

1	Audio Operating Systems	3
1.1	Service mode in radio and radio operating unit	3
1.2	Service mode with MID radio	4
1.3	Service mode with IRIS E39	15
1.4	Service mode radio, on-board monitor E46	17
1.5	Service mode in DIN radios	22
1.6	Service mode Professional C24 DIN	23
1.7	Service mode Bavaria C Professional RDS	27
1.8	Radio service mode Business CD RDS (CD23)	29
1.9	Radio service mode Business RDS (C13)	30
1.10	Radio service mode Bavaria C Reverse III	32
1.11	Service mode Bavaria C	
	- Reverse RDS	
	- Reverse III	
	- Bavaria CIII	33
1.12	Display check on MID radio E38/39	35
1.13	Radio operating unit button function test mode	35
1.14	Diagnosis radio with DIS/MoDiC E 38/39/46	36
1.15	Multiinformation display MID	37
1.16	IRIS function test E39	41
1.17	DSP operating unit function test	42
2	Telephone systems	43
2.1	Software and hardware information at MID and BM	43
2.2	Changeover from basic to high instrument cluster	45
3	Navigation systems	46
3.1	Mark II	46
3.2	Service mode Mark II with BM	71
3.3	BM settings	76

1. Audio Operating Systems

1.1 Service mode in radio and radio operating unit

Essentially, all radio sets with bus capabilities feature test facilities via the DIS/MoDiC. They also feature a self-test option, i.e. a type of on-board diagnosis.

Although the indications and options in the DIS/MoDiC are the same, it is possible to work independently in service mode.

Service mode can be effectively implemented on the vehicle both when stationary or while driving in the relevant broadcasting area or to investigate customer problems.

Radio systems that do not feature bus capabilities can only be tested and adjusted in service mode.

Note: The transmitter incidence and thus the antenna in formation is influenced by light reflection, concrete walls and similar in the workshop. This can lead to incorrect analysis.

In principle, the following technical interpretation and representation in the individual test steps in service mode applies to all radios specified in the manual.

The following points should be observed when working in service mode:

- the points of access may differ
- the test steps are not all identical
- the available test steps and their contents should be interpreted identically for all radios.

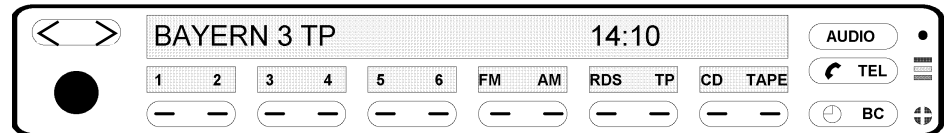
For the sake of completeness, the contents are sometimes repeated at the individual radio sets and operating units.

1.2 Service mode with MID radio

Test and setting functions with MID radio E38/E39

Entry and exit

The test functions (service mode functions) are called up and operated via the keyboard of the multi information display (MID).

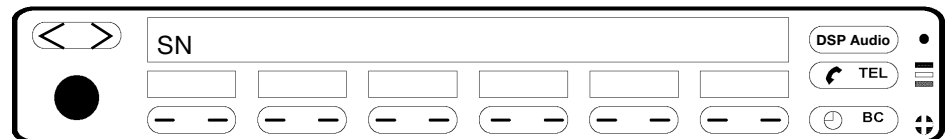


KT-1567

Fig. 1: Test function MID start mask

Entry

Switch on radio set at MID and, within 8 seconds, press the TP button or longer than 8 seconds until the display changes over from the standard mode display to the SN display.



KT-3514

Fig. 2: Test function entry mask

Exit

Switch off radio set at MID and switch on again to return to normal operating mode.

All settings, changed or unchanged, are stored automatically after switch-off.

General information

All 18 stored radio stations can be checked by pressing the **FM button**.

Allocations:

FM1 = Button 1 - 6 corresponding to position 1 - 6

FM2 = Button 1 - 6 corresponding to position 7 - 12

FMA = Button 1 - 6 corresponding to position 13 - 18

The radio stations on the other wavebands (SW/LW/MW) can be checked by pressing the **AM button**. RDS-related functions cannot be checked as on FM.

The, in part, different MID displays are attributed to the different types of radio.

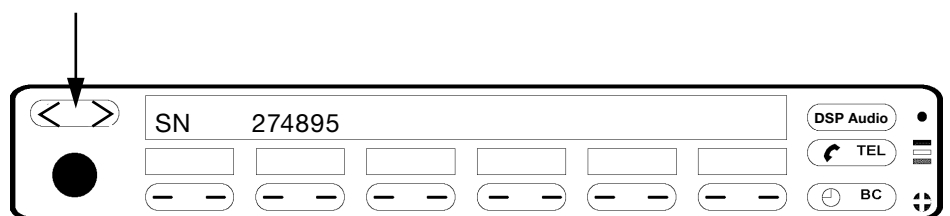
Only Business and Professional radios are dealt with in the following as only these radio sets are used in conjunction with the MID version.

Service mode is identical on the E39 Business single-module radio set.

The tests described below can be carried out in service mode by pressing the tuning rocker switch < and > at the top left of the MID.

Once you have accessed service mode, initially, the SN number appears in the display of the MID.

You can scroll in service mode by pressing the < > in the display of the MID.



KT-3514

Fig. 3: Test function entry mask

Serial number (SN)

Display of serial number; it cannot be changed. Among other things, it serves as the notice and verification in the work order. It can be used to determine what repairs have been carried out on what radio.

Software version (SV)

Display of software version. It is indicated together with the SW version, the programming calendar week and year, the series production version and the development version.

In the case of the Professional radio, the data of the CD changer are also indicated.

It can only be changed by the manufacturer in service mode.

It can be used as a reference point for determining faults, functional procedures and their solutions.

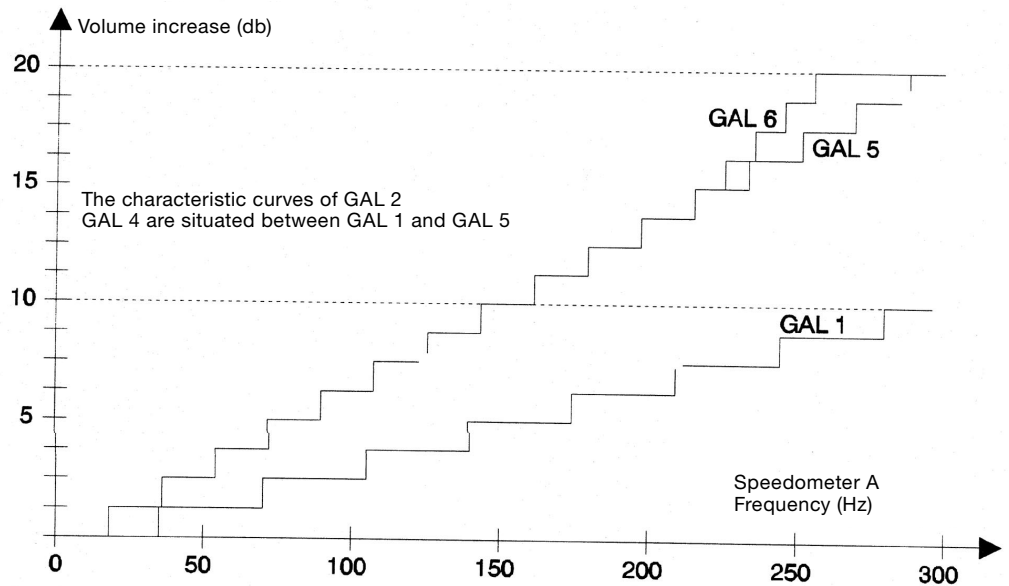
Speed-dependent volume control (GAL)

The volume increase can be set in ascending progression by pressing the station buttons 1 to 4 or up to 6.

Note:

If a DSP unit (TOP HiFi) is installed in the E38/E39, GAL control does not take place in the radio although it is indicated in the MID display. Speed-dependent equalising is implemented on vehicles equipped with this system. For example: Higher speed increased bass components; lower speed, less bass components.

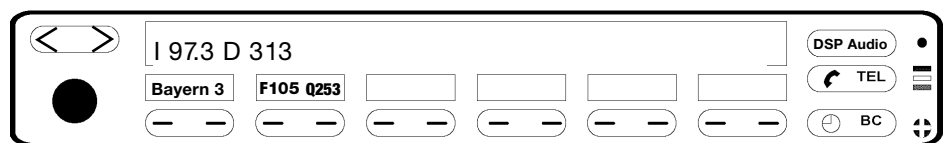
If a customer wishes the sound level to be increased on his/her radio set that, however, is only of 4-stage design, this problem can only be solved by replacing the radio set by a **new radio** featuring a different 6-stage GAL curve. The customer must bear the costs of this procedure as it does not represent a fault in the existing radio set.



KT-1795

Fig. 4: GAL increase 6-stage

Field strength and quality indication (S/Q)



KT-3514

Fig. 5: MID on Business radio set

In addition to the field strength and quality, the received station of the audio receiver is also indicated in the display.

With the RDS button pressed, the station is indicated in long name form together with the data of the RDS position, e.g. 313D. Instead of the name, only the frequency is displayed when the RDS function is deactivated.

An "F-number" indicating the type of field strength is also displayed.

F-number and its significance

The F-number in the display indicates a certain field strength, e.g. F14. The quality of the antenna system, radio itself and of the set station is checked based on this test and display.

It serves to interpret to what extent the station can be received with the existing antenna, antenna line and connections, the amplifier and wavetrap, the voltage

applied at the antenna amplifier, in the current location of the vehicle and under given atmospheric conditions. It only serves as a reference or comparison values.

The display scale ranges from 0 to 15.

The lower the value the poorer the reception of the tuned station. The setting of the station with its frequency and with or without RDS, of course, plays an important part.

In practical applications, it can be assumed that the value 15 corresponds to 100 % and thus represents optimum reception. This setting ensures HiFi/stereo sound reproduction.

At a value below 10 for instance, there is no HiFi/stereo sound reproduction but rather only mono quality.

If the value fluctuates below and above 10, not only does the sound quality improve but, under certain circumstances, the volume may also change slightly.

This change in volume is not attributed to GAL but rather to the way the tuned station is received. GAL influences this change in volume only in as far as it is louder or quieter, can be perceived to a greater or lesser extent.

These influences of the tuned and received station are particularly pronounced in the sound impression or tone during operation of subsequently connected DSP systems or HiFi/stereo sound systems. Depending on the station and the tape of music it broadcasts, it may be possible that the sound impression cannot be set to customer requirements.

Note: The poorer the reception the higher the share of low frequency sound in the sound impression. As a result, the customer tends to adjust the sound impression only with the treble, consequently producing corresponding distortion in the speaker characteristics.

Considerable differences can, of course, be determined after changing the mode (cassette, CD, radio). This prompts the customer to continuously adjust the sound impression, resulting in his/her annoyance.

This is not necessarily attributed to a fault in the systems but rather it depends on the reception quality of the radio station and the corresponding adjustments made by the customer.

Q-number

Radio station quality is also indicated and this serves the purpose of diagnosis evaluation in the radio.

The Q-number indicated in the display, e.g. Q 15, represents an RDS quality number.

If Q-00 or Q-0 is indicated in the display, this means the tuned station is not a radio station with AF tracking.

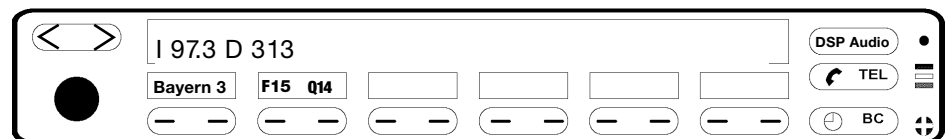
(AF - Alternative frequency)

The value of the Q-number does not represent the numerical value of the alternative frequencies of the tuned station but rather only the quality, 1 to 15, or indicates whether this station features AF.

The station with the Q-number 0 or 00 therefore features no other further frequency (mostly a local station).

On leaving the station reception area, the station can only be heard conditionally until the point the radio leaves the station in display and sound with "search" and makes available another radio station depending on other settings such as "TP" and search sensitivity.

The maximum field strength number "F" is 15.



KT-3514

Fig. 6: MID indication

Since the station transmits the RDS on the frequency-modulated band, the indicated Q-number from 1 to 15 is in the most cases identical to the F-number.

The currently indicated field strength also provides information on the reception quality of the station in the relevant broadcasting area with regard to HiFi/stereo quality.

While driving, in addition to the acoustic sound impression of the audio system, this information also shows the difference visually in the display.

This service mode function is indicated differently in the display of individual radios. It is not indicated in the Reverse radio E39.

In the Professional radio, the Q-number is 255, however, when converted it corresponds to 15 (15 corresponds to 255 and thus 100 %, optimum reception).

RDS number or display in MID with Professional radio

The previous description for the single-module Business radio also applies here with regard to the display of the F-number. This also applies to the Q-number indicated next to it.

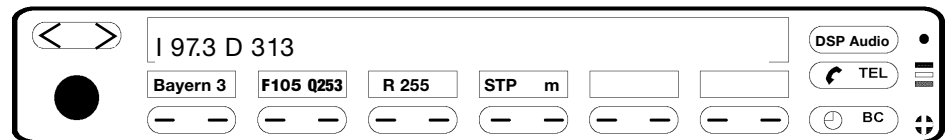
The F-number is indicated at a value up to 255. Converted, this value corresponds to 15 or 100 %.

The maximum value for the Q-number is 255 which is also converted in the same way as the value for the F-number.

The converted value for the F-number and/or Q-number is displayed on the DIS/MoDiC.

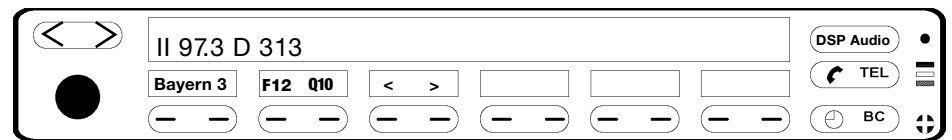
Since every Professional radio is designed as a single-module unit with two tuners, the second tuner of this radio can also be tested and displayed.

The following MID displays show the differences between the Business and Professional radios.



KT-3514

Fig. 7: Display in conjunction with Professional radio at MID



KT-3514

Fig. 8: Display in conjunction with Business radio at MID

< and > buttons

The buttons indicated in the menu line and the radio buttons < and > are operable.

After selection, the conditions of the next stations can be determined in the individual wavebands and FM ranges.

In the case of the Professional radio, the next station can only be selected by pressing the "m" button in the test menu and entering the frequency manually.

DSP setting

This function is indicated automatically via the I-bus on the E38 or via the K-bus on the E39. The value is set and cannot be changed by way of operation or switching.

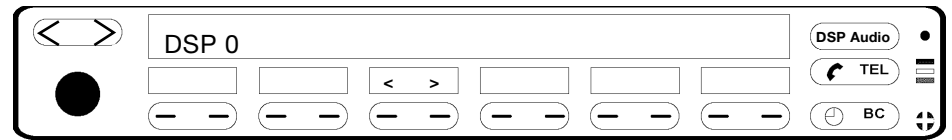
Only one item of information is provided via the bus.

Display:

DSP 0: DSP not installed

DSP 1: DSP installed

The display "DSP 0" although a DSP system is installed indicates a fault in the bus system, the DSP amplifier or a connection fault.



KT-3514

Fig. 9: Display at MID with Business radio

Setting the tuning (search) level (SEEK)

The sensitivity of the tuning levels can be set with the station buttons 1 and 2:

Button 1: High sensitivity

Button 2: Lower sensitivity

Correspondingly, poorly audible stations can be blanked out in this way so that only stations with good reception are heard.

This applies to the Business and Professional radios connected to the MID.

However, this basically also applies to all radio sets.

Setting the minimum travel programme volume (TIP-V)

The minimum traffic programme volume can be varied by a mean value with the station buttons 1 and 2:

Button 1:

Minimum travel programme volume decreased by 1 step (-), max. by -9

Button 2:

Minimum travel programme volume increased by 1 step (+), max. by +9

Indicated in display: (-9,...,0,...,+9)

If the TP value is changed (positively or negatively), the normal operating volume and the TP volume must be constantly adapted by means of the volume control button.

A difference can always be determined between traffic information and operating volume, a fact that may lead to customer complaints regarding the volume.

The ideal set value is +/-0 to 1.

After the TP setting option, service mode reaches its end in the MID version. It restarts from the beginning by pressing the > button.

A display test can be conducted and the area set (Europe, USA with/without TP) in DIN radios. This is not the case with Business and Professional radios with MID.

Since a Business CD DIN unit (C23 CD) can be installed in exceptional cases and on customer request in the E38, the display test and area setting options are also provided in this case.

Service mode can be continued by pressing the > < buttons in the MID or by pressing the arrow up and down buttons on the multifunction steering wheel (MFL). If a Business CD (DIN unit) is installed, service mode can also be continued by pressing the > < rocker switch on the radio unit.

Notes on reception:

If the reception and sound impression as well as the speaker characteristics are found to be poor in a vehicle system although the system as such is OK, the following points should also be checked:

- whether the rear window is OK
- whether the system should be expanded to incorporate an antenna diversity system

Expansion to an antenna diversity system involves a different antenna amplifier, wavetrap and an additional line, i.e. the IF line next to the RF antenna line to the radio.

A different left side window must be used on the E39 touring and E36 touring.

Antenna diversity cannot be retrofitted and connected in conjunction with Reverse radio systems.

- Refer to the brochure audio antennas -

1.3 Service mode with IRIS E39

Radio test functions at IRIS operating unit

IRIS is installed on the E39 only up to 3/98.

To access test mode

You can access test mode with the IRIS operating unit by pressing the "m" button.

Switch on radio, press "m" button until the SN number appears.

You can scroll through this mode with the > < rocker switch.

Depending on the type of radio, the same information as in the radio with MID is now displayed.

F-number and Q-number information is not displayed in the Reverse radio.

Test mode is exited by switching off the radio.

All changes and settings are saved when the radio is switched off.



KT-1687

Fig. 10: E39 Reverse radio with IRIS operating unit

Radio service mode with on-board monitor

The BMW radios

- **Business RDS BM (C23 BM) and**
- **Professional RDS BM (C24 BM)**

are used on all vehicles as the radio for the on-board monitor.

