Operating Manual

ILS / VOR Analyzer
R&S® EVS 300

3544.4005.02

ROHDE&SCHWARZ

3544.4486.12.02

Printed in the Federal
Republic of Germany

Rohde & Schwarz GmbH & Co. KG
Mühldorfstraße 15
D-81671 München
www.rohde-schwarz.com

3544.4486.12.02

ROHDE&SCHWARZ

EC Certificate of Conformity

CE

Certificate No.: **0502**

This is to certify that:

Equipment Type	Identifiation No.:	Designation
EVS 300	**3544.4005.02**	**ILS / VOR Analyzer**

complies with the provisions of the Directive of the Council of the European Union on the approximation of the laws of the Member States

- relating to electrical equipment for use within certain voltage limits (73/23/EEC revised by 93/68/EEC)
- relating to electromagnetic compatibility (89/336/EEC revised by 91/263/EEC, 92/31/EEC, 93/68/EEC)

Conformity is proven by compliance with the following standards:

- EN61010-1:2001
- EN55022:1998 + A1:2000 + A2:2003
- ETSI EN301489-1: V1.4.1
- ETSI EN301489-22: V1.3.1

Affixing th EC Conformity Mark as from: 2005

ROHDE & SCHWARZ GmbH & Co. KG
Service Centre Cologne
Graf-Zeppelin-Str. 18, D-51147 Cologne

Cologne, 24.10.2005

Quality Assurance 5C-Q / Bremmekamp

Before putting the product into operation for the first time, ma e sure to read the following

S a f e t y I n s t r u c t i o n s

Rohde & Schwarz makes every effort to keep the safety standard of its products up to date and to offer its customers the highest possible degree of safety. Our products and the auxiliary equipment required for them are designed and tested in accordance with the relevant safety standards. Compliance with these standards is continuously monitored by our quality assurance system. This product has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, Rohde & Schwarz will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or in the field and must not be used in any way that may cause personal injury or property damage. ou are responsible if the product is used for an intention other than its designated purpose or in disregard of the manufacturer s instructions. The manufacturer shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its operating manual and within its performance limits (see data sheet, documentation, the following safety instructions). Using the products requires technical skills and knowledge of English. It is therefore essential that the products be used exclusively by skilled and specialized staff or thoroughly trained personnel with the required skills. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation.

Symbols and safety labels

							
Observe operating instructions	Weight indication for units >18 kg	Danger of electric shock	Warning Hot surface	PE terminal	Ground	Ground terminal	Attention Electrostatic sensitive devices

					
Supply voltage ON/OFF	Standby indication	Direct current (DC)	Alternating current (AC)	Direct/alternat ing current (DC/AC)	Device fully protected by double/reinforced insulation

Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before putting the product into operation. It is also absolutely essential to observe the additional safety instructions on personal safety that appear in other parts of the documentation. In these safety instructions, the word product refers to all merchandise sold and distributed by Rohde & Schwarz, including instruments, systems and all accessories.

Tags and their meaning

DANGER	This tag indicates a safety hazard with a high potential of risk for the user that can result in death or serious injuries.
WARNING	This tag indicates a safety hazard with a medium potential of risk for the user that can result in death or serious injuries.
CAUTION	This tag indicates a safety hazard with a low potential of risk for the user that can result in slight or minor injuries.
ATTENTION	This tag indicates the possibility of incorrect use that can cause damage to the product.
NOTE	This tag indicates a situation where the user should pay special attention to operating the product but which does not lead to damage.

Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. Its ventilation must not be obstructed during operation. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products
IP protection 2X, pollution severity 2, overvoltage category 2, use only in enclosed spaces, max. operation altitude max. 2000 m.
2. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed. The product may be opened only by authorized, specially trained personnel. Prior to performing any work on the product or opening the product, the instrument must be disconnected from the supply network. Any adjustments, replacements of parts, maintenance or repair must be carried out only by technical personnel authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, PE conductor test, insulation resistance measurement, leakage current measurement, functional test).
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens) such as aluminum cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.
4. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered by electromagnetic radiation. The employer is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.

5. Operating the products requires special training and intense concentration. Disabled persons should not use the products unless it is made certain that their disability has no adverse effects while they are operating the products.
6. Prior to switching on the product, it must be ensured that the nominal voltage setting on the product matches the nominal voltage of the AC supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.
7. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with earthing contact and protective earth connection.
8. Intentionally breaking the protective earth connection either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.
9. If the product has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases, it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply. If products without power switches are integrated in racks or systems, a disconnecting device must be provided at the system level.
10. Never use the product if the power cable is damaged. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by e.g. tripping over the cable or suffering an electric shock.
11. The product may be operated only from TN/TT supply networks fused with max. 16 A.
12. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise this can result in sparks, fire and/or injuries.
13. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
14. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
15. Ensure that the connections with information technology equipment comply with IEC950/EN60950.
16. Never remove the cover or part of the housing while you are operating the product. This will expose circuits and components and can lead to injuries, fire or damage to the product.
17. If a product is to be permanently installed, the connection between the PE terminal on site and the product s PE conductor must be made first before any other connection is made. The product may be installed and connected only by a skilled electrician.
18. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused in such a way that suitable protection is provided for users and products.
19. Do not insert any objects into the openings in the housing that are not designed for this purpose. Never pour any liquids onto or into the housing. This can cause short circuits inside the product and/or electric shocks, fire or injuries.
20. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a thunderstorm) can reach the product. Otherwise the operating personnel will be endangered by electric shocks.

21. Rohde & Schwarz products are not protected against penetration of water, unless otherwise specified (see also safety instruction 1.). If this is not taken into account, there exists the danger of electric shock or damage to the product, which can also lead to personal injury.
22. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product was moved from a cold to a warm environment.
23. Do not close any slots or openings on the product, since they are necessary for ventilation and prevent the product from overheating. Do not place the product on soft surfaces such as sofas or rugs or inside a closed housing, unless this is well ventilated.
24. Do not place the product on heat-generating devices such as radiators or fan heaters. The temperature of the environment must not exceed the maximum temperature specified in the data sheet.
25. Batteries and storage batteries must not be exposed to high temperatures or fire. Keep batteries and storage batteries away from children. If batteries or storage batteries are improperly replaced, this can cause an explosion (warning lithium cells). Replace the battery or storage battery only with the matching Rohde & Schwarz type (see spare parts list). Batteries and storage batteries are hazardous waste. Dispose of them only in specially marked containers. Observe local regulations regarding waste disposal. Do not short-circuit batteries or storage batteries.
26. Please be aware that in the event of a fire, toxic gases that may be hazardous to your health may escape from the product.
27. Please be aware of the weight of the product. Be careful when moving it; otherwise you may injure your back or other parts of your body.
28. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer s installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves).
29. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. The driver is always responsible for the safety of the vehicle; the manufacturer assumes no responsibility for accidents or collisions.
30. If a laser product (e.g. a CD/DVD drive) is integrated in a Rohde & Schwarz product, do not use any other settings or functions than those described in the documentation. Otherwise this may be hazardous to your health, since the laser beam can cause irreversible damage to your eyes. Never try to take such products apart, and never look into the laser beam.

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)!

The installation and connection of the accessory XLR plug can be found in the chapter "DC Connection", in section 2, "Preparation".

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

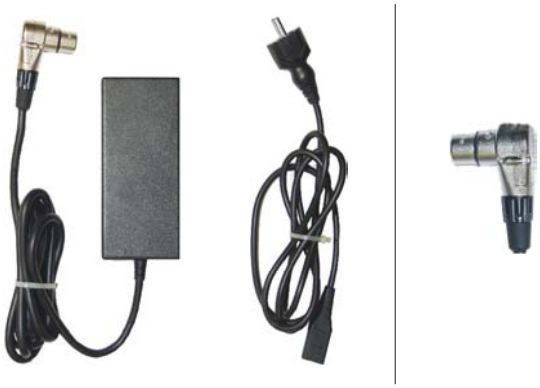
Lithium/NiMH batteries must not be exposed to high temperatures or fire. Keep batteries away from children. If the battery is replaced improperly, there is danger of explosion. Only replace the battery by R&S type. Lithium/NiMH batteries are suitable for environmentally friendly disposal or specialized recycling. Dispose them into appropriate containers, only. Do not short-circuit the battery.

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

1. Unpack the **ILS / VOR Analyzer R&S® EVS 300**.

2. Examine the equipment for obvious damages.

3. Test the accessories supplied!
   - **Power pack with cable**
   - **XLR plug**
   - **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 Center Cologne

☎	(49) / 2203 / 49-51**406** (49) / 2203 / 49-51**402**
FAX	(49) / 2203 / 49-51**642**

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

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

The **ILS / VOR Analyzer R&S® EVS 300** is used to test terrestrial radio navigation equipment in airports. The following components of ILS and VOR systems can be tested:

- ILS (**I**nstrument **L**anding **S**ystem)
  - LLZ (Localizer) 108 ... 118 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)
  - 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)
  - Identifier (modulation degree, frequency, code)
  - FM Index, FM Deviation
  - Bearing (30 Hz signals)
- Marker BEACON (MB) Mode
  - RF level
  - AM modulation degree for 300/1300/3000 Hz (with frequency display)
  - Identifier (modulation degree, frequency)
- F Scan Mode (spectrum display, option)
  - Display of the frequency spectrum

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

The versatile power supply and port options provide high flexibility and mobility. The **ILS / VOR Analyzer R&S® EVS 300** is suitable for outdoor use (battery operation), for use in vehicles

(12 ... 28 V on-board power supply) and for laboratory use (table power pack). To ensure autonomous operation in on-site use, the **ILS / VOR Analyzer R&S® EVS 300** has high-capacity internal data storage, which records all relevant measurement parameters (up to 36 hours of continuous measurement). Signal monitoring for longer time periods can be implemented through the special long-term measurement. With this, the **ILS / VOR Analyzer R&S® EVS 300** switches itself on for measurement automatically or periodically. During long-term measurement, the **ILS / VOR Analyzer R&S® EVS 300** can operate independently of a main power supply for up to a week.

The recorded data can be shown on the display or graphical, or transferred to the standard ports (RS-232 and LAN) for further processing, or copied onto a USB Memory Stick.

Remote control of the device functions can be done through the RS-232 port, or through a LAN or on a GSM modem (EVS-B2, with data transfer).

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

The **ILS / VOR Analyzer R&S® EVS 300** 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 6.6" TFT display (VGA, 640x480); can also be easily read in direct sunlight
- ❑ 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
- ❑ Data transfer over the ports (RS-232, LAN, USB)
- ❑ High long-term stability and reproducibility through digital signal processing from the ZF position
- ❑ All measurement data of a mode (ILS, VOR, Marker Beacon, F Scan) is shown simultaneously in the display. An enlarged display of some values gives good readability even at longer distances from the device
  * The measurement parameters related to the modes are described in Section 1.3
- ❑ Simultaneous and separate measurement of the course and clearance signals is possible in ILS mode through digital demodulation and filtering in the DSP
- ❑ Simultaneous measurement of the Localizer and Glideslope signals in ILS mode (with second channel, second channel, option)
- ❑ Two identically designed signal processing channels (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 log:
  - All measured values can be stored,
  - Single and continuous recording of measured values,
  - Up to 1000 lists (storage positions) can be compiled per mode,
  - Up to 100000 measurements (measurement lines) can be recorded per list.
- Position data recording (GPS, DGPS) through NMEA-0183
- 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,
  2 x RS-232,
  LAN,
  2 x USB

1.4 General Information about ILS and VOR/DVOR

1.4.1 ILS (Instrument Landing System)

Through the globally standardized ILS, the aircraft on a defined glide path during landing receives highly accurate positional information in reference to this glide path. This landing path is described by the intersection of a vertical Glideslope level and a horizontal localizer plane.

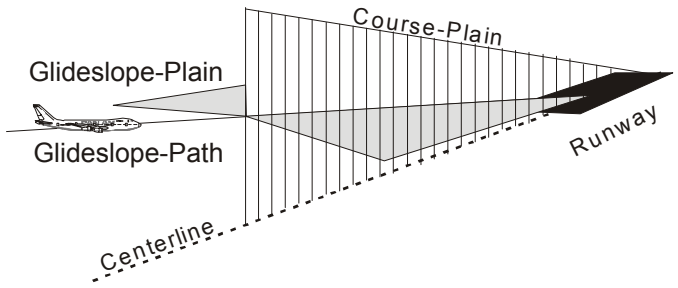


Fig. 1-1 Basics of ILS landing

The ILS frequency range lies between 108 ... 118 MHz for the LLZ (Localizer) and between 320 ... 340 MHz for the GS (Glideslope). The ILS is based on the interpretation of two amplitude modulated coherent carrier signals, each of which is emitted through an antenna array. If the aircraft is on the landing line, both signals are received with the same modulation degree. If the aircraft deviates from the landing line, either the 90 Hz or the 150 Hz components predominates after the AM demodulation. The ILS interpretation is done by measuring the modulation degrees of both emitted signals, the difference in which allows calculation of the DDM (Difference in Depth of Modulation).

$DDM = m(x_{90}) - m(x_{150})$

The ICAO (International Civil Aviation Organization) prescribes the way in which the DDM values must be generated for different distances from the runway threshold. According to this, the corresponding antenna diagrams of the landing course transmitter LLZ (Localizer) and the glide path transmitter GS (Glideslope) are calibrated.

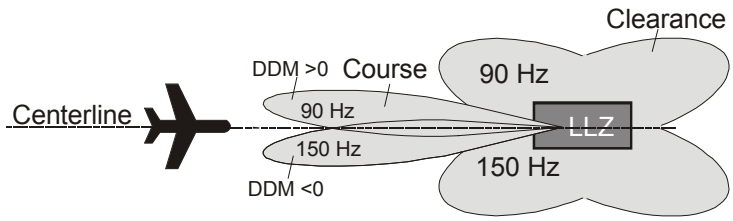


Fig. 1-2 Basic Antenna Diagrams of the ILS Localizer

1.4.1.1 Marker Beacon

The markers are VHF beacons (Inner Marker (IM), Middle Marker (MM), Outer Marker (OM)) and are positioned on the extended centerline of a runway at defined distances (IM approx. 200 m, MM approx. 1100 m, OM approx. 7500 m) from the landing point with reduced transmission capability. These markers are an additional aid during an ILS landing.

The beacon marker (Control lights in the airplane) lights up as a positional signal during over flight (over the Outer Marker (blue indicator light), Middle Marker (yellow indicator light) and Inner Marker (white indicator light)). As a rule, in civil airports only the Outer and Middle Markers are used; in military airports the Inner Marker is also used.

The frequencies of the beacons are fixed as follows:

Outer Marker	300 Hz
Middle Marker	1300 Hz
Inner Marker	3000 Hz

1.4.1.2 Components of the ILS

The ILS consists of the following components:

- LLZ (Localizer),
- GS (Glideslope),
- Marker Beacon
  - Outer Marker
  - Middle Marker
  - Inner Marker

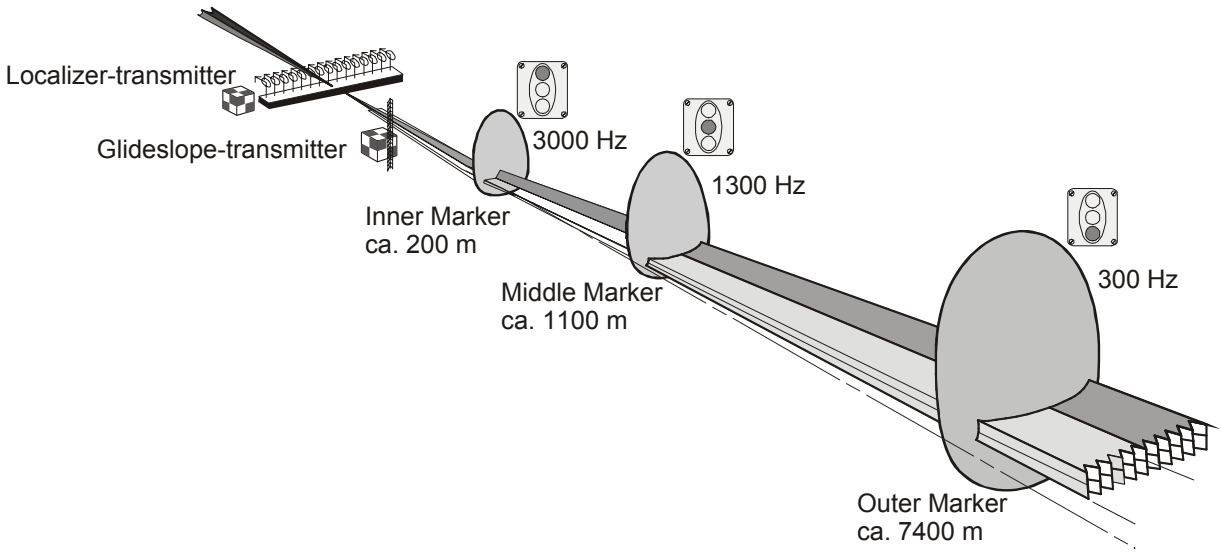


Fig. 1-3 Basic components of an ILS system

1.4.2 VOR (VHF Omni directional Radio Range)

VOR is a radio navigation system for short and medium distance navigation. VOR transmitter systems work in the VHF range between 108 ... 118 MHz. The VOR radio navigational aid supplies the aircraft with directional information, angle information relative to the magnetic north from the site of the beacon. The range covered by a VOR station is ideally a circle around the VOR station with a radius dependent on the flight altitude.

The VOR receiver obtains the directional information by measuring the phase difference of two 30 Hz signals transmitted by the beacon. A conventional VOR station transmits with a rotating antenna. From the rotation, a sinusoidal AM modulated signal, whose phase position depends on the present angle of rotation, arises on the receiver. The rotational frequency of the antenna sets the modulation frequency at 30 Hz. In order to determine the radial, the phase difference must be made into a reference phase. Because this reference phase must be independent of the rotation of the antenna, it is

modulated with a frequency swing of 480 Hz in FM on a secondary carrier of 9.96 kHz and emitted over a separate antenna with a rotational character.

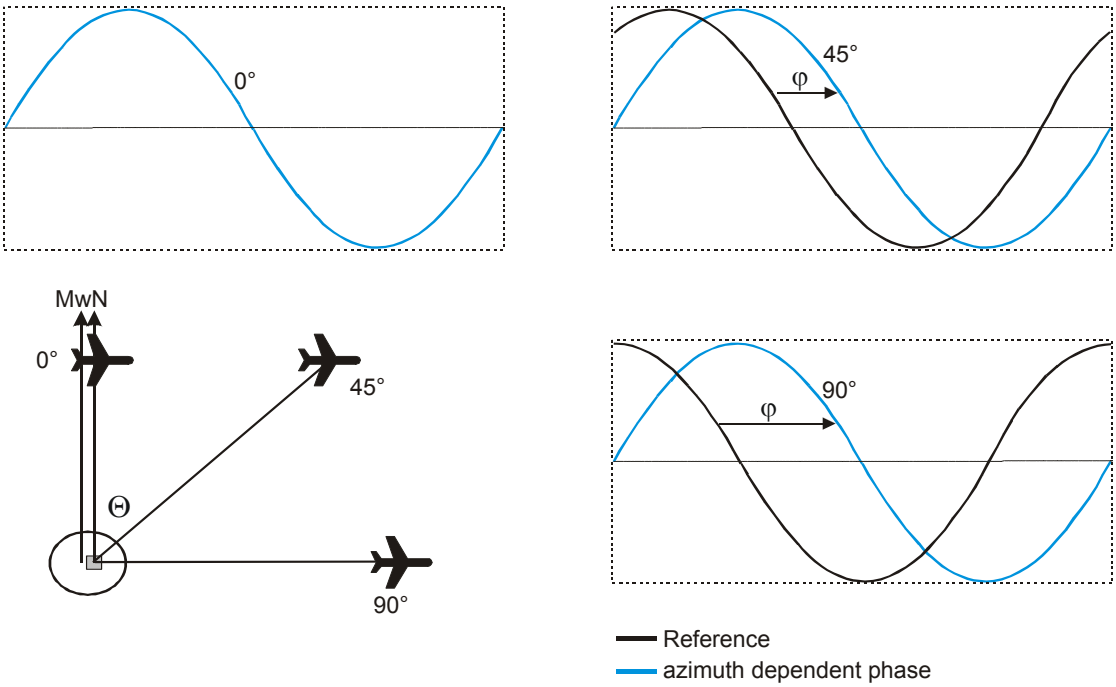


Fig. 1-4 Basics of the $_{VOR}$ φ Phase Angle Depending on the Azimuth Angle Θ

The frequency modulated secondary carrier for the reference phase is itself again modulated in AM on the RF carrier of the VOR station. In addition to the signals necessary for navigation, a Morse code with 1020 Hz or speech in the usual AF range from 300 Hz to 3.3 kHz can be transmitted on the VOR carrier. Often, the telephony channel of a VOR station is used for the transmission of ATIS (**A**utomatic **T**erminal **I**nformation **S**ervice) messages. The spectrum of a VOR signal is therefore composed of the carrier and three modulated components.

