Operating Manual

R&S® EVS 300

ILS / VOR Analyzer

3544.4005.02

ROHDE & SCHWARZ

3544.4486.12.07

Content

Figures

1   General Information

1.1   Symbols and Cautions

The symbols, which will be used in the description, are explained below.

Caution: requires special attention!

Pointing finger, this symbol indicates important details!

The making of all connections necessary for operation must only be done by authorized persons; otherwise damage may be caused to the equipment!

During a thunderstorm, the device must not be operated using a hand held antenna.

When connecting the equipment to the 12-V/24-V on-board power supply of a vehicle, it must be ensured that the negative pole of the battery is connected to the ground of the vehicle (GROUND)!

If there is a failure of the battery pack within the guarantee period, it must be changed through a Rohde & Schwarz Service Center!

Lithium/NiMH batteries must not be exposed to high temperatures or fire. Keep batteries away from children. If the battery is replaced improperly, there is danger of explosion. Only replace the battery by R&S type.

Lithium/NiMH batteries are suitable for environmentally friendly disposal or specialized recycling. They may only be disposed of in designated containers. Do not short-circuit the battery, fire hazard!

This device is equipped with a battery containing hazardous substances. It must not be disposed of with the domestic refuse. Once the service life of the battery has expired, it may be disposed of only via the Rohde & Schwarz Customer Service or at an appropriate collecting point!

This device is equipped with a firmly installed battery containing hazardous substances. Once the service life of the device has expired, it may be disposed of only via the Rohde & Schwarz Customer Service or at an appropriate collecting point!

1.2   Unpacking the R&S® EVS 300 ILS / VOR Analyzer

1.   Unpack the **R&S® EVS 300 ILS / VOR Ana-lyzer**.

2.   Examine the equipment for obvious dam-ages.

3.   Test the accessories supplied!
      -    **Power pack with cable**
      -    **XLR connection cable**
      -    **Operating Manual**
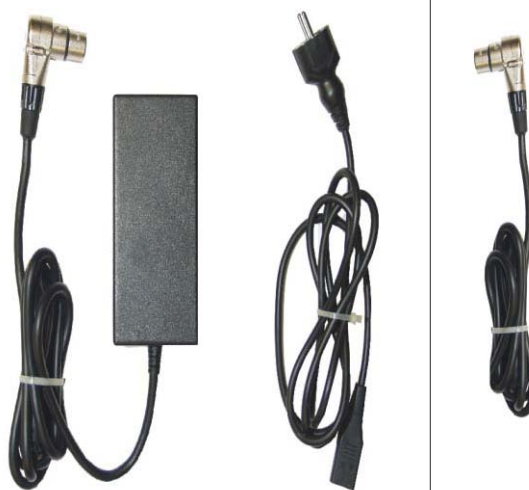
> *We recommend that you recycle the packaging material. If you have questions regarding service or other problems with the equipment, you can contact us by telephone or fax.*

◇ ROHDE&SCHWARZ Service Operations West	
☎	(49) / 2203 / 49-51**406** (49) / 2203 / 49-51**402**
📠 FAX	(49) / 2203 / 49-51**642**

1.3 Applications and Features of the R&S® EVS 300 ILS / VOR Analyzer

1.3.1 Applications of the R&S® EVS 300 ILS / VOR Analyzer

The **R&S® EVS 300 ILS / VOR Analyzer** is used to test terrestrial radio navigation equipment in airports. The following components of **I**nstrument **L**anding **S**ystems (ILS) and **V**HF **O**mni directional **Ra**dio Range systems (VOR) can be tested:

❑ ILS (**I**nstrument **L**anding **S**ystem)
    ❑ LLZ (Localizer)   108 ... 112 MHz
    ❑ GS (Glideslope)   320 ... 340 MHz
    ❑ Marker (Outer, Middle, Inner)   75 MHz

❑ Short and Medium distance navigation VOR (**V**HF **O**mni directional **R**adio Range)
    ❑ CVOR (Conventional VOR) beacons   108 ... 118 MHz
    ❑ DVOR (Doppler VOR)   108 ... 118 MHz

The following parameters are measured in the different modes of the equipment:

❑ ILS mode
    ❑ DDM, SDM
    ❑ RF level
    ❑ ILS frequencies (course, clearance)
    ❑ AM modulation degree for 90 / 150 Hz (with frequency display)
    ❑ AM modulation degree (voice signal)
    ❑ Distortion or 90 / 150 Hz
    ❑ Identifier (modulation degree, frequency, code)
    ❑ Phase (90 / 150 Hz signal)

❑ VOR mode
    ❑ RF level
    ❑ RF frequency
    ❑ AM modulation degree for 30 / 9960 Hz (with frequency display)
    ❑ AM distortion 9960 Hz
    ❑ Identifier (modulation degree, frequency, code)
    ❑ FM Index, FM Deviation
    ❑ Bearing (30-Hz signals)

❑ MARKER BEACON (MB) mode
    ❑ RF level
    ❑ AM modulation degree for 400 / 1300 / 3000 Hz (with frequency display)
    ❑ Identifier (modulation degree, frequency)

❑ F Scan mode (spectrum display, option)
    ❑ Display of the frequency spectrum

❑ FFT mode (option)
    ❑ FFT analysis (baseband signal)

Fields of application for the measurement technology are e.g.:
    ❑ Verification of terrestrial radio navigation systems (ILS and VOR systems)
    ❑ Dynamic Runway Measurement
    ❑ Function testing of CVOR / DVOR transmitter systems
    ❑ Course / Clearance (analysis of the parameters **without** switching off the transmitter systems through two independent measurement channels, option EVS-K3)
    ❑ Measurement and evaluation of all parameters at high interference field strengths

1.3.2   Features of the R&S® EVS 300 ILS / VOR Analyzer

The **R&S® EVS 300 ILS / VOR Analyzer** has the following features:

❑   Compact housing design and lightweight construction for mobile use, robust and splash proof (only if the bag is used)

❑   High-resolution 6.4" TFT display (VGA, 640 x 480); can also be easily read in direct sunlight

❑   Battery powered operation (option), intelligent battery management with quick charge, recharge and energy-saver modes, battery operating time 8 ... 10 hrs

❑   Display of battery level

❑   Remote control of the device through the RS-232 / LAN port

❑   Measurement data transfer over the ports (RS-232, LAN, USB)

❑   High long-term stability and reproducibility through digital signal processing from the IF position

❑   All measurement data of a mode (ILS, VOR, MARKER BEACON) is shown simultaneously in the display and may be stored in the internal data memory

❑   Display of the harmonic distortion (ILS-Distortion) in ILS mode

❑   Simultaneous and separate measurement of the course and clearance signals is possible in ILS mode through digital demodulation and filtering in the DSP

❑   Extendable by using a second signal processing channel

❑   Simultaneous measurement of the Localizer and Glideslope signals in ILS mode (with second channel, second channel, option)

❑   Measurement of the carrier frequency and the modulation frequencies with the accuracy of the reference oscillator

❑   Automatic assignment of the Glideslope to the corresponding Localizer frequencies, as under ICAO Annex 10

❑   High level measurement accuracy through built-in CAL Generator

❑   Remote control and data transfer through GSM modem (option)

❑   Data Logger:
　❑   all measured values of the modes ILS, VOR, MARKER BEACON may be simultaneously stored, even at the highest sampling rate,

　❑   Single and continuous recording of measured values,

　❑   Up to 999 lists (storage positions) can be compiled per mode,

　❑   Up to 1.000.000 measurements (measurement lines) can be recorded per list,

　❑   Graphic display of all data lists.

❑   Position data recording (GPS, DGPS option) through NMEA-0183 and custom-designed proto-cols

❑   Built-in speaker and headphone output

❑   Long-term measurements (max. 5 days autonomous operation)

❑   Long standby and measuring time with high-capacity data storage in autonomous operation

❑   Ports:
2 x Y / T-writer (Range 1 ... 4) / AF signal output,
Baseband signal input, Trigger input
2 x RS-232,
LAN,
2 x USB 1.1

1.4   Views of the Device   1-5

1.4.1   Front View

Fig. 1-1 shows the front view of the R&S® EVS 300 ILS / VOR Analyzer

1.4.2   Rear View

Fig. 1-2 shows the rack view of the R&S® EVS 300 ILS / VOR Analyzer

Fig. 1-1 Front view of the R&S® EVS 300 ILS / VOR Analyzer
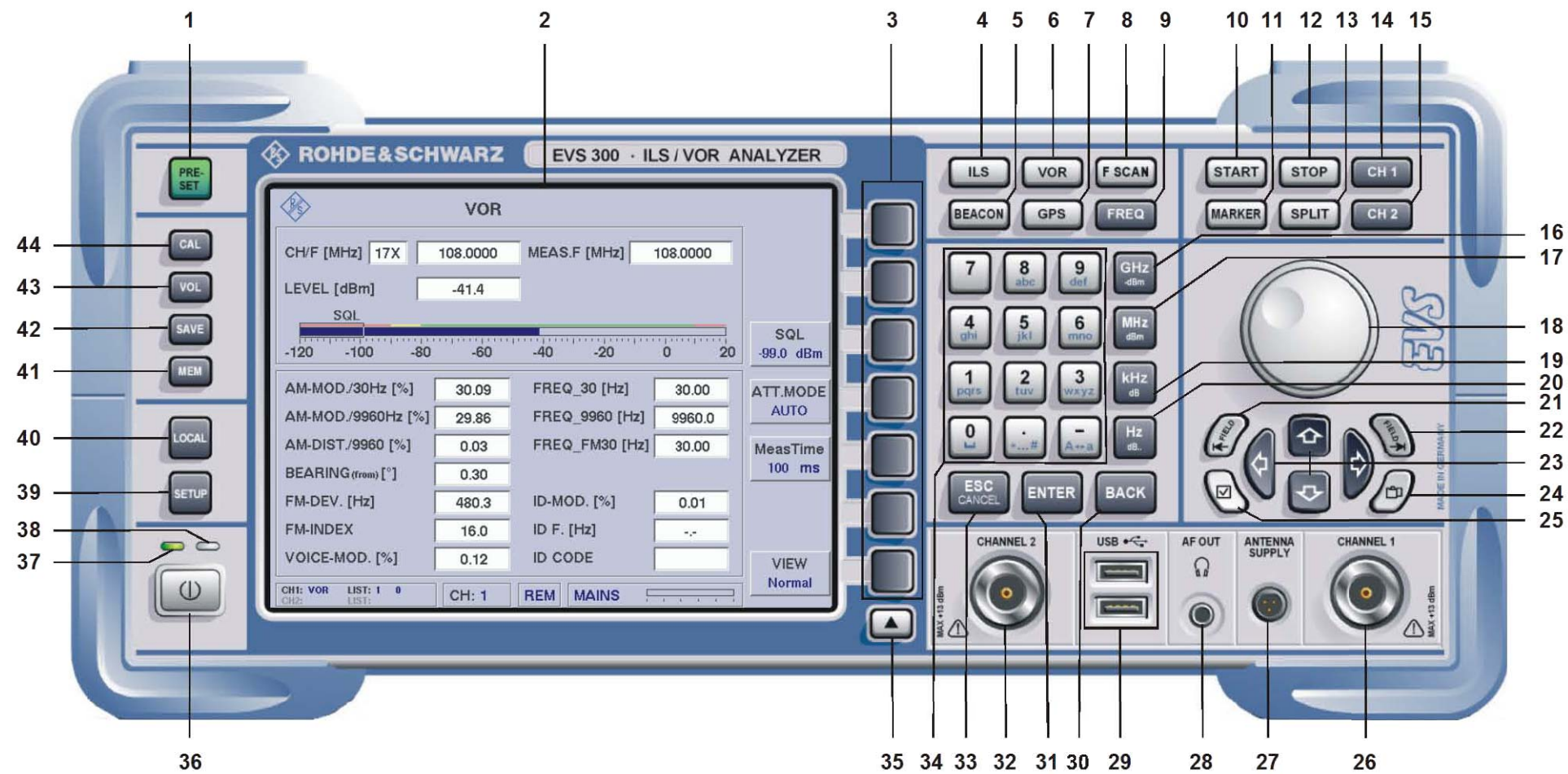
1	PRESET key	16	GHz key (Frequency input in GHz)	31	ENTER key (Confirmation key)
2	TFT Colour Display (640 x 480 Pixels)	17	MHz key (Frequency input in MHz)	32	Channel 2 (Antenna input 2 (option), N plug)
3	Softkeys (Program-dependent function keys)	18	Rollkey with ENTER function	33	ESC key (Cancel input)
4	ILS mode key (selection of ILS mode)	19	kHz key (frequency input in kHz)	34	Numerical keypad (numerical input)
5	MARKER BEACON mode key (selection of MARKER BEACON mode)	20	Hz key (frequency input in Hz)	35	Softkey extension (active in several menu windows, indication in the display 1/2 resp. 2/2 ▲)
6	VOR mode key (selection of VOR mode)	21	Not set	36	POWER key (ON / OFF switch)
7	GPS key (selection of GPS function, option)	22	Not set	37	Operating display (Power "ON")
8	F SCAN mode key (selection of F Scan-/ FFT mode, option)	23	Arrow (cursor) keys	38	Charge control display
9	FREQ Editor key (frequency- or channel input, toggle function)	24	Screenshot key (Stored image of a current display)	39	SETUP key (selection of SETUP menu)
10	START key (activates continuous saving of values)	25	Not set	40	LOCAL key (Switch between Local / Remote)
11	Marker key (marker function)	26	Channel 1 (Antenna input 1, N plug)	41	MEM key (selection of Data Logger)
12	STOP key (stops continuous saving of values)	27	ANTENNA SUPPLY (DC output for active receiving antenna)	42	SAVE key (Saves the current measurement data)
13	SPLIT key (simultaneous display of both channels)	28	AF OUT (headphone output)	43	VOL key (volume setting)
14	CH1 key (selection of reception channel 1)	29	USB (USB 2x 1.1 ports)	44	CAL key (Auto Calibration, with built-in CAL Generator)
15	CH2 key (selection of reception channel 2, option)	30	BACK key (backspace key)		
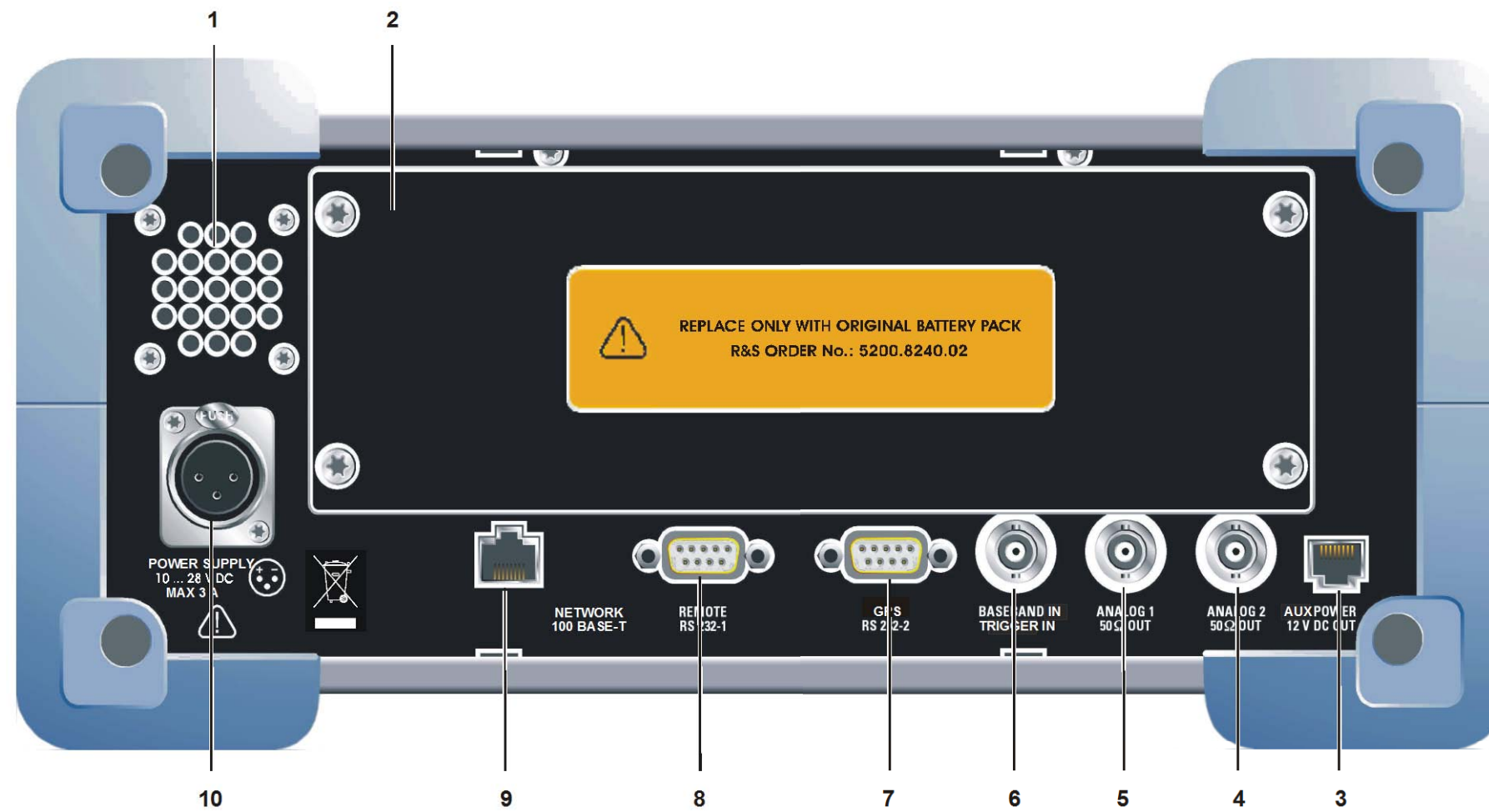
1	Speaker
2	Battery panel with battery pack (NIMH 13.2 V, 7.6 AH)
3	AUX POWER (12VDC OUT) (DC output to power supply for an external device as e.g. a GSM modem)
4	ANALOG 2 (50 Ω OUT) output for the analog baseband signal or, if in ILS mode, as analog DDM output (selection through setup)
5	ANALOG 1 (50 Ω OUT) output for the analog baseband signal or, if in ILS mode, as analog DDM output (selection through setup)
6	BASEBAND IN / TRIGGER IN
7	GPS RS 232-2, port connection of a GPS receiver (not supplied)
8	REMOTE RS 232-1 port
9	NETWORK 100 BASE-T (LAN connection)
10	POWER SUPPLY (10 … 28 VDC) power supply connection for table power pack/external feed

Fig. 1-2   Rear view of the R&S® EVS 300 ILS / VOR Analyzer

2   Preparation

2.1   Setting up the Equipment

The **R&S® EVS 300 ILS / VOR Analyzer** can be operated in a variety of places without detrimental effects on its features. Even the movement caused by transportation or mobile use will not impair its functioning.

> *The device operates at ambient temperatures between -10 ... +55 °C.*
> *Storage temperature range -20 ... +70 °C.*

2.1.1   Power Supply connection

2.1.1.1   General

To ensure high mobility and flexibility in the use of the **R&S® EVS 300 ILS / VOR Analyzer**, the device must be operated only on DC power (10 ... 28 VDC). This can be supplied from the table power pack or from external DC power sources (with the corresponding technical data (10 ... 28 VDC, 3.0 A)).

> *Start up, the device (with option "battery") should be operated using the supplied table power pack (charging time will vary with the condition of the battery pack, max. 4 hours), in order to charge the battery pack completely!*

> *The power connection plug (table power pack) must only be plugged into a two-pin grounded socket!*

2.1.1.2   Table Power Pack connection

⚠️ *When operating on the 230 V AC power supply only the supplied table power pack must be used!*

The **R&S® EVS 300 ILS / VOR Analyzer** is to be connected to the table power pack as follows:

1.	Connect the power cable to the table power pack and to a main power socket.	
2.	The green operating LED of the table power pack will light up.	
3.	Connect the DC connector of the table power pack to the POWER supply connection (10) on the back of the device.	
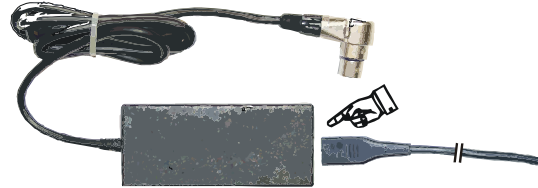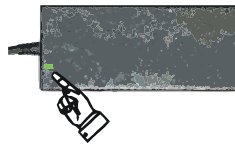
2.1.1.3   Connection to an external DC Power Source

The device can be operated directly from an external DC power source (10 ... 28 V DC). However, it must be ensured that there is a DC supply through a line cross-section of at least 1.5 mm^2, a cable protector (3 AT) and a 3-pin **XLR plug** to connect the device.

👉 *An XLR connection cable is supplied with the R&S® EVS 300 ILS / VOR Analyzer.*

The **R&S® EVS 300 ILS / VOR Analyzer** is connected to an external DC power source as follows:

1. Connect the DC supply (XLR connection cable) to the POWER Supply connection (10) on the back of the device.

10

⚠ *When connecting the device to an external DC power source, there must be electrical protection through cable protection (3 AT) or on-board protection!*

2.1.2 Connection of the Signal / Control-In / Outputs on the front of the device

32   29   28   27   26
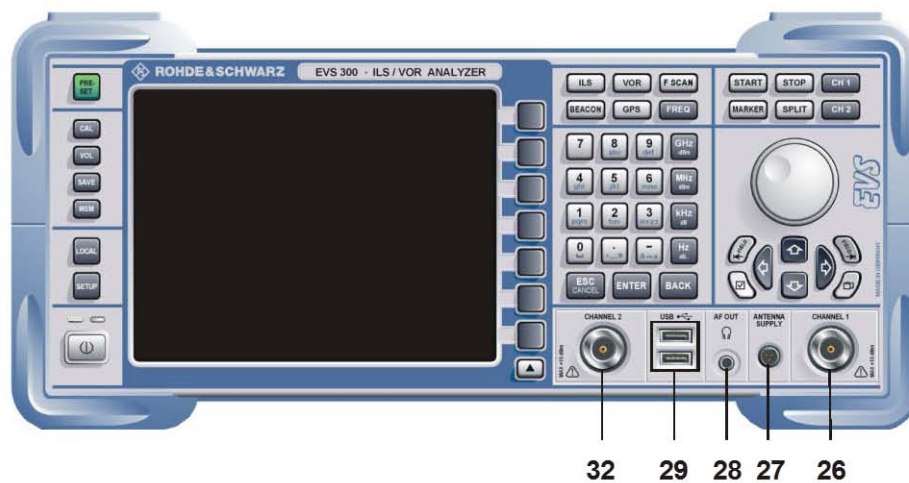
2.1.2.1 Receiving antenna connection (26, 32)

On the **RF-inputs (Channel 1 (26) and Channel 2 (32, optional)**, the **R&S® EVS 300 ILS / VOR Analyzer** is connected with one of the receiving antennae (max. +13 dBm) corresponding to the frequency range. The RF inputs are designed as N plugs.

☞ *Channel 2 is supplied as an option.*

2.1.2.2   Power Supply connection (27) for an Active Receiving Antenna

Through the ANTENNA SUPPLY connection (27), DC power (12 VDC, 300 mA) is fed to the power supply of an active receiving antenna.

2.1.2.3   Headphone connection (28)

Connection of a headphone with a 3.5 mm jack plug into AF OUT plug (28).

2.1.2.4   USB Port connection (Twin Port, 29)

USB 1.1 connections for storage devices e.g. Memory Stick.

> *The company Rohde & Schwarz recommend USB memory sticks without "security feature". The USB memory sticks supplied by the Kingston company or SanDisk have demonstrated proven effectiveness.*

2.1.3   Connection of the Signal/Control-In/Outputs on the back of the device
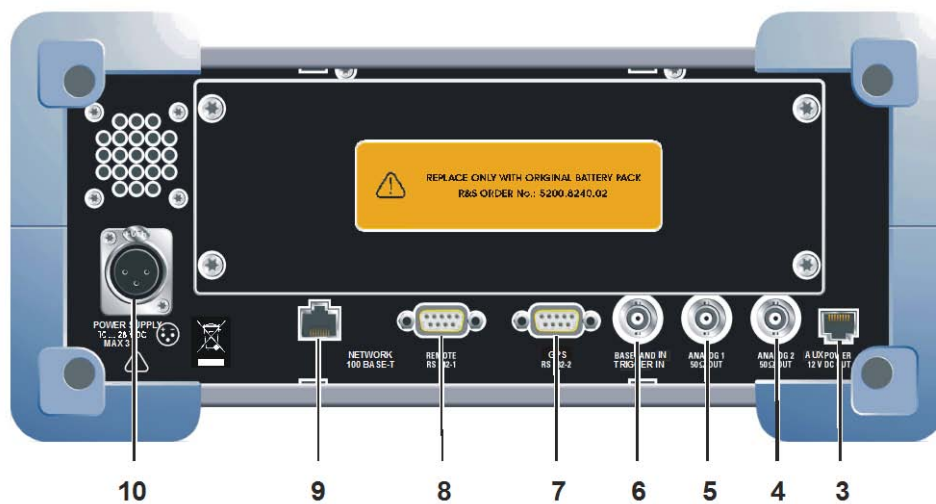
2.1.3.1   External Power Supply output (AUX POWER, 3)

Through the AUX POWER (3), DC output (12 VDC, 300 mA) to power supply for an external device as e.g. a GSM modem

2.1.3.2   ANALOG 1 (5) and ANALOG 2 (4) signal outputs

The analog signal outputs (BNC plug, 50 Ω) ANALOG 1 (5) and ANALOG 2 (4) may be used either as output for the analog baseband signal or, if in ILS mode, as analog DDM output. The respective assignment (BB OUT / DDM) will be set in the setup function. In addition, the option between FULL (demodulator bandwidth) or Audio (frequency range, 300 … 3000 Hz) can also be selected for the baseband output in the setup. In addition, the scaling of the XY values can be set in the setup for the Localizer and Glideslope modes.

Scaling of the XY values (setting Range 1 ... 4 in the setup)

Range	Localizer	Glideslope
Range 1	0.0 ±0.25 DDM ≙ 0.5 V ±0.5V	0.0 ±0.5 DDM ≙ 0.5 V ±0.5V
Range 2	0.0 ±0.025 DDM ≙ 0.5 V ±0.5V	0.0 ±0.05 DDM ≙ 0.5 V ±0.5V
Range 3	0.0 ±0.0258 DDM ≙ 0.5 V ±0.5V	0.0875 ±0.05 DDM ≙ 0.5 V ±0.5V
Range 4	0.0 ±0.5 DDM ≙ 0.5 V ±0.5V	0.175 +0.05 DDM ≙ 0.5 V ±0.5V
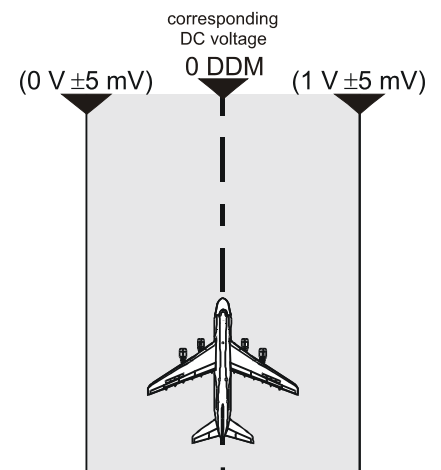
2.1.3.3   Baseband input / Trigger input (6)

Through BASEBAND IN (6) input (BNC plug, 1 MΩ), a baseband signal can be supplied to the **R&S® EVS 300 ILS / VOR Analyzer** for further analysis of typical AF parameters (e.g. level, frequency, modulation degree). In addition, this input may also be used as an external triggering mechanism of the Data Logger. The selection as well as the settings of the input will be done in the setup function.

2.1.3.4   GPS Control Port (7)

Through the GPS-RS 232-2 port (7) (9 pin Sub-D plug), a GPS receiver is. The NMEA protocol data is read in and displayed in GPS mode (Option EVS-K2).

2.1.3.5   Remote operation port (8)

Through the **RS 232 interface 1** (8) (9 pin Sub-D plug), all functions of the **R&S® EVS 300 ILS / VOR Analyzer** device can be operated remotely from a PC / terminal. Thus, the device can be operated through the commonly used terminal programs (e.g. HyperTerm™, ProCommPlus...). The port parameters are adjustable.

2.1.3.6 LAN connection (9)

Through the **LAN connection (Fast Ethernet) (9)**, all functions of the device and the data transfer of the measurement data of the **R&S® EVS 300 ILS / VOR Analyzer** can be remotely operated from a PC / network. IP Addresses and subnet mask identifier are set in the setup menu. The data transfer rate is 100 Mbit/s.

2.1.3.7 Power Supply connection (10)

Through the power supply connection (POWER SUPPLY (10), XLR plug,), the table power pack or an external DC power source (10 ... 28 VDC) is connected.

When connecting the equipment to an external DC power source, electrical protection must be provided through cable protection (3 AT) or on-board protection!

3 Operation

3.1 Switch ON / OFF the R&S® EVS 300 ILS / VOR Analyzer

To switch on or off the unit press the "Power" (1) button.

When the unit is switched on the power-LED (2, green) lights.

☞ *If the unit is driven by the belonging power supply or by an external DC-power supply >22 VDC, the installed accumulators will be charged as well when the unit is switched on as when it is switched off!*

3.1.1 Starting process

The boot process of the **R&S® EVS 300 ILS / VOR Analyzer** takes about 50 s and will be indicated by a white progressing bar. Then the unit switches over automatically into the last using measurement mode.

☞ *When switched on, the device is generally in the measurement mode that was active when the device was switched off. If valid data for automatic calibration are not available or if the last automatic calibration is more than 90 days ago, a corresponding warning will be displayed. The warning must be confirmed to access the measurement mode. In any case, automatic calibration as described in Section 3.16 is to be performed.*
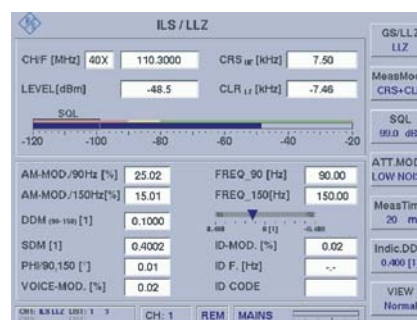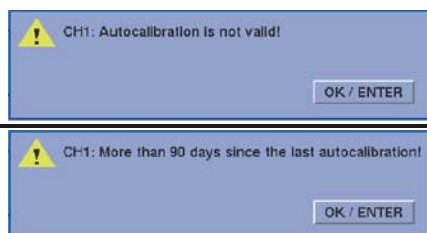
☞ *If a failure occurs when booting the unit, switch it off and make a restart after a few seconds. If a failure occurs again we recommend to contact Rohde & Schwarz.*

3.1.2   Battery powered operation

☞   *The battery may be ordered as option EVS-B3!*

When cutting the **R&S® EVS 300 ILS / VOR Analyzer** from an external power supply, it automatically switches over into battery operation.

The operating time is about 8 … 10 h (medium display brightness) with a completely charged battery. For an anytime battery charge monitoring there is a battery capacity indication (BATTERY), the battery status (bargraph) will be shown in the status field of the display.
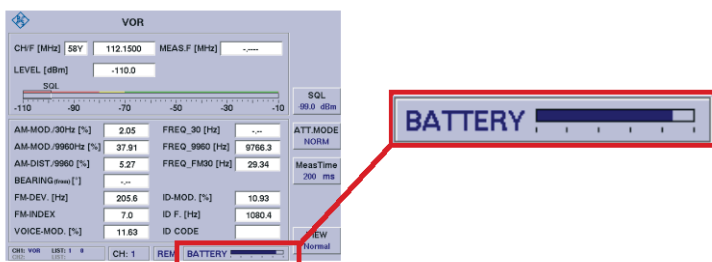
☞   *When running the R&S® EVS 300 ILS / VOR Analyzer with the Option EVS-B1 or with external equipment (e.g. active receiver antennas, GPS-receiver), the operating time will reduce accordingly.*

3.1.2.1   Battery level indication

Battery level is indicated by the display "BATTERY".
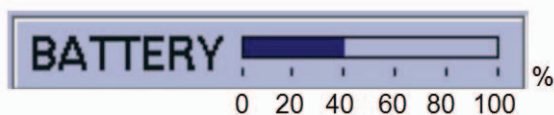
Battery level 100%-power	about 8 ... 10 hours operation time (with medium display brightness, 1*
Battery level about 80 ... 20%-power	about 1 ... 6 hours operation time (with medium display brightness, 1*
Battery level about 20 ... 0%-power	about 1 hour operation time (with medium display brightness, 1*

1*   without option EVS-B1 and external loads

☞   *If the battery becomes discharged, the word "EMPTY" will be displayed, accompanied by a loud beeping sound. Since the device will switch itself off after a few minutes when this stage is reached, the beep sound will be repeated every two minutes. A double beep sound indicates the device is switching itself off.*

3.1.2.2   Charging the Battery

The **R&S® EVS 300 ILS / VOR Analyzer** has an intelligent battery management system with quick charging, recharging and conserve charging methods. The charging circuit is protected by an overload protection and an overheating protection.

The charge time is about 3.5 ... 4 hours (standby / operation)

Generally the accumulators can be charged in operation with the power supply or with an external voltage supply more than 22 VDC.

The accumulators will not be charged with a voltage supply less than 22 VDC!

In operation the battery level display changes to the indication "CHARGE".
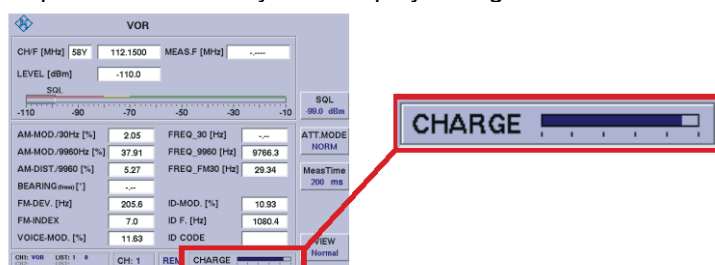
The (yellow) LED charge indicator displays the current charge level of the battery (while the device is turned on or off).

3.1.2.3   12 / 24-DC / DC-Converter

To facilitate a charging with supply voltages less than 22 VDC, the 12 / 24-DC-Converter is linked between.

This converter is available as an accessories EVS-Z5, order number 5200.6619.02.

3.1.2.4　　Charge level indication

Battery charging is indicated by the display "CHARGE".
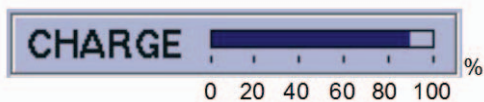
Charge level about 0 ... 20%	about 3 ... 4 hours remaining charge time
Charge level about 20 ... 80%	about 1 ... 3 hours remaining charge time
Charge level 80 ... 100%	about 0 ... 1 hours remaining charge time

> *The battery level is reached of 100 per cent this is indicated by the display "Full".*

3.1.3　　Internal clock

The **R&S® EVS 300 ILS / VOR Analyzer** contains an internal clock. A Lithium battery supplies this clock with the necessary voltage when the unit is switched off. If the Lithium battery is empty (life-span is approximately 5 years), the time and date will be lost. To exchange the Lithium battery the unit has to be opened, which may only be done by a competent service authority.

3.2 Signal Parameters and Displays

3.2.1 General

In this section are described the unit specific displays, its relevant signal parameters and settings.

Generally for all modes ILS, VOR and MARKER BEACON the display is divided as shown in the following figure:
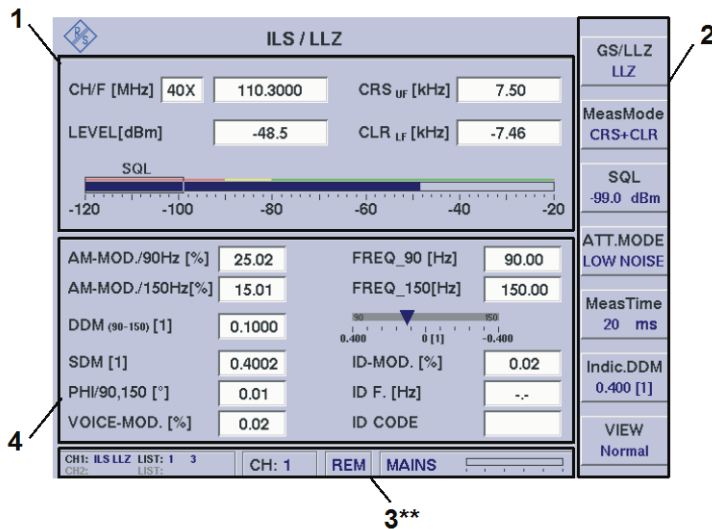
Example: ILS mode

Item	Function
1	RF Parameter section
2	Softkeys
3	Status display
4	Measured values section

3.2.1.1 Status Display (3**)

In all modes the status display shows just general specific unit information exception is the mode display).
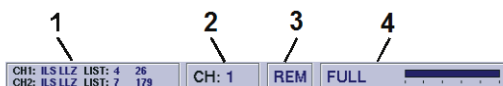
Item	Display	Function	Indication
1	Data Logger status	Display of the Data Logger status of both measuring channels; i.e. display of the set measuring mode as well as the currently selected Data Logger list and its length (number of datasets). A detailed description of the Data Logger can be found in section 3.15	e.g. CH1: ILS LLZ LIST: 4 26 CH2: ILS LLZ LIST: 7 179

Item	Display	Function	Indication
	Power Sensor status	Displays the used power sensor and the accompanying serial number in the DME Pulse View.	NRP-Z81 Ser. 100172
2	CH:	Shows the measuring channel (1 / 2) (channel 2 = Option)	1 / 2
3	LOC / REM	LOC "LOCAL"= local operation REM "REMOTE"= remote operation (the function can be switched off over the button "LOC") RLC "REMOTELOCK" = the local operation is locked by remote control (also see control command "REMOTELOCK")	LOC / REM /RLC
4	BATTERY / CHARGE FULL / EMPTY MAINS	Battery display / Battery level display, Charge level display of the battery, Devices without the option "Battery", will be operated via an external power source. Additional information can be found in section 3.1.2.1 "Battery level indication".	Bargraph BATTERY

3.3 General Information about the Controls

Settings on the **R&S® EVS 300 ILS / VOR Analyzer** can be made as well with the rollkey as with the arrow buttons. An exception for the setting is the tens keyboard which can only be used for numerical settings.
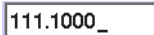
3.3.1 Tens keyboard

The tens keyboard is used for numerical entries into the unit. The relating edit windows can be activated either by the softkeys or by the "FREQ" button. An entry can be confirmed with the "Enter" button (e.g. the entered value is accepted) or it can be aborted with the "ESC" button. If the entry is aborted the old value is automatically reactivated. In addition, when using the "BACK" (backspace) button, the last input character can be deleted. If alphanumeric input is required, the numeric pad can be switch automatically to alpha input. The respective letter of a button is selected via a toggle switch.

A set receiving frequency can be confirmed as well with the "ENTER" button as with the corresponding dimension button (Hz ... GHz)!

Example: Frequency modification

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	Activating the frequency input, the frequency section is activated and behind the last digit the cursor appears. 111.1000_

	Control	Operation	Function
2.	0 … 9	Direct entry of the desired receiving frequency.	The frequency should be entered with the corresponding decimal place. 111.2000_
3.	MHz/GHz ENTER	Confirm	Change over to the new set frequency. 111.2000

3.3.2 Rollkey

The rollkey is a universally control element for value changes and to confirm them by its push function. The rollkey can also be used for navigation purposes in the setup or in the scroll listings. To change a value the relating edit function must be active.

Example: Changing a numerical value

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	Activating the frequency input, the frequency section is activated and behind the last digit the cursor appears. 111.1000_
2.	(rollkey)	Turn the rollkey until the right value is displayed.	**-** = value decreases **+** = value increases
3.	(rollkey)	Confirm (push rollkey)	Change over to the new set frequency. 111.2000

Example: Setup navigation (change the Correctionfactor CH1)

	Control	Operation	Function
1.	SETUP	Press the "Setup" (39) button.	Activates the setup menu.
2.	Signal In	Press the "Signal In" softkey	Switching the menu window "SignalIn Settings"
3.	(rollkey)	Selecting the menu point "Correctionfactor CH1".	**-** = move ⇑ **+** = move ⇓

	Control	Operation	Function
4.		Confirm (push rollkey)	Now changes can be concluded.
5.		Turn the rollkey slowly to the wanted direction until the right menu point is reached.	**-** = value decreases **+** = value increases
6.		Confirm (push rollkey)	Acceptance of the new changes.

3.3.3 Arrow buttons

The arrow buttons are for changing values or it can for navigation in the setup. To change a value the relating edit function must be active. Always the entry must be confirmed with the "Enter" button or by pushing the rollkey.

Example: Changing a numerical value:

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	Activating the frequency input, the frequency field is highlighted in white and behind the last digit the cursor appears. 111.1000_
2.		Press the arrow button several times until the wanted value is reached.	⇑ = value increases ⇓ = value decreases
3.	⇓	Hold the arrow button depressed until the wanted cursor position is reached. Use the up/down arrows to change the value. 111.2000_	⇐ = Cursor moves to the left ⇒ = Cursor moves to the right ⇑ = value increases ⇓ = value decreases
4.	ENTER	Press the Enter button / push rollkey.	Change over to the new set value. 111.2000
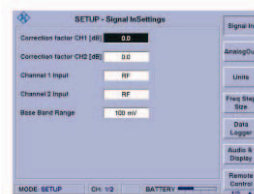
Example: Setup navigation (change the Correctionfactor CH1)

	Control	Operation	Function
1.	SETUP	Press the "Setup" (39) button.	Activates the setup menu.

	Control	Operation	Function
2.	Signal In	Press the "Signal In" softkey	Switching the menu window "SignalIn Settings"
3.		Selecting the menu point "Correctionfactor CH1".	⇑ = Move up ⇓ = Move down
4.	ENTER	Press the Enter button / push rollkey.	Now changes can be concluded.
5.	⇓	Hold the arrow button depressed until the wanted cursor position is reached. Use the up/down arrows to change the value. -4.0	⇐ = Cursor moves to the left ⇒ = Cursor moves to the right ⇑ = value increases ⇓ = value decreases
6.	ENTER	Press the Enter button / push rollkey.	Acceptance of the new changes.

3.4   Settings in the Setup menu

Activates the setup menu

	Control	Operation	Function
1.	SETUP	Press the "Setup" (39) button.	The R&S® EVS 300 switches over into the setup menu.

3.4.1 General
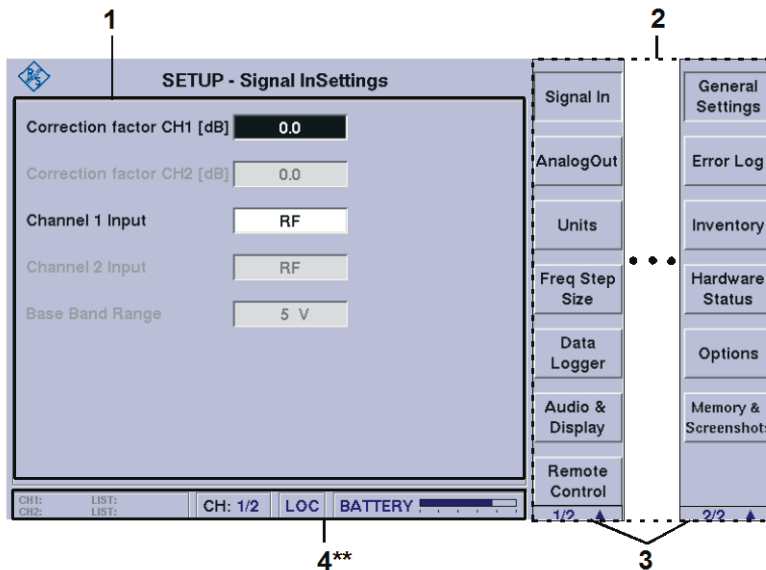
4**   for general description of the status field, refer to 3.2.1.1

☞ *Due to the multitude of settings offered, two softkey bars are available. The currently displayed softkey bar will be identified with the 1/2 e.g. 2/2 ▲ - symbol (3). Use the "🔲" -button to switch back and forth between the soft-key bars.*

In the setup menu the following menu windows can be opened by the softkeys:

Softkey bar 1
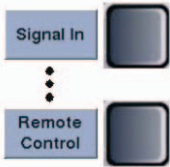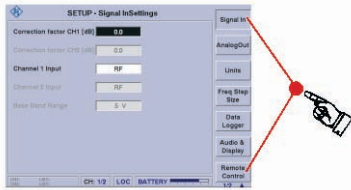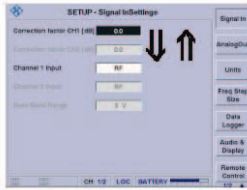
- Menu window; Signal In. (RF-Parameter setting),

- Menu window; AnalogOut (Analog parameter setting),

- Menu window; Units (Dimensions setting),

- Menu window; Freq Step Size (Frequency step width setting),

- Menu window; Data Logger (Data Logger setting),

- Menu window; Audio & Display (Display and audio setting),

- Menu window; Remote Control (LAN- and RS-232-interface setting).
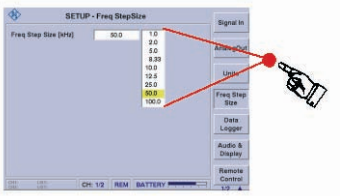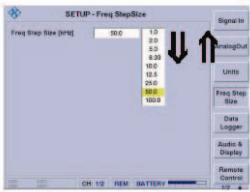
Softkey bar 2

- Menu window; General Settings (Base setting of the device),

- Menu window; Error Log (Call-up the Error Log),

- Menu window; Inventory (Call-up the Inventory),

- Menu window; Hardware Status (Call-up the Hardware status),

- Menu window; Options (Call-up the optional expansions),

- Menu window; Memory & Screenshots.

3.4.2   General operating steps in the setup menu

The general operating steps are described below. They explain the repeating operation steps, which are necessary for navigation and setting changes. For further setup operation these steps are required.

	Controls	Operation	Function
1.		Press the softkey to open the menu.	The activated softkey is shown pressed.
2.		Navigate to the individual selection window. **-** = move ⇑ **+** = move ⇓	In the active menu window a selection window is always shown black shadowed. From here on you can navigate with the rollkey.
Selection window with toggle function			
3.		Press the Enter button / push rollkey several times (toggle function) until the right selection appears.	In this window mode the selected setting is immediately active.
Selection window with edit function			
4.		Press the Enter button / push rollkey.	Activates the edit function in the selection window.
5.		Turn the rollkey several times until the required value appears.	**-** = value decreases **+** = value increases
6.		Press the Enter button / push rollkey.	Acceptance of the new set value. The setting is immediately active.
Selection-list			
7.		Press the Enter button / push rollkey.	Activates the selection-list.

Controls	Operation	Function
8.	Turn the rollkey several times until the required value appears.	
9.	Press the Enter button / push rollkey.	Acceptance of the new set value. The setting is immediately active.