Service mode for the relevant radios:

1. Business RDS (C23 BM)
2. Professional RDS (C24 BM)

Entry

After switching on the on-board monitor radio, within 8 seconds, the TP button must be pressed for longer than 8 seconds until service mode appears together with the serial number in the BM display.

Service mode contents

- Serial number
- Software version
- Speed-dependent volume control (GAL)
- Field strength/quality indication *
- DSP
- Tuning levels (Seek)
- Minimum travel programme volume

The > < rocker switch is used to **scroll through** this mode.

* = Special features in Professional RDS, otherwise the contents are identical

The contents and settings are evaluated in the same way as described under "Radio Service Mode with MID".

Exit

Service mode is exited by switching off the radio at the left-hand rotary knob on the on-board monitor.

E46

Service mode in the E46 on-board monitor radio takes place in the same way as in the E38/39 BM system.

1.4 Service mode radio, on-board monitor E46

RadNav service mode on E46

A service mode is available in all radios on the E46.

In the same way as on the E38/E39, the radios on the E46 are connected to the bus system; this therefore renders unnecessary the code card with code entry.



KT-2712

Fig. 11: RadNav operating unit

Refer to E38/39 BM for BM service mode on the E46.

To enter service mode

Within 8 seconds after switching on the radio, press and hold the **"m" button** for longer than 8 seconds until the serial number is shown in the display. This applies to all radios except the RadNav unit.

In the case of the **RadNav**, the **"TP" button** must be pressed and held for longer than 8 seconds within 8 seconds after switching on the radio until the serial number is shown in the display.

To exit service mode

Service mode can be terminated only by switching off the radio.

When switched off, the radio is automatically reset to FM1 with RDS on.

The test contents are identical in these devices. The Professional radio differs from the other devices of the E46 as it is designed as a two-tuner, single-module unit and therefore features two tuners for testing and consequently different contents.

The displays are similar to those on the Professional with MID operation.

Service mode only permits manual tuning.

Service mode functions E46

You can switch through the service mode functions with the search buttons "<" and ">" or the "+/-" buttons:

SN	Display of serial number
SV MM	Display of program statuses
GAL	Selection of GAL curve
TUNER-1	Setting and data of audio receiver
TUNER-2	Setting and data of search receiver (Professional only)
SEEK	Setting an FM search level pair not applicable
TP-V	Setting of minimum travel programme volume

Overview of functions

Display of serial number (SN)

The device serial number is displayed and cannot be changed.

Extended data is displayed only on the Business CD (CD43) for the purpose of internal diagnosis:

HI - Hardware indices
SIM - Software indices
SIP - Software indices
GI - Device indices

Display of program statuses (SV MM)

The software version installed in the radio is displayed. In addition to the week and year, a consecutive number is also indicated, starting at the number 1.1. The digit before the decimal point and a zero after the decimal point indicate a standard version. The numbers 1 to 99 after the decimal point indicate a corresponding development version.

Selection of GAL curve (speed-dependent volume control)

The current GAL curve is indicated. A new curve can be selected by pressing the station buttons 1 - 6.

The GAL signal in E46 radios is bus-controlled.

The DIN device features a conventional GAL controlled by the speedometer A-signal.

Setting and data of intercept receiver (TUNER-1)

Professional only:

The set frequency, field strength and quality (multipath/neighbouring channel/faults) of the received signal are displayed in FM mode.

In the case of RDS transmitters, the PI program chain identifier, PS program name and the RDS quality are additionally indicated.

The set frequency and field strength are shown in AM mode. The following output ranges are made available:

Measured value	Range	Output value	Description
Field strength	0...60dbpV	0...255	AM/FM
Quality number	0...255	AM/FM
RDS quality	0...255		FM

Setting and data of search receiver (TUNER-2) (Professional only)

This function makes it possible to display the RDS data (PI and PS) of the station tuned on the search receiver (FM only). The numerical frequency input can be selected by pressing the "m" button with the background search switched off with the "RDS" button. "SCAN" appears in the main line of the display when the background search is active.

Setting an FM search pair (SEEK)

This setting option is not provided in all E46 radios. The user himself can set and determine the search sensitivity in the operating menu.

Setting minimum travel programme volume (TP-V)

The minimum TP volume can be varied about a mean value in 9 steps (steps correspond to incremental transducer steps). The current minimum TP volume is set during a TP message to provide acoustic feedback.

Despite this, the customer can still additionally adjust the current TP volume louder or quieter during an announcement. The volume last set also serves as the volume setting at the start of the next TP announcement.

Larger differences between the minimum volume and the normal volume as well as the current TP volume sometimes lead to problems for the customer. The ideal setting is +/- 0 to 1.

Station button 1: Decrease of minimum TP volume by 1 step

Station button 2: Increase of minimum TP volume by 1 step

The digit with its corresponding sign within the range from -9 to +9.

The option of carrying out a **display test** on the Business C43, controlled by the station buttons 1/2, is provided in the annex. This test checks the display segments. Since the basic version of the Business CD (C43 CD) is used throughout the world, it additionally features a changeover facility for country-specific control.

Once test mode has been accessed, it is necessary to toggle to the current AREA code.

The AREA code "Europe", "USA" without TP, USA + TP is then displayed.

Note:

If the AREA USA is to be set, after switching off the radio that also means exiting service mode, a 5-digit antitheft code is valid only in DIN radios for the USA.

Under certain circumstances, the radio can no longer be operated if the code is not known.

The code is only recorded on the code card. In addition to the USA area setting, all US-specific parameters and features, including USA mode, are also set.

Special features

RadNav E46:

The RadNav device serves as an operating unit for the radio Business BM (23BM) and for the navigation computer (CC96).

A service mode option is provided for both systems via the display:

- Service mode for radio BM 23
- Service mode for NAVI Mark II (refer to navigation section in brochure)

Service mode for the radio is accessed with the TP button.

The Professional radio cannot be installed in conjunction with RadNav as the display cannot show the Professional data.

On-board monitor/navigation E46:

The business C23 BM or the Professional (C24 BM) can be used together with this system.

TMC can only be displayed in the on-board monitor. The corresponding test procedure described in the brochure applies to the above-mentioned radio sets.

Test mode for the on-board monitor/RadNav is operated under the same conditions with data displayed accordingly in the on-board monitor or RadNav.

Radio set	Entry/toggling in mode
Reverse RDS Business RDS Business CD RDS Professional RDS	- Within 8 seconds after switching on the radio, press and hold the "m" button for longer than 8 s until the serial number appears in the display - Continue with +/- button or MFL button
MID operating unit	< > button in MID
RadNav E46 BM C23	- Within 8 seconds after switching on the radio, press and hold the "TP" button for longer than 8 s until the serial number appears in the display - Continue with < > rocker switch or MFL button - Area changeover via FM button

1.5 Service mode in DIN radios

Service mode in DIN radios

The entry procedure and contents differ depending on what type of radio is to be tested. The information provided in the tests is identical wherever the procedures are the same.

For example, with regard to the test mode, various radio sets are represented in the TIS Repair Instructions E36 Group 65 Test mode.

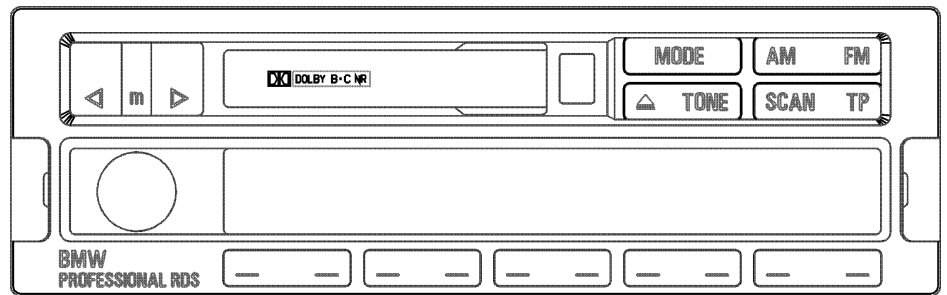
Descriptions are provided of the entry procedure, scrolling, contents and data saving.

Overview of all test modes in DIN radios

- Radio serial number
- Software version
- GAL settings/changes
- Station/RDS (F/Q) signal qualities
- Search sensitivity/SEEK LEV
- Travel programme volume/TP setting
- Display test
- Angle of view settings
- AERA settings USA/Europe/TP1

1.6 Service mode Professional C24 DIN

Radio service mode Professional C24 DIN



KT-3726

Fig. 12: Radio Professional C24 DIN

Switching service mode on and off

Switching on

Within 8 seconds after switching on the radio, press and hold the "TP" button for longer than 8 seconds.

Switching off:

Service mode can only be terminated by switching off the radio.

When switched on, service mode automatically switches over to radio mode, i.e. to FM1 with RDS on. Only one manual search is possible within service mode.

Service mode functions

You can switch through the service mode functions with the search buttons < and >:

- SN	Display of serial number
- SV mm	Display of program statuses
- GAL	Selection of GAL curve
- TUNER-1	Setting and data of intercept receiver
- TUNER-2	Setting and data of search receiver
- SEEK LEV	Setting of FM search level pair
- TP-V	Setting of minimum traffic programme volume

Overview and contents of functions

1. Display of serial number (SN)

The device serial number is displayed and cannot be changed.

2. Display of program statuses (SV MM)

The software version installed in the radio is displayed.

In addition to the week and year, a consecutive number is also indicated, starting at the number 1.1.

The digit before the decimal point and a zero after the decimal point indicate a standard version. The numbers 1 to 99 after the decimal point indicate a corresponding development version.

SV MM- 06 95 06 .	00 CDSV MM- 06 94
--------------------------	--------------------------

3. Selection of GAL curve (speed-dependent volume control)

The current GAL curve is indicated. A new curve can be selected by pressing the station buttons 1 to 4 or 6.

4. Setting and information data of intercept receiver (TUNER-1)

The set frequency, field strength and quality (multipath/ neighbouring channel/faults) of the received signal are displayed in FM mode. In the case of RDS stations, the PI program chain identifier, PS program name and the RDS quality are additionally indicated in FM only.

I 97.2	D 3 1 3
Bayern 3 F105 Q253 R255 STP	m

Fig. 13: Display in Professional RDS

Example explanation:

Tuner (intercept receiver) I; station Bayern 3, received on a frequency of 97.2 MHz. The PI (personal identity) is D313, the station name is Bayern 3, the field strength is F105, the quality number is Q253 and the RDS quality is 255.

The station is displayed in full length because "RDS on" is set in the submenu.

Verification of the reception data is interrupted by pressing the "STP" button. RUN appears in the display.

By pressing the "m" button - manual entry of frequency - only the numbers that are possible in the relevant frequency range are shown in the menu line. First make sure that the "STP" setting option is provided.

The set frequency and field strength are indicated in AM mode (LW/MW/SW).

The figure below shows the effects of pressing the "AM" button.

The LW frequency, e.g. 270 kHz, is set, the field strength of the relevant station is F57.

The following output ranges are made available:

Measured value	Range	Output value
Field strength	0...60 dbpV	0.....255
Quality number		0.... 255
RDS quality		0.....255

5. Setting and data of search receiver (TUNER 2)

This function makes it possible to display the RDS data (PI and PS) of the station tuned on the search receiver (FM only).

The numerical frequency input can be selected by pressing the "m" button with the background search switched off with the "RDS" button.

"SCAN" appears in the main line of the display when the background search is active.

All settings made here are cleared when service mode is switched off.

II SCAN	
	STP

6. Setting an FM search level pair (SEEK)

This setting is implemented by switching over between two possible search level pairs:

SEEK 1 - Sensitive

SEEK 2 - Not sensitive

The changeover takes place by pressing one of the buttons 1 or 2. The current setting is displayed in the main line of the MID.

7. Setting minimum travel programme volume (TP-V)

The minimum TP volume can be varied about a mean value (see table) in 9 steps (steps correspond to incremental transducer steps). The current minimum TP volume is set via the station button during a TP message to provide acoustic feedback.

Station button 1: Decrease of minimum TP volume by 1 step

Station button 2: Increase of minimum TP volume by 1 step

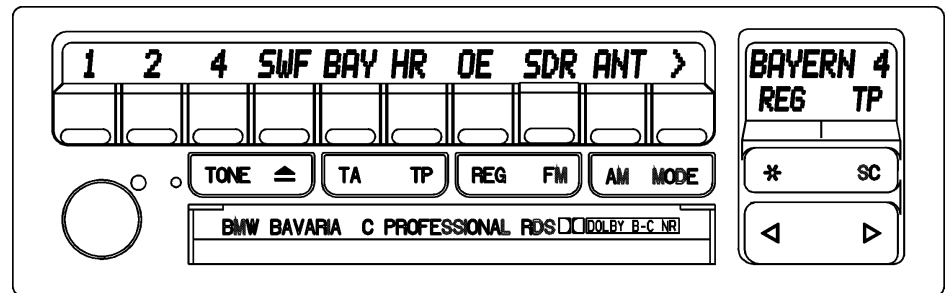
The digit with its corresponding sign within the range from -9 to +9.

1.7 Service mode Bavaria C Professional RDS

Test mode Bavaria C Professional RDS

- This mode is identical to the test mode Bavaria C Professional -

The "Bavaria C Professional RDS" radio features a test mode with which various device-internal data can be displayed and various operating statuses set.



KT-3725

Fig. 14: Radio Bavaria C Professional RDS

Entry in and starting test mode

Press "*" button and then press simultaneously the **buttons "8" and "0"** within the first 8 s after switching on the radio.

The basic menu appears in the display.
The entire test is menu-prompted.

The available test functions are selected via the basic menu.

For this purpose, various abbreviations for the individual functions that can then be activated by the corresponding button located below it on the multifunction keypad appear in the **C-display**.

The individual abbreviations activate the following functions:

1. **SYN:** Setting of synthesizers to fixed frequencies
2. **ADW:** Display of input values of 8 analog/digital converters
3. **NF:** Display of volume, bass, treble and fader values at sound control module in dB
4. **LCD:** LCD test
5. **GAL:** Activation of one of three GAL tables
6. **SN:** Output of serial numbers and software statuses
7. **NAT:** Area setting (USA, EUR)

In addition, the software status of the front software (week, year) is indicated in the **B-display**.

The test is terminated by pressing the button under "END".

LCD test (LCD)

During the LCD test, four different test patterns are switched in succession at all LEDs:

1. All LEDs switched on
2. Chequerboard pattern
3. Test 2 chequerboard pattern inverted
4. All LEDs switched off

The test can be terminated at any time by pressing the "0" button. After displaying all four test patterns, it also returns automatically to the main menu.

Speed-dependent volume control (GAL)

With the aid of this test, one of three GAL tables is activated that is then used to determine a speed-dependent volume offset and transferred to the radio.

The currently active table is indicated in the B-display. The table number is stored in the EEPROM.

Exiting test mode in both types of radio

- You can return to the main menu by pressing the button under "END".
- Switch off the radio and then switch on again.

1.8 Radio service mode Business CD RDS (CD23)

Radio service mode Business CD RDS (CD23)

TEST MODE ENTRY

Switch on radio and within 8 s press the TP button for longer than 8 s.

Scrolling in service mode: Press search button up or down.

Note: Only the serial number appears in the display if the code number is not entered.

Response after accessing service mode:

1. Service

"Service" appears in the display.
An available CD is loaded but not played.

2. Serial number

Indicated in display: Example: S-No. A1234567

3. Software version

Indicated in display: SW-V 08-93 02
08 = Week; 93 = Year; 02 = Software version status

4. GAL setting

The relevant GAL status is indicated in the display,
GAL 1, 2, 3 can be selected arbitrarily.

5. Signal quality

Indicated in display: S/Q value

- The value for the reception frequency level is shown on the left under S/Q; possible value from 0 - 15

- The Q-value is shown in the display on the right next to the station data; possible value from 0 - 15

S or F = Reception level of the currently tuned station to be tested

Q = Quality for RDS value

Refer to description under MID radio for F/Q!

1.9 Radio service mode Business RDS (C13)

Radio service mode Business RDS (C13)

TEST MODE ENTRY

Switch on radio and within 4 s press the "star button", followed by the station buttons 1 and 4 simultaneously.

Scrolling in service mode: Press search button up or down (up pressed in example).

The contents for the following radios are identical to those for MID radios.

Responses and contents on accessing service mode:

1. Service

"Service" appears in the display.

An available CD is loaded but not played.

2. Serial number

Indicated in display: Example: S-No. A1234567

3. Software version

Indicated in display: SW-V 08-93 021

08 = Week; 93 = Year; 02 = Software version status

4. GAL setting

The relevant GAL status is indicated as Tabx in the display, GAL 1, 2, 3 can be selected arbitrarily by pressing the station buttons

5. Signal quality

Indicated in display: F-value

- The value for the reception frequency level is indicated in the display; possible value from 0 - 49

F = Reception level of currently set station to be tested

6. FM search level

Indicated in display: SEEK Level 1 or 2

Level 1 = Sensitive

Level 2 = Not sensitive

This setting is also possible in Italy mode.

7. TP volume

Indicated in display: - 9 +9

Reduction -1.25 dB per step

Increase +1.25 dB per step

The setting is carried out by pressing the button 1 or 2.

8. Display test

Indicated in display: A chequerboard pattern is shown in the display.

The segments in the display are tested.

Buttons 1 to 4 are used to set and test the display.

Button 1 - All segments on

Button 2 - Chequerboard pattern

Button 3 - Inverse chequerboard pattern

Button 4 - All segments off

9. Angle of view setting

Indicated in display: LCD 1 or 2

Button 1 or 2 is pressed to set and check the display.

3, 5, 7 Series delivery status 2

8 Series delivery status 1

Explanation:

1 = Characters in display positioned at an angle with respect to driver

2 = Characters in display positioned at right angle with respect to driver

1.10 Radio service mode Bavaria C Reverse III

RADIO test mode for Bavaria C Reverse III

The "Bavaria C Reverse III" radio features a test mode with which various device-internal data can be displayed and various operating statuses set.

Entry in and starting test mode

Press buttons "2" and "5" simultaneously while switching on the radio. An upper case "S" appears in the display next to the waveband indication.

This service mode is exited by switching off and on once. The tuned station is still received during the test.

