

R&S®EVS300 ILS/VOR Analyzer

High-precision level and modulation analysis of ILS and VOR signals

The R&S®EVS300 level and modulation analyzer is used for checking and servicing ILS and VOR installations. Its manifold new functions make it now also optimally suited for flight inspections.

More information at
www.rohde-schwarz.com
 (search term: EVS300)

For maximum precision on the ground and in the air

Its new functions enable the R&S®EVS300 level and modulation analyzer (FIG 1) to perform both ground-based and airborne measurements on ILS and VOR installations with maximum accuracy. The R&S®EVS300 allows for the first time the direct comparison and analysis of the results of both ground and flight inspection. The correlation of these two measurements complies exactly with the requirements of the International Civil Aviation Organization (ICAO, Doc. 8071). Despite its compact design, the R&S®EVS300 works with a measuring accuracy matching that of the best laboratory equipment and provides a convincing number of outstanding features:

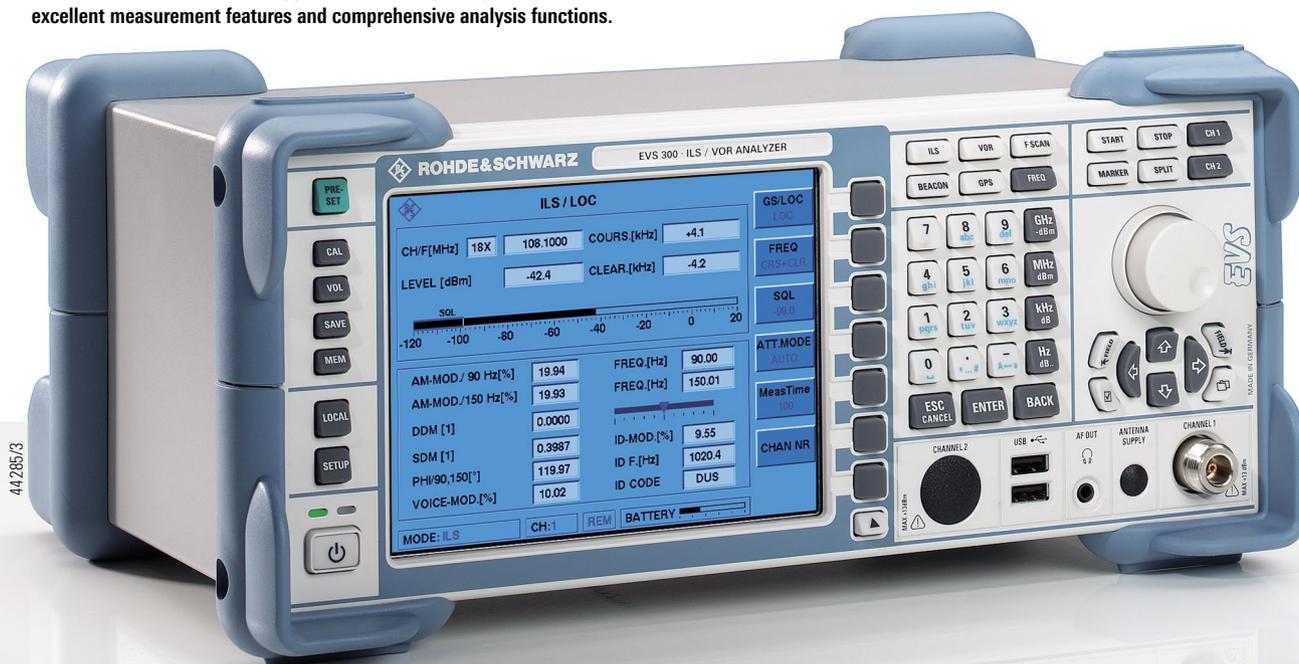
ILS signal analysis

- ◆ Highly accurate localizer, glidepath, and marker beacon measurements
- ◆ Parallel localizer and glidepath measurements (second independent signal processing channel, R&S®EVS-B1 option)
- ◆ Simultaneous course/clearance measurement with one signal processing channel (R&S®EVS-K3 option)
- ◆ Realtime distortion measurement of ILS signals (K2, K3, THD)

VOR signal analysis

- ◆ Accurate checking of CVOR / DVOR antenna systems in the field
- ◆ Selective modulation depth and deviation measurements, and display of useful and interfering signals

FIG 1 The R&S®EVS300 is rugged and extremely compact. Nevertheless, it stands out because of its excellent measurement features and comprehensive analysis functions.



