



Test Receiver ESVN40

Measurement of useful and interference signals from 9 kHz to 2.75 GHz

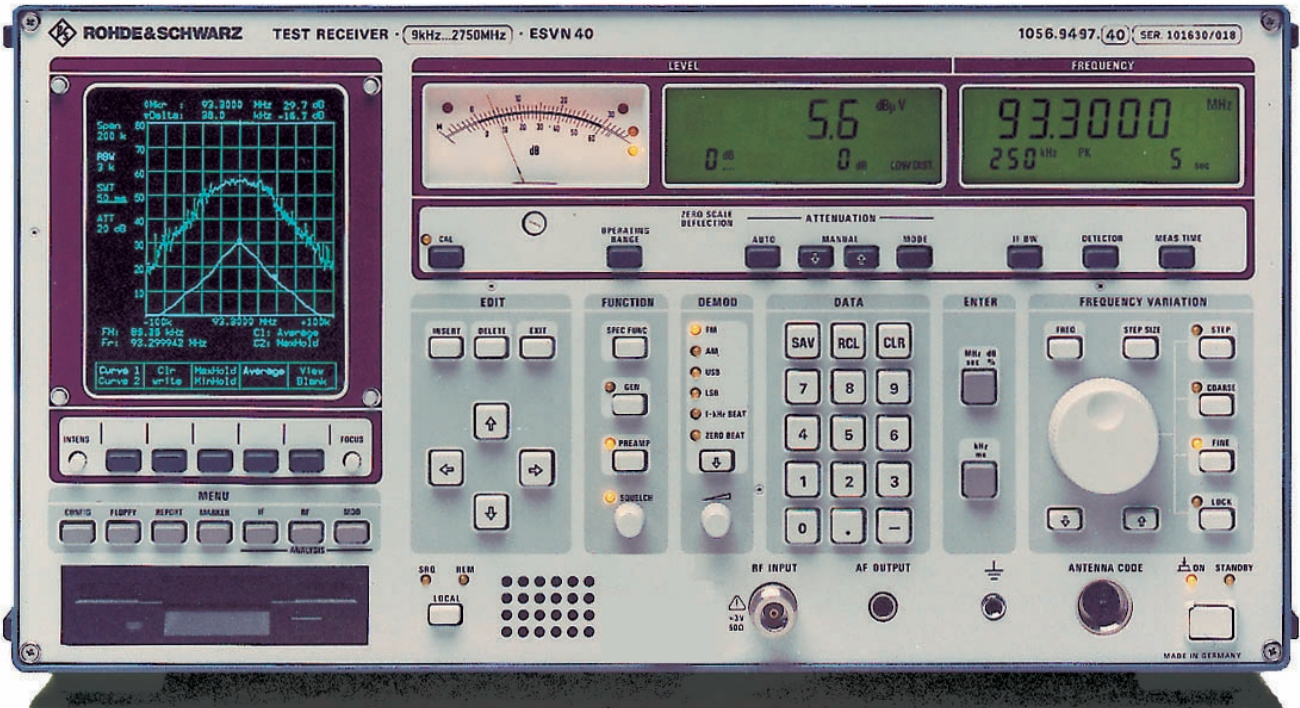
- Field-strength measurements using test antennas
- Radiomonitoring to CCIR
- Coverage measurements
- Radio interference measurements to EN 55011 to 55022, ETS, FCC, ANSI C63.4, VCCI and VDE 0871 to 0879
- Manual operation or automatic mode with spectrum display on screen and report of results on printer or plotter

- Operation from AC supply or battery

Test Receiver ESVN40 is used to measure and demodulate both amplitude-modulated (DSB, SSB, pulse) and frequency-modulated signals as well as narrowband and broadband interference in the range from 9 kHz to 2750 MHz.

His high overload capability, wide dynamic range, high measurement rate and versatile evaluation capability makes the test receiver an ideal tool for

- all applications in the fields of radiomonitoring, radio frequency management and radio network planning
- civil RFI measurements to all relevant standards



Test Receiver ESVN40 combines three different types of test receivers in one:

- a compact, manually tuned and battery-operated test receiver
- a test receiver which automatically performs measurements and reports the results
- a system-compatible test receiver

Superior RF circuit design

- Great measurement accuracy: error <1 dB; typ. <0.5 dB
- High-speed synthesizer: fast frequency scans, frequency resolution down to 10 Hz/100 Hz
- Wide dynamic range: noise figure typ. 7 dB with preamplifier, 12 dB without preamplifier, third-order intercept point typ. 20 dBm (without preamplifier)
- Full evaluation capability required for radiomonitoring: measurement of modulation depth and frequency or phase deviation, frequency and frequency-offset measurements with

built-in IF counter, SSB demodulator and audio squelch

- Large choice of IF filters (1/3/9/15/120/250 kHz)
- Demodulator for TV signals with switchover of standards

