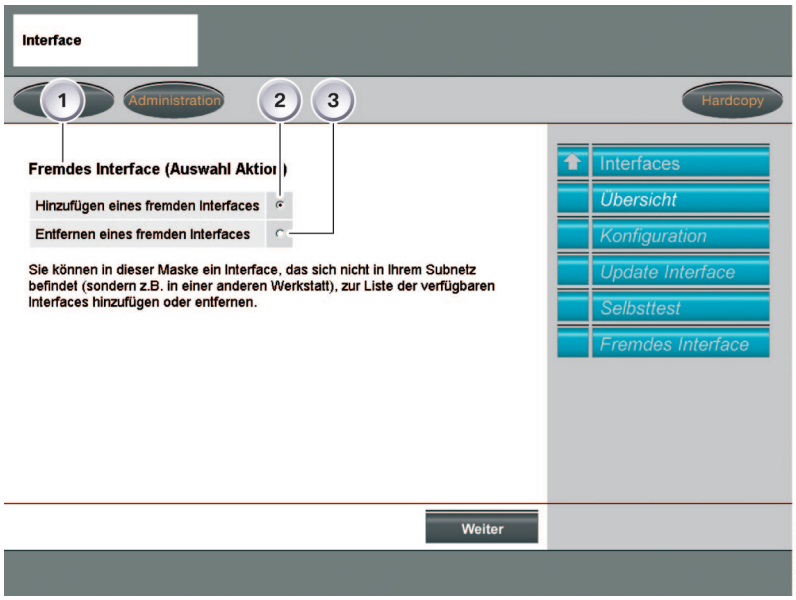


The interfaces can be checked to ensure they are operating correctly in the "Self-test" menu.

One or two test loops are required for this purpose depending on the type of interface. The result can be printed out.

Index	Explanation
1	Interface name
2	Device type OPPS/OPS/diagnostic head
3	User instructions for self-test
4	Test loop for MOST Direct Access
5	Test loop for ***byteflight***

External interface



External interface

Interfaces in external sub-networks can be added or removed in the "External Interface" menu.

Depending on the system structure, it is possible that other sub-networks are defined in sub-areas of the workshop network. Interfaces from external sub-areas must be added in this menu in order to connect them to a Software Service Station as required.

Interfaces must be removed if they are no longer to appear in the selection list.

This ensures that the list only shows the interfaces that are to be used in connection with the Software Service Station.

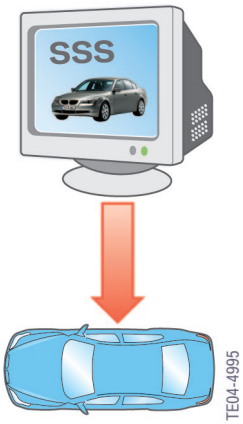
Index	Explanation
1	"External interface" menu
2	Adding an external interface
3	Removing an external interface

Summary
BMW Programming System

Summary of new features

The following table provides a summary of the most important information on programming applications at BMW.

This list outlines the main points in concise form and provides the opportunity of rechecking the most important facts provided in this Participant's Manual.



The Software Service Station adopts the key role in the programming procedure.

Software Service Station

BMW vehicles can now only be programmed with the Software Service Station. The Software Service Station establishes a connection with the vehicle and sends the programming data via the vehicle interfaces to the control units.

BMW diagnosis systems

The BMW diagnosis systems Group Tester One and DISplus can still be used as operator control terminals.

The BMW diagnosis systems are connected to the Software Service Station their screens show corresponding information and they serve as the remote control of the Software Service Station.

Progman

New screen masks and new user functions have been developed to accommodate the expanded options with Progman.

Up to five vehicles can be programmed simultaneously with Progman. Progman also makes it possible to manage programming procedures via various terminals.

