

# Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as Spectrum Analyzers, Signal Generators, Oscilloscopes, Power Meters, Network Analyzers etc from all the major suppliers such as Keysight, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. We fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 1 year warranty. Our staff have extensive backgrounds in T&M which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, presenting flexible technical + commercial solutions and supplying a loan unit during warranty repair, if available.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based in at Oakley, Bedfordshire in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our 40GHz in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

Test Equipment Solutions Ltd  
Unit 3 Highfield Court  
Highfield Road  
Oakley  
Bedfordshire  
MK43 7TA

Telephone: 01183 800 800

Email: [info@TestEquipmentHQ.com](mailto:info@TestEquipmentHQ.com)  
Web: [www.TestEquipmentHQ.com](http://www.TestEquipmentHQ.com)





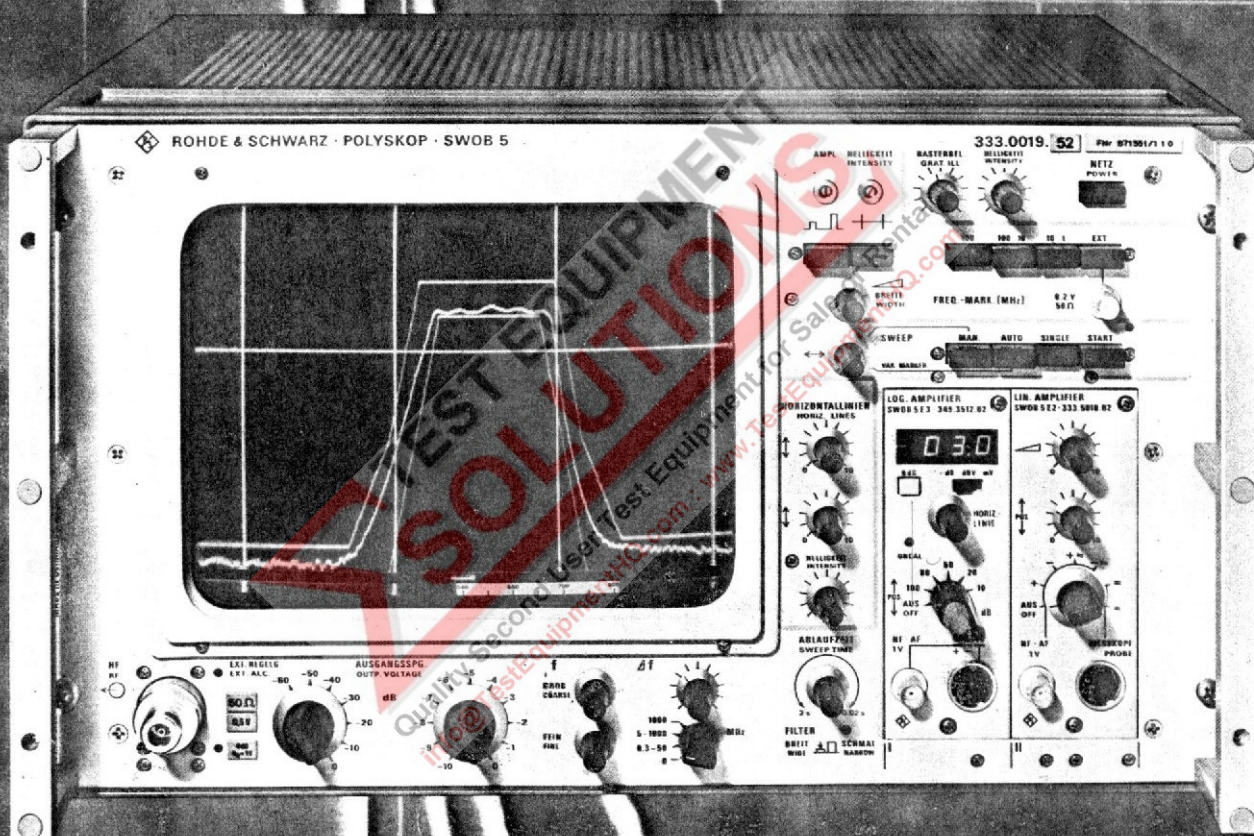


**ROHDE & SCHWARZ**

**SWOB 5**

0.1 to 1300 MHz

# POLYSKOP SWOB 5



Display section for single-channel or dual-channel display with linear or logarithmic amplification (variable configuration)

Compact dual-channel sweep tester with wide dynamic range



# POLYSKOP SWOB 5

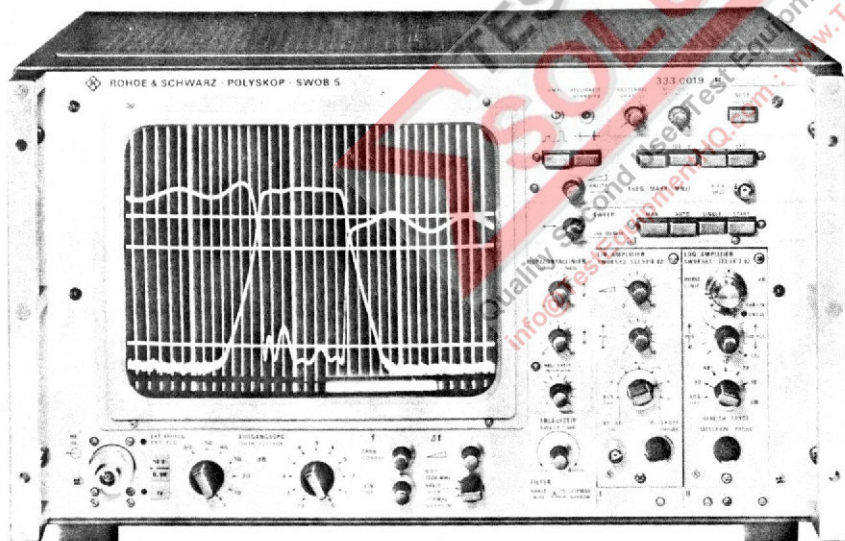
- Wide dynamic range through low inherent noise and high output voltage
- Wide continuous frequency range with good harmonic suppression
- Display section for single-channel or dual-channel display with linear or logarithmic amplification (variable configuration)
- Calibrated level line with logarithmic amplification (and digital display with Logarithmic Amplifier SWOB 5 E3) for absolute measurement, plus two independently shiftable level lines
- Any configuration of display section from single-channel linear to two-channel logarithmic (two logarithmic channels permit simultaneous display of transmission characteristic and reflection)
- Pulse or vertical-line frequency markers with crystal accuracy
- Manually adjustable brightup marker triggering external counter for direct frequency measurement
- Separate RF insertion units, terminating probes and high-impedance probes
- Compensation of spurious signals