Powerful processor

- Automatic test runs over up to 400 freely selectable channels with programmable thresholds
- Automatic level calibration
- Automatic consideration of frequency-dependent transducer factors, eg of antennas
- Nonvolatile storage of 10 complete instrument setups, 22 different antenna factors and limit lines

Optimum result display for every application

- Measurement of voltage, field strength and current with full indication of units
- Indication of level on analog meter

and digital display with 0.1-dB resolution

- Display of modulation depth with 0.1% resolution, deviation with resolution down to 1 Hz, frequency or frequency offset with resolution down to 0.1 Hz
- Display of frequency spectra (RF analysis) including limit values
- IF analysis with spans of up to 10 MHz for the visual check of spectra during manual measurements
- Connector for TV monitor to identify TV programs

Full storage and hardcopy of results

- Built-in 3¹/₂" disk drive for storing results and instrument setups
- Output of results as lists and diagrams on plotter or printer including limit lines and user-defined labelling

Manual operation

The test receiver performs the measurements at a fixed frequency with the desired bandwidth, attenuation, measurement time and mode of indication. The following measurements are carried out simultaneously:

- level measurement
- modulation and deviation measurement
- frequency and frequency-offset measurement

Thanks to the simultaneous measurements, the parameters of the receive signal can be determined in a single test cycle. The level is indicated both on a digital LC display and an analog meter. This is ideal for alignments or for the determination of maximum signal strength, eg for manual direction finding of transmitters or interference sources. The results of modulation and frequency measurements are digitally displayed on the screen.

IF analysis

While measurements are taking place, IF analysis allows the spectrum to be examined about the receive frequency. Measurement of level, modulation and frequency, and signal assessment using the built-in loudspeaker are made at the center frequency of the extended spectrum. The following settings are available for the frequency spectrum analyzed via the receive channel:

- span: 10 kHz to 10 MHz
- resolution bandwidth: 1/3/10 kHz
- level display range: 80 dB
- sweep time: 50 ms to 20 s

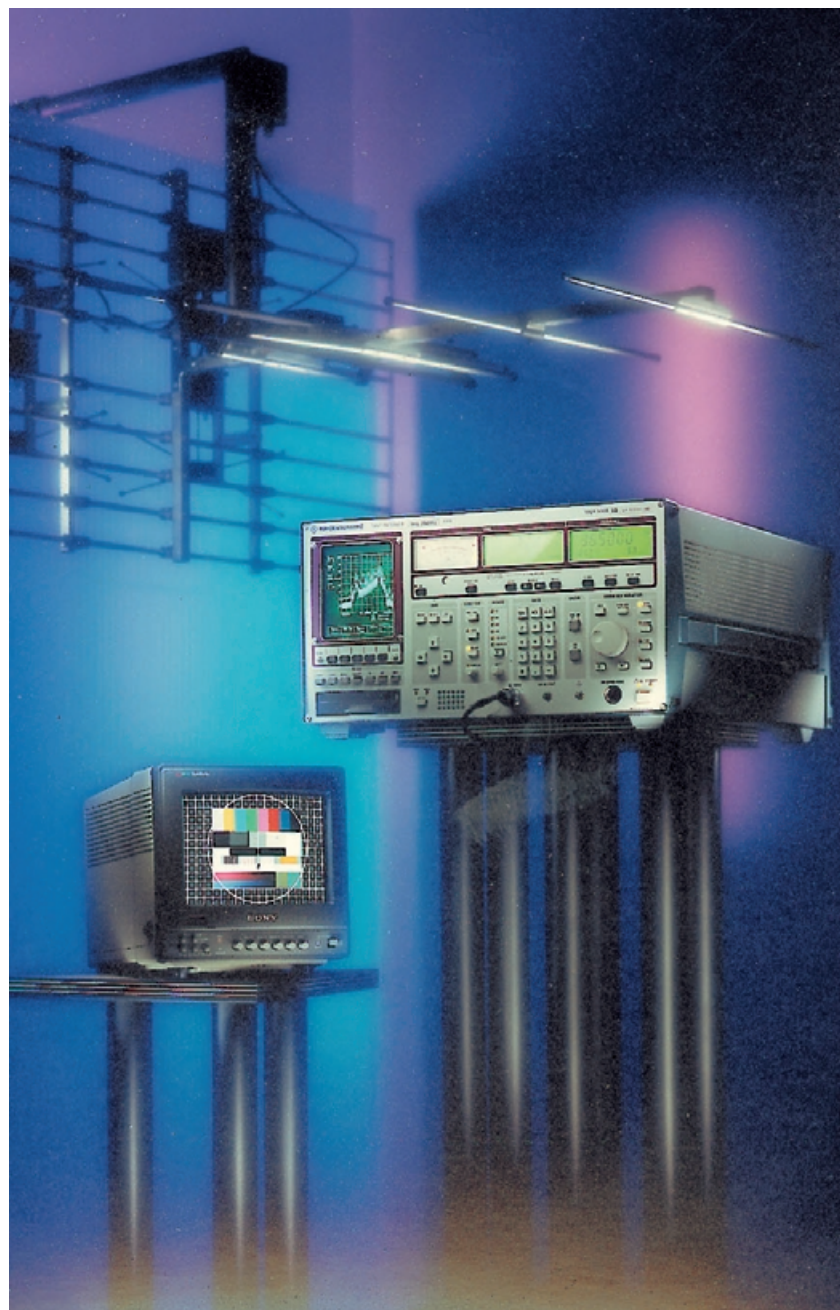
Two test waveforms can be displayed simultaneously on the screen. The display mode for the two curves can be selected independently from one another to suit the task:

- Max Hold: to locate pulse-shaped or brief signals
- Max/Min: to locate CW signals, eg in TV channels (the CW signal stands out in the min curve)
- Average: to suppress broadband signals and thus highlight narrow-band signals

These display modes allow fast identification and measurement of useful and interference signals in a signal spectrum. Marker functions are provided for the rapid evaluation and measurement of the signals identified in the receive channel:

- Marker → Peak: The maximum level of the spectrum is determined.
- Marker → Center: fast measurement of the desired signal in the receive channel

The integrated TV demodulator allows TV program identification via an external TV monitor



Automatic operation

RF analysis

The receive frequency range is scanned and the result displayed as a spectrum on the screen. Free selection of the measurement parameters such as start frequency, stop frequency, IF bandwidth, measurement time, attenuation, indication mode is possible. Single or recurrent scanning can be selected. It is possible to display two test curves simultaneously. For comparison measurements waveforms can also be loaded from a floppy.

Three different modes are available for frequency scanning:

Overview: Scanning over the desired frequency range is at a maximum speed and with fixed attenuation. It is quasi-continuous and at a high sweep rate so that all signals are covered.

Scan: Scanning is quasi-continuous, the step size and measurement time being selectable. Thanks to automatic attenuation setting, an extremely wide dynamic range is available at full measurement accuracy. Up to five sub-scans with free selection of the test parameters can be joined to ensure optimum setting for each subscan.

Channel: The receiver performs a scan over a defined frequency data set with up to 400 different frequency values. The channel mode is ideal for radiomonitoring. The measurement can be triggered at a specific frequency by an adjustable threshold with defined dwell time which in turn switches a carrier-operated relay (COR). The results (level, modulation, frequency offset) can be output automatically together with the time of the day as lists on a printer. Thus it is possible to use ESVN40 alone without an external computer for unattended

radiomonitoring over long periods of time.

Thanks to the built-in preselection filters, a high overload capability, bandwidths to CISPR 16 and VDE0876 and quasi-peak and average value weighting to standard from 150 kHz on, the receiver can be used for the fields of civil **RFI measurements** in addition to radiomonitoring and high-precision useful-signal measurements. Nonvolatile storage of 22 limit lines with up to 50 values is possible, two of them can be displayed on the screen at any given time.

The results can be made available in graphical form or as lists via a plotter or printer or stored on a floppy with the associated complete receiver set-up. Any relevant information can be added to the test report either by entering it via a line editor or, more conveniently, via an external keyboard. Parameters stored in the receiver such as date, time and receiver settings are automatically recorded. Results loaded from a floppy will be processed, compared with a measurement or documented in the same way as measured values.

From shortwaves to microwaves: ESVN40 together with an appropriate antenna is upgraded to a fully automatic radiomonitoring system without the use of an external controller



Radiomonitoring

The test receiver is able to perform all important radiomonitoring and measurement tasks in manual, semi-automatic and fully automatic operation:

- Field-strength measurements to CCIR Rec. 378-4 with R&S test antennas and direct display of the results
- Frequency and frequency-offset measurements with internal or external precision reference
- Modulation depth, frequency deviation and phase deviation measurements
- Visual spectrum monitoring with RF and IF analysis
- IF analysis with aural check of the received signal using AM, FM and SSB demodulators with selectable AF bandwidths and AF squelch or using a TV monitor for identifying TV signals

Use in computer-controlled systems

Full use of the high measurement rate of the test receiver is possible only in the remote mode using a high-speed controller. In the determination of field-strength profiles, the test receiver is able to furnish 5000 measured values per second after being triggered by a positioning system or a time base. 3000 measured values with a dynamic range of up to 100 dB are available when the special autorange function is used.