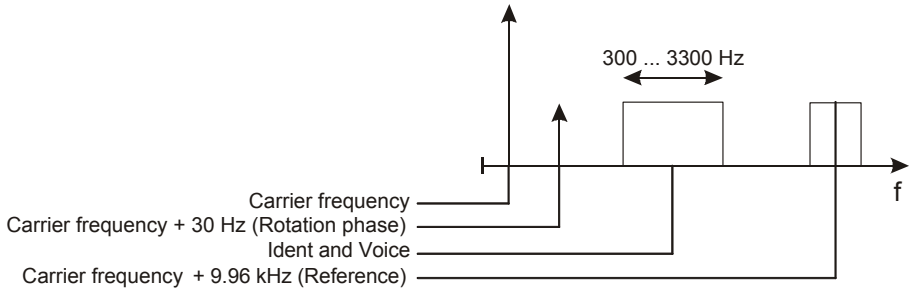


Fig. 1-5 Basics of the VOR Spectrum

The identical modulation degree m=0.3 for all three components was selected in ICAO Annex 10 such that the total signal still contains10% modulation reserve. The carrier is therefore not suppressed at any point in time. The 9960 Hz reference carrier is FM modulated with 480 Hz swing. The VOR signal generation as under ICAO is shown below.

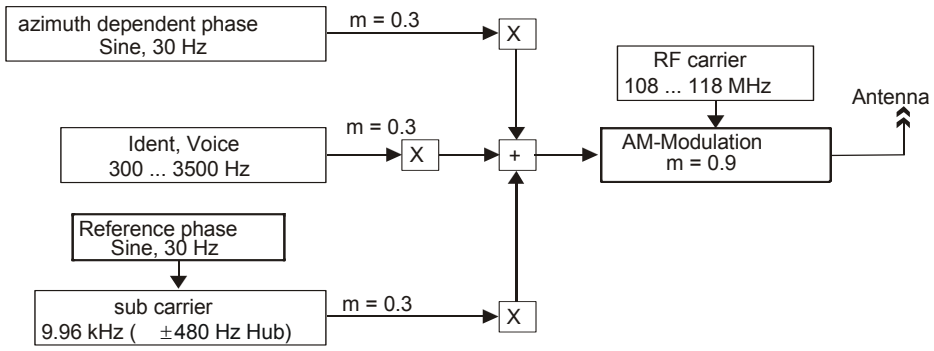


Fig. 1-6 Basics of the VOR signal generation

1.4.3 DVOR (Doppler VHF Omni directional Range)

A DVOR beacon transmits, like a VOR, an RF signal in which the two-phase angles are coded, from whose difference the receiver can calculate its positional line in reference to the DVOR. In contrast to the VOR, the meaning of the reference and azimuth dependent phase is interchanged. This means that the reference phase is no longer emitted in FM through the secondary carrier, but rather the 30 Hz reference signal is emitted in AM from a fixed antenna.
In DVOR, the azimuth dependent phase is generated using the Doppler effect. The Doppler effect is such that the receiving frequency f_{rx} increases when there is radial relative movement of a receiver with a speed v_x towards the transmitter, and correspondingly decreases when there is movement away from the transmitter.

The following illustration shows the 50 circularly arranged single antennae of a DVOR station. The secondary carrier to be transmitted on (carrier +9.96 kHz) is distributed using an electronic multiplexer on the circularly arranged antennae, such that that the transmission signal seems to revolve at 30 Hz in the circle.

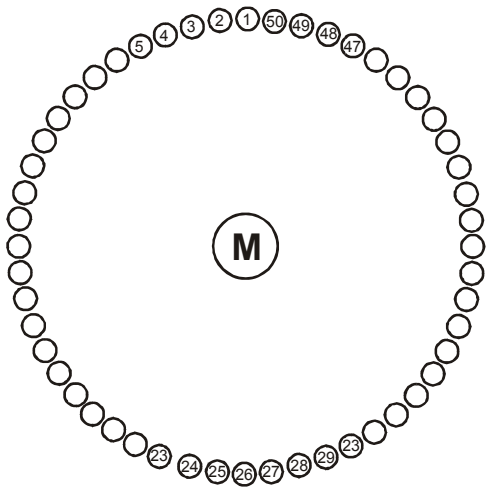


Fig. 1-7 Basics of a DVOR System

The circles shown in the above illustration symbolize radial transmitters. The transmission antenna in the center of the circle (M) transmits the reference phase in the form of the 30 Hz AM modulated carrier and the identifier of the station. The Doppler displacement corresponds to the FM swing.

In practice, both side bands of the secondary carrier (carrier +9.96 kHz and carrier - 9.96 kHz) are created separately and fed into the antenna array, spatially displaced by 180°. Therefore, two superimposed individual antennae are emitting at one period in time, each being one side band of the total signal. In the far field, there is the effect of an FM on the receiver, because one side band component always increases in frequency because of the Doppler effect, while the other component decreases in frequency. The reason for this complex method of signal generation lies in the high accuracy, which can be obtained for the azimuth-dependent phase.

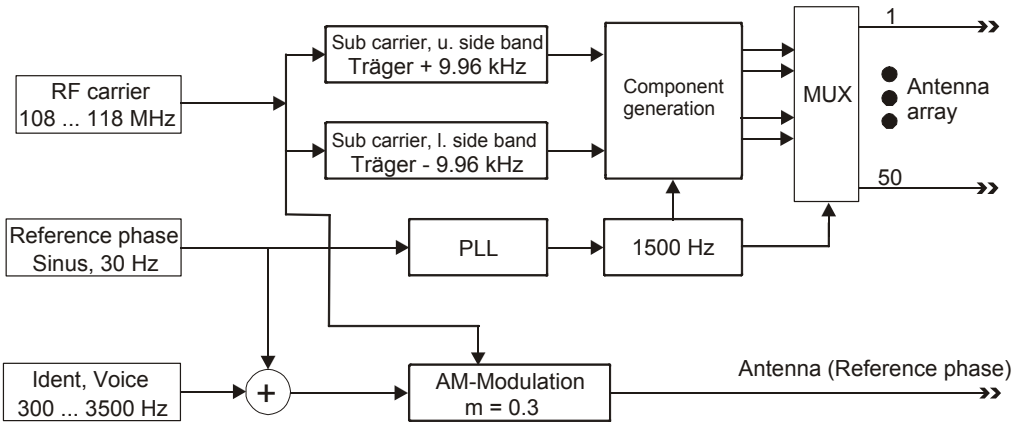


Fig. 1-8 Basics of DVOR Signal generation

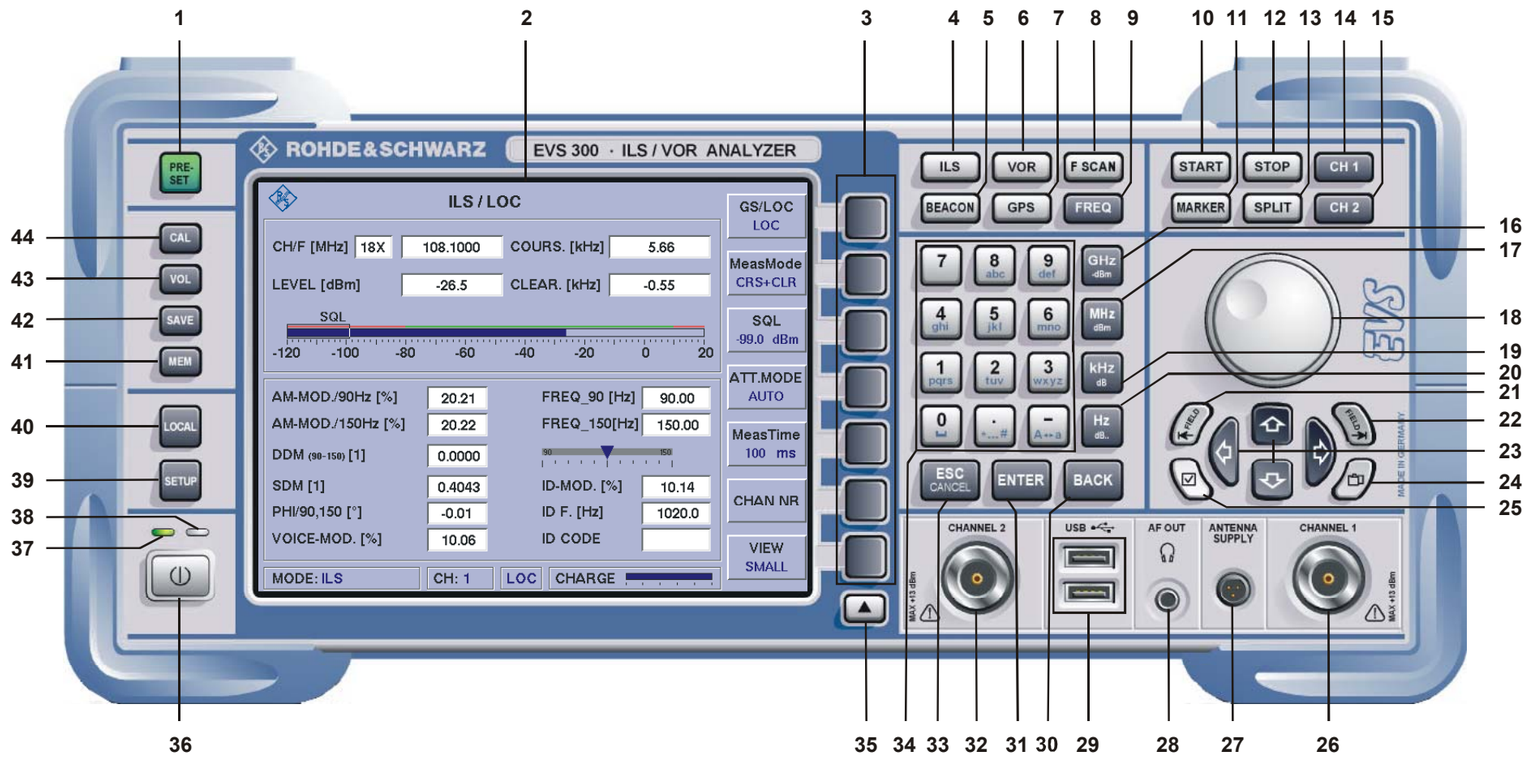
1.5 Views of the Device

1.5.1 Front View

Fig. 1-9 shows the front view of the ILS / VOR Analyzer R&S® EVS 300

1.5.2 Rear View

Fig. 1-10 shows the rack view of the ILS / VOR Analyzer R&S® EVS 300

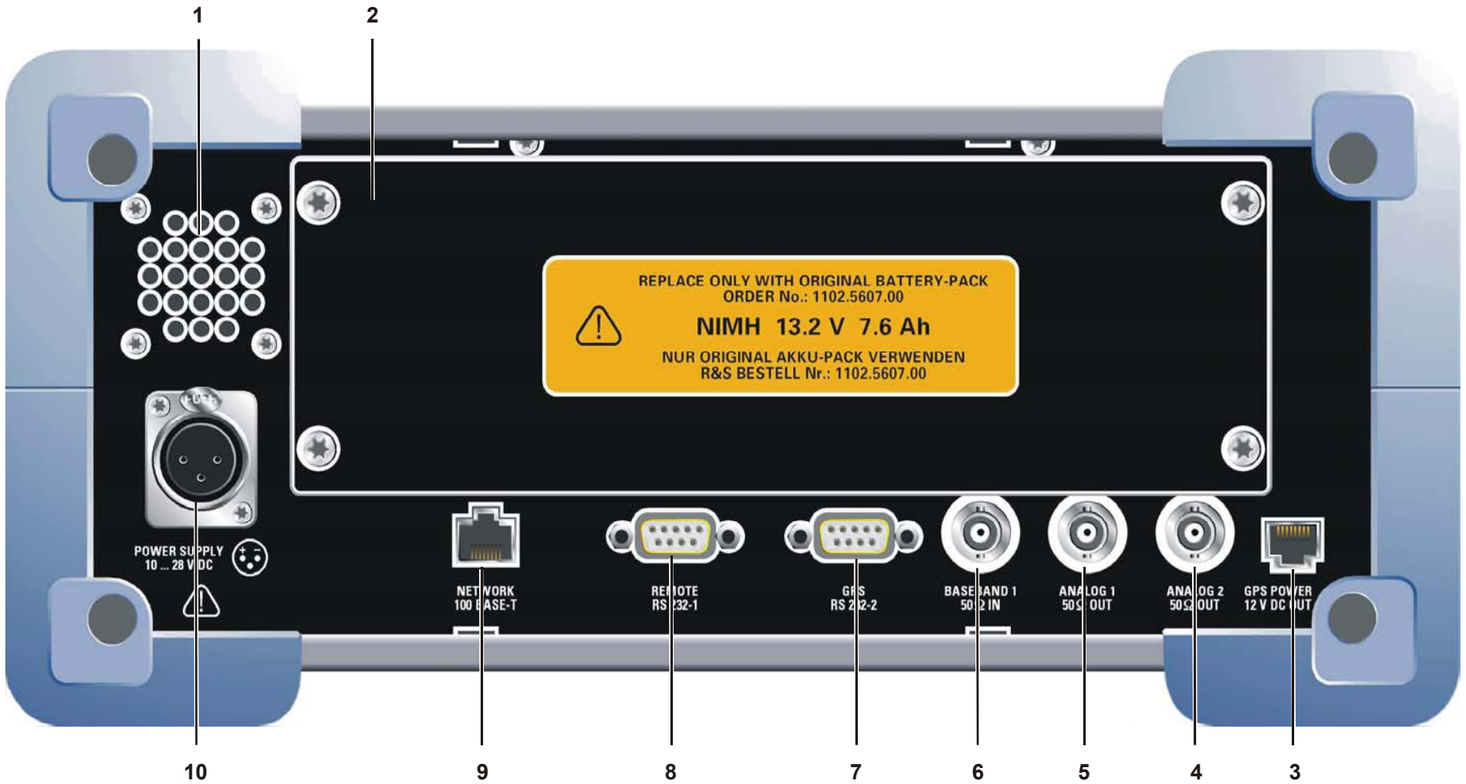


1	PRESET key
2	TFT Colour Display (640 x 480 Pixels)
3	Softkeys (Program-dependent function keys)
4	ILS Mode key (selection of ILS Mode)
5	BEACON Mode key (selection of BEACON Mode)
6	VOR Mode key (selection of VOR Mode)
7	GPS key (selection of GPS function, Option)
8	F SCAN Mode key (selection of F Scan Mode, Option)
9	FREQUENCY Editor key (frequency input)
10	START key (activates continuous saving of values)
11	Marker key (marker function)
12	STOP key (stops continuous saving of values)
13	SPLIT key (simultaneous display of both channels)
14	CH1 key (selection of reception channel 1)
15	CH2 key (selection of reception channel 2, optional)

16	GHz key (Frequency input in GHz)
17	MHz key (Frequency input in MHz)
18	Rollkey with ENTER function
19	kHz key (frequency input in kHz)
20	Hz key (frequency input in Hz)
21	Not set
22	Not set
23	Arrow (cursor) keys
24	Screenshot key (Stored image of a current display)
25	Not set
26	Channel 1 (Antenna input 1, N plug)
27	ANTENNA SUPPLY (DC output for active receiving antenna)
28	AF OUT (headphone output)
29	USB (USB 2x 1.1 ports)
30	BACK key (backspace key)

31	ENTER key (Confirmation key)
32	Channel 2 (Antenna input 2 (Option), N plug)
33	ESC key (Cancel input)
34	Numerical keypad (numerical input)
35	Softkey extension
36	POWER key (ON/OFF switch)
37	Operating display (Power "ON")
38	Charge control display
39	SETUP key (selection of SETUP Menu)
40	LOCAL key (Switch between Local/Remote)
41	MEM key (selection of Data log)
42	SAVE key (Saves the current measurement data)
43	VOL key (volume setting)
44	CAL key (Auto Calibration, with built-in CAL Generator)

Fig. 1-9 Front View of the ILS / VOR Analyzer R&S® EVS 300



1	Speaker
2	Battery pack (NIMH 13.2 V, 7.6 AH)
3	GPS POWER (12VDC OUT) (DC output for a GPS receiver)
4	ANALOG 2 (50 Ω OUT) analog XY recorder output/AF output channel 2 (selection through Setup)
5	ANALOG 1 (50 Ω OUT) analog XY recorder output/AF output channel 1 (selection through Setup)
6	BASEBAND 1 (50 Ω IN)
7	GPS (RS232-2 port) connection of a GPS receiver (not supplied)
8	REMOTE (RS232-1 port)
9	NETWORK (LAN connection)
10	POWER SUPPLY (10 … 28 VDC) power supply connection for table power pack/external feed

Fig. 1-10 Back View of the ILS / VOR Analyzer R&S® EVS 300

2 Preparation

2.1 Setting up the equipment

The **ILS / VOR Analyzer R&S® EVS 300** 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 **ILS / VOR Analyzer R&S® EVS 300**, 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)).

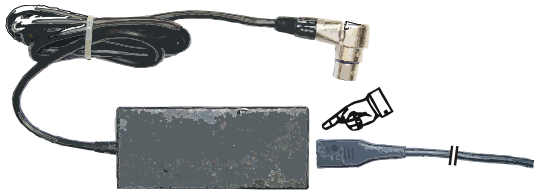
During commissioning, the device should be operated using the supplied table power pack (charging time will vary with the condition of the accumulator-pack, max. 4 hours), in order to charge the accumulator-pack completely!

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! It is vital to follow the following steps precisely!

The **ILS / VOR Analyzer R&S® EVS 300** 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.	

To disconnect the device from the table power pack, proceed in the opposite order from that followed during connection, i.e. firstly remove the XLR plug from 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 plug is supplied with the ILS / VOR Analyzer R&S® EVS 300. The setup of a DC supply is described in Section 2.1.1.4.

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

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

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

2.1.1.4 Setting up a DC connection

General

Cable specifications:

- PVC cable capacity as under VDE 0281, cross section **1.0 mm²** or larger
- Colour **RED** for +VDC
- Colour **BLUE** for Ground

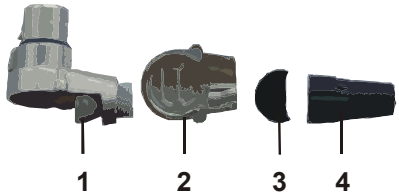
Connections in the XLR plug

- 1 PIN 1 + 12 VDC
- 2 PIN 2 - Ground
- 3 PIN 3 - nc.

Soldering side

Construction of the XLR plug (angled)

- XLR outer cover (1) with soldered plug and stress protector
- XLR cover (2) with screws
- Contact cover (3)
- XLR covering cap (4) with anti-kink protection

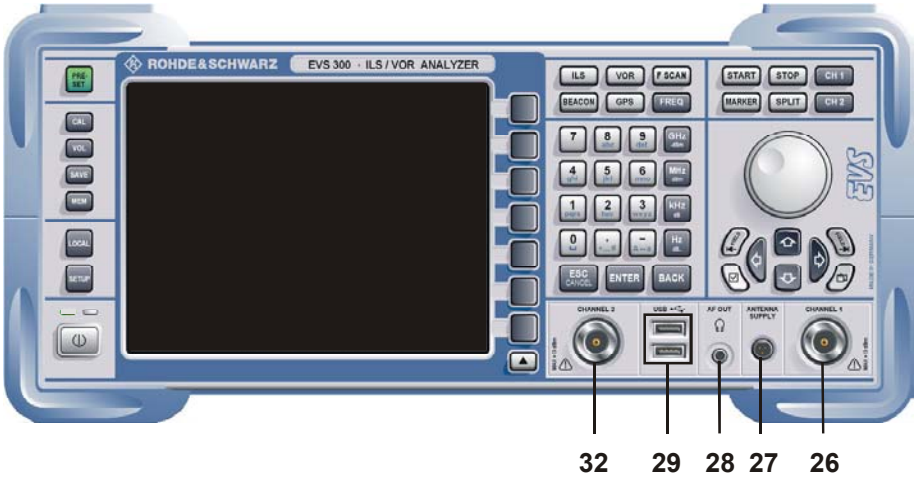


Setting up the XLR plug (angled)

1. Take the XLR plug apart.
2. Remove insulation and plating from the ends of the PVC wire cable, **approx. 5 mm**.
3. Pull the cable through the XLR covering cap (4) and the stress protector (1).

4. Solder the tin plated cable ends onto the soldered plug (1), according to the connection diagram.
5. Lock in the soldered plug (1) and screw on the XLR covering cap (4).
6. Push the contact cover (3) onto the soldered plug.
7. Put on the XLR outer cover.

2.1.2 Connection of the Signal/Control In/Output on the front of the device



2.1.2.1 Receiving Antenna connection (26, 32)

On the **RF-inputs (Channel 1 (26) and Channel 2 (32, optional)**, the **ILS / VOR Analyzer R&S® EVS 300** 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)

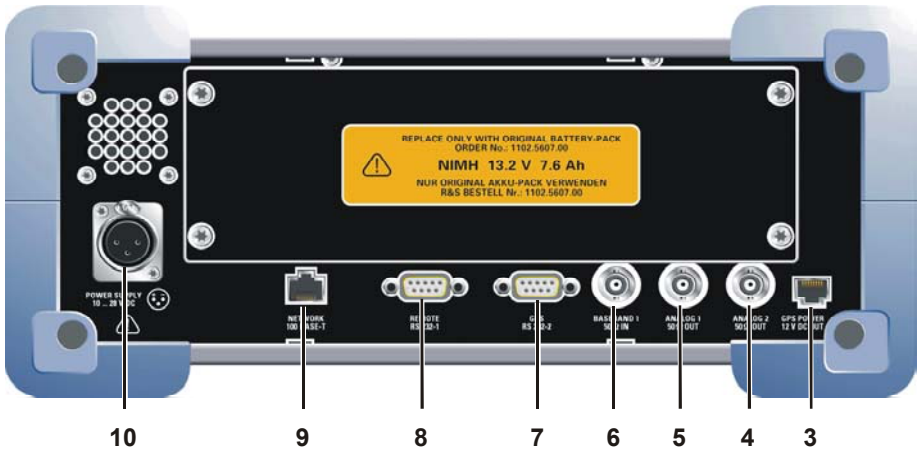
Connection of a headphone with a 3.5 mm jack plug into AF OUT plug (28).