Other information material:

Applications of SWOB 5, Info 001102;

Digital Display Store BDS, data sheet 343801

## OVERVIEW



Basic unit

### Options

- External Control Option SWOB 5 B1
- Slow Sweep Option SWOB 5 B2
- IF Markers Option SWOB 5 B3
- Oscillators (33.4 MHz, 38.9 MHz) SWOB 5 B4 for Option SWOB 5 B3
- Interface to Digital Display Store SWOB 5 B6

### Extras

- Overvoltage Protection SWOB 5 Z5

### Accessories

- Digital Display Store BDS with options:
- IEC-bus Interface BDS-B4
- Average-value Memory BDS-B5

### Measuring heads

- Demodulator SWOB 5 Z1
- Log. Probe SWOB 5 Z2
- RF Insertion Unit SWOB 5 Z3
- Demodulator Probe SWOB 3-Z
- Active Demodulator SWOB 5 Z4

### Amplifier plug-ins

- Logarithmic Amplifier SWOB 5 E1
- Linear Amplifier SWOB 5 E2
- Logarithmic Amplifier with digital display SWOB 5 E3

Polyskop SWOB 5 combines in a compact unit all the measuring facilities needed in an up-to-date sweep tester:

sweep generator with an output EMF of 1 V (+6 dB if required), with output attenuator covering 70 dB;

Display section with linear or logarithmic amplifiers with a dynamic range of 76 dB; large-size screen, marker generator, calibrated level marker and additional horizontal reference lines.

Different amplifier combinations are possible in the display section; see next page.

SWOB 5 is ideal for use in laboratories, test and production departments and wherever ease of operation is required together with large-screen display, high dynamic range and accurate results for either one-off tests or long series of measurements.

As the sweep width of SWOB 5 covers the whole frequency range, the frequency response of very wideband test items can be easily displayed within and even outside their service ranges.

Although wideband frequency-response and matching measurements are the most frequent applications, the very small spurious FM and high frequency stability also permit narrowband test items to be measured.

## SWEEP GENERATOR

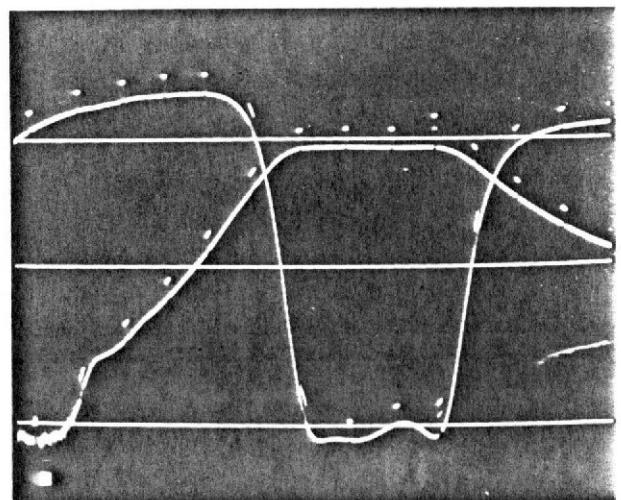
**Sweep width.** The sweep generator delivers the swept RF in one band from 0.1 to 1000 MHz for models 52 and 72 or from 0.1 to 1300 MHz for model 53. Four modes can be switch-selected for sweep width:

- 0.1 to 1000 (1300) MHz (total range),
- 5 to 1000 MHz (7 to 1300 MHz),
- 0.3 to 50 MHz,
- 0 (CW mode without sweep and return blanking).

A sweep-width and a centre-frequency potentiometer permit defined sweep widths between 1300 MHz and 0.3 MHz to be set at any point in the frequency range. The low spurious FM of typically 3 kHz in the narrow mode guarantees sharp display of steep filter edges. For avoiding substantial measuring errors when investigating filters, high suppression of harmonics is important; with SWOB 5 the harmonics are typically 40 dB down.

The generator output voltage is 0.5 V max. (0.35 V for the 75- $\Omega$  model) with frequency response flat within about  $\pm 0.25$  dB. The output can be increased by 6 dB with a rear switch, frequency response remaining flat in the range 0.5 to 300 MHz. A precise output attenuator with six 10-dB and ten 1-dB steps permits reduction of the output down to 167  $\mu$ V (to 117  $\mu$ V for the 75- $\Omega$  model).

The forward sweep time can be set between 2 s and 20 ms with a return sweep between 300 and 10 ms. The sweep-generator output is blanked out during the return sweep to allow automatic zeroing and automatic gain control in the logarithmic amplifier. Manual frequency adjustment and single sweep of the selected range are possible of course besides the automatic sweep mode.



Reflection-coefficient and attenuation curves of 25-MHz bandpass filter with pulse frequency markers



# DISPLAY SECTION

The display section is equipped with a **measuring head** and a **deflection amplifier**. Termination and insertion units with different characteristic impedances plus probes are available for use as measuring heads. The basic unit offers space for two deflection amplifiers. The amplifiers are in the form of plug-ins, enabling optimum adaption of the instrument to different measurement tasks and to customer requirements regarding price and performance.

## Measuring heads

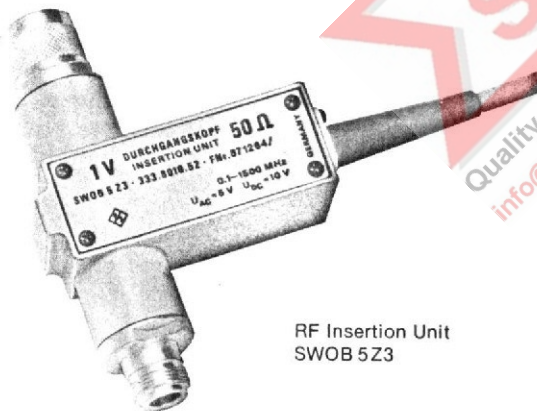
All the measuring heads of SWOB 5 are separate units connected to the basic unit by cable; the following types are available:

Demodulator SWOB 5 Z1 with built-in termination, 50-Ω and 75-Ω models.

Active Demodulator SWOB 5 Z4 for measuring very small voltages (20 μV), 50-Ω and 75-Ω models (illustration on next page).