The field strength can be determined at different frequencies within a particular frequency band at a rate of 2.5 ms per measured value. With cellular networks it is thus possible to measure for instance the field strength of several base stations according to

Lee's statistical method using a single receiver at the normal speed of the test vehicle.

For radiomonitoring, up to 10,000 frequencies can be stored in the receiver and combined to give a maximum of 100 segments. A set of 20 different receiver setups at the most can be assigned to each segment. The modulation limit values can be defined separately for each segment. The measurement results (level, modulation, frequency) are output to the controller either by blocks, continuously or depending on a limit-value violation automatically detected by the receiver (alert mode). Automatic user-port control with programmable wait time allows even complex test sequences involving several antennas to be carried out.

Interfaces

For further signal analysis and for driving or feeding add-on units, the test receivers have the following interfaces:

- Coding and supply socket (ANTENNA CODE) for active antennas and other accessories
- 10.7-MHz IF output, switchable between regulated and unregulated IF voltage for connection to a direction finder (external access to the control voltage is possible) or assessment of the IF signal, eg using an oscilloscope
- CCVS (composite colour video signal) output for connection to a TV monitor, switchable between positive and negative video polarity, measurement of the vision carrier or one sound carrier selectable with simultaneous display of the picture on the monitor through access to the internal LO
- AM/FM output for the demodulated (DC-coupled) AF for evaluation

of an audio signal on an oscilloscope or for measurement of transients

- In-phase and quadrature outputs for the most general type of demodulation, eg for connection to A/D converters and further processing of digital modulations in an external computer
- USER INTERFACE with
 - 6 TTL ports for controlling external devices, eg a carrier-operated relay (COR) or for automatic antenna switchover during a frequency scan
 - Input for external triggering of test runs
 - Input for external setting of the gain associated with the regulated IF output or the I/Q outputs
 - Outputs for the analog indication voltage to allow connection to a line recorder
 - Symmetrical and floating 600-Ω audio output for transmitting the AF signal via 600-Ω lines (option)
 - Serial interface for reprogramming the built-in flash EPROMs when updating the firmware via an AT-compatible computer
- Parallel interface (PRINTER INTERFACE) for connection to a printer
- IEC/IEEE-bus interface; it meets IEEE 488-2; the level is output with a resolution of 0.01 dB.
- Connector for an MF-compatible keyboard for text entry
- Input for an external reference frequency (5 MHz or 10 MHz)
- Output (10 MHz) for the internal oven-controlled crystal reference
- Connector (11 V to 33 V) for battery-powered operation, eg in a vehicle

Technical features at a glance

ESVN40 is a multiple-heterodyne receiver covering the frequency range from 9 kHz to 2750 MHz. Features to be highlighted are as follows:

- RF attenuator switchable in 10-dB steps from 0 dB to 120 dB
- Ten fixed-frequency and five tracking preselection filters up to 2750 MHz
- Preamplifier with wide dynamic range, can be connected between preselection filter and 1st mixer
- Crystal-stabilized synthesizer as 1st LO, variable in 10-Hz or 100-Hz steps, sweep mode for fast frequency scans
- High-level mixer ensuring high isolation of the 1st LO for converting the input frequency to the first IF
- IF filters for all analog radio services with bandwidths between 1 kHz and 250 kHz; 9-kHz and 120-kHz filters with low delay distortion for quasi-peak and average value measurements to CISPR 16
- High-linearity envelope detector with a dynamic range of more than 70 dB
- Peak, average, rms and quasi-peak detectors
- Automatic overload detection in the mixer stage and in the test channel by permanently active peak detectors
- Logarithmic amplifier with a dynamic range of more than 70 dB
- 12-bit A/D converter with short conversion time
- Measurement time adjustable between 1 ms and 100 s, 50 μ s for overview measurements
- Thanks to flash EPROMs, convenient and fast firmware updating without opening the instrument
- Automatic calibration at a key-stroke with the aid of an internal high-precision generator
- Frequency and frequency-offset measurements with built-in frequency counter
- Demodulators for measuring modulation depth and frequency and phase deviation
- Demodulator circuits for FM, AM, SSB (LSB and USB), zero beat and 1-kHz beat; built-in loudspeaker with headphones connector; demodulation using signal processors
- Separate signal channel with 5-MHz bandwidth and demodulator for TV signals, standard switch-over from negative to positive video polarity
- Automatic monitoring of all synthesizer loops and supply voltages during operation
- 3 1/2" floppy disk drive with storage capacity of 1.44 Mbyte
- IF analysis with resolution bandwidth 1 kHz, 3 kHz and 10 kHz; span 0.01 MHz to 10 MHz; runs in parallel with level measurement
- Detection of faulty modules by self-test facilities

Design

The service-friendly modular design of ESVN40 and the strict compliance with EMC rules ensure excellent specifications regarding RFI emission and immunity.