2.1.2.4 USB Port connection (Twin Port, 29)

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

We 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 Power Supply connection (3) to a GPS Receiver

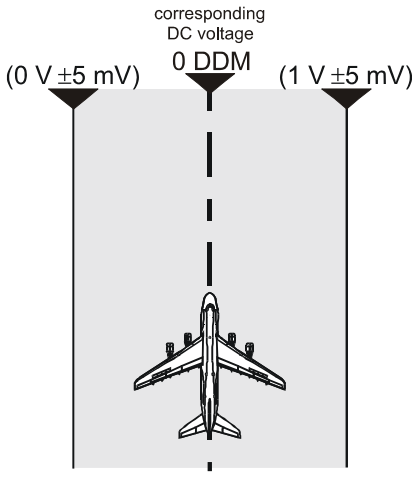
Through the GPS POWER connection (3), DC power (12 VDC, 300 mA) is fed to the power supply of a GPS receiver.

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

Through the analog signal outputs (BNC plug, 50 Ω) ANALOG 1 (5) and ANALOG 2 (4) analog XY signals and NF signals can be picked up. The selection of the signal source (XY signal/NF signal) is done 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



Scaling of the XY values (set Range 1 ... 4 in the Setup)

2.1.3.3 Base band input (6)

Through BASEBAND 1 (6) input (BNC plug, 50 Ω), a base band signal can be supplied to the **ILS / VOR Analyzer R&S® EVS 300** for further analysis of typical NF parameters (e.g. level, frequency, modulation degree).

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 **ILS / VOR Analyzer R&S® EVS 300** 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 **ILS / VOR Analyzer R&S® EVS 300** 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.

In order to feed in an external DC supply, the accompanying XLR plug must be set up as in Section 2.

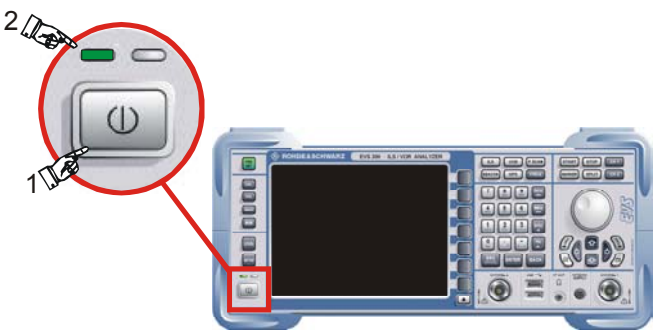
When connecting the equipment to an external DC power source, electrical protection must be provided through cable protection (3 AT) or on-board protection!

3 Operation

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

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

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

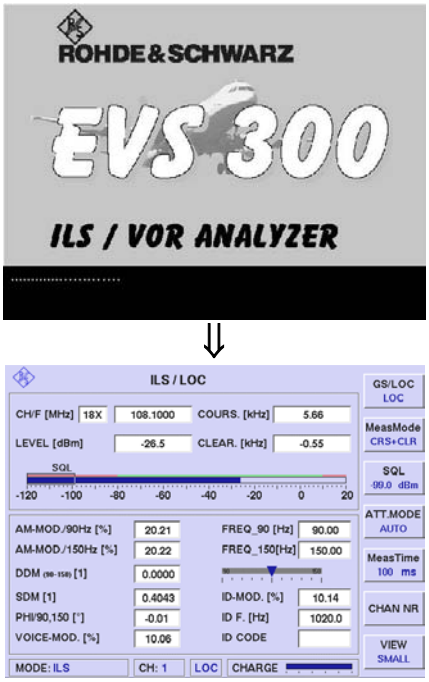


If the unit is driven by the belonging power supply or by an external DC-power supply >22 VDC, the installed accumulators will be charged as well when the unit is switched on as when it is switched off!

3.1.1 Starting process

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

The unit always switches over into that measurement mode, which was activated when switching off the unit.

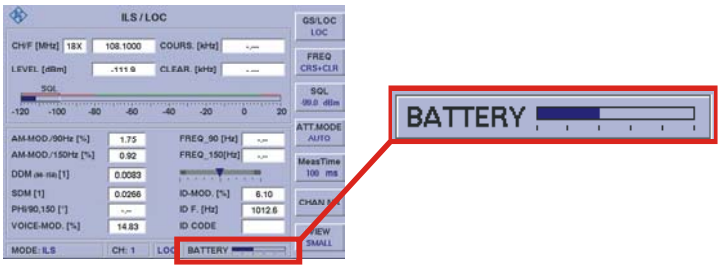


If a failure occurs when booting the unit, switch it off and make a restart after a few seconds. If a failure occurs again we recommend to contact Rohde & Schwarz.

3.1.2 Battery powered operation

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

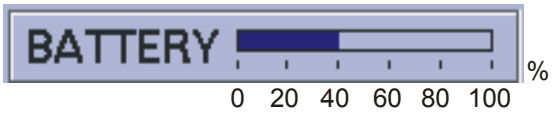
The operating time is about 8 … 10 h (medium display brightness) with a completely charged accumulator. For an anytime battery charge monitoring there is a battery capacity indication (BATTERY) on the status panel. This bargraph indicator has an indication step width of 20%-steps.



When running the ILS / VOR Analyzer R&S® EVS 300 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

A dead battery is indicated by the indication “EMPTY” accompanied by a loud beep 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

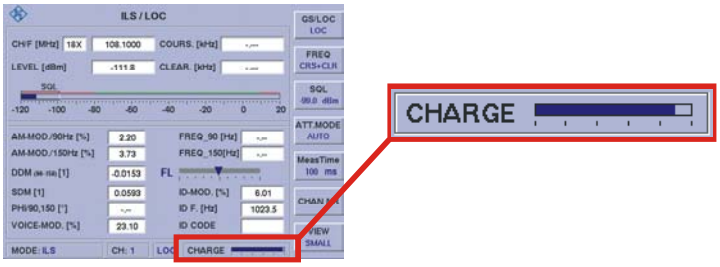
The **ILS / VOR Analyzer R&S® EVS 300** has an intelligent battery management system with quick charging, recharging and conserve charging methods. The charging circuit is protected by an overload protection and an overheating protection.

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 >22 VDC.

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

In operation the battery level display changes to the indication “CHARGE“.



As well as in the operation mode as in the switched off mode of the unit the charge control LED (yellow) lights and shows the charging process of the accumulator.

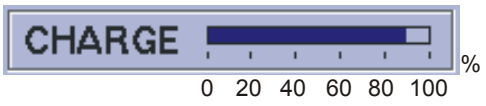
3.1.2.3 12/24-DC-Converter (Option)

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

If the 12/24-DC-Converter is used, the DC-Converter must first be connected to the DC supply before it is connected to the ILS / VOR Analyzer R&S® EVS 300. If the DC-Converter is no longer required, the XLR plug must firstly be disconnected from the ILS / VOR Analyzer R&S® EVS 300!

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

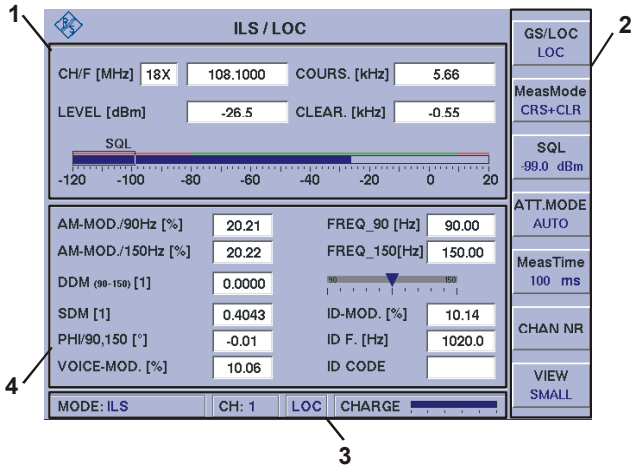
The **ILS / VOR Analyzer R&S® EVS 300** contains an internal clock. A Lithium battery supplies this clock with the necessary voltage when the unit is switched off. If the Lithium battery is empty (life-span is approximately 5 years), the time and date will be lost. To exchange the Lithium battery the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

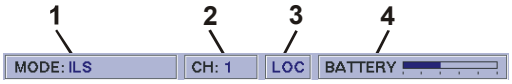
Generally for all modes ILS, VOR and Marker Beacon the display is divided as shown in the following figure:



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 / Measured Value
1	MODE	Shows the set measuring mode	e.g. “ILS“
2	CH:	Shows the measuring channel (1/2) (channel 2 = Option)	1/2
3	LOC/REM	LOC = local operation REM = remote operation	LOC/REM
4	BATTERY/CHARGE	Battery display / Battery level display	Bargraph

3.3 General information about the controls

Settings on the **ILS / VOR Analyzer EVS 300** 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. As well single character correction can be made with the “Back“ button.

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

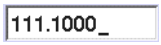
Example: Frequency modification

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	Change into the frequency input mode Das The frequency section is activated and behind the last digit the cursor appears. 111.1000_
2.	0 ... 9	Direct entry of the desired receiver 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.		Press the "FREQ" (9) button.	Change into the frequency input mode Das The frequency section is activated and behind the last digit the cursor appears. 
2.		Turn the rollkey until the right value is displayed.	**-** = value decreases **+** = value increases
3.		Confirm (Rollkey Push)	Change over to the new set frequency. 

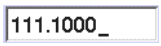
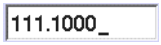
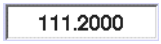
Example: Setup navigation

	Control	Operation	Function
1.		Press the “Setup“ (39) button.	Change into the Setup.
2.		Turn the rollkey slowly to the wanted direction until the right menu point is reached.	**-** = move ⇓ **+** = move ⇑
3.		Confirm (Rollkey Push)	Now changes can be concluded.
4.		Confirm (Rollkey Push)	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:

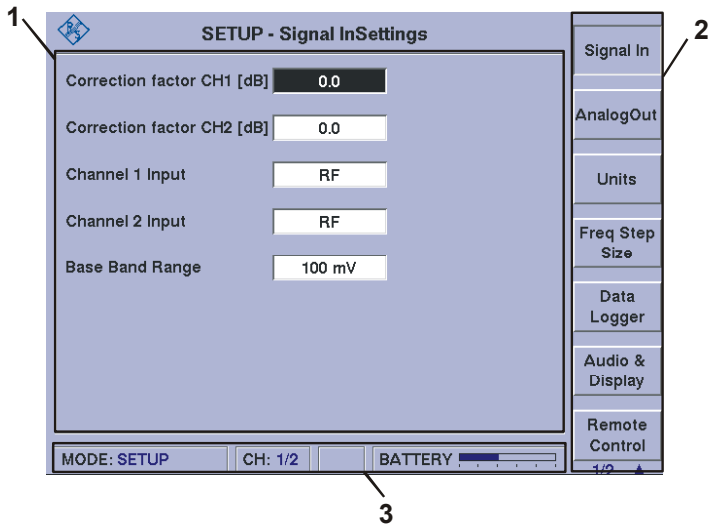
	Control	Operation	Function
1.		Press the "FREQ" (9) button.	Change into the frequency input mode Das The frequency section is activated and behind the last digit the cursor appears. 
2.		Hold the arrow button depressed until the wanted value is reached.	⇑ = value increases ⇓ = value decreases
3.		Hold the arrow button depressed until the wanted cursor position is reached and change the value with the buttons ⇑/⇓. 	⇐ = Cursor moves to the left ⇒ = Cursor moves to the right
		Press the Enter button / rollkey push.	Change over to the new set value. 

Example: Setup navigation

	Control	Operation	Function
1.		Press the “Setup“ (39) button.	Change into the Setup.
2.		Navigate with the arrow buttons until the right menu point is reached.	⇑ = Move up ⇓ = Move down ⇐ = Move to the left ⇒ = Move to the right
3.		Press the Enter button / rollkey push.	Now changes can be concluded.
4.		Press the Enter button / rollkey push.	Acceptance of the new changes.

3.4 Setup mode operation

3.4.1 General



The Setup consists of two windows.

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

Menu window 1

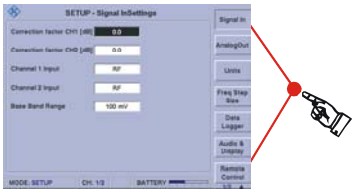
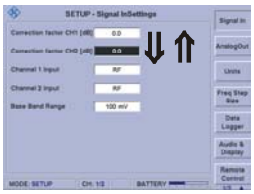
- Menu window; Signal In. (HF-Parameter setting),
- Menu window; AnalogOut (Analog parameter setting),
- Menu window; Units (Dimensions setting),
- Menu window; Freq Step Size (Frequency step width setting),
- Menu window; Data Logger (Data Logger setting),
- Menu window; Audio & Display (Display and audio setting),
- Menu window; Remote Control (LAN- and RS-232-interface setting).

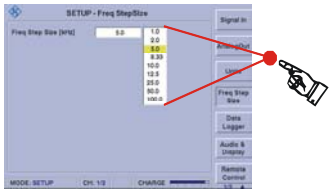
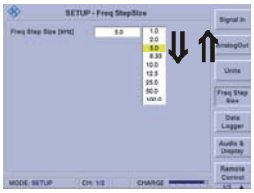
Menu window 2

- 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).

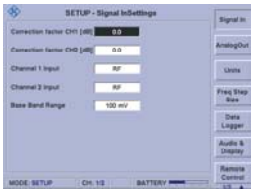
3.4.2 General operating steps in the setup mode

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.	Signal In ••• Remote Control	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. 
		Step 3. Selection window with toggle function!	
3.		Press the Enter button / rollkey Push several times (toggle function) until the right selection appears.	In this window mode the selected setting is immediately active.
		Step 4. Selection window with edit function!	
4.		Press the Enter button / rollkey push.	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 / rollkey push.	Acceptance of the new set value. The setting is immediately active.
		Step 7. Describes the selection-list!	

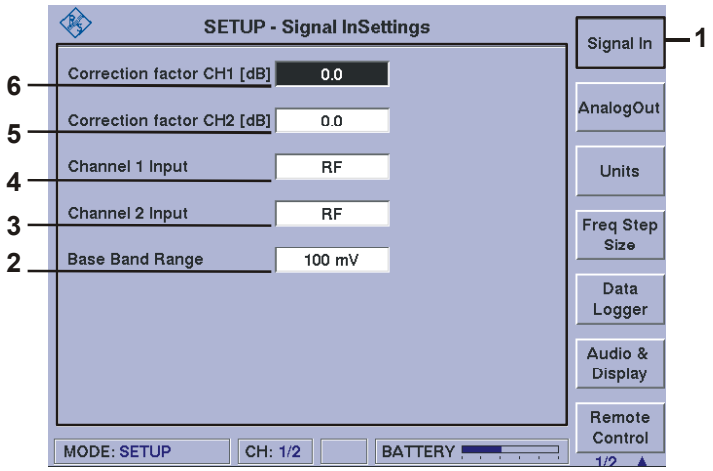
7.		Press the Enter button / rollkey push.	Activates the selection-list.  Example:
8.		Turn the rollkey several times until the required value appears.	
9.		Press the Enter button / rollkey push.	Acceptance of the new set value. The setting is immediately active.

3.4.3 Activates the setup menu

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

3.4.4 RF Parameter setting

	Control	Operation	Function
1.	Signal In	Press the softkey.	Change over into the SignalIn Settings menu window.



Item	Display	Function	Indication / Measured Value
2	Base Band Range	Setting (3*) the base band signal level setting value: 100 mV / 1 V	mV / V
3	Channel 2 Input	Changes (3*) between RF-input signal (CH2) or the base band-signal	RF / Base Band
4	Channel 1 Input	Changes (3*) between RF-input signal (CH1) or the base band-signal	RF / Base Band
5	Correction factor CH2 [dB]	Setting (2*) of the HF attenuation at the antenna input (CH2), setting value: –20 ... +20 dB	dB
6	Correction factor CH1 [dB]	Setting (2*) of the HF attenuation at the antenna input (CH1), setting value: –20 ... +20 dB	dB

2* edit function
3* selection-list

3.4.4.1 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) Setting value: –20 ... +20 dB
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.

3.4.4.2 Analyse selection on Channel 1 / Channel 2

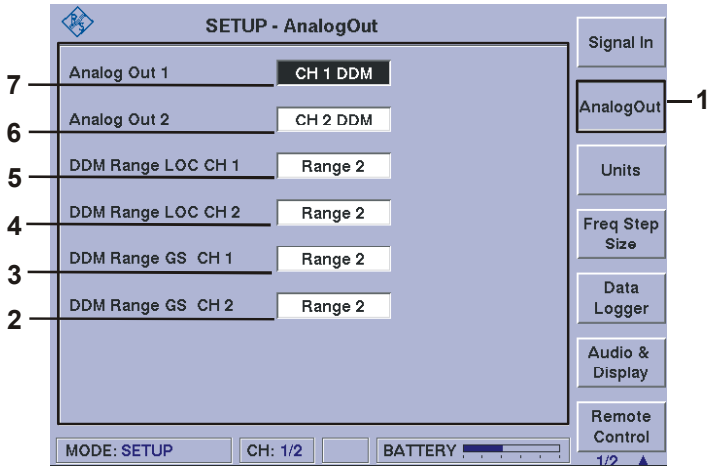
	Control	Operation	Function
1.	Go to the selection window “Channel 1/2 Input” and activate the edit function as described in section 3.4.2.		
2.		Turn the rollkey several times until the required function appears.	Change over either to the RF input signal or to the base band signal for further analyse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

3.4.4.3 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 base band signal which is provided for analyse in the range: Option: 100mV / 1 V
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.

3.4.5 Settings for Analogue Output 1 / 2

	Control	Operation	Function
1.	AnalogOut	Press the Softkey.	Change over into the AnalogOut menu window.



Item	Display	Function	Indication / Measured Value
2	DDM Range GS CH2	Scale (3*) of the XY values in Glideslope mode of the antenna input CH2	Range 1 … 4
3	DDM Range GS CH1	Scale (3*) of the XY values in Glideslope mode of the antenna input CH1	Range 1 … 4
4	DDM Range LOC CH2	Scale (3*) of the XY values in Localizer mode of the antenna input CH2	Range 1 … 4
5	DDM Range LOC CH1	Scale (3*) of the XY values in Localizer mode of the antenna input CH1	Range 1 … 4
6	Analog Out 2	Signal selection (3*) to the analog-output 2	CH1 DDM, CH2 DDM, CH4 Audio, CH2 Au4io
7	Analog Out 1	Signal selection (3*) to the analog-output 1	CH1 DDM, CH2 DDM, CH1 Audio, CH2 Audio

3* selection-list

3.4.5.1 Setting the Analogue Out 1 / 2

	Control	Operation	Function
1.	Go to the selection window “Analog Out 1/2” and activate the edit function 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. Option: CH1 DDM, CH2 DDM, CH1 Audio, CH2 Audio
3.		Press the Enter button / rollkey push.	Acceptance of the new set function.

3.4.5.2 Setting the DDM range LOC CH 1 / CH 2

	Control	Operation	Function
1.	Go to the selection window “DDM Range LOC CH 1/2” and activate the edit function 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. Option: Range 1 ... 4 (1*)
3.		Press the Enter button / rollkey push.	Acceptance of the new set function.

3.4.5.3 Setting the DDM range GS CH 1 / CH 2

	Control	Operation	Function
1.	Go to the selection window “DDM Range GS CH 1/2” and activate the edit function as 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. Option: Range 1 ... 4 (1*)

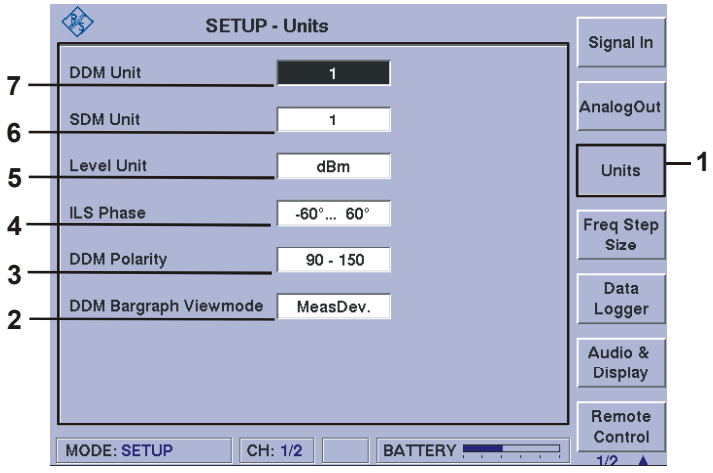
3.		Press the Enter button / rollkey push.	Acceptance of the new set function.

1*

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

3.4.6 Setting the Measuring Units

	Control	Operation	Function
1.	Units	Press the softkey.	Change over into the Units Menu window.