3.4.3   RF Parameter setting

Control	Operation	Function
1.	Press the softkey "Signal In".	Change over into the "SignalIn Settings" menu window.
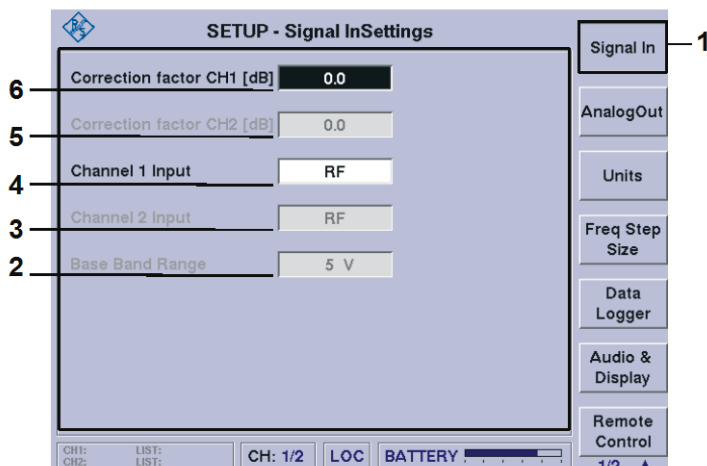
Item	Display	Function	Indication
2	Base Band Range (2*)	Setting the baseband signal level (sensitivity) Setting range: 500 mV / 5 V	500 mV / 5 V
3	Channel 2 Input (2*)	Changes between RF-input signal (CH2, 1*) or the baseband signal	RF / Base Band

Item	Display	Function	Indication
4	Channel 1 Input (2*)	Changes between RF-input signal (CH1) or the baseband signal	RF / Base Band
5	Correction factor CH2 [dB]	Setting of the RF attenuation at the antenna input (CH2) Setting value: -20 ... +20 dB	dB
6	Correction factor CH1 [dB]	Setting of the RF attenuation at the antenna input (CH1) Setting value: -20 ... +20 dB	dB

1* if channel 2 is used as an option (otherwise, not adjustable)

2* only usable with hardware revision: RF-Board as of version 5.08, main board as of version 6.05 and software as of version 3.0. (this information may be viewed in the setup function under "inventory").

3.4.3.1   Setting the Antenna Correction Factor on Channel 1 / Channel 2

	Control	Operation	Function
1.	Go to the selection window "Correction factor CH1 / CH2" and activate the edit function as described in section 3.4.2.		
2.		Turn the rollkey several times until the required value appears.	Setting of the antenna correction factor (gain or loss of the connected antenna, the set value will be added to the measured level) at CH1 / CH2 (1*). Setting value: -20 ... +20 dB
3.		Press the Enter button / push rollkey.	Acceptance of the new set value.

1* if channel 2 is used as an option (otherwise, not adjustable)

3.4.3.2   Analyse selection on Channel 1 / Channel 2
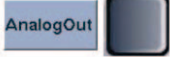
	Control	Operation	Function
1.	Go to the selection window "Channel 1 / 2 Input" and activate the edit function as described in section 3.4.2.		
2.		Turn the rollkey several times until the required function appears.	Change over either to the RF input signal or to the baseband signal for further analyse of the unit. Selection: RF / Base Band
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

1* if channel 2 is used as an option (otherwise, not adjustable)

3.4.3.3 Setting the Base band signal level

	Control	Operation	Function
1.		Go to the selection window "Base band Range" as described in section 3.4.2.	
2.		Turn the rollkey several times until the required value appears.	Setting the signal level (to avoid an input over modulation), of the baseband signal which is provided for analyse in the range: Selection: 500 mV / 5 V
3.		Press the Enter button / push rollkey.	Acceptance of the new set value.

3.4.4 Settings for Analogue Output 1 / 2

	Control	Operation	Function
1.	AnalogOut	Press the softkey "AnalogOut".	Change over into the "AnalogOut" menu window.
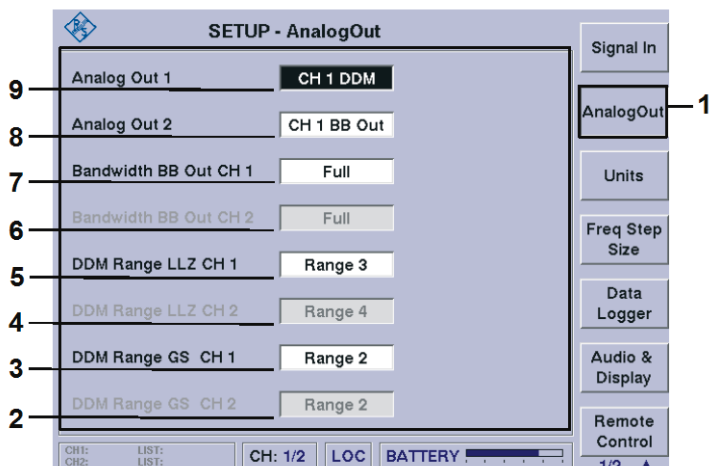
Item	Display	Function	Indication
2	DDM Range GS CH2	Scale of the XY values in Glideslope mode of the antenna input CH2	Range 1 … 4
3	DDM Range GS CH1	Scale of the XY values in Glideslope mode of the antenna input CH1	Range 1 … 4
4	DDM Range LLZ CH2	Scale of the XY values in Localizer mode of the antenna input CH2	Range 1 … 4
5	DDM Range LLZ CH1	Scale of the XY values in Localizer mode of the antenna input CH1	Range 1 … 4

Item	Display	Function	Indication
6	Bandwidth BB OUT CH 2	Selection the bandwidth of the baseband signal, of the antenna input CH2 (1*)	Full / Audio
7	Bandwidth BB OUT CH 1	Selection the bandwidth of the baseband signal, of the antenna input CH1	Full / Audio
8	Analog Out 2	Signal selection to the analog-output 2	CH1 DDM, CH1 BB OUT, CH2 DDM, (1*) CH2 BB OUT (1*)
9	Analog Out 1	Signal selection to the analog-output 1	CH1 DDM, CH1 BB OUT, CH2 DDM, (1*) CH2 BB OUT (1*)

1* if channel 2 is used as an option (otherwise, not adjustable)

3.4.4.1   Setting the Analogue Out 1 / 2

	Control	Operation	Function
1.		Go to the selection window "Analog Out 1 / 2" as described in section 3.4.2.	
2.		Turn the rollkey several times until the required value appears.	Signal selection between the voice signals and the XY-signals (standardized DDM-value range 1 ... 4) in relation to the receive channel. Selection: CH1 DDM, CH1 BB OUT, CH2 DDM, (1*) CH2 BB OUT (1*)
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

1* if channel 2 is used as an option (otherwise, not adjustable)

3.4.4.2   Setting the Baseband signal output CH 1 / CH 2

	Control	Operation	Function
1.		Go to the selection window "Bandwidth BB OUT CH 1 / CH 2" as described in section 3.4.2.	
2.		Turn the rollkey several times until the required function appears.	Setting the baseband signal output between the full bandwidth of the demodulator (Full, mode-dependant) or the audio range (Audio) in relation to the receiving channel CH 1 / CH 2 (1*). Selection: Full: (Demodulator band-

	Control	Operation	Function
			width) Audio: (300 … 3000 Hz)
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

1* if channel 2 is used as an option (otherwise, not adjustable)

3.4.4.3   Setting the DDM range LLZ CH 1 / CH 2

	Control	Operation	Function
1.	Go to the selection window "DDM Range LLZ CH 1 / 2" as described in section 3.4.2.		
2.		Turn the rollkey several times until the required function appears.	To scale the XY-values in Localizer mode of the antenna input CH 1 / CH 2 (1*). Selection: Range 1 ... 4 (2*)
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

1* if channel 2 is used as an option (otherwise, not adjustable)

3.4.4.4   Setting the DDM range GS CH 1 / CH 2

	Control	Operation	Function
1.	Go to the selection window "DDM Range GS CH 1 / 2" described in section 3.4.2.		
2.		Turn the rollkey several times until the required function appears.	To scale the XY-values in Glideslope mode of the antenna input CH 1 / CH 2 (1*). Selection: Range 1 ... 4 (2*)
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

1* if channel 2 is used as an option (otherwise, not adjustable)

2*	Range	Localizer	Glideslope
	Range 1	0.0 ±0.25 DDM ≙ 0.5 V ±0.5V	0.0 ±0.5 DDM ≙ 0.5 V ±0.5V
	Range 2	0.0 ±0.025 DDM ≙ 0.5 V ±0.5V	0.0 ±0.05 DDM ≙ 0.5 V ±0.5V

2*	Range	Localizer	Glideslope
	Range 3	0.0 ±0.0258 DDM ≙ 0.5 V ±0.5V	0.0875 ±0.05 DDM ≙ 0.5 V ±0.5V
	Range 4	0.0 ±0.5 DDM ≙ 0.5 V ±0.5V	0.175 +0.05 DDM ≙ 0.5 V ±0.5V

3.4.5   Setting the Display of the Measured data

	Control	Operation	Function
1.	Units	Press the softkey.	Change over into the "Units" menu window.
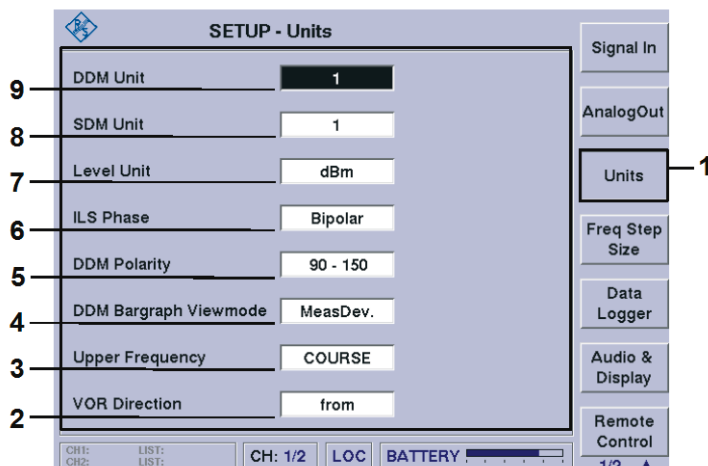
Item	Display	Function	Indication
2	VOR Direction	Setting the Bearing display in VOR mode	from / to
3	Upper Frequency	Setting in ILS mode, determining whether the upper frequency is the Coarse or the Clearance signal	COURSE, CLEARANCE
4	DDM Bargraph Viewmode	Setting the ILS bargraph display: MeasDev. (bargraph DDM value Cockpit (bargraph at LOC FL-FR GS FD-FU	MeasDev. Cockpit
5	DDM Polarity	Setting for the DDM polarity	90 – 150 / 150 - 90
6	ILS Phase	Selecting the value range in the ILS phase Bipolar: -60 … 60° Unipolar: 0 … 120°	Bipolar / Unipolar
7	Level Unit	Dimension setting for the level display reading	dBm / dBµV
8	SDM Unit	Dimension setting for the SDM display reading	µA , %, 1 (1 = dimensionless value)

Item	Display	Function	Indication
9	DDM Unit	Dimension setting for the DDM display reading	μA , %, 1 (1 = dimensionless value)

3.4.5.1 Setting the DDM Measuring Units

	Control	Operation	Function
1.	Go to the selection window "DDM Unit" as described in section 3.4.2.		
2.		Turn the rollkey several times until the required dimension appears.	Selection of the dimension for DDM-display at the ILS mode. Selection: μA , %, 1 (1 = dimensionless value)
3.		Press the Enter button / push rollkey.	Acceptance of the new set dimension.

3.4.5.2 Setting the SDM Measuring Units

	Control	Operation	Function
1.	Go to the selection window "SDM Unit" as described in section 3.4.2.		
2.		Turn the rollkey several times until the required dimension appears.	Selection of the dimension for SDM-display at the ILS mode. Selection: μA , %, 1 (1 = dimensionless value)
3.		Press the Enter button / push rollkey.	Acceptance of the new set dimension.

3.4.5.3 Setting the Level Measuring Units

	Control	Operation	Function
1.	Go to the selection window "Level Unit" as described in section 3.4.2.		
2.		Turn the rollkey several times until the required dimension appears.	Selection of the dimension for the level display. Selection: dBμV / dBm

Control	Operation	Function
		The setting will affect the level display and the bargraph in the ILS, VOR and MARKER BEACON modes.
3.	Press the Enter button / push rollkey.	Acceptance of the new set dimension.

3.4.5.4   Setting the values range of the ILS phase

Control	Operation	Function
1.	Go to the selection window "ILS Phase" as described in section 3.4.2.	
2.	Turn the rollkey several times until the required value appears.	Selection of the values range to the ILS phase. Selection: Bipolar: -60 … 60° Unipolar: 0 … 120°
3.	Press the Enter button / push rollkey.	Acceptance of the new set values range.

3.4.5.5   Setting the DDM polarity

Control	Operation	Function
1.	Go to the selection window "DDM Polarity" and activate the edit function as described in section 3.4.2.	
2.	Turn the rollkey several times until the required value appears.	Selection of the DDM polarity. Selection: -90 - 150 / 150 – 90 The setting will affect the DDM display and the bargraph in the ILS mode.
3.	Press the Enter button / push rollkey.	Acceptance of the new set values range.

3.4.5.6   Setting the ILS bargraph display

	Control	Operation	Function
1.		Go to the selection window "DDM Bargraph Viewmode" as described in section 3.4.2.	
2.		Turn the rollkey several times until the required mode appears.	Selection of the bargraph display in the ILS mode. Here, a decision is made, whether the DDM indicator in ILS mode mimics the measured data (MeasDEV) or a cockpit instrument, displaying the direction of flight, which must be followed. Selection: View mode **MeasDev.** (bargraph DDM value) or View mode **Cockpit** (bargraph at LLZ><FL---FR at GS><FD---FU
3.		Press the Enter button / push rollkey.	Acceptance of the new set mode.

3.4.6   F Step setting

	Control	Operation	Function
1.	Freq Step Size	Press the softkey "Freq Step Size".	Change over into the "Freq Step Size" menu window.

SETUP - Freq StepSize

Freq Step Size [kHz]   50.0

Signal In
AnalogOut
Units
Freq Step Size — 1
Data Logger
Audio & Display
Remote Control

CH1:   LIST:
CH2:   LIST: CH: 1/2   LOC   BATTERY   1/2
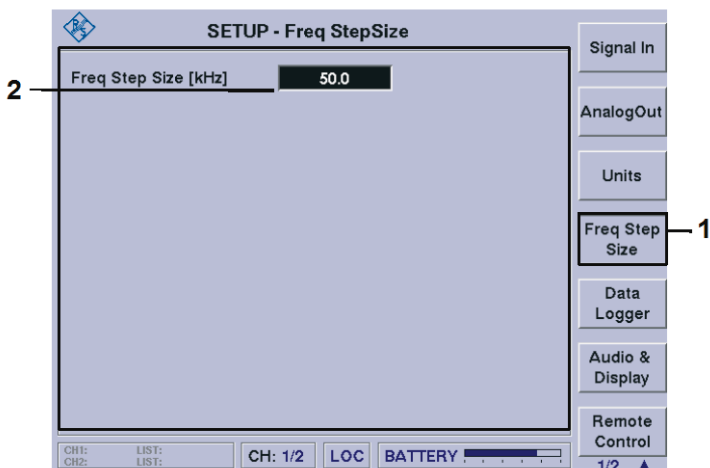
Item	Display	Function	Indication
2	Freq Step Size [kHz]	Setting of the frequency step width	1 ... 100 kHz

	Control	Operation	Function
2.	Go to the selection window "Freq Step Size" as described in section 3.4.2.		
3.		Turn the rollkey several times until the required value appears.	Setting of the frequency step width in the range: Setting value: 1 ... 100 kHz
4.		Press the Enter button / push rollkey.	Acceptance of the new set value.

3.4.7   Setting the Data Logger

	Control	Operation	Function
1.		Press the softkey "Data Logger".	Change over into the "Data Logger" menu window.
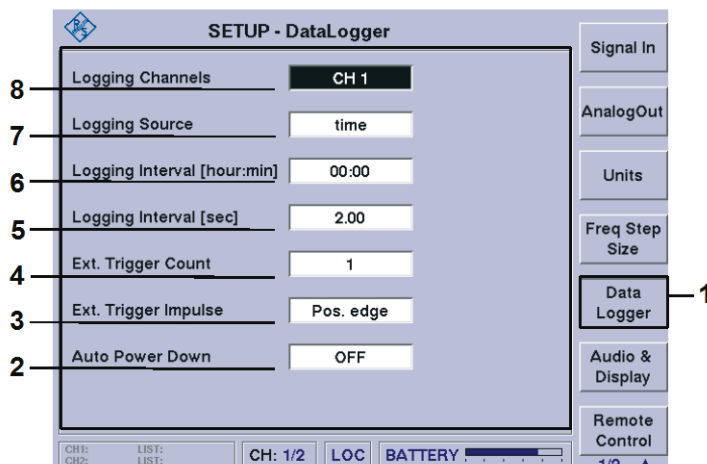
Item	Display	Function	Indication
2	Auto Power Down	Activates the automatic ON / OFF function at a measuring interval	ON / OFF
3	Ext. Trigger Impulse (1*)	Setting the pulse edge (postive / negative) of the external trigger signal	Pos. edge, Neg. edge
4	Ext. Trigger Count (1*)	Setting the number of external trigger signals Setting range: 1 … 1000	
5	Logging Interval [sec] (1*)	Measuring interval time setting in seconds Setting value: 0.1 ... 59.90 s	s
6	Logging Interval [hour:min] (1*)	Measuring interval time setting in hours and minutes Setting value: 00:01 ... 24:00 h	hh:mm

Item	Display	Function	Indication
7	Logging Source	Setting the trigger source	time (2*), ext. trigger (3*), time + ext. trig. time + PPS, (4*)
8	Logging Channels	Setting the receiving channel, which will be recoding the data	CH 1, CH 2 (5*), CH 1 + CH 2 (5*)

1* may not be displayed, see setting of Logging Source
2* Ext. Trigger Count and Ext. Trigger Impuls are displayed with grey background
3* Logging Intervall [hour:min] and Logging Intervall [sec] are displayed with grey background
4* Ext. Trigger Count displayed with grey background
5* if channel 2 is used as an option (otherwise, not adjustable)

> *A description of the required Data Logger settings can be found in section 3.15.4!*
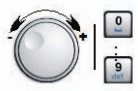
3.4.8   Setting the Audio- und Display characteristics

	Control	Operation	Function
1.	Audio & Display	Press the softkey "Audio & Display".	Change over into the Audio & Display menu window.
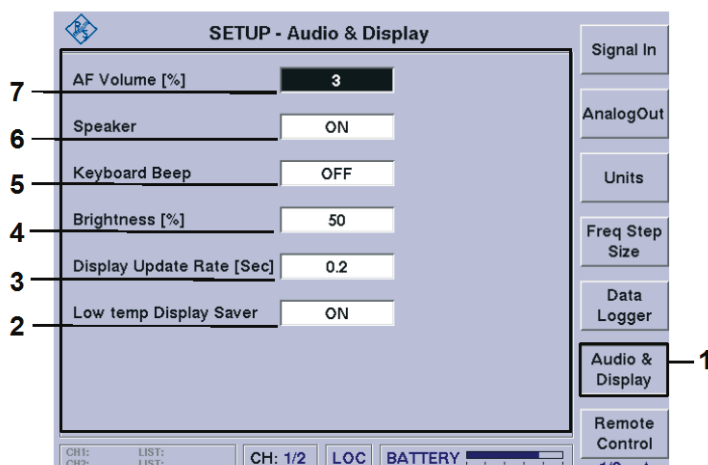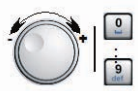
Item	Display	Function	Indication
2	Low temp Display Saver	Switch ON / OFF the Low temp Display Saver	ON / OFF
3	Display Update Rate [Sec]	Setting of the display update time	0.1 ... 2 s
4	Brightness [%]	Setting of the display brightness	0 … 100 %
5	Keyboard Beep	Switch ON / OFF the keyboard beeps	ON / OFF
6	Speaker	Switch ON / OFF the loudspeaker	ON / OFF
7	AF Volume [%]	Setting of the AF-output level (loudspeaker)	0 … 100 %
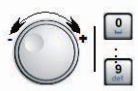
3.4.8.1 Setting the AF Volume

	Control	Operation	Function
1.	Go to the selection window "AF Volume" as described in section 3.4.2.		
2.		Turn the rollkey several times until the required value appears.	Setting the AF-volume, this will affect the headset and loudspeaker output volume Setting value: 0 ... 100 %
3.		Press the Enter button / push rollkey.	Acceptance of the new set value.

3.4.8.2 Setting the Display brightness

	Control	Operation	Function
1.	Go to the selection window "Brightness" as described in section 3.4.2.		
2.		Turn the rollkey several times until the required value appears.	Setting of the display brightness. Setting value: 0 ... 100 %
3.		Press the Enter button / push rollkey.	Acceptance of the new set value.

3.4.8.3 Setting the Display Update Rate

	Control	Operation	Function
1.	Go to the selection window "Display Update Rate" as described in section 3.4.2.		
2.		Turn the rollkey several times until the required value appears.	Display update rate setting (measurement values (ILS / VOR / MB mode) update in the display). Setting value: 0.1 ... 2 s
3.		Press the Enter button / push rollkey.	Acceptance of the new set value.

3.4.8.4   Setting the Keyboard Beep (ON / OFF)

	Control	Operation	Function
1.	Go to the selection window "Keyboard Beep"as described in section 3.4.2.		
2.		Select	ON / OFF sound of the keyboard (when pressing a button it will be confirmed with a beep sound). Selection: ON / OFF
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

3.4.8.5   Setting the Loudspeaker (ON / OFF)

	Control	Operation	Function
1.	Go to the selection window "Speaker" as described in section 3.4.2.		
2.		Select	ON / OFF sound of the loudspeaker. Selection: ON / OFF
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

3.4.8.6   Setting the Low temp Display Saver (ON / OFF)

	Control	Operation	Function
1.	Go to the selection window "Low temp Display Saver" as described in section 3.4.2.		
2.		Select	Screensaver ON / OFF function. If the screensaver is activated, the screen's back-light will be switched off between -14 to -15 °C. If the temperature raises above -14 °C, the screensaver automatically turns back on. Selection: ON / OFF
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

In order to prevent any damage to the display, the screen-saver should always be turned on if the temperature falls below -10 °C!

3.4.9   Setting the Communication interface

	Control	Operation	Function
1.	Remote Control	Press the softkey "Remote Control".	Change over into the "Remote Control" menu window.
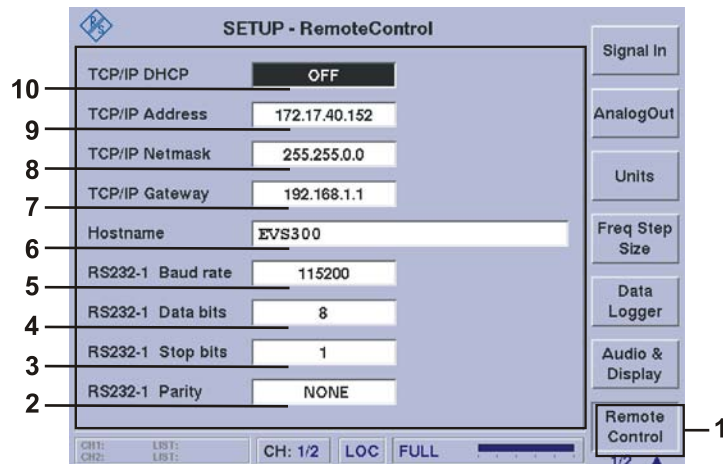
Item	Display	Function	Indication
2	RS232-1 Parity	Setting for the Parity characteristics of the RS 232-1 remote-interface	NONE, ODD, EVEN, MARK, SPACE
3	RS232-1 Stop bits	Setting for the Stop bit of the RS 232-1 remote-interface	1, 1,5, 2
4	RS232-1 Data bits	Setting for the Data bit of the RS 232-1 remote-interface	5, 6, 7, 8
5	RS232-1 Baud rate	Setting the Baud rate of the RS 232-1 remote-interface	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
6	Hostname	Enter any desired device name (host name)	e.g. "EVS300" (default)
7	TCP/IP Gateway	Setting of the IP Gateway	xxx.xx.xx.xxx
8	TCP/IP Netmask	Setting of the IP Netmask	xxx.xxx.xxx.x
9	TCP/IP Address	Setting of the unit's IP-address	xxx.xxx.xxx.x
10	TCP/IP DHCP	Setting of the Dynamic Host Configuration Protocol (DHCP)	ON / OFF

3.4.9.1 Setting of the Dynamic Host Configuration Protocol (DHCP)

	Control	Operation	Function
1.		Go to the selection window "TCP/IP DHCP" as described in section 3.4.2.	
2.		Select	Using the Dynamic Host Configuration Protocol (DHCP), the dynamic configuration of the IP address will be initiated. After the activation, the IP address and the submask address will be displayed next to the selection window. Selection: ON / OFF *If the Dynamic Host Configuration Protocol is used, all other protocol settings become inactive!*
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

3.4.9.2 IP Address setting

	Control	Operation	Function
1.		Go to the selection window "TCP/IP Address" and activate the edit function as described in section 3.4.2.	
2.		Enter the decimal number	Setting of the IP address to run the unit in a LAN-network. e.g. 172.17.40.139
3.		Press the Enter button / push rollkey.	Acceptance of the new set IP address.

3.4.9.3 Netmask ID setting

	Control	Operation	Function
1.		Go to the selection window "TCP/IP Netmask" and activate the edit function as described in section 3.4.2.	
2.		Enter the decimal number	Setting of the netmask ID to run the unit in a LAN-network. e.g. 255.255.255.0

	Control	Operation	Function
3.		Press the Enter button / push rollkey.	Acceptance of the new set Netmask ID.

3.4.9.4   Gateway ID setting

	Control	Operation	Function
1.	Go to the selection window "TCP/IP Gateway" and activate the edit function as described in section 3.4.2.		
2.		Enter the decimal number	Setting of the Gateway ID to run the unit in a LAN-network. e.g. 192.168.1.1
3.		Press the Enter button / push rollkey.	Acceptance of the new set Gateway ID.

3.4.9.5   Assigning a Hostname

	Control	Operation	Function
1.	Go to the selection window "Hostname" and activate the edit function as described in section 3.4.2.		
2.		Alphanumeric input	Assign a device name (host name). The default name is "EVS300".
3.		Press the Enter button / push rollkey.	Acceptance of the new set device name (host name).

3.4.9.6   Setting the Baud rate of the Remote interface

	Control	Operation	Function
1.	Go to the selection window "RS232-1 Baud rate" as described in section 3.4.2.		
2.		Select	Setting the Baud rate (Data transmission speed per second) of the RS 232-1 remote-interface. Setting value: 1200 ... 115200 baud

Control	Operation	Function
3.	Press the Enter button / push rollkey.	Acceptance of the new set value.

3.4.9.7 Setting the Data bit of the Remote interface

	Control	Operation	Function
1.	Go to the selection window "RS232-1 Data bits" as described in section 3.4.2.		
2.		Select	Setting the Data bit (Number of bits per byte) of the RS 232-1 remote-interface. Setting value: 5, 6, 7, 8
3.		Press the Enter button / push rollkey.	Acceptance of the new set value.

3.4.9.8 Setting the Stop bit of the Remote interface

	Control	Operation	Function
1.	Go to the selection window "RS232-1 Stop bits" as described in section 3.4.2.		
2.		Select	Setting of the stop bit of the RS 232-1 remote interface (during serial transfer, this enables the receiver to synchronize each transmitted character) Setting value: 1, 1,5, 2 (usually 1)
3.		Press the Enter button / push rollkey.	Acceptance of the new set value.

3.4.9.9   Setting the Parity property of the Remote interface

	Control	Operation	Function
1.		Go to the selection window "RS232-1 Parity" as described in section 3.4.2.	
2.		Select	Setting of the parity property (error detection during data transmission, using parity checking)
			Selection: NONE, ODD, EVEN, MARK, SPACE
			NONE: parity is not being sent, **ODD:** the parity bit is set to 0 / 1, this will ensure that an odd number of bits is received, which have been set to 1, **EVEN:** the parity bit is set to 0 / 1, this will ensure that an even number of bits is received, which have been set to 1, **MARK:** the parity bit is always set to 1, **SPACE:** the parity bit is always set to 0.
3.		Press the Enter button / push rollkey.	Acceptance of the new set value.

3.4.10   Setting the General features

	Control	Operation	Function
1.	General Settings	Switch to the second menu window of the setup function and press the softkey "General Settings".	Change over into the "General Settings" menu window.
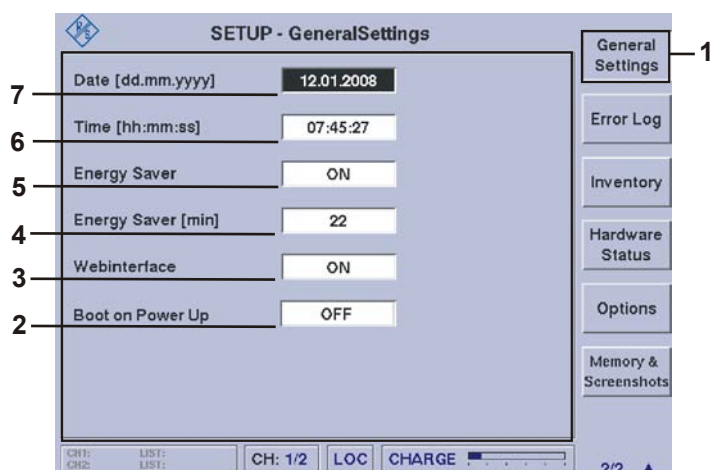
Item	Display	Function	Indication
2	Boot on Power Up	Switching on the device automatically	ON / OFF
3	Webinterface	Switch ON / OFF the Web interface	ON / OFF
4	Energy Saver [min]	Setting of the energy saver function	1 ... 60 min
5	Energy Saver	Switch ON / OFF the energy saver function	ON / OFF
6	Time [hh:mm:ss]	Time setting	hh:mm:ss
7	Date [dd..mm.yyyy]	Date setting	dd.mm.yyyy

3.4.10.1 Date setting

	Control	Operation	Function
1.	Go to the selection window "Date" and activate the edit function as described in section 3.4.2.		
2.		Enter the date.	Enter the date in the format shown (dd.mm.yyyy). e.g. 01.01.2006
3.		Press the Enter button / push rollkey.	Acceptance of the new set date.

3.4.10.2 Time setting

	Control	Operation	Function
1.	Go to the selection window "Time" and activate the edit function as described in section 3.4.2.		
2.		Enter the real time.	Enter the time in the format shown (hh:mm:ss). e.g. 08:59:00
3.		Press the Enter button / push rollkey.	Acceptance of the new set time.

3.4.10.3   Energy Saver setting (ON / OFF)

	Control	Operation	Function
1.	Go to the selection window "Energy Saver" as described in section 3.4.2.		
2.		Turn the rollkey several times until the required function appears.	Switching the energy saver setting ON and OFF. If the energy saver setting is activated, the display will be switched off when the time set under the energy saver timer has elapsed. The collection of data is still active, only the back light has been turned off. Selection: ON / OFF
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

☞ *The energy saver setting can be switched off by pressing a button or by turning the rollkey. Do not press the POWER "⏻" button (36) to turn on the display. It is the OFF button and will shut off the device!*

3.4.10.4   Setting the timer for the Energy Saver function

	Control	Operation	Function
1.	Go to the selection window "Energy Saver [min]" and activate the edit function as described in section 3.4.2.		
2.		Turn the rollkey several times until the required value appears.	Timer for the energy saver setting. After a preset time has elapsed, the display backlight turns itself off and can be turned back on by pressing the Enter button / push rollkey. Setting value: 1 ... 60 min ☞ *Do not press the POWER "⏻" button (36) to turn on the display. It is the OFF button and will shut off the device!*
3.		Press the Enter button / push rollkey.	Acceptance of the new set time value.

3.4.10.5   Switch ON / OFF the Web interface

Control	Operation	Function
1.	Go to the selection window "Webinterface" as described in section 3.4.2.	
2.	Turn the rollkey several times until the required function appears.	Switch ON / OFF the Web interface. Is the function "Webinterface ON" activated can this be called about the LAN interface about an Internet browser or about "OFF" locked. Selection: ON / OFF
3.	Press the Enter button / push rollkey.	Acceptance of the new set function.
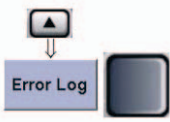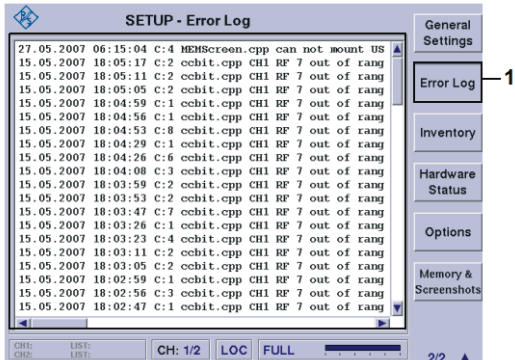
3.4.10.6   Switch ON / OFF the function "Boot on Power Up"

Control	Operation	Function
1.	Go to the selection window "Boot on Power Up" as described in section 3.4.2.	
2.	Turn the rollkey several times until the required function appears.	Switch ON / OFF the function "Boot on Power Up". This function serves for the automatic switching on the device at add-on connection of an external supply voltage. The function only makes sense to use at device without battery. The function can be used as of the keyboard controller (KBC) software version ≥2.2. Selection: ON / OFF ***After a turning the device off a waiting time must be taken into account of switching on approx. 10 s before a repeated one automatically!***
3.	Press the Enter button / push rollkey.	Acceptance of the new set function.

3.4.11 Call-up the Error Logbook

☞ *The error logbook contains only service information!*
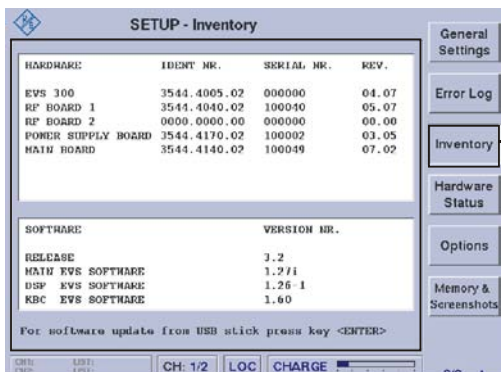
	Control	Operation	Function
1.		Switch to the second menu screen of the setup function and press the softkey "Error Log".	Switching to the "Error Log" menu window. General notes pertaining to the status of the device will be entered into the error logbook. In case of a malfunction, the cause of the error can be viewed here.
2.		With the rollkey / arrow buttons can navigate in the Error Logbook. ☞ *The entries can be deleted irrevocably over the button "ESC / Cancel"! Confirm the dialog "Clear error log?" with ENTER.*	

3.4.12 Call-up the Hardware / Software inventory list

☞ *The hardware / software inventory list provides information about the hardware version of the device (integrated modules, options etc.) and about the current software versions being used. This information is necessary for service purposes. Furthermore, if using a USB-memory stick (available with current software update), a software update can be processed.*

	Control	Operation	Function
1.		Switch to the second menu screen of the setup function and press the softkey "Inventory".	Switching to the "Inventory" menu window. In this hardware / software inventory list the following information is shown. **Hardware:** article code., serial number and revision number of the built-in modules

Control	Operation	Function
		Software: software version number. for the: Release, Firmware (Main), Digital signal processing (DSP), Keyboard-Controller (KBC)

3.4.12.1 Software Update

Click on the following website to receive the latest software update for your R&S® EVS 300 ILS / VOR analyzer:
http://www.rohde-schwarz.com/product/evs300.html.
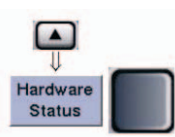
☞ *Implementation of how to update the software is described in section 5.3!*

3.4.13 Call-up the Device operating parameters

☞ *The hardware status includes the most important device operating parameters. This may contain information about possible causes of error!*

	Control	Operation	Function
1.		Press the "Setup" (1) button and change to the window 2 and press softkey "Hardware Status".	Switching to the "Hardware Status" menu window. The "Hardware Status" menu window delivers information about various test voltages of the power supply and the RF-modules. Display "temp" indicates the current internal temperature of the device Display "Status" indicates the sum of all test voltages

Control	Operation	Function

3.4.14   Software options

Through the menu screen "Options", all software options, which are installed in the device may be displayed. Rohde & Schwarz offers the following software features as an option.

- F SCAN (EVS-K1: Display of the RF-frequency spectrum),
- GPS (EVS-K2: GPS mode),
- CRS|CLR (EVS-K3: ILS extension, separate Course and Clearance display),
- FFT (EVS-K4: FFT signal analysis of the baseband signal)
- Power Sensor mode (EVS-K5)
- DME mode (EVS-K6, DME pulse analysis, DME = Distance Measurement Equipment)
- Scope mode (EVS-K7)
- GBAS mode (EVS-K9)

A licence is purchased for each respective option. The options window can be used to activate the option purchased.

	Control	Operation	Function
1.		Press the "Setup" button and change to the window 2 and press softkey "Options" (1).	Switching to the "Options" menu window. This function displays the device-specific optional extensions.

As soon as an option is activated, it will be identified as "available", otherwise, "not available" will be displayed. In addition, the device-internal MAC address of the network adapter is displayed; this information is required, since the option selection is dependant on the MAC address.
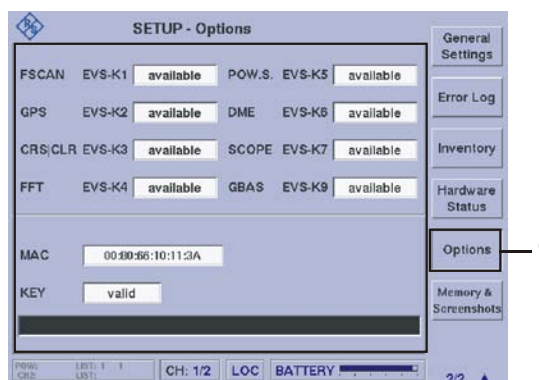
Control	Operation	Function

☞ *The activation of the software option is described in Section 3.19!*

3.4.15 Memory & Screenshots

When using the menu screen "Memory & Screenshots", the screenshots of the EVS memory can be deleted or copied to the USB-memory stick. They will be stored in PNG-image format (Portable Network Graphics). In addition, the internal EVS-flash memory card can be re-formatted.

☞ *If the EVS-Flash memory card is formatted, all screenshots and information stored on the Data Logger will be deleted!*
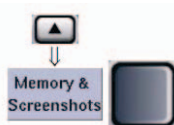
	Control	Operation	Function
1.		Press the "Setup" button and change to the window 2 and press softkey "Memory & Screenshots" (1).	Switching to the "Memory & Screenshots" menu window.
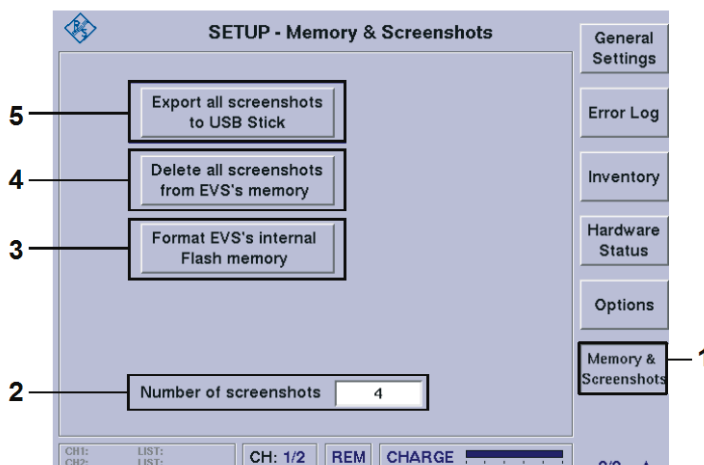
2 - Display window, displays the total number of screenshots stored
3 - Function button, activates the formatting of the internal EVS flash memory card

☞ *If the EVS-Flash memory card is formatted, all screenshots and information stored on the Data Logger will be deleted!*

4 - Function button, activates the deletion of all stored screenshots
5 - Function button, activates copying of all stored screenshots to a USB-memory stick

	Control	Operation	Function
2.		When using the rollkey / arrow buttons, the respective function keys 3 … 5 can be selected, and by using the Enter key, the function can be activated	Once the appropriate function has been selected, any further process can be controlled via the dialog box.

3.5   Setting of the RF-Signal Adjustment

The RF signal adjustment is available in the modes ILS, VOR, and MARKER BEACON.

	Control	Operation	Function
1.	ATT.MODE AUTO	Press the softkey "ATT MODE" several times until the wanted mode is set.	The set mode will be updated in the softkey and is then immediately active. ATT.MODE AUTO The following modes are available: - Low-N (Low Noise, +10 dB amplification) - Norm (Normal, 0 dB) - Low-D. (Low Distortion, -25 dB attenuation) - Auto (automatic setting, (-25, 0, +10 dB)

By the setting in the ATT mode the RF level can be influenced individually. As shown in the block diagram corresponding signal paths will be switched for the different functions, which effects the RF signal either with an amplification (Preamplifier +10 dB), an attenuation (Attenuator -25 dB) or has no influences to the signal (Bypass). For data safety on measurement the methods of the ATT mode on the following receive levels can be used:
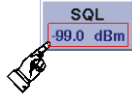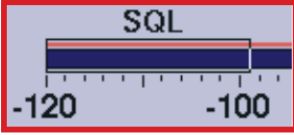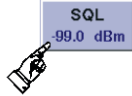
Low Noise: from <-70 dB, Indicating range: -120 … -20 dBm

Norm: from <-20 dB, Indicating range: -110 … -10 dBm

Low Distortion: from >-20 dB, Indicating range: -100 … 20 dBm

Depending on the signal level in the Auto mode automatically the correct signal path is switched. Indicating range: -120 … 20 dBm

☞   *The max. input level is +13 dBm!*

1	Signal path at setting "Low Noise"
2	Signal path at setting "Norm"
3	Signal path at setting "Low Distortion"
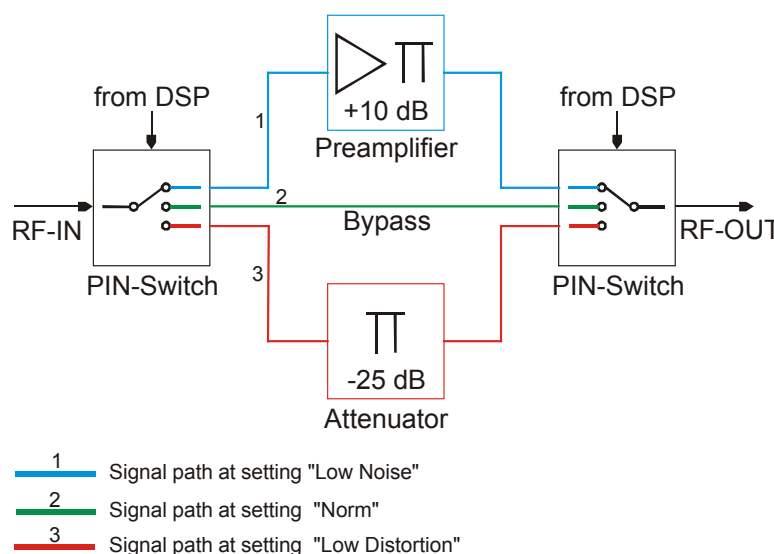
3.6   Setting of the Squelch Threshold

	Control	**Operation**	**Function**
1.	SQL -99.0 dBm	Press the softkey "SQL".	Switching over into the edit function to set the squelch threshold. The softkey value section is active.
2.		Turn the rollkey until the required squelch threshold is set.	The current squelch level will be carried along numerically in the softkey and graphically on the bargraph indicator. The green line above the bargraph marks the valid range, which is indicated in the data sheet.
			Example representation
			☞ *If the receiving volume exceeds the preset squelch threshold, the AM-demodulated audio signal in the loudspeaker / headset will be transmitted, or otherwise turned off.*
3.	ENTER	Press the Enter button / push rollkey.	Acceptance of the actually set squelch threshold.
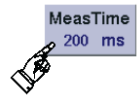
3.7   Setting the Measurement Interval Time

Setting a measuring time interval is available in the modes ILS, VOR, MARKER BEACON and Power Sensor (Option EVS-K5). The preset measuring interval stipulates the intervals at which measurement values will be recorded, enabling an average value to be calculated.
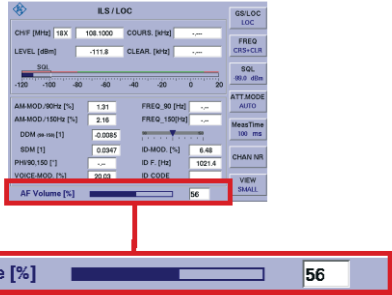
-    while in VOR and MARKER BEACON mode, max. 33.5 data / sec can be read, which approximates 30 ms / data

-    while in ILS mode, max. 100.5 data / sec can be read, which approximates 10 ms / data
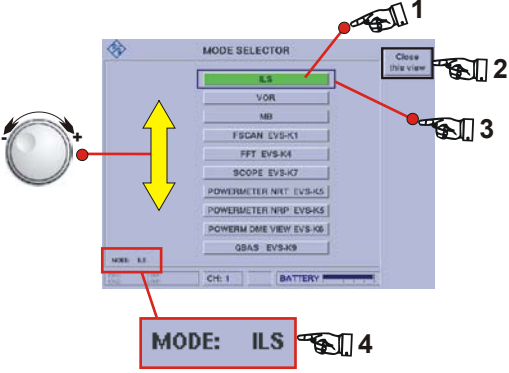
While in VOR mode, 30 ms is the smallest meaningful measuring time. One unit of data / sec is approx. the same value as "MeasTime / 30 ms.

	Control	Operation	Function
1.	MeasTime 100 ms	Press the softkey "Meas-Time".	Switching over into the edit function to set the measurement time. The softkey value section is active. MeasTime 100 ms
2.		Setting the corresponding measurement time with rollkey.	The current measurement time will be carried along numerically in the softkey. Setting value: ILS, 10 … 2000 ms (10 ms step width) MB / VOR, 30 … 2000 ms
3.	ENTER	Press the Enter button / push rollkey.	Acceptance of the actually set new measurement time. MeasTime 200 ms

3.8   AF-Volume setting
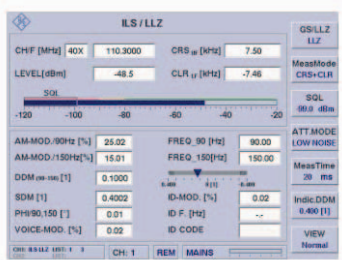
	Control	Operation	Function
1.		Press the "VOL" (43) button.	In the respective mode (e.g. ILS) the status display switches to editing function to enable the volume to be set. The change will be displayed numerically and graphically on the bargraph.
2.		Setting the AF-volume with rollkey.	Setting of the AF-volume level at the speaker. Setting value: 0 … 100 %
3.		Press the Enter button / push rollkey.	Acceptance of the new set AF-volume level.