To change volume increase rate during traffic announcements

Press the NF button for approx. 4 s until an "0" appears in the display. The station becomes a little louder.

The increase in volume can be set in +/- 5 steps with the search rocker switch.

The ex-factory setting is "0".

The control range is +/- 6.25 dB.

This mode is exited by pressing the NF button once again. Test mode remains active.

Setting speed-dependent volume control (GAL)

Press station button "3" for approx. 4 s until a "2" appears in the display. This value can be changed by pressing the search rocker switch.

The ex-factory setting is "2".

Control range:

"1": Slow increase

"2": Medium increase

"3": Fast increase

This mode is exited by pressing the button "3" once again. Test mode remains active.

Switching over from "distance" to "local" in Italy mode

Press rocker switch "m" for approx. 4 s until an "H" or "L" appears in the display. This setting can be changed by pressing the search rocker switch.

The ex-factory setting is "H".

Control range: "H": Distance; "L": Local

This mode is exited by pressing the rocker switch "m" once again. Test mode remains active.

1.11 Service mode Bavaria C

- Reverse RDS
- Reverse III
- Bavaria CIII

Test modes for

- BMW car radio Bavaria C Reverse RDS
- BMW car radio Bavaria C Reverse III
- BMW car radio Bavaria C III

These radios feature a test mode with which various device-internal data can be displayed and various operating statuses set.

Entry in and starting test mode

Press buttons "2" and "5" simultaneously while switching on the radio.

An upper case "S" appears in the display.

This service mode is exited by switching off and on once.

To change volume increase rate during traffic announcements

Press the "TP" button for approx. 4 s until an "0" appears in the display.

The station becomes a little louder.

The increase in volume can be set in 5 steps with the search rocker switch.

The ex-factory setting is "0".

The control range is 6.25 dB.

This mode is exited by pressing the "TP" button once again. Test mode remains active.

Setting speed-dependent volume control (GAL)

Press station button "3" for approx. 4 s until a "2" appears in the display. This value can be changed by pressing the search rocker switch.

The ex-factory setting is "2".

Control range:

"1": Slow increase

"2": Medium increase

"3": Fast increase

This mode is exited by pressing the button "3" once again. Test mode remains active.

Italy mode: Local and distance

Switching over from "distance" to "local" in Italy mode:

Press rocker switch "a*m" for approx. 4 s until an "H" or "L" appears in the display.

This setting can be changed by pressing the search rocker switch.

The ex-factory setting is "H".

Control range:

"H": Distance

"L": Local

By pressing the "a*m" rocker switch once again, this setting is saved and this mode exited.

Test mode remains active.

Setting of angle of view for display

The angle of view can be changed by pressing the "RDS" button (E31).

Ex-factory setting: Display blank when viewed directly from front.

1.12 Display check on MID radio E38/39

Test mode display check on MID radio

E38/E39

All symbols in the radio display light up simultaneously by pressing the buttons **LIN** and **BAL** simultaneously in the operating unit of the radios with bus capabilities installed in the E38/E39.

By pressing the individual buttons and during the corresponding response displays, the buttons can be checked for snagging, jamming as well as their function.

The display check of the MID is not a constituent part of radio service mode (refer to: E38/E39 MID; MID function test).

1.13 Radio operating unit button function test mode

Radio operating unit - Button function test mode

The radio operating unit in the E38/E39 with MID can be checked with regard to its button functions. Press buttons **LIN** and **BAL** and **switch on** radio: When the buttons are pressed, a star appears above the buttons as a reaction in the display.

1.14 Diagnosis radio with DIS/MoDiC E 38/39/46

Diagnosis radio with DIS/MoDiC E38/39/46

The radios BMW BUSINESS RDS, BMW Professional as well as BMW Reverse feature full diagnostic capabilities in conjunction with the DIS (diagnosis information system). Diagnosis with these testers is equivalent to service mode.

The decisive feature in the DIS/MoDiC is the DIS/TIS CD program loaded and used.

The DIS/MoDiC can be used for testing and setting purposes. Tests and settings are possible in expert mode in the fault symptom path as well as under service functions.

Reference should also be made to the diverse information provided in the fault symptom path in the DIS/MoDiC as well as in the TIS/Group 65 - Troubleshooting of the Repair Instructions.

Furthermore, the TIS Hotline information issued every month on the subject of radio/audio systems should also be observed.

The information provided in the EPC with regard to the allocation of devices in the systems should also be complied with.

Diagnosis DSP amplifier (E38/39)

The audio systems (active HiFi amplifier or DSP operating unit and DSP amplifier) feature diagnostic capabilities via the I-bus or K-bus. An interesting feature is checking the DSP system in test mode.

1.15 Multi-information display MID

MID function test/diagnosis

MID function test

The MID features an internal function test for the purpose of checking the functions in the workshop.

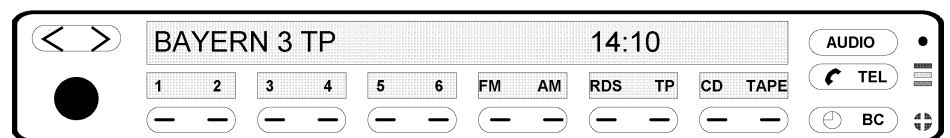
Although test functions or radio settings are also initiated via the MID, they have nothing to do with the MID directly.

Selecting function test

The test menu is called up by simultaneously pressing the **first and last menu button** and "terminal R ON".

The display is deactivated for all bus users for the test period.

The test is also possible without a connected bus.



KT-1567

Fig. 15: MID - View

The following test functions are available for selection in the test menu:

- Device identification
- Display test Button functions
- Button function
- Incremental transducer test
- LEDs for function indicators

Device identification

The following data are shown scrolling at 3 second intervals in the main menu:

- BMW part number
- Hardware, software version
- Date of manufacture: Week, year
- Revision index
- Variant number

Display test

The following functions are activated one after the other at 3 second intervals:

- Light box main line **ON**
- In main display:
 - All characters with all DOTs
 - All characters with chequerboard pattern
- All special scripts:
 - LIMIT
 - LIMITE
 - MEMO
 - STOP WATCH

sequentially and then together

- Light box main line **OFF**
- Light box menu line **ON**
- In menu display:
 - All characters with DOTs
 - All characters with chequerboard pattern

The test menu reappears in the menu line on completion of this test sequence.

Button functions

The menu buttons, selection buttons and both levels of the search rocker switch are tested.

An indicator bar that jumps one position further to the right every time a button is pressed appears in the main display.

Incremental transducer test

A two-digit counter, starting at "00" is shown in the main display.

With every step to the right, the value increases by one up to a maximum 36 (= 1 turn).

The value is reduced by one when it is turned in counter-clockwise direction.

LED function indicators

The individual coloured LEDs are activated consecutively at 3 second intervals:

- TEL LED red, yellow, green
- LED heating/ventilation symbol

MID diagnosis

The MID features diagnostic capabilities and requires encoding.

All diagnostic data are transferred via the I-bus interface to the electronic instrument cluster (IKE). The IKE serves as the gateway from the diagnosis computer (DIS) to the I-bus.

MID diagnosis is subdivided into three sections:

- Device identification
- Self-diagnosis with fault code storage
- Stimulation via diagnosis computer

MID device identification

Data are stored in the EEPROM of the MID for the purpose of control unit identification and can be retrieved via the DIS/MoDiC:

MID identification data:

1. BMW part number
2. Hardware version
3. Coding index
4. Diagnosis index
5. Bus index
6. Date of manufacture, week
7. Date of manufacture, year
8. Supplier
9. Software version
10. MID variant

MID fault code memory

Fault codes based on the MID self-diagnosis are stored in the EEPROM of the MID. These fault codes can be read out via the DIS.

MID diagnosis test functions

Various tests can be called up via the diagnosis computer. In contrast to the device-internal test, the precondition for this is that the MID can communicate effectively on the I/K-bus.

Display test (test menu)

The test consists of three parts. The diagnosis computer writes the following in both display lines:

1. All characters with chequerboard pattern
2. Display of special characters

LIMIT	LIMITE
MEMO	TIMER

Function LED test

In this test, all LEDs for the special functions are activated sequentially for 1 s each.

- TEL LED red, yellow, green
- LED heating/ventilation symbol

1.16 IRIS function test E39

IRIS function test E39

A device-internal function test is integrated in the IRIS for the purpose of quickly checking all button functions and the display of the IRIS in the workshop.

Selecting function test

The test menu is called up by simultaneously pressing the buttons "RDS" and "6" and then switching on terminal R.

* The device identification appears in the display for 3 s together with the hardware and software status.

In order to activate further test functions, one of the following buttons must be pressed within these three seconds:

SCAN: Display test:

The display test runs automatically following activation.

* All elements of the display

* All special scripts

are activated one after the other.

MODE: Button test:

All buttons of the operating unit including the function of the incremental transducer are tested.

A number which changes every time a button is pressed appears in the display.

▲▼: Incremental transducer test:

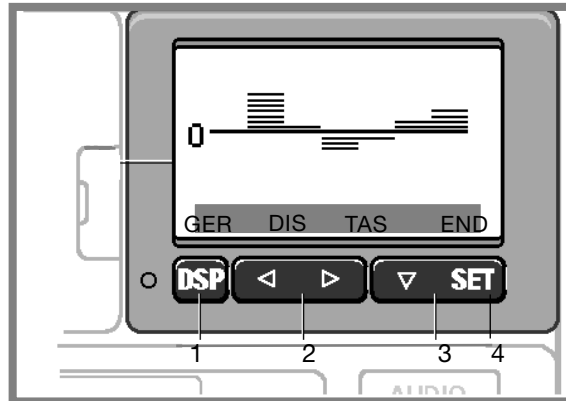
A two-digit counter, starting at "00" display test appears in the display.

With every step in clockwise direction, the value increases by one up to maximum 36 (= 1 turn) and the value decreases with every step in counterclockwise direction.

1.17 DSP operating unit function test

DSP operating unit function test

This operating unit is only installed in the E38. The DSP can be operated in the MID as replacement for this operating unit.



KT-1786

Fig. 16: DSP operating unit, only in E38

DSP operating unit test functions

A device-internal test function can be called up by simultaneously pressing the buttons "DSP", ">" and "SET" while switching on the radio.

The following test menu points are then indicated in the menu line of the display:

GER DIS TAS END

Corresponding test menu points can be activated by pressing the buttons located below them:

- **GER**
Button 1 **Device identification:**
Displayed in scrolling form:
 - BMW part number
 - Hardware and software version
 - Date of manufacture
 - Revision index

- **DIS**
Button 2 **Display test:**
All pixels of the LC display are activated

- **TAS**
Button 3 **Button function test:**
Every time a button is pressed, a star appears in the display in the position of the pressed button

- **END**
Button 4 End of function test

This test is also possible without a connected bus.

2. Telephone systems

2.1 Software and hardware information at MID and BM

Telephone service mode Special features in E39

By the push of a button, certain information is displayed in the MID in conjunction with the basic/high instrument cluster, MID, multifunction steering wheel (MFL), telephone version Phase IV^{plus}, Phase V and Phase V^{plus}:

- the software and hardware status of the interface and transceiver
- telephone number and name (when high instrument cluster display not available). This only takes place when changing over in the MID from basic to high instrument cluster.

The customer should have saved the names and telephone numbers of the participants on the card.

The following hidden functions can be displayed and performed in the MID and BM:

Function	MID	FMID	BM
Displaying the SW and HW status of the bus interface	X	-	X
Displaying the SW and HW status of the transceiver unit	X	-	X
Changing over from basic to high instrument cluster mode	X	-	-

You will need to use the following button combinations for these functions

Multi-information display (MID)

- Switch on terminal R
- Plug in the SIM card and enter PIN code
- Switch off terminal R once you have successfully logged into the network
- Switch on terminal R again
- Press the TEL button on the MID (within 9 s of switching on terminal R)
- Wait until the telephone menu line appears on the MID
- Press menu button for third level and hold for at least 3 s (= 2 arrow down buttons ▼▼ in right of MID display)

The following is then displayed in the MID

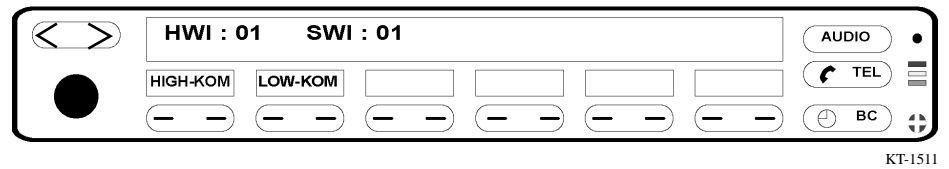


Fig. 17: MID service mode hardware/software interface display

This is deleted from the hardware/software status display of the transceiver unit after 6 s.
The software number must be interpreted.

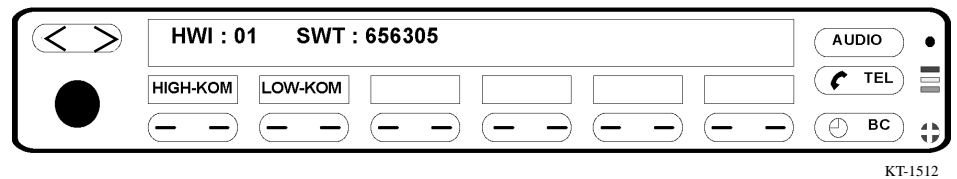


Fig. 18: MID hardware/software status of transceiver unit

After 6 s, the telephone switches over again into the first or second telephone level.

On-board monitor (BM)

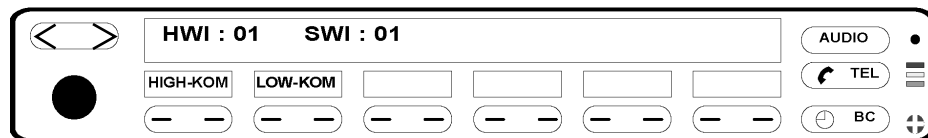
Service mode:

The procedure on the on-board monitor (BM) corresponds to that on the MID. In this case, however, the info button is pressed for the third level instead of the menu button. However only information about the software and hardware is displayed in the main line on the on-board monitor.

2.2 Changeover from basic to high instrument cluster

Changeover "basic to high instrument cluster"

The MID can be used as the display unit in order to equip vehicles without a display in the instrument cluster with a multifunction steering wheel (MFL). You can switch between basic and high instrument cluster in menu service mode of the MID.



KT-1511

Fig. 19: MID service mode; switching between basic/high instrument cluster

This is indicated in the main line by pressing one of the two buttons.

After one second, the starting position is redisplayed.

When you have switched over from basic to high instrument cluster, the parts can be retrofitted for telephone operations on the MFL. All telephone operations can now be performed using the fully equipped MFL and these can be displayed on the MID.

On-board monitor (BM)

Switching over:

It is not necessary to switch over from basic to high instrument cluster in conjunction with the on-board monitor (BM) as the BM is always installed together with a high instrument cluster.

Important note:

If the "low instrument cluster button" is pressed on a vehicle equipped with BM or high instrument cluster, displays will no longer be visible in the high instrument cluster when the MFL buttons are pressed!

The changeover can take place as often as required.

3. Navigation systems

3.1 Mark II

Service mode in the navigation systems Mark II (E38/E39 E46) provides the option of checking various components and their representation with regard to correct function and contents.

Entering service mode

Select "Settings" in the menu and press and hold the menu button for longer than 8 s until service mode appears in the display.

Exiting service mode

Press the menu button or switch off the ignition.

Scope of tests - Overview -

Radio navigation

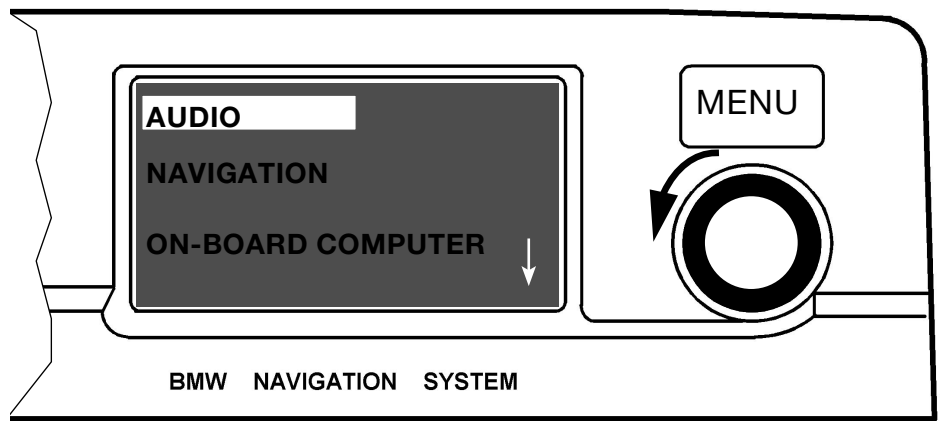
- **Operating unit**
 - Versions
 - Display test
 - Button function
 - Brightness adjustment

BM navigation

- **On-board monitor**
 - No function possible
- **Navigation graphics stage**
 - Version
- **GPS**
 - Version
 - Status
 - Tracking information
- **Wheel sensors**
 - GPS satellite
 - GPS status
 - Gyro
 - Heading

- **Sensor test**
 - Wheel (wheel sensors)
 - GPS status
 - Satellite
 - Gyro

Below, an example with the radio navigation system:

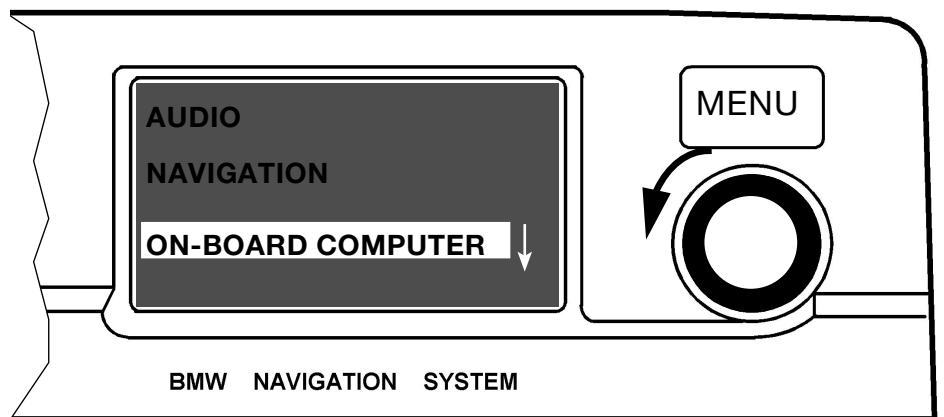


KT-2136

Fig. 20: Main menu (audio selected)

The main menu is shown in the display as from terminal "R".