Comprehensive self-test functions allow troubleshooting down to the functional-block level signalling to the user the impaired function. Thus the faulty module can easily be found and replaced with a minimum of effort and without affecting the other modules.

Rear-panel inputs/outputs



Specifications

Frequency range 9 kHz to 2750 MHz
subdivided into

	Range I	Range II	Range III	Range IV
ESVN40	–	20 MHz to 1000 MHz	1000 MHz to 2050 MHz	–
ESVN40 with options ESVN-B1 and ESVN-B2	9 kHz to 30 MHz	30 MHz to 1000 MHz	1000 MHz to 2050 MHz	2050 MHz to 2750 MHz

Frequency setting with tuning knob fine, coarse or any step size selectable

Range	fine	coarse
I, II with SSB demodulation	10 Hz	10 kHz
II, III, IV	100 Hz	100 kHz

Numerical Step size Automatic scanning Display Resolution by keyboard entry any size selectable for RF analysis 8-digit LCD range I, II with SSB demod.: 10 Hz ranges II + III: 100 Hz

Frequency error after 30 minutes of warmup $1 \cdot 10^{-7}$
Temperature drift $1 \cdot 10^{-9}/^{\circ}\text{C}$
Aging $1 \cdot 10^{-7}/\text{year}$

RF input $Z_{in} = 50 \Omega$, N female
RF attenuator 0 to 120 dB, switchable in 10-dB steps VSWR
9 kHz to 1000 MHz <math>< 1.2</math> at 10-dB RF attenuation <math>< 2</math> at 0-dB RF attenuation
1000 MHz to 2750 MHz <math>< 1.35</math> at 10-dB RF attenuation <math>< 2</math> at 0-dB RF attenuation

Input filters
Range I five fixed-frequency bandpass filters
Range II one fixed-frequency and five tracking bandpass filters
Range III four fixed-frequency bandpass filters
Range IV three fixed-frequency bandpass filters

Preamplifier can be connected between input filter and 1st mixer
Gain 10 dB

Oscillator reradiation at RF input (0-dB RF attenuation)

	Preamplifier off	Preamplifier on
9 kHz to 1000 MHz	<math>< 20</math> dB μV	<math>< 10</math> dB μV
1000 MHz to 1900 MHz	<math>< 50</math> dB μV	<math>< 40</math> dB μV
1900 MHz to 2750 MHz	<math>< 60</math> dB μV	<math>< 50</math> dB μV

Interference rejection, nonlinearities

	9 kHz to 1000 MHz	1000 MHz to 1900 MHz	1900 MHz to 2750 MHz
Image frequency	>90, typ. 100 dB	>80, typ. 100 dB	>70, typ. 90 dB
1st IF	>90, typ. 100 dB	>90, typ. 100 dB	>90, typ. 100 dB
2nd IF	>90, typ. 100 dB	>90, typ. 100 dB	>90, typ. 100 dB
IF rejection	>90, typ. 100 dB	>90, typ. 100 dB	>90, typ. 100 dB

	Preamplifier off	Preamplifier on
Intercept point d3	$P_{f1,f2} = -10$ dBm	$P_{f1,f2} = -20$ dBm
Range I, $f_{in} > 2$ MHz ($B_{IF} < 15$ kHz, $ f1-f2 \geq 100$ kHz)	>15, typ. 20 dBm	>0, typ. 5 dBm
Range II ($ f1-f2 \geq 10$ MHz) $f_{in} < 50$ MHz $f_{in} \geq 50$ MHz	typ. 15 dBm >15, typ. 20 dBm	typ. 5 dBm >5, typ. 10 dBm
Ranges III, IV ($ f1-f2 \geq 10$ MHz)	>13, typ. 18 dBm	>3, typ. 8 dBm
Intercept point k2		
Range I	>40 dBm	>20 dBm
Range II	>35 dBm	>25 dBm
Ranges III, IV	>50 dBm	>40 dBm

Maximum input level

RF attenuation 0 dB	
DC voltage	50 V
Sinewave AC voltage	130 dB μV
Spectral pulse density	97 dB $\mu\text{V}/\text{MHz}$
RF attenuation >0 dB	
DC voltage	7 V (corresponding to 1 W)
Sinewave AC voltage	137 dB μV
Max. pulse voltage	
Range I	700 V
Ranges II, III and IV	150 V
Max. pulse energy (10 μs)	
Range I	100 mWs
Ranges II, III and IV	1 mWs