3.9   Selection of the mode
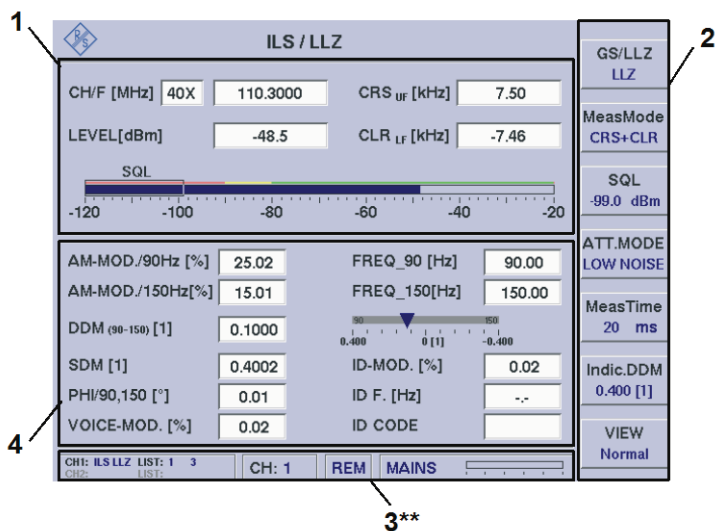
	Control	Operation	Function
1.	SPLIT	Press the "SPLIT" (13) button.	The R&S® EVS 300 switches over into the Mode Selector.
	In the mode selection window the actual active mode is displayed with green background. In the mode display the actual active mode is displayed.		
2.		Set a mode with the rollkey.	The blue frame indicates the new choice.
3.		Press the Enter button / push rollkey.	Changes to the new selected mode.
Canceling a selection			
4.		Press "Close this view" (2) softkey.	Cancel and return to the previously active mode.

3.10 ILS mode operation

Activates the ILS mode

	Control	Operation	Function
1.	**ILS** or **SPLIT**	Press the "ILS" (4) button. Press the "SPLIT" (13) button and select the ILS mode.	The R&S® EVS 300 switches over into the ILS mode.
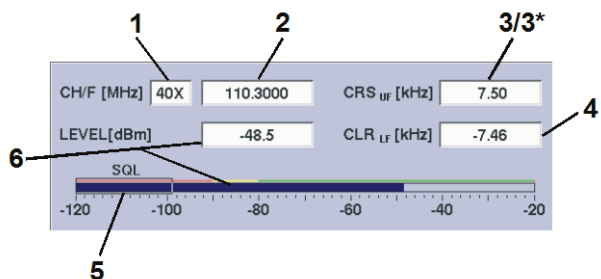
3.10.1   Signal Parameters and Display in the ILS mode

3** for general description of the status field, refer to 3.2.1.1

3.10.1.1   RF Parameter Section (1)

The display fields in the RF parameter field change with each setting of the measuring mode (MeasMode). The respective fields are identified with an * and will be described in the following table, however, figures are not provided.

Example: measuring mode CRS+CLR

Item	Display	Function	Indication
1	CH	Channel reading / channel setting (frequency assignment according to ICAO-frequency list)	e.g. 22X
2	F [MHz]	Reading and setting of the receive frequency (receive frequency setting by channel setting according to ICAO-frequency list)	MHz
3	CRS $_{UF}$ [kHz] or CLR $_{UF}$ [kHz]	Display of the measured upper frequency (relative to the preset channel frequency). Which frequency shall be set as UF (upper frequency), will be determined in the setup function	kHz
3*	FREQ. [kHz]	Measured deviation in relation to the preset channel frequency during the single signal measurement	kHz
4	CLR $_{LF}$ [kHz] or CRS $_{LF}$ [kHz]	Display of the measured lower frequency (relative to the measured channel frequency). Which frequency shall be set as LF (lower frequency), will be determined in the setup function	dBm / dBµV
5	SQL	Graphic display (bargraph) of the measured level, as well as the preset squelch threshold. The green line above the bargraph marks the valid range, which is indicated in the data sheet. Information contained in the datasheet has no or only limited validity in the range identified by the red or yellow bar.	dBm / dBµV
5	LEVEL [dBm]	Measured receive level (numerical / bargraph) in dBm / dBµV with the settable antenna correction factor (0.0) from the setup, if this level was selected as ≠0.0.	dBm / dBµV

3.10.1.2 Measured Values Section (4)

Example: normal view
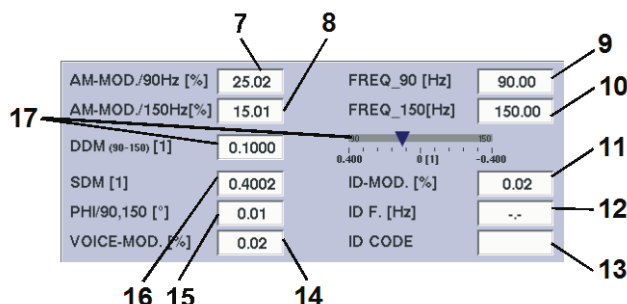
If the softkey VIEW is used to select "Distortion", the measurement parameters in the display will change. This is further described in Section 3.10.6.1 under the heading: Measurement data field "Distortion".

Item	Display	Function	Indication
7	AM-MOD./ 90 Hz [%]	AM-modulation factor 90-Hz signal	%
8	AM-MOD./ 150 Hz [%]	AM-Modulation factor 150-Hz signal	%
9	FREQ_90 [Hz]	measured 90-Hz frequency	Hz

Item	Display	Function	Indication
10	FREQ_150 [Hz]	measured 150-Hz frequency	Hz
11	ID MOD.[%]	Modulation factor of the Identifier	%
12	ID F.[Hz]	measured frequency of the Identifier	Hz
13	ID CODE	decoded identifier code	e.g. "IKOW"
14	VOICE-MOD.[%]	AM-Modulation factor of the voice signal (in the range 300 ... 3000 Hz)	%
15	PHI/90,150 [°]	Phase between 90-Hz and 150-Hz signal	[°] degree
16	SDM [1]	Sum modulation factor as the unit 1 (absolute), μA or percent (setup selection)	μA , %, 1 (1 = dimensionless value)
17	DDM (90-150) [1]	Difference in Depth of Modulation (DDM) (setup selection)	μA , %, 1 (1 = dimensionless value)
	Bargraph	Graphic display of the DDM value, depending on the display mode (MeasDev. / Cockpit, adjustable in the setup function) and the set measuring mode LLZ / GS. Display mode **MeasDev.** at the measuring mode LLZ / GS: Example: LLZ mode ***When exceeding the indicating range the arrow turns red!*** Example: GS mode Display mode **Cockpit** (flight course indication) at the measuring mode LLZ / GS: Fade in: FR ("Fly Right", LLZ mode), FL ("Fly Left", LLZ mode) FU ("Fly Up", GS mode) FD ("Fly Down", GS mode) Example: LLZ mode ***When exceeding the indicating range the arrow turns red!*** Example: GS mode	
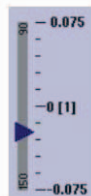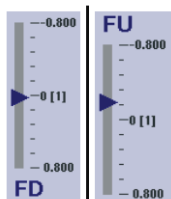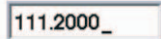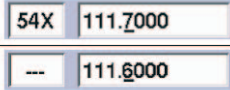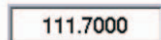
*   Measurement accuracies are given in the Technical Data!

3.10.1.3   Softkeys (2)

Display	Function
GS/LLZ LLZ	Switch over from Glideslope- / Localizer mode, set mode is shown in the softkey.
MeasMode CRS+CLR	Switch over the Course- and Clearance signal measuring, set measuring method is shown in the softkey: - Single (Single signal measuring) - CRS+CLR (Course- + Clearance signal measuring) - CRS (Course signal measuring) - CLR (Clearance signal measuring) - CRS|CLR (parallel Course- + Clearance signal measuring, option)
SQL -99.0 dBm	Activates the edit function for the squelch threshold (SQL value is shown in the softkey) ☞ *Setting of the squelch threshold is described in section 3.6!*

ATT.MODE
AUTO
	Switch over of the RF-attenuation, set range is shown in the softkey:
	- LOW NOISE (+10 dB),
	  Indicating range: -120 … -20 dBm
	- NORM (Normal, 0dB)
	  Indicating range: -110 … -10 dBm
	- LOW DIST (Low Distortion, -25dB)
	  Indicating range: -100 … 20 dBm
	- AUTO (the most favorable range will be selected automatically)
	  Indicating range: -120 … 20 dBm
	
	☞ *The max. input level is +13 dBm. The Setting of the RF-Signal Adjustment is described in section 3.5!*

MeasTime 100 ms	Activates the measurement time Setting value: 10 … 2000 ms (10 ms step width) ☞ *Setting of the measurement time is described in section 3.7!*
Indic.DDM 40 %	Scaling of the DDM bargraph (Setting the units of measure in the setup function) Setting range: <table><tr><td>**Glideslope mode:**</td><td>**Localizer mode:**</td></tr><tr><td>80%, 15%, 7.5% 0.800, 0.150, 0.075 [1] 800 μA, 150 μA, 75 μA</td><td>40%, 15%, 7.5% 0.400, 0.150, 0.075 [1] 400 μA, 150 μA, 75 μA</td></tr></table> ☞ *Starting with software release 3.1, scaling of the DDM bargraph is possible. In previous versions, the softkey function "CHAN NR" is active instead.*
VIEW Normal	Switch over between Normal- / Distortion- / Large views, set mode is shown in the softkey: - Normal (normal view) - Distortion (distortion view) - Large (zoom view)

3.10.2   Setting the Receiving frequency in the ILS mode

ILS-Localizer: 108 … 112 MHz
ILS-Glideslope: 329 … 335 MHz (Preselector filter 320 … 340 MHz)

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	Behind the last digit the cursor appears. 111.2000_
2.		Setting the corresponding frequency with rollkey / keyboard.	Enter the frequency, including the appropriate decimal places. If the frequency corresponds with a defined channel (ICAO frequency list, 3.9.3.1), then the channel number will be shown in the channel display window; otherwise dashes will be shown. 54X 111.7000 --- 111.6000
3.		Confirm with the correct dimension or Press the Enter button / push rollkey.	Acceptance of the new set frequency. 111.7000

<u>*NOTES*</u>

1) *On frequency input the complete frequency range (70 ... 350 MHz) can be entered independent from the mode. However, the data content is only given at mode specific frequency ranges:*

   ILS-Localizer: 108 ... 112 MHz
   ILS-Glideslope: 329 … 335 MHz (Preselector filter 320 … 340 MHz)

   With the "ESC" button any time a break off of the function is possible and the old value will be restored!
   As of SW release 3.2 you change when setting a frequency within the Localizer or Glideslope frequency range into the corresponding mode LLZ or GS automatically.

2) *If the frequency setting will be performed with the rollkey or the cursor buttons, the corresponding target channels will be displayed according to the ICAO frequency list in the channel window.*

3) *The frequency step width (0,001 ... 10,000 MHz) is settable in the setup (F-Step) when using the rollkey or the cursor buttons.*

3.10.3   Setting the Receiving channel in the ILS mode

	Control	Operation	Function
1.	FREQ	Press (2x) the "FREQ" (9) button.	Switching over into the edit function for channel input (frequency assignment according to ICAO-frequency list, 3.9.3.1). The channel section is activated and behind the last digit the cursor appears. 22X
2.		Use the rollkey / keyboard to set the respective channel number and use the up / down arrows to set X or Y	Only digits entry. (see also ILS-frequency / channel list). The frequency (ICAO frequency list, 3.9.3.1) associated with the channel will be displayed in the frequency field 22X 108.5000
3.	ENTER	Press the Enter button / push rollkey.	Acceptance of the new set channel no. 22X

NOTES

1) *On channel input via the tens keyboard the mode specific channel ranges must be observed:*

   Localizer / Glideslope: 18X ... 56Y
   (channel no. Assignment is identical)

   When the channel ranges are exceeded or when they fall below, the digits in the frequency section will be displayed in red and they cannot be used!

2) *With the "ESC" button any time a break off of the function is possible and the old value will be restored!*

3) *If the frequency setting will be performed with the rollkey or the cursor buttons, the corresponding frequencies will be displayed during setting!*

3.10.3.1   ILS-Channel Frequency list

ICAO Channel	Localizer mode Frequency (MHz)	Glideslope mode Frequency (MHz)
18X	108.10	334.70
18Y	108.15	334.55
20X	108.30	334.10
20Y	108.35	333.95
22X	108.50	329.90
22Y	108.55	329.75
24X	108.70	330.50
24Y	108.75	330.35
26X	108.90	329.30
26Y	108.95	329.15
28X	109.10	331.40
28Y	109.15	331.25
30X	109.30	332.00
30Y	109.35	331.85
32X	109.50	332.60
32Y	109.55	332.45
34X	109.70	333.20
34Y	109.75	333.05
36X	109.90	333.80
36Y	109.95	333.65
38X	110.10	334.40
38Y	110.15	334.25
40X	110.30	335.00
40Y	110.35	334.85
42X	110.50	329.60
42Y	110.55	329.45
44X	110.70	330.20
44Y	110.75	330.05
46X	110.90	330.80
46Y	110.95	330.65
48X	111.10	331.70
48Y	111.15	331.55
50X	111.30	332.30
50Y	111.35	332.15
52X	111.50	332.90
52Y	111.55	332.75
54X	111.70	333.50
54Y	111.75	333.35
56X	111.90	331.10
56Y	111.95	330.95

3.10.4   Selection the Localizer / Glideslope mode

This function determines which area (LLZ / GS) of the ground-based instrument landing system (ILS) should be checked. A selection will be made whether the Localizer (LLZ) or the Glideslope (GS) should be measured. The respective measurement parameters will be shown in a mode-specific display.

	Control	Operation	Function
1.	GS/LOC LOC	Press the softkey "GS / LLZ".	Switching over between Glideslope and Localizer mode, the current mode is shown in the softkey. GS/LLZ LLZ Selection: GS / LLZ

☞ *The previously selected receiving channel will be maintained during mode switch-over, however, the frequency will be changed per ICAO frequency list. As of SW release 3.2 you change when setting a frequency within the Localizer or Glideslope frequency range into the corresponding mode LLZ or GS automatically.*

3.10.5   Switch over the Display view in the ILS mode

This function enables the display to be switched between normal- and large views. In the large view, the most important parameters of a mode are displayed extra large, enabling them to be read from a large distance. The view "Distortion" comprises all measurement parameters for the determination of the distortion factors for the 90 / 150 Hz signal in the Localizer / Glideslope mode. Channel number / frequency, as well as the use of the softkey are still available during the large function.

	Control	Operation	Function
1.	VIEW Normal	Press the softkey "View" several times until the wanted display is set.	Switch over between Normal- / Distortion- / Large views, set mode is shown in the softkey. VIEW Normal Example: Select "Normal" view. Selection: Normal (normal view) Distortion (view distortion) Large (zoom view)

normal view   view distortion   zoom view (large)
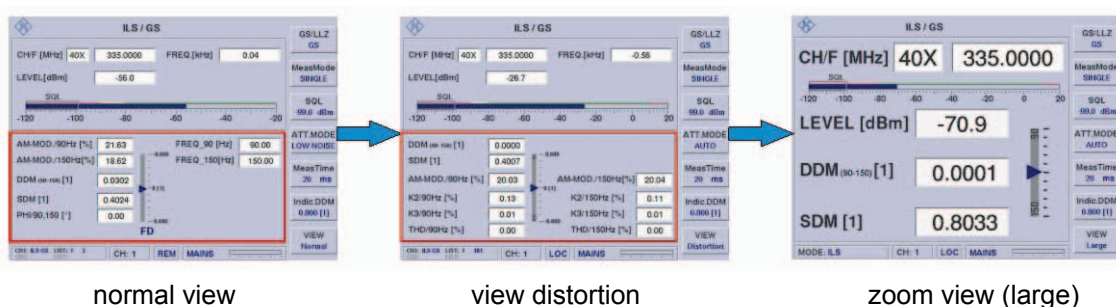
3.10.6   Processing Distortion measurements in ILS mode

Distortion measurements are used to evaluate the quality of the received ILS signals. The measurements provide information about not-so-ideal characteristics (non-linear properties) of the Localizer's and Glideslope's transmitter. The modulation of the 2nd and 3rd order will be measured selectively and the "Total Harmonic Distortion" (THD) will be determined. The THD-value specifies the ratio between the modulation's power and the power of the wanted signal plus the modulation. When determining the THD value, harmonic waves up the 4th order are considered.

	Control	Operation	Function
1.	VIEW Distortion	Press the softkey "View" several times until the distortion view is set.	The display switches to the ILS distortion function, the current mode is shown in the softkey. VIEW Distortion

The view "Distortion" contains all measurement parameters for the determination of the distortion factors for the 90 / 150 Hz signal in the Localizer / Glideslope mode.
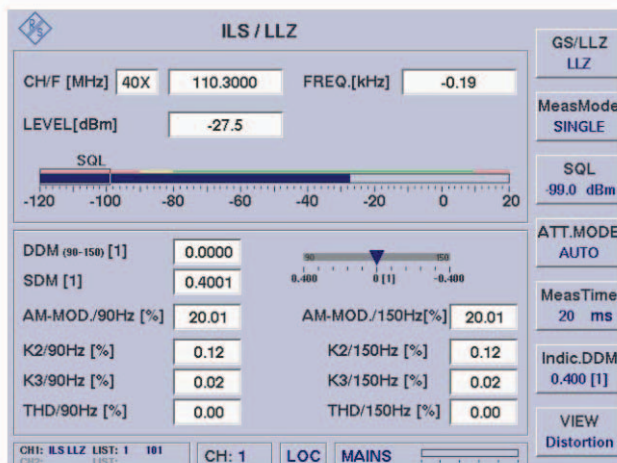
Example: View "Distortion" ILS / LLZ

While in the "CRS|CLR" measuring mode, distortion measurements are not possible!

3.10.6.1 Measured Values Section (4) of the ILS Distortion view

☞ *The following only describes the differences between the data displays "Distortion" vs. ILS view "Normal".*
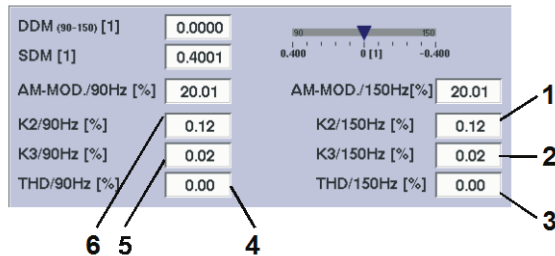
Example: View "Distortion" ILS / LLZ

Item	Display	Function	Indication
1	K2/150 Hz [%]	distortion 2rd order, 150-Hz signal	%
2	K3/150 Hz [%]	distortion 3rd order, 150-Hz signal	%
3	THD/150 Hz [%]	Total Harmonic Distortin (THD), 150-Hz signal	%
4	K2/90 Hz [%]	distortion 2rd order, 90-Hz signal	%
5	K3/90 Hz [%]	distortion 3rd order, 90-Hz signal	%
6	THD/90 Hz [%]	Total Harmonic Distortin (THD), 90-Hz signal	%

3.10.7 ILS measurement modes

In order to perform a differentiated signal analysis of the Course and Clearance signal while in ILS mode, the following measurement modes are available:

- Single (Single signal measuring)
- Course and Clearance signal measuring (CRS+CLR)
- Course signal measuring (CRS)
- Clearance signal measuring (CLR)
- parallel Course- + Clearance signal measuring (CRS|CLR)

Select a measurement mode

	Control	Operation	Function
1.		Press the softkey "Meas-Mode" several times until the measurement mode is set.	The display switches to the Course and Clearance signal measuring, the current mode is shown in the softkey. Example: Course and Clearance signal measuring

☞ *The following sections describe the operation and the technical features of the individual measurement modes.*

3.10.7.1 Single signal measuring

The function Single signal measurement measures the preset channel frequency on the narrow band. The nominal width of the filter band is 12.4 kHz (±0.1 dB); the measured deviation in relation to the preset frequency will be displayed in kHz in the frequency field.
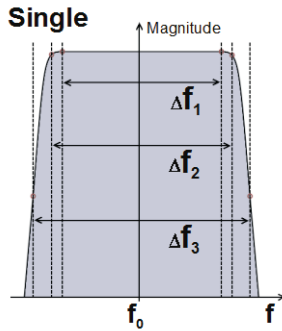
Filter curves Single signal measuring		
$\Delta f1$	Filter flatness (ripple <0.1dB)	12.4 kHz
$\Delta f2$	-3 dB bandwidth	14.8 kHz
$\Delta f3$	-60 dB stop band attenuation	18.8 kHz

3.10.7.1.1 Select the Single signal measuring mode

	Control	Operation	Function
1.	MeasMode SINGLE	Press the softkey "Meas-Mode" several times until the "Single" measurement mode is set.	The display switches to the Single signal measuring, the current mode is shown in the softkey:

The deviation with respect to the preset channel frequency is shown in the display field frequency (1).
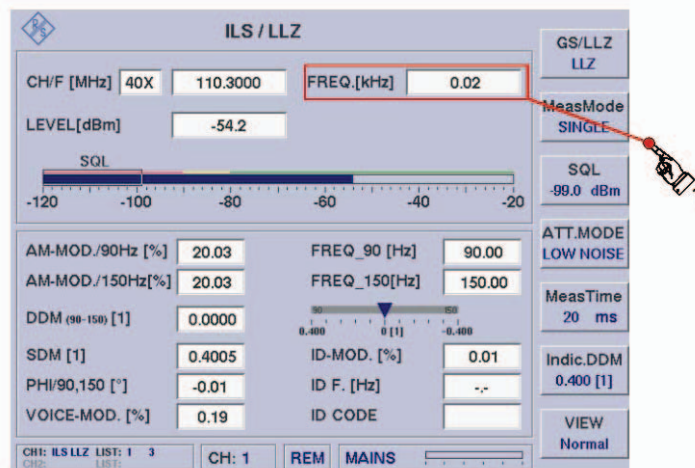
3.10.7.2   Wideband signal measuring

The function Wideband signal measurement measures the preset channel frequency broadband. The nominal bandwidth of the filter is 32,0 kHz (±0.1 dB).
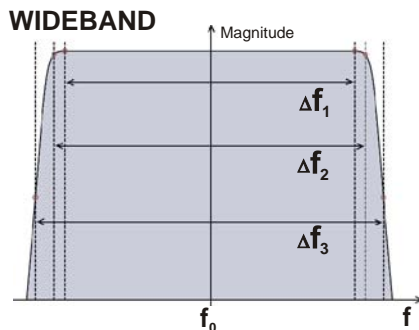
WIDEBAND

Filter bandwidth Wideband signal measuring		
Δf1	Filter flatness (ripple <0,1dB)	32,0 kHz
Δf2	-3 dB bandwidth	34,9 kHz
Δf3	-60 dB stop band attenuation	39,1 kHz

3.10.7.2.1   Messmode Wideband-Signalmessung anwählen

	Bedienelement	Aktion	Beschreibung
1.	MeasMode WIDEBAND	Press the softkey "Meas-Mode" several times until the "WIDEBAND" mode is set.	The display switches to the Wideband signal measurement, the current mode is shown in the softkey.

In the adjusted measuring mode " Wideband " the indication areas for frequency (1) and level (2) are grey. The displayed values are thus invalid.

3.10.7.3   Course and Clearance Signal measuring

The Course and Clearance signal measuring analyses the ILS dual frequency systems, whereby one signal lies slightly above and the second signal slightly below the nominal channel frequency. In order to capture both signals simultaneously, measurements are taken on a broadband, using the preset receiving frequency. The filterbandwidth (CRS+CLR) is 32.0 kHz (±0.1 dB) nominal.
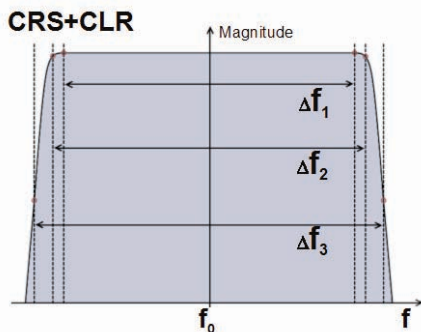
Filter bandwidths CRS+CLR signal measuring		
$\Delta f1$	Filter flatness (ripple <0.1dB)	32.0 kHz
$\Delta f2$	-3 dB bandwidth	34.9 kHz
$\Delta f3$	-60 dB stop band attenuation	39.1 kHz

3.10.7.3.1   Select the Course and Clearance signal measuring

	Control	Operation	Function
1.		Press the softkey "Meas-Mode" several times until the "CRS+CLR" measurement mode is set.	The display switches to the Course and Clearance signal measuring, the current mode is shown in the softkey:

While in "CRS+CLR" measuring mode, both Course and Clearance frequencies are displayed simultaneously. Furthermore, while in the setup function "Units", a selection may be made, whether to receive the Course or the Clearance signal along the upper frequency (UF); consequently, depending on the selection, the other signal will therefore be assigned to the lower frequency (LF).

☞ *When measuring the level in CRS+CLR mode, only those parts of a signal will be considered, which lie within the separation filters for CRS and CLR*

(see filter diagrams in Section 3.10.7.3). Therefore, the level of a single signal, which coincides precisely with the channel frequency, will not be displayed correctly!

3.10.7.4   Separate measurements of Course or Clearance signals

While in CRS and CLR mode, the respective signal will be filtered, demodulated and analyzed on its own. The nominal filter bandwidth is 12.4 kHz (±0.1 dB) with a capacity (at filter center) of ±10 kHz of the preset channel frequency.
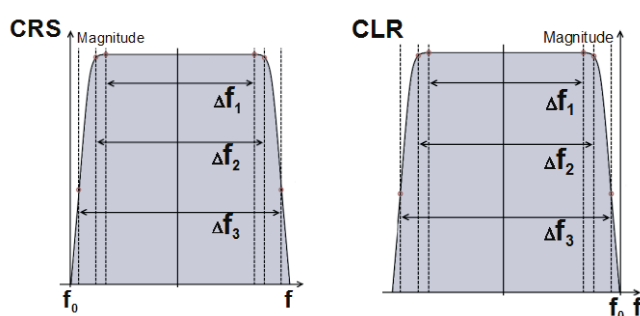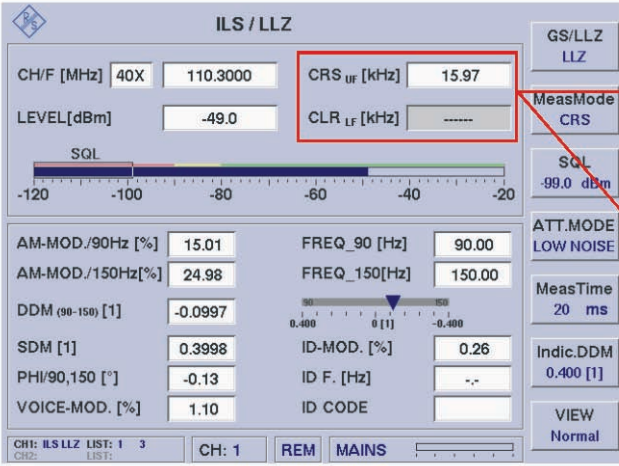
Filter bandwidths CRS/CLR signal measuring		
$\Delta f1$	Filter flatness (ripple <0.1dB)	12.4 kHz
$\Delta f2$	-3 dB bandwidth	14.8 kHz
$\Delta f3$	-60 dB stop band attenuation	18.8 kHz

3.10.7.4.1   Select the "CRS" or "CLR" measuring mode

	Control	Operation	Function
1.		Press the softkey "Meas-Mode" several times until the "CRS" or "CLR" measurement mode is set.	The display switches to the Course or Clearance signal measuring, the current mode is shown in the softkey:
	In the set measuring mode "CRS" or "CLR", the respective Course or Clearance frequency will be shown. The display of the measurement mode, which is not active, will be dimmed gray. Furthermore, while in the setup function "Units", a selection may be made, whether to receive the Course or the Clearance signal along the upper frequency (UF); consequently, depending on the selection, the other signal will therefore be assigned to the lower frequency (LF).		

Control	Operation	Function

3.10.7.5 Parallel Course and Clearance signal measuring (Option EVS-K3)

While in the function CRS|CLR (parallel Course and Clearance display - optional feature), both the Course and Clearance signal will be demodulated and analyzed simultaneously, however separate from each other. In addition, the sum signal (corresponds with the CRS+CLR mode) will be demodulated and analyzed.
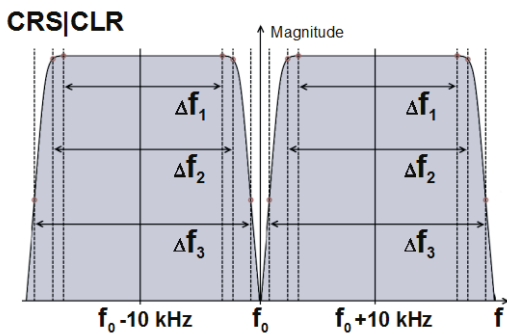
Filter bandwidths CRS|CLR signal measuring		
$\Delta f1$	Filter flatness (ripple <0.1dB)	12.4 kHz
$\Delta f2$	-3 dB bandwidth	14.8 kHz
$\Delta f3$	-60 dB stop band attenuation	18.8 kHz

3.10.7.5.1 Select the CRS|CLR measuring mode

	Control	Operation	Function
1.		Press the softkey "Meas-Mode" several times until the "CRS|CLR" measurement mode is set.	The display switches to the parallel Course or Clearance signal measuring, the current mode is shown in the softkey:

Control	Operation	Function

In addition, a frequency / channel change can be performed the same way as in "Normal" view.
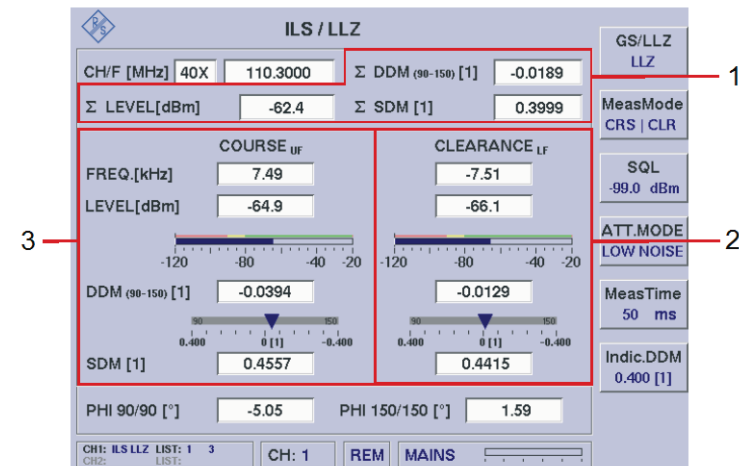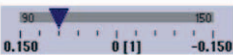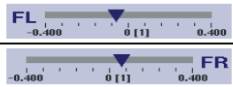
1 - Indication of the sum signal's parameters
2 - Indication of the Course signal's
3 - Indication of the Clearance signal's

3.10.7.5.2   Signal Parameters and Display in the CRS|CLR window (Option EVS-K3)
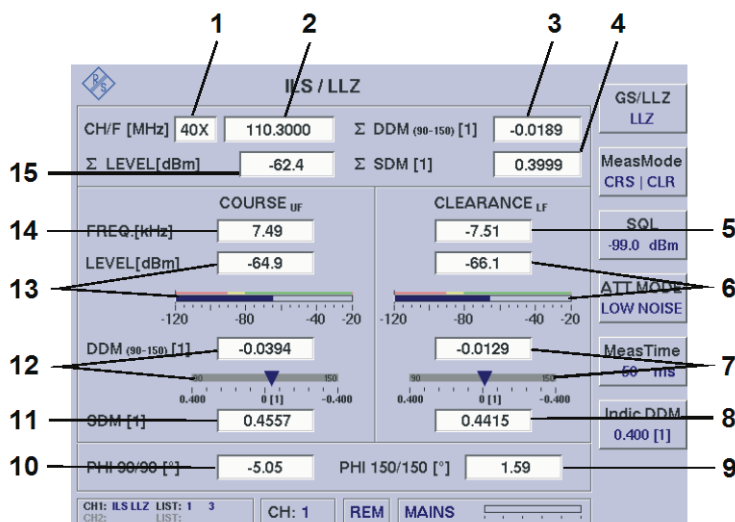
Item	Display	Function	Indication
1	CH	Channel reading / channel setting (frequency assignment according to ICAO-frequency list)	e.g. 40X
2	F [MHz]	Reading and setting of the receive frequency (receive frequency setting by channel setting according to ICAO-frequency list)	MHz

Item	Display	Function	Indication
3	∑ DDM (90-150) [1]	DDM value of the sum signal (CRS+CLR) (Setting of the units in the setup)	μA , %, 1 (1 = dimensionless value)
4	∑ SDM [1]	SDM value of the sum signal (CRS+CLR) (Setting of the units in the setup)	μA , %, 1 (1 = dimensionless value)
5	FRQ. [kHz]	Display of the measured Clearance / Course LF frequency (3*) relative to the measured channel frequency.	kHz
6	LEVEL [dBm]	Measured receive level of the Clearance / Course LF signals (3*), numerical / bargraph) in dBm / dBµV (setup selection)	dBm / dBµV
7	DDM (90-150) [1]	Measured Difference in Depth of Modulation (DDM) of the Clearance / Course LF signals (3*). (Setting of the units in the setup)	μA , %, 1 (1 = dimensionless value)
	Bargraph	Graphic display of the DDM value of the measured Clearance / Course LF signal (3*) depends on the display mode MeasDev. / Cockpit, setup selection) and the preset measurement mode LLZ / GS. *The bargraph is omitted in measurement mode "GS"* Display mode **MeasDev.** at the measuring mode LLZ: Example: LLZ mode ***When exceeding the indicating range the arrow turns red!*** Display mode **Cockpit** (flight course indication) at the measuring mode LLZ: Fade in: FR (Fly Right), FL (Fly Left) Example: LLZ mode ***When exceeding the indicating range the arrow turns red!***	
8	SDM [1]	Measured Sum of Modulation (SDM) of the Clearance / Course LF signals (3*). (Setting of the units in the setup)	μA , %, 1 (1 = dimensionless value)
9	PHI 150/150 [°]	Phase between the two 150-Hz signals of the measured Course and Clearance LF signals (3*).	[°] degree
10	PHI 90/90 [°]	Phase between the two 90-Hz signals of the measured Course and Clearance LF signals (3*).	[°] degree
11	SDM [1]	Measured Sum of Modulation (SDM) of the Clearance / Course UF signals (4*). (Setting of the units in the setup)	μA , %, 1 (1 = dimensionless value)
12	DDM (90-150) [1]	Measured Difference in Depth of Modulation (DDM) of the Clearance / Course UF signals (4*). (Setting of the units in the setup)	μA , %, 1 (1 = dimensionless value)

Item	Display	Function	Indication
	Bargraph	Graphic display of the DDM value of the measured Clearance / Course UF signal (4*), otherwise, same as Item 7.	
13	LEVEL [dBm]	Measured receive level of the Clearance / Course UF signals (4*), numerical / bargraph) in dBm / dBµV (setup selection)	dBm / dBµV
14	FRQ. [kHz]	Display of the measured Clearance / Course UF frequency (4*) relative to the measured channel frequency.	kHz
15	$\sum$ LEVEL [dBm]	The sum of the single levels of Course and Clearance signal. Only these signal parts will be considered, which lie within the separation filter for CRS and CLR.	dBm / dBµV
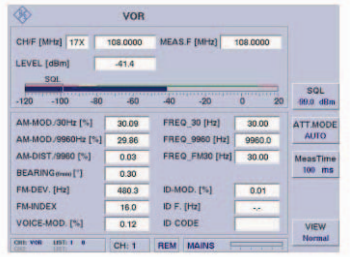
*   Measurement accuracies are given in the Technical Data!

3* LF = lower frequency
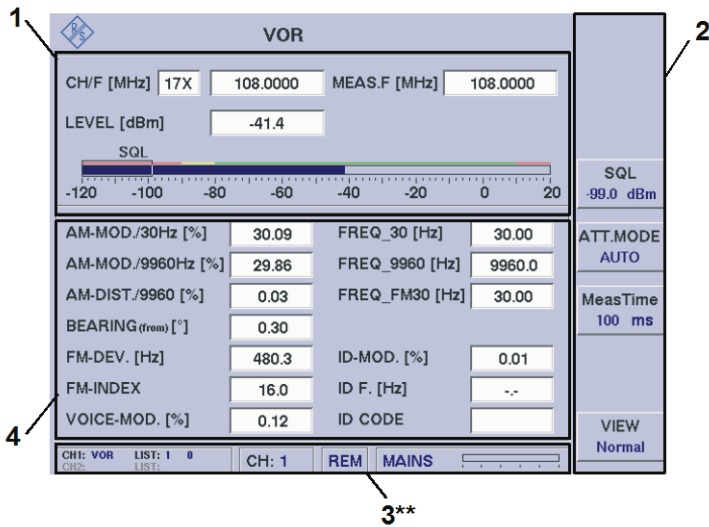
4* UF = upper frequency

3.11 VOR mode operation

Activates the VOR mode

	Control	Operation	Function
1.	VOR or SPLIT	Press the "VOR" (6) button. Press the "SPLIT" (13) button and select the VOR mode.	The R&S® EVS 300 switches over into the VOR mode.

3.11.1 Signal Parameters and Display in the VOR mode

3** for general description of the status field, refer to 3.2.1.1

3.11.1.1   RF Parameter Section (1)

Item	Display	Function	Indication
1	CH/F [MHz]	Channel reading / channel setting (frequency assignment according to ICAO-frequency list)	z.B. 38X
2	CH/F [MHz]	Reading and setting of the receive frequency (receive frequency setting by channel setting according to ICAO-frequency list)	MHz
3	MEAS.F. [MHz]	Reading of the measured VOR frequency	MHz
4	SQL	Graphic display (bargraph) of the measured level, as well as the preset squelch threshold. The green line above the bargraph marks the valid range, which is indicated in the data sheet. Information contained in the datasheet has no or only limited validity in the range identified by the red or yellow bar.	dBm / dBµV
5	LEVEL [dBm]	Measured receive level (numerical / bargraph) in dBm / dBµV with the settable antenna correction factor (0.0) from the setup, if this level was selected as ≠0.0.	dBm / dBµV LEVEL[dBm] 5.0

3.11.1.2   Measured Values Section (4)

Item	Display	Function	Indication
6	AM-MOD./ 30 Hz [%]	AM-modulation factor, 30-Hz signal	%
7	AM-MOD./ 9960 Hz [%]	AM-Modulationsgrad, 9960-Hz-sub carrier signal	%
8	FREQ_30 [Hz]	measured 30-Hz frequency (AM modulates)	Hz
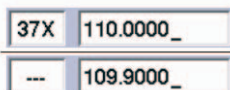
Item	Display	Function	Indication
9	FREQ_9960 [Hz]	measured 9960-Hz frequency (AM modulates)	Hz
10	FREQ_FM30 [Hz]	measured 30-Hz frequency (FM modulates)	Hz
11	ID-MOD.[%]	Modulation factor of the Identifier	%
12	ID-F.[Hz]	measured frequency of the Identifier	Hz
13	ID-CODE	decoded identifier code	e.g. "IKOW"
14	VOICE-MOD.[%]	AM-Modulation factor of the voice signal (in the range 300 ... 3000 Hz, identifier notched)	%
15	FM-INDEX	FM-Index	Hz
16	FM-DEV. [Hz]	FM-Hub	Hz
17	BEARING (to/from)[°]	Phase between both 30-Hz signals VOR direction (to = plane, from = station) is settable in the setup.	[°] Degree
18	AM-DIST./ 9960 [%]	AM-distortion at the 9960 Hz frequency	%

*   Measurement accuracies are given in the Technical Data!

3.11.1.3   Softkey (2)

Display	Function
SQL -99.0 dBm	Activates the edit function for the squelch threshold (SQL value is shown in the softkey) *Setting of the squelch threshold is described in section 3.6!*
ATT.MODE AUTO	Switch over of the RF-attenuation, set range is shown in the softkey: - LOW NOISE (+10 dB), Indicating range: -120 … -20 dBm - NORM (Normal, 0dB) Indicating range: -110 … -10 dBm - LOW DIST (Low Distortion, -25dB) Indicating range: -100 … 20 dBm - AUTO (the most favorable range will be selected automatically) Indicating range: -120 … 20 dBm *The max. input level is +13 dBm. The Setting of the RF-Signal Adjustment is described in section 3.5!*
MeasTime 100 ms	Activates the measurement time Setting value: 10 … 2000 ms (10 ms step width) *Setting of the measurement time is described in section 3.7!*
VIEW Normal	Switch over (1*) between Normal- and Large views, set mode is shown in the softkey: - Normal (normal view) - Large (zoom view)

3.11.2   Setting the Receiving frequency in the VOR mode

VOR: 108 ... 118 MHz

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	Behind the last digit the cursor appears. 110.3000_
2.		Setting the corresponding frequency with rollkey / keyboard.	Enter the frequency, including the appropriate decimal places. If the frequency corresponds with a defined channel (ICAO frequency list, 3.10.3.1), then the channel number will be shown in the channel display window; otherwise dashes will be shown. 37X 110.0000_ --- 109.9000_
3.		Confirm with the correct dimension or Press the Enter button / push rollkey.	Acceptance of the new set frequency. 110.0000

NOTES

1) *On frequency input the complete frequency range (70 ... 350 MHz) can be entered independent from the mode. However, the data content is only given at mode specific frequency ranges:*

   VOR: 108 ... 118 MHz

   With the "ESC" button any time a break off of the function is possible and the old value will be restored!

2) *If the frequency setting will be performed with the rollkey or the cursor buttons, the corresponding target channels will be displayed according to the ICAO frequency list in the channel window.*

3) *The frequency step width (0.001 ... 10.000 MHz) is settable in the setup (F-Step) when using the rollkey or the cursor buttons.*

3.11.3 Setting the Receiving channel in the VOR mode

	Control	Operation	Function
1.	FREQ	Press (2x) the "FREQ" (9) button.	Switching over into the edit function for channel input (frequency assignment according to ICAO-frequency list, 3.10.3.1). The channel section is activated and behind the last digit the cursor appears. 51Y
2.	0 : 9	Use the rollkey / keyboard to set the respective channel number and use the up/down arrows to set X or Y	Only digits entry. (see also ILS-frequency / channel list). The frequency (ICAO frequency list, 3.10.3.1) associated with the channel will be displayed in the frequency field 51Y 111.4500
3.	ENTER	Press the Enter button / push rollkey.	Acceptance of the new set channel no. 51Y

NOTES

1) **On channel input via the tens keyboard the mode specific channel ranges must be observed:**

   VOR: 18X ... 56Y

   When the channel ranges are exceeded or when they fall below, the digits in the frequency section will be displayed in red and they cannot be used!

2) **With the "ESC" button any time a break off of the function is possible and the old value will be restored!**

3) **If the frequency setting will be performed with the rollkey or the cursor buttons, the corresponding frequencies will be displayed during setting!**

3.11.3.1   VOR-Channel Frequency List
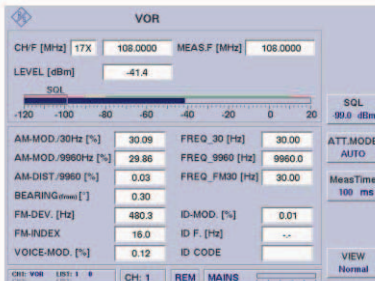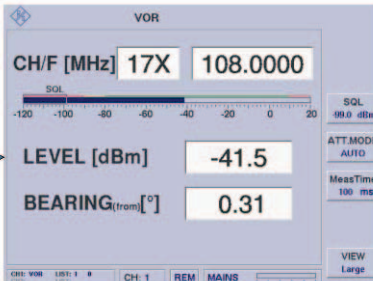
Channel (ICAO)	Frequency (MHz)	Channel (ICAO))	Frequency (MHz)	Channel (ICAO))	Frequency (MHz)
17X	108,00	75Y	112,85	104X	115,70
17Y	108,05	76X	112,90	104Y	115,75
19X	108,20	76Y	112,95	105X	115,80
19Y	108,25	77X	113,00	105Y	115,85
21X	108,40	77Y	113,05	106X	115,90
21Y	108,45	78X	113,10	106Y	115,95
23X	108,60	78Y	113,15	107X	116,00
23Y	108,65	79X	113,20	107Y	116,05
25X	108,80	79Y	113,25	108X	116,10
25Y	108,85	80X	113,30	108Y	116,15
27X	109,00	80Y	113,35	109X	116,20
27Y	109,05	81X	113,40	109Y	116,25
29X	109,20	81Y	113,45	110X	116,30
29Y	109,25	82X	113,50	110Y	116,35
31X	109,40	82Y	113,55	111X	116,40
31Y	109,45	83X	113,60	111Y	116,45
33X	109,60	83Y	113,65	112X	116,50
33Y	109,65	84X	113,70	112Y	116,55
35X	109,80	84Y	113,75	113X	116,60
35Y	109,85	85X	113,80	113Y	116,65
37X	110,00	85Y	113,85	114X	116,70
37Y	110,05	86X	113,90	114Y	116,75
39X	110,20	86Y	113,95	115X	116,80
39Y	110,25	87X	114,00	115Y	116,85
41X	110,40	87Y	114,05	116X	116,90
41Y	110,45	88X	114,10	116Y	116,95
43X	110,60	88Y	114,15	117X	117,00
43Y	110,65	89X	114,20	117Y	117,05
45X	110,80	89Y	114,25	118X	117,10
45Y	110,85	90X	114,30	118Y	117,15
47X	111,00	90Y	114,35	119X	117,20
47Y	111,05	91X	114,40	119Y	117,25
49X	111,20	91Y	114,45	120X	117,30
49Y	111,25	92X	114,50	120Y	117,35
51X	111,40	92Y	114,55	121X	117,40
51Y	111,45	93X	114,60	121Y	117,45
53X	111,60	93Y	114,65	122X	117,50
53Y	111,65	94X	114,70	122Y	117,55
55X	111,80	94Y	114,75	123X	117,60
55Y	111,85	95X	114,80	123Y	117,65
57X	112,00	95Y	114,85	124X	117,70
57Y	112,05	96X	114,90	124Y	117,75
58X	112,10	96Y	114,95	125X	117,80
58Y	112,15	97X	115,00	125Y	117,85
59X	112,20	97Y	115,05	126X	117,90
59Y	112,25	98X	115,10	126Y	117,95
70X	112,30	98Y	115,15		
70Y	112,35	99X	115,20		
71X	112,40	99Y	115,25		
71Y	112,45	100X	115,30		
72X	112,50	100Y	115,35		
72Y	112,55	101X	115,40		
73X	112,60	101Y	115,45		
73Y	112,65	102X	115,50		
74X	112,70	102Y	115,55		
74Y	112,75	103X	115,60		
75X	112,80	103Y	115,65		

3.11.4   Switch over the Display view in the VOR mode

This function enables the display to be switched between normal- and large views. In the large view, the most important parameters of a mode are displayed extra large, enabling them to be read from a large distance. Channel number / frequency, as well as the use of the softkey are still available during the zoom function.

	Control	Operation	Function
1.		Press the softkey "VIEW".	Switch over between Normal- and Large views, set mode is shown in the softkey Selection: Normal (normal view) Large (zoom view)
	normal view		zoom view (large)

3.12 MARKER BEACON mode operation

Activates the MARKER BEACON mode

	Control	Operation	Function
1.	 or 	Taste "BEACON" (5) drücken. Press the "SPLIT" (13) button and select the MARKER BEACON mode.	The R&S® EVS 300 switches over into the MARKER BEACON mode.