Item	Display	Function	Indication / Measured Value
2	DDM Bargraph View-mode	Setting (3*) for the ILS bargraph display: MeasDev. (bargraph von 90-150) Cockpit (bargraph at LOC FL-FR GS FD-FU)	MeasDev. Cockpit
3	DDM Polarity	Setting for the DDM polarity (3*)	90 – 150 / 150 - 90

4	ILS Phase	Setting for the ILS phase (3*)	-60 … 60° / 0 … 120°
6	Level Unit	Dimension setting (3*) for the level display reading	dBm/dBµV
7	SDM Unit	Dimension setting (3*) for the SDM display reading	µA , %, 1 (1 = dimensionless value)
8	DDM Unit	Dimension setting (3*) for the DDM display reading	µA , %, 1 (1 = dimensionless value)

3* selection-list

3.4.6.1 Setting the DDM Measuring Units

	Control	Operation	Function
1.	Go to the selection window “DDM Unit” and activate the edit function 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. Option: µA , %, 1 (1 = dimensionless value)
3.		Press the Enter button / rollkey push.	Acceptance of the new set dimension.

3.4.6.2 Setting the SDM Measuring Units

	Control	Operation	Function
1.	Go to the selection window “SDM Unit” and activate the edit function 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. Option: µA , %, 1 (1 = dimensionless value)
3.		Press the Enter button / rollkey push.	Acceptance of the new set dimension.

3.4.6.3 Setting the Level Measuring Units

	Control	Operation	Function
1.	Go to the selection window “Level Unit” and activate the edit function 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. Option: dBµV , dBm
3.		Press the Enter button / rollkey push.	Acceptance of the new set dimension.

3.4.6.4 Setting the values range of the ILS phase

	Control	Operation	Function
1.	Go to the selection window “ILS Phase” 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 values range to the ILS phase. Option: -60 … 60° / 0 … 120°
3.		Press the Enter button / rollkey push.	Acceptance of the new set values range.

3.4.6.5 Setting the DDM polarity

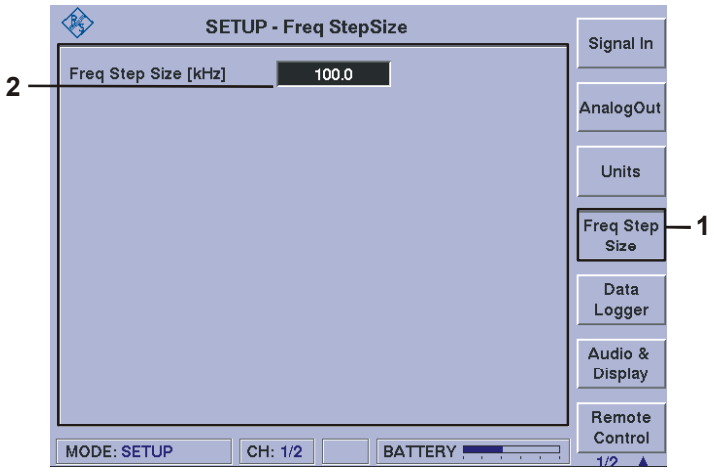
	Control	Operation	Function
1.	Go to the selection window “DDM Polarity” and activate the edit function as described in section 3.4.2.		
2.		Turn the rollkey several times until the required value appears.	Selection of the DDM polarity. Option: -90 - 150 / 150 - 90
3.		Press the Enter button / rollkey push.	Acceptance of the new set values range.

3.4.6.6 Setting the ILS bargraph display

	Control	Operation	Function
1.	Go to the selection window “DDM Bargraph View mode” and activate the edit function 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. Selection: MeasDev. (bargraph from 90-150) / Cockpit (bargraph at LOC><FL---FR at GS><FD---FU)
3.		Press the Enter button / rollkey push.	Acceptance of the new set mode.

3.4.7 F Step setting

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



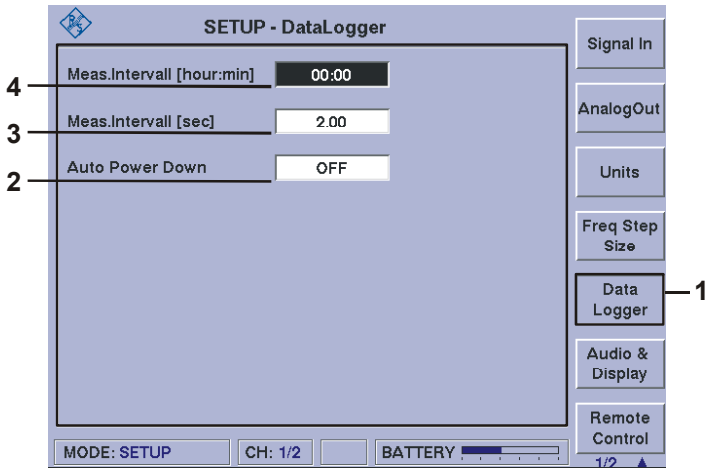
Item	Display	Function	Indication / Measured Value
2	Freq Step Size [kHz]	Setting of the frequency step width (3*)	1 ... 100 kHz

3* selection-list

	Control	Operation	Function
1.	Go to the selection window “Freq Step Size” 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 frequency step width in the range: Setting value: 1 ... 100 kHz
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.

3.4.8 Setting the Data Logger

	Control	Operation	Function
1.		Press the softkey.	Change over into the Data Logger Menu window.



Item	Display	Function	Indication / Measured Value
2	Auto Power Down	Activates the automatic ON/OFF function at a measuring interval	ON/OFF
3	Meas.Interv.[hh:mm]	Measuring interval time setting (2*) in hours and minutes Setting value: 0.1 ... 597.39 h	hh:mm
4	Meas.Interv.[sec]	Measuring interval time setting (2*) in seconds Setting value: 0.0 ... 59.0 s	s

2* edit function
3* selection-list

3.4.8.1 Setting the Measurement interval time

	Control	Operation	Function
1.	Go to the selection window “Meas Intervall [hour:min]“ and activate the edit function as described in section 3.4.2.		
2.		Turn the rollkey several times until the required value appears.	Measurement interval setting in hours and minutes (e.g. setting: 1 h = one measurement per hour). Setting value: 0.0 ... 597.39 h Depending of meas. interval (sec)
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.
1.	Go to the selection window “Meas Intervall [sec]“ and activate the edit function as described in section 3.4.2.		
2.		Turn the rollkey several times until the required value appears.	Measurement interval setting in seconds (e.g. setting: 1 s = one measurement per second). Setting value: 0.0 ... 59.0 s Depending of meas. interval (hh:mm)
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.

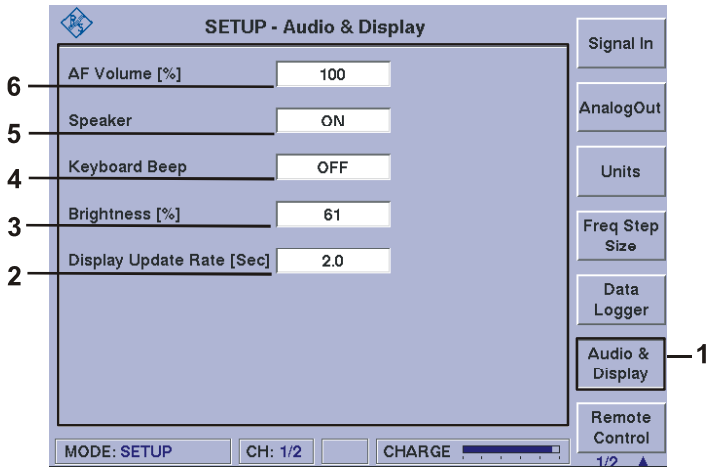
3.4.8.2 Activation the automatic on/off function at measuring interval

	Control	Operation	Function
1.	Go to the selection window “Auto Power Down“ and activate the edit function as described in section 3.4.2.		
2.		Turn the rollkey several times until the required function appears.	Activation of the automatic ON/OFF function at a preset measuring interval. Option: ON/OFF
		 ***To enable proper auto power down function, the interval set must be greater than 5 minutes!***	
3.		Press the Enter button / rollkey push.	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!

3.4.9 Setting the Audio- und Display characteristics

	Control	Operation	Function
1.	Audio & Display	Press the softkey.	Change over into the Audio & Display menu window.



Item	Display	Function	Indication
2	Display Update Rate [Sec]	Setting (2*) of the display update time	0.1 ... 2 s
3	Brightness [%]	Setting (2*) of the display brightness	0 … 100 %
4	Keyboard Beep	Switch ON/OFF (3*) the keyboard beeps	ON/OFF
5	Speaker	Switch ON/OFF (3*) the loudspeaker	ON/OFF
6	AF Volume [%]	Setting (2*) of the AF-output level (loudspeaker)	0 … 100 %

2* edit function
3* selection-list

3.4.9.1 Setting the AF Volume

	Control	Operation	Function
1.	Go to the selection window “AF Volume“ 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 AF Volume at the speaker. Setting value: 0 ... 100%
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.

3.4.9.2 Setting the Display brightness

	Control	Operation	Function
1.	Go to the selection window “Brightness“ 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 display brightness. Setting value: 0 ... 100%
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.

3.4.9.3 Setting the Display Update Rate

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

3.4.9.4 Setting the Keyboard Beep

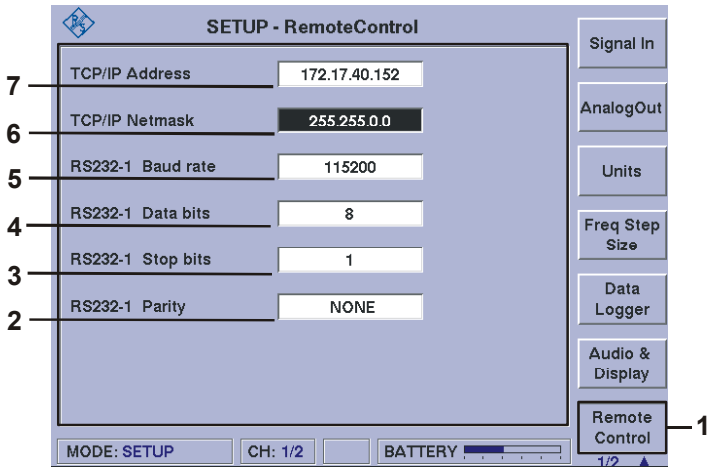
	Control	Operation	Function
1.	Go to the selection window “Keyboard Beep“as described in section 3.4.2.		
2.		Turn the rollkey several times until the required function appears.	ON/OFF sound of the keyboard (when pressing a button it will be confirmed with a beep sound). Option: ON/OFF
3.		Press the Enter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

3.4.9.5 Setting the Loudspeaker (ON/OFF)

	Control	Operation	Function
1.	Go to the selection window “Speaker“ as described in section 3.4.2.		
2.		Turn the rollkey several times until the required function appears.	ON/OFF sound of the loudspeaker. Option: ON/OFF
3.		Press the Enter button / rollkey push.	Acceptance of the new set function.

3.4.10 Setting the Communication interface

	Control	Operation	Function
1.	Remote Control	Press the softkey.	Change over into the Remote Control menu window.



Item	Display	Function	Indication / Measured Value
2	RS232-1 Parity	Setting (3*) for the Parity of the RS232-1-REMOTE-interface	NONE, ODD, EVEN, MARK, SPACE
3	RS232-1 Stop bits	Setting (3*) for the Stop bit of the RS232-1-REMOTE-interface	1, 1,5, 2
4	RS232-1 Data bits	Setting (3*) for the Data bit of the RS232-1-REMOTE-interface	5, 6, 7, 8
5	RS232-1 Baud rate	Setting (3*) the Baud rate of the RS232-1-REMOTE-interface	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400
6	TCP/IP Netmask	Setting (2*) of the Netmask-ID	xxx.xx.xx.xxx
7	TCP/IP Address	Setting (2*) of the unit's IP-address	xxx.xxx.xxx.x

2* edit function
3* selection-list

3.4.10.1 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 / rollkey push.	Acceptance of the new set IP address.

3.4.10.2 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 to run the unit in a LAN-network. e.g. 255.255.255.0
3.		Press the Enter button / rollkey push.	Acceptance of the new set Netmask ID.

3.4.10.3 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.		Turn the rollkey several times until the required value appears.	Setting the Baud rate of the RS232-1-REMOTE-interface Setting value: 1200 ... 230400 baud
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.

3.4.10.4 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.		Turn the rollkey several times until the required value appears.	Setting the Data bit of the RS232-1-REMOTE-interface. Setting value: 5, 6, 7, 8
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.

3.4.10.5 Setting the Stop bit of the remote interface

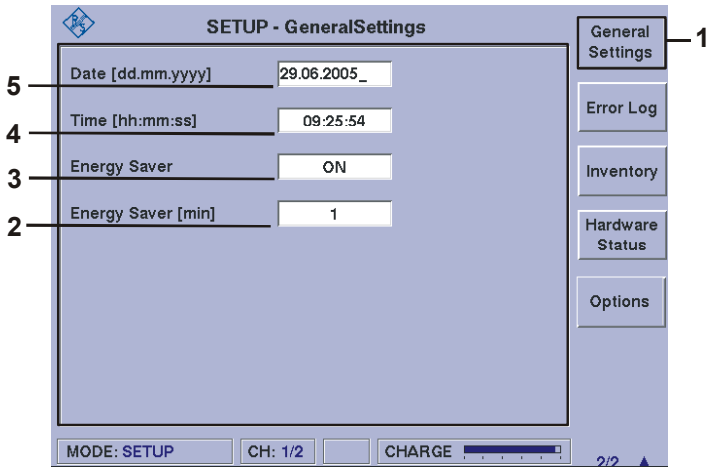
	Control	Operation	Function
1.	Go to the selection window “RS232-1 Stop bits“ as described in section 3.4.2.		
2.		Turn the rollkey several times until the required value appears.	Setting the Stop bit of the RS232-1-REMOTE-interface. Setting value: 1, 1,5, 2
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.

3.4.10.6 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.		Turn the rollkey several times until the required value appears.	Setting the Parity property of the RS232-1-REMOTE-interface Setting value: NONE, ODD, EVEN, MARK, Space
3.		Press the Enter button / rollkey push.	Acceptance of the new set value.

3.4.11 Setting the General features

	Control	Operation	Function
1.	General Settings	Press the softkey.	Change over into the General Settings Menu window.



Item	Display	Function	Indication / Measured Value
2	Energy Saver [min]	Setting (2*) of the energy saver function	1 ... 60 min
3	Energy Saver	Switch ON/OFF (3*) the energy saver function	ON/OFF
4	Time	Time setting (2*)	hh.mm.ss
5	Date	Date setting (2*)	tt.mm.jjjj

2* edit function
3* selection-list

3.4.11.1 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.	0 ... 9	Enter the date.	Date input in tt.mm.jjjj. e.g. 01.01.2005
3.	ENTER	Press the Enter button / rollkey push.	Acceptance of the new set date.

3.4.11.2 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.	Time input in hh.mm.ss. e.g. 08.59.00
3.		Press the Enter button / rollkey push.	Acceptance of the new set time.

3.4.11.3 Energy Saver setting

	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. By pressing a button or turning the rollkey, the display will be activated. The recording of the measured values continues. Option: ON/OFF
3.		Press the Enter button / rollkey push.	Acceptance of the new set function.

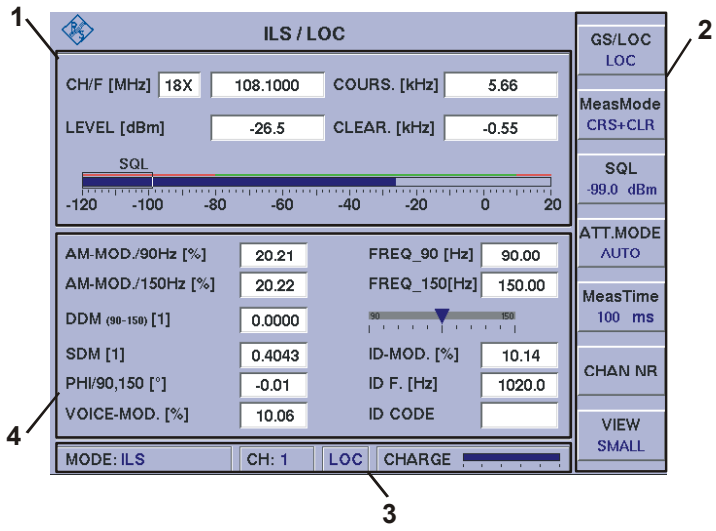
 ***The energy saver setting can be switched off by pressing a button or by turning the rollkey!***

3.4.11.4 Setting the timer for the Energy Saver function

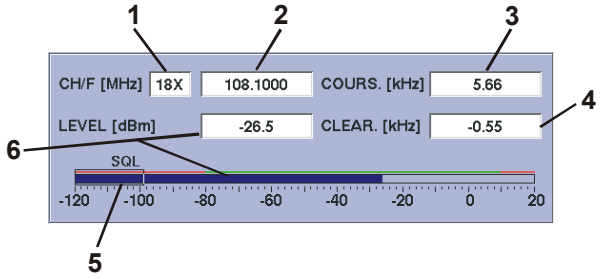
	Control	Operation	Function
1.	Go to the selection window “Energy Saver [min]“ and activate the edit function as described in section 3.4.2.		
2.		Turn the rollkey several times until the required value appears.	Timer setting for the Energy Saver function. Setting value: 1 ... 60 min
3.		Press the Enter button / rollkey push.	Acceptance of the new set time value.

3.5 ILS mode operation

3.5.1 Signal Parameters and Display in the ILS mode

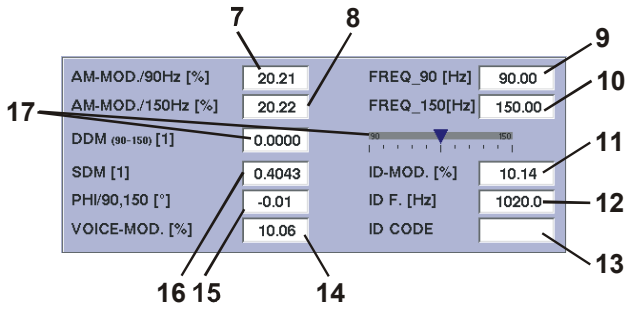


3.5.1.1 RF Parameter Section (1)



Item	Display	Function	Measured Value
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	COURSE. [kHz]	Reading of the measured course-frequency (relative to the settable channel frequency)	kHz
4	CLEAR. [kHz]	Reading of the measured clearance-frequency (relative to the measured channel frequency)	kHz
5	SQL	Graphic display (bargraph) of the set squelch threshold)	dBm, dBµV
6	LEVEL [dBm]	Measured reception level (numerical / bargraph) in dBm/dBµV with antenna correction factor settable in the setup.	dBm, dBµV

3.5.1.2 Measured Values Section (4)



Item	Display	Function	Indication / Measured Value
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
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, identifier notched)	%
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]	Differential modulation factor as the unit 1(absolute), µA or percent (Setup selection)	µA , %, 1 (1 = dimensionless value)
	Bargraph	Graphic display of the DDM-value flashing on FR (deviation right) or FL (deviation left) at LOC, and FU (deviation top) or FD (deviation down) by GS in the cockpit display, or in the 90/150 Meas Device display.The respective view is settable in the setup.	

* Measurement accuracies are given in the Technical Data!

3.5.1.3 Softkeys (2)

Display	Function
GS/LOC LOC	Switch over (1*) from Glideslope-/Localizer mode, set mode is shown in the softkey
FREQ CRS+CLR	Switch over (1*) the Course / Clearance frequency measuring, set measuring method is shown in the softkey: - CRS (Course frequency) - CLR (Clearance frequency) - CRS+CLR (Course + Clearance frequency) - CRS|CLR (separate Course + Clearance displays (option)) - Single (single frequency measuring)
SQL -99.0 dBm	Activates the edit function (2*) for the squelch threshold (SQL value is shown in the softkey)
ATT.MODE AUTO	Switch over (1*) of the HF-attenuation, set range is shown in the soft-key: - Low-N. (Low Noise, +10 dB) - Norm (Normal, 0dB) - Low-D. (Low Distortion, -25dB) - Auto
	The Setting of the RF-Signal Matching to described in section 3.10!
MeasTime 100 ms	Activates the measurement time (2*) Setting value: 10 … 2000 ms (10 ms step width)
CHAN NR	Activates the edit function (2*) for the channel input
VIEW SMALL	Switch over (1*) between normal and zoom views, set mode is shown in the softkey: - SMALL (normal view) - LARGE (zoom view)

1* toggle function
2* edit function

3.5.2 Activate the ILS mode

	Control	Operation	Function
1.	ILS	Press the "ILS" (4) button.	The R&S® EVS 300 switches over into the ILS mode. 

3.5.3 Setting the receiver frequency in the ILS mode

ILS-Localizer: 108 … 118 MHz
ILS-Glideslope: 320 … 340 MHz.

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	Behind the last digit the cursor appears. 111.1000_
2.		Direct entry of the desired receiver frequency or turn the rollkey several times until the required frequency appears.	The frequency should be entered with the corresponding decimal place. 111.2000
3.		Confirm with the correct dimension or Press the Enter button / rollkey push.	Acceptance of the new set frequency. 111.2000

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:

ILS-Localizer: 108 ... 118 MHz
ILS-Glideslope: 320 ... 340 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 (1 ... 100 kHz) is settable in the setup (F-Step) when using the rollkey or the cursor buttons.

3.5.4 Setting the receiver channel in the ILS mode

	Control	Operation	Function
1.		Press the softkey.	Switching over into the edit function for channel input. The channel section is activated and behind the last digit the cursor appears. 
2.		Direct entry of the channel no. or turn the rollkey several times until the required channel no. appears.	Only digits entry (see also ILS-frequency/channel list).
3.		Press the Enter button / rollkey push.	Acceptance of the new set channel no. 

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!