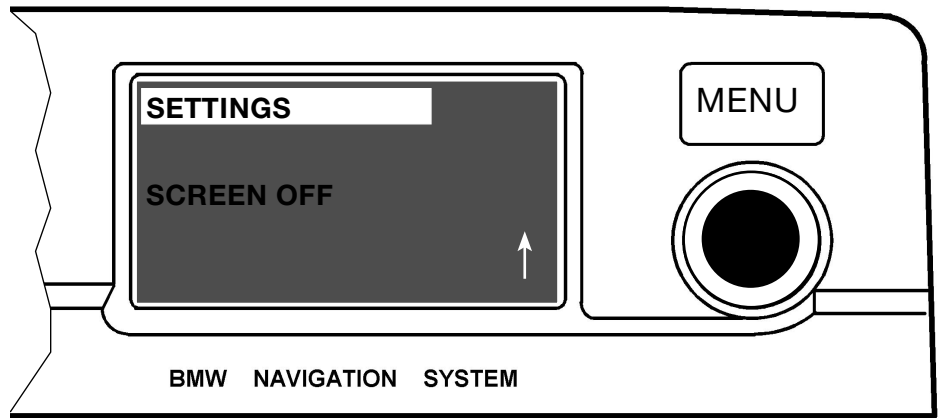
If terminal R or terminal 15 is already switched on, the main menu is selected by pressing the "MENU BUTTON".



KT-2136

Fig. 21: Main menu (on-board computer selected)

The cursor moves down by turning the rotary push button in counterclockwise direction. The cursor moves up by turning the button in clockwise direction.

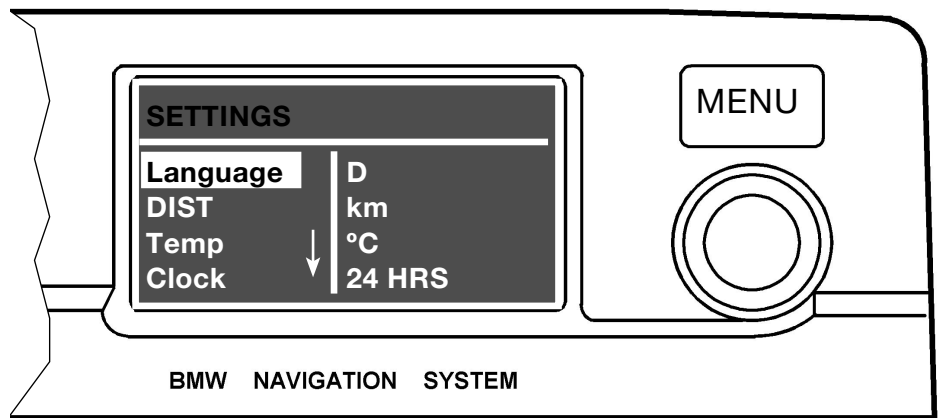


KT-2136

Fig. 22: Main menu (settings selected)

You must select the menu position "SETTINGS" in order to call up "SERVICE MODE". For this purpose, turn the rotary push button to the highlighted menu line "Settings".

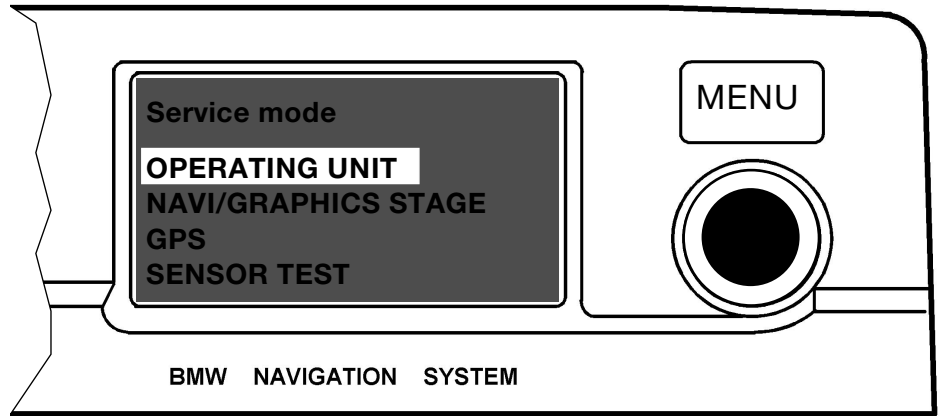
Press the rotary push button in order to activate the function.



KT-2136

Fig. 23: "Settings" menu

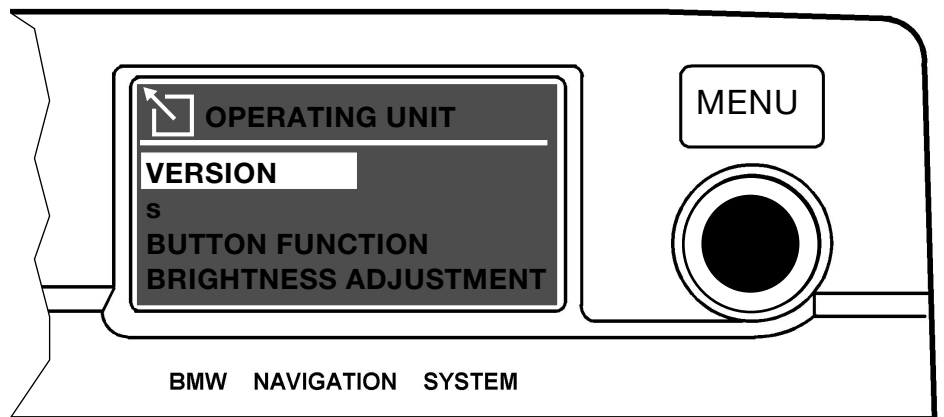
If the "SETTINGS" menu is shown in the display, the "MENU" must now be pressed and held (> 8 seconds) until "SERVICE MODE" appears.



KT-2136

Fig. 24: Service mode, operating unit selected

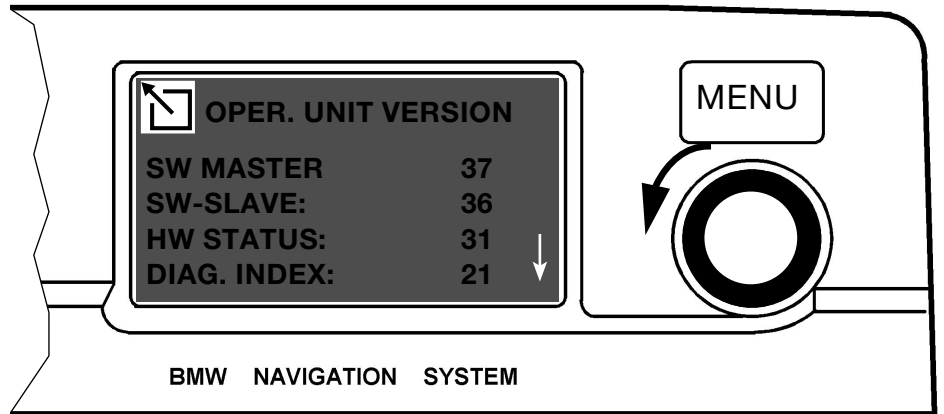
If the first item "OPERATING UNIT" is selected,...



KT-2136

Fig. 25: Version selection

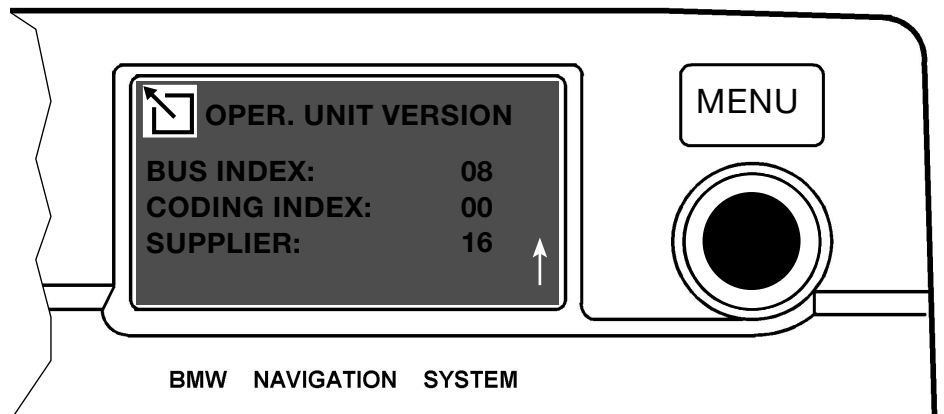
... four lower-ranking selection options appear in the display.



KT-2136

Abb. 26a: Contents of operating unit, Mask 1

The "VERSION" position contains information on the hardware and software statuses of the operating unit ...

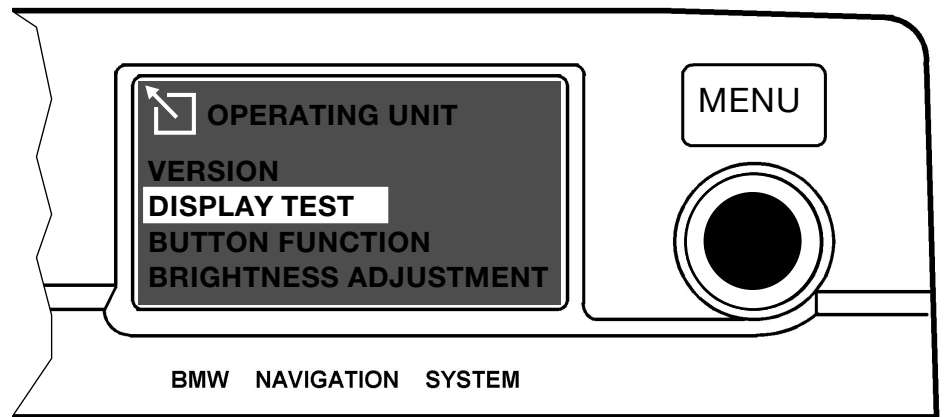


KT-2136

Abb. 26b: Contents of operating unit, Mask 2

... as well as information on diagnosis, BUS, coding indices and suppliers. At present, this information is of secondary status, however, it may be required at a later point in time.

Press the rotary push button in order to return to the service mode menu.

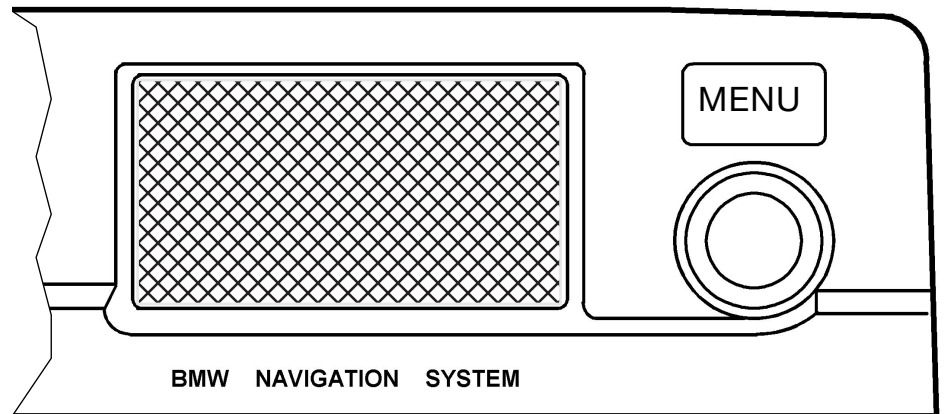


KT-2136

Abb. 27a: Selection operating unit display test

The display test can be used to check the display for faulty pixels.

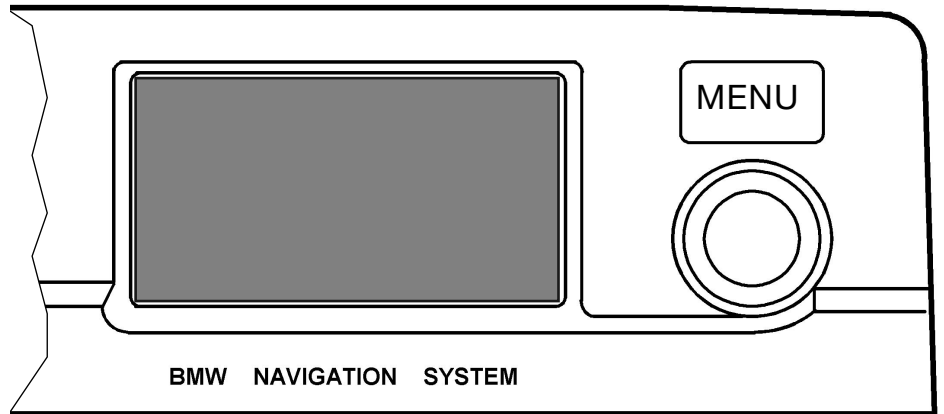
After being activated, the "DISPLAY TEST" function runs automatically.



KT-2136

Abb. 27b: Coarse grid display

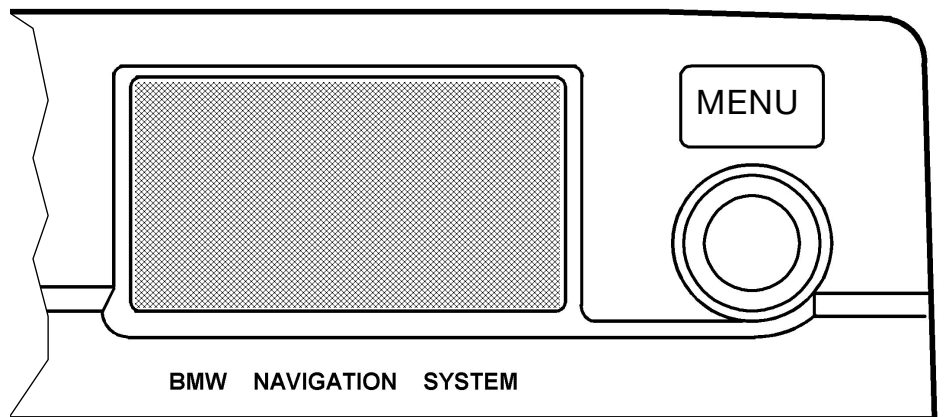
Initially, a coarse grid pattern appears. After a few seconds, the display changes ...



KT-2136

Abb. 27c: Background lighting active

... so that the display is only illuminated by the background lighting.



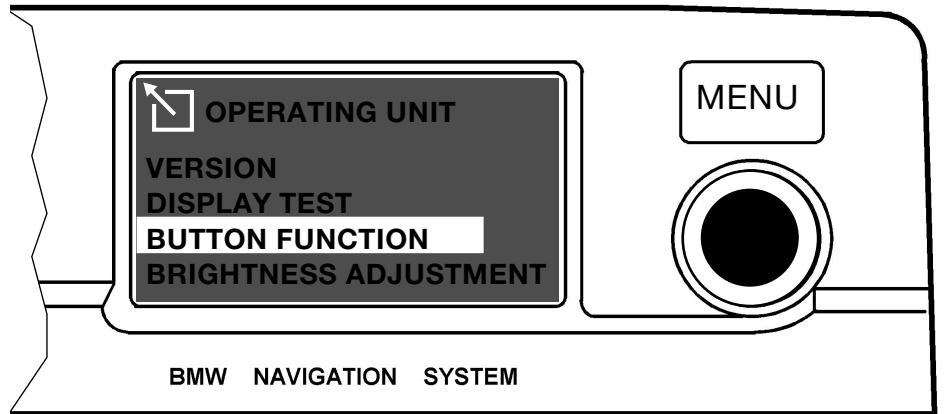
KT-2136

Abb. 27d: Fine grid display

A fine grid pattern must then be displayed. In this way you can determine whether there are any pixel faults*.

Pixel faults appear as dark or bright dots in the display.

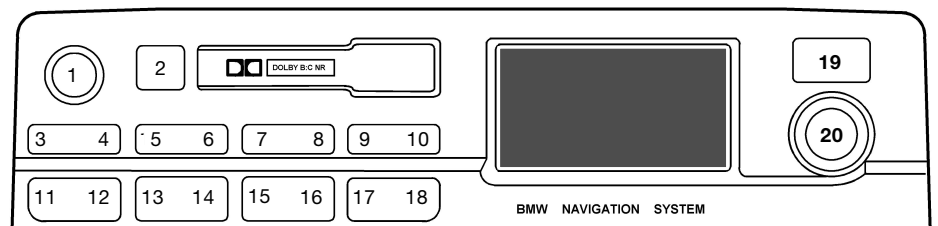
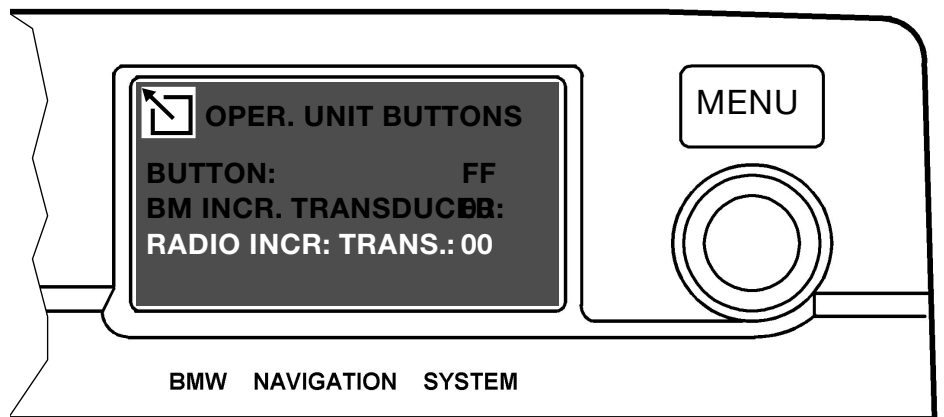
* There is currently no information relating to the number of permitted pixel faults.