RF Insertion Unit SWOB 5 Z3, 50-Ω and 75-Ω models (illustration below).

Two types of probe: Logarithmic Demodulator **SWOB 5 Z2** for use with a logarithmic amplifier and Linear Demodulator **SWOB 3-Z** for connection to the BNC input of the linear amplifier or of Logarithmic Amplifier SWOB 5 E3.



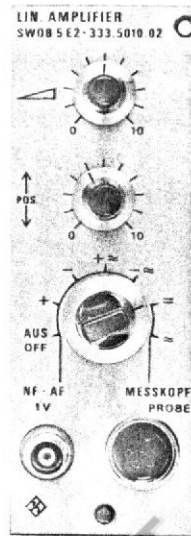
RF Insertion Unit  
SWOB 5 Z3

## Deflection amplifiers

The following amplifier combinations are possible for linear and/or logarithmic display:

1. One linear amplifier  
(low-priced single-channel version),
2. Two linear amplifiers,
3. One linear and one logarithmic amplifier,
4. Two logarithmic amplifiers  
(high comfort for most exacting requirements).

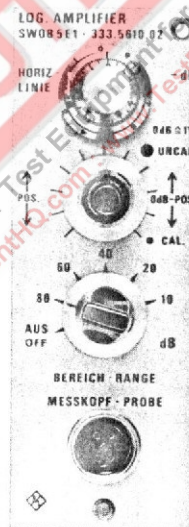
## Linear Amplifier SWOB 5 E2



Lin. Amplifier  
SWOB 5 E2

The Linear Amplifier SWOB 5 E2 amplifies the detected voltage from the measuring head for display. It may be used wherever a display range of 20 to 30 dB and a maximum sensitivity of 15 mV for full display height are adequate. An additional AF input to the linear amplifier allows connection of a simple probe or of the AF output of a test item such as an IF amplifier with demodulator. The deflection coefficient when using this input is about 0.2 mV/cm.

## Logarithmic Amplifier SWOB 5 E1



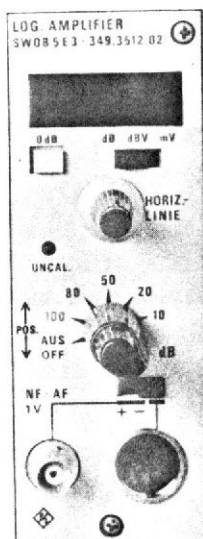
Log. Amplifier  
SWOB 5 E1

Together with an RF termination unit or an RF insertion unit, the Logarithmic Amplifier SWOB 5 E1 has a typical noise limit of 170 μV (with the noise filter switched into circuit). With a sweep-generator output voltage of 0.5 V this provides a **dynamic range of 70 dB**. When the sweep generator is operated with 1 V output, using the rear-panel switch, the dynamic range even amounts to 76 dB. The use of the Active Demodulator SWOB 5 Z4 reduces the noise limit to about 20 μV. The level limit for the demodulator being 50 mV, a dynamic range of 70 dB again results.

The display range on the screen is switchable to 80, 60, 40, 20 or 10 dB when the SWOB 5 E1 is used, and can be shifted by more than 70 dB with a positioning potentiometer. Any portion of the displayed curve can thus be spread.

A calibrated, horizontal reference line, shiftable by more than 80 dB, aids **accurate level measurement**. The level can be read with a resolution of 0.1 dB on a graduated knob. The level is referred to 1 V, i.e. the indication on the knob is in dB below 1 V. Since the zero can be shifted by about - 10 dB, another level reference can be chosen or round dB values can be set for relative measurements. A red lamp lights if the reference level is other than 1 V.

## Logarithmic Amplifier SWOB 5E3



Log. Amplifier  
SWOB 5E3

The Logarithmic Amplifier SWOB 5E3 operates with the same wideband probes as the SWOB 5E1 and offers similar dynamic characteristics.

The main assets are:

- digital level indication,
- automatic setting of reference levels,
- signalling of excessive spurious levels,
- gain of active demodulator taken into account in level measurements,
- AF input for the connection of test items with a built-in rectifier.

The characteristics when using the AF input are the same as for operation with an RF probe. Positive or negative polarity can be selected with a switch to take the detection in the test item into account.

The display range can be switch-selected for 100, 80, 50, 20 or 10 dB. The horizontal graticule of the SWOB-5 screen thus provides scales of 10, 8, 5, 2 and 1 dB/div. A positioning potentiometer allows shifting of the display over more than 70 dB.

With the aid of a calibrated level line, which can be shifted through about 100 dB with a potentiometer, the level can be accurately measured at any point of the curve.

Level indication is in 3½ digits as an absolute value in dBV or mV or as a relative value in dB.

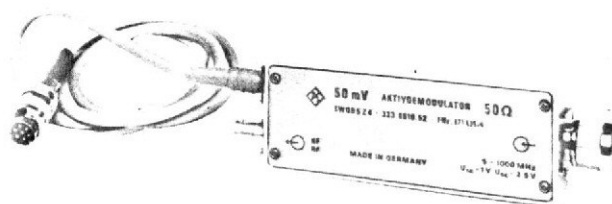
Autorangeing is provided for absolute measurements in mV, the display ranges being 20, 200 and 2000 mV. The resolution of the digital display is 10 µV, 100 µV or 1 mV depending on the voltage range, or 0.1 dB for dBV or dB indication.

The reference level for relative measurements can be set at any point between 0 and -100 dBV. For this purpose the level switch is set to "dB", the calibrated level line adjusted to the desired position and the "0 dB" button pressed. The digital display is thus set automatically to 0 dB and when the level line is shifted the measured level is indicated in ±dB referred to the reference level.

The automatic setting of a reference level is very expedient in transmission-factor measurements: the level line is to be adjusted to the input level of the test item: Set the level switch to "dBV" and adjust the level line to that level, then change the level switch to "dB" and press the "0 dB" button. The level line can now be adjusted to the point of the displayed curve where the transmission factor is to be determined, for instance the maximum of a filter characteristic. The gain or attenuation of the test item is then read out in dB.