3.12.1   Signal Parameters and Display in the MARKER BEACON mode
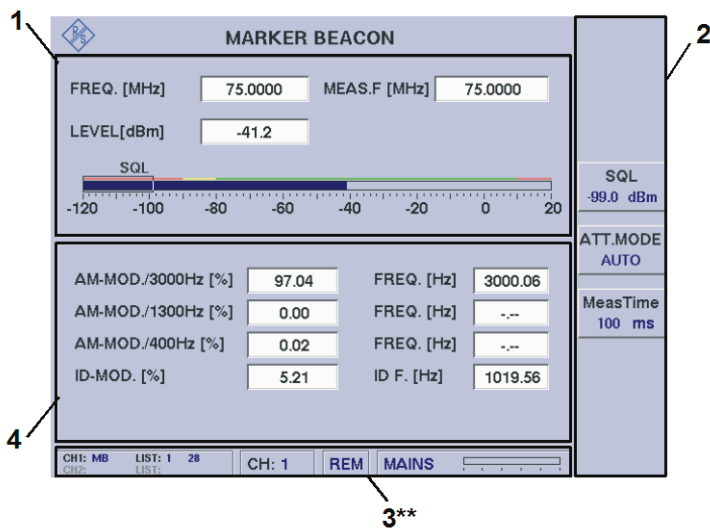
3** for general description of the status field, refer to 3.2.1.1

3.12.1.1   RF Parameter Section (1)

Item	Display	Function	Indication
1	FREQ. [MHz]	Reading and setting of the receive frequency	MHz
2	MEAS.F. [MHz]	Reading of the measured beacon carrier frequency	MHz
3	SQL	Graphic display (bargraph) of the measured level, as well as the preset squelch threshold. The green line above the bargraph marks the valid range, which is indicated in the data sheet. Information contained in the datasheet has no or only limited validity in the range identified by the red or yellow bar.	dBm / dBµV
4	LEVEL [dBm]	Measured receive level (numerical / bargraph) in dBm / dBµV with the settable antenna correction factor (0.0) from the setup, if this level was selected as ≠0.0.	dBm / dBµV LEVEL[dBm] 5.0

3.12.1.2   Measured Values Section (4)

Item	Display	Function	Indication
5	AM-MOD./ 3000 Hz [%]	AM-modulation factor of the 3000-Hz markers	%
6	AM-MOD./ 1300 Hz [%]	AM-modulation factor of the 1300-Hz markers	%
7	FREQ. [Hz]	measured 3000-Hz marker frequency	Hz
8	FREQ. [Hz]	measured 1300-Hz marker frequency	Hz
9	FREQ. [Hz]	measured 400-Hz marker frequency	Hz
10	ID F. [Hz]	measured identifier frequency	Hz
11	ID-MOD. [%]	AM-modulation factor of the identifier	%
12	AM-MOD./ 400 Hz [%]	AM- modulation factor of the 400-Hz marker	%
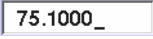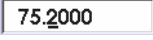
*   Measurement accuracies are given in the Technical Data!

3.12.1.3   Softkeys (3)

Display	Function
SQL -99.0 dBm	Activates the edit function for the squelch threshold (SQL value is shown in the softkey) *Setting of the squelch threshold is described in section 3.6!*
ATT.MODE AUTO	Switch over of the RF-attenuation, set range is shown in the softkey: - LOW NOISE (+10 dB), Indicating range: -120 … -20 dBm - NORM (Normal, 0dB) Indicating range: -110 … -10 dBm - LOW DIST (Low Distortion, -25dB) Indicating range: -100 … 20 dBm - AUTO (the most favorable range will be selected automatically) Indicating range: -120 … 20 dBm *The max. input level is +13 dBm. The Setting of the RF-Signal Adjustment is described in section 3.5!*
MeasTime 100 ms	Activates the measurement time Setting value: 10 … 2000 ms (10 ms step width) *Setting of the measurement time is described in section 3.7!*

3.12.2   Setting the Receiving frequency in the MARKER BEACON mode

MARKER BEACON: 74,7 ... 75,3 MHz

	Control	**Operation**	**Function**
1.	FREQ	Press the "FREQ" (9) button.	Behind the last digit the cursor appears. 75.1000_
2.		Setting the corresponding frequency with rollkey / key-board.	The frequency should be entered with the corresponding decimal place. 75.2000
3.		Confirm with the correct di-mension or Press the Enter button / push rollkey.	Acceptance of the new set frequency. 75.2000

Notes

1) *On frequency input the complete frequency range (70 ... 350 MHz) can be entered independent from the mode. However, the data content is only given at mode specific frequency ranges:*

   MARKER BEACON: 74.7 ... 75.3 MHz

2) *With the "ESC" button any time a break off of the function is possible and the old value will be restored!*

3) *The frequency step width (0.001 ... 10.000 MHz) is settable in the setup (F-Step) when using the rollkey or the cursor buttons.*

3.13 F SCAN, FFT and Scope mode (Options) operation

F SCAN mode (Option EVS-K1), *FFT mode (Option EVS-K4) and the Scope mode (Option EVS-K7) are software options that can be installed in the R&S® EVS 300 independently of each other.*
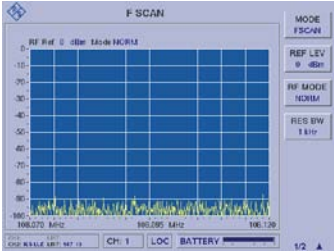
In the following text, the operation of these modes will be discussed separately; however, some operating features are identical.

3.13.1 F SCAN mode (Option EVS-K1) operation

In F SCAN mode, the settings for the receiving frequency and Marker function are activated via the device buttons "FREQ" (9) and "MARKER" (11). Depending on the selected function, the respective softkeys will be shown in the F SCAN display. In the modes F SCAN / FFT, the following settings will be stored individually for each mode:

-        Frequency settings,
-        Marker settings,
-        Reference level,
-        RF mode,
-        Trace settings,
-        Display settings

Activates the F SCAN mode (Option EVS-K1)

	Control	Operation	Function
1.	F SCAN ⇓ MODE FSCAN or SPLIT	Press the "F SCAN" button and change with softkey "MODE" in the F SCAN mode. Press the "SPLIT" (13) button and select the FSCAN mode.	The R&S® EVS 300 switches over into the F SCAN mode.

If all the options are installed, the system switches to that mode, which was active last, either F SCAN, FFT or Scope mode.

3.13.1.1   Signal Parameters and Display in the F SCAN mode (Option EVS-K1)
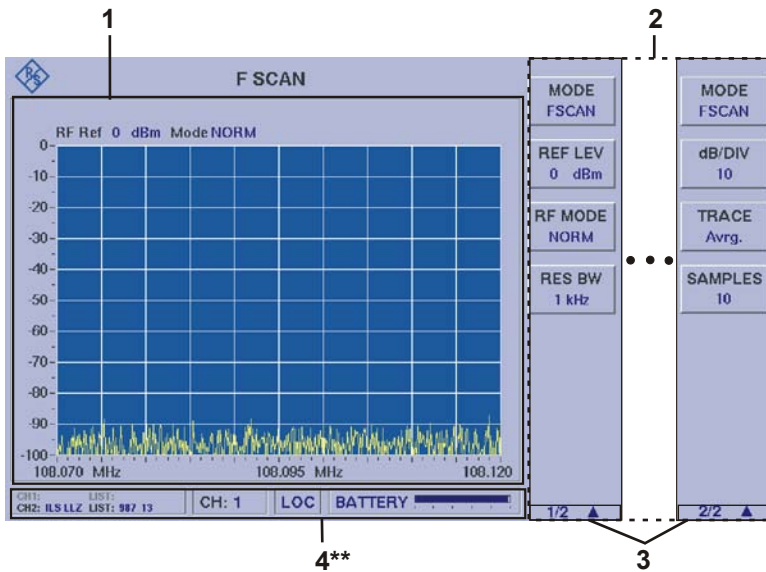
4**   for general description of the status field, refer to 3.2.1.1

☞ *Due to the multitude of settings offered, two softkey bars are available. The currently displayed softkey bar will be identified with the 1/2 e.g. 2/2 ▲ - symbol (3). Use the "⬆" -button to switch back and forth between the soft- key bars.*

3.13.1.1.1   Spectrum-Display F SCAN (1)
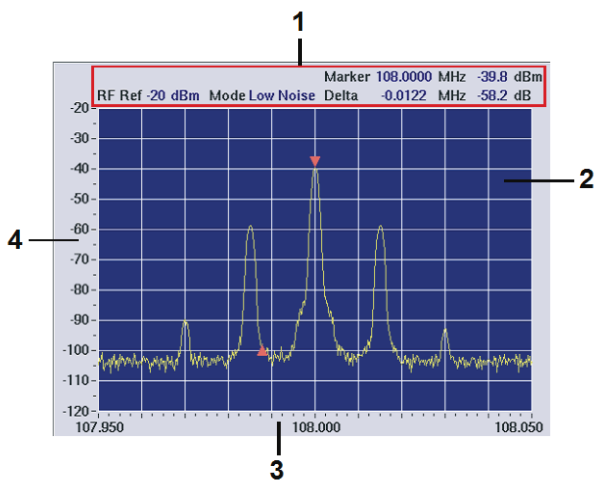
Item	Display	Function	Indication
1	Parameter indication	Indication and setting of the following parame- ter: RF REF: Indication of the reference level in dBm / dBµV.	

Item	Display	Function	Indication
		Mode: Indication of the ATT mode, set with the "RF Mode" softkey. Marker: Indication and setting of the Marker frequency (MHz) and indication of the measured level (dBm / dBμV). Delta: Indication and setting of the Delta Marker frequency (MHz) and indication of the measured level difference in dB.	
2	Display	Graphic display (bargraph) of the frequency spectrum, indication of level vs. frequency. Y-axis= level X-axis= frequency	frequency spectrum
3	Frequency (X-axis)	Frequency scale	MHz
4	Level (Y-axis)	Level scale	dBm / dBμV

3.13.1.1.2   Softkeys (2)

Display	Function
Softkey bar 1	
MODE FSCAN	Switching of the analysis mode, F SCAN or FFT, if both options are installed. F SCAN = spectrum analysis of the receiver signal FFT = analysis of the demodulated baseband signal or one of the externally fed AF signals (BASEBAND IN) (FFT = Fast Fourier Transform)
REF LEV 0 dBm	Setting of the reference level, set level (dBm / dBμV settable in the setup) is shown in the softkey and the display. Setting value: +20 … -100 dBm
RF MODE NORM	Switch over of the RF-attenuation, set range is shown in the softkey: - LOW NOISE (+10 dB), Indicating range: -120 … -20 dBm - NORM (Normal, 0dB) Indicating range: -110 … -10 dBm - LOW DIST (Low Distortion, -25dB) Indicating range: -100 … 20 dBm - Coupled, coupling of the reference level with an automatic adjustment of the RF input attenuation ☞ ***The max. input level is +13 dBm. The Setting of the RF-Signal Adjustment is described in section 3.5!***

Display	Function
RES BW 1 kHz	Switch over of the bandwidth Selection: 30 kHz, 10 kHz, 3 kHz, 1 kHz
Softkey bar 2	
dB/DIV 10	Setting of the resolution (scaling of the Y axis), set level is shown in the softkey: Selection: 10 dB, 5 dB, 2 dB, 1 dB
TRACE Avrg.	Switch over of the trace function, set function is shown in the softkey: Selection: Clr / Wr. (Clear / Write) Avrg. (Average) Max Hold View
SAMPLES 10	Setting the number of samples, for the average, set number of samples is shown in the softkey. Setting range: 1 … 100 *Can only be adjusted in the Trace function "Average".*

3.13.1.2   Frequency setting at F SCAN mode

In F SCAN mode all receiving frequency settings are activated via the device button "FREQ" (9). Depending on the selected function, the softkeys will be shown in the F SCAN display. At this point, the start, stop, center, and span frequency can be entered.

Example: Flow of a frequency setting

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	The softkeys for the frequency setting in F SCAN mode are shown. Softkey: Start F (entering start frequency), Softkey: Stop F (entering stop frequency), Softkey: Center F (entering center freq.), Softkey: Span F (entering span frequency)
	 Normal view F SCAN mode	 Frequency setting view	
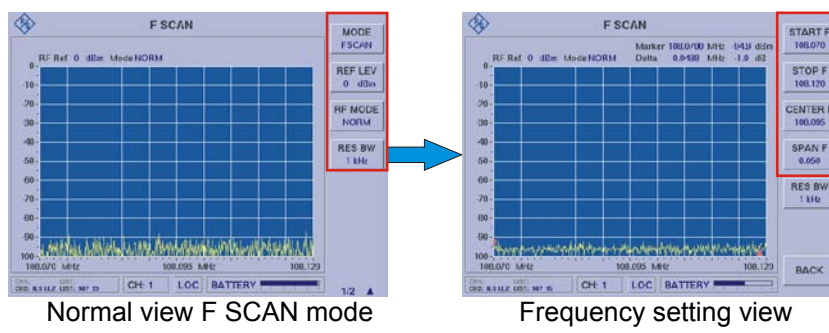
3.13.1.2.1   Softkeys (2) of the Frequency setting

Display	Function
START F 118.000	Activates the edit function for the start frequency, set frequency is shown in the softkey.
STOP F 120.000	Activates the edit function for the stop frequency, set frequency is shown in the softkey.
CENTER F 119.000	Activates the edit function for the center frequency, set frequency is shown in the softkey.
SPAN F 2.000	Activates the edit function for the span frequency, set frequency is shown in the softkey.
BACK	Change to the F SCAN Softkey bar 1/2 switched on before.

3.13.1.3   Flow of a Frequency setting in F SCAN mode

In the following text, the flow for the setting of the start frequency will be described. These steps are also representative for the setting **Stop, Center, and Span frequency.**

	Control	Operation	Function
1.	START F 118.000	Press the softkey "START F".	Activation of the edit function for changing the start frequency. START F 118.000
2.	(rollkey)	Turn the rollkey until the required frequency is set.	Setting the new start frequency. **-** = Frequency decreases **+** = Frequency increases START F 120.000

Features:	When setting the frequencies, the analogously linked frequencies will be automatically adjusted. The respective changes will be displayed simultaneously in the associated softkeys. The following frequency dependencies are set:

Start frequency setting: Center and Span frequency are adapted,
Stop frequency setting: Center and Span frequency are adapted,
Center frequency setting: Start and Stop frequency are adapted,
Span frequency setting: Start and Stop frequency are adapted.

3.	(ENTER)	Press the Enter button / push rollkey.	Acceptance of the actually set new start frequency.

3.13.1.4   Setting the IF bandwidth
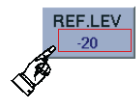
	Control	Operation	Function
1.	RES BW 30 kHz	Press the softkey "RES BW" several times until the IF bandwidth is set.	The IF bandwidth changes and the set value is displayed in the softkey. RES BW 30 kHz Selection: 30 kHz, 10 kHz, 3 kHz, 1 KHz

When setting a lower IF bandwidth, the resolution of the frequency spectrum will be increased. In addition, the hissing sound will be reduced and subsequently the input sensitivity will be increased.

Depending on the preset span frequency range, the following settable IF bandwidths are permitted:

Span frequency: <2 MHz   RES BW: 30 kHz, 10 kHz, 3 kHz, 1 kHz
Span frequency: >2 MHz   RES BW: 30 kHz, 10 kHz, 3 kHz
Span frequency: >20 MHz   RES BW: 30 kHz, 10 kHz
Span frequency: >100 MHz   RES BW: 30 kHz

3.13.1.5   Setting the Reference level
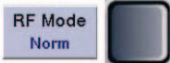
The reference level indicates the max. permissible level value of the input signal, which can be displayed undistorted. Higher signal levels cause overmodulation of the receiver; should this happen, a warning will be displayed.

> *The maximal levels of the individual RF modes must be adhered to. They must not be exceeded, even if the reference level (REF LEV) is set higher!*

	Control	Operation	Function
1.	REF.LEV -20	Press the softkey "REF LEV".	Activation of the edit function for changing the reference level, set value is shown in the softkey. REF.LEV -20
2.	(rollkey)	Turn the rollkey until the required level is set.	Setting of the reference level, set level Pegel (dBm / dBµV settable in the setup) is shown in the softkey and the display. Setting range: -100 … +20 dBm, 7 … 127 dBµV
3.	(enter)	Press the Enter button / push rollkey.	Acceptance of the actually set new reference level.

3.13.1.6   Setting the RF mode
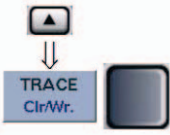
	Control	Operation	Function
1.	RF Mode Norm	Press the softkey "RF Mode" several times until the RF mode is set.	Switch over the RF attenuation.

Switch over of the RF-attenuation, set range is shown in the softkey:

- LOW NOISE (+10 dB),
  Indicating range: -120 … -20 dBm
- NORM (Normal, 0dB)
  Indicating range: -110 … -10 dBm
- LOW DIST (Low Distortion, -25dB)
  Indicating range: -100 … 20 dBm
- Coupled, coupling of the reference level with an automatic adjustment of the RF input attenuation

The max. input level is +13 dBm. The Setting of the RF-Signal Adjustment is described in section 3.5!

3.13.1.7   Setting the Resolution (level scale)

To analyze very small spectral shares of a signal the resolution of the Y axis can setting gradually 10 … 1 dB.

	Control	Operation	Function
1.	dB/DIV 10	Press the softkey "dB / div" several times until the wanted value is set..	Setting the resolution (level scale), set value is shown in the softkey. The respective setting becomes effective immediately. dB/DIV 10 Selection: 10 dB, 5 dB, 2 dB, 1 dB

3.13.1.8 Setting Trace function

	Control	Operation	Function
1.		Switch to the second menu window and press the softkey "Trace".	Setting at Trace function, set function is shown in the softkey. Selection: Clr / Wr. (Clear / Write), Average, Max Hold, View

Explanation of the "Trace" functions:

Clear / Write: In the Clear / Write function, the display of the measured spectrum is continuously updated, i.e. the Trace memory is rewritten with each sweep.

Average: In the Average function, the mean value of several sweeps will be calculated and displayed. This is a floating message, i.e. after each sweep, the display is updated, showing the mean value of a number of previous sweeps. The number of these sweeps can be set via the "Samples" softkey. When starting the "Average" function, or when changing the number of samples, all available sweeps are determined first, until a sufficient number of test samples are available in the memory and a floating message can be used.

Max Hold: When using the "Max Hold" function, the peak values of the captured spectrum can be stored automatically. With each sweep, the display is being updated. However, the displayed curve will only be overwritten in those areas, where the currently captured data is larger than the previously displayed value in the same location.

View: With the "View" function, the current spectrum can be "frozen"

2.		Press the softkey "Samples".	Setting the number of samples to the Trace "Average" function, set number of samples is shown in the softkey. Setting range: 1 … 100 (samples) *The "Samples" softkey is only activated during the "Average" function!*

3.13.1.9   Calling up the Marker function

The Marker functions are applicable for both, the F SCAN and the FFT function. The activation of the Marker function is identical for both analysis functions.

	Control	Operation	Function
1.	MARKER	Press the "Marker" (11) button.	The softkeys for the Marker settings in F SCAN / FFT mode will be shown, the parameter display (1) will be expanded to show the Marker's frequency and level as well as the Delta Marker
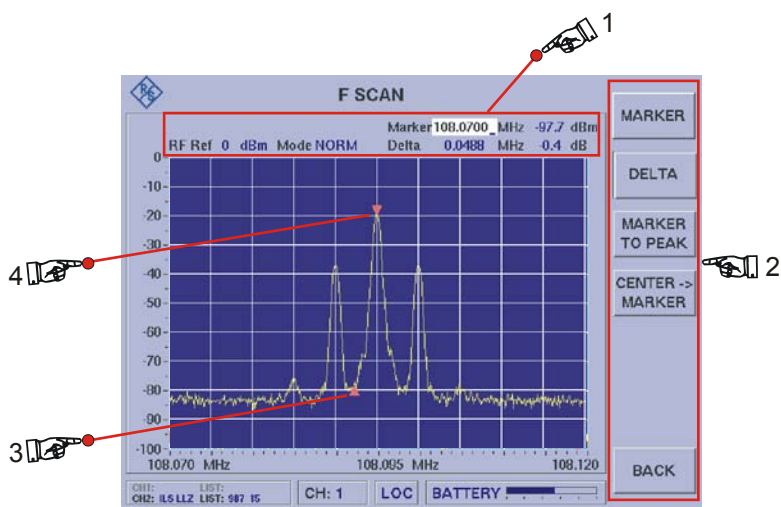
Parameteranzeige (1): RF REF, display of the reference level in dBm / dBµV

Mode, displays the ATT mode, which was set with the softkey "RF Mode"

Marker, display and setting of the Marker frequency (MHz) and the display of the measured level (dBm / dBµV)

Delta, display and setting of the Delta Marker frequency (MHz) and the display of the measured level difference in dB.

Softkeys (2):   Marker, Delta Marker, Marker to Peak, Center to Marker
Delta Marker (3):   Example, signed Delta Marker
Marker (4):   Example, signed Marker

3.13.1.9.1   Softkeys (2) of the Marker function

Display	Function
MARKER	Activates the Marker function and the frequency setting of the Marker, setting and display in the parameter display.
DELTA	Activates the Delta Marker function and the frequency setting of the Delta Marker, setting and display in the parameter display.
MARKER TO PEAK	Activates the Peak Marker function, on pressing the button, the Marker will be set on the highest signal within the spectrum

Display	Function
	The Peak Marker function can only be switched on while the Marker is activated!
CENTER -> MARKER	Activates the Center Marker function, on pressing the button, the current Marker frequency will be set to the new Center frequency. *The Center Marker function can only be switched on while the Marker is activated!*
Back	Change to the F SCAN Softkey bar 1/2 switched on before.
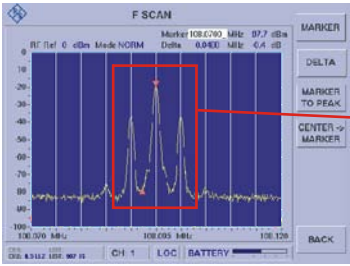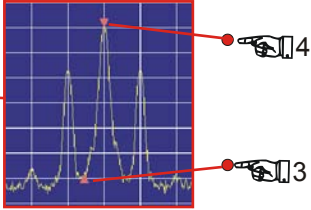
3.13.1.10 Explanation of the different Marker functions

The following text describes a sample flow of the different Marker functions, these are:
- Marker function,
- Delta Marker function,
- Peak Marker function,
- Center Marker function

 The Center Marker function is only available in the F SCAN mode!

	Control	Operation	Function
Marker function:			
1.	MARKER	Press the softkey "Marker".	The Marker (4) will be shown, i.e. the automatic search and identification of the spectrum's max. value will be initiated (only if the Marker was not activated previously). In addition, the rollkey can be used to set the Marker's frequency. Pressing the softkey again, will deactivate the Marker.
Delta Marker function:			
2.	DELTA	Press the softkey "Delta".	Delta Marker (3) will be shown as Marker (4), i.e. if the marker has not been activated prior, it will be automatically set to the highest signal. The display will show the level and the frequency difference with respect to

Control	Operation	Function
		the reference marker.

Peak Marker function:

| 3. | MARKER TO PEAK | Press the softkey "Marker to Peak". | After pressing the button, the Marker (4) will be set on the highest signal within the spectrum. The level and frequency displays will be automatically updated. If the Delta Marker (3) is activated, the level and frequency difference with respect to the reference Marker will also be updated in its display. |

☞ *The Peak Marker function can only be switched on while the Marker is activated!*

Center Marker function:

| 4. | CENTER -> MARKER | Press the softkey "Center to Marker". | After pressing the button, the current Marker frequency will be set to the new Center frequency. By doing so, any Delta Marker which is switched on, will be dragged along accordingly. The frequency display will be updated according to the preset Span frequency. |

☞ *The Center Marker function can only be switched on while the Marker is activated. This function is only available in the F SCAN mode!*

3.13.2   FFT mode (Option EVS-K4) operation

F SCAN mode (Option EVS-K1), FFT mode (Option EVS-K4) and the Scope mode (Option EVS-K7) are software options that can be installed in the R&S® EVS 300 independently of each other.

While in FFT mode, the settings for the frequency and for the Marker functions are activated via the device buttons "FREQ" (9) and "MARKER" (11). Depending on the selected function, the respective softkeys will be shown in the F SCAN display. In the modes F SCAN / FFT, the following settings will be stored for each mode:
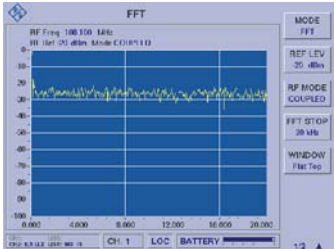
- Frequency settings,
- Marker settings,
- Reference level,
- RF mode,
- Trace settings,
- Display settings

The operation of the following settings and functions is identical with those of the F SCAN mode. For further information, please refer to the description of the F SCAN mode.

- *Setting the reference level (3.13.1.5)*

- *Setting the RF mode (3.13.1.6)*

- *Setting the indication resolution (3.13.1.7)*

- *Trace functions (3.13.1.8)*

- *Marker functions (3.13.1.9)*

Activates the FFT mode (Option EVS-K4)

	Control	Operation	Function
1.	F SCAN ⇓ MODE FFT or SPLIT	Press the "F SCAN" button and change with softkey "MODE" in the FFT mode. Press the "SPLIT" (13) button and select the FFT mode.	The R&S® EVS 300 switches over into the FFT mode.

If all the options are installed, the system switches to that mode, which was active last, either F SCAN, FFT or Scope mode.

3.13.2.1 Signal Parameters and Display in the FFT mode (Option EVS-K4)
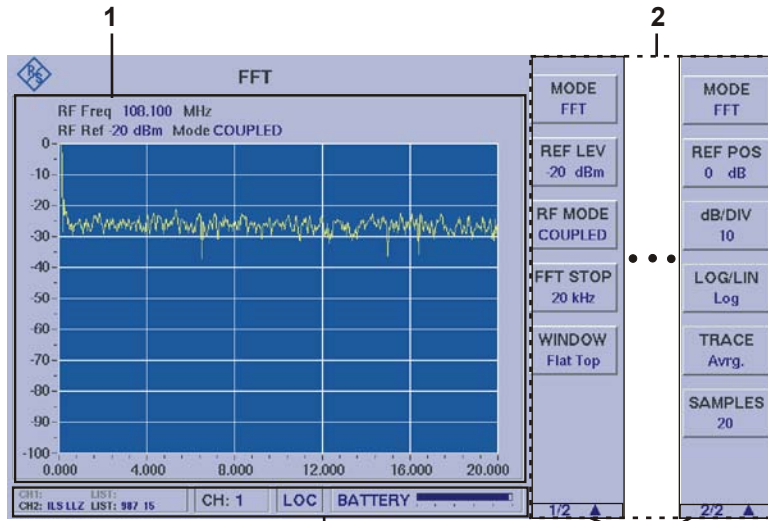
4** for general description of the status field, refer to 3.2.1.1

☞ *Due to the multitude of settings offered, two softkey bars are available. The currently displayed softkey bar will be identified with the 1/2 e.g. 2/2 ▲ - symbol (3). Use the "▣" -button to switch back and forth between the soft-key bars.*

3.13.2.1.1 Spectrum-Display FFT (1)
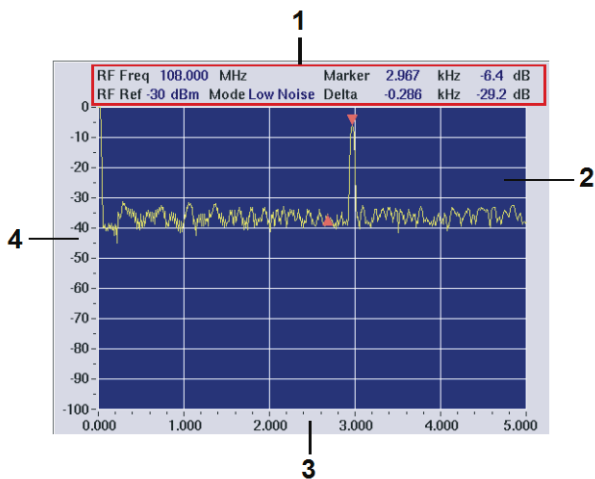
Item	Display	Function	Indication
1	Parameter indication	Indication and setting of the following parameter: RF Freq: Indication and setting of the RF receive frequency in MHz.	

Item	Display	Function	Indication
		RF REF: Indication of the reference level in dBm / dBµV. Mode: Indication of the ATT mode, set with the "RF Mode" softkey. Marker: Indication and setting of the Marker frequency (MHz) and indication of the measured level (dBm / dBµV). Delta: Indication and setting of the Delta Marker frequency (MHz) and indication of the measured level difference in dB.	
2	Display	Graphic display (bargraph) of the frequency spectrum, indication of level vs. frequency. Y-axis= level X-axis= frequency	frequency spectrum
3	Frequency (X-axis)	Frequency scale	kHz
4	Level (Y-axis)	Level scale	dB

3.13.2.1.2 Softkeys (2)

Display	Function
Softkey bar 1	
REF LEV -20 dBm	Setting of the reference level, set level (dBm / dBµV settable in the setup) is shown in the softkey and the display. Setting value: +20 … -100 dBm
RF Mode Norm	Switch over of the RF-attenuation, set range is shown in the softkey: - LOW NOISE (+10 dB), Indicating range: -120 … -20 dBm - NORM (Normal, 0dB) Indicating range: -110 … -10 dBm - LOW DIST (Low Distortion, -25dB) Indicating range: -100 … 20 dBm - Coupled, coupling of the reference level with an automatic adjustment of the RF input attenuation ☞ ***The max. input level is +13 dBm. The Setting of the RF-Signal Adjustment is described in section 3.5!***
FFT STOP 20 kHz	Activates the edit function for the FFT stop frequency, set frequency is shown in the softkey.
WINDOW Flat Top	Setting of the FFT window function, set function is shown in the softkey: The following functions can be select: None, Hann, Flat Top

Display	Function
Softkey bar 2	
REF POS 0 dB	Setting the reference position (upper value of the Y axis) will shift the display in the direction of the Y axis by the entered value: Setting range: 10 … -90 dB
dB/DIV 10	Setting of the resolution (scaling of the Y axis), set level is shown in the softkey: Selection: 10 dB, 5 dB, 2 dB, 1 dB
LOG/LIN Log	Switching between linear and logarithmic frequency axis; the set function will be displayed in the softkey.

TRACE Avrg.	Switch over of the trace function, set function is shown in the softkey:
	 Selection: Clr / Wr. (Clear / Write)
	             Avrg. (Average)
	             Max Hold
	             View

SAMPLES 20	Setting the number of samples, for the average, set number of samples is shown in the softkey. Setting range: 1 … 100 *Can only be adjusted in the Trace function "Average".*

3.13.2.2   Setting the Receiving frequency

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	In the frequency field, behind the last digit the cursor appears.
	Frequency settings view		
2.		Setting the corresponding frequency with rollkey / keyboard.	The frequency should be entered with the corresponding decimal place.
3.		Confirm with the correct dimension or Press the Enter button / push rollkey.	Acceptance of the new set frequency.

3.13.2.3   Setting the FFT stop frequency

	Control	Operation	Function
1.	FFT STOP 20 kHz	Press the softkey "FFT Stop" several times until the frequency is set.	Switch over of the FFT stop frequency, set value is shown in the softkey. The analysis area (resolution of the X axis) is setting here. FFT STOP 20 kHz Selection: 20 kHz, 10 kHz, 5 kHz, 2,5 kHz, 1,25 kHz, 0,625 kHz,

3.13.2.4   Setting a Window function

	Control	Operation	Function
1.	WINDOW Flat Top	Press the softkey "Window" several times until the function is set.	Switch over of the window function, set method is shown in the softkey. WINDOW Flat Top Selection: None, Hann, Flat-Top

In order to minimize the Leakage Effect, the signal allocated for the analysis, must be "windowed" after scanning, i.e. the time during which the spectrum is viewed, must be limited. By selecting this temporarily limited function, the quality of the display, the amplitude and the resolution of the frequency is affected. The R&S® EVS 300 offers two types of "windows", windowing per Hann or Flat Top.

Hann method: This type of windowing is suitable for measurements requiring high frequency accuracy and resolution.

Flat-Top method: This windowing function is suitable for precise amplitude measurements with low frequency resolution.
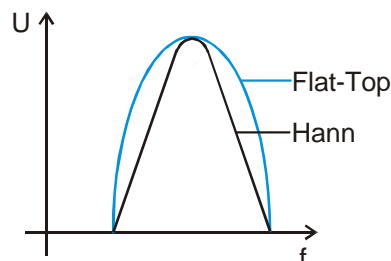
Example: Flat-Top and Hann windowing

3.13.2.5   Switching between Logarithmic or Linear display (Log / Lin)

	Control	Operation	Function
1.	LOG/LIN Log	Press the softkey "Log / Lin".	Switching between a logarithmic or a linear display. In the logarithmic display, the setting for the resolution of the Y axis can be selected as "dB per unit" and in the linear display, the resolution can be selected as "% per unit". The selected function will be shown in the softkey. LOG/LIN Log Selection: Log / Lin

3.13.2.6   Setting the Reference position

	Control	Operation	Function
1.	REF POS 0 dB	Press the softkey "Ref Pos".	The editing function for changing the reference position of the Y axis will be active. REF POS 0 dB
2.		Turn the rollkey until the required level is set.	Causes a shift of the display in the amount of the entered value and in direction of the Y axis. When using the "Log / Lin" softkey, either the logarithmic or the linear display may be selected. If selecting the logarithmic display, the measuring unit "dB" will be displayed in the "Ref Pos" softkey; if selecting the linear display, the measuring unit "%" will be used. Setting range Log: 10 … -90 dB Setting range Log: 10 … 110 %
3.	ENTER	Press the Enter button / push rollkey.	Acceptance of the new set reference position.
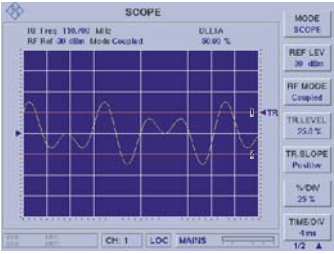
3.13.3   Scope mode (Option EVS-K7) Operation

F SCAN mode (Option EVS-K1), FFT-mode (Option EVS-K4) and the Scope mode (Option EVS-K7) are software options that can be installed in the R&S® EVS 300 independently of each other.

Demodulated signals as well as signals supplied to the baseband input can be displayed in Scope mode. The settings for triggering and of the Y-axis of the display depend on the input signal and the baseband range set during setup. The frequency setting is enabled via the "FREQ" (9) device button. Depending on the selected function, the corresponding softkeys will be shown in the Scope display. The following settings will be stored:

- Frequency settings (only for the signal IN: RF),
- Reference level (only for the signal IN: RF),
- RF mode (only for the signal IN: RF),
- Cursor settings,
- Trigger level,
- Trigger slope,
- Display settings (axis scaling, time base)

Activates the Scope mode (Option EVS-K7)

	Bedienelement	Aktion	Beschreibung
1.	F SCAN ⇩ MODE SCOPE or SPLIT	Press the "F SCAN" button (8) and change with softkey "MODE" in the Scope mode. Press the "SPLIT" (13) button and select the SCOPE mode.	The R&S® EVS 300 will switch to the Scope mode.

If all the options are installed, the system switches to that mode, which was active last, either F SCAN, FFT or Scope mode.

3.13.3.1 Signal Parameters and Displays in the Scope mode (Option EVS-K7)
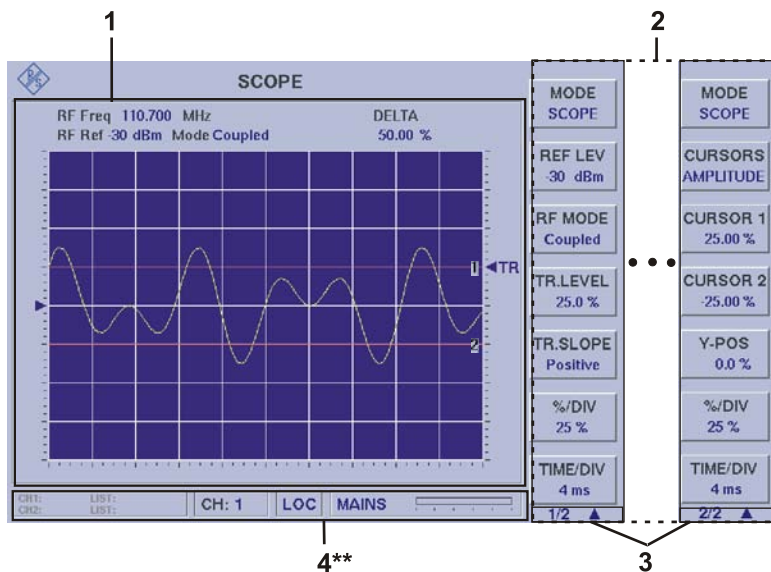

4** for general description of the status field, refer to 3.2.1.1.

Due to the multitude of settings offered, two softkey bars are available. The currently displayed softkey bar will be identified with the 1/2 e.g. 2/2 ▲ - symbol (3). Use the "▲" -button to switch back and forth between the soft-key bars.

3.13.3.1.1 Scope Display (1)
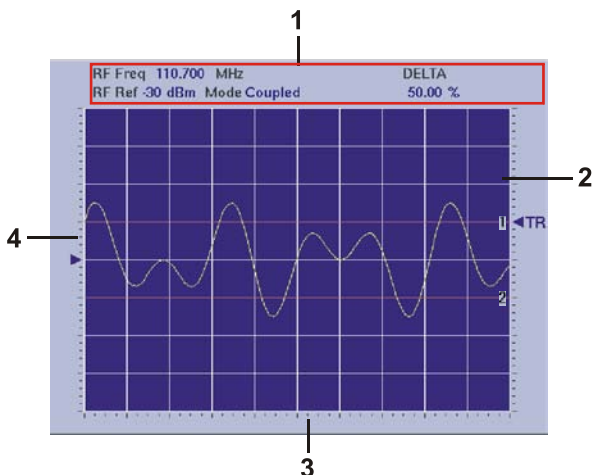
Item	Display	Function	Indication
1	Parameter indication	Indication and setting of the following parameters: RF Freq (only for the signal IN: RF): Indication and setting of the RF receive frequency in MHz	
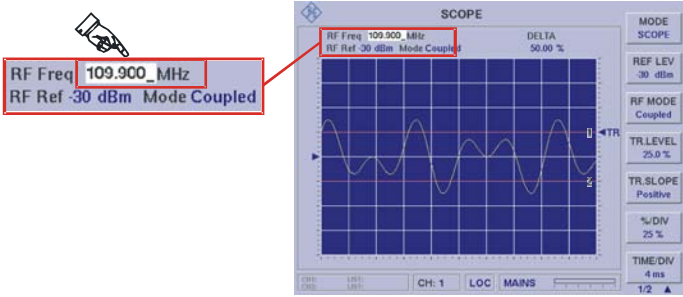
Item	Display	Function	Indication
		RF Ref (only for the signal IN: RF): Difference of the reference level in dBm / dBµV	
		Mode (only for the signal IN: RF): Indication of the ATT mode, set via the "RF Mode" softkey.	
		Delta: Indication of the Delta value with the cursor function enabled	
2	Display	Graphic display in the period, modulation factor or voltage over time. Y-axis = modulation (signal IN: RF), voltage (baseband input) X-axis = time axis	
3	X-axis	Time axis	TIME / DIV
4	Y-axis	Amplitude scale	Baseband: Volt / DIV or RF: % / DIV

3.13.3.1.2   Softkeys (2)

Display	Description
Softkey bar 1	
REF LEV -20 dBm	Setting of the reference level (active only for the signal IN: RF), set level (dBm / dBµV, can be set in the setup), shown in the softkey and the display: Setting range: +20 … -80 dBm
RF MODE Norm	Switchover of the RF-attenuation (active only for the signal IN: RF), the set range is shown in the softkey and the display: - LOW NOISE (+10 dB), Indicating range: -120 … -20 dBm - NORM (Normal, 0 dB) Indicating range: -110 … -10 dBm - LOW DIST (Low Distortion, -25 dB) Indicating range: -100 … 20 dBm - COUPLED, depending on the set reference level, the appropriate ATT mode and the corresponding attenuation value in ATT mode will automatically be set. *The max. input level is +13 dBm. The Setting of the RF-Signal Adjustment is described in section 3.5!*
TR.LEVEL 10.0 %	Setting of the Trigger level; the setting depends on the input signal and the baseband range: Range for baseband, range 5 V: - -5.00 … +5.00 V, increments of 0.01 V

Display	Description
	Range for baseband, range 0.5 V: - -500 … +500 mV, increments of 1 mV Range for RF In: - -100 … +100 %, increments of 0.1%
TR.SLOPE Negative	Setting of the trigger slope: Selection: Positive / Negative
%/DIV 25 %	Scaling of the Y-axis; the setting depends on the input signal and base-band range: Range for baseband, range 5 V: Selection: 2, 1, 0.5, 0.2, 0.1 VOLT / DIV Range for baseband, range 0.5 V: Selection: 0.2, 0.1, 50 mV, 20 mV, 10 mV (VOLT / DIV) Range for demodulated RF signal: Selection: 25, 10, 5, 2, 1 % / DIV
TIME/DIV 2 ms	Setting of the time base: • Selection: 32 ms, 16 ms, 8 ms, 4 ms, 2 ms, 1 ms
Softkey bar 2	
CURSORS AMPLITUDE	Setting of the cursor function: Selection: OFF, AMPLITUDE, TIME
CURSOR 1 5.60 ms	Setting of the value of cursor 1; the value range depends on the function (AMPLITUDE / TIME = cursor position horizontal / vertical) and the axis scaling. Example: Cursor function = AMPLITUDE Signal In =RF Setting % / DIV = 5 % $\triangleq$ the value range of from -20 … +20%
CURSOR 2 10.58 ms	The setting is identical to that of cursor 1.
Y-POS 0.0 %	Shifting of the screen contents in Y-direction.

3.13.3.2   Setting the Receiving Frequency (Signal IN: RF)

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	In the frequency field, behind the last digit the cursor appears.
	  Frequency setting view		
2.		Setting the corresponding frequency with rollkey / keyboard.	The frequency should be entered with the corresponding decimal place.
3.		Confirm with the correct dimension or Press the Enter button / push rollkey.	Acceptance of the actually set new frequency.

3.13.3.3   Setting the Reference level

The reference level specifies the maximum permissible level value of an input signal that can be represented free of distortion. Higher signal levels cause overmodulation of the receiver, which is also indicated by a warning on the display ("OVL", Overload).

	Control	Operation	Function
1.	REF.LEV -20	Press the softkey "REF LEV".	Activation of the edit function for changing the reference level, the set value is displayed in the softkey. REF.LEV -20
2.		Turn the rollkey until the required level is set.	Setting of the reference level, set level (dBm / dBμV, settable in the setup), is shown in the softkey and the display. The setting range depends on the RF mode set. Setting range: -80 … +20 dBm, 27 … 127 dBμV

	Control	Operation	Function
3.		Press the Enter button / push rollkey.	Acceptance of the actually set new reference level.

3.13.3.4   Setting the RF mode

	Control	Operation	Function
1.	RF MODE Norm	Press the softkey "RF MODE" several times until the wanted RF mode is set.	Switchover of the RF input attenuation.

The set function is shown in the softkey and the display. The corresponding settings will take effect immediately. The following settings are possible in Scope mode:

- LOW NOISE (+10 dB),
  Indicating range: -80 … -20 dBm
- NORM (Normal, 0 dB),
  Indicating range: -70 … -10 dBm
- LOW DIST (Low Distortion, -25 dB),
  Indicating range: -50 … 20 dBm
- COUPLED, depending on the set reference level, the appropriate ATT mode and the corresponding attenuation value in ATT mode will automatically be set.

☞ *The max. input level is +13 dBm. The Setting of the RF-Signal Adjustment is described in section 3.5!*
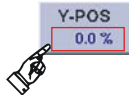
3.13.3.5   Setting the Y-Axis

To analyze very small portions of a signal, the scaling of the Y-axis can be set.

	Control	Operation	Function
1.	VOLT/DIV 0.2 %/DIV 25 %	Press the softkey "%/DIV" or "VOLT/DIV".	The selection list for changing the scaling will be enabled. The setting depends on the input signal of the baseband range.
2.		Select	Select the corresponding scaling for the Y axis according to the selection list. The scaling of the Y-axis applies to "VOLT/DIV" baseband signals and to demodulated "%/DIV" F signals. Range for baseband, range 5 V Selection: 2, 1, 0.5, 0.2, 0.1 VOLT / DIV

Control	Operation	Function
		Range for baseband, range 0.5 V Selection: 0.2, 0.1, 50 mV, 20 mV, 10 mV (VOLT / DIV) • Range for demodulated RF signal: Selection: 25, 10, 5, 2, 1 % / DIV
3.	Press the Enter button / push rollkey.	Acceptance of the actually set new value.

3.13.3.6   Setting the Y-position

Control	Operation	Function
1.	Press the softkey "Y-POS".	Activation of the edit function for changing the image position in y-direction. The value field in the softkey will be displayed on a background.
2.	Turn the rollkey until the required value is set.	Shifts the display in the direction of the Y-axis by the entered value. The setting depends on the input signal of the baseband range. Range for baseband, range 5 V: Selection: -5.00 … +5.00 V (increments of 0.01 V) Range for baseband, range 0.5 V: Selection: -500 … +500 mV (increments of 1 mV) • Range for RF In: Selection: -100 … +100% (increments of 0.1%)
3.	Press the Enter button / push rollkey.	Acceptance of the actually set new Y-position.

3.13.3.7 Setting the Time base

To analyze very small portions of a signal, the scaling of the X-axis (time base) can be set.

	Control	Operation	Function
1.	TIME/DIV 2 ms	Press the softkey "TIME/DIV".	The selection list for changing the time base of the X-axis will be enabled.
2.		Select	Select the corresponding time base according to the selection list. Selection: 32 ms, 16 ms, 8 ms, 4 ms, 2 ms, 1 ms
3.	ENTER	Press the Enter button / push rollkey.	Acceptance of the actually set new time base.

3.13.3.8 Triggering settings

	Control	Operation	Function
Set the trigger level as follows:			
1.	TR.LEVEL 10.0 %	Press the softkey "TR.LEVEL".	Activation of the edit function for changing the trigger level. The value field in the softkey will be displayed on a background. To ensure exact setting, a green cursor line (1) will be shown representing the current trigger level.
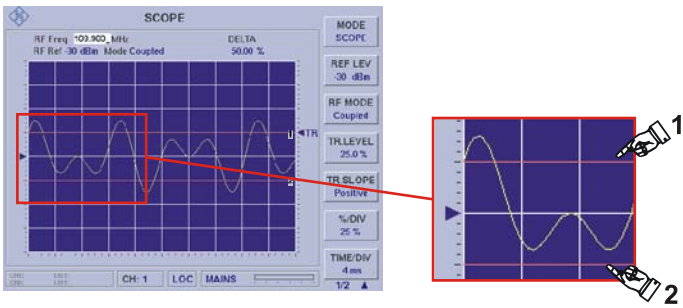
While the setting is performed, the topical value range of the trigger level is identified by the green cursor line 1 and the marker ◄TR (2). The cursor line (1), the marker position (2) and the value range will be updated in the softkey in synchrony with the control dial rotation. The cursor line (1) will be hidden as soon as the set trigger level has been accepted.