KT-2136

Fig. 28: Operating unit, button function selection

All button/rotary transducer functions can be checked with the "BUTTON FUNCTION" test.



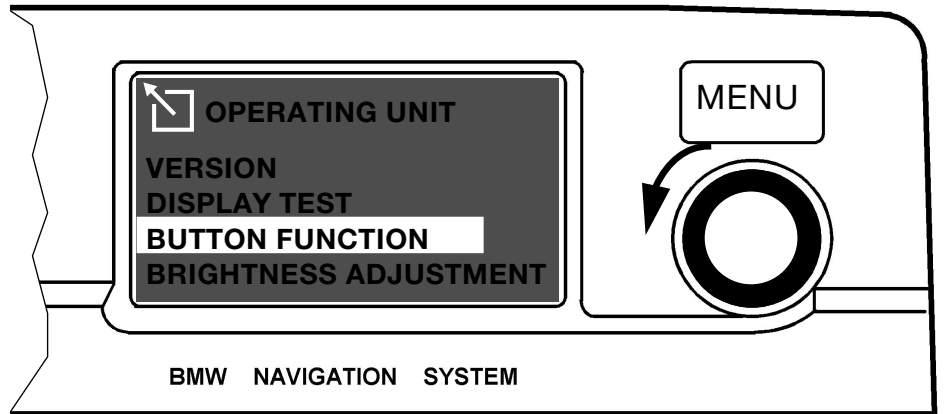
KT-2137

KT-2136

Fig. 29: Keypad/rotary push button test, incremental transducer

The buttons are allocated numbers which are indicated in the display when the relevant button is pressed. The increments of the rotary transducers (volume and rotary push button) are indicated in the form of a hexadecimal number in the display.

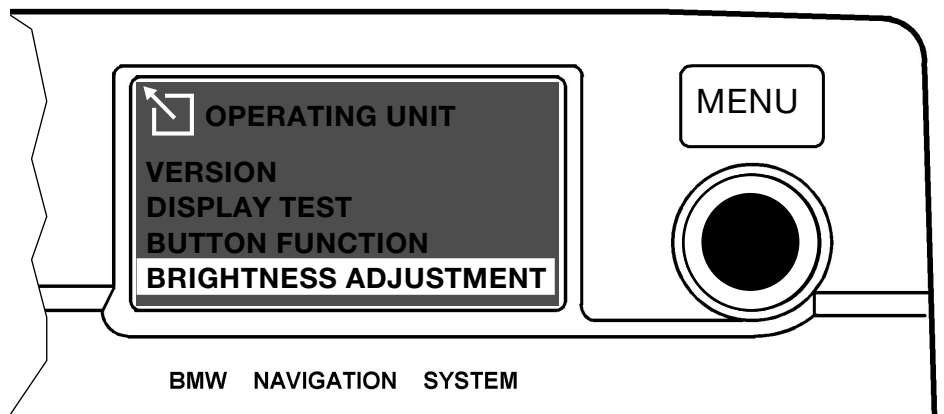
The operating unit must be replaced if a button does not operate or an incorrect number appears in the display.



KT-2136

Fig. 30: Operating unit, button function selection

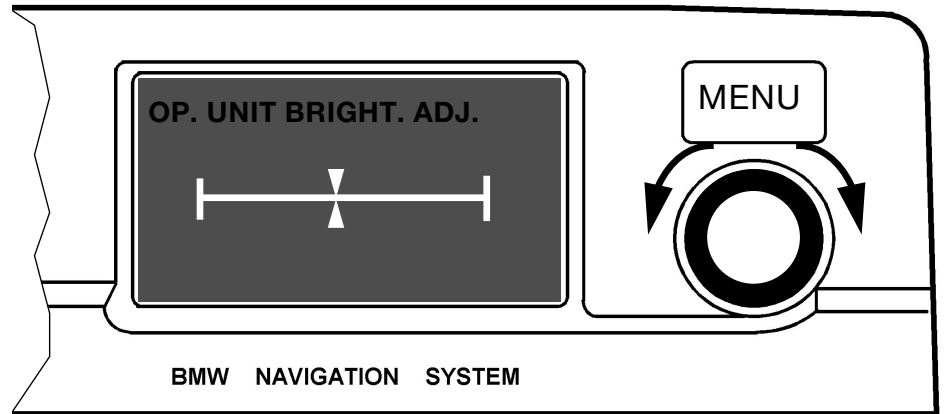
The "BUTTON FUNCTION" is exited approx. 5 seconds after the last time a push button is pressed or a rotary transducer is turned and returns to the "OPERATING UNIT" menu.



KT-2136

Fig. 31: Operating menu brightness adjustment selection

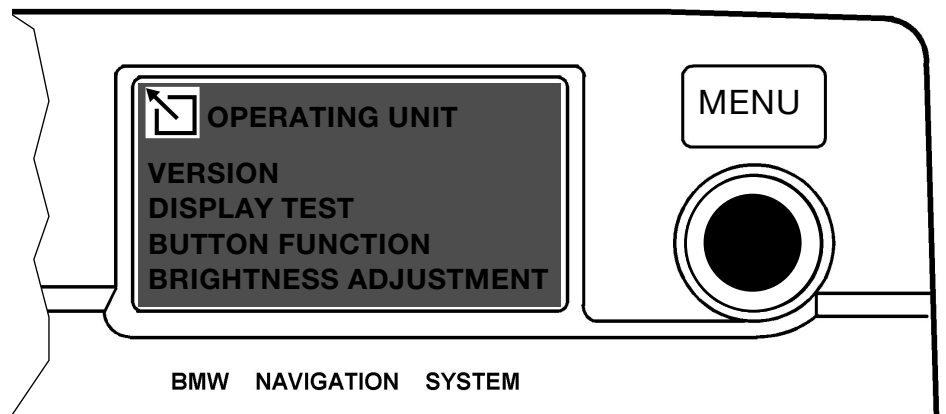
With this function, the display brightness can be set with the rotary push button.



KT-2136

Fig. 32: Operating unit brightness adjustment setting

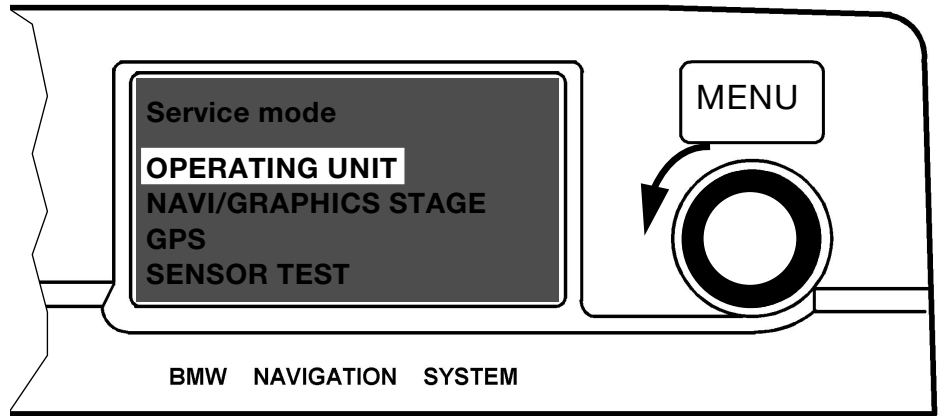
The brightness of the display is increased by turning the rotary push button in clockwise direction. The display becomes darker when the button is turned in counter-clockwise direction. Press the rotary push button in order to save the new setting.



KT-2136

Fig. 33: End of operating unit test

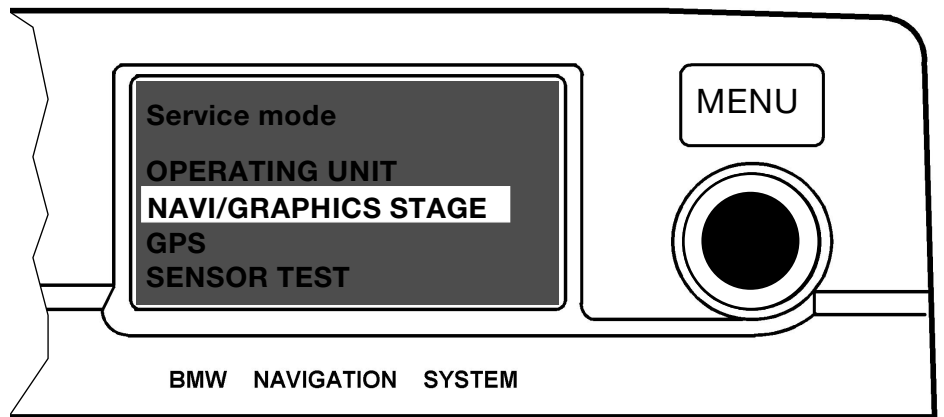
When the cursor is positioned in the top left and the rotary push button is pressed ...



KT-2136

Fig. 34: End/start of operating unit test selection

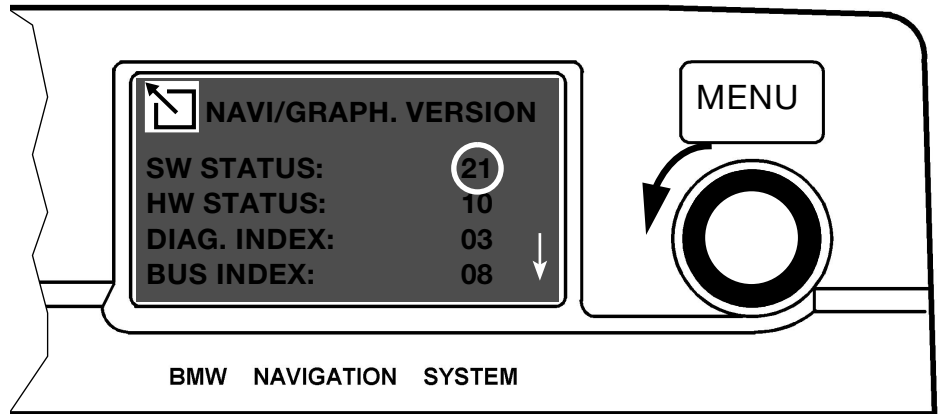
... the display returns to the "Service mode" menu.



KT-2136

Fig. 35: Selection navigation/graphics stage

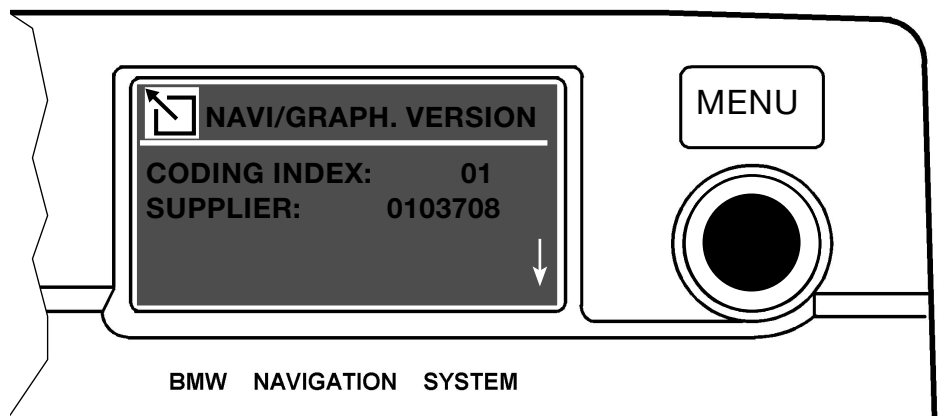
Information can be called up directly from the navigation computer with the "NAVI/GRAPHICS STAGE" function.



KT-2136

Fig. 36: Contents of navigation graphics version Part 1

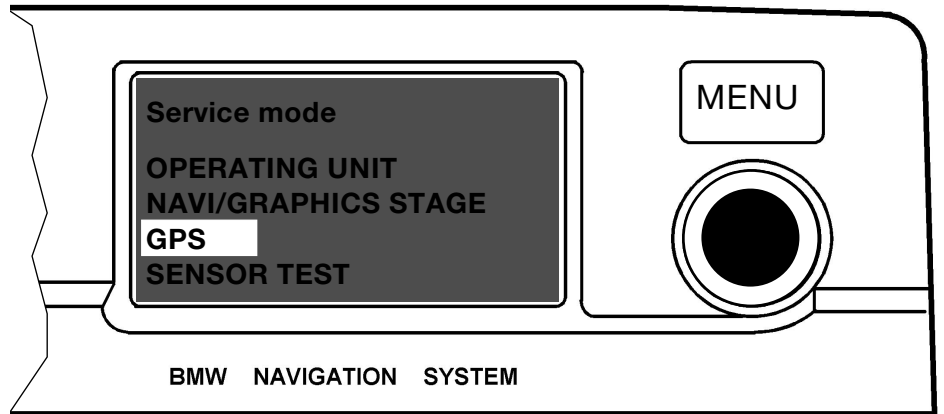
In the same way as the "OPERATING UNIT VERSION" function, information concerning the hardware and software statuses of the navigation computer can be read out. This makes it possible to immediately check whether the software status of the operating system corresponds to the current version of the navigation system. In our example, the software status "21" means "2.1". This corresponds to the currently valid status (8/98). Turn the rotary push button in counterclockwise direction



KT-2136

Fig. 37: Contents of navigation graphics version Part 2

... in order to display the next page of this function. Press the rotary push button in order to return to the service mode menu.



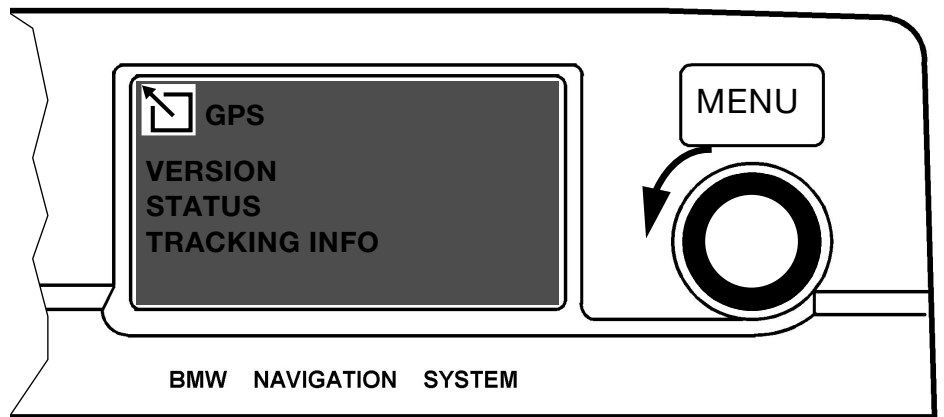
KT-2136

Fig. 38: Selection menu for GPS

The GPS menu is selected by pressing the rotary push button. Here, data are read directly from the GPS receiver.

Note

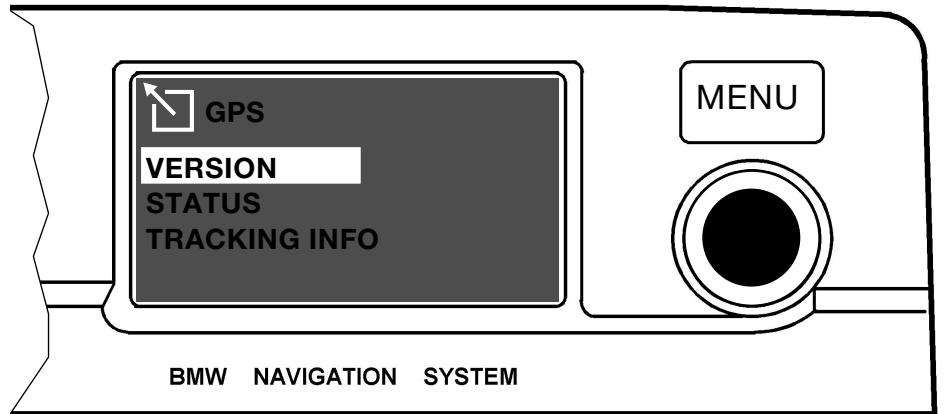
Note that GPS information appears only in English irrespective of the language setting of the system.



KT-2136

Fig. 39: Contents of GPS overview mask

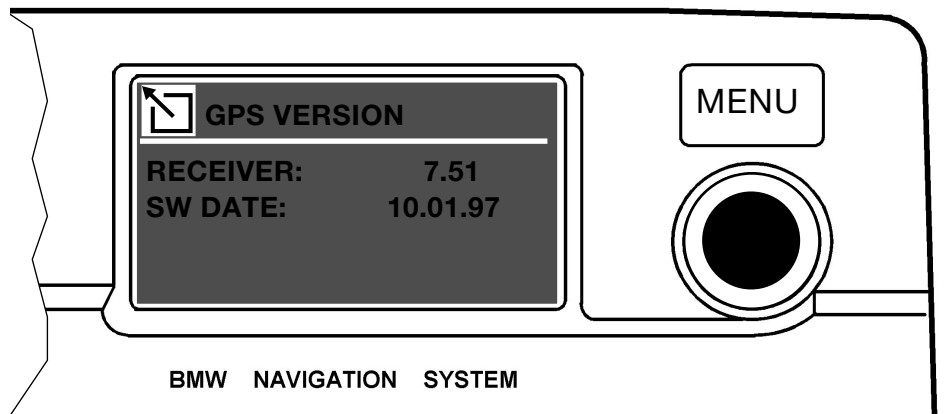
The GPS menu is made up of three lower-ranking menus.



KT-2136

Fig. 40: Selection "Version" GPS

Here, the software version of the GPS receiver ...



KT-2136

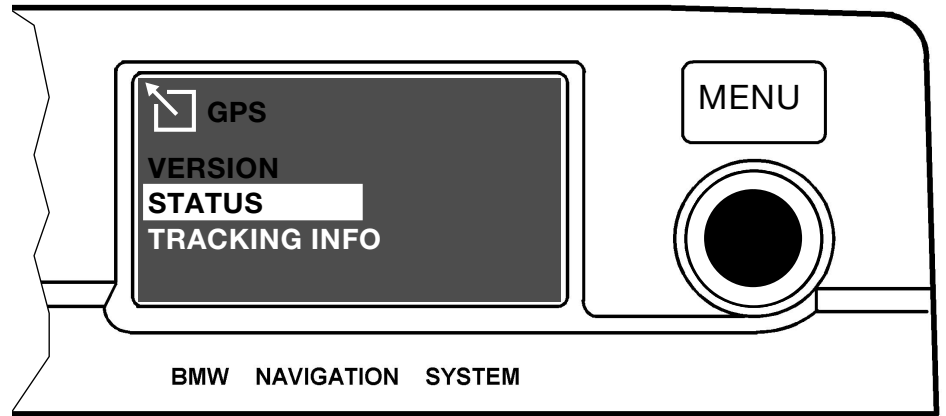
Fig. 41: Contents "Version" GPS

... as well as the software date can be read out.