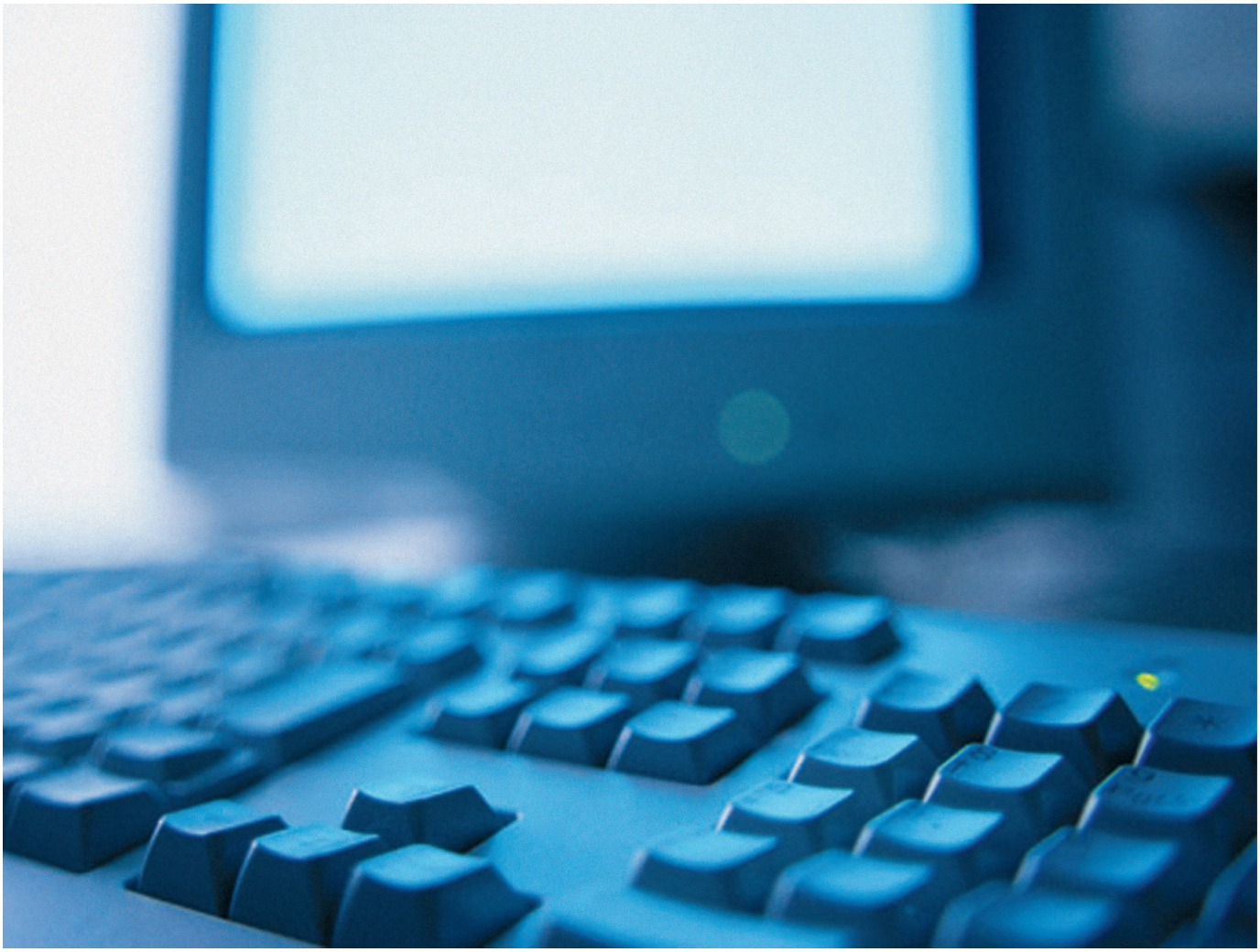
Participant's Manual
BMW Information System

Technical information

Function descriptions

Repair instructions

Detailed information



Notes on this Participant's Manual

Symbols used

The following symbols are used in this Participant's Manual to facilitate better comprehension and to draw attention to important information.

⚠ contains information for better understanding of the described systems and their functions.

◄ identifies the end of an item of information.

Current content of Participant's Manual

In view of the constant further developments in the design and equipment of BMW vehicles deviations may arise between this Participant's Manual and the vehicles made available as part of the training course.