	Control	Operation	Function
2.		Turn the rollkey until the required level is set.	The setting depends on the input signal of the baseband range.
			Range for baseband, range 5 V: Selection: -5.00 … +5.00 V (increments of 0.01 V)
			Range for baseband, range 0.5 V: Selection: -500 … +500 mV (increments of 1 mV)
			Range for RF In: Selection: -100 … +100% (increments of 0.1%)
3.		Press the Enter button / push rollkey.	Acceptance of the actually set new trigger level.
Set the trigger slope as follows:			
4.		Press the softkey "TR.SLOPE".	Switch to the signal slope to be triggered. The set property will be displayed in the softkey.
			Selection: Negative/positive

3.13.3.9   Cursor function settings

The cursor function serves for performing amplitude or time measurements on the signal represented. For this purpose, two cursor lines can be set, the delta values of which are displayed. Cursor lines are marked with 1 and 2. If the cursor function is switched off, the set cursor lines will also be hidden.

	Control	Operation	Function
Selecting the cursor function:			
1.		Press the softkey "Cursors" several times until the wanted function is set.	Switchover between the cursor functions, the set function is shown in the softkey and is active right away.
			Selection: OFF, AMPLITUDE, TIME
			If the cursor function is switched off (OFF"), the two cursor lines and the softkeys (Cursor 1 and Cursor 2) will also hidden!

	Control	Operation	Function
Set Cursor 1 und Cursor 2:			
2.	CURSOR 1 43.13 %	Press the softkey "CURSOR 1".	Activation of the edit function for changing the cursor position. The value field in the softkey will be displayed on a background.
	While the setting is performed, the topical value range of the cursor is identified by the red cursor line (1). The cursor line (1) will be moved in the horizontal level and the value range will be updated in the softkey in synchrony with the control dial rotation. The procedure for setting Cursor 2 is identical to that for Cursor 1. Cursor = AMPLITUDE = horizontal red cursor lines (value range in "%" or mV/V (Baseband)). Cursor = TIME = vertical red cursor lines (value range in "ms").		
3.		Turn the rollkey until the required value is set.	The setting depends on the selected function and the axis scaling. Example: Cursor function = AMPLITUDE Signal In =RF Setting % / DIV = 5 % ≙ the value range of from -20 … +20%
4.		Press the Enter button / push rollkey.	Acceptance of the actually set new cursor value.

3.14 Power-Sensor mode (Option EVS-K5)

In power-sensor mode you can select between directional power sensors (R&S® NRT) and terminating sensors (R&S® NRP) of the ROHDE & SCHWARZ sensor families R&S® NRT and R&S® NRP. The terminating sensor (R&S® NRP) continuously measures the average power; apart from the power applied to the load, the directional sensor (R&S® NRT) additionally measures the return power and determines the VSWR or the return loss from these values. Sensors of the R&S® NRP family with the adapter R&S® NRP-Z3 or R&S® NRP-Z4 are connected to the USB port, while sensors of the R&S® NRT family with adapter R&S® NRT-Z3 are connected to the RS 232 interface of the R&S® EVS 300.

In power-sensor mode, the "NRP" selection provides the option (EVS-K6) of performing DME pulse analysis (exclusively using the R&S® NRP-Z81 broadband sensor). (also refer to Section 3.14.10)
DME (Distance Measurement Equipment)

3.14.1   Terminating Power Sensor R&S® NRP

The sensors of the R&S® NRP family can be connected via the interface adapters R&S® NRP-Z4 or R&S® NRP-Z3 to the USB port of the R&S® EVS 300 . the power supply is implemented via the USB port. The R&S® NRP-Z3 adapter additionally features a trigger input.

3.14.1.1   Measuring construction for Measuring Low-Level Signals
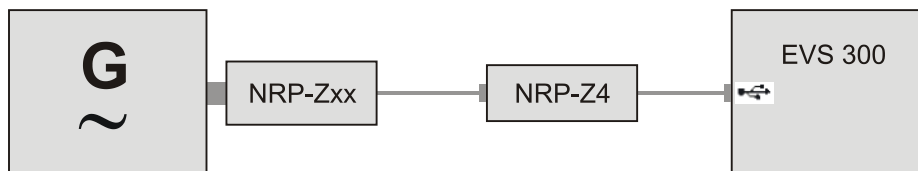
Fig. 3-1 Configuration, R&S® NRPxx power sensor with passive R&S® NRP-Z4 adapter
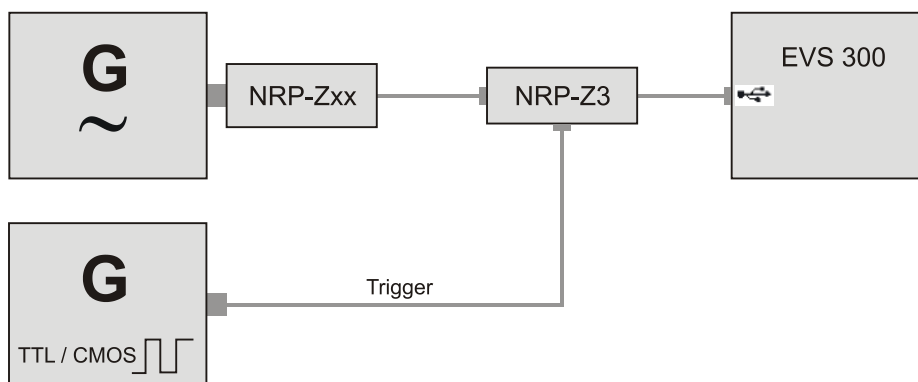
Fig. 3-2 Configuration, R&S® NRPxx power sensor with active R&S® NRP-Z3 adapter

3.14.1.2 Measuring construction for DME analysis
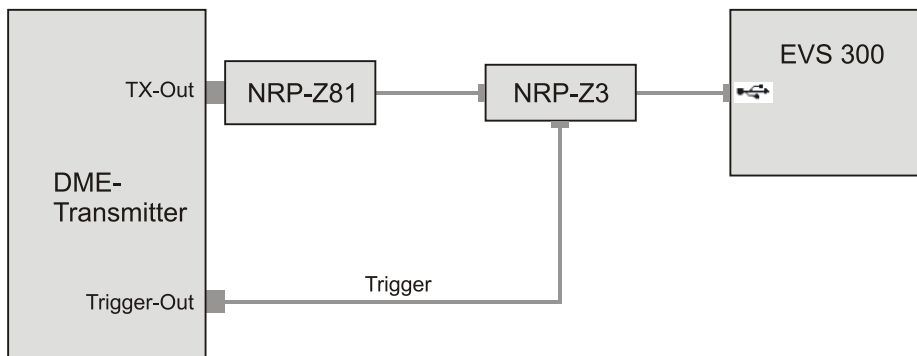
Fig. 3-3 Configuration, R&S® NRP-Z81 power sensor with active R&S® NRP-Z3 adapter

3.14.2 Directional Power Sensor R&S® NRT

The sensors of the R&S® NRT family can be connected via the R&S® NRT-Z3 adapter to the serial interface or via the R&S® NRT-Z5 adapter to the USB port of the R&S® EVS 300 . Depending on the adapter used, the power is supplied either via the USB port (R&S® NRT-Z5 adapter) or via the Aux power connector (R&S® NRT-Z3 adapter) of the R&S® EVS 300.

3.14.2.1 Measuring construction for measuring large signals
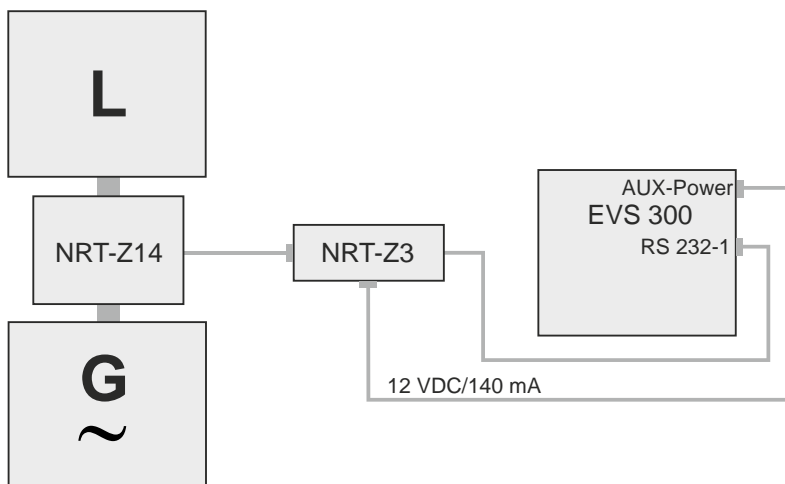
Fig. 3-4 Configuration, R&S® NRT-Z14 power sensor with active R&S® NRT-Z3 adapter
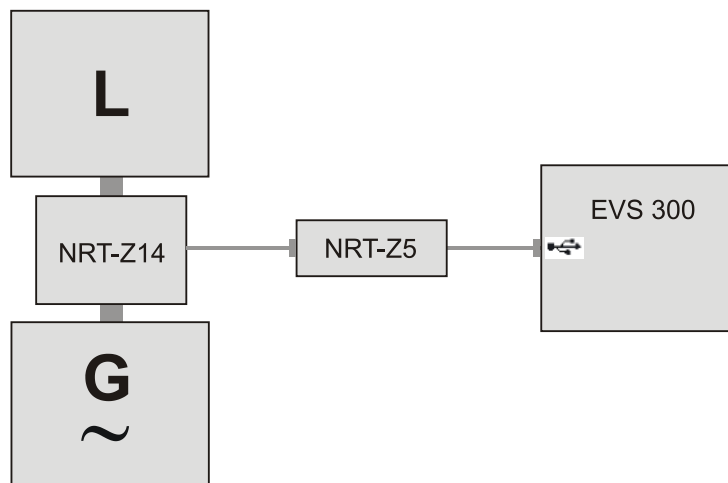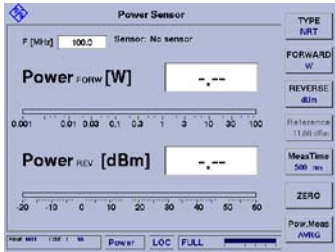
Fig. 3-5 Configuration, R&S® NRT-Z14 power sensor with active R&S® NRT-Z5 adapter

3.14.3   Activates the Power-Sensor mode

	Control	Operation	Function
1.	SPLIT	Press the "SPLIT" (13) button and select the POWERMETER mode NRT or NRP.	The R&S® EVS 300 will switch to the Power-Sensor mode.

Display of power sensor R&S® NRT   Display of power sensor R&S® NRP

In the following, the two power-sensor types will be described separately due to their individual characteristics.

☞ *The R&S® EVS 300 will always change to the power-sensor type that was enabled last (Type-NRT / Type- NRP).*

3.14.4 Signal Parameters and Displays for Power Sensor R&S® NRP
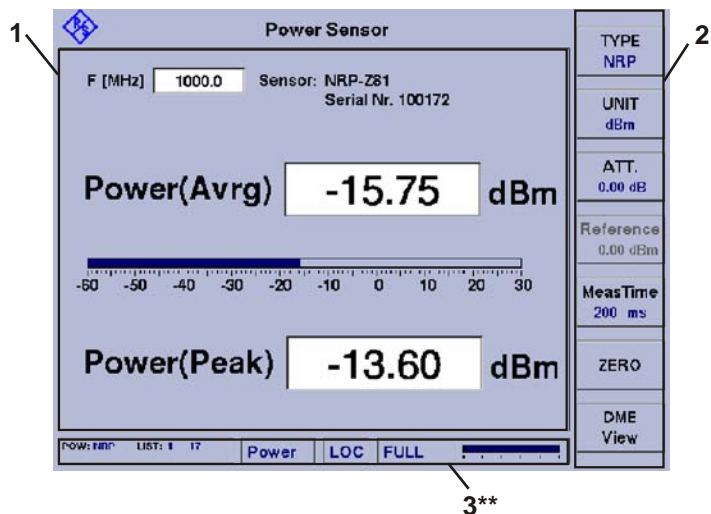
3** for general description of the status field, refer to 3.2.1.1.

3.14.4.1 Parameter and Measured Value Section (1)

Item	Display	Function	Indication
1	F [MHz]	Indication and setting of the correction frequency	MHz
2	Information field	Display of the identification data of the connected sensor. If a sensor is not connected or if the sensor cannot be identified, "No sensor" will be displayed in this field.	
3	Power (Avrg)	Indication of the measured power value (numeric / bargraph display) **Bargraphskalierung bei ATT. = 0 dB (60 dB)** dBm: -60 (0) … 30 (90) dBm dB: -30 (-30)… 30 (30) dB mW: 10 nW (10 mW) … 100 mW (100 kW) W: 10 nW (10 mW) … 100 mW (100 kW)	dBm / dB / mW / W

Item	Display	Function	Indication
		(The dimension is set via the "UNIT" softkey)	
4	Power (Peak)	Indication of the measured peak power value (only with Power Sensor R&S® NRP-Z81)	dBm / dB / mW / W

3.14.4.2   Softkeys (2)

Display	Description
TYPE NRP	Switchover between the two possible sensor types R&S® NRT / R&S® NRP. While switching to one sensor type, this sensor will be initialized accordingly and the identification data of the sensor will be displayed in the information field (2). If a sensor is not connected or if the sensor cannot be identified, "No sensor" will be displayed in the information field (2).
UNIT dBm	Dimension setting of the measured value display. The set unit will automatically be carried over to the measured value display Power(Avrg) (3) and to the Power(Peak) display (4). The scaling of the bargraph will automatically be adapted. The following selection can be made: - dBm - dB (level difference measurement) - mW - W
ATT. 0.0 dB	Setting of the attenuation correction value (upstream attenuation in the measurement system), adjustable attenuation value of 0 dB to 60 dB.
Reference 0.00 dBm	Setting of the reference level (reference level for level difference measurement) in "dBm, softkey is enabled only in the dimension setting "UNIT, dB".
MeasTime 50 ms	Enables the setting of the measurement time. Setting range: 10 … 2000 ms 🖝 *Setting of the measuring time is described in section 3.7!*
ZERO	Enables user-controlled zeroing of the connected sensor.
DME View	Switchover to the DME (Distance Measurement Equipment) display. The "DME" display can only be enabled with the R&S® NRP-Z81 power sensor connected and the EVS-K6 option enabled.
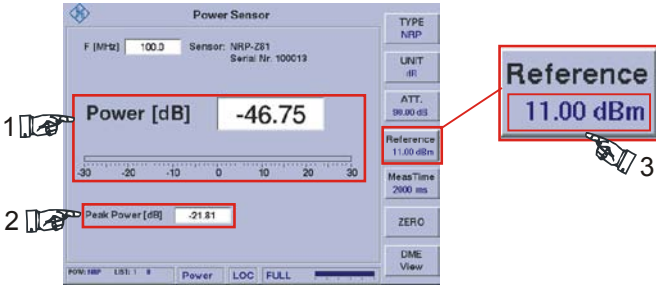
3.14.5 Setting the Correction frequency

Many characteristics of power sensors are frequency-dependent. In this context, level correction is implemented via the frequency with correction table. To achieve a high measuring accuracy, the R&S® EVS 300 features a setting for the correction frequency. After the correction frequency has been input, the R&S® EVS 300 will transfer it to the power sensor, which will then correct the measuring results accordingly.

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	In the frequency field, behind the last digit the cursor appears. Setting range: 50 … 18000 MHz *Take into consideration the frequency range of the power sensor.* Correction frequency setting view
2.		Setting the corresponding frequency with rollkey / keyboard.	The correction frequency should be entered with the corresponding decimal place.
3.		Confirm with the correct dimension or Press the Enter button / push rollkey.	Acceptance of the actually set new correction frequency.
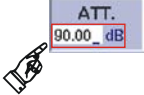
3.14.6 Setting the Measured Value displays

	Control	Operation	Function
1.	UNIT dBm	Press the softkey "UNIT" several times until the wanted unit is set.	Switchover of the unit for the measured value displays (1, 2). The set unit will be displayed in the softkey. Selection: dBm, dB, mW

Control	Operation	Function
When switching from the "dBm" to the "dB" unit, the currently measured level will be stored as the reference level in the "Reference, 3" softkey. The reference level can also be set manually (also refer to "Setting the Reference Level").		

The scaling of the bargraph will automatically be adapted to the selected unit.

Bargraph scaling:

dBm: -60 … 30 dBm
dB: -30 … 30 dB
mW: 0.01 µW … 100 mW

3.14.7   Setting the Attenuation Correction value

To achieve a high measuring accuracy, the R&S® EVS 300 features a setting for the attenuation correction value. Before stating a measurement, the upstream attenuation in the measuring system should be determined. After the attenuation correction value has been entered in "dB", an existing attenuation in the measuring system can be taken into consideration. The power measured by the power sensor will be incremented by the set correction value for display.

	Control	Operation	Function
1.		Press the softkey "ATT.".	Activation of the edit function for changing the correction value, the set value is shown in the softkey.
2.		Setting the corresponding value with rollkey / keyboard.	Enter the attenuation including the corresponding decimal place. Setting range: 0 … 90 dB
3.		Press the Enter button / push rollkey.	Acceptance of the actually set new attenuation correction.

3.14.8 Setting the Reference level

When switching from the "dBm" to the "dB" unit, the currently measured level will automatically be stored as the reference level and can be used as the reference for a relative display. The reference level can also be set manually.

	Control	Operation	Function
1.	UNIT dBm	Press the softkey "UNIT" several times until the unit "dB" is set.	Selection of the unit "dB". UNIT dB
		☞ *The reference level can only be set manually in the unit "dB". Only in this setting will the "Reference" softkey be enabled.*	
2.	Reference 0.00 dBm	Press the softkey "Reference".	Activation of the edit function for changing the reference level, the set value is shown on the softkey. Reference 11.00_ dBm
3.		Setting the corresponding value with rollkey / keyboard.	Enter the reference level including the corresponding decimal place. Setting range: -60 … 110 dBm
4.	ENTER	Press the Enter button / push rollkey.	Acceptance of the actually set new reference level.

3.14.9 Zeroing the R&S® NRP Power Sensor

Zeroing increases the accuracy when measuring low power values or small maladjustments by reducing the zero point error. The zero point error is an additive disturbance variable that can be caused by the electronic equipment and thermal influences.

	Control	Operation	Function
		☞ *For zeroing, the R&S® NRP power sensor must be disconnected from the device under test or the signal source must be switched off. Otherwise the power sensor may be destroyed.*	
1.	ZERO	Press the softkey "ZERO".	A security prompt will be displayed that has to be confirmed accordingly. Press the "ESC" button to abort the process.

Control	Operation	Function
		Before zeroing the power sensor,please remove all signals from the sensor input. Press ENTER to start zeroing... [ESCAPE] [ENTER]
2.	ENTER	Press the "ENTER" (31) button.	After the security prompt has been confirmed, zeroing of the connected power sensor will be performed.

3.14.10   DME Pulse Analysis (Option, EVS-K6)

The DME pulse analysis (DME = Distance Measurement Equipment) is used for testing the RF output signal of DME transponders. The following parameters can be analyzed using the R&S® NRP-Z81 power sensor:

-   Pulse amplitude of the transmission pulse
-   Pulse form (rise time, fall time and pulse duration)
-   Pulse spacing

3.14.11   Signal Parameters and Displays in the DME Function
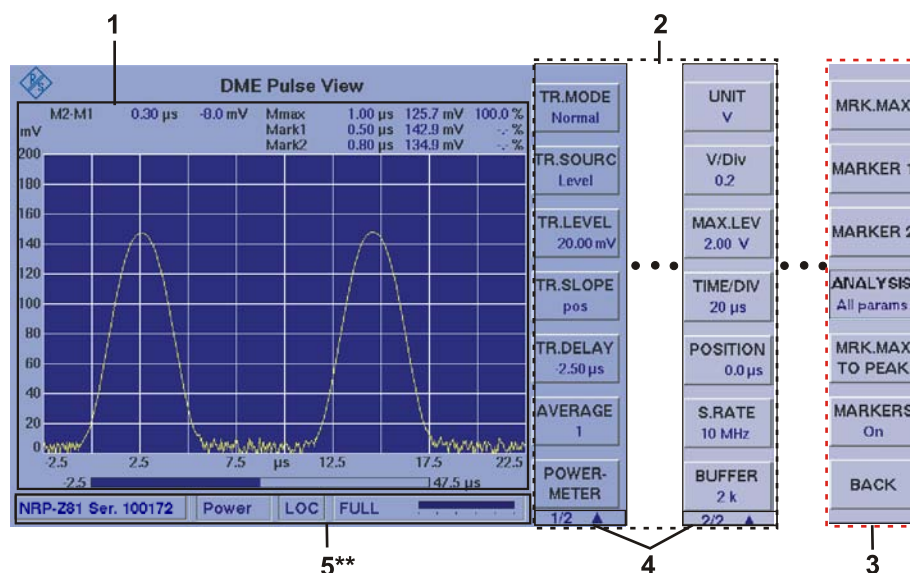
**   for general description of the status field, refer to 3.2.1.1.

👉 *Due to the multitude of settings offered, two softkey bars are available. The currently displayed softkey bar will be identified with the 1/2 e.g. 2/2 ▲ - symbol (3). Use the " ▲ " -button to switch back and forth between the softkey bars. The softkey bar (3) for the DME Marker function is called via the "Marker" device button. The marker function is described in Section 3.14.19.*

3.14.11.1 Parameter and Measured Value Section (1)

Item	Display	Function	Indication
1	Parameter indication	Indication and setting of the following parameters as a factor of the unit set for "UNIT": Mmax: Indication and setting of the Marker Max position, i.e. the marker is automatically set to the peak (Peak 100%) of a pulse in the function (MRK.MAX TO PEAK) or positioned manually. Display of the chronological position in µs and of the pulse amplitude in V (mV, mW, µW, nW, dBm) and %. Mark1 Indication and setting of the position of Marker 1. Display of the chronological position in µs and of the pulse amplitude in V (mV, mW, µW, nW, dBm) and %. Mark2 Indication and setting of the position of Marker 2. Display of the chronological position in µs and of the pulse amplitude in V (mV, mW, µW, nW, dBm) and %. M2-M1 Indication of the difference between Marker 1 and Marker 2 in µs and V (mV, mW, µW, nW, dBm)	
2	Display	Graphic display of the frequency spectrum, display of the level over time. Y-axis = amplitude X-axis = time axis	
3	X-axis	Time axis	µs
4	Bargraph	Bargraph for the time axis (shows the start time and stop time of the entire measurement, the current display area will be visualized)	µs
5	Y-axis	Amplitude scale	dBm, mW, µW, nW, V, mV
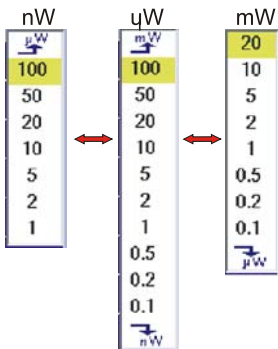
3.14.11.2   Softkeys (2) of the DME mode

> *The softkeys (3) of the DME marker function are described in Section 3.14.19.1.*
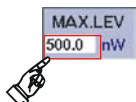
Display	Description
Softkey bar 1	
TR.MODE Normal	Selection of the trigger function "Normal" or "Single shot". Normal: permanent refreshing of a value set with a valid trigger Single shot: after manual confirmation with the "Enter" - key, this is confirmed with "ACQUIRE…" and with the occurrence of a valid trigger a value set is taken up.
TR.SOURC Level	Selection of the trigger source; the following trigger sources can be set: Level: Triggering is made when the trigger threshold set for "TR.LEVEL" has been reached cont: continuous recording of measurement values (trigger level, trigger slope and trigger delay time settings are not possible) ext: external trigger source (trigger level setting not possible)

TR.LEVEL 0.01 V	Setting of the trigger level; the setting range depends on the unit set for "UNIT":
	
	 Range for unit V:
	     0.01 … 3.16 V
	
	 Range for unit W:
	     0 … 200 mW
	
	 Range for unit dBm:
	     -30 … 20 dBm

TR.SLOPE pos	Setting of the trigger slope, possible only for the triggers "Source", Level or ext. Selection: Positive / Negative
TR.DELAY 0.00 µs	• Setting for Trigger Delay Time (time delay after trigger event, trigger circuit will be locked for the set time. Setting range: -50.00 … 9999.00 µs
AVERAGE 1	Setting of after how many measuring events a message will be displayed: • Selection: 1, 4, 16, 64, 256, 1024
POWER-METER	• Switching to the NRP power-sensor function.
Softkey bar 2	
UNIT V	Dimension setting of the level axis (Y-axis) of the graphic display. Choose between a linear (V), quadratic (W) and logarithmic (dBm) display. Selection: dBm, W, V

V/Div 0.2	Scaling of the Y-axis selectable in fixed steps, the setting range depends on the unit set for "UNIT":
	 Selection: for "UNIT, dBm" = 1, 2 ,5 ,10 dB / DIV
	               for "UNIT, W" = 1 nW, 2 nW,5 nW … 20 mW / DIV
	               for "UNIT, V" = 0.1 mV, 0.2 mV, 0.5 mV … 1 V / DIV

Display	Description
MAX.LEV 2.00 V REF.LEV 20 dBm	Setting of the Y-axis maximum value; the setting range and the softkey depend on the unit set for "UNIT": Selection: for "UNIT, dBm" = REF LEVEL for "UNIT, W,V" = MAX LEVEL
TIME/DIV 20 µs	Setting of the time base; the setting range depends on the set sampling frequency (sampling rate) and the buffer size.
POSITION 0.0 µs	Shifting of the display detail within the measured data storage. The left-hand time of the display window will be set.
S.RATE 10 MHz	Setting of the sampling frequency (sampling rate): Selection: 2.5, 10, 40, 80 MHz
BUFFER 2 k	Setting of the buffer size of the power sensor. This setting determines the number of values (samples) that are recorded per storage cycle. Selection: 0.5, 1, 2, 4, 8 k

3.14.12 Setting the Resolution (Y-Axis)

	Control	Operation	Function
1.	V/Div 0.2	Press the softkey "XX/DIV". The display of the unit in the softkey depends on the unit set for "UNIT" and the setting range.	The selection list for changing the resolution of the Y-axis according to the set unit will be displayed.

Scaling of the Y-axis is selectable in fixed steps, the setting range depends on the unit set for "UNIT": Cross-unit scrolling in the selection lists is possible.

Selection: for "UNIT, dBm" = 1, 2, 5, 10 dB / DIV
            for "UNIT, W" = 1 nW, 2 nW, 5 nW … 20 mW / DIV
            for "UNIT, V" = 0.1 mV, 0.2 mV, 0.5mV … 1 V / DIV

Example of a selection list ("UNIT, W"), ranges nW … mW

2.		Turn the rollkey until the required value is set.	Changes the resolution of the Y-axis by the value entered.
3.	ENTER	Press the Enter button / push rollkey.	Acceptance of the actually set new resolution.

3.14.13   Setting the Maximum level (Y-Axis)

	Control	Operation	Function
1.	MAX.LEV 2.00 V REF.LEV 20 dBm	Press the softkey "MAX.LEV / REF.LEV". The softkey depends on the unit set for "UNIT":	Activation of the edit function for changing the maximum level or the reference level. MAX.LEV 500.0 nW for "UNIT, dBm" = REF LEVEL for "UNIT, W,V" = MAX LEVEL
	The selection of the unit as well as the resolution setting (xx/Div) influence the setting range of the maximum level as follows: Selection: for "UNIT, dBm" = 1, 2, 5, 10 dB / DIV for "UNIT, W" = 1 nW, 2 nW, 5 nW … 20 mW / DIV for "UNIT, V" = 0.1 mV, 0.2 mV, 0.5mV … 1 V / DIV *The setting ranges for the maximum level and the reference level are listed in the following table.*		
2.		Turn the rollkey until the required value is set.	Changes the resolution of the Y-axis by the value entered.
3.		Press the Enter button / push rollkey.	Acceptance of the actually set new resolution.
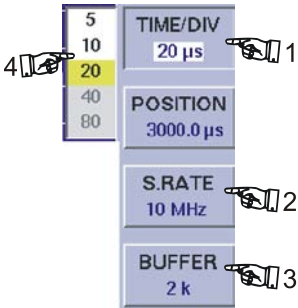
Unit	Setting range	Unit	Setting range	Unit	Setting range
"W"	Max. Level	"V"	Max. Level	"dBm"	REF. Level
mW / Div		V / Div		dB / Div	
20 mW	200 mW	1 V	10 V	10 dB	-50 … 30 dBm
10 mW	100 … 200 mW	0.5 V	5 … 10 V	5 dB	-50 … 30 dBm
5 mW	50 … 200 mW	0.4 V	4 … 10 V	2 dB	-50 … 30 dBm
2 mW	20 … 200 mW	0.3 V	3 … 9.9 V	1 dB	-50 … 30 dBm
1 mW	10 … 100 mW	0.2 V	2 … 10 V		
0.5 mW	5 … 50 mW	0.1 V	1 … 10 V		
0.2 mW	2 … 20 mW	mV / Div			
0.1 mW	1 … 10 mW	100 mV	1000 mV		
		50 mV	500 … 1000 mV		
µW / Div		20 mV	200 … 1000 mV		
100 µW	1000 µW	10 mV	100 … 1000 mV		
50 µW	500 … 1000 µW	5 mV	50 … 500 mV		
20 µW	200 … 1000 µW	2 mV	20 … 200 mV		
10 µW	100 … 1000 µW	1 mV	10 … 100 mV		
5 µW	50 … 500 µW	0.5 mV	5 … 50 mV		
2 µW	20 … 200 µW	0.2 mV	2 … 20 mV		
1 µW	10 … 100 µW	0.1 mV	1 … 10 mV		
0.5 µW	5 … 50 µW				
0.2 µW	2 … 20 µW				
0.1 µW	1 … 10 µW				

Unit "W"	Setting range Max. Level	Unit "V"	Setting range Max. Level	Unit "dBm"	Setting range REF. Level
nW / Div					
100 nW	1000 nW				
50 nW	500 … 1000 nW				
20 nW	200 … 1000 nW				
10 nW	100 … 1000 nW				
5 nW	50 … 500 nW				
2 nW	20 … 200 nW				
1 nW	10 … 100 nW				

Table: Setting ranges for the maximum level and reference level

3.14.14 Setting the Time base

To analyze very small portions of a signal, the scaling of the X-axis (time base) can be set in increments.

	Control	Operation	Function
1.	TIME/DIV 2 ms	Press the softkey "TIME/DIV".	The selection list for changing the time base of the X-axis will be enabled.

The selection list and the setting range depend on the set sampling frequency (sampling rate) and the buffer size. The following table lists the time base when the entire measured data storage is displayed as a factor of the set sampling frequency and buffer size.

Example:

TIME/DIV setting (1),
Sampling rate (2) = 10 MHz,
Buffer (3) = 2 k,
corresponds to a setting range (4) of:
5 … 20 µs

Selection:	Buffer	Sampling range			
		2,5 MHz	10 MHz	40 MHz	80 MHz
	0,5 k	20 µs	5 µs	1.25 µs	0.625 µs
	1 k	20 … 40 µs	5 … 10 µs	1.25 … 2.5 µs	0.625 … 1.25 µs
	2 k	20 … 80 µs	5 … 20 µs	1.25 … 5 µs	0.625 … 2.5 µs
	4 k	20 … 160 µs	5 … 40 µs	1.25 … 10 µs	0.625 … 5 µs
	8 k	20 … 320 µs	5 … 80 µs	1.25 … 20 µs	0.625 … 10 µs

	Control	Operation	Function
2.		Select	Select the corresponding time base according to the selection list. The times on a gray background can only be set if the buffer size is expanded accordingly.
3.		Press the Enter button / push rollkey.	Acceptance of the actually set new time base.

3.14.15 Setting the Sampling frequency

	Control	Operation	Function
1.	S.RATE 10 MHz	Press the softkey "S.RATE".	The selection list for changing the sampling frequency will be enabled.
		☞ *The selected sampling frequency influences the TIME/DIV setting range. (also refer to the table in Section 3.14.14)*	
2.		Turn the rollkey until the required value is set.	Changes the sampling frequency to the selected value. Selection: 2.5, 10, 40, 80 MHz
3.	ENTER	Press the Enter button / push rollkey.	Acceptance of the actually set new sampling frequency.

3.14.16 Setting the Buffer size

	Control	Operation	Function
1.	BUFFER 2 k	Press the softkey "Buffer".	The selection list for changing the buffer size will be enabled.
	This setting determines the memory area of the power sensor and thus the number of values (samples) that are recorded per storage cycle.		
		☞ *The selected buffer size influences the time base setting range (TIME/DIV). (also refer to the table in Section 3.14.14)*	
2.		Turn the rollkey until the required value is set.	Changes the buffer size to the selected value. Selection: 0.5, 1.0, 2, 4, 8 k
3.	ENTER	Press the Enter button / push rollkey.	Acceptance of the actually set new buffer size.

3.14.17 Shifting the display detail within the Measured Data Storage

	Control	Operation	Function
1.	POSITION 0.0 µs	Press the softkey "POSITION".	Activation of the edit function for shifting the display detail within the measured data storage. The left-hand time of the display window will be set. POSITION 30.0_ µs

This makes it possible to scroll horizontally within the measured data storage. The left-hand time for the display and the bargraph is refreshed accordingly by the "POSITION" value. The contents of the display will be shifted horizontal by this time. The bargraph visualizes the current display area.
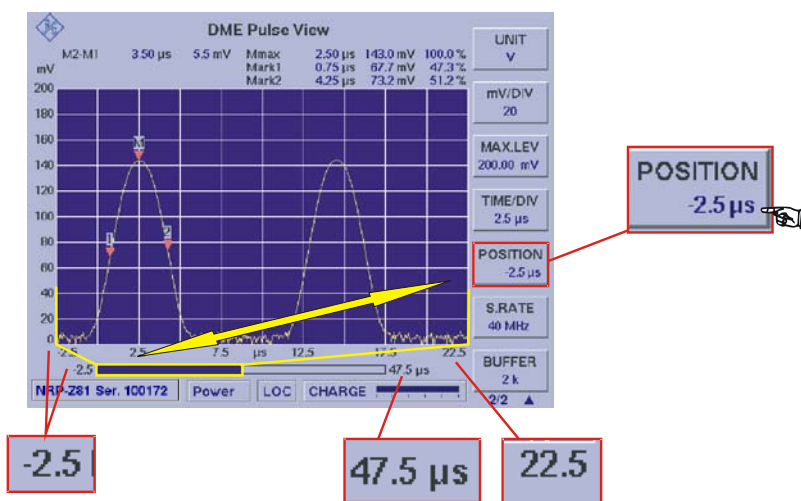
Example of shifting the display detail within the measured data storage:

Duration of the measurement event: -2.5 … 47.5 µs
Position value: -2.5 µs
Display detail: -2.5 … 22.5 µs (25 µs)
Start value: -2.5 µs

	Control	Operation	Function
2.		Turn the rollkey until the required time is set.	Shifting of the display detail by the set time.
3.		Press the Enter button / push rollkey.	Acceptance of the actually set new position.
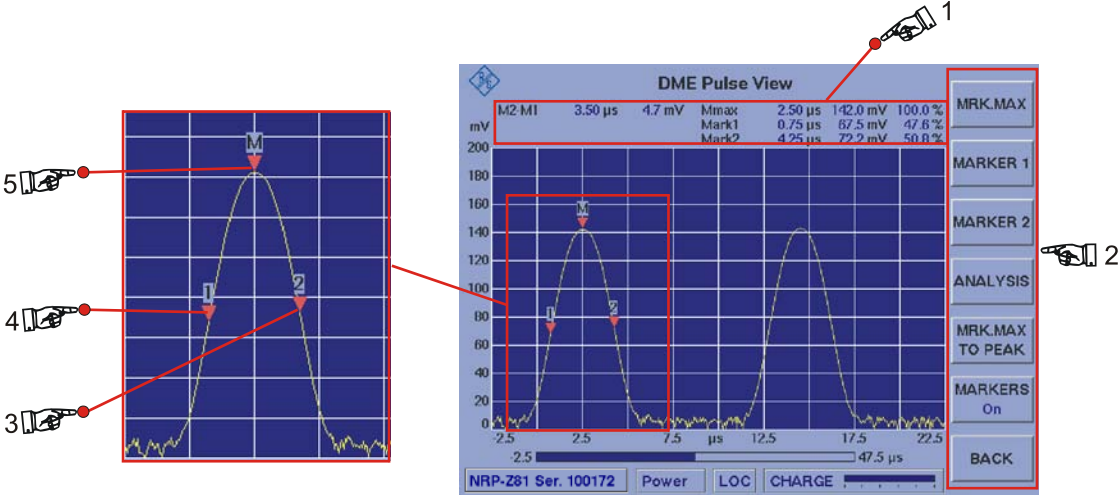
3.14.18 Settings for triggering in DME mode

	Control	**Operation**	**Function**
Set the trigger source as follows:			
1.	TR.SOURC Level	Press the softkey "TR.SOURC" several times until the wanted trigger source is set.	Selection of the trigger source, set value is shown in the softkey. TR.SOURC Level Selection: Level, cont, ext
	Level: Triggering upon reaching the trigger threshold set for "TR.LEVEL" cont: continuous recording of measurement values (trigger level, trigger slope and trigger delay time settings are not possible) ext: external trigger source (trigger level setting not possible)		
Set the trigger level as follows:			
		👉 *The trigger level can only be set when "Level" has been selected as the trigger source.*	
2.	TR.LEVEL 10.0 %	Press the softkey "TR.LEVEL".	Activation of the edit function for changing the trigger level, set value is shown in the Softkey. TR.LEVEL 9000_ nW

3.	0 ... 9	Setting the corresponding value with rollkey / keyboard.	Enter the trigger level including the corresponding decimal place. The setting range depends on the unit set for "UNIT":
			
			Range for unit V:
			   0.01 … 3.16 V
			Range for the unit W:
			   0 … 200 mW
			Range for the unit dBm:
			   -30 … 23 dBm

4.	ENTER	Press the Enter button / push rollkey.	Acceptance of the actually set new trigger level.
Set the trigger slope as follows:			
		👉 *The trigger slope can only be set when "Level" or "ext" has been selected as the trigger source.*	
5.	TR.SLOPE pos	Press the softkey "TR.SLOPE".	Switching to the signal slope to be triggered. The set property will be displayed in the softkey. TR.SLOPE pos Selection: pos (positive), neg (negative)

	Control	Operation	Function
Set the trigger delay time as follows:			
		☞ *The Trigger Delay Time can only be set when "Level" or "ext" has been selected as the trigger source.*	
6.	TR.DELAY 0.00 µs	Press the softkey "TR.DELAY".	Activation of the edit function for changing the trigger delay, set value is shown in the Softkey. TR.DELAY 9.00 µs
7.		Setting the corresponding value with rollkey / keyboard.	Setting the trigger delay time. Setting range: -50.00 … 9999.00 µs
8.		Press the Enter button / push rollkey.	Acceptance of the actually set new trigger delay time.

3.14.19 Calling the Marker functions in DME mode

The different marker functions are an important part of the DME pulse analysis. Apart from the marker functions (M1, M2, Mmax), the "pulse rise time", "pulse duration", "pulse decay time" and "pulse spacing time" analysis functions can be used.

	Control	Operation	Function
1.	MARKER	Press the "Marker" (11) button.	The softkeys for marker settings in DME mode will be shown.

Parameter display (1): Mmax: Display and setting of the position of Marker Max, display of the chronological position in µs and of the pulse amplitude in V (mV, mW, µW, nW, dBm) and %.

Mark1 Display and setting of the position of Marker 1, display of the chronological position in µs and of the pulse amplitude in V (mV, mW, µW, nW, dBm) and %.

Mark2 Display and setting of the position of Marker 2, display of the chronological position in µs and of the pulse amplitude in V (mV, mW, µW, nW, dBm) and %.

M2-M1 Display of the difference between Marker 1 and Marker 2 in µs and V (mV, mW, µW, nW, dBm)

Softkeys (2):
Marker (4):   Example, set marker M1
Marker (3):   Example, set marker M2
Marker (5):   Example, set marker Mmax

3.14.19.1 Softkeys (2) of the Marker function

Display	Description
MRK.MAX	This function facilitates manual positioning of the marker Mmax to the peak of a pulse. Automatic positioning can be selected via the "MRK.MAX TO PEAK" function. Setting and display in the parameter display.
MARKER 1	This function facilitates manual positioning of marker 1. Setting and display in the parameter display.

Display	Description
MARKER 2	This function facilitates manual positioning of marker 2. Setting and display in the parameter display.
ANALYSIS All params	Selection of the analysis function for DME pulses (DME single pulse, DME double pulse). This function can only be selected for the unit (UNIT = V) and the scaling (mV / DIV or V / DIV). Selection: Pulse rise time (M1 to 10 % ascending, M2 to 90 % ascending, M2-M1 = Rise time) Pulse duration (M1 to 50 % ascending, M2 to 50 % descending, M2-M1 = Width time) Pulse decay time (M1 to 90 % descendingM2 to 10 % descending, M2-M1 = Fall time) Pulse spacing time (M1 to 50 % ascending first pulse, M2 to 50 % ascending second pulse, M2-M1 = Spacing time) "All parameters" represents in the parameter display (1) the characteristic numbers of all analysis functions described above at the same time: Pulse spacing 36.00 µs Rise time Duration Decay time Peak variation 0.02 dB Pulse 1 1.96 µs 3.57 µs 1.97 µs All parameters Pulse 2 1.97 µs 3.57 µs 1.97 µs
MRK.MAX TO PEAK	Automatic positioning of Marker Max to the first (Peak 1) or second (Peak 2) pulse in the display area.
MARKERS On	Showing/hiding of the markers. Selection: ON / OFF
BACK	Return to the softkey bar of the DME mode used last.

3.14.19.2 Different Marker functions

In the following, the different marker functions are described in an example sequence. These are:
- Marker Max with Peak marker function,
- Marker 1 and Marker 2.

	Control	Operation	Function
Marker Max with peak marker function:			
1.	MRK.MAX	Press the softkey "MRK.MAX".	The setting (2) for manual positioning of the marker 1 (3) is enabled.

The marker position can be set manually via the rollkey / keyboard. Another actuation of the "MRK.MAX" (1) softkey will save the settings (level values will be updated). Via the Peak marker function (softkey "MRK.MAX TO PEAK, 4), Marker Max can automatically be set to the peak (Peak 100%) of a DME pulse. In the case of a DME double pulse, e.g. it is thus possible to select one of the two pulse peaks (Peak1 / Peak2) to which the marker is to be set.
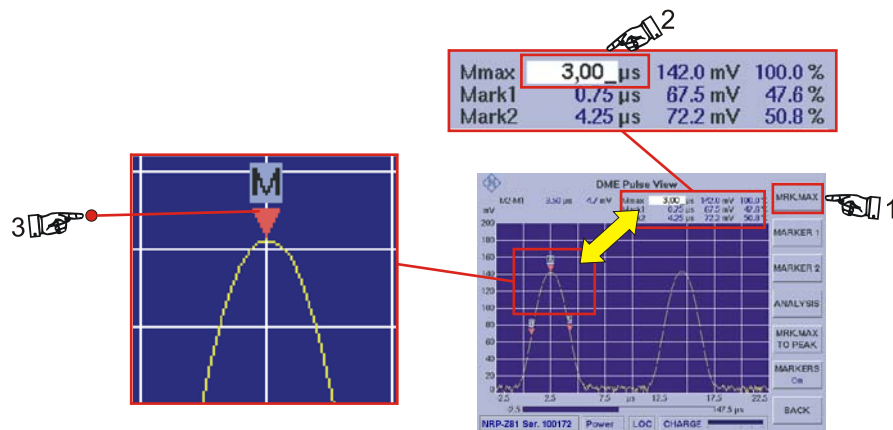
Figure shows the manual positioning of marker "Max".
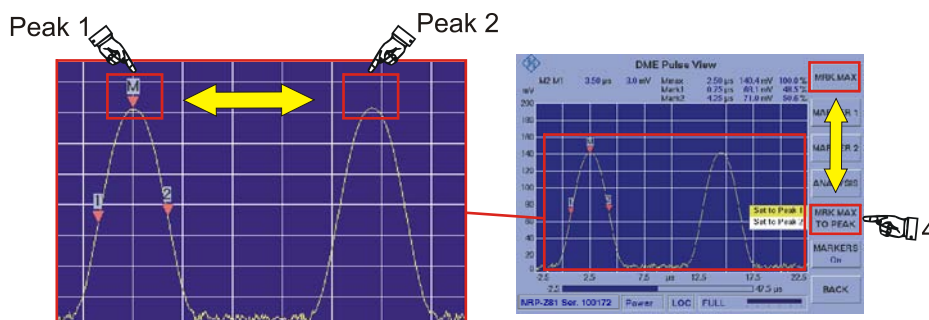
Figure shows the automatic positioning of marker "Max" via the Peak marker function by select-ing Peak 1 or Peak 2.

Marker 1 and Marker 2 function:			
Since the operation of this marker function is identical for the two marker functions, it will only be described with the example of Marker 1.			
2.	MARKER 1	Press the softkey "Marker 1".	The setting (2) for manual positioning of the marker (3) is enabled. The marker position can be set manually via the rollkey / key-

Control	Operation	Function
		board. Another actuation of the "Marker 1" (1) softkey will save the settings (level values will be updated). The figure shows the manual positioning Marker 1

3.14.19.3 DME Analysis function

In the DME analysis, the data visible on the display area (DME single or double pulse) will automatically be analyzed. Following the analysis, the markers will be set to exactly 10 %, 50 % or 90 % according to the analysis function selected. The parameters corresponding to the marker position (time, level) are interpolated. The following analysis functions can be selected:

- Pulse rise time (analysis of the rising pulse slope)
- Pulse decay time (analysis of the falling pulse slope)
- Pulse duration (analysis of the pulse width)
- Pulse spacing time (analysis of the pulse spacing for a DME double pulse)
- "All parameters" (Summary of all characteristic numbers of the functions described above)

Control	Operation	Function
	☞	***Before a pulse analysis is started, the marker "Max" must be set to the peak of a pulse. In addition, the unit (UNIT = V) and the scaling (mV / DIV or V / DIV) must be set.***
Select and start an analysis function as follows:		
1.	Press the softkey "ANALYSIS".	The selection list of the analysis function will is opened.

	Control	Operation	Function
2.		Select the "Pulse rise time" analysis function with the rollkey and enable it by press-ing the Enter button / push rollkey.	The analysis will be started.