Press the rotary push button in order to return the display to the GPS menu.

Note:

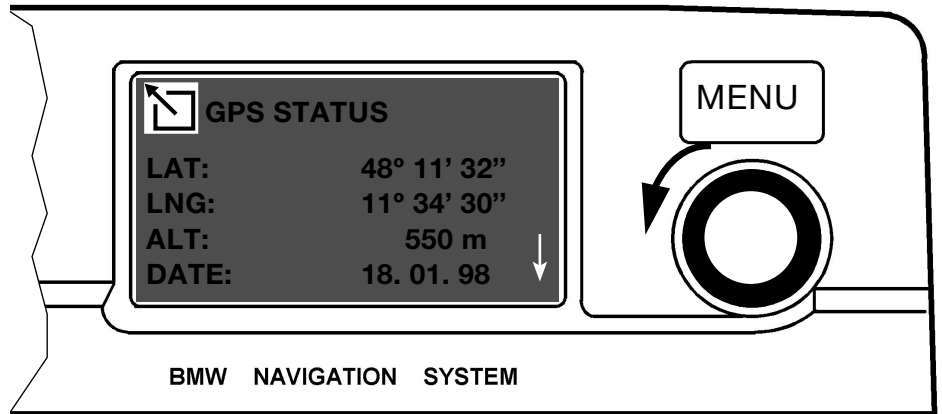
Version 7.51 is no longer valid. The current version (when going to print) is 7.52.



KT-2136

Fig. 42: Selection mask GPS status

Information with regard to the received GPS data can be read out with the status inquiry function.



KT-2136

Fig. 43: GPS status data, Mask 1

LAT and LNG = Latitude and longitude

Provided signals from at least three satellites can be received and evaluated, the actual position of the GPS receiver (vehicle) appears in the display.

ALT = Altitude above sea level

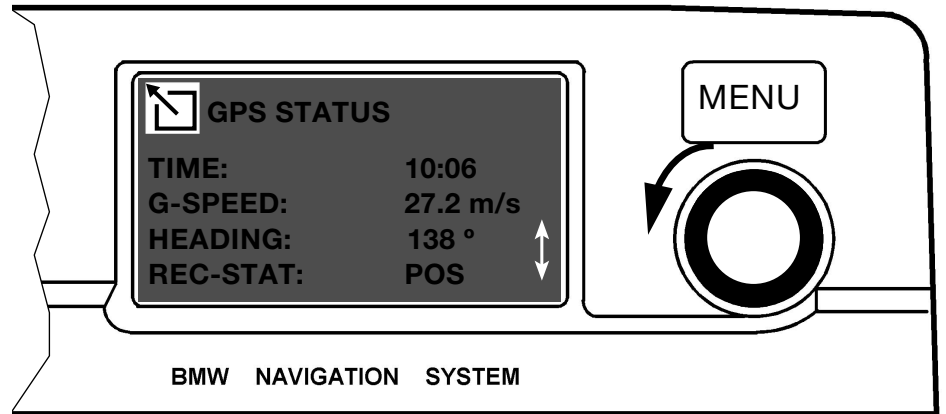
Provided signals from at least four satellites can be received and evaluated, the altitude of the GPS receiver (vehicle) above sea level appears in the display. It should be noted that the displayed value can deviate from the actual altitude. This is a function that is already included in the GPS receiver but is currently not suitable for our purposes.

DATE

The displayed date is not supplied by the vehicle but rather it is received directly from the GPS satellites.

Note:

The date is currently not supplied in the on-board computer (BC).



KT-2136

Fig. 44: GPS status data, Mask 2

TIME

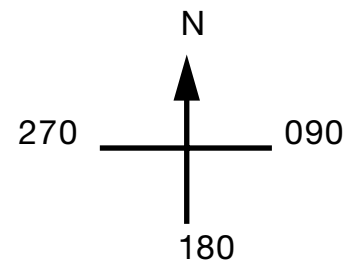
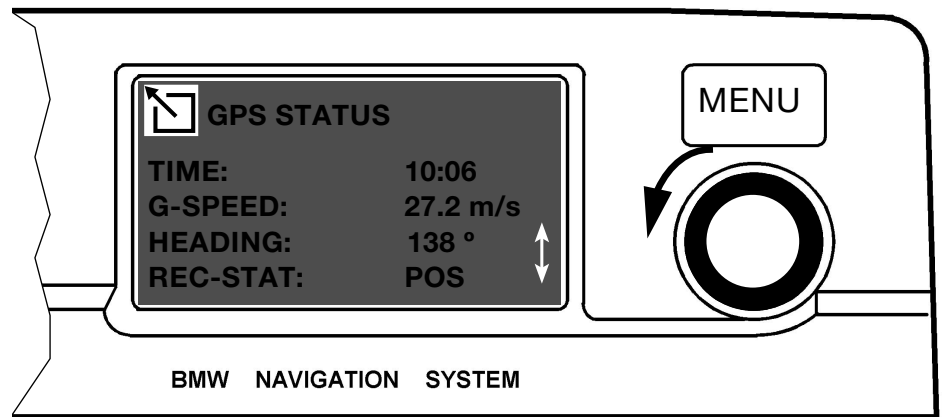
In the same way as the date, the time is not supplied by the vehicle system but rather from the GPS satellites. It therefore corresponds to the time at the 0° meridian, i.e. Greenwich Mean Time. For this reason, there may be a deviation between this displayed time and the time indicated by the vehicle clock. The accuracy of this time supplied by the satellites corresponds to +/- 1 s in 1,000,000 years.

Note:

The time is not fed into the on-board computer (BC).

G-SPEED = Ground speed

When the vehicle is in motion, the relative speed over the ground (ground speed) is calculated by the GPS receiver and is indicated in the display in m/s.



KT-2136

Fig. 45: GPS status data

HEADING

When the vehicle is in motion and signals from at least four satellites are received and evaluated, the receiver can calculate the heading which is then indicated in the display in degrees.

Note:

If values appear in these fields while the vehicle is stationary, i.e. not in motion, this is not attributed to a fault but rather a correction in the positioning of monitoring stations in the USA.

REC-STAT = Receiver status

The following messages can appear in this field.

SEARCH

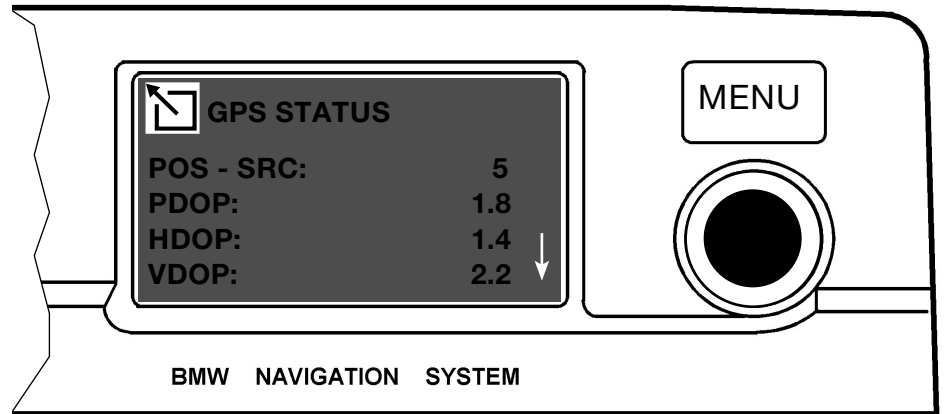
The GPS searches for satellite contact

TRACK

Reception of at least one satellite but position cannot yet be determined

POS

The received data can be evaluated and the position of the vehicle is known.



KT-2136

Fig. 46: GPS status data

POS-SRC = Position source

This function indicates how many satellites are currently supplying signals that can be evaluated.

PDOP = **P**osition **D**ilution **O**f **P**recision (3 coordinates)

HDOP = **H**orizontal **D**ilution **O**f **P**recision (2 coordinates)

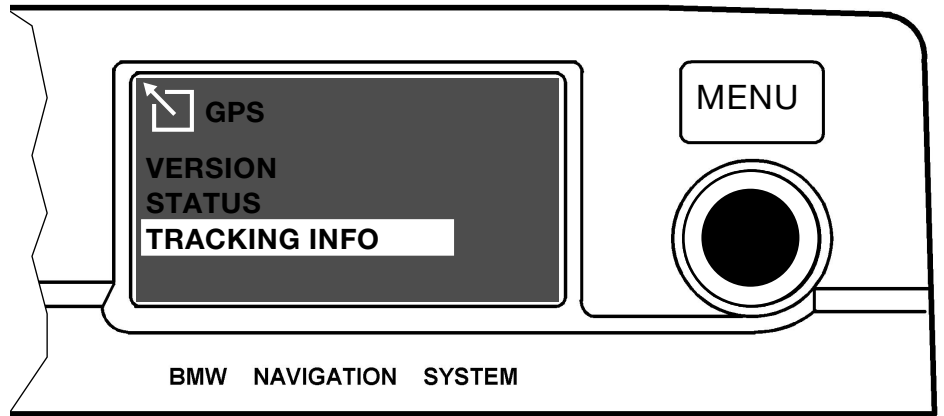
VDOP = **V**ertical **D**ilution **O**f **P**recision (vertically only)

These values depend on the current satellite constellation and represent factors for the quality of the calculable position. They have no physical unit.

The following applies in principle:

Values < 8 enable satisfactory GPS position definition.

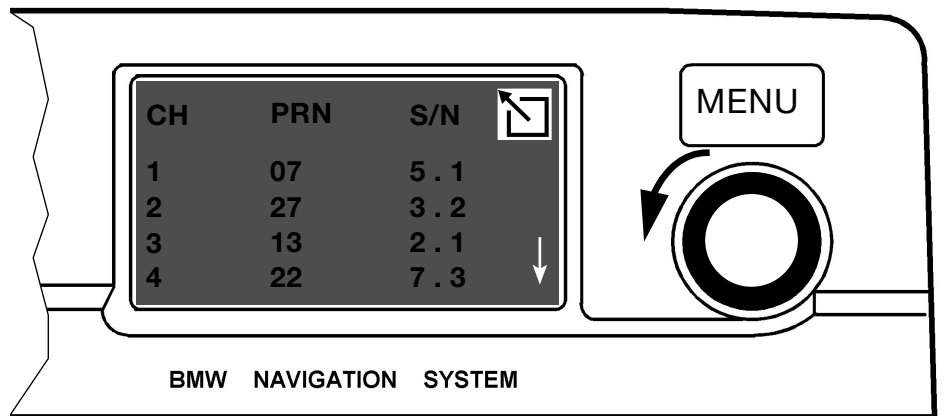
Values < 4 enable very good GPS position definition.



KT-2136

Fig. 47: GPS tracking info selection mask

The "TRACKING INFO" menu contains details of the satellite signals.



KT-2136

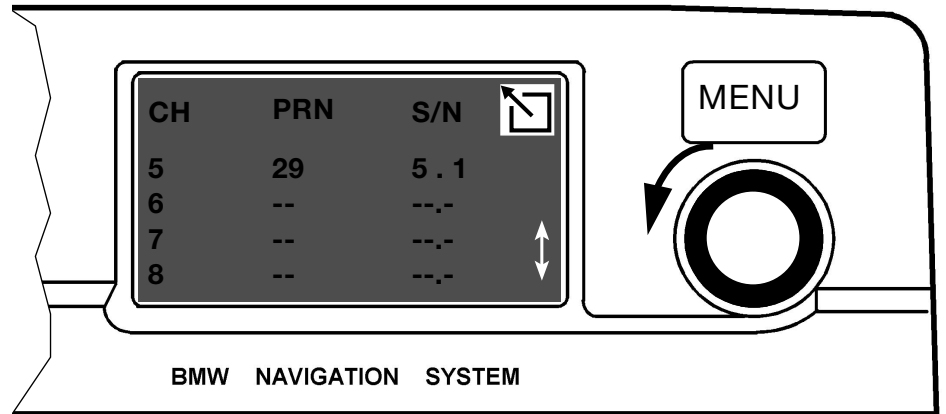
Fig. 48: Satellite definition, Mask 1

CH = Logic reception channel

PRN = Distinct identification of satellites (satellite definition)

S/N = Signal-to-noise ratio in dB

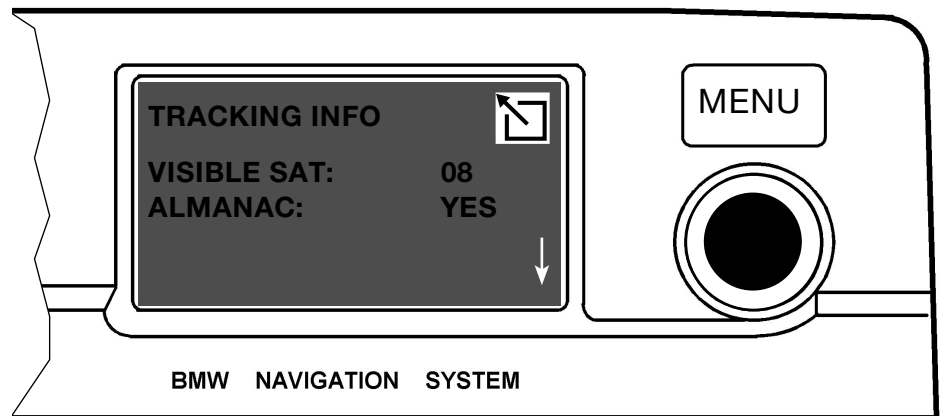
High values represent good reception quality of satellite signals.



KT-2136

Fig. 49: Satellite definition, Mask 2

Continuation of previous menu, Fig. 47.



KT-2136

Fig. 50: Satellite information

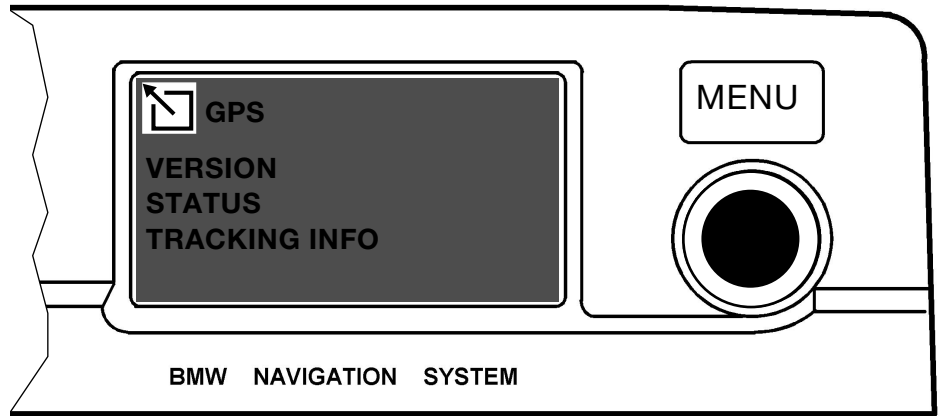
VISIBLE SAT = Number of satellites from which signals can be received

The value in this field depends on the satellite constellation.

ALMANAC = Status of satellite orbit data stored in the receiver

If the orbit data of all GPS satellites is available and current, the display will indicate "YES", otherwise "NO".

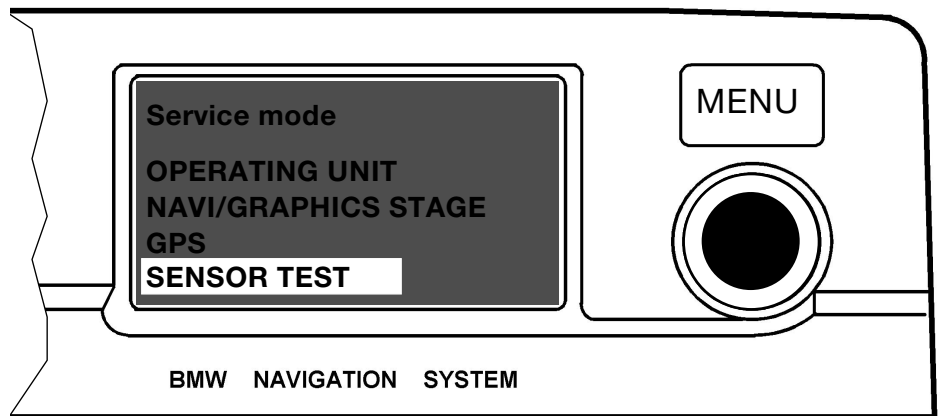
These data are lost if the battery is disconnected or the navigation system is disconnected from the vehicle electrical system. It takes approx. 15 minutes to reload and restore these data.



KT-2136

Fig. 51: GPS overview mask

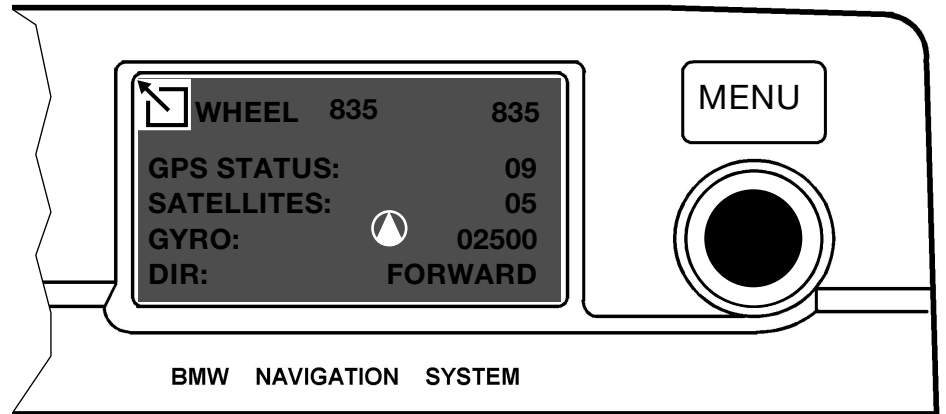
Press the rotary push button in order to return the display to the GPS menu.