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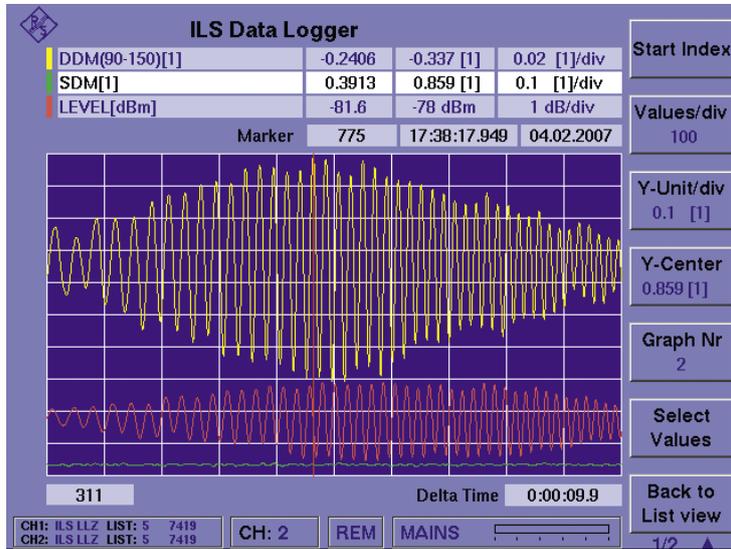


FIG 2 The ILS Data Logger display shows graphical representations of the DDM sequence, for example.

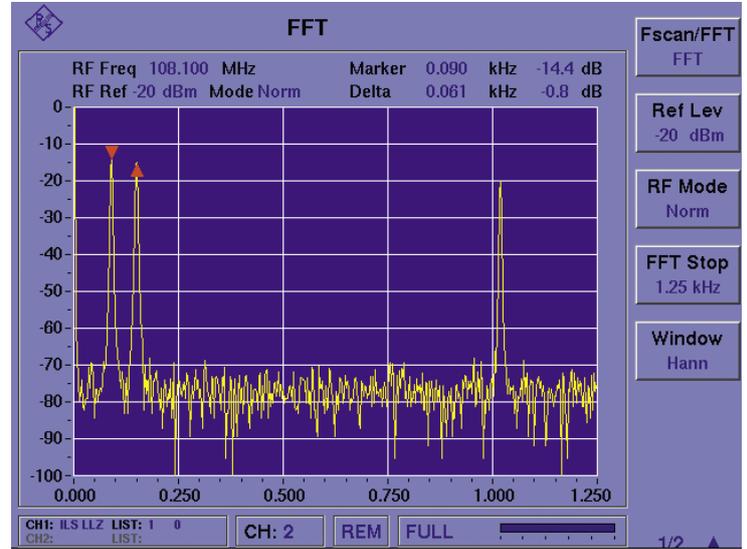


FIG 3 FFT analysis with the R&S®EVS-K4 option.

Additional special characteristics

- ◆ Steep-edge preselector filters for high immunity to interference
- ◆ Frequency scan (R&S®EVS-K1 option) with a dynamic range of up to 100 dB
- ◆ FFT analysis of AM signals (R&S®EVS-K4 option)
- ◆ Realtime logging of all measured values (max. 100 measurements per second)
- ◆ Mains-independent operating time of 8 h to 10 h during continuous measurements
- ◆ Rugged and compact design for use in the field
- ◆ Embedded web server enabling easy remote access
- ◆ Feeding of GPS time and position information based on the NMEA 0183 protocol (R&S®EVS-K2 option)

Multitalent for ground-based ILS measurements

Although ILS installations feature integrated monitoring functions, the regular measuring and servicing of these systems using independent equipment is an absolute must in modern air traffic control (ATC). In particular the dynamic

measurement of ILS signals by means of runway measurements with vehicles is a core task of ATC organizations. The R&S®EVS 300 is just made for these challenges as it offers numerous functions such as integrated logging of all relevant measured values including GPS position data, remote triggering, and graphical display of the DDM sequence (FIG 2). In combination with the R&S®HF108 antenna that has specifically been designed for these applications, it forms the core component of the measuring system. The R&S®EVS-K3 option enables simultaneous and independent measurements of level and phase relations of course / clearance signals of an ILS system during operation. Due to the high measuring speed and fast data logging, this option helps to save valuable time when the runway has to be closed for performing the measurements.

Ideal for use in flight inspection aircraft

Time is money – this is especially true for flight inspections. When equipped with a second measuring channel (R&S®EVS-B1 option), the R&S®EVS 300

is capable of performing two independent measuring tasks on any frequencies in parallel, e.g. the measurement of localizer and glideslope signals during a landing approach or the checking of two CVOR / DVOR systems.