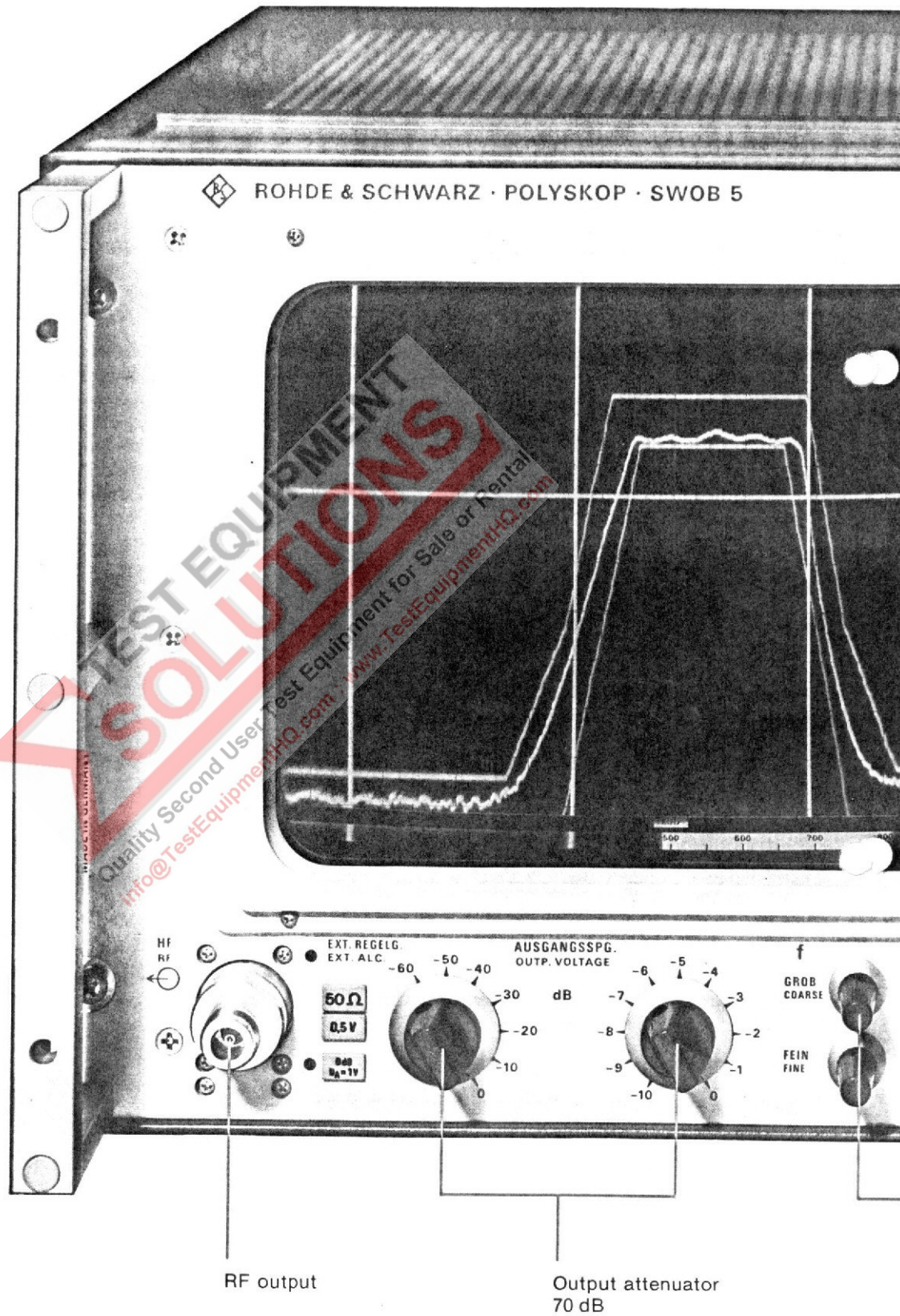
It is also possible to set the reference level by removing the test item and connecting the measuring head directly to the RF output of the Polyskop. If the reference line is shifted to make it coincide with the display line and the "0 dB" button is pressed, the display is calibrated with reference to the sweep-generator output level.

If an active demodulator is connected to the amplifier plug-in, the calibrated level line is automatically lifted by 20 dB (gain of active demodulator), so in absolute measurements the level actually present at the input of the active demodulator is displayed. The noise level with the active demodulator is about 20 µV or -94 dBV. Since the calibrated level line covers a range of about 100 dB (0 to -100 dBV), this level can be measured accurately.