KT-2136

Fig. 52: Sensor test selection mask

It is necessary to test drive the vehicle in order to conduct the sensor test.



KT-2136

Fig. 53: Sensor test contents

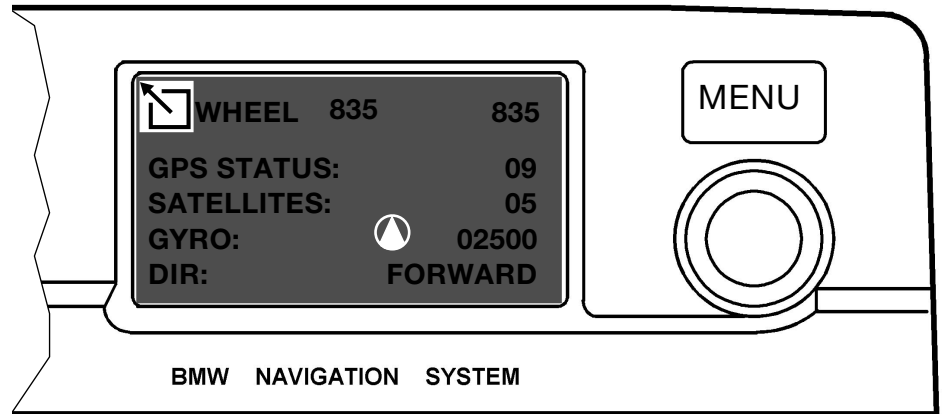
WHEEL = The number of pulses per minute from both rear ABS sensors is indicated here. Only the values from the rear left sensor (E38/E39 front left) are evaluated for the navigation system. The system indicates a minus sign before the value when the vehicle is driven in reverse.

GPS STATUS = A coded number is indicated in this field corresponding to the reception status.

SATEL- LITES = The number of satellites that can be currently received is indicated.

*** Coded numbers:**

00	No GPS	GPS inoperable
01	Communication fault	GPS receiver/navigation computer
02	Receiver fault	GPS receiver/antenna
03	No almanac	GPS data not stored
04	Search for satellite contact	GPS searches for satellites
05	1 satellite found	No GPS support
06	2 satellites found	No GPS support
07	3 satellites found	2D positioning possible
08	4 satellites found	3D positioning possible
09	5 satellites found	3D positioning possible
10	6 satellites found	3D positioning possible
11	2D position determined	Longitude and latitude determined
12	3D position determined	Longitude, latitude, bearing and altitude as well as ground speed can be determined



KT-2136

Fig. 54: Sensor test contents

GYRO = Piezogyro sensor (in navigation computer)

Function test:

With the vehicle outdoors in the open, quickly drive several circles with small diameters in counterclockwise and clockwise directions.

Observe the display.

The gyro symbol (direction arrow) must move distinctly out of the zero position in the direction of the driven circle.

When driving a circle in clockwise direction, the millivolt value must increase and this value must decrease when in driving counterclockwise direction. When the vehicle is stationary or driving straight ahead, the symbol must be in the straight ahead position (vertical) and the millivolt value should be 2500 +/- 400.

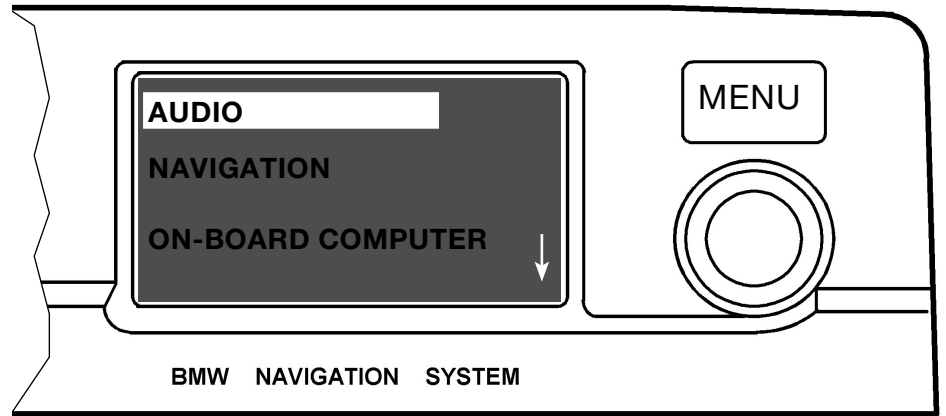
DIR = Direction

The word "BACKWARD" must appear when reverse gear is engaged. The word "FORWARD" must be indicated in all other positions.

If the vehicle rolls forward (gradient) with reverse gear engaged, the correct position (backward) must still be recognized!

Exit:

Simply press the menu button in order to exit the service mode menu.



KT-2136

Fig. 55: Main menu (audio selected)

The main menu is reached again.

3.2 Service mode Mark II with BM

Service mode

This function is selected in the "SETTINGS" menu by pressing and holding (> 8 s) the menu button. The following menu is built up and displayed on the screen.

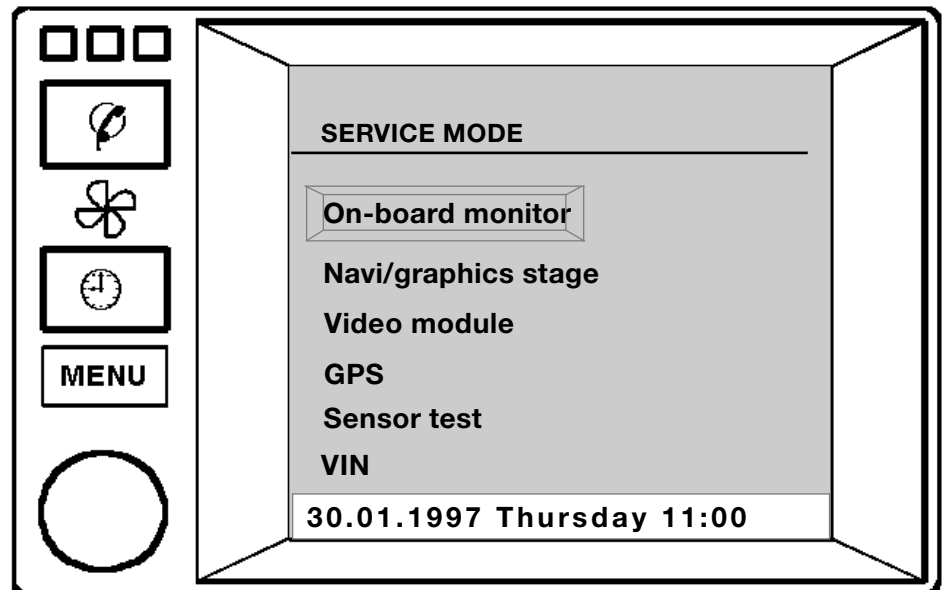


Fig. 56: Service mode: Selection mask

This menu offers information on the hardware and software statuses, activation of function tests as well as dynamic evaluation of data such as sensors, GPS etc.

The following components are addressed in service mode:

- On-board monitor
- Navigation computer/graphics stage
- Video module (TV receiver)
- GPS
- Sensor test
- VIN (Vehicle Identification Number)

The selection functions are represented in the following:

Selection functions in service mode

No function is currently provided for the menu point **on-board monitor**.

The "version" function is currently available for selection for the **navigation/graphics stage** and **video module** functions:

This function calls up the version data of the installed components.

The following functions are currently available for selection for **GPS**:

- Version
Calls up software data of GPS receiver
- GPS status
Calls up status data of GPS receiver
- GPS tracking info
Calls up current GPS tracking information

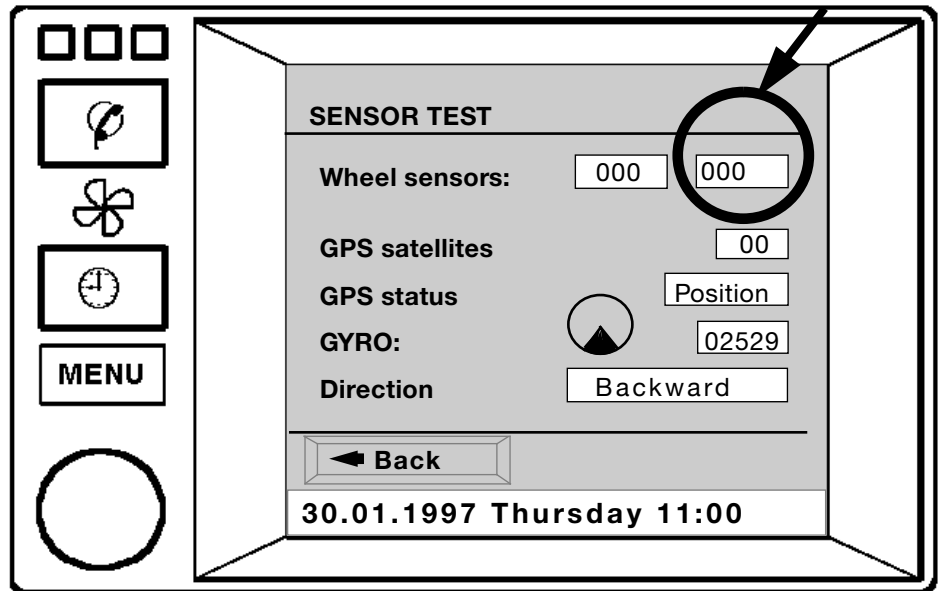
Sensor test

The sensor test serves the purpose of verifying following functions:

- Wheel sensors
- GPS satellites
- GPS status
- Gyro
- Heading/direction

Note:

Only one ABS signal is evaluated from the wheel sensors.



KT-1128

Fig. 57: Menu: Sensor test

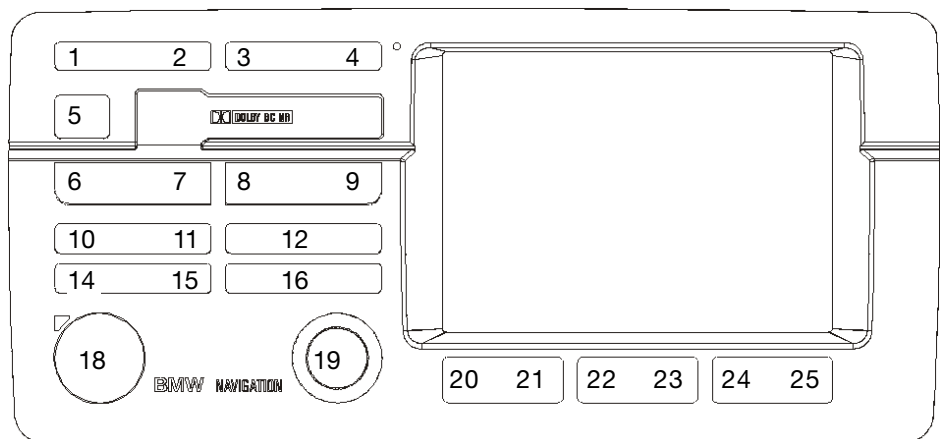
On-board monitor E46

Service mode

In addition to E38/E39 BM service mode, there are three further options under the menu point "on-board monitor". on the E46 BM.

In contrast to the E38/E39 BM, the on-board monitor menu point is active. It contains:

- Version*
- Button function*
- Brightness adjustment*



KT-3720

Fig. 58: Button functions BM E46

* Refer to contents of RadNav E46!

With the aid of service mode it is now possible to read out information on software and hardware statuses without having to connect the tester (DIS) or MoDiC.

For further details refer to diagnosis program in DIS!

Important note:

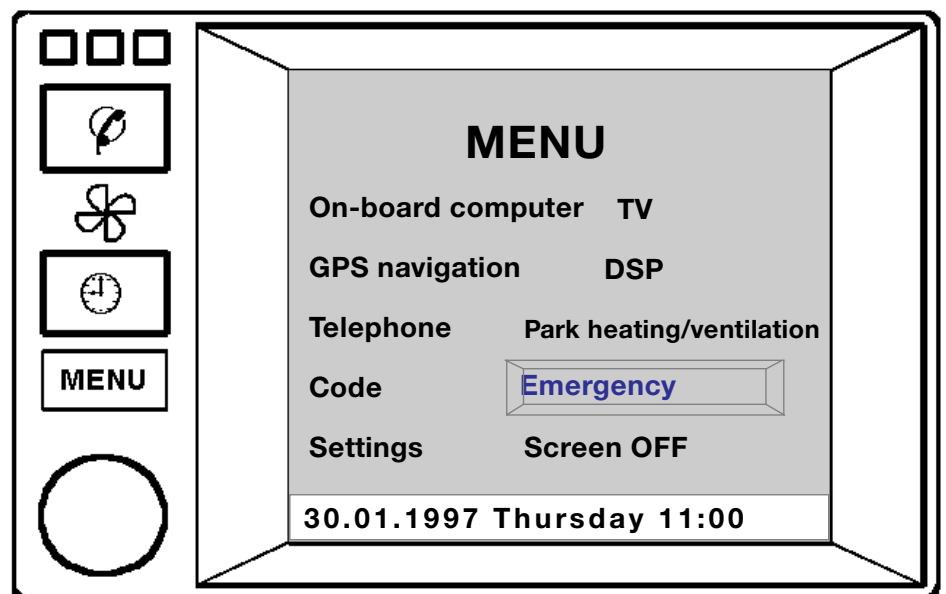
Service mode as well as calibration mode are only intended for the workshop.

This information must not be passed on to third parties, unauthorized persons or customers.

US coding

The emergency function is only coded in US vehicles.

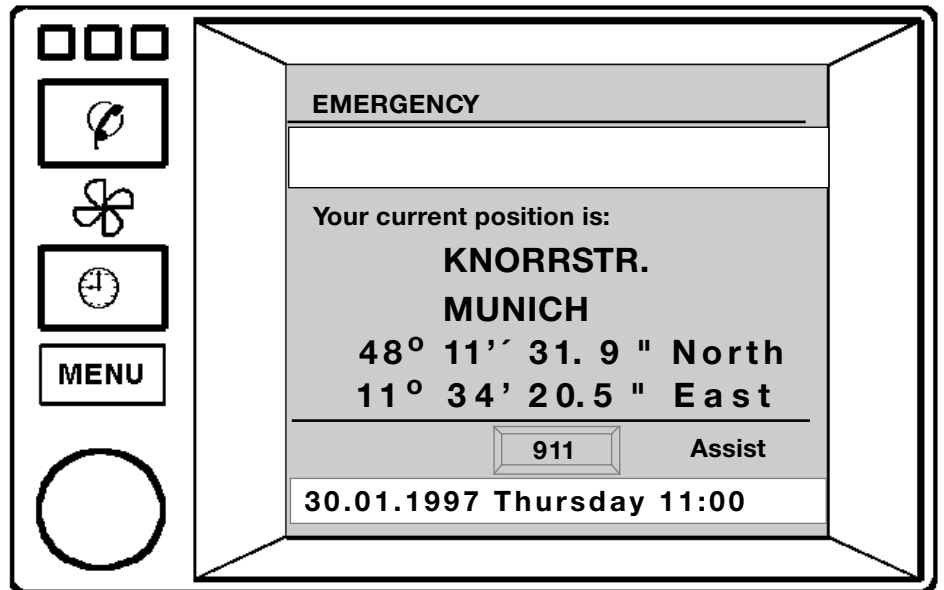
It is called up in the MENU. When activating the menu point "EMERGENCY", the menu also shows the further functions "ASSIST" and "911".



KT-1128

Fig. 59: Main menu (depending on options) US coding

The current location is indicated in the centre of the display in the form of coordinates and, if possible, also the street and place names. The display is constantly updated while driving. By activating "911", the graphics stage of the navigation computer writes the telephone number 911 into the transmit buffer of the telephone.

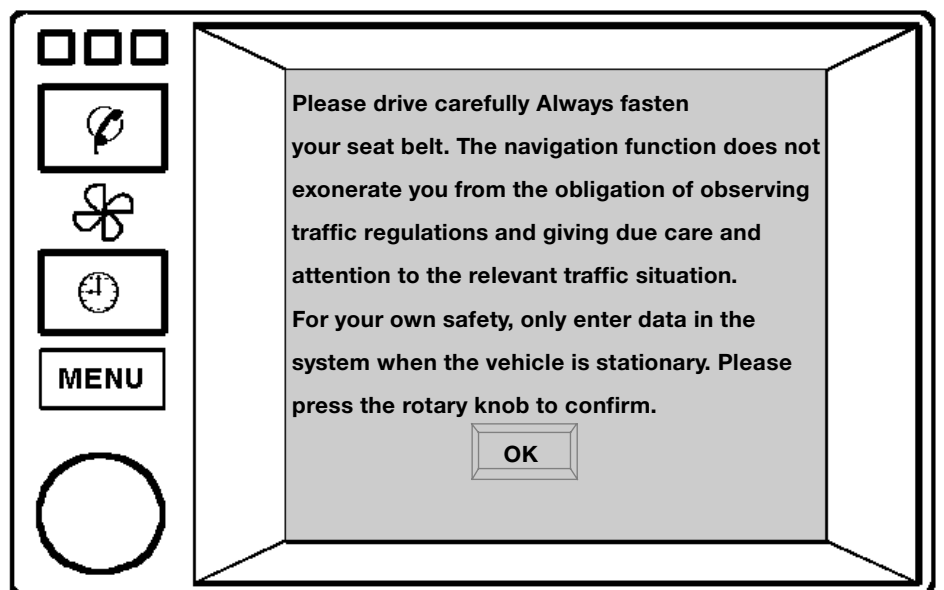


KT-1128

Fig. 60: EMERGENCY; the location is shown in the form of coordinates and, if possible, street and place names are indicated

Depending on the country, instead of the telephone number the emergency number 112 appears for Germany for instance.

The so-called DISCLAIMER menu appears the first time the "GPS navigation" function is selected.



KT-1128

Fig. 61: Disclaimer together with US coding

3.3 BM settings

Language selection in BM and RadNav E38/39/46

With the aid of the coding program, other languages that do not belong to the basic program of the BM or RadNav can be set with the DIS.

Example:

The languages German, English and French can be selected in the on-board monitor (BM).