RF shielding

Voltage indication at a field strength of 10 V/m at 0-dB RF attenuation ($f \neq f_{in}$) <math>< 0</math> dB μV
Additional error in CISPR indication range (10 V/m) <math>< 1</math> dB

Intermediate frequencies

	Range I	Range II	Ranges III, IV
1st IF	74.7 MHz	1354.7 MHz	394.7 MHz
2nd IF	10.7 MHz	74.7 MHz	74.7 MHz
3rd IF	100 kHz	10.7 MHz	10.7 MHz
4th IF		100 kHz	100 kHz

IF bandwidths

Nominal bandwidth	-3 dB	-6 dB	Shape factor $BW_{6\text{dB}}/BW_{3\text{dB}}$
1 kHz	1 kHz $\pm 20\%$	1.2 kHz $\pm 20\%$	1:2.8
3 kHz	3 kHz $\pm 10\%$	3.15 kHz $\pm 20\%$	1:1.8
9 kHz*)	7 kHz $\pm 20\%$	9.5 kHz $\pm 10\%$	1:2.2
15 kHz	15 kHz $\pm 10\%$	17 kHz $\pm 20\%$	1:1.8
120 kHz*)	90 kHz $\pm 20\%$	120 kHz $\pm 10\%$	1:5
250 kHz	250 kHz $\pm 20\%$	330 kHz $\pm 10\%$	1:3.7

*) Tolerance to CISPR 16.

For SSB demodulation a 2.4-kHz IF filter is connected into the audio channel. Different customer-specific bandwidths available on request.

Noise indication (average value, BW=1 kHz)

	Preamplifier off	Preamplifier on
Range I ($f_{in} > 50$ kHz)	<math>< -22</math> dB μV , typ. -27 dB μV	<math>< -28</math> dB μV , typ. -33 dB μV
Range II	<math>< -18</math> dB μV , typ. -23 dB μV	<math>< -22</math> dB μV , typ. -28 dB μV
Ranges III, IV	<math>< -16</math> dB μV , typ. -22 dB μV	<math>< -22</math> dB μV , typ. -28 dB μV

RMS value noise indication average value +1 dB (typ.)

Peak value noise indication average value +12 dB (typ.)

Quasi-peak (typ. value)
Band B (150 kHz to 30 MHz) -13 dB μV -19 dB μV
Bands C/D (30 MHz to 1000 MHz) +2 dB μV -4 dB μV

Voltage measurement range

Lower limit (additional error caused by inherent noise <math>< 1</math> dB)
Average value (AV) 4 dB above noise indication
RMS value (RMS) 5 dB above noise indication
Peak value (PK) 15 dB above noise indication
Quasi-peak value (QP), 100-Hz pulse frequency 3 dB above noise indication
Upper limit
AV, RMS, PK, QP 137 dB μV (RF attenuation >0 dB)
Inherent spurious responses (equivalent input voltage)
Range I <math>< -10</math> dB μV
Ranges II, III and IV <math>< 0</math> dB μV

Level display

Digital 3 digits in dB μV , dB μA , dBm, dB $\mu\text{V}/\text{m}$, dB $\mu\text{A}/\text{m}$, dBpW, resolution 0.1 dB

Analog	on moving-coil meter in operating range of IF detector with additional digital display of lower range limit 30 dB, 60 dB
Operating ranges	
Screen	5" CRT with digital memory
Resolution	1024 pixels x 1024 pixels
RF analysis	
Display range	
X axis (frequency)	freely selectable, linear or logarithmic
Y axis (level)	10 dB to 200 dB, adjustable in 10-dB steps
Test curves	max. 2 traces
Display modes	Clr/Write, Max Hold, View
Frequency scan modes	
Overview	scan with fixed attenuation and step size at maximum speed
Scan	scan with automatic attenuation setting and selectable step size
Channel	scan at up to 400 predefinable frequency values
Marker	2 markers with digital display of frequency and level
Marker functions	normal marker, delta marker, marker to peak, marker to receiver frequency
Indication modes	average value (AV), rms value (RMS), peak value (PK), quasi-peak value (QP, $f_{in} > 150$ kHz)
Measurement time	1 ms to 100 s (1/2/5 steps)