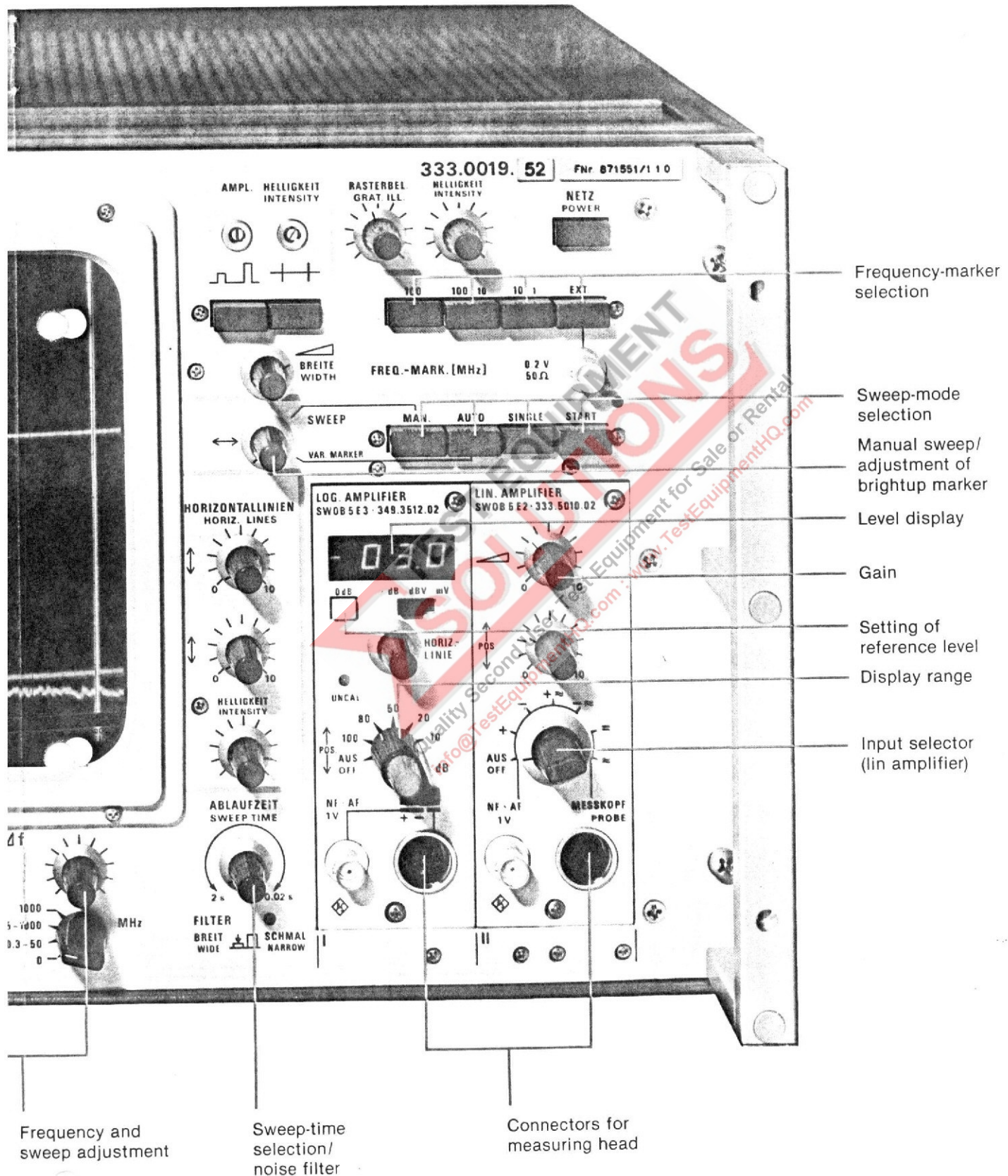


Active Demodulator SWOB 5Z4





# FRONT PANEL

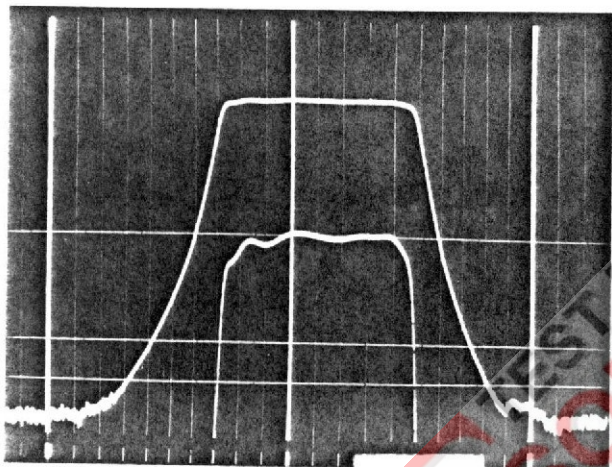




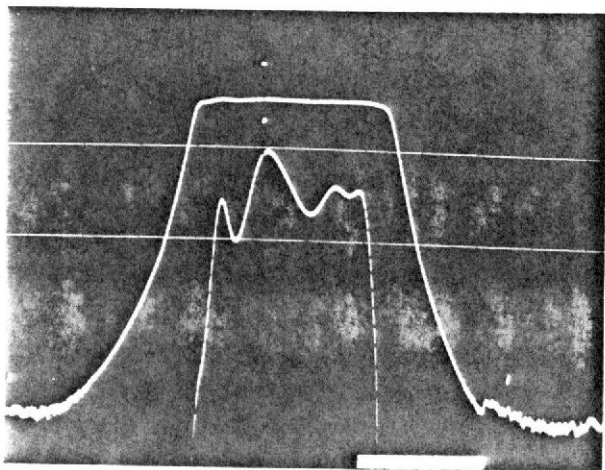
# OTHER FEATURES OF SWOB 5

The display of the results is obtained on a long-persistence screen. The screen size of 21 cm x 16 cm enables unstrained working. Four level lines (configuration with two logarithmic amplifiers) and crystal-controlled vertical-line markers or pulse markers permit accurate evaluation. A counter connected at the RF monitoring output and triggered by a manually adjustable brightup marker permits accurate frequency determination at any point of the display. A bright bar at the lower edge of the screen indicates the selected sweep range and helps to avoid reading errors.

**Frequency markers.** Pulse or vertical-line markers provide a scale on the frequency axis with the steps identified by higher intensity; see illustration below.



Simultaneous display of passband characteristic and dynamic range of a bandpass filter. SWOB 5 equipped with two logarithmic amplifiers.  
Display range: 80 dB and 10 dB (spread).  
Frequency markers: vertical-line markers.



Simultaneous display of passband characteristic and dynamic range of a bandpass filter. SWOB 5 equipped with a linear and a logarithmic amplifier.  
Display range: 80 dB log, 1 dB lin.  
Frequency markers: pulse markers.

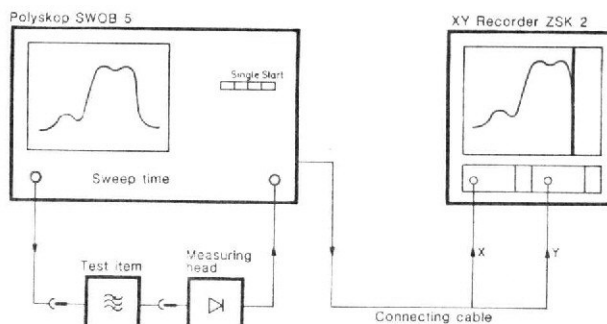
**Noise filter.** A noise filter can be cut in for observing very weak signals near the noise limit of the set. In this case, a red lamp lights to warn the user that he may have to reduce the sweep rate, depending on the test item.

**Compensation of spurious signals.** Spurious signals such as may arise, for example, from the oscillator voltage of a tuner and which may limit the useful dynamic range are measured by both the linear and logarithmic amplifiers during the return sweep – while the RF is blanked – and compensated for.

The maximum tolerable spurious level is 20 mV for the **Logarithmic Amplifier SWOB 5 E1** and up to 1 V for the **Linear Amplifier SWOB 5 E2** (depending on the driving level: signal and spurious level together must not exceed 1 V). The specified values refer to the voltage at the probe input.

For the **Logarithmic Amplifier SWOB 5 E3** the maximum permissible spurious level is 40 mV (4 mV with Active Demodulator); superimposed DC up to  $\pm 6$  V is permissible at the AF input. The spurious voltage is measured during the return sweep and the pilot lamp lights whenever the permissible limits are exceeded.

**Recorder output.** For the documentation of measured results a recorder output with pen-lift contact is provided for each AF channel. With the Polyskop set to the "single" sweep mode, pressing the "start" button triggers a single sweep over the set sweep band, the sweep duration being selected with the corresponding knob (max. 2 s). A sweep period of 30 s is obtainable using the **Slow Sweep Option** and linking two contacts at the recorder-output socket (see next page).