3.5.4.1 ILS-Channel Frequency List

ICAO	Localizer mode	Glideslope mode
Channel	Frequency (MHz)	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

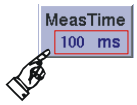
3.5.5 Selection the Localizer / Glideslope mode

	Control	Operation	Function
1.		Press the softkey (1*).	Switching over between Glideslope and Localizer mode, the actual mode is shown on the softkey  Option: GS, LOC

1* toggle function

3.5.6 Setting the measurement interval time in the ILS mode

The preset measuring interval stipulates the intervals at which measurement values will be recorded, enabling an average value to be calculated. The ILS mode can read in 114 measurement values/s, the equivalent of 9-ms/measurement value.

	Control	Operation	Function
1.		Press the softkey.	Switching over into the edit function to set the measurement time. The softkey value section is active. 
2.		Turn the rollkey several times until the required measure-ment time appears.	The actual measurement time will be carried along numerically on the softkey. Setting value: 10 … 2000 ms (10 ms step width)
3.		Press the Enter button / rollkey push.	Acceptance of the actually set measure-ment time. 

3.5.7 Switch over the display view in the ILS mode

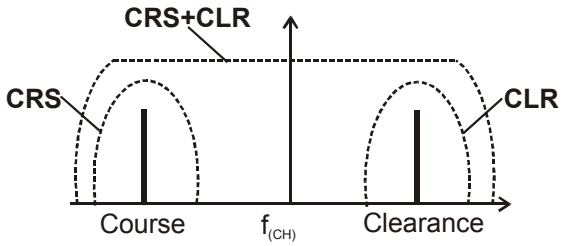
This function enables the display to be switched between normal and zoom views. In the zoom view, the most important parameters of a mode are displayed extra large, enabling them to be read from a large distance.

	Control	Operation	Function
1.		Press the softkey (1*).	Switch over (1*) between normal and zoom views, set mode is shown in the softkey. - SMALL (normal view) - LARGE (zoom view)

1* toggle function

3.5.8 Course- und Clearance frequency measuring

Course and clearance frequency measuring calculates the corresponding frequency (relative to the channel frequency being measured). All other parameters are always measured with reference to the channel frequency being measured. The CRS + CLR analysis measures over a broad band of frequencies, whereas the respective individual course and clearance measurements are narrow band.



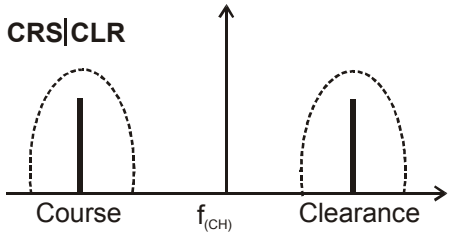
	Control	Operation	Function
1.		Press the softkey (1*).	The set measuring method of the Course / Clearance frequency measuring will be updated in the softkey and is then immediately active.  The following modes are available: - CRS (only Course frequency) - CLR (only Clearance frequency) - CRS+CLR (Course + Clearance-frequency) - CRS|CLR (separate Course + Clearance displays, Option) - Single (single frequency measuring)

1* toggle function

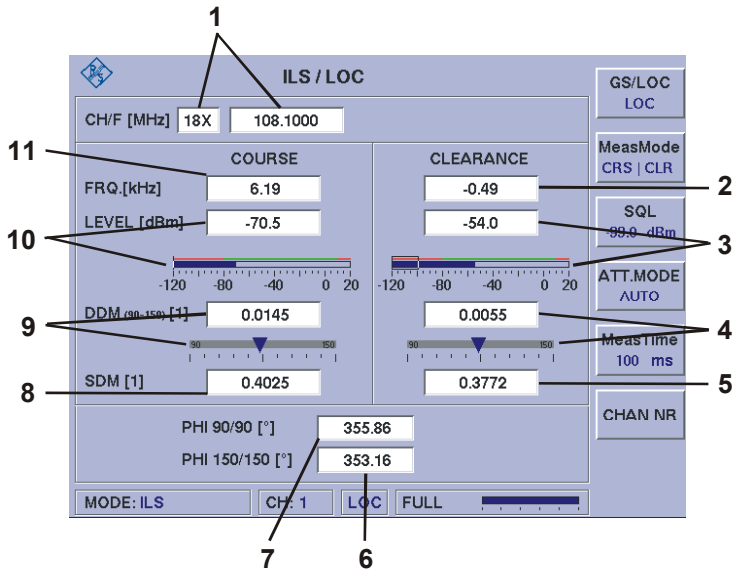
3.5.8.1 Separate Course- und Clearance frequency measuring (Option)

In the CRS|CLR function (separate course + clearance displays (Option)) the course and clearance signal are subjected to highly differentiated analysis at the same time. During this process, the following course and clearance parameters are displayed:
Frequency
Level
DDM value
SDM value
PHI 150/150
PHI 90/90

Analysis is carried out via a narrow frequency band of the course and clearance signal.



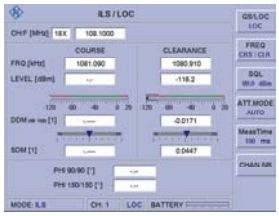
3.5.8.1.1 Signal Parameters and Display in the CRS|CLR window (Option)



Item	Display	Function	Indication / Measured Value
1	CH/F [MHz]	Reading and setting of the receive frequency (receive frequency setting by channel setting according to ICAO-frequency list)	38X MHz

2	FRQ. [kHz]	Reading of the measured clearance frequency (relative to the measured channel frequency)	kHz
3	LEVEL [dBm]	Measured reception level of the clearance signal (numerical / bargraph) in dBm/dBµV	dBm/dBµV
4	DDM (90-150) [1]	Differential modulation factor of the clearance signal as the unit 1(absolute), µA or percent (Setup selection)	µA , %, 1 (1 = dimensionless value)
	Bargraph	Graphic display of the DDM-value flashing on FR (deviation right) or FL (deviation left) at LOC, and FU (deviation top) or FD (deviation down) by GS in the cockpit display, or in the 90/150 Meas Device display.The respective view is settable in the setup.	
5	SDM [1]	Sum modulation factor of the clearance signal as the unit 1(absolute), µA or percent (Setup selection)	µA , %, 1 (1 = dimensionless value)
6	PHI 90/90 [°]	Phase between both 90-Hz signals (of the measured course- and clearance signals)	[°] degree
7	PHI 150/150 [°]	Phase between both 150-Hz signals (of the measured course- and clearance signals)	[°] degree
8	SDM [1]	Modulation factor of the Identifier (of the measured clearance signal)	µA , %, 1 (1 = dimensionless value)
9	DDM (90-150) [1]	Differential modulation factor of the course signal as the unit 1(absolute), µA or percent (Setup selection)	µA , %, 1 (1 = dimensionless value)
	Bargraph	Graphic display of the DDM-value flashing on FR (deviation right) or FL (deviation left) at LOC, and FU (deviation top) or FD (deviation down) by GS in the cockpit display, or in the 90/150 Meas Device display. The respective view is settable in the setup.	
10	LEVEL [dBm]	Measured reception level of the course signal (numerical / bargraph) in dBm/dBµV	dBm/dBµV
11	FRQ. [kHz]	Reading of the measured course frequency (relative to the measured channel frequency)	kHz

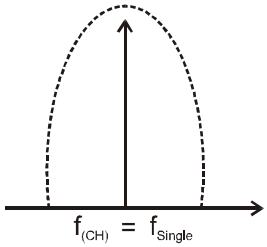
* Measurement accuracies are given in the Technical Data!

	Control	Operation	Function
1.		Press the softkey (1*).	The display changes to the CRS|CLR setting. Frequency and channel changes can be made in the same way as in normal view. 

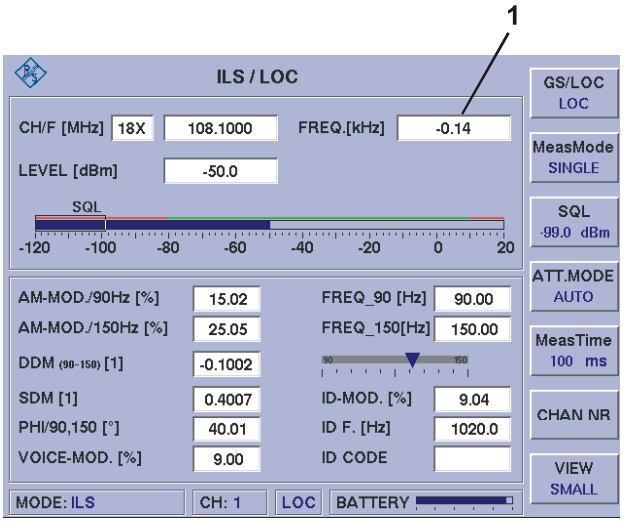
1* toggle function

3.5.8.2 Single frequency measuring

In the single frequency measuring setting, a narrow band measurement is made of the channel frequency of a single frequency system. The deviation to the set channel frequency is displayed in kHz.

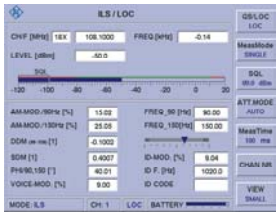


3.5.8.2.1 Signal Parameters and Display of the single frequency measuring



Item	Display	Function	Indication / Measured Value
1	FREQ. [kHz]	Measured deviation to the settable channel frequency	kHz

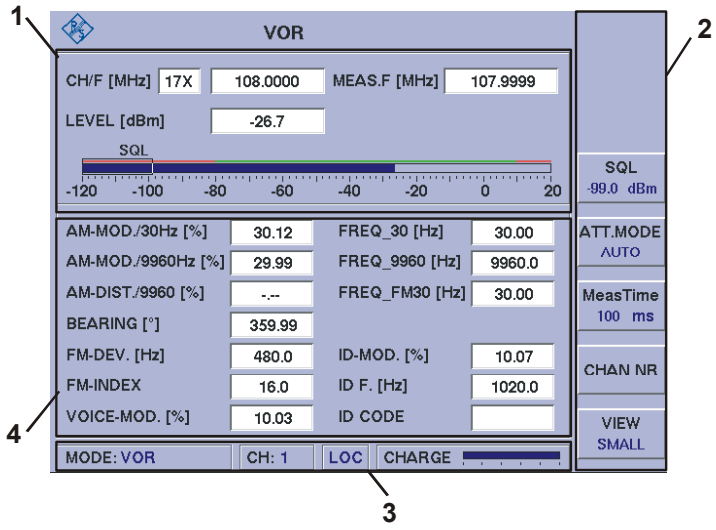
The other parameters correspond to the ILS mode!

	Control	Operation	Function
1.	FREQ CRS+CLR	Press the softkey (1*).	The display changes to the Single frequency measuring. 

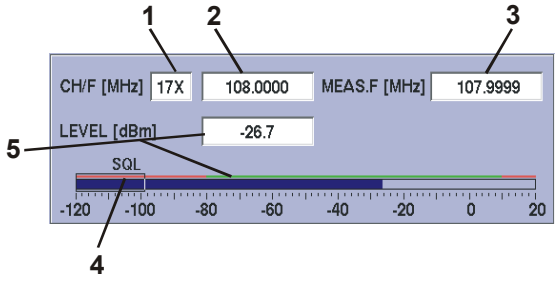
1* toggle function

3.6 VOR mode operation

3.6.1.1 Signal Parameters and Display in the VOR mode

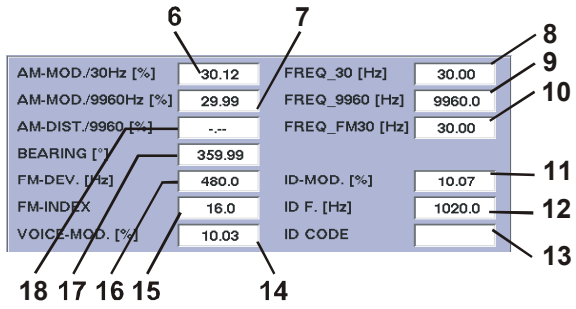


3.6.1.2 RF Parameter Section (1)



Item	Display	Function	Indication / Measured Value
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 set squelch threshold)	dBm, dBµV
5	LEVEL [dBm]	Measured reception level (numerical / bargraph) in dBm/dBµV with antenna correction factor settable in the setup.	DBm, dBµV

3.6.1.3 Measured Values Section (4)



Item	Display	Function	Indication / Measured Value
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
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 [°]	Phase between both 30-Hz signals	[°] Degree
18	AM-DIST./ 9960 [%]	AM-distortion at the 9960 Hz frequency	%

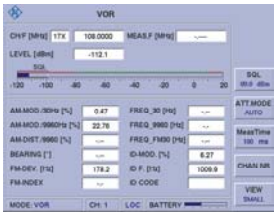
* Measurement accuracies are given in the Technical Data!

3.6.1.4 Softkey (2)

Display	Function
SQL -99.0 dBm	Activates the edit function (2*) for the squelch threshold (SQL value is shown in the softkey)
ATT.MODE AUTO	Switch over (1*) of the HF-attenuation, set range is shown in the softkey: - Low-N. (Low Noise, +10 dB) - Norm (Normal, 0dB) - Low-D. (Low Distortion, -25dB) - Auto
	The Setting of the RF-Signal Matching to described in section 3.10!
MeasTime 100 ms	Activates the measurement time (2*) Setting value: 10 … 2000 ms (10 ms step width)
CHAN NR	Activates the edit function (2*) for the channel input
VIEW SMALL	Switch over (1*) between normal and zoom views, set mode is shown in the softkey: - SMALL (normal view) - LARGE (zoom view)

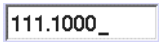
1* toggle function
2* edit function

3.6.2 Activate the VOR mode

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

3.6.3 Setting the receiver frequency in the VOR mode

VOR: 108 ... 118 MHz

	Control		Function
1.		Press the "FREQ" (9) button.	Behind the last digit the cursor appears. 
2.		Direct entry of the desired receiver frequency or turn the rollkey several times until the required frequency appears.	The frequency should be entered with the corresponding decimal place. 
3.		Confirm with the correct dimension or Press the Enter button / rollkey push.	Acceptance of the new set frequency. 

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.***

1) ***The frequency step width (1 ... 100 kHz) is settable in the setup (F-Step) when using the rollkey or the cursor buttons.***

3.6.4 Setting the receiver channel in the VOR mode

	Control	Operation	Function
1.		Press the softkey.	Switching over into the edit function for channel input. The channel section is activated and behind the last digit the cursor appears. 
2.		Direct entry of the channel no. or turn the rollkey several times until the required channel no. appears.	Only digits entry (see also ILS-frequency/channel list).
3.		Press the Enter button / rollkey push.	Acceptance of the new set channel no. 

NOTES

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

VOR: 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!

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

3.6.4.1 VOR-Channel Frequency List

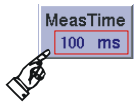
Channel (ICAO)	Frequency (MHz)
17X	108.00
17Y	108.05
19X	108.20
19Y	108.25
21X	108.40
21Y	108.45
23X	108.60
23Y	108.65
25X	108.80
25Y	108.85
27X	109.00
27Y	109.05
29X	109.20
29Y	109.25
31X	109.40
31Y	109.45
33X	109.60
33Y	109.65
35X	109.80
35Y	109.85
37X	110.00
37Y	110.05
39X	110.20
39Y	110.25
41X	110.40
41Y	110.45
43X	110.60
43Y	110.65
45X	110.80
45Y	110.85
47X	111.00
47Y	111.05
49X	111.20
49Y	111.25
51X	111.40
51Y	111.45
53X	111.60
53Y	111.65
55X	111.80
55Y	111.85
57X	112.00
57Y	112.05
58X	112.10
58Y	112.15
59X	112.20
59Y	112.25
70X	112.30
70Y	112.35
71X	112.40
71Y	112.45
72X	112.50
72Y	112.55
73X	112.60
73Y	112.65
74X	112.70

Channel (ICAO)	Frequency (MHz)
74Y	112.75
75X	112.80
75Y	112.85
76X	112.90
76Y	112.95
77X	113.00
77Y	113.05
78X	113.10
78Y	113.15
79X	113.20
79Y	113.25
80X	113.30
80Y	113.35
81X	113.40
81Y	113.45
82X	113.50
82Y	113.55
83X	113.60
83Y	113.65
84X	113.70
84Y	113.75
85X	113.80
85Y	113.85
86X	113.90
86Y	113.95
87X	114.00
87Y	114.05
88X	114.10
88Y	114.15
89X	114.20
89Y	114.25
90X	114.30
90Y	114.35
91X	114.40
91Y	114.45
92X	114.50
92Y	114.55
93X	114.60
93Y	114.65
94X	114.70
94Y	114.75
95X	114.80
95Y	114.85
96X	114.90
96Y	114.95
97X	115.00
97Y	115.05
98X	115.10
98Y	115.15
99X	115.20
99Y	115.25
100X	115.30
100Y	115.35
101X	115.40
101Y	115.45

Channel (ICAO)	Frequency (MHz)
102X	115.50
102Y	115.55
103X	115.60
103Y	115.65
104X	115.70
104Y	115.75
105X	115.80
105Y	115.85
106X	115.90
106Y	115.95
107X	116.00
107Y	116.05
108X	116.10
108Y	116.15
109X	116.20
109Y	116.25
110X	116.30
110Y	116.35
111X	116.40
111Y	116.45
112X	116.50
112Y	116.55
113X	116.60
113Y	116.65
114X	116.70
114Y	116.75
115X	116.80
115Y	116.85
116X	116.90
116Y	116.95
117X	117.00
117Y	117.05
118X	117.10
118Y	117.15
119X	117.20
119Y	117.25
120X	117.30
120Y	117.35
121X	117.40
121Y	117.45
122X	117.50
122Y	117.55
123X	117.60
123Y	117.65
124X	117.70
124Y	117.75
125X	117.80
125Y	117.85
126X	117.90
126Y	117.95

3.6.5 Setting the measurement interval time in the VOR mode

The preset measuring interval stipulates the intervals at which measurement values will be recorded, enabling an average value to be calculated. The ILS mode can read in 36 measurement values/s, the equivalent of 27-ms/measurement value.

	Control	Operation	Function
1.		Press the softkey.	Switching over into the edit function to set the measurement time. The softkey value section is active. 
2.		Turn the rollkey several times until the required measure-ment time appears.	The actual measurement time will be carried along numerically on the softkey. Setting value: 10 … 2000 ms (10 ms step width)
3.		Press the Enter button / rollkey push.	Acceptance of the actually set measure-ment time. 

3.6.6 Switch over the display view in the VOR mode

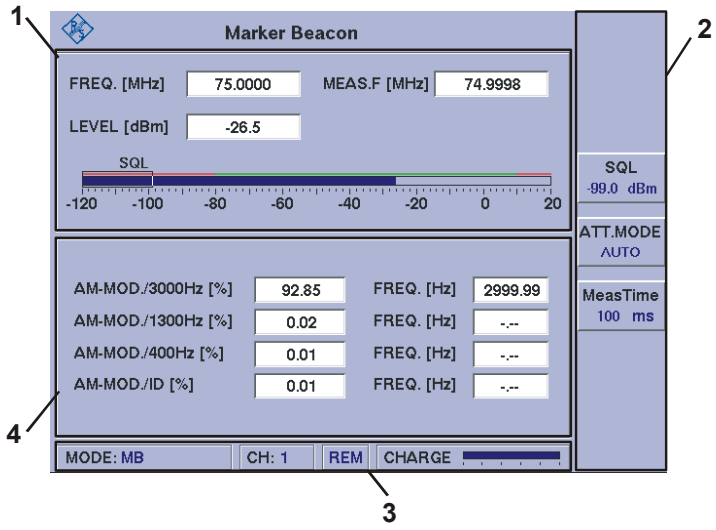
This function enables the display to be switched between normal and zoom views. In the zoom view, the most important parameters of a mode are displayed extra large, enabling them to be read from a large distance.

	Control	Operation	Function
1.		Press the softkey (1*).	Switch over (1*) between normal and zoom views, set mode is shown in the softkey - SMALL (normal view) - LARGE (zoom view)

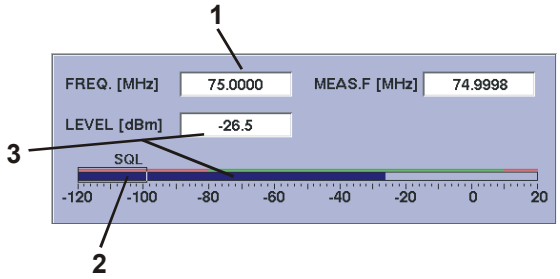
1* toggle function

3.7 MARKER BEACON mode operation

3.7.1 Signal Parameters and Display in the Marker Beacon mode

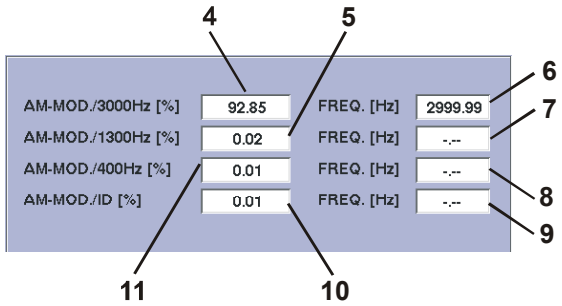


3.7.1.1 RF Parameter Section (1)



Item	Display	Function	Indication / Measured Value
1	FREQ. [MHz]	Reading and setting of the receive frequency	MHz
2	SQL	Graphical display (bargraph) of the set squelch threshold	dBm, dBµV
3	LEVEL [dBm]	Measured receive level (numerical / bargraph) in dBm/dBµV with the settable antenna correction factor (setup).	dBm, dBµV

3.7.1.2 Measured Values Section (4)



Item	Display	Function	Measured Value
4	AM-MOD./ 3000 Hz [%]	AM-modulation factor of the 3000-Hz markers	%
5	AM-MOD./ 1300 Hz [%]	AM-modulation factor of the 1300-Hz markers	%
6	FREQ. [Hz]	measured 3000-Hz marker frequency	Hz
7	FREQ. [Hz]	measured e 1300-Hz marker frequency	Hz
8	FREQ. [Hz]	measured 400-Hz marker frequency	Hz
9	FREQ. [Hz]	measured identifier frequency	Hz
10	AM-MOD./ ID [%]	AM-modulation factor of the identifier (1020 Hz)	%
11	AM-MOD./ 400 Hz [%]	AM- modulation factor of the 400-Hz marker	%

* Measurement accuracies are given in the Technical Data!