Measurement error (digital display, average value for S/N > 16 dB)	
Range I	< 1 dB
Range II 0°C to +55°C	< 1 dB
-10°C to 0°C	< 1.5 dB
Ranges III, IV	< 2 dB
Internal level calibration	short or total calibration by keystroke
Generator	sinewave and harmonics generator
Frequency drift	digital in kHz
Resolution	0.1 Hz to 100 Hz
Measurement range	0.5 · IF bandwidth
Measurement time	1 ms to 100 s
Measurement error	see frequency error
Frequency deviation	digital in kHz
Resolution	0.1 kHz/0.01 kHz
Measurement range	deviation + $f_{mod} < 0.5 \cdot$ IF bandwidth
Modulation frequency f_{mod}	< 100 kHz
Measurement error for S/N > 40 dB, AF = 1 kHz, IF bandwidths	
1/3/9 and 15 kHz	100 Hz + 3% of measured value
IF bandwidths 120 and 250 kHz	2 kHz + 3% of measured value
Phase deviation (bandwidths 1/3/9/15 kHz)	digital in rad
Resolution	0.1 rad
Maximum deviation	8 rad
Modulation frequency	300 Hz to 5 kHz
Measurement error for S/N > 40 dB, AF = 1 kHz	0.1 rad + 5% of measured value
Modulation depth	digital in %
Resolution	0.1%
Measurement range	1 to 99%
Modulation frequency f_{mod}	< 100 kHz
Measurement error for S/N > 40 dB, m = 50%, AF = 1 kHz	< 5% (absolute)

IF analysis	
Frequency display	
Range I	10 kHz to 2 MHz, 1/2/5 steps
Ranges II, III and IV	10 kHz to 10 MHz, 1/2/5 steps
Level display range	80 dB
Attenuation switchover (in IF path)	0 dB/20 dB

Resolution bandwidths (-3 dB)	1 kHz/3 kHz/10 kHz
Sweep time	50 ms to 10 s, 1/2/5 steps
Number of test curves	max. 2 traces
Display modes	Clr/Write, Max Hold, Min Hold, Average, View
Marker	2 markers with digital display of frequency and level
Marker functions	normal marker, delta marker, marker to peak, marker to center frequency (= receiver frequency)
AF demodulation modes	zero beat, 1-kHz beat, AM (for A3E emissions), USB and LSB (for SSB emissions), FM (for F3E emissions) adjustable with front-panel knob
Squelch	
Trigger functions	
External	TTL level, positive- or negative-going edge
Internal	controlled by RF level, threshold adjustable
Date, time of day	internal clock, permanently operated from internal battery

Connectors and interfaces

Remote control	interface to IEC 625-2 (IEEE 488)
Remote-control connector	24-contact Amphenol female
Interface functions	AH1, L4, SH1, T6, SR1, PP1, RL1, DC1, DT1, C1, C2, C3, C11
Plotter	via IEC/IEEE bus
Plotter language	HP-GL
Printer	parallel interface (15-contact Cannon female connector)
Keyboard	5-contact DIN female connector
Floppy disk drive	3 1/2", 1.44 Mbyte, formatted, for storing instrument setups, results, transducer factors and limit lines MS-DOS-compatible
Formatting	
Front-panel outputs	Supply and coding connector for antennas, etc.
AF output	12-contact Tuchel female
EMF	$Z_s = 10 \Omega$, jack JK34 adjustable up to 1.5 V
Rear-panel outputs	
IF 10.7 MHz	$Z_s = 50 \Omega$, BNC female, switch-selected between levelled and unlevelled IF voltage, bandwidth = IF bandwidth
EMF in range of analog level display for unmodulated sinewave signal	
Unregulated output	
Operating range	30 dB
60 dB	1 mV to 30 mV
700 mV	1 mV to 1 V
Regulated output	700 mV
AM/FM	output for demodulated AF voltage
Output voltage (EMF)	
AM, m = 50% (DC-coupled)	2 V_{pp}
FM (DC-coupled)	
Bandwidth 1 kHz/3 kHz	2 V/kHz
9 kHz/15 kHz	0.2 V/kHz
120 kHz/250 kHz	0.3 V/10 kHz
Φ M (AC-coupled)	0.2 V/rad
I/Q demodulator output	BNC female connector
Z_s	50 Ω , external load > 200 Ω
EMF (peak value, regulated)	3 V, can be switched to external control
Bandwidth	0.5 · IF bandwidth
Phase error between I and Q for S/N > 40 dB, output frequency 10 kHz to 100 kHz	< 1°, typ.