Documenting test results with XY Recorder ZSK 2



The External Control option SWOB 5 B1 is used in conjunction with the RF Insertion Unit SWOB 5 Z3 to keep the voltage immediately at the test-item input constant, for example if a cable of some length is required between the sweep-generator output and the test item. The level of the regulated voltage can be adjusted with a potentiometer.

Using the Slow Sweep option SWOB 5 B2, recording over a prolonged sweep period of 30 s (0.02 to 2 s without the option) is possible with **full sensitivity** and without drift of offset or gain. The gain of the logarithmic amplifiers is stabilized by short RF blanking intervals. The recorder voltage is kept at the corresponding level during the RF blanking intervals.

IF Markers option SWOB 5 B3. This option facilitates measurements on TV tuners: it permits IF markers for the vision and sound carriers to be generated and to be displayed simultaneously in addition to the other markers. The Oscillators option SWOB 5 B4 consists of two plug-in crystal oscillators generating the markers for 33.4 MHz and 38.9 MHz, respectively. The IF is fed to the external frequency marker input by way of the Insertion Unit SWOB 5 Z3 or the Active Demodulator SWOB 5 Z4.

Interface option SWOB 5 B6 to Digital Display Store. This option is necessary for operation of the Digital Display Store BDS with the SWOB 5. It can be retrofitted in the units with serial number 871551 and higher.

All options can readily be retrofitted.

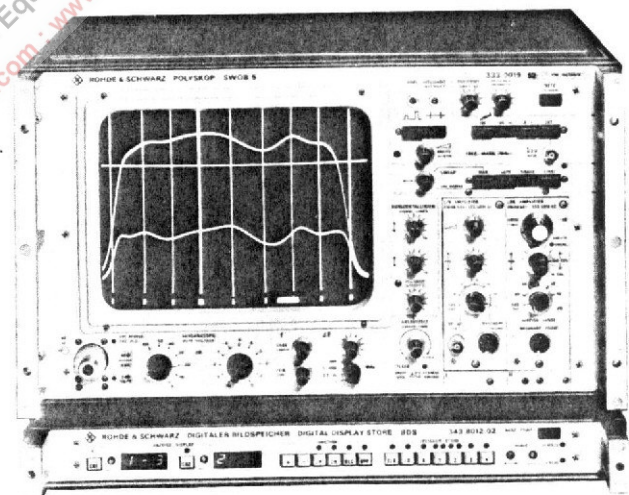
## DIGITAL DISPLAY STORE BDS

The Digital Display Store BDS – described in detail in data sheet 343801 – yields a **flicker-free** display even with slow sweep times and considerably extends the applications of the sweep tester thanks to a number of additional functions. The characteristic features of the BDS are:

- display of slow sweeps as a stationary pattern
- four independent memories
- combination of contents of any memory by addition or subtraction
- insertion of additional frequency markers
- IEC-bus capability with interface option

Moreover, the Average-value Memory option BDS-B5 to the Digital Display Store permits noise suppression by taking the average over several sweeps.

Storing of reference curves. Correction or reference curves can be stored and combined by addition or subtraction with the sweep curve, so it is possible to compensate for frequency-response errors or to readily align any item being tested to a given response.



Digital Display Store BDS at bottom of SWOB 5

IEC-bus Interface. An IEC-bus interface (option) in the BDS opens up the way for entirely new applications with the sweep tester. The connection of a desktop computing system makes it possible to read out, convert and re-enter all memory contents. In production and quality tests, for example, the entire amplitude/frequency characteristics of tested items can be transferred to the computer and processed for statistical evaluation.

The flat, 78-mm high bottom or top add-on unit has the same width and depth as the SWOB 5 and is connected to the Polyskop via a 36-way female connector and a cable which is delivered with the BDS.



## Specifications of SWOB 5

(Frequency specifications up to 1300 MHz are valid for model 53)

Frequency range	0.1 to 1000 MHz (0.1 to 1300 MHz) (in one band; only centre frequency and sweep width need be adjusted)
Sweep width	four ranges
1000 (1300)	full frequency range
5-1000 (7-1300)	variable: 5 to 1000 MHz (7 to 1300 MHz)
0.3-50	variable: 0.3 to 50 MHz
0	no sweep (CW)
Spurious FM (NARROW)	$\leq 5$ kHz, typ. 3 kHz (test bandwidth 50 Hz to 10 kHz)
Sweep linearity	1:1.01
Indication linearity	better than 1:1.1
Sweep adjustment	$\Delta f$ and centre frequency (coarse fine)
extern	via remote-control input
Scale error of range indication	$\pm 3\%$ of fs
Remote control	via 7-pole female connector on rear
Centre-frequency adjustment	$\approx 3$ to 8 V
Sweep-width adjustment (ext. potentiometer 5 k $\Omega$ )	0 $\Omega$ for $\Delta f_{\min}$ , $R_{\max}$ for $\Delta f_{\max}$
Sweep time	0 to 5 V for 2 to 0.02 s
RF monitoring output	50 mV into 50 $\Omega$ , BNC female connector on rear
Output EMF	50 $\Omega$ 75 $\Omega$ 1 V 0.7 V (can be increased by 6 dB rear switch) N female
Connector	N female
Frequency-response flatness of output voltage with match- termination	$< \pm 0.5$ dB (typ. $\pm 0.25$ dB) for 0.1 to 1000 MHz (0.1 to 1300 MHz), $< 0.15$ dB for 10 MHz sweep otherwise $+1$ dB
with 6-dB increase	$\pm 0.2$ dB in addition (5 to 300 MHz, otherwise $+1$ dB)
Output attenuator	0 to 70 dB in 1-dB steps
Error coarse (10-dB steps)	$\pm 0.5$ dB
fine (1-dB steps)	$\pm 0.2$ dB } overall error
Harmonic suppression (for EMF = 1 V or 0.7 V)	
0.1 to 1 MHz	$\geq 30$ dB
> 1 to 1000 MHz (0.5 to 1300 MHz)	$\geq 36$ dB (typ. 40 dB)
Suppression of non-harmonic spurious signals (0.1 to 1000 MHz)	$\geq 40$ dB ( $\geq 30$ dB up to 1300 MHz)
Frequency sweep	
AUTO	forward/return with RF blanked during return
MAN	manual sweep adjustment
SINGLE	triggered by button or external trigger signal, recorder operation
Sweep time AUTO	forward 0.02 to 2 s, continuously adjustable; return: 0.01 to 0.3 s
SINGLE	$\approx 0.02$ to 2 s, continuously adjustable
Triggering	in SINGLE mode
Ext. trigger level	$\approx +5$ V (at rear input)
Frequency markers internal <sup>1)</sup>	100 MHz; 100/10 MHz; 10/1 MHz; error $< \pm 1 \cdot 10^{-4}$
external	1 to 1300 MHz, $\approx 0.2$ V (50 $\Omega$ )
Marker type	pulse and vertical-line markers
Orientation along frequency axis (internal)	marker amplitude or brightness modulated to highlight the decades by MAN adjustment in AUTO mode
Brightup marker	TTL H during unblanked period ( $> 10$ ms), BNC female connector
Trigger signal for counter	TTL L by changing internal connection
Level lines	two; separate adjustment of vertical position; common adjustment of intensity
Useful display area	21 cm $\times$ 16 cm, screen type M 28-12 GM
Recorder output	$\pm 2.5$ V for max. X deflection 2.5 V for max. Y deflection $R_{\text{out}} = 5$ k $\Omega$
Connector	6-pole female (1 channel) or BNC female (2 channels)