"Pulse rise time" analysis function:

In the "Pulse rise time" analysis function, marker 1 is set to exactly 10 % of the rising pulse slope and marker 2 to exactly 90 % of the rising pulse slope. The resulting difference (M2-M1) between the two marker positions is output in the parameter field in time (2) and level (3). Pro-vided the analysis was successful, the indication"Pulse rise time" (1) is displayed on a white background. If the background is yellow, the marker positions must be checked.
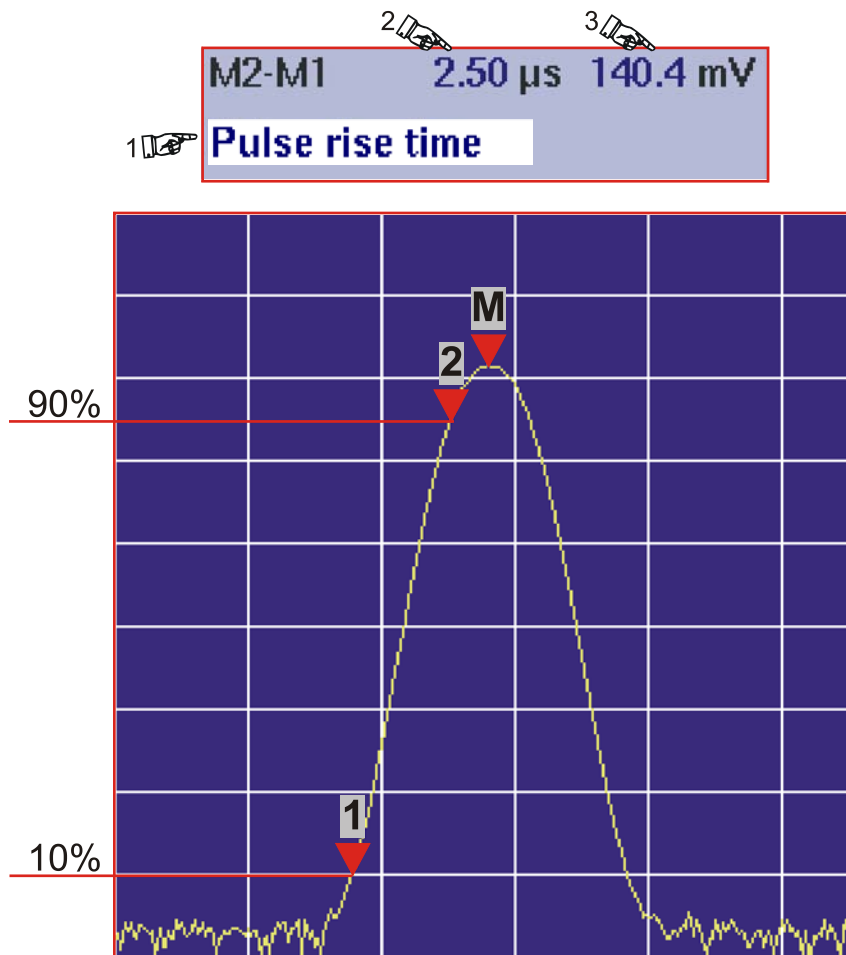
Example of the "Pulse rise time" analysis function

Control	Operation	Function
"Pulse decay time" analysis function:		

In the "Pulse decay time" analysis function, marker 1 is set to exactly 90 % of the falling pulse slope and marker 2 to exactly 10 % of the falling pulse slope. The resulting difference (M2-M1) between the two marker positions is output in the parameter field in time (2) and level (3). Provided the analysis was successful, the indication "Pulse decay time" (1), is displayed on a white background. If the background is yellow, the marker positions must be checked.
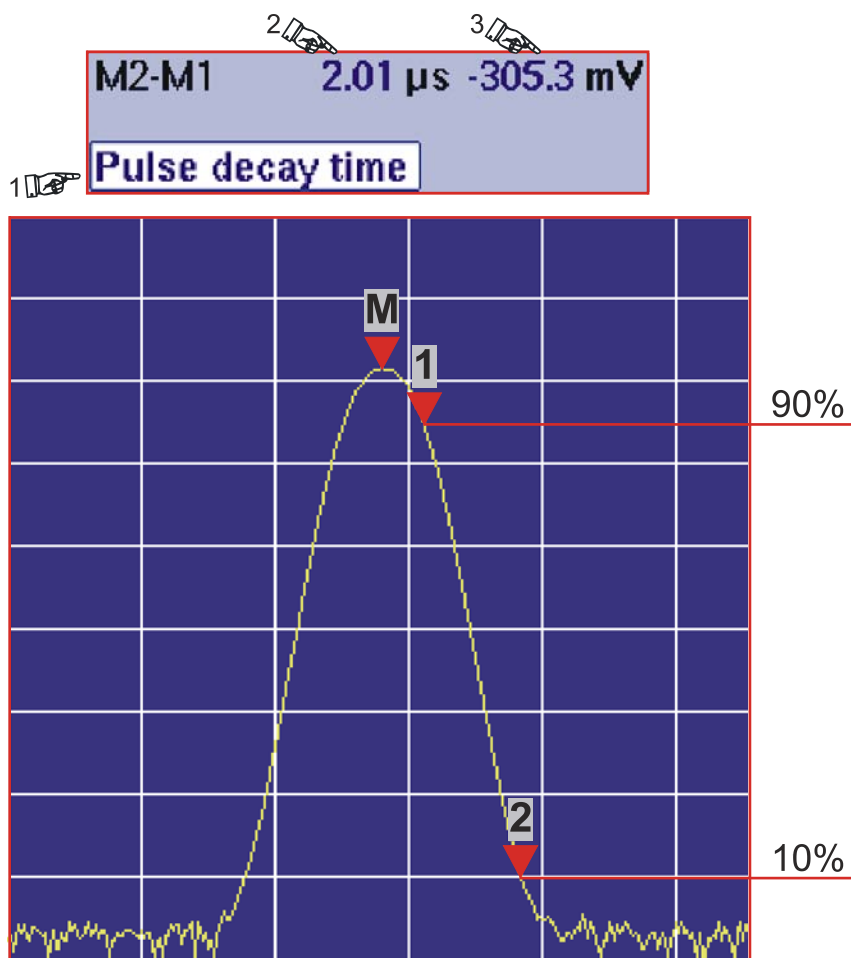
Example of the "Pulse decay time" analysis function

Control	Operation	Function
"Pulse duration" analysis function:		

In the "Pulse duration" analysis function, marker 1 is set to exactly 50 % of the rising pulse slope and marker 2 to exactly 50 % of the falling pulse slope. The resulting difference (M2-M1) between the two marker positions is output in the parameter field in time (2) and level (3). Provided the analysis was successful, the indication "Pulse duration" (1), is displayed on a white background. If the background is yellow, the marker positions must be checked.
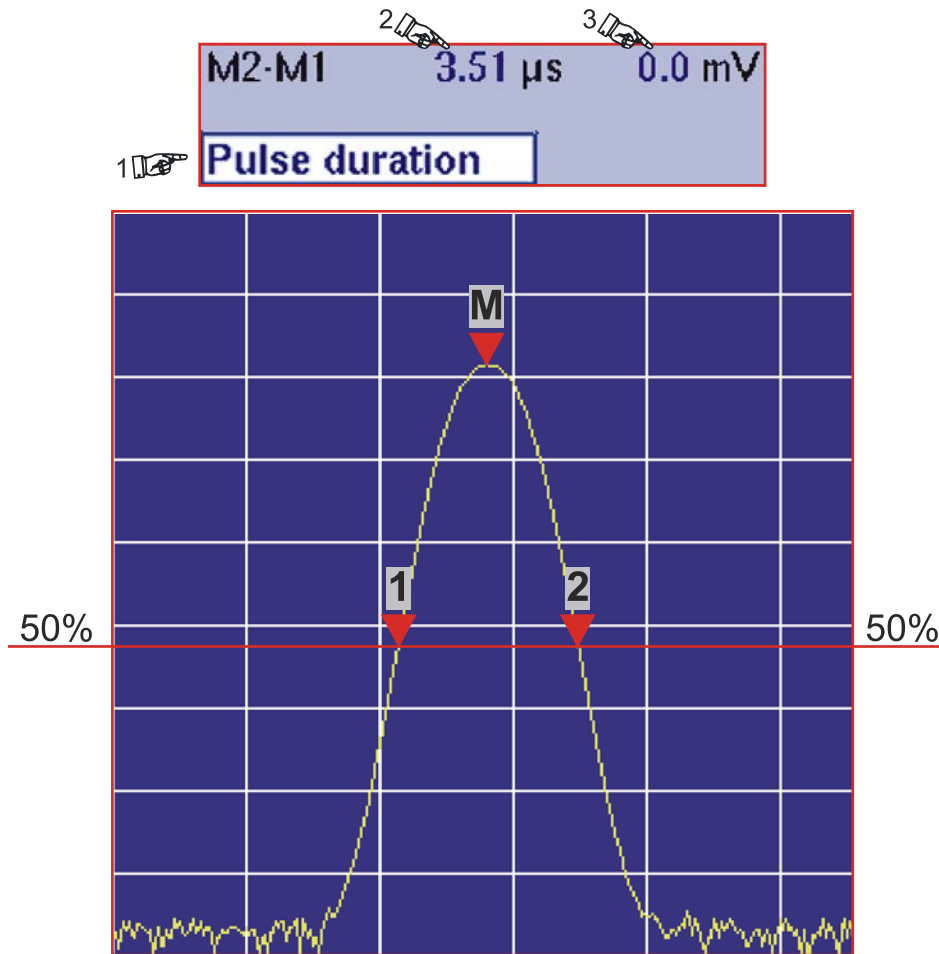
Example of the "Pulse duration" analysis function

Control	**Operation**	**Function**

"Pulse spacing time" analysis function:

In the "Pulse spacing time" analysis function, marker 1 is set to exactly 50 % of the rising pulse slope and marker 2 to exactly 50 % of the rising pulse slope of the second pulse. The resulting difference (M2-M1) between the two marker positions is output in the parameter field in time (2) and level (3). Provided the analysis was successful, the indication "Pulse spacing" (1), is displayed on a white background. If the background is yellow, the marker positions must be checked.
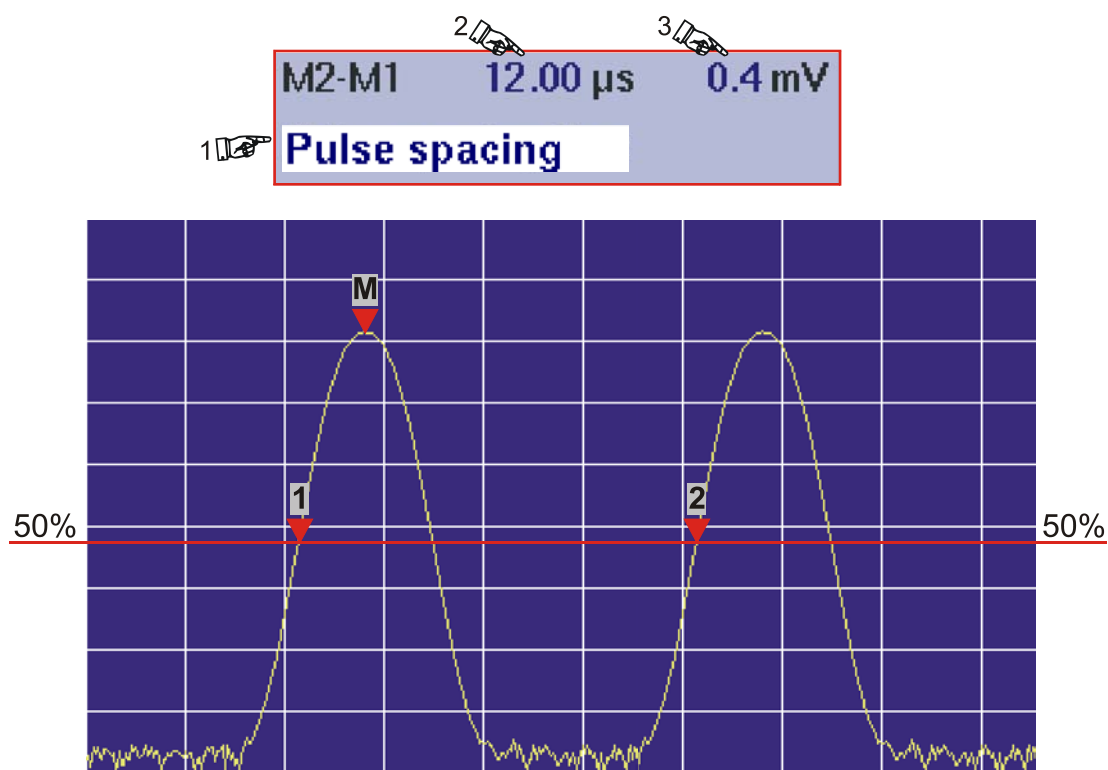
Example of the "Pulse spacing time" analysis function

3.14.20 Signal Parameters and Displays for Power Sensor R&S® NRT
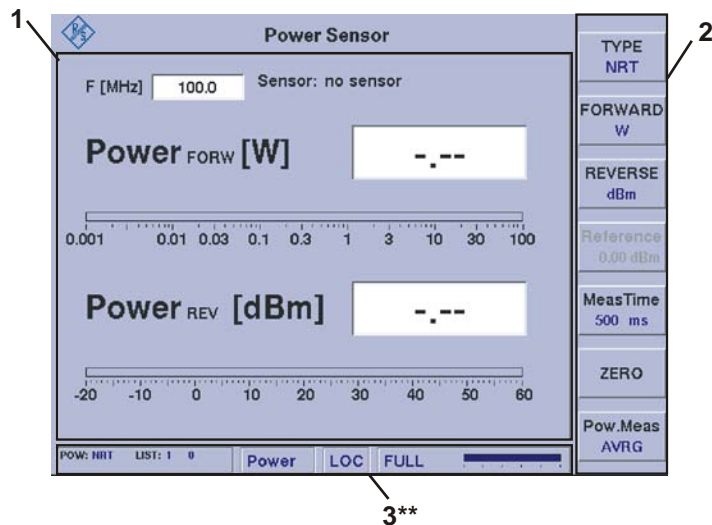
3** for general description of the status field, refer to 3.2.1.1.

3.14.20.1 Parameter and Measured Value section (1)

Item	Display	Function	Indication
1	F [MHz]	Indication and setting of the correction frequency	MHz
2	Information field	Display of the identification data of the connected sensor. If a sensor is not connected or if the sensor cannot be identified, "No sensor" will be displayed in this field.	
3	Power FORW [W]	Indication of the feed power (numeric / bargraph display) **Bargraph scaling:** dBm: -20 … 60 dBm dB: -30 … 30 dB W: 0.001 … 100 W	dBm / dB / W
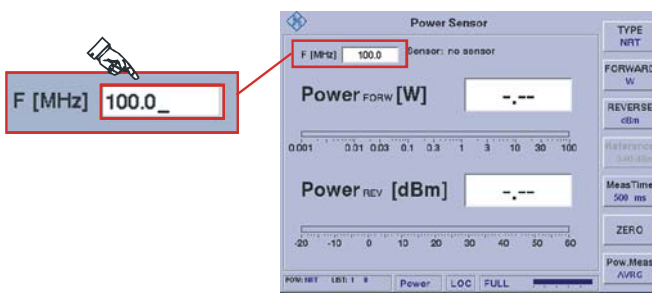
Item	Display	Function	Indication
4	Power REV [dBm], Return loss [dB], VSWR	Different indications (numeric / bargraph display) for reflection **Bargraph scaling:** dBm: -20 … 60 dBm W: 0.001 … 100 W RL: 0 … 40 dB VSWR: 1 … ∞	dBm / W / RL / VSWR

3.14.20.2 Softkeys (2)
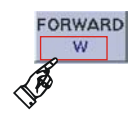
Display	Description
TYPE NRT	Switchover between the two possible sensor types R&S® NRT / R&S® NRP. While switching to one sensor type, this sensor will be initialized accordingly and the identification data of the sensor will be displayed in the information field (2). If a sensor is not detected, "no Sensor" will be displayed in the information field (2).
FORWARD W	Dimension setting for the measured value display of the feed power. The set unit will automatically be carried over to the measured value display (Power FORW, 3). The scaling of the bargraph will automatically be adapted. The following selection can be made: - dBm - dB - W
REVERSE W	Dimension setting for the measured value display of the return power. The set unit will automatically be carried over to the measured value display (4). The scaling of the bargraph will automatically be adapted. The following selection can be made: - Display of the return power in Watt or dBm, - Display of the return loss (RL) in dB, - Display of the VSWR
Reference 0.00 dBm	Setting of the reference level (reference level for relative level measurement) in "dBm, softkey is enabled only in the dimension setting "FORWARD, dB".
MeasTime 50 ms	Enables the setting of the measurement time. Setting range: 50 … 2000 ms (10 ms increments) 👉 *Setting of the measuring time is described in section 3.7!*
ZERO	Enables user-controlled zeroing of the connected sensor.
Pow.Meas AVRG	Switchover between measurement of the average power (AVRG = Average) and the maximum peak envelope power (PEP = **P**eak **E**nvelope **P**ower).

3.14.21 Setting the Correction frequency

Many characteristics of power sensors are frequency-dependent. In this context, level correction is implemented via the frequency with correction table. To achieve a high measuring accuracy, the R&S® EVS 300 features a setting for the correction frequency. After the correction frequency has been input, the R&S® EVS 300 will transfer it to the power sensor, which will then correct the measuring results accordingly.

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	In the frequency field, behind the last digit the cursor appears. Setting range: 25 … 1000 MHz ☞ *Take into consideration the frequency range of the power sensor.* Correction frequency setting view
2.		Setting the corresponding correction frequency with rollkey / keyboard.	The correction frequency should be entered with the corresponding decimal place.
3.		Confirm with the correct dimension or Press the Enter button / push rollkey.	Acceptance of the actually set new correction frequency.

3.14.22 Setting the Measured Value Display of the Feed Power

	Control	Operation	Function
1.	FORWARD W	Press the softkey "FORWARD" several times until the wanted unit is set.	Switchover the unit for the measured value display (1) of the feed power. The set unit is shown in the softkey. FORWARD W Selection: dBm, dB, W

Control	Operation	Function
When switching from the "dBm" to the "dB" unit, the currently measured feed level will be stored as the reference level in the "Reference, 2" softkey. The reference level can also be set manually (also refer to "Setting the Reference Level").		
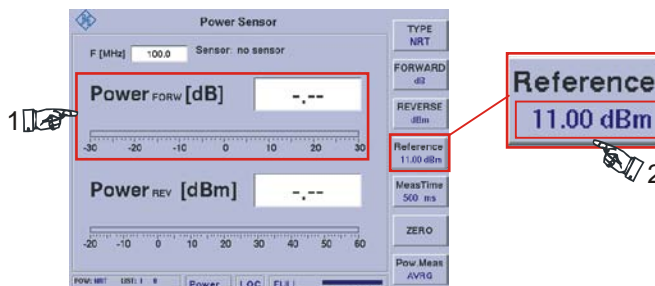
The scaling of the bargraph will automatically be adapted to the selected unit.

Bargraph scaling:
dBm: -20 … 60 dBm
dB: -30 … 30 dB
W: 0.001 W … 100 W

3.14.23 Setting the Measured Value Display of the Return Power

To gain exact information on the return power, the return loss and the VSWR (voltage standing wave ratio) can be determined in addition to the return power.

	Control	Operation	Function
1.		Press the softkey "REVERSE" several times until the wanted unit/measuring method is set.	Switchover the unit for the measured value display (1) of the return power. The set unit is shown in the softkey. The following selection can be made: - Display of the return power in Watt or dBm, - Display of the return loss (RL) in dB, - Display of the VSWR
			Bargraph scaling: dBm: -20 … 60 dBm W: 0.001 … 100 W RL: 0 … 40 dB VSWR: 1 … ∞
	The scaling of the bargraph will automatically be adapted to the selected unit.		
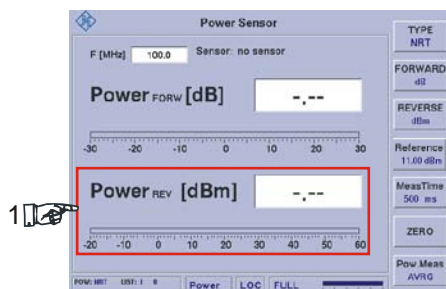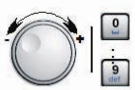
3.14.24   Setting the Reference level
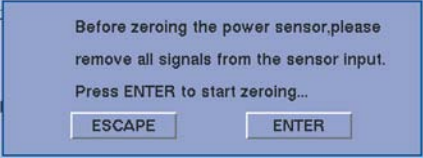
When switching from the "dBm" to the "dB" unit for the feed power, the currently measured level will automatically be stored as the reference level and can be used as the reference for a relative display. The reference level can also be set manually.

	Control	Operation	Function
1.	FORWARD dBm	Press the softkey "FORWARD" several times until the unit "dB" is set.	Selection of the unit "dB". FORWARD dB
		The reference level can only be set manually in the unit "dB". Only in this setting will the "Reference" softkey be enabled.	
2.	Reference 0.00 dBm	Press the softkey "Reference".	Activation of the edit function for changing the reference level, set value is shown in the softkey. Reference 11.00_ dBm
3.		Setting the corresponding value with rollkey / keyboard.	Enter the reference level including the corresponding decimal place. Setting range: -30 … 60 dBm
4.	ENTER	Press the Enter button / push rollkey.	Acceptance of the actually set new reference level.

3.14.25   Zeroing the R&S® NRT Power Sensor

Zeroing increases the accuracy when measuring low power values or small maladjustments by reducing the zero point error. The zero point error is an additive disturbance variable that can be caused by the electronic equipment and thermal influences.

	Control	Operation	Function
		For zeroing, the R&S® NRP power sensor must be disconnected from the device under test or the signal source must be switched off. Otherwise the power sensor may be destroyed.	
1.	ZERO	Press the softkey "ZERO".	A security prompt will be displayed that has to be confirmed accordingly. Press the "ESC" button to abort the process.

Control	Operation	Function
		Before zeroing the power sensor,please remove all signals from the sensor input. Press ENTER to start zeroing... ESCAPE ENTER
2.	ENTER	Press the "ENTER" (31) button.	After the security prompt has been confirmed, zeroing of the connected power sensor will be performed.

3.14.26 Functions for Power measurement

The R&S® EVS 300 features functions for measuring the average power (effective value) and the maximum peak envelope power (PEP = **P**eak **E**nvelope **P**ower). In this way, any types of measurement signals can be measured with high accuracy.

Control	Operation	Function
AVRG function (measurement of the average power):		
1. Pow.Meas AVRG	Press the softkey "Pow.Meas" several times until the "AVRG" function is set.	Switchover to the "AVRG" function. The set function is shown in the softkey. Pow.Meas AVRG
Measuring of the average power (effective value) always delivers the average power, irrespective of the measurement signal, whether modulated, unmodulated or multiple carriers. This means, this function delivers a measurement result just like a thermal power meter. It is characterized by a large measuring range and high measuring accuracy.		
PEP function (measurement of the maximum peak envelope power):		
2. Pow.Meas PEP	Press the softkey "Pow.Meas" until the "PEP" function is set.	Switchover to the "PEP" function. The set function is shown in the softkey. Pow.Meas PEP
The measurement of the peak envelope power provides information on the maximum power peaks in the case o modulated envelopes. This provides information on the modulation capabilities of transmitters.		

3.15 Data Logger operation

The Data Logger records and manages series of measurements or individual data. For each mode (ILS, VOR, MARKER BEACON, Power Sensor (Option EVS-K5)) up to 999 lists with max. 1.000.000 data lines each may be recorded. The dataset lists are stored on the internal Compact-Flash card of the R&S® EVS 300. For further processing, the dataset lists may be transferred in CSV format to a USB-memory stick.
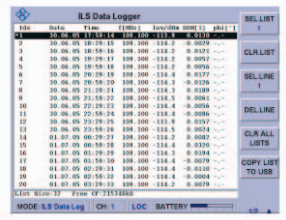
In the ILS mode, the user interface of the Data Logger consists of 5 display views, while the VOR, MARKER BEACON and Power Sensor (Option EVS-K5) modes contain 2 display views, which can all be accessed via softkeys or the shift button "⬛" (35). All display views refer to the currently active mode, e.g.: "ILS". The following display views of the Data Logger may be called up

1. Display view "Dataset list" (top display view Data Logger)
2. Display view "Parameter settings"
3. Display view "ILS-Graph" (only the ils mode attainable)
4. Display view "ILS-Graph-Trace"
5. Display view "ILS-Graph-Cursor"

Graphic overview, showing the assignment of the display views within the Data Logger mode

2ˢᵗ "Parameter settings" display view

1ˢᵗ "Dataset list" display view

4ˢᵗ "ILS-Graph-Trace" display view

3ˢᵗ "ILS-Graph" display view

5ˢᵗ "ILS-Graph-Marker" display view

· · · · only the ils mode attainable
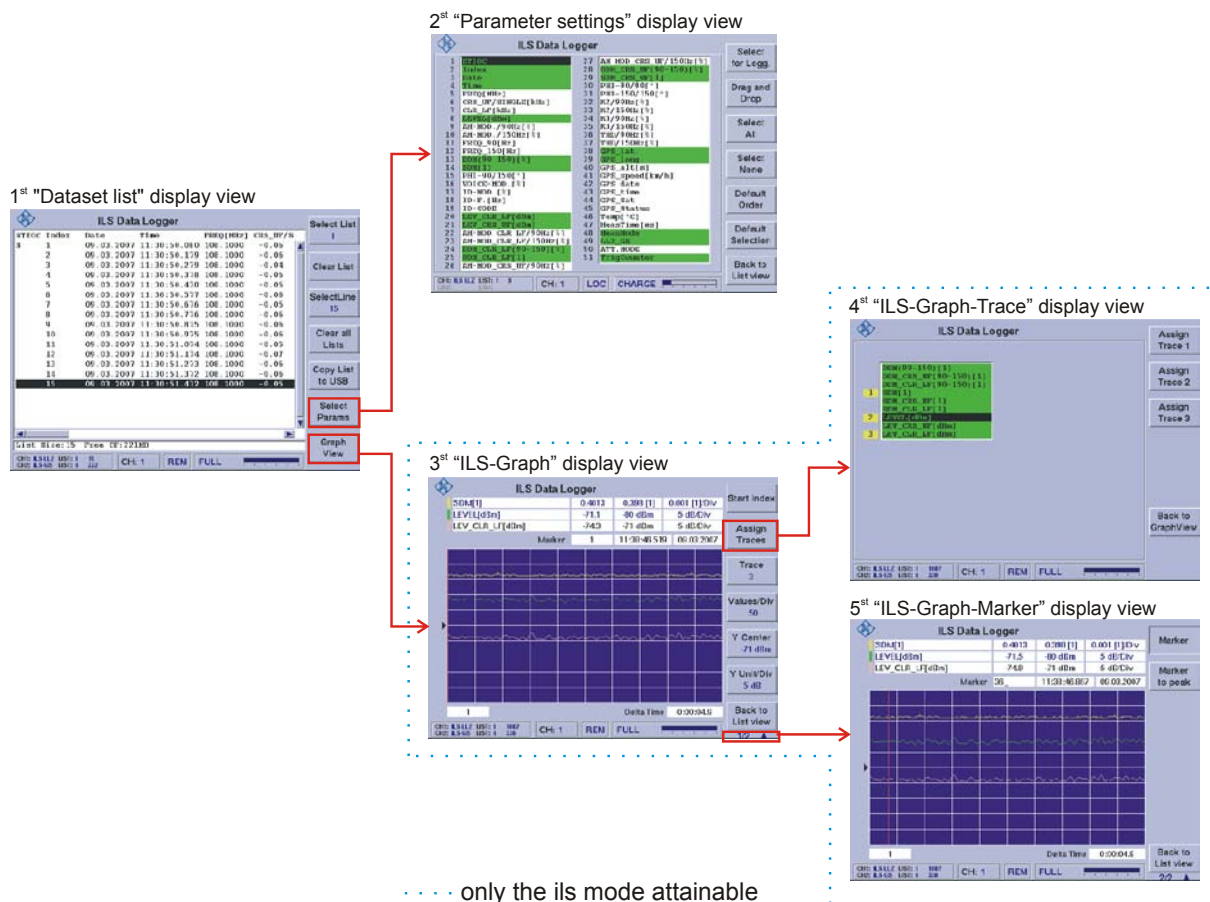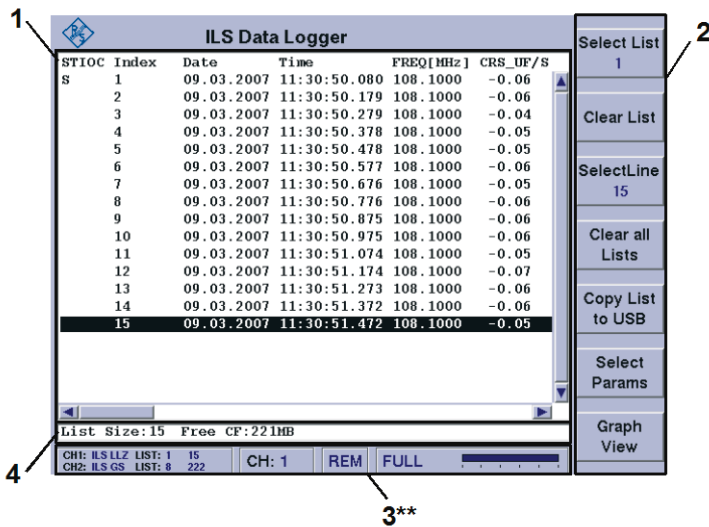
Activates the Data Logger function

Control	Operation	Function
1.	Press the "MEM" (41) button.	The R&S® EVS 300 switches over into the Data Logger function.

In order to access a dataset of a particular mode, e.g.: ILS, the ILS mode must also be turned on. Each device mode may consist of up to 999 lists with max. 1.000.000 data lines (datasets) each.

3.15.1 Signal Parameters and Display in the display view "Dataset lists"

3.15.1.1 Dataset list (1)

All available data of the applicable mode will be entered into the dataset list, i.e for the following modi different data set listings will be compiled:

- ILS mode,
- VOR mode,
- MARKER BEACON mode.

While in the ILS mode, it further depends on the measuring modes (MEAS.MODE: Single, CRS+CLR etc.), as well as the VIEW modes (Normal, Distortion), which data will be captured and entered into the dataset list.

Each mode may consist of up to 999 lists (1.000.000 data lines / list) each. To each mode, individual parameters can be assigned, which should be shown in the dataset list. Use the display view "Parameter settings" to select the applicable parameter-specific modes.

Structure of the dataset list:

Item	Function
1	Column "STIOC" identifies the datasets within the list. Each letter within the column receives an identification, which in turn can also be found in the list below the respective letter. The following identification letters may be displayed: **S**tart: "S" will always be set, if a single dataset is accepted with the button "SAVE, (42)", or if the button "START, (10)" is used to initiate a series of measurements. **T**rigger: "T" marks a dataset, which was prompted by an external trigger mechanism. **I**nvalid: "I" indicates the recording of a dataset at a time, when the measurement level was either not permitted or too low (within the red range of the bargraph). **O**verload: "O" indicates the recording of a dataset at a time, when the RF input signal was too high. **C**orrection: "C" indicates that the dataset was recorded at a time, when the measurement included the RF input correction factor. PPS "P" marks a dataset, which was prompted by an external PPS trigger mechanism.
2	In the "Index" column each dataset which is entered, receives an index number. This serves two purposes, firstly, each dataset entered is recorded chronologically and secondly, specific data can be selected and displayed graphically.
3	Data display: the order and the selection of the parameters of a dataset can be set individually in the display view "Parameter settings".

3.15.1.2   Softkeys (2) of the display view "Dataset list"

Display	Function
Select List 1	Selection of a data set list (1 ... 999, listno. is shown in the softkey) ☞ ***Each unit mode can deal with max. 999 listings!***
Clear List	Deletes the current list
SelectLine 1	Marks a line of the current list (line no. is shown in the softkey) with scroll function ☞ ***A list can have about max. 1.000.000 data lines!***
Clear all Lists	Deleting all lists of the current mode
Copy List to USB	To copy the current list onto an USB-memory-stick
Select Params	Switching to the parameter display view. In this display view, the parameter of the active mode (e.g.: ILS) can be selected, which will be accepted into the dataset list.
Graph View	Switching to the graphic display of DDM values. This function is only available in ILS mode. In the modes VOR and MARKER BEACON, the softkey is hidden.

3.15.1.3   Memory Status Information (4)

```
    1            2
    |            |
List Size:15  Free CF:221MB
```
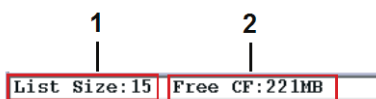
Item	Display	Function	Indication
1	List Size	Number of measured lines within the current dataset list (one line equals one measurement).	
2	FREE CF	Display of available memory on the internal compact flash card (256 MB).	MB

3.15.2   Signal Parameters and Display in the display view "Parameter settings"

Item	Display	Function	Indication
1	Shortlist	A shortlist contains all parameters associated with a particular mode. From the multitude of parameters available in the shortlist, the order and the parameters can be determined, which should be stored and which should be displayed in the list. This selection determines the display of the dataset list. Selected parameters will be highlighted green. Each individual setting can be associated with a preset location. Either the rollkey or the up/down arrows may be used to navigate through the list.	

3.15.2.1   Softkeys (2) of the display view " Parameter settings"

Display	Function
Select for Logg.	Use this softkey to select and accept a parameter into the shortlist (green background) or to delete the parameter (white background).
Drag and Drop	Use this softkey to change the order of the parameter within the shortlist. To do this, select a parameter (inverse) and use the softkey to mark it (blue background), then use the rollkey to select a new position within the list. Confirm the new position by pressing the softkey again.
Select All	This function selects all parameters of the shortlist. The selection will be highlighted green.
Select None	This function selects none of the parameters of the shortlist. The selection will be highlighted white. If this setting is selected, no datasets will be displayed or stored in the dataset list.
Default Order	This softkey resets the default order of all parameters in the shortlist.

Display	Function
Default Selection	With the softkey the default shortlist is called.
Back to List view	Switching to the "Dataset list" display view.

3.15.3 Signal Parameters and Display in display view "ILS-Graph"

Item	Display	Function	Indication
1	Parameter field	Displays all parameters and data, which were selected in the "Trace" display view. Up to 3 different parameters may be displayed. The colour marking of the parameter line (yellow, green, and light red) corresponds with the displayed curve. The displayed data corresponds with the current Cursor position. Display within the table: Measurement parameter, measured value Y value in diagram middle (Y center) Scaling in Y direction	The display of the different units of measure depends on the selection made.
2	Cursorr field	The first field contains the Cursor Index; this identifies the selected measurement line of the current list. Furthermore, the date and time when the highlighted dataset was stored is also shown.	Index No. hh:mm:ss.sss dd.mm.yyyy
3	Softkeys	These will be described in the following section.	
4	Delta Time	Delta Time indicates the period between the first and the last displayed data.	hh:mm:ss.sss

Item	Display	Function	Indication
5	Index field	Display and selection (softkey "Start Index") of the used indices (dataset) from the current dataset list.	
6	Indication	Graphic display of the selected parameter value set.	

3.15.3.1   Softkeys (3) of the display view "ILS-Graph"

Display	Function
Start Index	Activates the setting for the selection of an index (index field 5) from the dataset list. This defines the index of a dataset list, with which the graphic display should start.
Assign Traces	Switching to the "ILS-Graph-Trace" display view, in order to select those parameters, which should be displayed graphically.
Trace 1	Selection of the curve (Trace) for which the setting "Y Center" and "Y Unit/Div" should be carried out. The respective parameter line will be highlighted white.
Values/Div 50	Activates the editing function to change the number of displayed data per scale division on the X axis. This will automatically determine the width of the displayed time window (Delta Time). Setting range: 5, 10, 25, 50, 100, 250, 500, 1000, 2500, 5000
Y Center 0.000 [1]	Activates the editing function to change the position of the center line. By doing this, a value will be assigned to the center line of the selected Trace. The setting refers to the curve, which has been selected via the "Trace" softkey. For each Trace 1 ... 3, this value can be set individually.
Y Unit/Div 0.02 [1]	Activates the editing function to change the scaling of the Y axis. This determines the unit of measure per scale division on the Y axis. The setting refers to the curve, which has been selected via the "Trace" softkey. For each Trace 1 ... 3, this value can be set individually.
Back to List view	Switching to the "Dataset list" display view.

3.15.3.2   Signal Parameters and Display in the display view "ILS-Graph-Marker"

☞ *Any display not discussed here, can be found in the description of the display view "ILS Graph".*
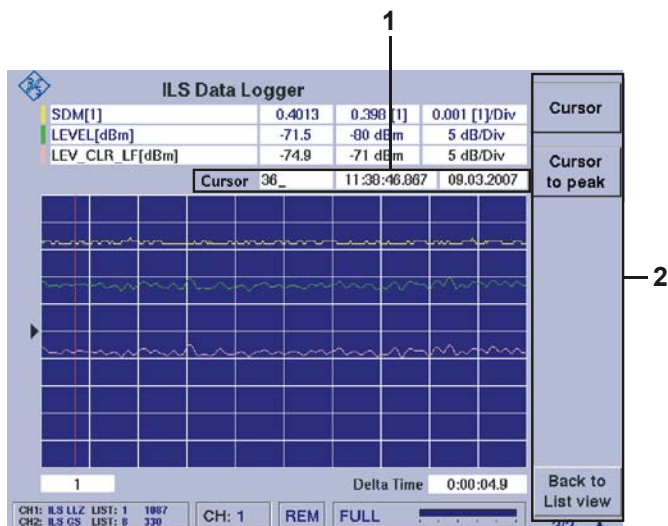
Item	Display	Function	Indication
1	Cursor field	Display and selection of the Cursor Index. The editing function can be activated via the "Marker" softkey. Furthermore, the date and time when the highlighted dataset was stored is also shown.	Index No. hh:mm:ss.sss dd.mm.yyyy

3.15.3.2.1   Softkeys (2) of the display view "ILS-Graph-Marker"

Display	Function
Cursor	Activates the editing function to change the Cursor setting. The Cursor Index (which corresponds with the line index of the current list) can be changed in the Cursor field. The Cursor is displayed as a red vertical bar.
Cursor to peak	The Marker will be placed on the largest visible data value of that curve, which was selected via the "Trace" softkey. The table will be updated accordingly.
Back to List view	Switching to the "Dataset list" display view.

3.15.3.3 Signal Parameters and Display in the display view "ILS-Graph-Trace"

Item	Display	Function	Indication
1	Shortlist	Selection of all possible parameters, which should be displayed graphically. One parameter should be selected per Trace. A yellow box with the respective trace number indicates the order and assignment to Trace 1 ... 3. The green background indicates the availability of the parameter in the dataset list, i.e. the parameter was selected for "Logging" in the display view "Parameter settings" (see 3.14.2).	

3.15.3.3.1 Softkeys (2) of the display view "ILS-Graph-Marker"

Display	Function
Assign Trace 1 ⋮ Assign Trace 3	When using the "Assign Trace 1 ... 3" softkey, an individual parameter can be assigned from the selection display view. A yellow box with the respective trace number indicates the order and assignment to Trace 1 ... 3.
Back to List view	Switching to the "Dataset list" display view.

3.15.4 Using the Data Logger for the storage of data

While in mode ILS, VOR, MARKER BEACON and Power Sensor (Option EVS-K5), the Data Logger may be used to log data. The "SAVE" (42) button may be used to accept individual datasets manually into the dataset list of the preset mode, or entire measurement lines can be automatically recorded. Use the "START" button to begin the recording of the measurement line and use the "STOP" button to

stop the process. However, prior to starting a measurement line, the following settings must be activated:

3.15.4.1   Setting the Logging Interval Time

	Control	Operation	Function
1.	Switch to "Setup” and select the display view "Data Logger”. Select the window "Logging Interval [hour:min]".		
2.		Setting the corresponding Logging Interval Time (h) with rollkey / keyboard.	Measurement interval setting in hours and minutes (e.g. Setting: 1 h = one measurement per hour). Setting value: 00:01 ... 24:00 h Depending of meas. interval (sec)
3.		Press the Enter button / push rollkey.	Acceptance of the new set value.
4.	Select the window "Logging Interval [sec]"		
5.		Setting the corresponding Logging Interval Time (s) with rollkey / keyboard.	Measurement interval setting in seconds (e.g. setting: 1 s = one measurement per second). Setting value: 0.01 ... 59.90 s Depending of meas. interval (hh:mm)
6.		Press the Enter button / push rollkey.	Acceptance of the new set value.
		☞	*The external trigger settings are only effective, if in the selection window "Logging Source" the settings "time" or "time + ext. trig." are selected!*

3.15.4.2   Activation the Automatic ON / OFF function at measuring interval

	Control	Operation	Function
1.	Switch to "Setup” and select the display view "Data Logger”. Select the window "Auto Power Down".		
2.		Select	Activation of the automatic ON / OFF function at a preset measuring interval. Selection: ON / OFF
		☞	*If the time between 2 measurements exceeds 3 minutes and 59.9 seconds , the device automatically shuts off and turns back on after 2 minutes. In order to enable a meaningful Auto-Power-Down function, the interval should be set to >5 min!*

	Control	Operation	Function
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

> *If a measuring routine is started while the auto power down function is activated, the device will carry out the measurement and then immediately switch itself off. Just before the preset measuring interval is reached, the device will switch itself back on and carry out the next measurement in accordance with the preset interval before switching itself off again. This measuring rhythm will remain operational until the series of measurements is discontinued by pressing the "STOP" button!*

3.15.4.3 Settings to the external Trigger mechanism of the Data Logger

	Control	Operation	Function
1.	Switch to "Setup" and select the display view "Data Logger". Select the window "Ext. Trigger Impulse".		
2.		Select	Setting the impulse slope (positive / negative) of the external trigger impulses. Immediately after receiving a trigger impulse, the measurement takes place at the trigger input.
			Selection: Pos. edge / Neg. edge
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.
4.	Select the menu window "Ext. Trigger Count".		
5.		Setting the corresponding value with rollkey / keyboard.	Setting the number of external trigger impulses, which are required to initiate a trigger mechanism.
			e.g. "5". After each fifth external trigger impulse one dataset will be stored in the Data Logger (logging source "ext. trigger") or in the column "STIOC" a dataset will be identified with the letter "T" (Logging Source "time + ext. Trig.").
			See also Section 3.14.4.5, "Setting the control system (Logging Source)"!
			Setting value: 1 ... 1000

	Control	Operation	Function
6.		Press the Enter button / push rollkey.	Acceptance of the new set function.

☞ *The external trigger settings are only effective, if in the selection window "Logging Source" the settings "ext. trigger" or "time + ext. trig." are selected!*

3.15.4.4   Setting the Logging Channel

	Control	Operation	Function
1.	Switch to "Setup" and select the display view "Data Logger". Select the window "Logging Channel".		
2.		Select	Setting the receiver channel, from which the Data Logger should record the data. Selection: CH 1 CH 2 (1*), CH1 + CH 2 (1*)
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

1* if channel 2 is used as an option (otherwise, not adjustable)

3.15.4.5   Setting the Logging Source

	Control	Operation	Function
1.	Switch to "Setup" and select the display view "Data Logger". Select the window "Logging Source".		
2.		Select	Setting the Data Logger control system. The control system may be selected based on time, external trigger impulses, or a combination of both. The control system determines the frequency of data recording. If a control function is selected based on time, the datasets will be stored depending on the time of the "Logging Interval". If a control function is selected based on external trigger mechanisms , the datasets will be stored depending on the trigger impulse. A system combining both methods, will mark the occurrence of an external trigger impulse in addition to the time-controlled Data

	Control	Operation	Function
			Logger list.
			Selection: time
			ext. trigger
			time + ext. Trig
			time + PPS.
3.		Press the Enter button / push rollkey.	Acceptance of the new set function.

3.15.4.6   Start / Stopp the Automatic storing of the measured value
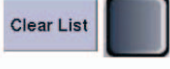
	Control	Operation	Function
1.	START	Press the "Start" (10) button.	The automatic storing process fort he measured value must be initiated manually in the set measurement mode (e.g. ILS). According to the setup measurement inter- val times the measured values will be en- tered into the Data logger.
2.	STOP	Press the "Stop" (12) button.	The automatic storing process fort he measured value must be terminated manu- ally in the set measurement mode (e.g. ILS).

3.15.5   Selection of Data set list

	Control	Operation	Function
1.	Select List 1	Press the softkey.	Switching over into the edit function and selection of a data set list. The softkey value section is active.
2.		Turn the rollkey several times until the required list appears.	The current list number will be carried along numerically in the softkey.
3.		Press the Enter button / push rollkey.	Acceptance of the actually set new data set list.

3.15.6 Processing a Dataset list
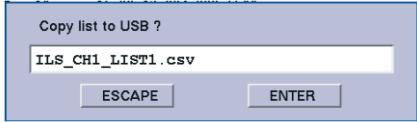
The following explains the operating steps necessary for processing a dataset list.

	Control	Operation	Function
Selection of Data set line			
1.		Press the softkey "Select Line".	Switching over into the edit function and selection of a data set list. The softkey value section is active. Selection of a line takes place via rollkey / keyboard. To accept the index, press enter or push rollkey.
Deletes the current Data set list			
2.		Press the softkey "Clear List".	The current data set list is deleted after the security question has been confirmed.
Deletes all Data set listings in the current device mode			
3.		Press the softkey "Clear all Lists".	All data set listings relating to the device mode set are, deleted after the security question has been confirmed.

3.15.7 Copy the current list onto an USB-memory-stick
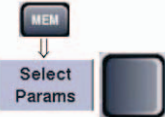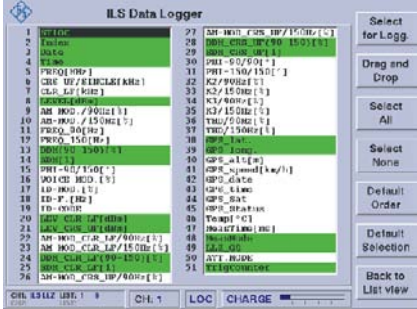
The following explains the operating steps necessary for copy the current list onto an USB-memory-stick.

	Control	Operation	Function
1.		Insert the USB memory stick into one of the USB interfaces (29).	wait about 5 seconds
		We recommend USB memory sticks without "security feature". The USB memory sticks supplied by the Kingston company or SanDisk have demonstrated proven effectiveness.	