CCVS output	BNC female connector for CCVS TV monitor, video polarity and vision/sound carrier offset can be selected for all TV standards
Reference output	BNC female connector, can be switched to input for external reference
Frequency	10 MHz
Level	7 dBm
User port	25-contact Cannon female connector, includes 6 TTL control lines for an external device (eg driven by RF level), analog voltage indication, input for external triggering, input for IF control, RS-232-C interface for firmware update
Rear-panel inputs	
External battery	3-contact connector
Reference input	BNC female, can be switched to reference output
Level required	EMF >1 V from 50 Ω
Frequency	5 MHz/10 MHz

General data

Rated temperature range	-10°C to +55°C (condensation not permissible)
Operation of floppy disk drive	+5°C to +50°C
Storage temperature range	-25°C to +70°C
Mechanical resistance	shock-tested to MIL-STD 810 D (shock spectrum 40 g), vibration-tested to MIL-T-28800 D, class 5, complies with IEC Publ. 68-2-6
EMC	complies with VDE 0876, part 1a, regulation 527/1979, MIL-STD-461C (CE03 and RE02) and EN50081-1/EN50082-1
Power supply	
AC supply	100 V/120 V/240 V ±10%, 230 V +6%/-10%, 47 Hz to 420 Hz, safety class I to VDE 0411
Power consumption	155 VA
Battery (external)	11 V to 33 V (switch-on voltage >12 V) 4.4 A at 24 V/8 A at 12 V
Dimensions (W x H x D)	435 mm x 236 mm x 572 mm
Weight	35 kg incl. ESVN-B1 and ESVN-B2 32 kg without options



Ordering information

Order designation

Test Receiver (20 MHz to 2050 MHz)	ESVN40	1056.9497.40
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Accessories supplied

power cable, connector for external battery, N/BNC adapter, viewing hood, operating manual

Options

Frequency Extension 9 kHz to 20 MHz	ESVN-B1	1070.4501.02
2050 MHz to 2750 MHz	ESVN-B2	1070.4001.02
Balanced 600-Ω Audio Output	ESN-B3	1056.9422.02

Recommended extras

Current Probe, 20 Hz to 100 MHz for EMS measurements	EZ-17	816.2063.02
	EZ-17	816.2063.03
VHF Current Probe, 20 MHz to 300 MHz	ESV-Z1	353.7019.02
Absorbing Clamp 30 MHz to 1000 MHz	MDS-21	194.0100.50
0.3 MHz to 2500 MHz	MDS-22	1052.3507.02
Ferrite Clamp, 1 MHz to 1000 MHz	EZ-24	1107.2535.02
Active Probe, 9 kHz to 30 MHz (high impedance)	ESH2-Z2	299.7210.52
Passive Probe, 9 kHz to 30 MHz (VDE 0876)	ESH2-Z3	299.7810.52
4-line V-Network, 9 kHz to 150 kHz/ 30 MHz (VDE 0876)	ESH2-Z5	338.5219.52
2-line V-Network	ESH3-Z5	831.5518.52
Double Two-Wire ISN to CISPR22	ENY22	1109.9508.02
Four-Wire ISN to CISPR22	ENY41	1110.0175.02
V-Network, 5 μH 50 Ω	ESH3-Z6	836.5016.52
Antenna Impedance Converter	EZ-12	1026.4800.03

Antennas and accessories

Loop Antenna, 9 kHz to 30 MHz	HFH2-Z2	335.4711.52
Log-periodic Broadband Antenna, 80 MHz to 1300 MHz	HL023A1	577.8017.02
Biconical Antenna, 20 MHz to 300 MHz	HK116	4000.7752.02
Log-periodic Antenna, 200 MHz to 1300 MHz	HL223	4001.5501.02
Log-per. Antenna, 400 MHz to 3000 MHz	HL040	4035.8755.02
Ultra Broadband Antenna Ultralog, 30 MHz to 3000 MHz	HL562	4041.3000.02
Adapter (BNC female to N male)		118.2812.00
Preamplifier, 10 dB, 20 MHz to 1000 MHz	ESV-Z3	397.7014.52
Tripod	HFU-Z	100.1114.02
Mast (for tripod)	HFU-Z	100.1120.02
Wooden Tripod	HZ-1	837.2310.02
RF Connecting Cable, 7 m	HFU2-Z5	252.0055.56
12 m	HFU2-Z4	252.0090.56

Other accessories

Keyboard German	PSA-Z1	1009.5001.31
English	PSA-Z1	1009.5001.32
Service Manual		1027.3013.24
Service Kit	EZ-8	816.1067.02
19" Rack Adapter	ZZA-95	396.4911.00
Transit Case	ZZK-955	1013.9408.00
Trolley	ZZK-1	1014.0510.00

Cables

Printer Cable	EZ-11	816.1767.02
IEC/IEEE-bus Connecting Cable, 1 m	PCK	292.2013.10
2 m	PCK	292.2013.20
Supply Cable for active antennas in shielded chambers (2 cables required), 10 m	HZ-4	816.0519.02

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