When employed in a flight inspection aircraft, the R&S®EVS 300's steep-edge preselector filters prevent the development of intermodulation products in the vicinity of high-power VHF FM transmitters. In measurements along the edge of the coverage area, the low-noise front-end ensures a stable display even with signals far below the specified measurement range.

Because each measured value is correlated with the corresponding GPS position (R&S®EVS-K2 option), additional measuring instruments in the aircraft are basically not required. The R&S®EVS 300 also provides realtime storage of the results in its internal data memory. Thus, everything has been taken into consideration: Its numerous functions drastically reduce the complexity of measurement systems to be used for checking radio navigation systems in line with the ICAO Doc. 8071 recommendation.

► Options for every application

Various options allow the R&S®EVS300 to be optimally adapted to the measuring task at hand: The R&S®EVS-K1 option features an additional continuous frequency scan in the range from 70 MHz to 350 MHz. The dynamic range extends up to 100 dB, and the start/stop frequencies are user-selectable. The noise floor is below -130 dBm.

The R&S®EVS-K4 option allows the FFT analysis of demodulated RF signals or signals at the baseband input at a dynamic range above 90 dB (FIG 3). ILS/VOR/marker beacon modulation signals including their harmonics can thus be analyzed as easily as nonharmonics.

Both for frequency scan and FFT, the R&S®EVS300 offers convenient visualization of the spectrum via a marker/delta marker function, as well as via the clear/write, average, and peak hold trace modes.

Large data memory and clearly structured visualization

The large internal data memory enables the R&S®EVS300 to simultaneously store all 50 measured values in a single data set at the highest data rate of 100 measurements per second. For every mode (ILS/VOR/marker beacon) up to 999 individual lists with up to 1000000 data sets each can be managed. The R&S®EVS300 visualizes the stored measured values quickly in a clearly structured graphical representation. This unique feature enables, for example, the immediate verification of runway measurement data on board the measuring vehicle without the need to use an external PC or additional software. For archiving or further processing the measurement results can be transmitted from the data memory via standard interface (LAN, RS-232-C, GSM) or simply copied to a USB memory stick.

High-convenience operation

Despite its multitude of functions, the R&S®EVS300 is convenient to operate. Its low weight and the rechargeable batteries' operating time of eight to ten hours during continuous measurements ensure mains-independent applications. It can be completely remote-controlled via one of the standard interfaces by means of remote-control commands. This allows automatic ILS or VOR measurements to be performed under constant measurement conditions.

Summary

The R&S®EVS300 with its extensive scope of functions represents an ideal instrument for ground-based and airborne ILS/VOR/marker beacon measurements. Its extremely fast measurement data processing, remote control capability, and large internal data memory round out its well-thought-out design.

Klaus Theissen; Benjamin Marpe

General R&S®EVS300 characteristics

- ◆ High-contrast TFT color display (16.4 cm / 6.4")
- ◆ Wide operating temperature range of -10 °C to $+55$ °C
- ◆ Low weight (approx. 5.7 kg)
- ◆ High mechanical resistance
- ◆ Analog output enabling subsequent analysis of received signals in the baseband
- ◆ Analysis of external baseband signals
- ◆ Selftest (BITE)
- ◆ LAN, RS-232-C, and GSM interface for remote control of all functions and for measurement data output
- ◆ USB connector for easy data export and software updates

Condensed data of the R&S®EVS300

Frequency range	70 MHz to 350 MHz
Absolute level	-120 dBm to $+13$ dBm
Deviation at -30 dBm	<0.8 dB
Linearity error (-40 dB to $+30$ dB)	<0.5 dB
Inherent noise (BW 16 kHz)	typ. -119 dBm
ILS	
DDM measurement, localizer mode	
Deviation $\leq \pm 10\%$ DDM	$\leq 0.04\%$ DDM $\pm 0.1\%$ of reading
Deviation $> \pm 10\%$ DDM	$< 0.04\%$ DDM $\pm 0.2\%$ of reading
DDM measurement, glideslope mode	
Deviation $\leq \pm 20\%$ DDM	$< 0.08\%$ DDM $\pm 0.1\%$ of reading
Deviation $> \pm 20\%$ DDM	$< 0.08\%$ DDM $\pm 0.2\%$ of reading
VOR	
Azimuth resolution	0.01°
Azimuth deviation	$\leq \pm 0.1^\circ$