<sup>1)</sup> Spurious markers may appear with increased output level (6 dB rear switch).

External X deflection	$\pm 1$ V (symmetrical about zero) for full display width rising edge: forward 0.02 to 2 s, falling edge: return 0.01 to 0.3 s
Connector	7-pole female on rear

## Amplifier plug-ins

### Logarithmic Amplifier SWOB 5E1

Measurement range (full display height)	10/20/40/60/80 dB
Noise level (with Demodulator SWOB 5Z1 or RF Insertion Unit SWOB 5Z3)	typ. 170 $\mu$ V (with filter)
Max. test voltage	1 V (with SWOB 5Z1 or Z3)
Display adjustment range	$> 70$ dB
Level line, calibrated in dB	
Reference level	shiftable by $-12$ dB; detent position calibrated at 1 V = 0 dB
Adjustment range	0 to $< -100$ dB, resolution 0.1 dB
Error limits	typ. $\pm 1.5$ dB (with SWOB 5Z1 or Z3)
Lowpass filter	switch-selected, indicated
3-dB point	$\approx 40$ Hz
Connector for measuring head	7-pole female
Input impedance	suitable for measuring heads SWOB 5Z1, Z2, Z3, Z4
Compensation of spurious signals	25 mV RF (2.5 mV with Active Demodulator)

### Logarithmic Amplifier SWOB 5E3

Inputs	AF	Meas. head
Connector	BNC female	7-pole female
Input impedance	$\approx 100$ k $\Omega$	suitable for measuring heads SWOB 5Z1, Z2, Z3, Z4
Measurement using		
Demodulator SWOB 5Z1 or Insertion Unit SWOB 5Z3		
Measurement range	10/20/50/80/100 dB	
Display adjustment range	$> 70$ dB	
Noise level	typ. 170 $\mu$ V	
Error limits	typ. $\pm 1.5$ dB	
Max. test voltage	1 V (measuring-head RF input)	
Measurement via AF input		
Measurement range (full display height)	10/20/50/80/100 dB	
Display adjustment range	$> 70$ dB	
Noise level	typ. 170 $\mu$ V	
Error limits	typ. $\pm 1$ dB (down to $-60$ dBV)	
Max. test voltage	1 V	
Max. permissible input voltage	14 V	

#### Level line calibrated in mV, dBV and dB

Adjustment range,	
absolute measurement	10 $\mu$ V to 1 V / $-100$ to 0 dBV
relative measurement	0 to 100 dB
Level indication	3 1/2 digits
Voltage indication range	20 mV 200 mV 2000 mV
Resolution	10 $\mu$ V 100 $\mu$ V 1 mV
dBV and dB ranges	$> 100$ dB
Resolution	0.1 dB
Indication error	0.1 dB or 2% $\pm 1$ digit

Lowpass filter	switch-selected on basic unit, indicated
3-dB point	$\approx 40$ Hz

Compensation of spurious signals	AF $\pm 6$ V	Meas. head 40 mV RF (4 mV with Active Demodulator)
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A pilot lamp lights when the spurious level exceeds the permissible limit.

### Linear amplifier SWOB 5E2

Inputs	AF <sup>2)</sup>	Meas. head connector
Input impedance	500 k $\Omega$	500 k $\Omega$
Connector	BNC female	7-pole female
Input selector positions	+/- / + / - / =	= / = (compensation for spurious RF signals in test item)
Deflection coefficient	0.2 mV/cm	—
Voltage required for full display height with max. sensitivity	$< 3$ mV	$< 15$ mV
Max. permissible input voltage	10 V (= or =)	5 V (=) or 10 V (=)

<sup>2)</sup> Connector for probe or test item containing a demodulator.



## Measuring heads

### Demodulator SWOB 5Z1 (with built-in termination)

Impedance	50 $\Omega$	75 $\Omega$
Connector	N male	N male
Frequency range	0.1 to 1300 MHz	0.1 to 1000 MHz
VSWR	$\leq 1.1$ up to 1000 MHz $\leq 1.2$ up to 1300 MHz	$\leq 1.1$
Frequency-response flatness	$\leq \pm 0.5$ dB typ. $\pm 0.25$ dB	$\leq \pm 0.5$ dB typ. $\pm 0.25$ dB
0.1 to 1300 MHz	$\leq 1$ dB	
Max. test voltage, rms	1 V	
Max. permissible input voltage	5 V (=) or 10 V (=)	
Connection to lin/log amplifier	via cable (1 m) and 7-pole male connector	

### RF Insertion Unit SWOB 5Z3

Impedance	50 $\Omega$	75 $\Omega$
Connector	N male	N male
Frequency range	0.1 to 1300 MHz	0.1 to 1000 MHz
VSWR	$\leq 1.15$ up to 1000 MHz $\leq 1.3$ up to 1300 MHz	$\leq 1.25$
Frequency response flatness	$\leq \pm 0.5$ dB typ. $\pm 0.25$ dB	$\leq \pm 0.5$ dB typ. $\pm 0.25$ dB
0.1 to 1300 MHz	$\leq 1$ dB	
Max. test voltage, rms	1 V	
Max. permissible input voltage	5 V (=) or 10 V (=)	
Connection to lin/log amplifier	via cable (1 m) and 7-pole male connector	