3.7.1.3 Softkeys (3)

Display	Function
SQL -99.0 dBm	Activates the edit function (2*) for the squelch threshold (SQL value is shown in the softkey)
ATT.MODE AUTO	Switch over (1*) of the HF-attenuation, set range is shown in the soft-key: - Low-N. (Low Noise, +10 dB) - Norm (Normal, 0dB) - Low-D. (Low Distortion, -25dB) - Auto
	The Setting of the RF-Signal Matching to described in section 3.10!
MeasTime 100 ms	Activates the measurement time (2*) Setting value: 10 … 2000 ms (10 ms step width)

1* toggle function
2* edit function

3.7.2 Activate the MARKER BEACON mode

	Control	Operation	Function
1.	BEACON	Taste "BEACON" (5) drücken.	Der R&S® EVS 300 wechselt in den MARKER BEACON mode. 

3.7.3 Setting the receiver frequency in the MARKER BEACON mode

MB: 74.7 ... 75.3 MHz

	Control	Operation	Function
1.	FREQ	Press the "FREQ" (9) button.	Behind the last digit the cursor appears. 111.1000_
2.		Direct entry of the desired receiver frequency or turn the rollkey several times until the required frequency appears.	The frequency should be entered with the corresponding decimal place. 111.2000
3.		Confirm with the correct dimension or Press the Enter button / rollkey push.	Acceptance of the new set frequency. 111.2000

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:

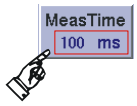
MB: 74.7 ... 75.3 MHz

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 (1 ... 100 kHz) is settable in the setup (F-Step) when using the rollkey or the cursor buttons.

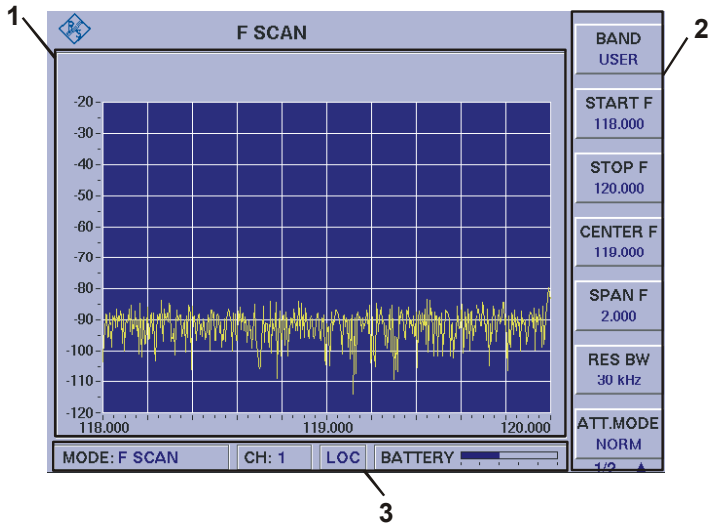
3.7.4 Setting the measurement interval time in the MARKER BEACON mode

The preset measuring interval stipulates the intervals at which measurement values will be recorded, enabling an average value to be calculated. The ILS mode can read in 36 measurement values/s, the equivalent of 27-ms/measurement value.

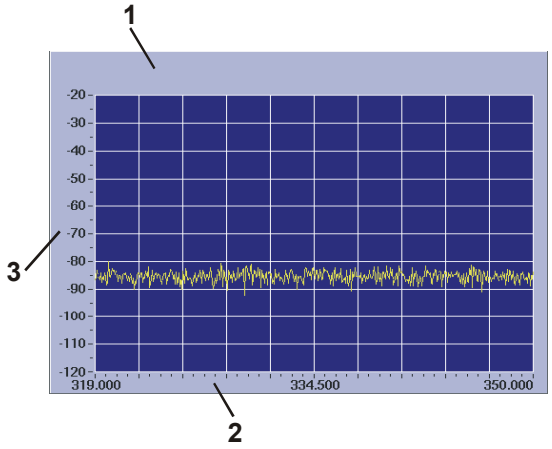
	Control	Operation	Function
1.		Press the softkey.	Switching over into the edit function to set the measurement time. The softkey value section is active. 
2.		Turn the rollkey several times until the required measure-ment time appears.	The actual measurement time will be carried along numerically on the softkey. Setting value: 10 … 2000 ms (10 ms step width)
3.		Press the Enter button / rollkey push.	Acceptance of the actually set new meas-urement time. 

3.8 F SCAN mode (Option) operation

3.8.1 Signal Parameters and Display in the F-SCAN mode (Option)



3.8.1.1 Spectrum-Display (1)



Item	Display	Function	Indication / Measured Value
1	Frequency spectrum	Graphical indication of the frequency spectrum	
2	Frequency (X-axis)	Frequency scale	MHz
3	Level (Y-axis)	Level scale	dBm, dBµV

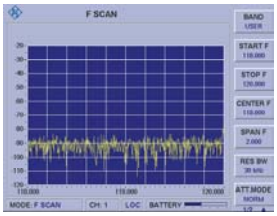
3.8.1.2 Softkeys (2)

Display	Function
BAND USER	Switch over (1*) of the receiver band - USER * - ILS LOC - ILS GS - VOR - MB
START F 118.000	Activates the edit function (2*) for the start frequency, set frequency is shown in the softkey
STOP F 120.000	Activates the edit function (2*) for the stop frequency, set frequency is shown in the softkey
CENTER F 119.000	Activates the edit function (2*) for the center frequency, set frequency is shown in the softkey
SPAN F 2.000	Activates the edit function (2*) for the span frequency, set frequency is shown in the softkey
RES BW 30 kHz	Switch over (1*) of the bandwidth - 1 KHz, 3 KHz, 10 KHz, 30 KHz
ATT.MODE NORM	Switch over (1*) of the HF-attenuation, set range is shown in the softkey: - Low-N. (Low Noise, +10 dB) - Norm (Normal, 0dB) - Low-D. (Low Distortion, -25dB)
	The Setting of the RF-Signal Matching to described in section 3.10!
window 2	
REF.LEV -20	Setting of the reference level (2*), set level is shown in the softkey: Setting value: -30 … 20 dB
dB/DIV 10	Setting of the resolution (level scale) (1*), set level is shown in the softkey: - 2 dB - 5 dB - 10 dB
TRACE Clr/Wr.	Switch over (1*) of the trace function, set function is shown in the softkey: - Clr/Wr. (Clear/Write) - Average Max Hold (samples = ∞)
Samples 1	Setting the number of samples (2*), set number of samples is shown in the softkey: Setting value: 1 … 100

* individual setting of the frequency parameters

1* toggle function
2* edit function

3.8.2 Activate the F SCAN mode

	Control	Operation	Function
1.	F SCAN	Press the "F SCAN" (8) button.	The R&S® EVS 300 switches over into the F SCAN mode. 

3.8.3 Change the Receiver band

	Control	Operation	Function
1.	BAND USER	Press the softkey (1*).	The set mode will be updated in the softkey and is then immediately active.  Following modes are available: ILS LOC: 107 ... 119 MHz ILS GS: 319 ... 341 MHz VOR: 107 ... 119 MHz MB: 74.7 ... 75.3 MHz USER: 70 ... 350 MHz In the particular receive band the lower frequency will be set as the “Start frequency“ and the higher frequency as the “Stop frequency“.

1* toggle function

In each frequency band the frequency range can be set between 70 … 350 MHz for analysis.

3.8.4 Setting the Start frequency

	Control	Operation	Function
1.		Press the softkey.	Activation of the edit function for changing the start frequency. 
2.		Turn the rollkey until the required frequency is set.	Setting the new start frequency. **-** = Frequency decreases **+** = Frequency increases
3.		Press the Enter button / rollkey push.	Acceptance of the actually set new start frequency.

The center frequency and the span frequency will be matched automatically with the start frequency!

3.8.5 Setting the Stop frequency

	Control	Operation	Function
1.		Press the softkey.	Activation of the edit function for changing the stop frequency. 
2.		Turn the rollkey until the required frequency is set.	Setting the new stop frequency. **-** = Frequency decreases **+** = Frequency increases
3.		Press the Enter button / rollkey push.	Acceptance of the actually set new stop frequency.

The center frequency and the span frequency will be matched automatically with the stop frequency!

3.8.6 Setting the Center frequency

	Control	Operation	Function
1.		Press the softkey.	Activation of the edit function for changing the center frequency. 
2.		Turn the rollkey until the required frequency is set.	Setting the new center frequency. **-** = Frequency decreases **+** = Frequency increases
3.		Press the Enter button / rollkey push.	Acceptance of the actually set new center frequency.

The span frequency and the stop frequency will be matched automatically with the center frequency!

3.8.7 Setting the Span frequency

	Control	Operation	Function
1.		Press the softkey.	Activation of the edit function for changing span frequency. 
2.		Turn the rollkey until the required frequency is set.	Setting the new span frequency. **-** = Frequency decreases **+** = Frequency increases
3.		Press the Enter button / rollkey push.	Acceptance of the actually set new span frequency.

The center frequency and the stop frequency will be matched automatically with the center frequency!

3.8.8 Setting the IF band width

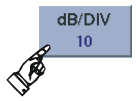
	Control	Operation	Function
1.		Press the softkey (1*).	The IF band width changes and the set value is displayed in the softkey.  Option: 1 kHz, 3 kHz, 10 kHz, 30 kHz.

1* toggle function

3.8.9 Setting the Reference level

	Control	Operation	Function
1.		Press the softkey.	Activation of the edit function for reference level, set value is shown in the softkey. 
2.		Turn the rollkey until the required frequency is set.	Setting the reference level into dependence of the "ATT mode“: Setting value: "Norm": -10 … -60 dBm Setting value: "Low-N": -20 … -60 dBm Setting value: "Low-D": +20 … -60 dBm
3.		Press the Enter button / rollkey push.	Acceptance of the actually set new reference level.

3.8.10 Setting the Resolution (level scale)

	Control	Operation	Function
1.		Press the softkey (1*).	Setting the resolution (Level scale), set value is shown in the softkey.  Option: 2 dB, 5 dB, 10 dB,

1* toggle function

3.8.11 Setting Trace function

	Control	Operation	Function
1.		Press the softkey (1*).	Setting at Trace function, set function is shown in the softkey.  Option: Clr/Wr. (Clear/Write), Average, Max Hold,

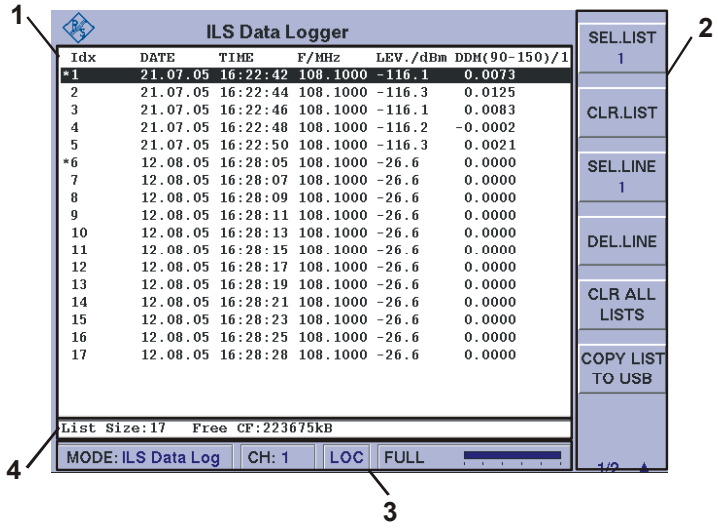
1* toggle function

3.8.12 Setting the number of samples

	Control	Operation	Function
1.		Press the softkey.	Setting the number of samples to the Trace "Average“ function, set number of samples is shown in the softkey.  Setting value: 1 … 100 (samples)

3.9 Data Logger operation

3.9.1 Signal Parameters and Display in the Data Logger



The data log consists of two menu windows. The first menu window displays a list of data records, the second window showing a graphic representation of the DDM value in ILS mode.

3.9.1.1 Data set list (1)

All mode relevant data will be entered in the data set list, i.e for the following modi different data set listings will be compiled:

- ILS mode,
- VOR mode,
- Marker Beacon mode.

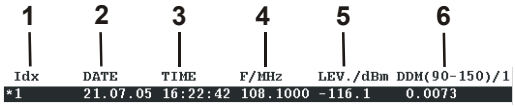
The data set list parameters are mode dependent!

The display reading is only an extract of a list!

A complete list can be stored on an USB-memory-stick or transmitted via a remote interface for further evaluation! The concerned file format is CSV, which can be opened and handled under MS-EXCEL.

The symbol "*" in the list of data records indicates the start of a new series of measurements within a list of data records.

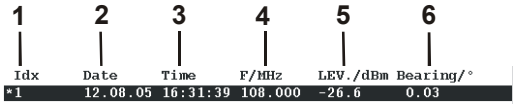
3.9.1.1.1 Data set list in the ILS mode



(Representation in the unit)

Item	Display	Function	Indication / Measured Value
1	Idx (Index)	Running data set no.	1 ... 9999
2	Date	Recording date (day, month, year)	tt.mm.jj
3	Time	Recording time	hh.mm.ss
4	F [MHz]	Receiver frequency	MHz
5	LEV.[dBm]	Receiver level	dBm
6	DDM (90-150) [1]	Differential modulation factor	1 (1 = dimensionless value)

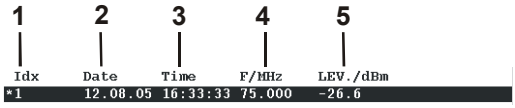
3.9.1.1.2 Data set list in the VOR mode



(Representation in the unit)

Item	Display	Function	Indication / Measured Value
1	Idx (Index)	Running data set no.	1 ... 9999
2	Date	Recording date (day, month, year)	tt.mm.jj
3	Time	Recording time	hh.mm.ss
4	F [MHz]	Receiver frequency	MHz
5	LEV. [dBm]	Receiver level	dBm
6	Bearing [°]	Phase between the both 30-Hz signals	[°] Degree

3.9.1.1.3 Data set list in the MB mode



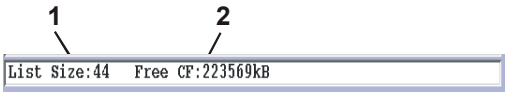
(Representation in the unit)

Item	Display	Function	Indication / Measured Value
1	Idx (Index)	Running data set no.	1 ... 9999
2	Date	Recording date (day, month, year)	tt.mm.jj
3	Time	Recording time	hh.mm.ss
4	F [MHz]	Receiver frequency	MHz
5	LEV. [dBm]	Receiver level	dBm

3.9.1.2 Softkeys of the Data Logger (menu window 1)

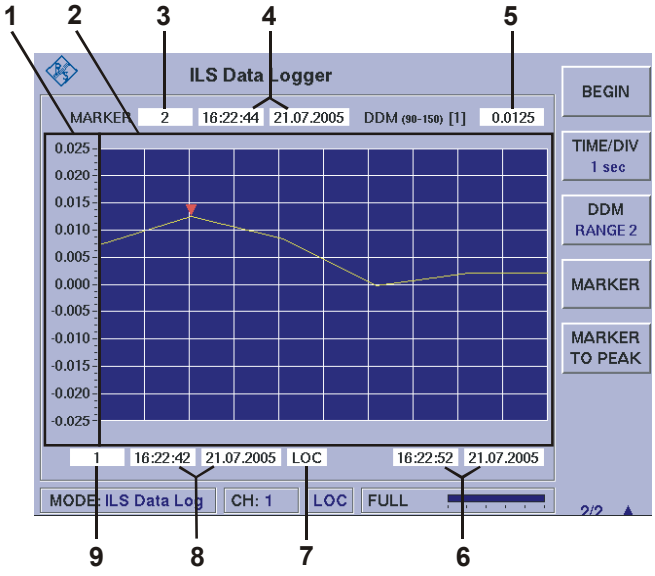
Display	Function
SEL.LIST 1	Selection of a data set list (1 ... 999, listno. is shown in the softkey)
	Each unit mode can deal with max. 999 listings!
CLR.LIST	Deletes the actual list
SEL.LINE 1	Marks a line of the actual list (line no. is shown in the softkey) with scroll function
	A list can have about 50000 lines!
DEL.LINE	Deletes a marked line (black labelled)
CLR ALL LISTS	Deletes all listings (mode dependent)
COPY LIST TO USB	To copy the actual list onto an USB-memory-stick

3.9.1.3 Memory Status Information



Item	Display	Function	Indication / Measured Value
1	List Size	List size/number of measurements (one line for one measurement)	
2	FREE CF	Display of available memory on the internal compact flash card (256 MB)	kByte

3.9.1.4 Graphical indication of the DDM value in the ILS mode



Item	Display	Function	Indication / Measured Value
1	DDM (Y-axis)	DDM scale	dimensionless value
2	Display DDM value	Graphical display of the DDM value	
3	Marker	Display and selection (softkey ”Marker“) of the marker index	
4	Time/Date	Time/Date of the actual marker	hh.mm.ss/ tt.mm.jjjj
5	DDM (90-150) [1]	DDM value of the actual marker	1 (1 = dimensionless value)

6	Time/Date	Time/Date of the last measurement ones index	hh.mm.ss/ tt.mm.jjjj
7	LOC	Display of the ILS mode	LOC/GS
8	Time/Date	Start time of the measurement	hh.mm.ss/ tt.mm.jjjj
9	Index	Indication and selection (softkey “Begin”) of an index from the list of data records	

3.9.1.5 Softkeys of the Data Logger (menu window 2)

Display	Function
BEGIN	Activates selection (2*) of an index from the data set list
TIME/DIV 1 sec	Setting of the resolution (3*) for showing the time axis. Setting value above the selection-list: 1 s … 24 h
DDM RANGE 1	Switch over (1*) of the DDM range - Range 1 - Range 2 - Range 3 - Range 4
MARKER	Activates setting (2*) for the selection of an marker index from the list of data set
MARKER TO PEAK	Places the marker on the DDM peak value.

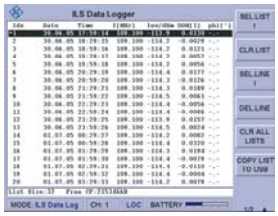
1* toggle function
2* edit function
3* selection-list

3.9.2 Record data into the Data Logger

Data may be writing into the data logger from the following modes: ILS, VOR and Beacon. The save button (42) can be used directly to apply the current data set from the mode set. If a whole series of measurements are to be recorded, the necessary settings regarding the measuring interval and power down function will need to be made ion the data log set up. The series of measurements can then be started by pressing the “START” button and can be ended at any time via the “STOP” button. The listings of data records can then be viewed by opening the data log and used for further analysis.

3.9.3 Activate the Data Logger function

To access the listings of data sets in a certain mode, e.g. ILS, this mode needs to have been activated. Each unit mode can deal with max. 999 listings and about 50000 lines (Data sets)!

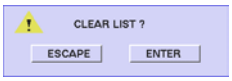
	Control	Operation	Function
1.	MEM	Press the "MEM" (41) button.	The R&S® EVS 300 switches over into the Data Logger function. 

The data log function consists of two display windows, and button 35 can be used to switch between these. The first window provides an overview of the data sets, as well as all the necessary editing tools, and the second window enables the DDM value form the values set in the first window to be represented graphically.

3.9.4 Selection of Data set list

	Control	Operation	Function
1.	SEL.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.		Direct entry of the desired receiver frequency or turn the rollkey several times until the required list appears.	The actual list number will be carried along numerically on the softkey.
3.		Press the Enter button / rollkey push.	Acceptance of the actually set new data set list. 

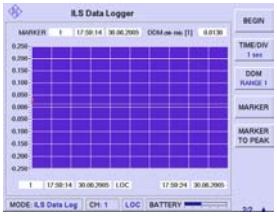
3.9.5 Edit the Data set list

	Control	Operation	Function
Selection of Data set line			
1.	SEL.LINE 1	Press the softkey.	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 rollkey push.
Deletes of Data set line			
1.	DEL.LINE	Press the softkey.	If a line is marked, it is immediately deleted.
Deletes the actual Data set list			
1.	CLR.LIST	Press the softkey.	The current data set list is deleted after the security question has been confirmed. 
Deletes all Data set listings in the current device mode			
1.	CLR ALL LISTS	Press the softkey.	All data set listings relating to the device mode set are, deleted after the security question has been confirmed. 