Control	Operation	Function
2. Copy List to USB	Press the softkey " Copy List to USB ".	The default file name may be changed. After confirmation of a security question, the transfer of the current list in CSV file format will be started. Should any error occur during the transfer, a dialog box will be displayed. Copy list to USB ? ILS_CH1_LIST1.csv ESCAPE ENTER 👉 *Never remove the USB memory stick during the copying process!*
3.	Remove the USB memory stick.	When the copying process is complete, wait approximately 10 seconds before removing the USB memory stick.
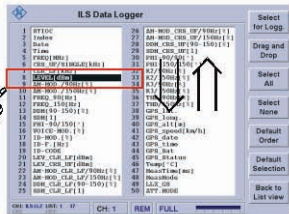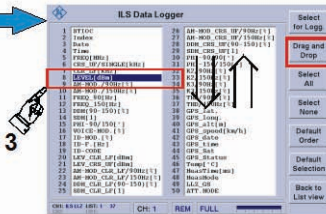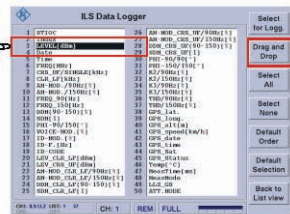
3.15.8 Creating an individual Dataset list

The following explains the operating steps necessary to create a individual dataset list.
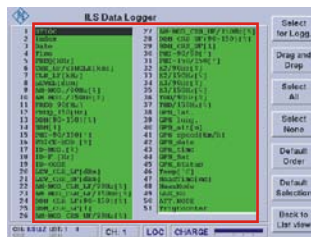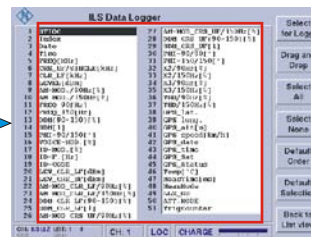
Control	Operation	Function
1. MEM ↓ Select Params	Press the "MEM" (41) button and the softkey "Select Params".	The device switches to the Data Logger function and to the display view "Parameter settings" of the previously set mode (e.g. ILS).
Example: Change the list order		
2. Drag and Drop	Select a parameter with the rollkey and dialing with the softkey "Drag and Drop".	Using the "Drag and Drop" softkey, the order of the parameter within the selection list can be established. This will determine the order of the columns within the dataset list

Control	Operation	Function
Sequence 1 Use the rollkey to select the parameter (1), which needs to be shifted.	**Sequence 2** Use the "Drag and Drop" soft-key (2) to mark (blue back-ground) the selected parame-ter (3, inverse). Use the roll-key to position the parameter into its new location in the list.	**Sequence 3** Confirm the new position in the shortlist by pressing the softkey (4).

Sequence 1   Sequence 2   Sequence 3

Example: Selecting or deselecting all parameters on a list

| 3. | | Press the corresponding soft-key "Select All" oder "Select None". | Softkey "Select All", selecting all parameter in the shortlist.

Softkey "Select None", deselecting all pa-rameter in the shortlist. |

Use the "Select All" softkey to select all parameter in the list. The selection will be highlighted green. Subsequently, all parameters in the list will be displayed and stored. Use the "Select None" to deselect all parameters of a list. The selection will be highlighted white. Subsequently, none of the parameters in the list will be displayed or stored. This is helpful, if a quick selection of parameters becomes necessary.

selecting all parameter   deselecting all parameter

Example: Selecting or deselecting individual parameters on a list

| 4. | | To pick out a parameter with the rollkey and select with the softkey "Select for Logg.". | Use the "Select for Logg." softkey to select a parameter and to accept it into the list (green background); use the same key to remove a parameter (white background). |

Example: Restoring the order of parameters in the list back to their default

| 5. | | Press the softkey "Default Order". | When using the "Default Order" softkey, the default order of the parameters in the short-list is restored. |

Control	Operation	Function

Example: Calling the default shortlist

	Control	Operation	Function
6.	Default Selection	Press the softkey "Default Selection".	With the softkey "Default Selection" the default shortlist is called.

3.15.8.1   Graphic display of ILS data
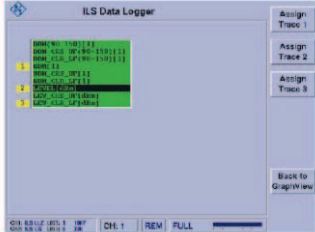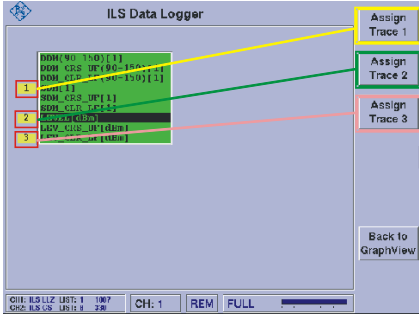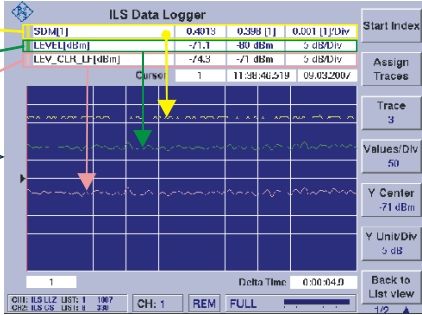
The following explains the operating steps necessary analyzing a ILS signal graphically.

	Control	Operation	Function

Switch to window 2 of the Data Logger

	Control	Operation	Function
1.	MEM ⇓ Select List 1	Press the "MEM" (41) button and softkey "Select List".	Select the dataset list for analysis.
2.	Graph View	Press the softkey "Graph View".	Switch to the graphic display of the data.

Select a dataset
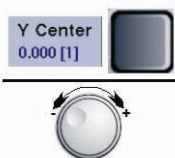
	Control	Operation	Function
3.	Start Index	Activating the editing function with the softkey and making the selection over the rollkey / keyboard.	Use the softkey (1) to activate the editing function in the Index field (5). A dataset may also be selected from the current dataset list by using the index number. Within the dataset list, this selection determines the starting point of the graphic display. To accept the selection, press enter or push rollkey.

Control	Operation	Function
Selecting parameters for the graphic display		
4.	Press the softkey "Assign Traces".	Switch to the "ILS-Graph-Trace" display view.
5.	Select a parameter with the rollkey and refer with the soft-key "Trace 1 … 3".	A particular parameter may be assigned from the shortlist for each Trace. Use the rollkey to select a parameter, and press on the "Assign Trace 1 … 3" softkey to assign the parameter. A yellow box with the re-spective trace number indicates the order and assignment to Trace 1 ... 3. This order also corresponds with the sequential values in the parameter field.

Parameter assignment   View of the graphic display

| 6. | Press the softkey "Graph View". | Returning to the graphic display. |
| 7. | Press the softkey "Trace". | Selecting previously defined Traces 1 … 3. |

The data of the selected Trace will be highlighted in the parameter field (2). The currently active Trace will be displayed in the softkey (1).

Control	Operation	Function
Placing the Marker		
8.	Switch to the second menu display and press the softkey "Marker".	Switching to the display view "ILS-Graph-Marker"

Use the "Marker" softkey (2) to activate the editing function for the Marker Index (4). With this function, the Marker Index - i.e. the selected measurement line in the current list - is selected via the rollkey. The Marker (3) is placed onto the appropriate position on the graphic display. During the setting, the data of the Marker position will be updated dynamically in the DDM parameter field (1). Furthermore, the date and time when the dataset was marked in the Marker field (4) and when this information was stored is also shown.

Placing the Marker on the DDM peak value		
9.	Press the softkey "Marker to peak".	Places the Marker (3) on the peak value of the curve associated with the current Trace. The index of the peak value and the associated data will be displayed in the parameter field (1) or the Marker field (4).
Setting the display resolution		
10.	Press button.	Returning to the first display view "ILS-Graph".
11.	Press the softkey "Values/Div" and put through the setting with rollkey.	The softkey (1) activates the settings for the display resolution of the X axis.
12.	Press the softkey "Y Unit/Div" and put through the setting with rollkey.	The softkey (3) activates the editing function for the settings of the Y axis.

Control	Operation	Function
13.	Press the softkey "Y Center" and put through the setting with rollkey.	The softkey (2) activates the editing function for the settings of the the center line of the Y axis.

Setting the display resolution of the X axis: select the number of data per scale division on the X axis. This will automatically determine the width of the displayed time window (Delta Time, 4). The set value will be displayed in the softkey.

Setting range: 5, 10, 25, 50, 100, 250, 500, 1000, 2500, 5000 / data per scale division
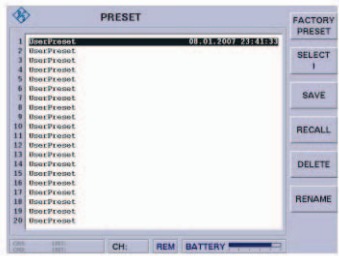
Setting the Y axis: Set the unit of measure per scale division on the Y axis. When selecting the units of measure for the parameter, its DDM and SDM values can be set to μA, %, or 1. To do this, use the setup function "Units". The scaling of level values is always expressed in dB. The scaling can be set individually for each Trace 1 … 3.

Setting the center line of the Y axis: This assigns a certain value to the centerline of a selected Trace, and allows shifting the position of the data curve in the Y direction. When selecting the units of measure for the parameter, its DDM and SDM values can be set to μA, %, or 1. To do this, use the setup function "Units". Level values can be selected with the setup function and determined either as dBm or dBμV. The Y-Center can be set individually for each Trace 1 … 3.
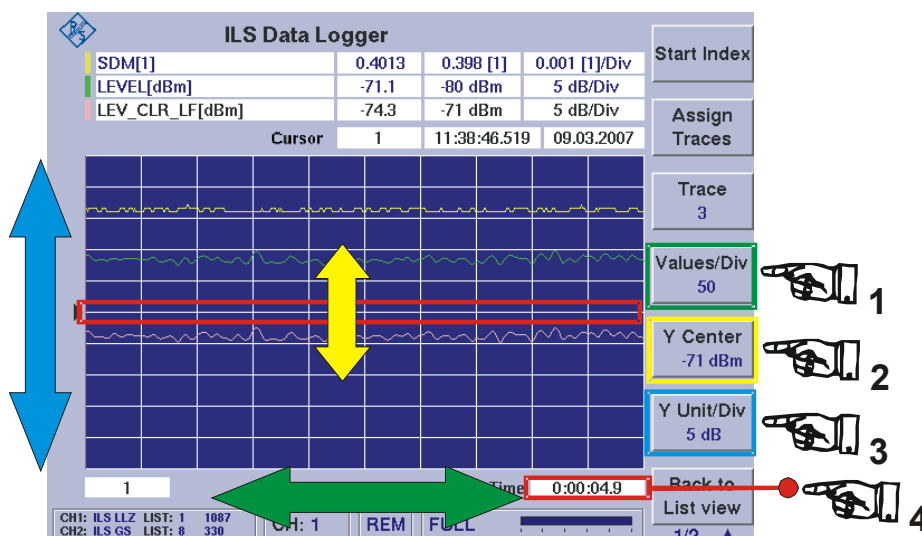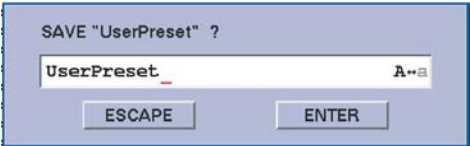
3.16 Preset mode operation

The preset function enables 20 different individual device settings to be saved and used. This pre -
settings includes operational settings for a mode (such as frequency, channel etc.) and the most im-
portant set up settings. If a particular device setting is stored, date and time are automatically as-
signed to the list's element. Each element of a list may be named individually.

	Control	Operation	Function
1.	PRE-SET	Press the "Preset" button.	The display switches over into the Preset mode.
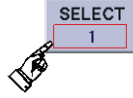
Call-up a preset
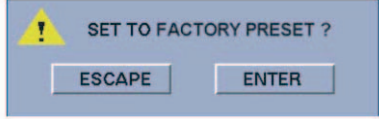
	Control	Operation	Function
2.	SELECT 1	Press the softkey "SELECT".	Change to editing function to select a "UserPreset-No.". The softkey value section is active. SELECT 1 Selection of a "UserPreset-No." is activated via the rollkey / keyboard. To accept the value, press enter or push rollkey.
3.	SAVE	Press the softkey "SAVE".	Following selection, a dialog box will display the name up to that time by default. This name, however, can be changed as desired. After confirming a security prompt, the topical device settings will be saved with the topical date and time. SAVE "UserPreset" ? UserPreset A↔a ESCAPE ENTER

*Assignment of a saved presetting is indicated by a date / time entry.
Available memory has no date / time entry. Assigned memory can be
rewritten any number of times!*

Retrieval a preset

	Control	Operation	Function
4.	SELECT 1	Press the softkey "SELECT".	Change to editing function to select a "UserPreset-No.". The softkey value section is active.

Control	Operation	Function
		SELECT 1 Selection of a "UserPreset-No." is activated via the rollkey / keyboard. To accept the value, press enter or push rollkey.
5. RECALL	Press the softkey "RECALL".	The current device settings will be rewritten with the pre-settings of the selected "User-Preset-No." after the security question has been confirmed. ⚠ RECALL SELECTED PRESET ? ESCAPE ENTER
Delete a preset		
6. SELECT 1	Press the softkey "SELECT".	Change to editing function to select a "UserPreset-No." to be deleted. SELECT 1 Selection of a "UserPreset-No." is activated via the rollkey / keyboard. To accept the value, press enter or push rollkey.
7. DELETE	Press the softkey "DELETE".	The selected "UserPreset-No." will be deleted after the security question has been confirmed. ⚠ DELETE SELECTED PRESET ? ESCAPE ENTER
Renaming a list element		
8. SELECT 1	Press the softkey "SELECT".	Change to editing function to select a "user settings number" to be renamed. SELECT 1 Selection of a "UserPreset-No." is activated via the rollkey / keyboard. To accept the value, press enter or push rollkey.
9. RENAME	Press the softkey "RENAME".	Following selection, a dialog box will display the name up to that time by default. This name can be changed as desired and saved after confirming a security prompt.

	Control	Operation	Function
10.		Renaming with arrow buttons and the keyboard	Use the up/down arrow button and the keyboard to edit the respective name. Use the "ENTER" key to accept and store the current list element and its newly created name. To abort the process, press the "ESCAPE" button any time.

Call-up of the factory settings

11.	FACTORY PRESET	Press the softkey "FACTORY PRESET".	The current device settings will be overwritten with the default settings after the security question has been confirmed.
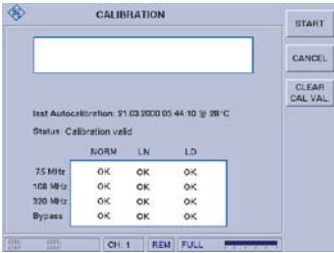
3.17 The Auto Calibration

Auto calibration corrects changes in the attenuation characteristics of the RF signal paths. These changes can occur due to the aging process or temperature drifts. The calibration optimizes the accuracy of the level measurements.

> *Auto calibration should be performed on a weekly basis or whenever the ambient temperature of the device changes. Before starting the auto calibration process, the device needs a startup time of at least 15 minutes to adapt to the ambient temperature. When auto calibration has not been performed for more than 90 days or if auto calibration values are not available, a corresponding warning will be displayed when the device is started.*

Activates the Auto calibration

	Control	Operation	Function
1.	CAL	Press the "CAL" (44) button.	The device switches over into the auto calibration function.

3.17.1 Displays in calibration menu
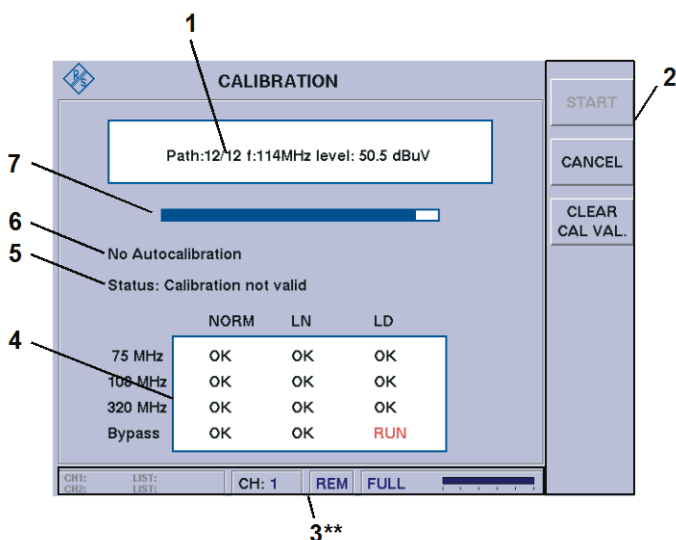
3** for general description of the status field, refer to 3.2.1.1

Item	Display	Function	Indication
1	Output window	Display of the currently performed measurments (linearity or signal path with frequencies) includ-	

Item	Display	Function	Indication
		ing the respective measurement results.	
2	Softkeys	see 3.16.1.1	
3**	Status field	3** for general description of the status field, refer to 3.2.1.1.	
4	Status window	Display of the measurement status of the twelve individual RF-signal paths. Matrix: 3 attenuator modes x 4 preselector-paths	
5	Measurement status	Display of the current calibration status. After an auto calibration has been completed or aborted, the measurement status will be updated accordingly.	
6	Last Autocalibration	Entry of date, time and temperature (during the calibration) of the device's last auto calibration. The temperature of the device is approx. 10° C higher than the ambient temperature.	dd.mm.yyyy, hh:mm:ss; °C
7	Progress graph	Graphic representation of the progress of auto calibration.	

3.17.1.1   Softkeys

Display	Function
START	Starts an auto calibration of the device
CANCEL	Cancel an ongoing auto calibration
CLEAR CAL VAL.	Deleting the calibration values as well as the status indications in the status window

3.17.2   Auto Calibration operating

	Control	Operation	Function
Starting Auto calibration			
1.	START	Press the softkey "START".	Starting the auto calibration; the respective parameters and their values are displayed in the output window. The bargraph shows the progress of the calibration.

Control	Operation	Function

Path:4/12 f:159MHz level: 53.6 dBuV

If the auto calibration is successful, it will be displayed in the output window (1) as " Autocalibration ready, reboot is recommended!" Simultaneously, the date, time and the temperature of this calibration will be updated in the display window "last Autocalibration (6)". The respective calibration data will be displayed in the status window (4) as "OK". A restart of the device after a successful auto calibration is recommended.
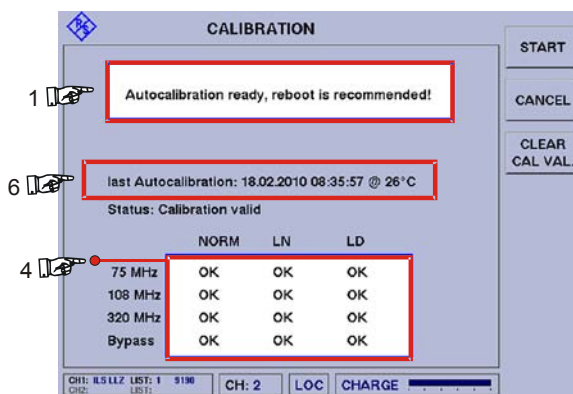
☞ *In the event of a faulty auto calibration process, this is indicated in the status display window by "Auto calibration Error!". In this case, the device should be switched off and on again and the auto calibration process should be repeated. If the error message continues to appear, the device should be dispatched to the Rohde & Schwarz Service Department!*

Cancel Auto calibration
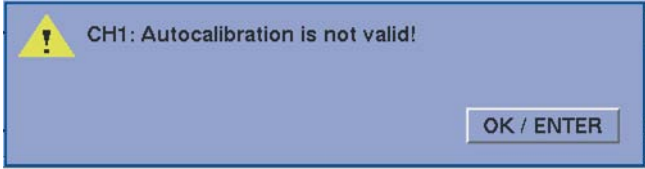
2.	Press the softkey "CANCEL".	Stopping an ongoing auto calibration. This is indicated in the status display window by "Auto calibration Aborted".

In this case, changes will not be made in the device. The data of the last auto calibration will be deleted and replaced with the display "No Autocalibration" (6). The current measurement status will be set to "Calibration not valid". The respective status displays in the status window (4) will be deleted.
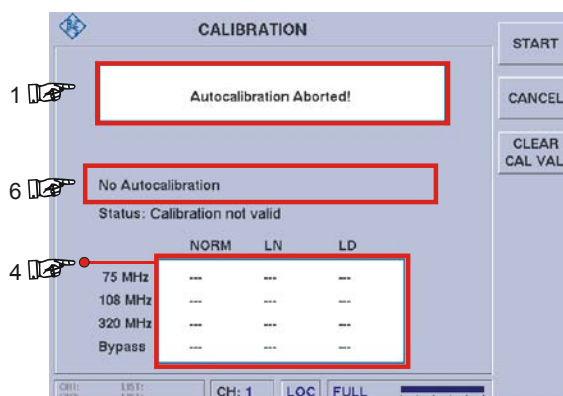
Control	Operation	Function
When the device is restarted, a corresponding warning will be displayed that has to be confirmed.		

Deleting the calibration values

	Control	Operation	Function
3.	CLEAR CAL VAL.	Press the softkey "CLEAR CAL VAL.".	Deleting the calibration values of the last auto calibration. All information regarding the last auto calibration will remain in the display "last Autocalibration (6)". The respective status messages will be deleted from the status window (4) and the R&S® EVS 300 will only process the static calibration values.

The data of the last automatic calibration will be deleted and replaced with the display "No Autocalibration" (6). The current measurement status will be set to "Calibration not valid". The respective status displays in the status window (4) will be deleted.
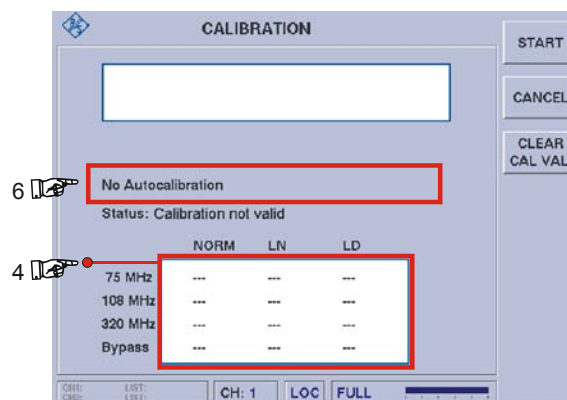
When the device is restarted, a corresponding warning will be displayed that has to be confirmed.
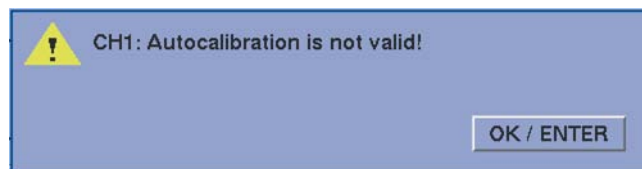
3.18   GPS function (Option)

The GPS function enables the indication of the current position and corresponding parameters, which were gained from the dataset of the NMEA protocol. A GPS receiver needs to be connected to the GPS interface (RS 232-2 (7)) for this purpose. The GPS data are added to the corresponding data record when automated recording of values measured is carried out.

3.18.1   GPS operating (Option)

	Control	Operation	Function
1.	GPS	Press the "GPS" (7) button.	The device switches over into the GPS function window.
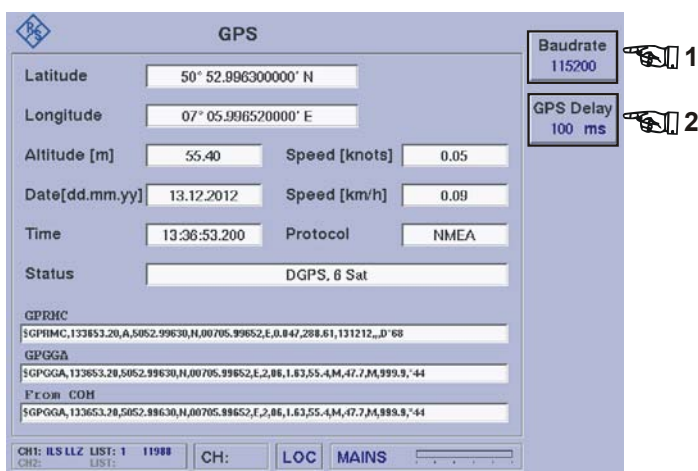
Setting the baud rate of the RS 232-2 interface

2.	Baudrate 4800	Press the softkey "Baudrate" several times until the wanted value is reached.	The set baud rate will be updated in the softkey and is then immediately active. Setting value: 4800 ... 230400 baud

Setting of the GPS Delay time

3.	GPS Delay 100 ms	Press the softkey "GPS Delay" (2) and put through the setting with rollkey.	The set Delay time will be updated in the softkey and is then immediately active. The recommended GPS delay time is 0 ms. Einstellwert: 0 ... 500 ms

3.18.2 Displays in the GPS menu

Item	Display	Function	Indication
1	Baudrate	Indication of the set baud rate	baud
2	GPS Delay	Indication of the set GPS delay time	ms
3	Speed [knots]	Indication of speed (knots)	knots / h
4	Speed [km/h]	Indication of speed (km/h)	km/h
5	Protocol	Indication of the GPS protocol, e.g. NMEA (National Marine Electronics Association)	
6	From COM	Arriving data from the serial interface (GPS RS 232-2, 7).	

7	GPGGA	GPGGA (Global Positioning System Fix Dat) dataset containing the most important information of the GPS position and accuracy. They will be displayed as ASCII character set with 4.800 baud and in the following format:
		
		$GPGGA,hhmmss.ss, IIII.II,a,yyyyy.yy,b,q,nn,d.d,a.a,M,g.g,M,h.h, rrrr*hh
		   a. hhmmss.ss = current time (UTC)
		   b. IIII.II = Latitude detail
		   c. a = Hemisphere of latitude N (north) / S (south)
		   d. YYYYY.YY = Longitude detail
		   e. a = Hemisphere of longitude E (east) / W (west)
		   f. q = GPS-quality
		   g. nn = Number of used satellites (0 ... 12)
		   h. d.d = Horizontal deterioration of the position
		   i. a.a = Height of the antenna
		   j. M = Unity of the antenna height in meter (m)
		   k. h.h = Age of the DGPS data
		   l. rrrr = DGPS-reference station (0000 ... 1023)
		   m. hh = Checksum	

8	GPRMC	GPRMC (Global Positioning Recommended Minimum Specific) means, a GPS receiver with NMEA protocol should display a dataset with the least amount of information. This dataset will be displayed as ASCII character set with 4.800 baud and in the following format.	

Item	Display	Function	Indication
		$GPRMC,hhmmss.ss,A,IIII.II,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a*hh n. hhmmss.ss = current time (UTC) o. A = Status (A=ok, V=warning) p. IIII.II = Latitude detail q. a = Hemisphere of latitude N (north) / S (south) r. YYYYY.YY = Longitude detail s. a = Hemisphere of longitude E (east) / W (west) t. x.x = Speed into knots u. x.x = Direction in degree v. ddmmyy = Date w. x.x = magnetic deviation x. a = E (east) / W (west) y. hh = Checksum	
9	Status	GPS status and number of satellites detected	
10	Time	Indication of the current Time	hh.mm.ss
11	Date	Indication of the current Date	dd.mm.yyyy
12	Altitude [m]	Indication of the current altitude	m
13	Longitude	Indication of the Longitude	[°] Degree
14	Latitude	Indication of the Latitude	[°] Degree

3.19 GBAS mode (Option EVS-K9)

The GBAS function (GBAS = Ground-Based Augmentation System) can be used to analyse the quality of the GBAS signal of a GBAS ground station. The receiver frequency range lies between 108.000 … 117.975 MHz with a channel spacing of 25 kHz. To do this, the GBAS signal is analysed for its RF characteristics, signal strength and frequency accuracy, on the one hand, and the GBAS signal data (type 4 messages) is demodulated, decoded and displayed from the GBAS signal. An individual FAS data block can be selected and analysed from the FAS data (FAS = Final Approach Segment).

Up to 8 time slots can be displayed and analysed. The following display views can be called to do this:
- TIME SLOT
- FAS DATA BLOCK

Graphic overview to assign the display views in GBAS mode

1st GBAS mode display view

2st Time Slot display view

3st FAS DATA BLOCK display view
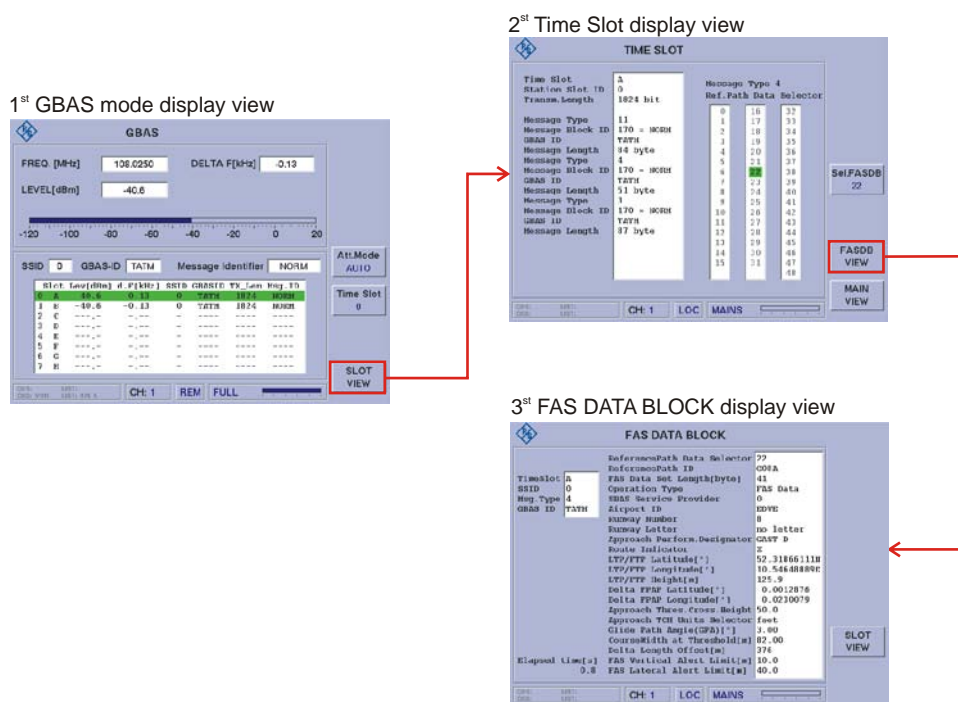
Activates the GBAS mode (Option EVS-K9)

	Control	Operation	Function
1.	SPLIT	Press "SPLIT" (13) button and select the GBAS mode.	The R&S® EVS 300 switches over into the GBAS mode.
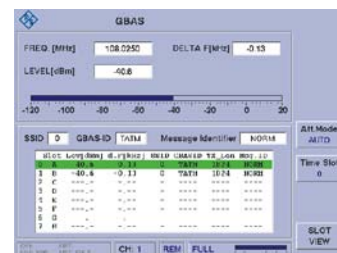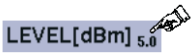
3.19.1   Signal Parameters and Display in GBAS mode (EVS-K9 option)
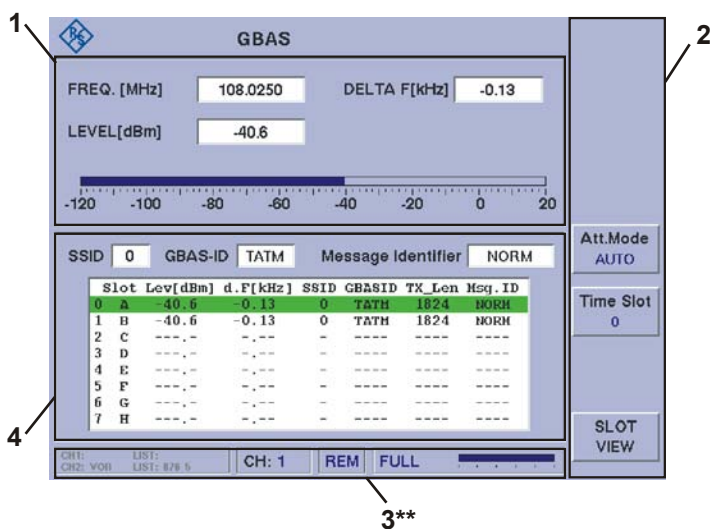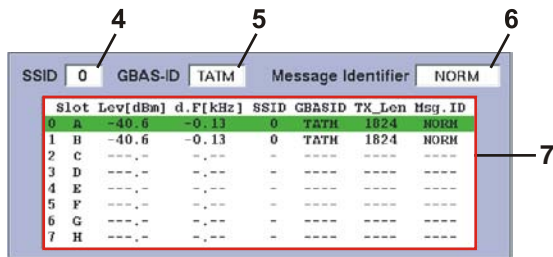
3** for a general description of the status field, refer to 3.2.1.1

3.19.1.1   RF Parameter Section (1)
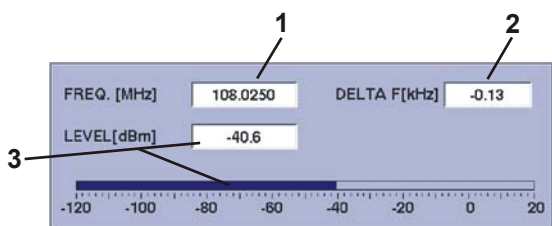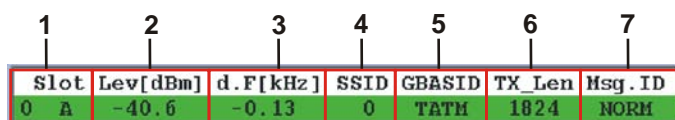
Item	Display	Function	Indication
1	FREQ. [MHz]	Display and setting of the receiver frequency GBAS receiver frequency range 108.000 … 117.975 MHz.	MHz
2	DELTA.F. [kHz]	Display of the difference between the carrier frequency and the set receiver frequency.	kHz
3	LEVEL [dBm]	Measured reception level (numeric/bar graph display) in dBm/dBµV with details of the antenna correction factor (0.0) from the setup, if this ≠0.0 was selected.	dBm/dBµV LEVEL[dBm] 5.0

3.19.1.2   Measured Values Section (4)

Item	Display	Function	Indication
4	SSID	Display of the SSID (station slot identifier) identifier of the selected time slot.	0 … 7
5	GBAS-ID	Display of the GBAS identifier of the ground station of the selected time slot.	alphanumeric
6	Message identifier	Display of the operating mode on the selected time slot.	STANDARD/TEST
7	GBAS data display	Display of the GBAS time slot data from A … H.	Data

3.19.1.2.1   Structure of the GBAS data display

Item	Display	Function	Indication
1	Slot	GBAS, time slot description	A … H
2	Lev[dBm]	Measured reception level of the corresponding time slot burst.	dBm
3	d.F[kHz]	Display of the difference between the carrier frequency and the set receiver frequency.	kHz
4	SSID	Display of the SSID (station slot identifier) identifier for the corresponding time slot burst.	0 … 7
5	GBASID	Display of the GBAS identifier of the ground station for the corresponding time slot burst.	alphanumeric
6	TX_Len	Display of the data package size, GBAS data and FEC data (FEC = Forward Error Correction).	Number of bits
7	Msg.ID	Display of the operating mode of the corresponding time slot.	STANDARD/TEST

3.19.1.3 Softkeys (2)

Display	Function

ATT.MODE AUTO	Switch over to the RF input attenuation, set range is shown in the softkey:
	
	- LOW NOISE (+10 dB),
	  Indicating range: -120 … -20 dBm
	
	- NORM (Normal, 0 dB)
	  Indicating range: -110 … -10 dBm
	
	- LOW DIST (Low Distortion, -25 dB)
	  Indicating range: -100 … 20 dBm
	
	- AUTO (the most favourable range is selected automatically in each case)
	  Indicating range: -120 … 20 dBm
	
	☞ *The maximum input range is +13 dBm. Setting of the RF signal adjustment is described in section 3.5!*

Time Slot 0	Selection of a time slot. Setpoint: 0 .. 7
SLOT VIEW	Switch over to the time slot display view of the currently selected time slot.

3.19.2 Parameters and Display in the "TIME SLOT" display view
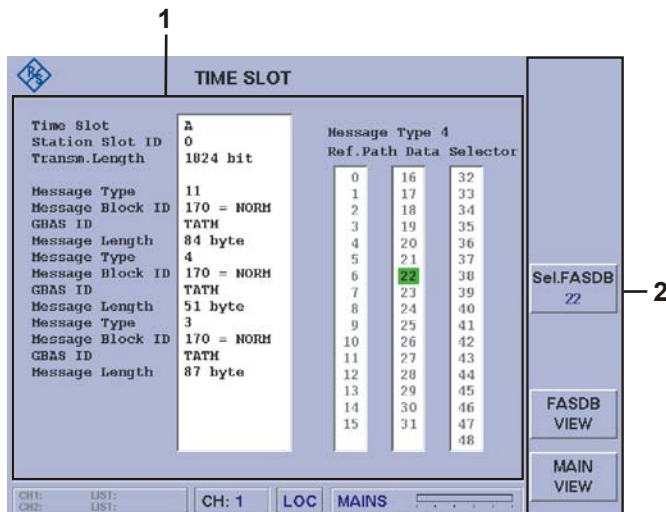
Item	Display	Function	Indication
1	Time slot data display	Display of the current data on the selected time slot	dynamic

3.19.2.1 Softkeys (2)

Display	Function
Sel.FASDB 22	Selection of an FAS data block, for further analysis in the "FAS DATA BLOCK" display view.
FASDB VIEW	Switch over to the FAS DATA BLOCK menu window of the currently selected FAS data block.
MAIN VIEW	Return to the GBAS display view.

3.19.2.2 Structure of the Time Slot data display
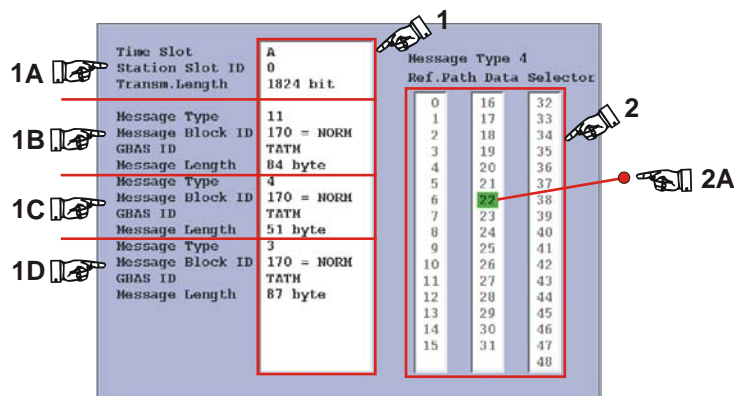
The time slot data display consists of a basic data display (1) and the message type 4-display and selection window (2).

All decoded data of the currently selected time slot is displayed in its chronological sequence in the display field 1 as follows.

Display	Function
To 1A, range of the general data, such as:	
Time slot	Display of the selected time slot
Station slot ID	Display of the station slot identifier
Transm. length	Display of the data package size
To 1B, range of the initial messages data:	
Message type	Messages type
Message Block ID	Display of the operating mode on the selected time slot.
GBAS-ID	Display of the GBAS identifier of the ground station for the corresponding time slot burst.
Message length	

To 1C – 1D, range of the second and third messages data with same structure as range 1B.

Display	Function
To 2, message type 4 display and selection window	
Message type 4, Ref. path data selector	Display and selection of a received FAS data block for further analysis in the FAS DATA BLOCK display view. The available data blocks can be identified by the black contrast level. If a data block is selected, it will be highlighted green (2A).

3.19.3 Parameters and Display in the "FAS DATA BLOCK" display view
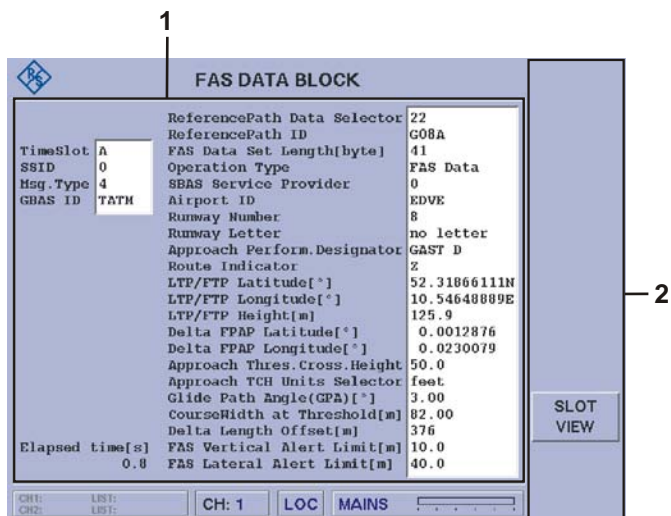
Item	Display	Function	Indication
1	FAS data block display	Display of the current FAS data for the selected FAS data block.	dynamic

3.19.3.1 Softkeys (2)

Display	Function
SLOT VIEW	Return to the TIME SLOT display view.

3.19.3.2   Structure of the FAS data block display view
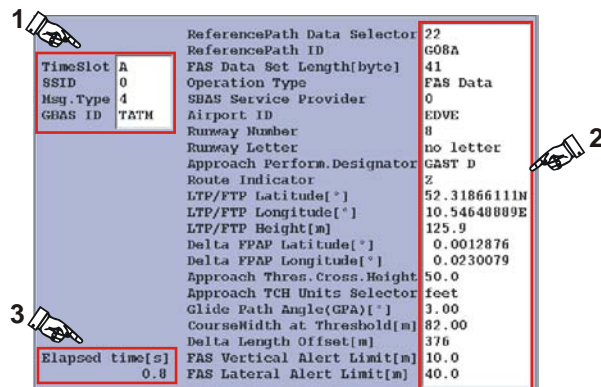
The FAS data block data display consists of a basic data display (1), the FAS data display (2) and a time display (3). All decoded data of the currently selected time slot is displayed in its chronological sequence in the display field 1 as follows.

Display	Function
To 1, range of the general data, such as:	
Time slot	Display of the selected time slot
SSID	Display of the station slot identifier
Msg.Type	Display of the message type of the selected time slot
GBAS-ID	Display of the GBAS identifier of the ground station for the corresponding time slot burst
To 2, range of the FAS data:	
Reference Path Data Selector	Numerical identifier of the FAS Data Block
Reference Path ID	Identifier of the Reference Path
FAS Data Set Length [byte]	The length of the FAS DB in byte
Operation Type	FAS Data Blocks (be evaluated.) At the moment, TAP and Ma data blocks are not supported!
SBAS Service Provider	Satellite-Based Augmentation System Service Provider
Airport ID	Identifier of the airport
Runway Number	Represents the approach runway number
Runway Letter	Represents the runway letter
Approach Perform.Designator	Approach Performance Designator GAST A, GAST B, GAST C and GAST D
Route Indicator	Used to differentiate between multiple approaches to the runway end
LTP/FTP Latitude[°]	Represents the Latitude of the LTP/FTP
LTP/FTP Longitude[°]	Represents the Longitude of the LTP/FTP
LTP/FTP Height[m]	The Height of the LTP/FTP above the WGS-84 ellipsoid
Delta FPAP Latitude[°]	Delta FPAP Latitude, the difference of latitude of the runway Flight Path Alignment Point (FPAP) from the LTP/FTP. Positive values denote the

Display	Function
Delta PFAP Longi-tude[°]	FPAP latitude north of LTP/FTP latitude, negative: south
	Delta FPAP Longitude, the difference of longitude of the runway Flight Path Alignment Point (FPAP) from the LTP/FTP. Positive values denote the FPAP longitude east of LTP/FTP longitude, negative: west
Approach Thres.Cross. Height	Approach Threshold Crossing Height
	the height of the FAS path above the LP/FTP
Approach TCH Units Selector	Approach TCH Units, feet or meter
Glide Path An-gle(GPA)[°]	Glide Path Angle (GPA °)
Course Width at Thre-shold[m]	Course Width at Threshold, the lateral displacement from the path de-fined by the FAS alt the LTP/FTP
Delta Length Offset[m]	Delta Length Offset distance from the stop end of the runway to the FPAP
FAS Vertical Alert Lim-it[m]	FAS Vertical Alert Limit in meter
FAS Lateral Alert Lim-it[m]	FAS Lateral Alert Limit in meter
To 3, elapsed time display	
Elapsed time	Display of the elapsed time to receive the last valid data block

3.19.4   Setting the Receiving frequency in GBAS mode

GBAS mode of the typical frequency range: 108.000 ... 117.975 MHz

	Control	Operation	Function
1.	FREQ	Press "FREQ" (9) button.	The cursor appears behind the last figure in the frequency field. 117.9500_
2.		Setting the corresponding frequency with rollkey / key-board.	Enter the frequency including the corre-sponding decimal place. 117.9500
3.		Confirm with the correct di-mension or Press the Enter button / push rollkey	Changeover to the new frequency. 117.9500

Notes

1)   On frequency input the complete frequency range (70 ... 350 MHz) can be entered independent from the mode. However, the data content is

only given at mode specific frequency ranges:
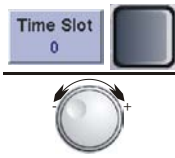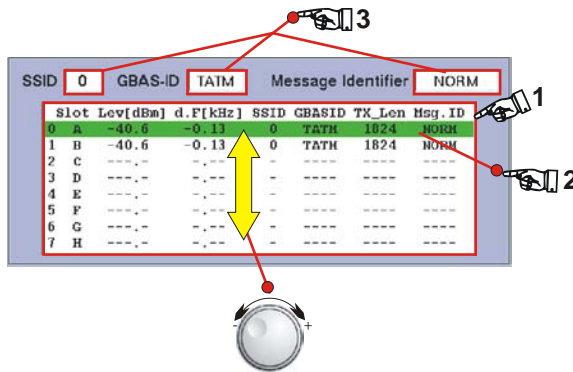
GBAS: 108.000 ... 117.975 MHz

2) *With the "ESC" button any time a break off of the function is possible and the old value will be restored!*

3) *The typical frequency step width of 25 khz mode should be adjusted in the setup (F-step).*

3.19.4.1   General Operating steps in GBAS mode
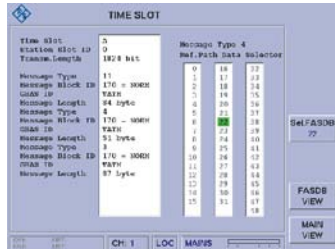
All the operating steps that are necessary to analyse the GBAS data are described in the following. These are the following operating processes:

- Selection of a time slot
- Switch over to TIME SLOT display view
- Selection of an FAS data block
- Switch over to the "FAS DATA BLOCK" display view

	Control	Operation	Function
Selection of a time slot			
1.		Activate the edit function with the "Time Slot" softkey and make the selection using the rollkey/keyboard.	Switch over to the edit function to select a set of values (time slots) in the GBAS data display (1). The set of values for the time slot data analysis is selected with this display. The value field in the softkey will be displayed on a different background. To accept the selection, press enter or push rollkey.
	This will be highlighted green, if a set of values is selected (2) and the corresponding displays (3) are updated automatically.		

	Control	**Operation**	**Function**
Switch over to TIME SLOT display view			
2.	SLOT VIEW	Press "SLOT View" softkey.	Switch to the TIME SLOT display view.

The corresponding, analysed data of the currently selected time slot value set is displayed in the basic data display (1) and the message type 4-display and selection window (2). An existing FAS data block can be identified from its black colour contrast (3)

	Control	**Operation**	**Function**
Selection of an FAS data block			
3.	Sel.FASDB 22	Activate the edit function with the "Sel.FASB" softkey and make the selection by using the rollkey/keyboard.	Switch over to the edit function to select an FAS data block in the GBAS data display (1). The set of values for the FAS data block analysis is selected with this option. The value field in the softkey will be displayed on a different background. To accept the selection, press enter or push rollkey.

An existing FAS data block can be identified from its black contrast level (1) and is highlighted green when it is selected (29).

Control	Operation	Function

Switch over to the "FAS DATA BLOCK" display view
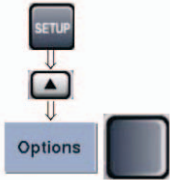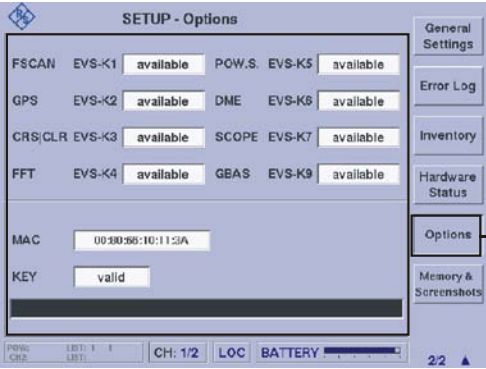
2.	FASDB VIEW	Press "FASDB View" softkey.	Switch over to the "FAS DATA BLOCK" display view.