The background material refers exclusively to left-hand drive vehicles. The controls are in part arranged differently in right-hand drive vehicles than shown on the graphics in the Participant's Manual.

Additional information sources

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

- BMW diagnosis system
- Workshop Systems Documentation
- SBT BMW Service Technology.

Contents
BMW Information System

Introduction
BMW Information System

Information on BMW Technology

The technical information systems are becoming ever more important in the troubleshooting process of modern systems in automotive engineering. Sound information on the technology used is therefore necessary for the diagnosis and repair of complex systems.

The technical information systems at BMW contain e.g. information on the mode of operation of the systems and technical details (pin assignments, cable colours, setpoint values, installation locations, etc.).

Information options

To ensure reliable fault diagnosis, it is becoming increasingly important to have a sound knowledge of the correct function of the many systems and their subfunctions. Only when the correct function is known can a fault be evaluated.

Function descriptions

The necessary information can be found predominantly in the SBT function descriptions and in the Participant's Manuals of the Aftersales Academy. In conjunction with the vehicle, the technician can build up a picture of the correct mode of operation of the vehicle systems.

On top of the function descriptions, the following information systems are available:

- BMW Diagnosis System (DISplus and GT1)
- Technical Information System (TIS)
- Product and Measures Management Aftersales (Puma).

BMW Diagnosis System

As well as their functions as diagnostic tester and measuring equipment, the BMW DISplus and GT1 diagnosis systems are designed to communicate and convey information. As from the E65 mainly background information and special knowledge for diagnostic purposes are described in the function descriptions relating to the relevant systems.

As well as the function descriptions, there is the option of outputting wiring diagrams with all the detailed information and installation and storage locations of the adapter cables for the electrical systems in the vehicle.

Technical Information System TIS

The "Technical Information System" offers primarily technical background information to all subjects covering all aspects of the vehicle.

In addition to repair instructions, it contains tightening torques, the latest Service Information bulletins and much more. The corresponding vehicle type can be selected by selecting a model or entering the vehicle identification number.

Puma

The Puma online platform (Product and Measures Management Aftersales) provides users online in no time at all with current problems and how to solve them. Even in the case of systems in the vehicle with poor diagnostic capabilities, figures based on colleagues' experience can greatly simplify troubleshooting.

All the information systems together provide a strong foundation for efficient repair and diagnosis work. The function and operation of the systems are designed to be as intuitive as possible and therefore require hardly any explanation.

A detailed description and operating instructions can be found in the SIP "Problem and Measures Management in Aftersales". It is essential to have worked through this SIP to be able to attend this seminar.

In relation to the basic functions described in the SIP, the following improvements have been made above all in the categorization of fault symptoms:

1. Structurally improved fault pattern/ symptom selection

The most important new features are:

- Separate classification of navigation systems into High and Low navigation
- Division of telephone fault patterns/ symptoms based on optional extras through creation of Cordless Keypad Handset, Universal Charging and Handsfree Kit and TCU telephones
- Grouping of chassis control systems under the "Chassis systems" fault location
- Combination of control display (CID) and monitor into "Display/Monitor", of DSP and TopHifi into "Option 677/DSP/TopHifi" and of CD changer and MMC into "CD/DVD Changer"
- Additions for E87 and E64
- Creation of a new "Services" section for all telematics and online services
- Creation of CIP with separate classification into programming, coding, CKM and the relevant control units
- Corrections, such as deletion of multiple entries and rectifications of the allocation of fault location and fault type
- Additions to already existing fault patterns/ symptoms, e.g. for diagnosis, airbag, etc.
- Omission of the "Component information" fault type since this is no longer required with the separate finding categoriza

2. Extended Search

It is possible under "Extended Search" to enter repeatedly the location and type of detection as well as main group/subgroup. It is thus possible to search for several paths, thereby increasing the possibility of finding the sought-after measure. The E-Series, the engine and the body are as before repeatedly selectable and deselectable with the Ctrl key.

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