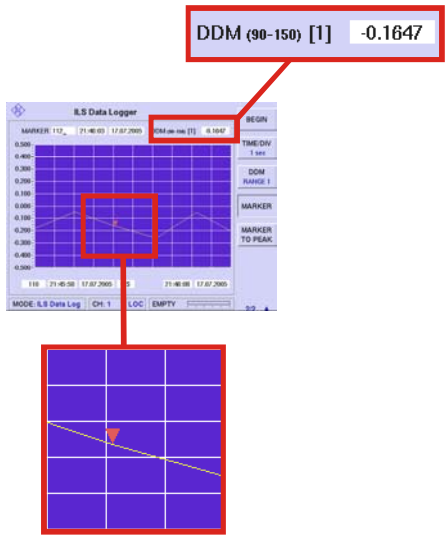
3.9.6 Copy the actual list onto an USB-memory-stick

	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.	
2.	COPY LIST TO USB	Press the softkey.	The data for the current list is transferred in CSV data format.
		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.

3.9.6.1 Analyse the DDM value of a Data set list

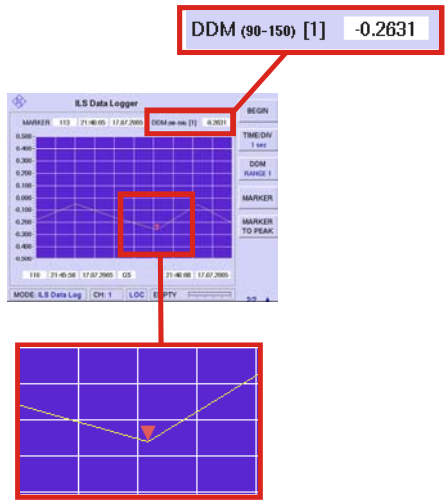
	Control	Operation	Function
Change over to window 2 of the Data Logger			
1.		Press the softkey.	Change to window 2 (graphic representation of the DDM value) of the data set list selected in window 1. 
Selection of data set			
1.	BEGIN	Press the softkey.	Selection of a data set via the index number. Selection of an index takes place via rollkey/keyboard. To accept the index, press enter or rollkey push.

Placing the marker

1.	MARKER	Press the softkey.	Selection of a marker via the marker index number of the current data set. Selection of the marker index takes place via rollkey/keyboard. To accept the index, press enter or rollkey push. The rollkey can now be used to set the market to the respective DDM marks. The DDM value corresponding to the respective marker position is displayed in the DDM window (90-150). The time and date of the corresponding marker position or the corresponding data index are displayed dynamically. 

Placing the marker on the peak DDM value

1.	MARKER TO PEAK	Press the softkey.	Places the marker on the peak DDM value within the current DDM procedure. The DDM value corresponding to the marker peak position is displayed in the DDM window (90-150). The time and date of the corresponding marker position or the corresponding data index are displayed dynamically.

Setting the resolution

1.	TIME/DIV 1 sec	Press the softkey (3*).	Setting of the resolution for showing the time axis. Setting value: 1 s ... 24 h Selection of the time via rollkey/keyboard. To accept the value, press enter or rollkey push.

Setting the DDM range

1.	DDM RANGE 1	Press the softkey (1*).	Setting the DDM range. Setting value: Range 1 ... 4

1* toggle function
3* selection-list

3.10 Setting of the RF-Signal Matching

	Control	Operation	Function
1.		Press the softkey (1*).	The set mode will be updated in the softkey and is then immediately active.  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 … +10 dB)

1* toggle function

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:

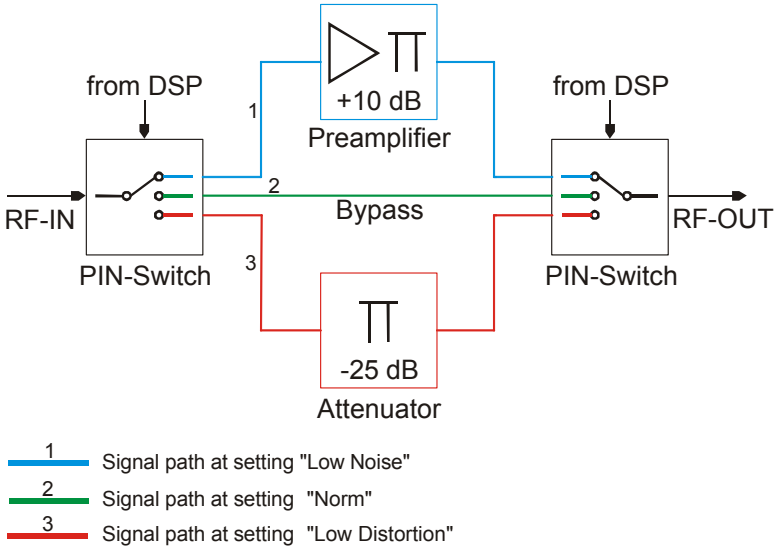
Low Noise: from <-70 dB

Norm: from <-20 dB

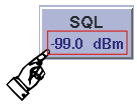
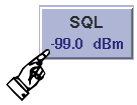
Low Distortion: from >-20 dB

Depending on the signal level in the Auto mode automatically the correct signal path is switched.

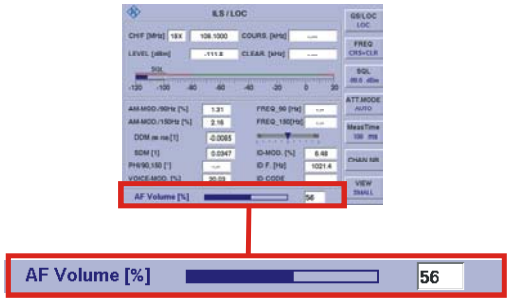
The auto mode is not applicable at the F-SCAN mode (Option)



3.11 Setting of the Squelch Threshold

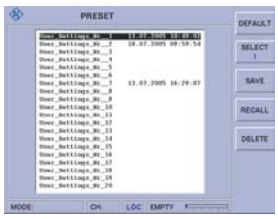
	Control	Operation	Function
1.		Press the softkey.	Switching over into the edit function to set the squelch threshold. The softkey value section is active. 
2.		Turn the rollkey until the required squelch threshold is set.	The actual squelch level will be carried along numerically on the softkey and graphically on the bargraph indicator.
3.		Press the Enter button / rollkey push.	Acceptance of the actually set squelch threshold. 

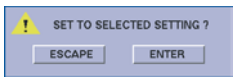
3.12 AF Volume setting

	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. 
2.		Turn the rollkey until the required volume is set.	Setting of the AF Volume level at the speaker. Setting value: 0 … 100 %
3.		Press the Enter button / rollkey push.	Acceptance of the new set AF Volume level.

3.13 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 important set up settings.

	Control	Operation	Function
1.	PRE-SET	Press the “Preset“ (1).	The display changes over into the Preset mode. 
Call-up a preset			
1.	SELECT 1	Press the softkey.	Change to editing function to select a “user settings number”. The softkey value section is active.  Selection of a “user settings number” is activated via the rollkey/keyboard. To accept the value, press enter or rollkey push.
2.	SAVE	Press the softkey.	The current device settings will be saved to the selected “user settings number” with the current date/time after the security question has been confirmed. 
		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			
1.	SELECT 1	Press the softkey.	Change to editing function to select a “user settings number”. The softkey value section is active. 

2.	RECALL	Press the softkey.	Selection of a “user settings number” is activated via the rollkey/keyboard. To accept the value, press enter or rollkey push. The current device settings will be rewritten with the pre-settings of the selected “user settings number” after the security question has been confirmed. 

Delete a preset

1.	SELECT 1	Press the softkey.	Change to editing function to select a “user settings number” to be deleted.  Selection of a “user settings number” is activated via the rollkey/keyboard. To accept the value, press enter or rollkey push.
2.	DELETE	Press the softkey.	The selected “user settings number” will be deleted after the security question has been confirmed. 

Call-up of the factory settings

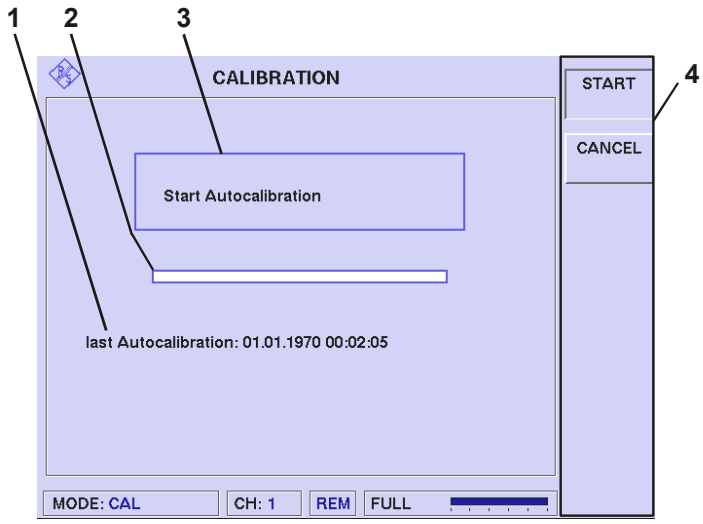
1.	DEFAULT	Press the softkey.	The current device settings will be overwritten with the default settings after the security question has been confirmed. 

3.14 The Auto calibration

Auto calibration is carrying out a linearity correction.

Auto calibration should generally be carried out weekly, or more often in the event of significant fluctuations in temperature!

3.14.1 Displays in calibration menu

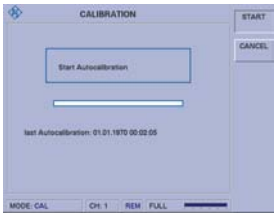


Item	Display	Function	Indication / Measured Value
1	Last auto calibration	Entry of the date and time of the last auto calibration of the device	tt.mm.jjjj, hh.mm.ss
2	Progress graph	Graphic representation of the progress of auto calibration	
3	Statusfenster	Indication of the current calibration status	
4	Softkeys		

3.14.1.1 Softkeys

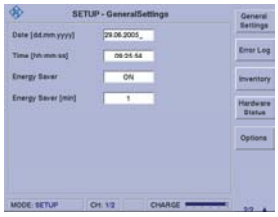
Display	Function
START	Starts an auto calibration of the device
CANCEL	Cancel an ongoing auto calibration

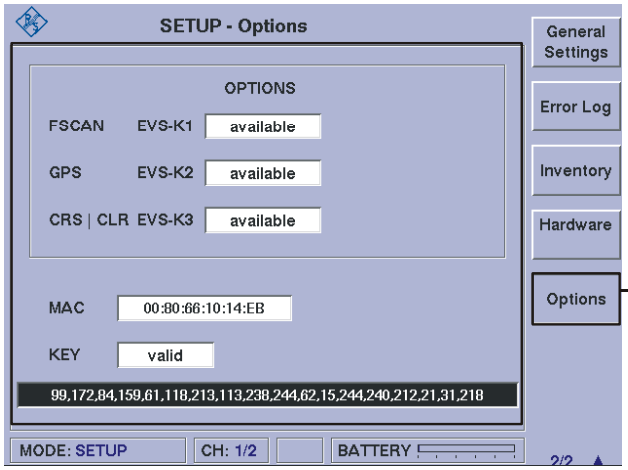
3.14.2 Auto calibration operating

	Control	Operation	Function
1.	CAL	Press the “CAL“ (44) button.	The device changes over into the auto calibration window. 
Starting auto calibration			
1.	START	Press the softkey.	Auto calibration is started. The corresponding parameters and their values are shown in the status display window. Successful auto calibration is indicated in the status display window by “Auto calibration Ready”. At the same time, the date and time of this calibration are updated.
		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			
1.	CANCEL	Press the softkey.	Stopping an ongoing auto calibration. This is indicated in the status display window by “Auto calibration Aborted”. In this case, no changes are made to the device.

3.15 Enable optional functionalities t

It is also possible to obtain optional functionalities such as FSCAN (EVS-K1), GPS (EVS-K2) or CRS/CLR (EVS-K3). 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“ (1) and change to the window 2.	The device changes over into the Setup menu (window 2). 
Change over into the option window			
2.		Press the softkey.	The Setup changes over into the option window.



Status display of the optional expansions of the device!

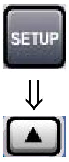
Execution of licensing			
1.			After an option has been acquired, tele-phone, fax or mail contact is made to the company Rohde & Schwarz for the purpose of issuing the MAC code for devices. The key number for the option purchased is then issued.
2.		Press the Enter button / rollkey push.	The editing function for the entry of the key number is activated and the key number received can be entered.

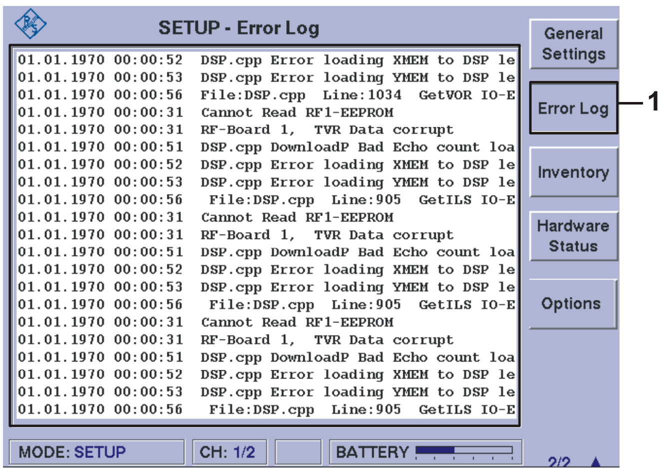
3.		Press the Enter button / rollkey push.	Transfer of the key number. The option purchased is activated.

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.

3.16 Call-up the Error Logbook

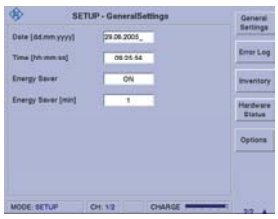
The error logbook contains only service information!

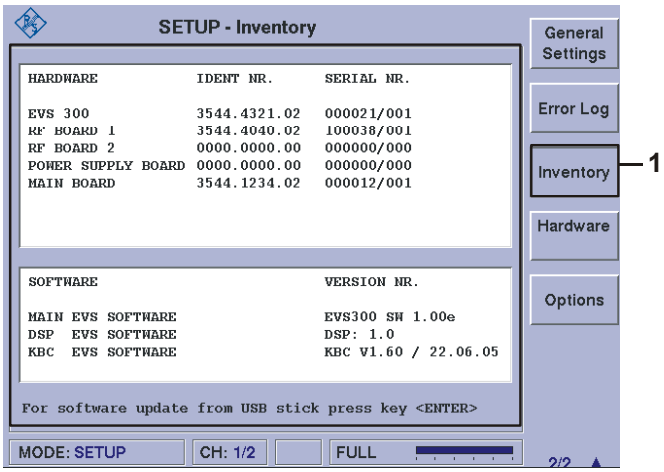
	Control	Operation	Function
1.		Press the “Setup“ (1) button and change to the window 2.	The device changes over into the Setup menu (window 2). 
2.		Press the softkey.	The Setup changes over into the Error Log window.



3.17 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!

	Control	Operation	Function
1.	SETUP ⇓ ▲	Press the “Setup“ (1) button and change to the window 2.	The device changes over into the Setup menu (window 2). 
2.	Inventory	Press the softkey.	The Setup changes over into the hardware/software inventory list window.



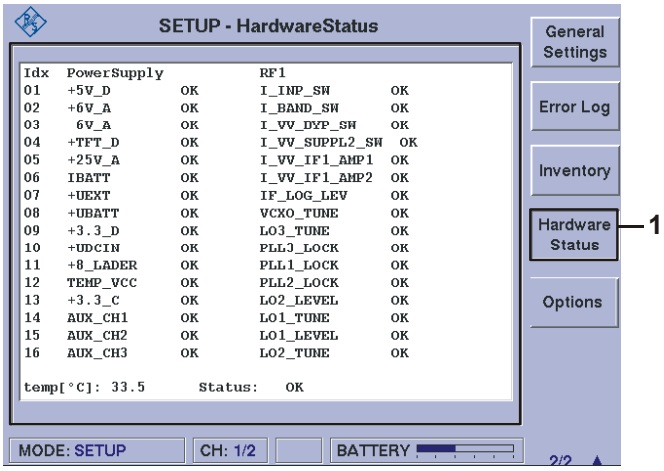
3.17.1 Software update

	Control	Operation	Function
1.	SETUP ⇓ ▲	Press the “Setup“ (1) button and change to the window 2.	The device changes over into the Setup menu (window 2). 
2.	Inventory	Press the softkey.	The Setup changes over into the hardware/software inventory list window.
3.		Insert the USB memory stick into one of the USB interfaces (29).	wait about 5 seconds
4.	ENTER	Press the “Enter“ (31) button.	Initialisation of the software update is beginning.
5.	ENTER	Press the “Enter“ (31) button.	The software update will begin after the security question has been confirmed.
		⚠ ***Never remove the USB memory stick or switch off the device during the software update!***	
6.	ENTER	Press the “Enter“ (31) button.	When the software update is completed, the update programme is ended after confirmation by pressing “Enter”.
7.		Remove the USB memory stick.	
8.	⏻	Press the button twice	The device needs to be restarted to activate the new software.

3.18 Call-up the Device operating parameters

The hardware status includes the most important device operating parameters. This information is necessary for service purposes!

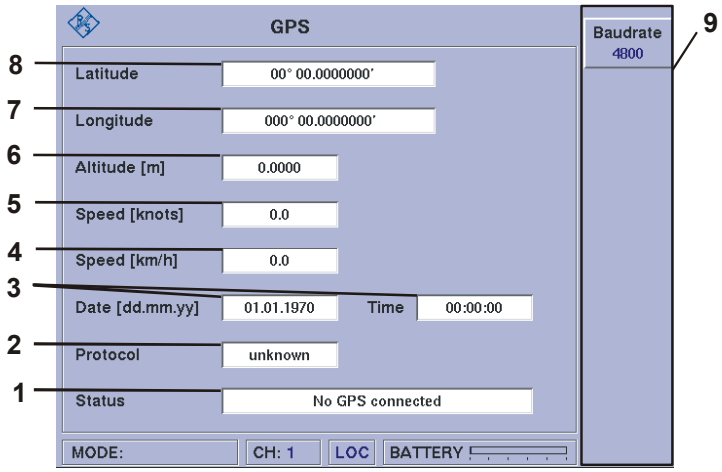
	Control	Operation	Function
1.	SETUP ⇓ ▲	Press the “Setup“ (1) button and change to the window 2.	The device changes over into the Setup menu (window 2). 
2.	Hardware Status	Press the softkey.	The Setup changes over into the device operating parameters window. (Hardware Status).



3.19 GPS function (Option)

The GPS function enables the current position and corresponding parameters to be displayed. A GPS receiver needs to be connected to the GPS interface (RS232-2 (7)) for this purpose. The GPS data are added to the corresponding data record when automated recording of values measured is carried out.

3.19.1 Displays in the GPS menu



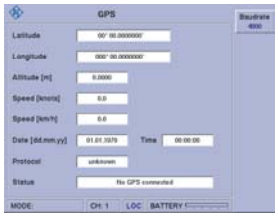
Item	Display	Function	Indication / Measured Value
1	Status	Status display	
2	Protocol	Indication of the GPS protocol	
3	Date/Time	Indication of the current Date/Time	tt.mm.jjjj, hh.mm.ss
4	Speed [km/h]	Indication of speed (km/h)	km/h
5	Speed [knots]	Indication of speed (knots)	Knoten/h
6	Altitude [m]	Indication of the current altitude	m
7	Longitude	Indication of the Longitude	[°] Degree
8	Latitude	Indication of the Latitude	[°] Degree

3.19.1.1 Softkeys

Display	Function
Baudrate 4800	Setting (1*) the Baud rate of the RS232-1-REMOTE-interface Setting value: 4800 … 115200 baud

1* toggle funktion

3.19.2 GPS operating (Option)

	Control	Operation	Function
1.	GPS	Press the “GPS“ (7) button.	The device changes over into the GPS function window. 
Setting the baud rate of the RS232-2 interface			
2.	Baudrate 4800	Turn the rollkey until the required baud rate is set.	The set baud rate will be updated in the softkey and is then immediately active. Setting value: 4800 ... 115200 baud

3.20 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 interval times the measured values will be entered into the data logger.
2.	STOP	Press the “Stop“ (12) button.	The automatic storing process fort he measured value must be terminated manually in the set measurement mode (e.g. ILS).

3.21 Remote control of the ILS / VOR Analyzer R&S® EVS 300

3.21.1 Operation via RS-232 interface

All important unit functions of the **ILS / VOR Analyzer R&S® EVS 300** 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. HyperTerm™, 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).

3.21.2 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 **ILS / VOR Analyzer R&S® EVS 300** can be remotely operated from a PC/ network. IP Addresses and subnet mask identifier are set in the Setup Menu.

3.21.3 Remote control commands

There are two categories of control commands.

- ❑ super commands (mode independent, unit related)
- ❑ mode dependant commands (specified mode must first be selected)

The following table makes clear the control commands structure.

Unit related control commands	**Mode dependant control commands**			
	ILS mode	**VOR mode**	**BEACON mode**	**Setup mode**
BI CH CH? INV LA LO M? MB MI MV RF RF? VER MEASTIME	AF8 AM2 AM3 AM8 AM9 DD0 DD1 FA0 FA1 FA2 FA3 FA4 FA5 PH	AF8 AM0 AM1 AM8 AM9 BE FA0 FA2 FM0 FM1	AF4 AF5 AF6 AF7 AM4 AM5 AM6 AM7 FA0 FA2	INPUT BBLEVEL ANALOG_OUT1 ANALOG_OUT2 DDM_RANGE_LOC DDM_RANGE_GS VOLUME SPEAKER ENERGYSAVER

MEASTIME? SQUELCH STREAM GETDATADEF GETDATA SET SETATTMODE	SD0 SD1			

3.21.3.1 Unit related control commands

Command	Parameter	Response	Function
LO		READY	Set the unit back to local control.
VER		<sw-version>	Request of the software version.
BI		<BI-Info>	Built-in-test information.
INV		<Inv-Info>	Request of the serial number (unit and modules).
MB		READY	Activates the MARKER BEACON mode.
MI		READY	Activates the ILS mode.
MV		READY	Activates the VOR mode.
M?		ILS VOR MB	Request of the current set mode.
CH	1 2	READY	Selection of the receiver channel 1/2.
CH?		1 2	Request of the current receiver channel.
RF	<freq in kHz>	READY	Sets the frequency.
RF		<freq in kHz>	Request of the current receiver frequency.
LA		<dBm>	Request of the receiver level.
GETDATADEF		definition	Definition of data delivered by GETDATASET The text is identical to the first row of a CSV-list exported to USB.
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.