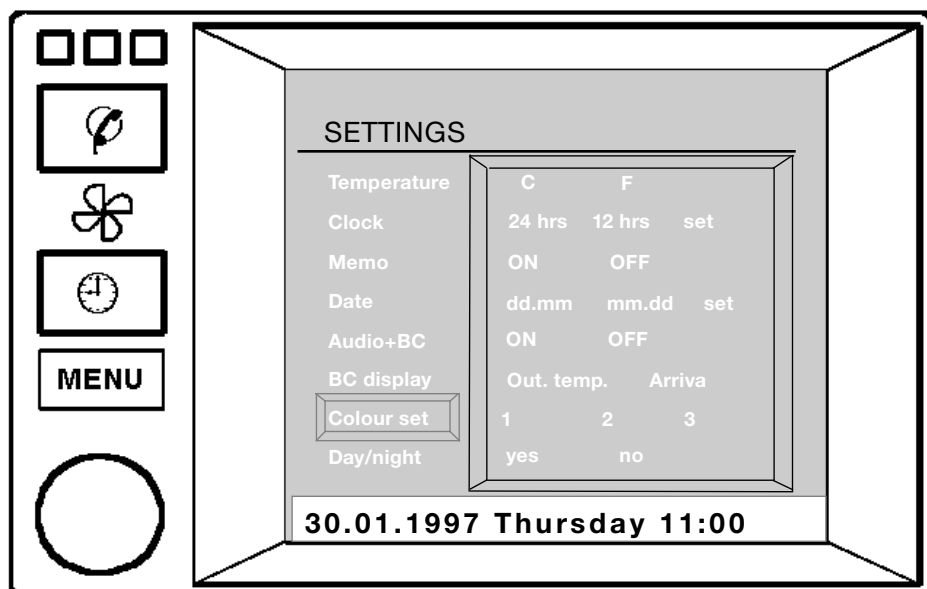
The BM must be coded accordingly with the DIS in order for it to show displays in Italian.

Voice changeover in BM and RadNav E38/39/46

In both systems, the female voice can be changed over to the male voice as many times as required by means of the DIS coding program.

Colour set settings

3 alternatives are provided for a certain colour set of the operator environment. On activating 1, 2 or 3, the new setting is correspondingly marked in colour and the cursor returns back to the overview mask.



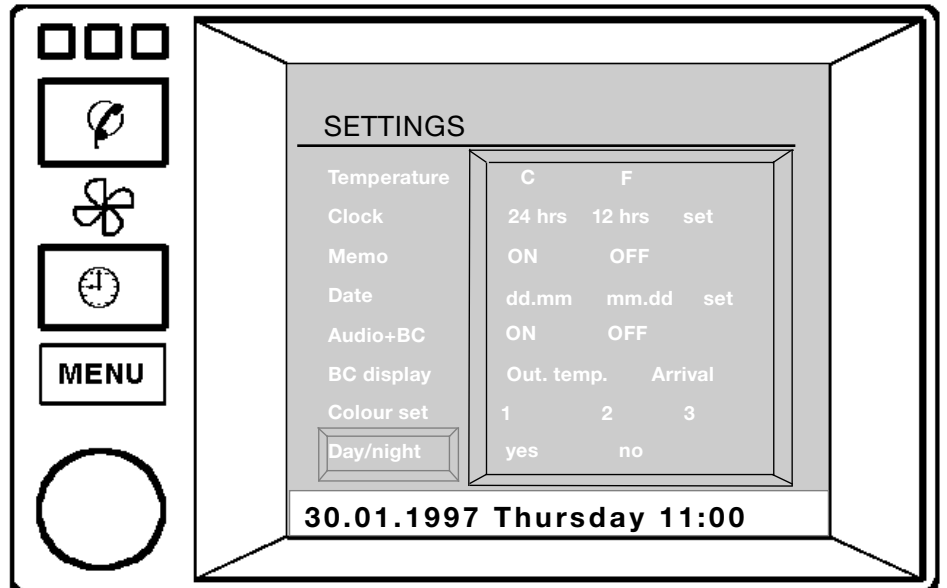
KT-1128

Fig. 62: Menu point: Colour set selection of menu colours

Day/night

Here it is possible to activate automatic day/night colour changeover together with an existing colour set.

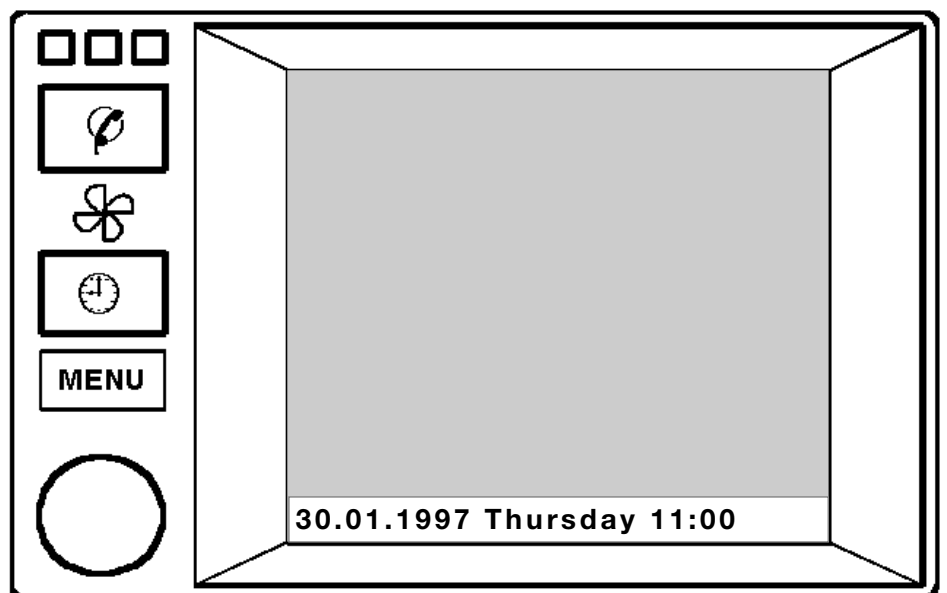
On activating "yes" or "no", the new setting is correspondingly marked in colour and the cursor returns back to the overview mask.



KT-1128

Fig. 63: Menu point: Day/night - automatic colour changeover

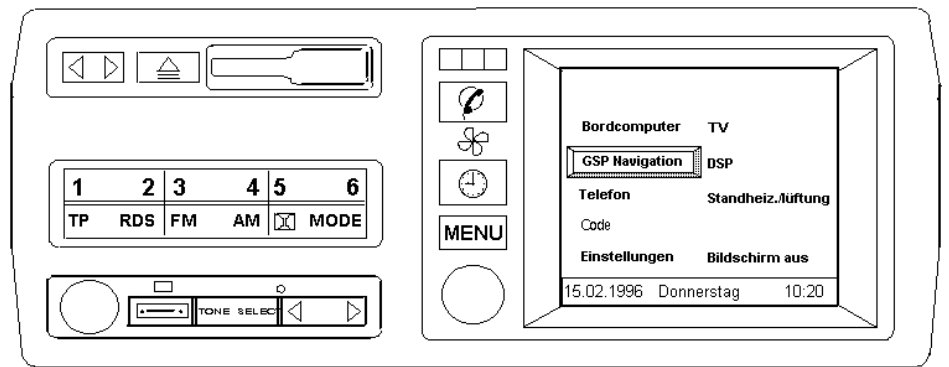
The following mark appears in the display if the driver's door is opened at terminal 0 (driver's door status). In this case, the installed system is a Mark II navigation system.



KT-1128

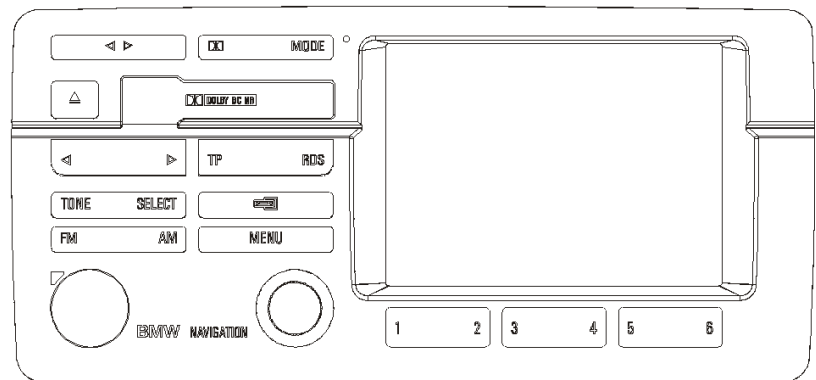
Fig. 64: Display is activated when driver's door is opened, identification feature of Mark II navigation system

Comparison of on-board monitors



KT-1047

Fig. 65: E38/39 on-board monitor



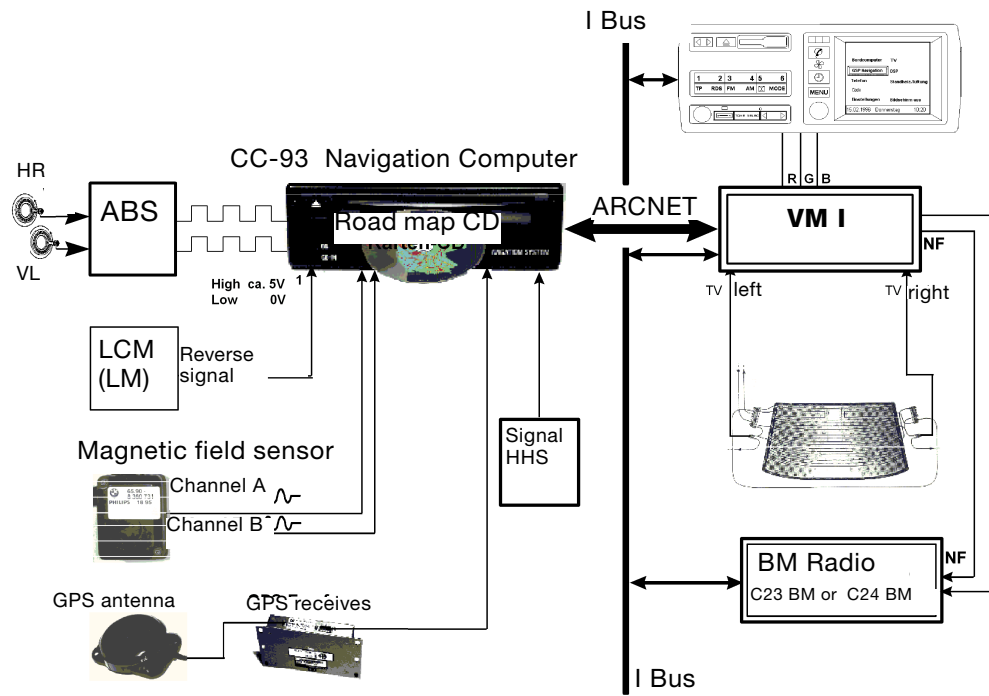
KT-3719

Fig. 66: E46 on-board monitor

Note:

The illustrations shown above do not correspond to real scale.

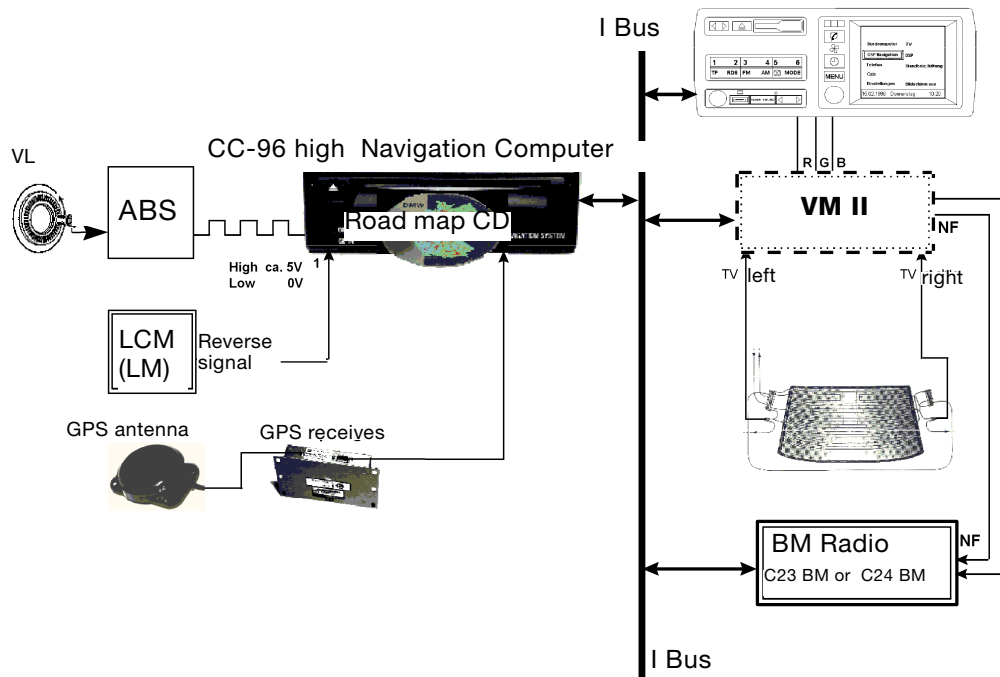
Comparison of navigation systems:



BMW AG/VK-12/Desmond.Stagg@bmw.de

KT-3723

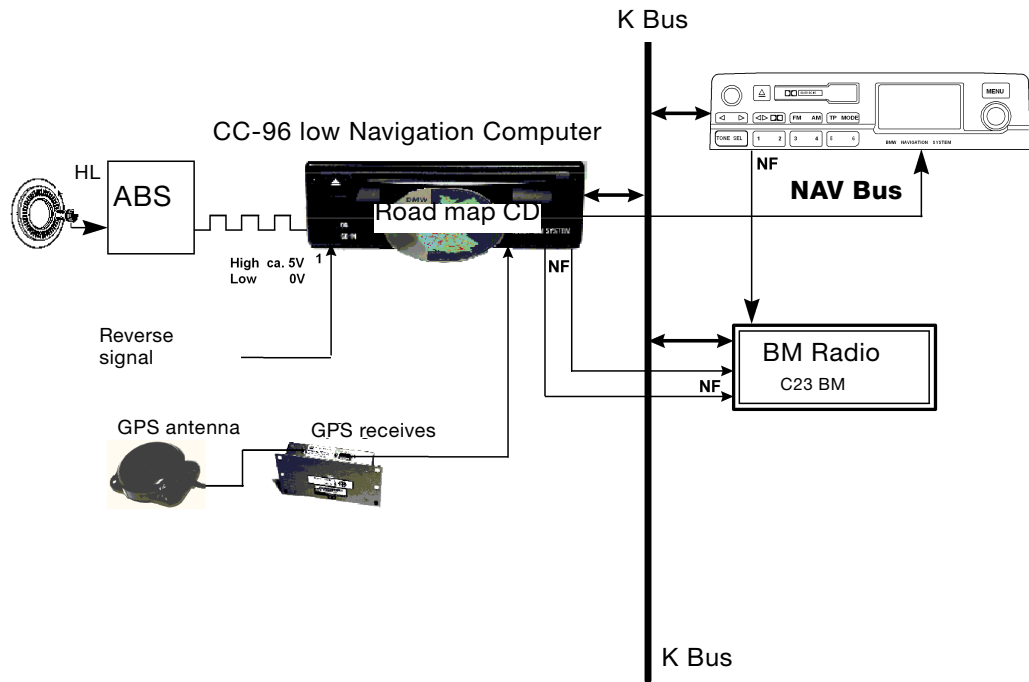
Fig. 67: Navigation Mk-1



BMW AG/VK-12/Desmond.Stagg@bmw.de

KT-3724

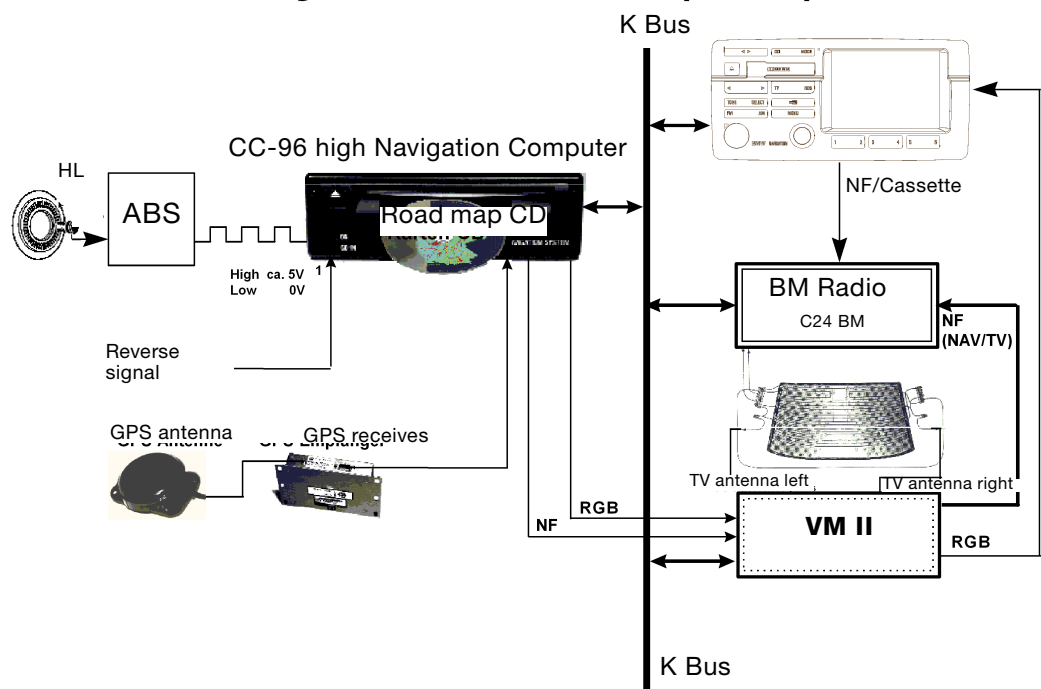
Fig. 68: Navigation Mk-2



BMW AG/VK-12/Desmond.Stagg@bmw.de

KT-3722

Fig. 69: RadNav E46



BMW AG/VK-12/Desmond.Stagg@bmw.de

KT-3721

Fig. 70: E46 on-board monitor