### Log. Probe SWOB 5Z2

Impedance (depending on frequency and attenuator)	$> 3$ k $\Omega$ to $> 20$ M $\Omega$    0.5 to 2.5 pF
Frequency range	0.1/5/1 to 500 MHz (rough indication up to 1300 MHz)
Frequency response flatness	$< \pm 1$ dB
Attenuation of probe tips	0/20/40 dB
Input voltage range	0.2 mV to 1 V/2 mV to 10 V/ 20 mV to 100 V (rms) unbalanced, earthed
Input circuit	

### Demodulator SWOB 3-Z

(probe with BNC male connector, only for SWOB 5E2 and SWOB 5E3)

Frequency range	0.5 to 400 MHz (rough indication up to 1300 MHz)
Input impedance	$\geq 30$ k $\Omega$    2 to 3 pF
at 50 MHz	$\geq 10$ k $\Omega$
at 200 MHz	
Input voltage	min. 50 mV for full display height, max. permissible 5 V RF, superimposed DC up to 100 V + DC $\geq 5$ mV into $> 500$ k $\Omega$ , for 50 mV (rms) (0.5 to 400 MHz)
Output signal <sup>3)</sup>	

### Active Demodulator SWOB 5Z4 (50 or 75 $\Omega$ depending on model)

Input voltage range	20 $\mu$ V to 50 mV
Frequency-response flatness	$\leq \pm 2$ dB for 5 to 1300 MHz
Input VSWR	$\leq 1.3$

## Recommended extras

VSWR Bridge	SWOB 4-Z	ZRB
	50 or 75 $\Omega$	50 $\Omega$
Frequency range	10 to 1000 MHz	5 to 2000 MHz
Test-item connector	N male	N female
RF input	N female	N female
Output to detector	N female	N female
Directivity	$\geq 40$ dB	$\geq 46$ dB
Insertion loss	$\approx 6.5$ dB	$\approx 6.5$ dB

### Overvoltage Protection SWOB 5Z5

(for RF input or output)

Impedance	50 $\Omega$
Response threshold	$\approx 4$ V DC or RF
Switching time	$\leq 3$ ms

Digital Display Store ..... see data sheet 343801

## Extensions (options)

(mounting with electrical connections via irreversible connectors of basic unit)

### External Control SWOB 5B1

Switchover	int./ext. via slide switch; lamp lights in ext. mode
Input	7-pole female connector for Insertion Unit SWOB 5Z3
Voltage adjustment	0.1 to 0.5 V, continuous

<sup>3)</sup> Waveform: square up to 30 mV RF, linear from about 0.5 V RF.

### Slow Sweep SWOB 5B2

X voltage	$\pm 2.5$ V for max. deflection
Y voltage	1 V for max. deflection
Sweep time	0.02 to 2 s; $\approx 30$ s with recorder cable plugged in
Connectors	6-pole female (1 channel), 3 BNC female

### IF Markers SWOB 5B3/B4

Input	frequency markers
Frequency range	0.5 to 150 MHz
Input impedance	50 $\Omega$
VSWR	$\leq 1.15$ in range 5 to 150 MHz with lowpass filter
Input voltage for perfect marker display	$\leq 1.3$ in range 5 to 150 MHz
	min. 10 mV (1 mV in range 5 to 150 MHz), max. 200 mV
Max. permissible input voltage	5 V (=) or 10 V (=)
Number of markers	2, produced by plug-in crystal oscillators
Marker frequencies	33.4 MHz, 38.9 MHz
Max. frequency error	$2 \times 10^{-5}$

### Display-store Interface

SWOB 5B6	required for operation of SWOB 5 with BDS; units from serial No. 871 551 on are prepared for retrofitting
Connector	50-pole female, suitable for connection of BDS

## General data

Nominal temperature range	+5 to +40 $^{\circ}$ C
Storage temperature range	25 to +60 $^{\circ}$ C
Power supply	110/125/220/235 V $\pm 10$ %, 47 to 63 Hz (180 VA)
Dimensions, weight	492 mm x 294 mm x 392 mm, 25 kg

## Ordering information

Order designation	► Polyskop SWOB 5
SWOB 5, without amplifier plug-ins:	
50- $\Omega$ model, 0.1 to 1000 MHz	333.0019.52
50- $\Omega$ model, 0.1 to 1300 MHz	333.0019.53
75- $\Omega$ model, 0.1 to 1000 MHz	333.0019.72
Amplifier plug-ins:	
Log. Amplifier	SWOB 5E1 .. 333.5610.02
Log. Amplifier	SWOB 5E3 .. 349.3512.02
Lin. Amplifier	SWOB 5E2 .. 333.5010.02
Measuring heads:	
Demodulator	SWOB 5Z1
50- $\Omega$ model	333.7513.52
75- $\Omega$ model	333.7513.72
RF Insertion Unit	SWOB 5Z3
50- $\Omega$ model	333.8010.52
75- $\Omega$ model	333.8010.72
Log. Probe	SWOB 5Z2 .. 333.9016.02
Demodulator Probe	SWOB 3-Z .. 241.2116.00
Active Demodulator	SWOB 5Z4
50- $\Omega$ model	333.8510.52
75- $\Omega$ model	333.8510.72

Accessories supplied ..... power cable

### Recommended extras and extensions (options)

VSWR Bridge	SWOB 4-Z	
50- $\Omega$ model		912.7003.00
75- $\Omega$ model		912.7303.00
VSWR Bridge	ZRB	335.2819.50
Overvoltage Protection	SWOB 5Z5	333.9316.52
Recorder Adapter Cable (ZSK 2)	SWOB 4-Z	289.5450.02
Recorder Adapter Cable (ZSKT)	SWOB 4-Z	289.5450.03
RF cable		
50 $\Omega$ , 1 m long, N male conn.		100.7670.10
75 $\Omega$ , 1 m long, N male conn.		100.7687.10
Extensions (options):		
External Control Option	SWOB 5B1	333.6700.02
Slow Sweep Option	SWOB 5B2	333.9616.02
IF Markers option		
Motherboard	SWOB 5B3	333.9716.02
additionally required:		
Crystal Oscillator	SWOB 5B4	
33.4 MHz and 38.9 MHz		333.9916.30

### Accessories

Digital Display Store	BDS	343.8012.02
IEC-bus Interface for BDS	BDS-B4	343.9602.02
Average-value Memory	BDS-B5	343.9802.02
Display-store Interface	SWOB 5B6	333.5410.02
Basic Software for control of BDS/SWOB 5 via Process Controller		
PUC or PPC	BDS-K1	358.1919.02