Command	Parameter	Response	Function
STREAM		Ready	Starts streaming of the complete measurement result; output format is the same as GETDATASET (only work properly with TCP/IP, FA0 terminates the output).
MEASTIME	Time in ms	READY.	Setting of the measurement interval time.
MEASTIME?		Time in ms	Request of the current measurement interval time.
SQUELCH	Squelch in dBm	READY	Sets the squelch level in the current mode.
SETATTMODE	AUTO LN NORM LD	READY	Selects the ATT mode in the current mode.

3.21.3.2 Remote control commands of the ILS mode

Command	Parameter	Response	Function
DD0		<DDM [1]>	Request of the current DDM value (dimensionless).
DD1		<DDM [µA]	Request of the current DDM value (µA).
SD0		<SDM [1]>	Request of the current SDM value (dimensionless).
SD1		<SDM [µA]	Request of the current SDM value (µA).
AM2		< [%]>	Request of the AM-modulation factor of 90 Hz signal (%).
AM3		< [%]>	Request of the AM-modulation factor of 150 Hz signal (%).
PH		<DEG>	Request of the phase shift 90Hz/150Hz (degree).
AF8		< Hz >	Request of the AF frequency of identifier (Hz).
AM8		<%>	Request of the AM-modulation factor of identifier (%).
AM9		<%>	Request of the AM-modulation factor of Voice signal (%).

Command	Parameter	Response	Function
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] The command FA0 stops the output.
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 The command FA0 stops the output.
FA3		READY.	Same output format as FA2, but the values are only transmitted when triggered by another FA3 command.
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.
FA0		READY.	Stops the continuous output that was started with FA1,FA2, FA4, FA5, STREAM.
MEASMODE	CRS+CLR COURSE CLEAR CRS|CLR	READY	Selects the measurement mode.

3.21.3.3 Remote control commands of the VOR mode

Command	Parameter		Function
AF8		<Hz>	Request of the AF frequency of identifier (Hz).
AM0		<%>	Request of the AM-modulation factor of 30 Hz signal (%).

Command	Parameter	Response	Function
AM1		<%>	Request of the AM-modulation factor of 9960 Hz signal (%).
AM8		<%>	Request of the AM-modulation factor of identifier (%).
AM9		<%>	Request of the AM-modulation factor of Voice signal (%).
BE		<DEG>	Request of the BEARING angle (degree).
FM0		<Hz>	Request of the FM-Hub (Hz).
FM1		<1>	Request of the FM-Index (Hz).
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
FA0		READY.	Stops the continuous output that was started with FA2.

3.21.3.4 Remote control commands of the Marker Beacon mode

Command	Parameter	Response	Function
AF4		<Hz>	Request of the AF frequency of the 3000 Hz signal (Hz).
AF5		<Hz>	Request of the AF frequency of the 1300 Hz signal (Hz).
AF6		<Hz>	Request of the AF frequency of the 400 Hz signal (Hz).
AF7		<Hz>	Request of the AF frequency of identifier (Hz).

Command	Parameter	Response	Function
AM4		<%>	Request of the AM-modulation factor of 3000 Hz signal (%).
AM5		<%>	Request of the AM-modulation factor of 1300 Hz signal (%).
AM6		<%>	Request of the AM-modulation factor of 400 Hz signal (%).
AM7		<%>	Request of the AM-modulation factor of identifier (%).
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-Mod300 [%], factor: 100 AM-Mod1300 [%], factor: 100 AM-Mod3000 [%], factor: 100 AM-Mod ID [%], factor: 100
FA0		READY.	Stops the continuous output that was started with FA2.

3.21.3.5 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	Selects the input source for 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: - 100mV - 1V - ?	READY	Input sensitivity for the base band input. Always applies to both channels. (Channel 1/2). ? (Output of the set level)

Command	Parameter	Response	Function
SETUP: ANALOG_OUT1	CH1DDM CH2DDM CH1AUDIO CH2AUDIO	READY	Selects the source for Analog Out 1.
SETUP: ANALOG_OUT2	CH1DDM CH2DDM CH1AUDIO CH2AUDIO	READY	Selects the source for Analog Out 1.
SETUP: DDM_RANGE_LOC	Channel:1,2 Range:1,2,3,4	READY	Selection of predefined DDM ranges (ILS-LOC, 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	Sets the AF volume (%).
SETUP: SPEAKER	ON,OFF	READY	Activates the speaker (ON/OFF)
SETUP: ENERGYSAVER	0 … 60min	READY	Energy Saver Time input (minutes) Input "0", no energy saver function (display always visible)

4 Service

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

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

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

ROHDE&SCHWARZ Service Center Cologne	
☎	(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 ILS / VOR Analyzer R&S® EVS 300 needs to be calibrated yearly!

5.2 Cleaning

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

- brush
- soft, lint free cloth

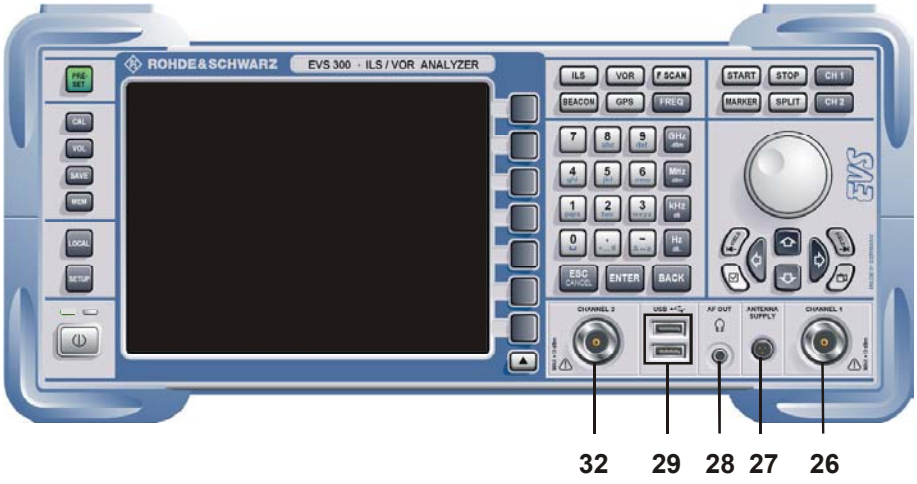
Before cleaning the ILS / VOR Analyzer* R&S® *EVS 300 it must be switched OFF!

Don't use aggressive cleaner for cleaning the surfaces of the ILS / VOR Analyzer* R&S® *EVS 300!

Electric interfaces must not be cleaned with liquid cleanser e.g. contact spray!

6 Interfaces of the unit

6.1 Front side interfaces



6.1.1 Antenna input 1

Item	Interface	Function
26	Channel 1	Input level: 0 dBm / 50 Ω Connector: N-socket **max. +13 dBm** **(Data stability until 10 dBm guaranteed)** Frequency range: 70 ... 350 MHz VSWR: <1.5

6.1.2 Active Antenna control

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

Item	Interface	Function
28	AF OUT	3.5 mm jack plug

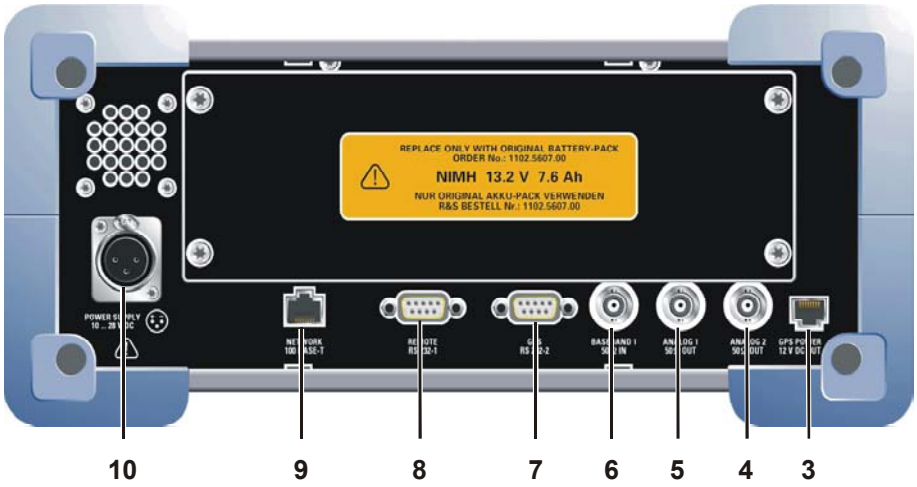
6.1.4 USB interface

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

6.1.5 Antenna input 2

Item	Interface	Function
30	Channel 2	Input level: 0 dBm / 50 Ω Connector: N-socket **max. +13 dBm** **(Data stability until 10 dBm guaranteed)** Frequency range: 70 ... 350 MHz VSWR: <1.5

6.2 Rear interfaces



6.2.1 GPS-Power output

Item	Interface	Function
3	GPS POWER 12 VDC OUT	Power supply connector for an external GPS-receiver Power supply: 12 VDC / 300 mA Connector: RJ 14

6.2.2 Analogous output 2

OZ	Bezeichnung	Beschreibung
4	ANALOG 2 50 Ω OUT	Analogous XY-signal output (analogous XY-write connector) / AF-output XY-signal output [1]: the graduation of the XY-values is performed in the Setup Menu AF-output [1]: Voice-Frequency Range: 300 ... 3000 Hz, ca. 200 $mV_{eff.}$ Connector: BNC-socket

[1] The signal type setting (XY-Signal / NF-Signal) is performed in the Setup-Menu

6.2.3 Analogous output 1

OZ	Bezeichnung	Beschreibung
5	ANALOG 1 50 Ω OUT	Analogous XY-signal output (analogous XY-write connector) / AF-output XY-signal output [1]: the graduation of the XY-values is performed in the Setup Menu AF-output [1]: Voice-Frequency Range: 300 ... 3000 Hz, ca. 200 $mV_{eff.}$ Connector: BNC-socket

[1] The signal type setting (XY-Signal / AF-Signal) is performed in the Setup-Menu

6.2.4 AF-Base Band input

Item	Interface	Function
6	BASEBAND1 50 Ω IN	AF-Input (Base band signal) for further AF-analysis. Input Level [1]: 100 $mV_{eff.}$ / 1 $V_{eff.}$ / 50 Ω Connector: BNC-socket

[1] The setting of the max. AF input level is performed in the Setup-Menu.

6.2.5 GPS Control interface

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

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

6.2.7 LAN interface

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

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

Technical Information

ILS / VOR Analyzer R&S®EVS 300

High precision air navigation signal analysis

ILS Signal Analysis

- High precision Localizer, Glidepath and Marker Beacon-measurement
- Comparison measurement between course and clearance signals (two independent signal processing units (Option EVS-B1))

VOR Signal Analysis

- Exact field measurements of CVOR/DVOR systems
- Selective measurement of the modulation depth of the information signal and the interferer

General Features

- Frequency scan (Option EVS-K1) with dynamic range to 110 dB
- Robust and handy design for measurements in the field
- approx. 8 hours continuous operating time on battery power

ROHDE&SCHWARZ

Monitoring of terrestrial air traffic navigation installations of airports and remote locations

u Brief description

The R&S®EVS300 has been designed as a high precision level and modulation analyzer especially for monitoring and service of ILS and VOR installations.

Handy and robust
The robust design and its handy dimensions make the EVS the ideal instrument for measurements in the field.

Stationary or standalone
Due to the long battery operating time of 8…10 h the EVS can be used the whole day without need to recharge. The analyzer can also be powered by dry batteries (Size AA). The 10...28 V input can be used in vehicles to feed the analyzer from the car battery.

Flexible output of measurement data
The internal data logger of the R&S®EVS300 is able to store all measurement results (up to 36 hours in continuous measurement mode). An external Laptop in field measurements is no longer necessary. The data can be displayed on the screen of the R&S®EVS300 in tables or as measurement plots. For archiving and data processing you can use the standard interfaces (LAN or RS232) or just copy the data via the USB interface to an USB memory stick.

Long term measurements
To monitor signals over a longer period of time the R&S®EVS300 provides a long term measurement mode. The analyzer is switched on periodically. After the measurement the device is switched off to save battery power. This enables battery powered long term measurements up to one week.

Remote control via GSM modem
The optional GSM modem (EVS-B2) allows the operation of the analyzer on remote sites without any infrastructure available. The instrument can be fully remote controlled and the measurement values can be transmitted via the GSM network. The GSM modem is powered by the +12 V output on the rear of the R&S®EVS300

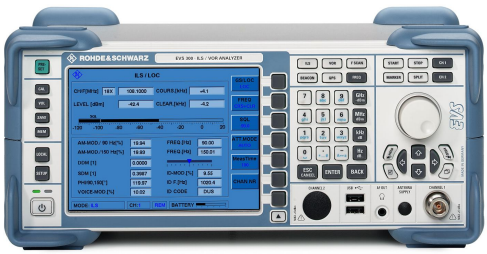
High precision level measurement
The internal calibration generator guarantees the long term stability of the level measurement and a precise measurement of the input signal level.

An internal switchable preamplifier and a switchable attenuator extend the dynamic range for all kinds of measurements. The wide input level range and optimal shielding of the modules allow measurements close to the transmit antennas as well as on distant sites.

Runway measurement with positioning data (GPS)
Due to its high measurement accuracy and fast data storage the R&S®EVS300 is optimal for dynamic runway measurements. The current position of the vehicle can be determined by an external GPS receiver. These values are transmitted to the second RS232 interface of the R&S®EVS300 in the NMEA-183-format. Every measurement value is marked by a time and position stamp.

General features

- u High contrast 16,4 cm (6,4'') – TFT color display
- u Wide temperature range -10…+55 °C
- u Low weight ca. 6 kg
- u High mechanical stability (MIL-810D und DIN-IEC 68)
- u Further analysis of the received signals via two analog outputs
- u Analysis of external base band signals
- u Self test (BITE)
- u LAN and RS232 interface for remote control and output of measurement data



Specifications

FREQUENCY

Frequency Ranges

Marker-Beacon ..... 74,7... 75,3 MHz *)
ILS LOC / VOR ..... 107...119 MHz *)
ILS GS ..... 319...341 MHz *)
Frequency scan (Option EVS-K1) .....70…350 MHz

Frequency resolution .....100 Hz

Temperature drift (-10 °C...+55 °C).....≤1 ppm

Frequency error (-10 °C...+55 °C).....≤1 ppm

Aging p. a.....≤1 ppm

*) Preselector filter range. Functionality also available in the frequency range 70…350 MHz.

LEVEL

Absolute Level

Indication range*)
Low Noise Mode
(Preamplifier on) ..... -120...-20 dBm

Normal Mode
(Preamplifier off) .....-110…-10 dBm

Low Distortion Mode
(Attenuator on) .....-100...+20 dBm

Autorange Mode.....-120...+20 dBm

Level resolution ..... 0,1 dB

Error at -30 dBm
(after internal calibration)..... < 0,8 dB

Linearity error between -40…+30 dB..... <0,5 dB

Maximal Input Power..... +13 dBm

Noise floor..... < -115 dBm

*) Overload message to indicate any in band or out-of-band overload

Intermodulation

Third-order intercept, IP3
(2 x 10 dBm, Δf >200 kHz, Low Dist.) ..... > 20 dBm

ILS SIGNAL ANALYSIS

Input Level Range ..... -80...+10 dBm

Modulation depth (0…95 %)

Resolution.....0,01 %

Error 90/150 Hz ±2 % [1].....≤0,5 %

Error Voice/Ident .....≤1,0 %

AF Frequency

Error 90/150 Hz ±5 Hz [1].....≤0,05 Hz

Error 1020 Hz ± 50 Hz [1].....≤5,0 Hz

[1] max. frequency deviation of modulation signal

[2] o .r. = of reading

Phase angle 90/150 Hz

Measurement range..... 0...+120° or ±60°

Resolution..... 0,1°

Error ..... ≤0,2°

DDM-Measurement, Localizer Mode

Error ≤ ±10% DDM.....≤0,04 % DDM, ± 0,1 % o. r. [2]

Error > ±10% DDM.....≤0,04 % DDM, ± 0,2 % o. r. [2]

DDM- Measurement, Glideslope Mode

Error ≤ ±20% DDM.....≤0,08 % DDM ±0,1 % o. r. [2]

Error > ±20% DDM.....≤0,08 % DDM, ± 0,2 % o. r. [2]

MARKER BEACON SIGNAL ANALYSIS

Input Level Range ..... -80...+10 dBm

Modulation depth (80…100 %)

Resolution.....0,01 %

Error 400/1300/3000 Hz ±2 % [1].....≤0,5 %

Error ID-Tone 1020 Hz ±2 % [1].....≤1,0 %

AF frequency

Error 400/1300/3000 Hz ±50 Hz [1].....≤0,5 Hz

Error ID-Tone 1020 Hz ±20 Hz [1].....≤5,0 Hz

VOR SIGNAL ANALYSIS

Input Level Range ..... -80...+10 dBm

Azimuth

Resolution..... 0,01°

Error ..... ≤ ±0,1°

AM modulation depth (0…50 %)

Resolution.....0,01%

Error 30/9960 Hz ±2 % [1].....≤0,5 %

Error Voice/Ident .....≤1,0 %

Error AM distortion .....≤1,0 %

AF frequency

Error 30 Hz ±3 Hz [1].....≤0,03 Hz

Error 1020 Hz ±50 Hz [1].....≤5,0 Hz

Error 9960 Hz ±100 Hz [1].....≤0,5 Hz

FM deviation

Resolution.....0,1 Hz

Error ..... ≤0,1 Hz ±0,5 % o. r. [2]

Specifications

Frequency Scan (Option EVS-K1)

Frequency range .....70…350 MHz
Start/Stop / Center/Span adjustable between 70…350 MHz

Measurement range (Low Noise, Normal or Low Distortion) .....-120…+20 dBm

Resolution bandwidths ..... 1/3/10/30 kHz

IN- / OUTPUTS (FRONT PANEL)

RF Input (Channel 1).....N Connector, 50 Ω

RF Input (Channel 2; Option EVS-B1)
.....N Connector, 50 Ω

Audio Output.....3,5 mm mini jack

USB Twin port (for USB stick)

Antenna Supply
Output for feeding of active antenna

IN / OUTPUTS (REAR PANEL)

Remote Interface..... RS-232-1, 9 pin Sub-D-socket

GPS Interface (Option EVS-K2)
..... RS-232-2, 9 pin Sub-D- socket

LAN Interface .....RJ45, 100 BaseT

AUX power supply..... 12 V

DC input.....10...28 V

Baseband input ..... BNC socket

Analog output (2 ports)..... BNC socket

GENERAL DATA

Display..... 16,4 cm (6,4'') TFT Color display

Resolution.....640 x 480 Pixel

Temperature ranges

Operating Temperature .....-10 ... +55 °C

Storage Temperature.....-35 ... +70 °C

Power Supply

Mains..... 100...240 VAC, 1...0,6 A, 47...63 Hz

Safety ..... complies with EN61010-1

Internal Battery (Option EVS-B3). NiMH battery pack

Operating Time (10...45 °C) ..... 8…10 h

Charging Time ..... 4 h

External DC power supply ..... 10...28 V, 3 A (max.)

Mechanical resistance

Vibration (Sine) .....IEC 68-2-6

Random vibration
10 Hz...100 Hz, Acceleration 1 g (effective)

Shock
40 g Shock-Spectrum, MIL-STD-810D and MIL-T-28800D

Dimensions in mm (W x H x D).....350 x 147 x 219

Weight (without options).....5,7 kg

ORDER INFORMATION

Order designation .....ILS/VOR Analyzer

Type EVS300

Order Number..... 3544.4005.02

Accessories supplied

External power supply 100 ... 240 V, user manual, DC power cable

OPTIONS

Order designation	Type	Order Number
Second signal processing unit	EVS-B1	5200.6625.02
GSM modem	EVS-B2	5200.6631.02
Battery pack	EVS-B3	1102.5607.00
Frequency Scan Mode	EVS-K1	5200.6554.00
GPS Mode	EVS-K2	5200.6548.00
CRS|CLR Mode	EVS-K3	5200.9082.00

RECOMMENDED EXTRAS

Order designation	Type	Order Number
Protective bag	EVS-Z1	5200. 5812.00
Transport case	EVS-Z2	5200.6525.00
ILS (LOC / GS) / VOR dipole antenna	EVS-Z3	5200.6577.02
Carrying bag for ILS (LOC / GS) / VOR dipole antenna	EVS-Z4	5200.9999.00
DC DC Converter 12 V to 24 V	EVS-Z5	5200.6619.02
Spare battery pack	EVS-B3	1102.5607.00
ILS LOC / VOR directional antenna	HF-108	4061.0506.02
External Power Supply 100..240 V		5200.6583.00
User manual		3544.4486.12
Service manual		3544.4486.22