All decoded data of the currently selected data block is shown in the displays (1....3) of the "FAS DATA BLOCK" display view.

3.20 Release of Software Options

A license key for the purchased options can be entered via the options window. Once the option has been purchased, Rohde & Schwarz will provide you with the necessary key number in writing.
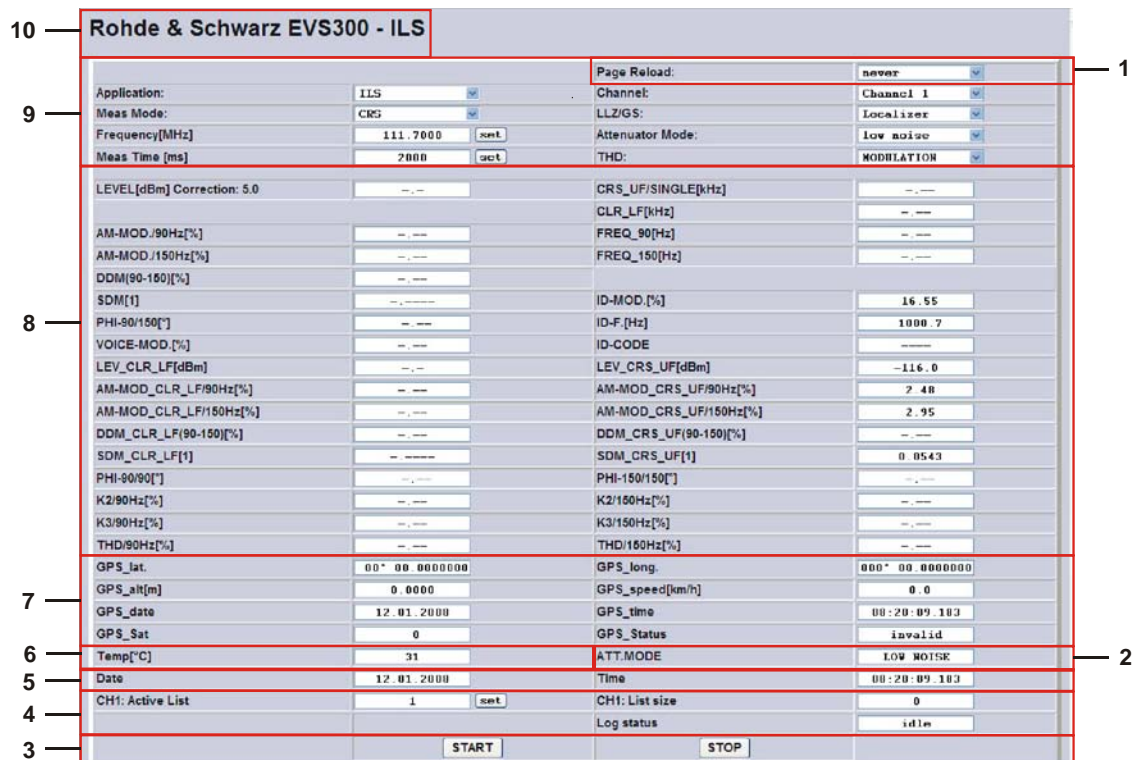
	Control	**Operation**	**Function**
1.		Press the "Setup" button and change to the window 2 and press softkey "Options" (1).	Switching to the "Options" menu window. This function displays the device-specific optional extensions.
2.		Press the Enter button / push rollkey.	The editing function for the entry of the key number is activated and the key number received can be entered.
3.		Press the Enter button / push rollkey.	Transfer of the key number, the purchased option will be enabled and identified as "available".

If activation of the option does not take place, check initially that the window "Key" is displaying the entry "valid". If this is not the case, an error has been made in entering the key number, and the procedure needs to be repeated.

3.21 Operation within the R&S® EVS 300 Web interface

If the R&S® EVS 300 is operated as part of a LAN network or as a stand-alone computer (PC / laptop), it can be remotely controlled via the web interface. For this, the R&S® EVS 300 requires a defined IP address and an associated subnetwork. If the R&S® EVS 300 is operated as a stand-alone computer, the device must be connected with a coaxial LAN cable. If using an internet browser, such as "MS Internet Explorer", the web interface of the device can be called up. While using the web interface, settings for the individual modes, such as ILS, VOR, MARKER BEACON, Data Logger, and Setup can be carried out and data can be called up. The display of the web interface can vary, depending on the mode.

Item	Function
1	Updating the web indication.
2	The currently active Attenuator mode, also at Attenuator mode "Auto" is shown to it corresponding adjusted Attenuator mode.
3	Starting or stopping a series of measurements over the buttons "start" and "stop". Buttons are mode-dependant.
4	Information window of the Data Logger, with the "set" button to select an active list.
5	Indication of the date and the time of the device.
6	Indication the temperature of the device.
7	GPS parameter window, displays all evaluated GPS data.
8	Information window of the mode-specific data.
9	General settings of the set device mode, e.g.: "ILS" via pull-down menu. Use the "set" button to adjust the receiving frequency and the measurement period.
10	Display of the set device mode

3.21.1   Call-up the Web interface

	Function
1.	Use an appropriate LAN cable to connect the R&S® EVS 300 with either the LAN network or a stand-alone computer.
2.	In the setup function of the R&S® EVS 300, go to the menu item "Remote Control" and select or replace the TCP / IP address with a new one.
3.	Call up an Internet browser, e.g.: "MS Internet Explorer", on your computer and enter the IP address (1) of the R&S® EVS 300 into the browser's address bar, confirm your input by pressing the "Enter" button. The Internet browser should now change to the R&S® EVS 300 web interface (2). *The Web interface must be switched on in Setup!*
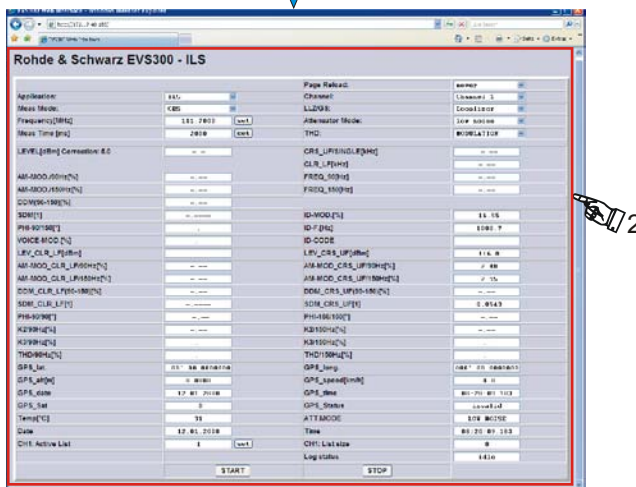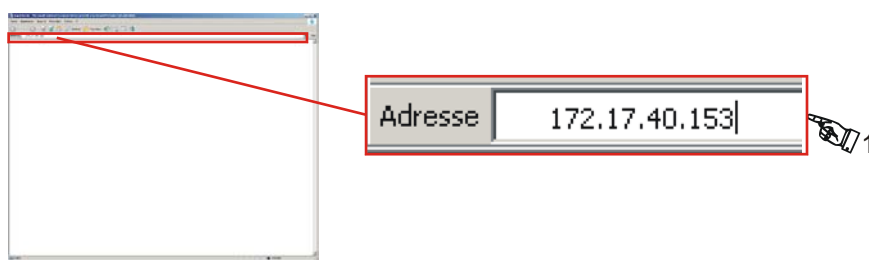
3.22 Remote Control of the R&S® EVS 300 ILS / VOR Analyzer

3.22.1   Operation via RS-232 interface

All important unit functions of the **R&S® EVS 300 ILS / VOR Analyzer** can be remote controlled via the RS-232-Interface (V24 standard) by a PC terminal which can be operated with commercial terminal programs (e.g. HyperTermTM, ProCommPlus...). The interface parameters are adjustable in the setup.

> *If measuring time is set at >50 ms, a baud rate of up to 19200 baud should be set. If the baud rate is set at 115200 baud, shorter measuring times can be set (10 ms).*

3.22.2   Operation via LAN interface

Through the **LAN connection (Fast Ethernet) (9)**, all functions of the device and the data transfer of the measurement data of the **R&S® EVS 300 ILS / VOR Analyzer** can be remotely operated from a PC / network. IP Addresses and subnet mask identifier are set in the setup menu.

3.22.3   Remote Control Commands

There are two categories of control commands.

❑ super commands (mode related)
❑ mode dependant commands (specified mode must first be selected)

The following table makes clear the control commands structure.

Mode related control commands	Mode dependant control commands				
	ILS mode	VOR mode	MARKER BEACON mode	Data Logger mode	Setup mode
	FSCAN-Mode	FFT-Mode	SCOPE-Mode	GBAS-Mode	

3.22.3.1   Mode related Control Commands

Command	Parameter	Response	Function
FACTORY_PRESET		READY	R&S® EVS 300 back to its initial settings.
BI, BI?		<BI-Info>	Built-in-test information.

Command	Parameter	Response	Function
CH	1 2	READY	Selection of the receiving channel 1 / 2.
CH?		1 2	Request of the current receiving channel.
GETDATADEF		definition	Definition of data delivered by GETDATASET The text is identical to the first row of a CSV-list exported to USB. The dataset depends on the mode and Data Logger settings, e.g.: "Select Params".
GETDATA SET		All values	All measurement values are returned as one comma separated string. Format is the same as one row of the CSV-list exported to USB. Works for ILS, VOR, MB.
GETGPSGPGGA		GPGGA-dataset	Displays the last GPGGA dataset of the GPS receiver come in.
GETGPSGPRMC		GPRMC-dataset	Displays the last GPRMC dataset of the GPS receiver come in.
GETGPSGPGSA		GPGSA-dataset	Shows the GPGSA data record of the GPS receiver entered last. In it the data VDOP and HDOP are contained as measure for the accuracy of the positioning of the satellites.
GETMEAS Example: GETMEAS FULL,1	FULL, SELECT, SHORT 1, 2, 1+2	READY	Starts the data output in the current mode with the following options: **FULL:** All possible data of the current mode will be displayed as comma-separated values **SELECT:** Only those data of the current mode will be displayed as comma-separated, which were previously selected under the Data Logger setting "Select Params". **SHORT:** Only the most important data of a mode will be displayed as comma-separated. Data Logger settings under the function "Select Params" do not affect the data output. The following data of the measuring modes will be displayed:

Command	Parameter	Response	Function
			ILS parameters: Mode-specific, only a portion of the following parameter will be measured. Data, which has not been measured will be displayed as "-- --" Channel, Time after start in ms, Level, Level CRS, Level CLR in dBm, DDM, DDM CRS, DDM CLR in [1], SDM, SDM CRS, SDM CLR in [1], GPS Latitude, GPS Longitude **VOR** parameters: Channel, Time after start in ms, Level in dBm, Bearing in [°], Mod 30 Hz, Mod 9960 Hz in [%], FM Deviation in Hz, GPS Latitude, GPS Longitude **MARKER BEACON** parameters: Channel, Time after start in ms, Level in dBm, Mod 400 Hz, Mod 1300 Hz, Mod 3000 Hz in [%], Mod ID in [%], GPS Latitude, GPS Longitude
GETMDEF	FULL, SELECT, SHORT 1, 2	definition	Definition of data delivered by GETMEAS. The text is identical to the first row of a CSV-list exported to USB.
GETOPTIONS		e.g. "F SCAN", "GPS"	Request the released software option.
GETTEMP		Values	Request the temperature of the main board, RF1 and RF2-Board.
INV, INV?		<Inv-Info>	Request of the serial number (unit and modules).
LA, LA?		<dBm>	Request of the receiver level.
LO		READY	The device moves back into the local usability at a previous inhibition of the local usability by the command "REMOTELOCK".
M?		ILS VOR MB	Request of the current set mode.

Command	Parameter	Response	Function
MARKSTREAM		READY	In the running stream output the "S" flag is set. Only visible in "FULL" or "SELECT" stream. (also see command "SREAM")
MB		READY	Activates the MARKER BEACON mode.
MEASTIME Example: MEASTIME 100	Time in ms	READY.	Setting the measurement time in the active mode.
MEASTIME?		Time in ms Example: 100 ms	Request the current measurement time settings of the current mode.
MI		READY	Activates the ILS mode.
MV		READY	Activates the VOR mode.
REMOTELOCK	ON, OFF	READY	IF set to "ON", no local operation by keyboard is possible. The "LOCAL" button has no effect. To leave this state, the device must be set to "REMOTELOCK OFF" or must be restarted.
RF Example: RF 108150	<freq in kHz>	READY	Sets the frequency.
RF?		<freq in kHz> e.g. "RF 108150"	Request of the current receiving frequency.
SETATTMODE	AUTO LN NORM LD	READY	Selects the ATT mode in the current mode.
SQUELCH Example: SQUELCH -90.5	Squelch in dBm	READY	Sets the squelch level in the current mode.
SQUELCH?		<[dBm]>	Request of the squelch level in the current mode.
STOPSTREAM		READY	Ends the output.

Command	Parameter	Response	Function
STREAM Example: STREAM FULL,1	FULL, SELECT, SHORT 1, 2, 1+2	READY	See command "GETDATASET" and "GETMEAS".
VER,VER?		<sw-version>	Request of the software version.

3.22.3.2   Remote Control Commands of the ILS mode

Command	Parameter	Response	Function
AC8		<CODE>	Request of the identifier CODE.
AF2		<Hz> e.g. "90.01Hz"	Request of the AF frequency of 90-Hz signal in Hz.
AF3		<Hz> e.g. "150.02Hz"	Request of the AF frequency of 150-Hz signal in Hz.
AF8		< Hz >	Request of the AF frequency of identifier in Hz.
AM2		< [%]>	Request of the AM-modulation factor of 90-Hz signal in %.
AM3		< [%]>	Request of the AM-modulation factor of 150-Hz signal in %.
AM8		<%>	Request of the AM-modulation factor of identifier in %.
AM9		<%>	Request of the AM-modulation factor of Voice signal in %.
DCLR		<DDM_CLR [1]>	Request of the current DDM Clearance value (dimensionless).
DCRS		<DDM_CRS [1]>	Request of the current DDM Course value (dimensionless).
DD0		<DDM [1]>	Request of the current DDM value (dimensionless).
DD1		<DDM [ųA]	Request of the current DDM value in ųA.

Command	Parameter	Response	Function
FA0		READY.	Stops the continuous output that was started with FA1, FA2, FA4, FA5.
FA1		READY.	Activates the continuous output of DDM / level measurement results. The output rate is defined by the current measurement interval time. Values are separated by a TAB (ASC 09). DDM [1] RF level [dBm]
FA2		READY.	Activates the continuous repetition of a set of values. The output rate is defined by the current measurement interval time. All values are transmitted as integer values, multiplied with a constant factor: DDM [1], factor: 10000 RF level [dBm], factor: 10 AM-Mod90 [%], factor: 100 AM-Mod150 [%], factor: 100
FA4		READY.	Same as FA1, but output is preceded by a measurement time.
FA5		READY.	Same as FA1, but output is preceded by the time in ms since the FA5 is started.
MEASMODE	CRS+CLR COURSE CLEAR CRS|CLR	READY	Selects the measurement mode.
PH		<DEG>	Request of the phase shift 90Hz / 150Hz (degree).
SD0		<SDM [1]>	Request of the current SDM value (dimensionless).
SD1		<SDM [ųA]	Request of the current SDM value (ųA).
FCLR		<Hz> e.g. "-8000.3Hz"	Request of the current frequency Clearance value in Hz.
FCRS		<Hz> e.g. "8000.2Hz"	Request of the current frequency Course value in Hz.

Command	Parameter	Response	Function
FSINGLE		<Hz> e.g. "31.2Hz"	Request of the current frequency Single value in Hz.
GS		READY.	Setting the GS mode.
K2_150		<%>	Request of the K2 distortion value of 150-Hz signal in %.
K2_90		<%>	Request of the K2 distortion value of 90-Hz signal in %.
K3_150		<%>	Request of the K3 distortion value of 150-Hz signal in %.
K3_90		<%>	Request of the K3 distortion value of 90-Hz signal in %.
LCLR		<dBm>	Request of the current Level Clearance value in dBm.
LCRS		<dBm>	Request of the current Level Course value in dBm.
LLZ		READY.	Setting the LLZ mode.
MEASMODE	CRS+CLR_MOD COURSE_MOD CLEAR_MOD CRS|CLR_MOD SINGLE_MOD CRS+CLR_THD COURSE_THD CLEAR_THD SINGLE_THD	READY	Setting of a measuring mode.
PH		<DEG>	Request of the phase shift 90 Hz / 150 Hz in degree.
PH_150_150		<DEG>	Request of the phase shift 150 Hz / 150 Hz in degree.
PH_90_90		<DEG>	Request of the phase shift 90 Hz / 90 Hz in degree.
SCLR		<SDM_CLR [1]>	Request of the current SDM Clearance value (dimensionless).
SCRS		<SDM_CRS [1]>	Request of the current SDM Course value (dimensionless).
SD0		<SDM [1]>	Request of the current SDM value (dimensionless).

Command	Parameter	Response	Function
SD1		<SDM [µA]>	Request of the current SDM value in µA.
THD_150		<%>	Request of the THD distortion-value of 150-Hz signal in %.
THD_90		<%>	Request of the THD distortion-value of 90-Hz signal in %.
VIEW	NORMAL LARGE	READY	This function enables the display to be switched between normal- and large views.

3.22.3.3   Remote Control Commands of the VOR mode

Command	Parameter	Response	Function
AC8		<CODE>	Request of the identifier CODE.
AF0		<Hz>	Request of the AF frequency of 30-Hz signal in Hz.
AF1		<Hz>	Request of the AF frequency of 9960-Hz signal in Hz.
AF2		<Hz>	Request of the AF frequency of 30-Hz FM signal in Hz.
AF8		<Hz>	Request of the AF frequency (ID) in Hz.
AM0		<%>	Request of the AM modulation factor of 30-Hz signal in %.
AM1		<%>	Request of the AM modulation factor of 9960-Hz signal in %.
AM8		<%>	Request of the AM modulation factor (ID) in %.
AM9		<%>	Request of the AM modulation factor (Voice) in %.
BE		<DEG>	Request of the BEARING angle in °degree.
DIST_9960		<%>	Request of the AM distortion-value of 9960-Hz signal in %.
FA0		READY.	Stops the continuous output that was started with FA2.

Command	Parameter	Response	Function
FA2		READY.	Activates the continuous repetition of a set of values. The output rate is defined by the current measurement interval time. All values are transmitted as integer values, multiplied with a constant factor: RF level [dBm], factor: 10 Bearing [DEG], factor: 100 AM-Mod30 [%], factor: 100 AM-Mod9960 [%], factor: 100 FM-Deviation [Hz], factor 10 FM-Index [1], factor: 10
FM0		<Hz>	Request of the FM-Hub in Hz.
FM1		<1>	Request of the FM-Index in Hz.
FMEAS		<Hz> e.g. "108050000Hz"	Request of the MEAS-F frequency in Hz.

3.22.3.4   Remote Control Commands of the MARKER BEACON mode

Command	Parameter	Response	Function
AF4		<Hz>	Request of the AF frequency of the 3000-Hz signal in Hz.
AF5		<Hz>	Request of the AF frequency of the 1300-Hz signal in Hz.
AF6		<Hz>	Request of the AF frequency of the 400-Hz signal in Hz.
AF7		<Hz>	Request of the AF frequency of identifier in Hz.
AM4		<%>	Request of the AM-modulation factor of 3000-Hz signal in %.
AM5		<%>	Request of the AM-modulation factor of 1300-Hz signal in %.
AM6		<%>	Request of the AM-modulation factor of 400-Hz signal in %.
AM7		<%>	Request of the AM-modulation factor of identifier in %.

Command	Parameter	Response	Function
FA0		READY.	Stops the continuous output that was started with FA2.
FA2		READY.	Activates the continuous repetition of a set of values. The output rate is defined by the current measurement interval time. All values are transmitted as integer values, multiplied with a constant factor: RF level [dBm], factor: 10 AM-Mod400 [%], factor: 100 AM-Mod1300 [%], factor: 100 AM-Mod3000 [%], factor: 100 AM-Mod ID [%], factor: 100
FMEAS		<Hz> e.g. "75000000Hz"	Request of the MEAS-F frequency in Hz.

3.22.3.5 Remote Control Commands of the Data Logger mode

Command	Parameter	Response	Function
CLEARACTIVELIST		READY	Clears content of active list.
CLEARALLLISTS		READY	Clears all lists of current mode / channel.
DL_START		READY	Start Data Logging
DL_STOP		READY.	Stop Data Logging
GETACTIVELIST		List Nr.	Shows active list
GETFREEMEMORY		<MB>	Request of the free capacity on internal flash memory in MB.
GETLISTSIZE		<Nr>	Request list size of the active list.
SAVEACTIVELIST2USB	FileName	MOUNT COPY READY	Store on USB stick
SELECTLISTPARAM Example: SELECTLISTPARAM 1,2,3,4,5	ALL NONE Nr., Nr., …	READY	Defines the list selection: ALL: everything is logged / exported. NONE: nothing is selected. Nr.: The parameter with this Nr. is selected. Nr. is meant in default order. !Nr.: Parameter is deselected

Command	Parameter	Response	Function
SETACTIVELIST	List Nr.	READY	Selects active list for current mode (ILS/MB/VOR)

3.22.3.6　Remote Control Commands of the F SCAN mode

Command	Parameter	Response	Function
FSCAN_FREQSTART	<freq in kHz>	READY.	Set the FSCAN START frequency
FSCAN_FREQSTART?		<[kHz]>	Query of the FSCAN START frequency
FSCAN_FREQSTOP	<freq in kHz>	READY.	Set the FSCAN STOP frequency
FSCAN_FREQSTOP?		<[kHz]>	Query oft he FSCAN frequency
FSCAN_FREQCENTER	<freq in kHz>	READY.	Set the FSCAN CENTER frequency
FSCAN_ FREQCENTER?		<[kHz]>	Query oft he FSCAN CENTER frequency
FSCAN_FREQSPAN	<freq in kHz>	READY.	Set the FSCAN SPAN frequency
FSCAN_FREQSPAN?		<[kHz]>	Query oft he FSCAN SPAN frequency
FSCAN_RES_BW	<freq in kHz> 30, 10, 3, 1	READY.	Set the FSCAN Resolution Bandwidth
FSCAN_ RES_BW?		<[kHz]>	Query oft he FSCAN Resolution Bandwidth
FSCAN_ATTMODE	COUPLED LN NORM LD	READY.	Selects the attenuation of the FSCAN mode.
FSCAN_ATTMODE?		COUPLED LN NORM LD	Query of the attenuation of the FSCAN mode
FSCAN_REFLEVEL	<level in dBm>	READY.	Set the FSCAN Ref Level
FSCAN_REFLEVEL?		<[dBm]>	Query of the FSCAN Ref Level
FSCAN_TRACE	CLWR AVRG MAXHOLD VIEW	READY.	Selects the TRACE mode of the FSCAN mode.

Command	Parameter	Response	Function
FSCAN_ TRACE?		CLWR AVRG MAXHOLD VIEW	Query of the TRACE mode of the FSCAN mode
FSCAN_AVRG_FCTR	\<factor\>	READY.	Set the FSCAN Average Factor
FSCAN_ AVRG_FCTR?		\<factor\>	Query of the FSCAN Average Factor
FSCAN_GETSPECT		all values	All measurement values in dBm are returned as one comma separated string.

3.22.3.7 Remote Control Commands of the FFT mode

Command	Parameter	Response	Function
FFT_FREQRF	\<freq in kHz\>	READY.	Set the FFT RF frequency
FFT_FREQRF?		\<[kHz]\>	Query oft he FFT RF frequency
FFT_FREQSTOP	\<freq in kHz\> 20, 10, 5, 2.5, 1.25, 0.625	READY.	Set the FFT Stop frequency
FFT_FREQSTOP?		\<[kHz]\>	Query oft he FFT Stop frequency
FFT_ATTMODE	COUPLED LN NORM LD	READY.	Selects the attenuation of the FFT mode.
FFT_ATTMODE?		COUPLED LN NORM LD	Query of the attenuation of the FFT mode
FFT_REFLEVEL	\<level in dBm\>	READY.	Set the FFT Ref Level
FFT_REFLEVEL?		\<[dBm]\>	Query oft he FFT Ref Level
FFT_WINDOW	HANN FLAT_TOP NONE	READY.	Selects the FFT window.
FFT_WINDOW?		HANN FLAT_TOP NONE	Query oft he FFT window

Command	Parameter	Response	Function
FFT_TRACE	CLWR AVRG MAXHOLD VIEW	READY.	Selects the TRACE mode of the FFT mode.
FFT_ TRACE?		CLWR AVRG MAXHOLD VIEW	Query of the TRACE mode of the FFT mode
FFT_AVRG_FCTR	<factor>	READY.	Set the FFT Average Factor
FFT_ AVRG_FCTR?		<factor>	Query oft he FFT Average Factor
FFT_GETSPECT		all values	All measurement values in dBm are returned as one comma separated string.

3.22.3.8   Remote Control Commands of the SCOPE mode

Command	Parameter	Response	Function
SCOPE_FREQRF	<freq in kHz>	READY.	Set the SCOPE RF frequency
SCOPE_FREQRF?		<[kHz]>	Query of the SCOPE RF frequency
SCOPE _ATTMODE	COUPLED LN NORM LD	READY.	Selects the attenuation of the SCOPE mode.
SCOPE _ATTMODE?		COUPLED LN NORM LD	Query of the attenuation of the SCOPE mode
SCOPE _REFLEVEL	<level in dBm>	READY.	Set the SCOPE Ref Level
SCOPE _REFLEVEL?		<[dBm]>	Query of the SCOPE Ref Level
SCOPE_TRIGLEVEL_RFPCT	<trg lev in %>	READY.	Set the SCOPE Trigger Level for RF Input
SCOPE_TRIGLEVEL_RFPCT?		<[%]>	Query of the SCOPE Trigger Level for RF Input
SCOPE_TRIGLEVEL_BB5V0	<trg lev in V>	READY.	Set the SCOPE Trigger Level for BB 5V Input
SCOPE_TRIGLEVEL_BB5V0?		<[V]>	Query of the SCOPE Trigger Level for BB 5V Input

Command	Parameter	Response	Function
SCOPE_TRIGLEVEL_BB0V5	<trg lev in mV>	READY.	Set the SCOPE Trigger Level for BB 500 mV Input
SCOPE_TRIGLEVEL_BB0V5?		<[mV]>	Query of the SCOPE Trigger Level for BB 500 mV Input
SCOPE_TRIGSLOPE	POSITIVE NEGATIVE	READY.	Selects the SCOPE trigger slope.
SCOPE_TRIGSLOPE?		POSITIVE NEGATIVE	Query of the SCOPE trigger slope
SCOPE_TIMEDIV_RF	<time/div in ms> 32, 16, 8, 4, 2, 1	READY.	Set the SCOPE time/div for RF Input
SCOPE_TIMEDIV_RF?		<[ms]>	Query of the SCOPE time/div for RF Input
SCOPE_TIMEDIV_BB	<time/div in ms> 32, 16, 8, 4, 2, 1	READY.	Set the SCOPE time/div for BB Input
SCOPE_TIMEDIV_BB?		<[ms]>	Query of the SCOPE time/div for BB Input
SCOPE_GETMEAS		all values	All measurement values in % (RF Input) or in mV (BB Input) are returned as one comma separated string.

3.22.3.9 Remote Control Commands of the GBAS mode

Command	Parameter	Response	Function
MODE_GBAS		READY.	Activates the GBAS mode
RF GBAS_FREQRF	<freq in kHz>	READY.	Set the GBAS RF frequency
RF? GBAS_FREQRF?		<[kHz]>	Query of the GBAS RF frequency
GBAS_ATTMODE	AUTO LN NORM LD	READY.	Selects the attenuation of the GBAS mode.

Command	Parameter	Response	Function
GBAS_ATTMODE?		AUTO LN NORM LD	Query of the attenuation of the GBAS mode.
LA? GBAS_LEV?		<[dBm]>	Query of the GBAS level
GBAS_FMEAS?		<[kHz]>	Query of the GBAS measured value of delta frequency to RF frequency
GBAS_GETMEASDEF		CHANNEL, TIMESLOT, LEV[dBm], MEASDELTAFREQ[kHz], SSID, GBASID, TX_LENGTH[bit], MESSAGEID	Definition of return values commands: GBAS_GETSLOTMEAS GBAS_GETFRAMEMEAS
GBAS_GETSLOTMEAS	<Time slot index>	< for example:> CH:1, 1, -39.61, -0.08, 0, TATM, 1824, NORM	Display of the return value of the command: GBAS_GETMEASDEF.
GBAS_GETFRAMEMEAS		All eight slots with the same format as GBAS_GETSLOTMEAS	Display of the return value of the command: GBAS_GETMEASDEF.
GBAS_GETFASDATADEF		CHANNEL, TIMESLOT, LEV[dBm], MEASDELTAFREQ[kHz], SSID, GBASID, TX_LENGTH[bit], MESSAGEID, { ReferencePath Data Selector, ReferencePath ID, FAS Data Set Length[byte], OperationType, SBAS Service Provider,	Definition of return values commands: GBAS_GETSLOTFASDATAGBAS_GETFRAMEFASDATA

Command	Parameter	Response	Function
		AirportID, RunwayNumber, RunwayLetter, Approach Perform.Designator, Route Indicator, LTP/FTP Latitude[°], LTP/FTP Longitude[°], LTP/FTPHeight[m], Delta FPAP Longitude[°], Approach Thres.Cross.Height, Approach TCH Units Selector, Glide Path Angle(GPA)[°], CourseWidth at Threshold[m], Delta Length Offset[m], FAS Vertical Alert Limit[m], FAS Lateral Alert Limit[m] }	
GBAS_GETSLOTFASD ATA	\<Time slot index>	\< for example:> CH:1, 0, -39.67, -0.08, 0, TATM, 1824, NORM, { 22, G08A 41, FAS Data, 0, EDVE, 8, no letter, GAST D, Z, 52.31866111N, 10.54648889E, 125.9, 0.0012876, 0.0230079, 50.0, feet,	Display of the return value of the command: GBAS_GETFASDATADEF.

Command	Parameter	Response	Function

		3.00,
		82.00,
		376,
		10.0,
		40.0
		}
		,{
		if the next FAS Data Block is present
		}	

GBAS_GETFRAMEFAS DATA		All eight slots with the same format as GBAS_GETSLOTFA SDATA	Display of the return value of the command: GBAS_GETFASDATADEF.
GBAS_GETRAWDATA DEF		CHANNEL, TIMESLOT, LEV[dBm], MEASDELTAFREQ[kHz], SSID, GBASID, TX_LENGTH[bit], MESSAGEID, BURSTDATA: [FirstBit:0 or 1], [hex data], [LastBits]	Definition of return values commands: GBAS_GETSLOTRAWDATA GBAS_GETFRAMERAWDATA
GBAS_GETSLOTRAW DATA	<Time slot index>	< for example:> CH:1, 0, -39.66, -0.08, 0, TATM, 1824, NORM, 0, 01 38 06 55 B0 A8… ED A1 7C DC 11	Display of the return value of the command: GBAS_GETRAWDATADEF.
GBAS_GETFRAMERA WDATA		All eight slots with the same format as GBAS_GETSLOTRA WDATA	Display of the return value of the command: GBAS_GETRAWDATADEF.
GBAS_SETSLOTS_TO STREAM	<decimal number>	READY.	Set some or all slots to stream Slots are binary coded: index 0: binary 0001, dec.1 index 1: binary 0010, dec.2 index 2: binary 0100, dec.4 index 3: binary 1000, dec.8 index 4: 0001 0000, dec.16

Command	Parameter	Response	Function
			index 5: 0010 0000, dec.32 index 6: 0100 0000, dec.64 index 7: 1000 0000, dec.128 If multiple slots must be selected use the sum of decimal values: Example: If slots 2 +3 for ex. : 4+8=12
GBAS_GETSLOTS_TO STREAM		< for example:> A[0],B[1],C[2],D[3], E[4],F[5],G[6],H[7],	The example: when all slots are selected
GBAS_STREAM	MEASDATA,1 if RF 1 sel. FASBDATA,1 RAWBDATA,1 MEASDATA,2 if RF 2 sel. FASBDATA,2 RAWBDATA,2		Activates the continuous repetition of a set of values. The output rate is defined by the selected slots. Maximum 16 string values per second if all slots selected, the command GBAS_STOPSTREAM stops the output.
GBAS_STREAM	MEASDATA,1		Display of the return value of the command: GBAS_GETSLOTMEAS.
GBAS_STREAM	FASBDATA,1		Display of the return value of the command: GBAS_GETSLOTFASDATA.
GBAS_STREAM	RAWBDATA,1		Display of the return value of the command: GBAS_GETSLOTRAWDATA.
GBAS_STOPSTREAM		READY.	Stops the continuous output that was started with GBAS_STREAM

3.22.3.10   Remote Control Commands of the Setup mode

Command	Parameter	Response	Function
SETUP: INPUT Example: SETUP:INPUT 1.RF	Channel: 1,2 Input:RF,BB,?	READY	Switchover between the RF input signal and the baseband signal to Channel 1 / 2. Value: RF (RF input at the front BB (Base band input at the rear) ? (Output with the active input (RF / BB)
SETUP: BBLEVEL Example: SETUP:BBLEVEL 100mV	Level: - 0.5V - 5V - ?	READY	Input sensitivity for the baseband input. Always applies to both channels. (Channel 1 / 2). ? (Output of the set level)
SETUP: ANALOG_OUT1	CH1_DDM CH2_DDM CH1_BB_FULL CH2_BB_FULL CH1_BB_AUDIO CH2_BB_AUDIO	READY	Selects the source for Analog Out 1.
SETUP: ANALOG_OUT2	CH1_DDM CH2_DDM CH1_BB_FULL CH2_BB_FULL CH1_BB_AUDIO CH2_BB_AUDIO	READY	Selects the source for Analog Out 2.
SETUP: DDM_RANGE_LLZ Example: SETUP:DDM_RANGE_LLZ 1,4	Channel:1,2 Range:1,2,3,4	READY	Selection of predefined DDM ranges (ILS-LLZ), active for analog out and DDM bargraph indication.
SETUP: DDM_RANGE_GS	Channel:1,2 Range:1,2,3,4	READY	Selection of predefined DDM ranges (ILS-GS), active for analog out and DDM bargraph indication.
SETUP: VOLUME	0 … 100	READY	Setting the AF output level in %.
SETUP: SPEAKER	ON, OFF	READY	Activates the speaker (ON / OFF)
SETUP: ENERGYSAVER	ON, OFF 0 … 60min	READY	ON turns the function on. OFF turns the function off. Energy Saver Time input (minutes) Input "0", no energy saver function (display always visible)

Command	Parameter	Response	Function
SETUP: SETGPSBAUDRATE	4800 9600 19200 38400 57800 115200	READY	Regulation of the GPS baud rate. Only valid parameters may be entered.
SETUP:UNIT:DDM	? 1 μA %	READY	Request or set DDM unit. Instead of "μA" the string "uA" is accepted. "%" may be replaced by "PCT".
SETUP:UNIT:SDM	? 1 μA %	READY	Request or set SDM unit. Instead of "μA" the string "uA" is accepted. "%" may be replaced by "PCT".
SETUP:UNIT:Level	? dBm dBμV	READY	Request or set Level unit.
SETUP:UNIT: ILSPHASE	? bipolar unipolar	READY	Request or set ILS phase representation.
SETUP:UNIT: POLARITYDDM	? 90-150 150-90	READY	Request or set DDM polarity.
SETUP:UNIT: BARGRAPH	? MeasDev Cockpit	READY	Request or set Bargraph representation.
SETUP:UNIT: UPPERFREQ	? CRS CLR	READY	Request or set if the Upper frequency is the Course- or the Clearance- frequency. (while the low frequency is always vice versa)
SETUP:UNIT: VORDIRECTION	? from to	READY	Request or set the VOR direction point of view. from: station to: airplane

4   Service

To guarantee a repair as quick as possible a defective **R&S® EVS 300 ILS / VOR Analyzer** must be sent to the services as stated below.

> ☞ *To avoid damages on transport the unit should be sent inside its original packing.*

Shipping address:
Rohde&Schwarz GmbH & Co. KG.
Service Operations West
Graf-Zeppelin-Str. 18
D-51147 Köln

> ☞ *For questions concerning the service or other problems with the unit, please contact us.*

ROHDE&SCHWARZ Service Operations West	
☎	(49) / 2203 / 49-51**406** (49) / 2203 / 49-51**402**
FAX	(49) / 2203 / 49-51**642**

4.1   Guarantee

See our terms and conditions of trade (sales contract).

> ⚠ *During the guarantee a defective internal battery may only be changed by a Rohde & Schwarz-Service Centre, otherwise the right to claim under guarantee get lost!*

5   Maintenance

5.1   Calibration

👉 *The R&S® EVS 300 ILS / VOR Analyzer needs to be calibrated yearly!*

5.2   Cleaning

To clean the **R&S® EVS 300 ILS / VOR Analyzer** we recommend the following utensils:

- brush
- soft, lint free cloth

👉 *Before cleaning R&S® EVS 300 ILS / VOR Analyzer it must be switched OFF!*
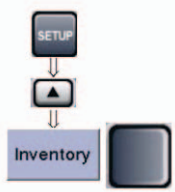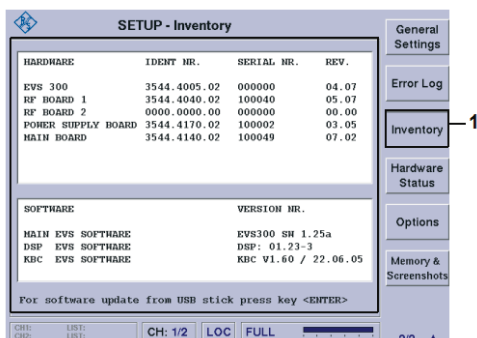
Don't use aggressive cleaner for cleaning the surfaces of the R&S® EVS 300 ILS / VOR Analyzer!
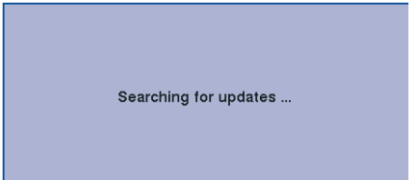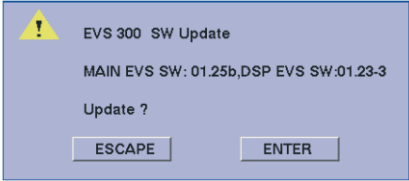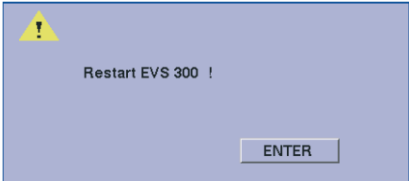
Electric interfaces must not be cleaned with liquid cleanser e.g. contact spray!

5.3   Software Update

Click on the following website to receive the latest software update for your R&S® EVS 300 ILS / VOR Analyzer:
http://www.rohde-schwarz.com/product/evs300.html.

	Control	Operation	Function
1.		Activate setup and switch to the second menu window, press the softkey "Inventory".	Switching to the "Inventory" menu window.
2.		Insert the USB memory stick with the current software update into one of the USB interfaces (29).	wait about 5 seconds

	Control	Operation	Function
3.	ENTER	Press the "Enter" (31) button.	Initialisation of the software update is beginning. Searching for updates ...
4.	ENTER	Press the "Enter" (31) button.	The software update will begin after the security question has been confirmed. ⚠ EVS 300 SW Update MAIN EVS SW: 01.25b,DSP EVS SW:01.23-3 Update ? ESCAPE ENTER
			Never remove the USB memory stick or switch off the device during the software update! *If the USB memory stick is removed during an update, the following error message will be displayed: "Cannot unpack Update". Use the "ESC" button to acknowledge the message. The update mode will be interrupted, i.e., the device can still be operated.*
5.	ENTER	Press the "Enter" (31) button.	When the software update is completed, the update programme is ended after confirmation by pressing "Enter". ⚠ Restart EVS 300 ! ENTER
6.		Remove the USB memory stick.	
7.	⏻	Press the button twice	The device needs to be restarted to activate the new software.

6 Interfaces of the Unit

6.1 Front side interfaces
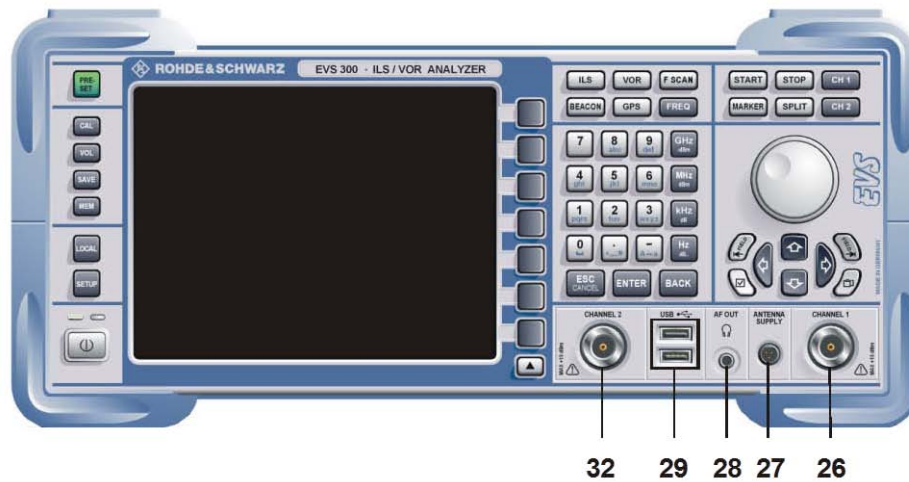
6.1.1 Antenna input 1 (26)

Item	Interface	Function
26	Channel 1	RF input for the first channel Connector: N-socket, 50 Ω Input level: max. +13 dBm Frequency range: 70 ... 350 MHz VSWR: <1.5 *The max. input level is +13 dBm, Data stability until 10 dBm guaranteed!*

6.1.2 Active Antenna control (27)

Item	Interface	Function
27	ANTENNA SUPPLY	Power supply output for an active receiver antenna. Power supply: 12 VDC / 300 mA

6.1.3 Headset output (28)

Item	Interface	Function
28	AF OUT	3.5 mm jack plug

6.1.4 USB interface (29)

Item	Interface	Function
29	USB ←	USB 1.1 Standard Twin-Port Transmission rate: max. 12 Mbit/s Power supply: 5 VDC / 500 mA per Port (integrated)

6.1.5 Antenna input 2 (32)

Item	Interface	Function
32	Channel 2	RF input for the second channel (Option EVS-B1) Connector: N-socket, 50 Ω Input level: max. +13 dBm Frequency range: 70 ... 350 MHz VSWR: <1.5 ☞ *The max. input level is +13 dBm, data stability until 10 dBm guaranteed!*

6.2 Rear side interfaces
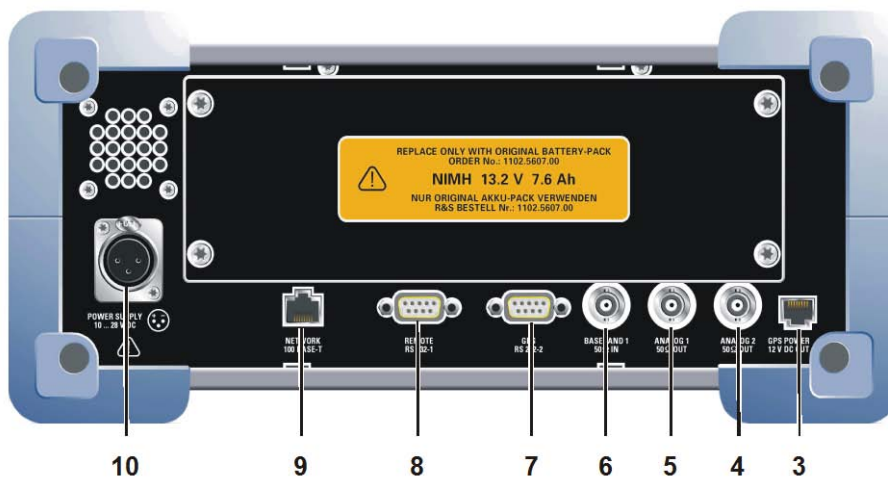
6.2.1 AUX-Power output (3)

Item	Interface	Function
3	AUX POWER 12 VDC OUT	Power supply connector for an external device as e.g. a GSM modem Power supply: 12 VDC / 300 mA Connector: RJ 14

6.2.2   Analogous output 2 (4)

Item	Interface	Function
4	ANALOG 2 50 Ω OUT	Analog output for the baseband signal or, if in ILS mode, as analog DDM output. The selection is made in the setup function BB-Out (Full): Demodulator bandwidth, mode-dependant BB-Out (Audio): 300 ... 3000 Hz, max. 1 V_{rms} DDM-Range: 1 ... 4 Connector: BNC-socket, 50 Ω

6.2.3   Analogous output 1 (5)

Item	Interface	Function
5	ANALOG 1 50 Ω OUT	Analog output for the baseband signal or, if in ILS mode, as analog DDM output. The selection is made in the setup function BB-Out (Full): Demodulator bandwidth, mode-dependant BB-Out (Audio): 300 ... 3000 Hz, max. 1 V_{rms} DDM-Range: 1 ... 4 Connector: BNC-socket, 50 Ω

6.2.4   Baseband input / Trigger input (6)

Item	Interface	Function
6	BASEBAND IN TRIGGER IN	AF input for the analysis of baseband signals or the trigger input for the trigger mechanism of the internal Data Logger. **BASEBAND IN**: Input level [1]: 0 … 0.5 / 5 V_p **TRIGGER IN**: Input level: 3.3 … 12 V_{pp} Connector: BNC-socket, 1 MΩ

[1]   The setting of the max. AF input level is performed in the setup menu.

6.2.5 GPS Control interface (7)

Item	Interface	Function
7	GPS RS 232-2	GPS control interface (serial) for an external GPS receiver COM-parameter: N81 Baud-rate: adjustable Connector: SUB-D-plug (9 pin)

6.2.6 RS-232 interface (8)

Item	Interface	Function
8	REMOTE RS 232-1	Remote control interface (serial) of the **R&S® EVS 300 ILS / VOR Analyzer** COM-parameter: adjustable Baud-rate: adjustable Connector: SUB-D-plug (9 pin)

6.2.7 LAN interface (9)

Item	Interface	Function
9	NETWORK 100 BASE-T	LAN interface (Fast Ethernet Standard) Data transfer rate: 100 Mbit/s Connector: RJ 45

6.2.8 DC Power Supply input (10)

Item	Interface	Function
10	POWER SUPPLY 10 ... 28 VDC	Supply voltage input Input voltage: 10 ... 28 VDC Connector: XLR-plug

When an external DC-Power Supply is used the connection sequence of the XLR plug must strictly be met!

7   Technical Data

See data sheet