

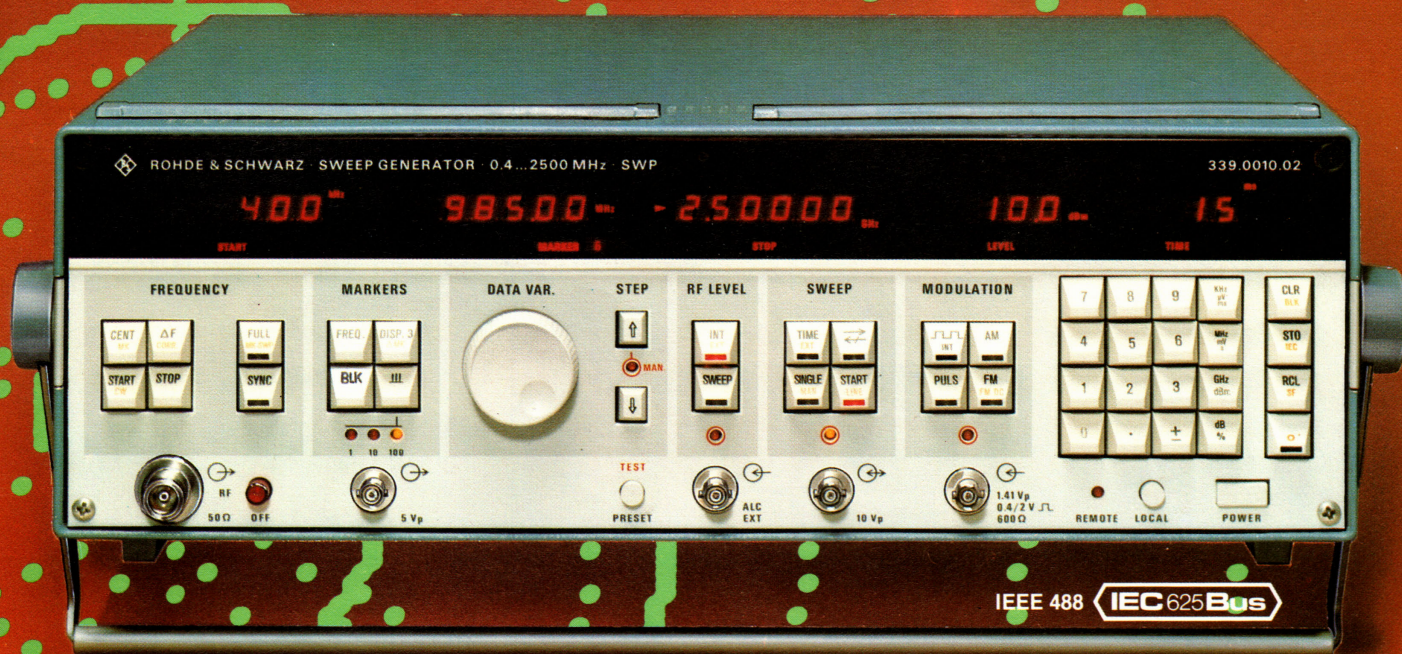


**ROHDE & SCHWARZ**

**SWP**

# **SWEEP GENERATOR SWP**

0.1 to 2500 MHz



**SWEEPER  
SIGNAL GENERATOR  
SYNTHESIZER**

combined in a single unit;  
all functions are programmable.



# CHARACTERISTICS, USES

## Outstanding Performance

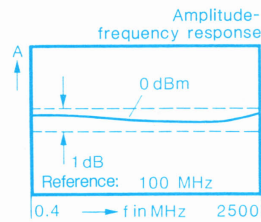
### SWEEPER

Wide frequency range:  
0.4 to 2500 MHz

Low content of harmonics  
and spurious signals:  
typically 40 and 50 dB down

Six variable frequency  
markers – level sweep –

Sweep time 10 ms to 100 s

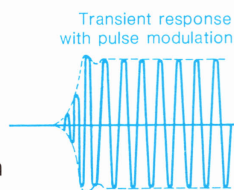


### SIGNAL GENERATOR

Amplitude modulation  
with low distortion

Pulse and frequency modulation

Calibrated output level  
+10 to -110 dBm max., resolution 0.1 dB



### SYNTHESIZER

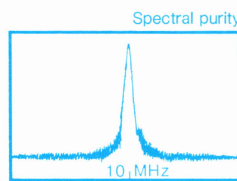
from 100 kHz

Crystal-referenced  
frequency setting

Low spurious FM:  
< 5 Hz (CCITT weighting)

Frequency resolution 1 kHz

Short settling time,  
continuous sweep



## Great Operational Convenience

- Clear front-panel layout
- Keyboard entry for all parameters

### Marker section

Six freely selected markers between 0.1 and 2500 MHz

Crystal reference through Synchronizer option

Additional harmonic markers at intervals of 100/10/1 MHz (with option)

## Fields of Application (examples on page 9)

### ► General sweep techniques

Measuring magnitude of reflection and transmission factors

### ► Network analysis

Ideal signal source for impedance, group-delay and s-parameter measurements using Vector Analyzer ZPV

### ► Multi-source measurements (using 2 or 3 SWPs)

Transposer, mixer, tuner and intermodulation measurements

### ► Multi-source applications (AM, FM, pulse modulation)

Use as a universal signal generator

- Variation through step key or rotary knob
- Memory capacity for 10 full front-panel setups (saved in CMOS RAM)

### Programmability

All functions set from IEC bus (standard)

Listener, talker, learn mode, service request

Access to CMOS RAM in both directions via IEC bus

Short setting times

# CHARACTERISTICS, OPERATION

## Functional Features

The Sweep Generator SWP is a general-purpose signal generator for use in development, production and servicing. The output signal can be continuously swept over the **frequency range of 0.4 to 2500 MHz**.

In conjunction with the **Synchronizer** option, the SWP offers synthesizer performance and permits CW operation and narrowband sweeping above 100 kHz with low spurious FM. Frequency resolution is 1 kHz and settling time < 100 ms.

The **output level** is calibrated and presents a very flat frequency response; harmonics and spurious signals are typically down 40 and 50 dB, respectively – extraordinary values for a sweep generator; level range from +10 to 0 dBm with 0.1 dB resolution (level settings up to +13 dBm are possible). Levels down to -110 dBm can be set in conjunction with the **Attenuator** option.

**Level sweep** facilitates, for example, the determination of the compression points of amplifiers and the compensation for frequency-response roll-off in test setups.

The SWP has been designed for different types of **modulation**: squarewave modulation with an internal signal; AM, FM and pulse modulation with an external signal. This affords the SWP its great versatility as a signal source.

A total of six variable **frequency markers** can be entered, the frequency of any one marker being indicated on the display. When the Synchronizer option is incorporated the markers are crystal-referenced. The **Harmonic Marker** option produces **additional markers** at 100/10/1-MHz intervals. The marker identifying the displayed frequency and the 100-MHz or 10-MHz marker are highlighted by widening of the marker pulse.

**Storage/recall.** Up to nine\* full front-panel setups can be stored and recalled with a single keystroke when needed.

\* Ten including the last operating setup, which is stored when the unit is switched off.

## Operating Convenience

### Operation

The clear arrangement of operating controls and displays and the optimized number of keys make operation very easy.

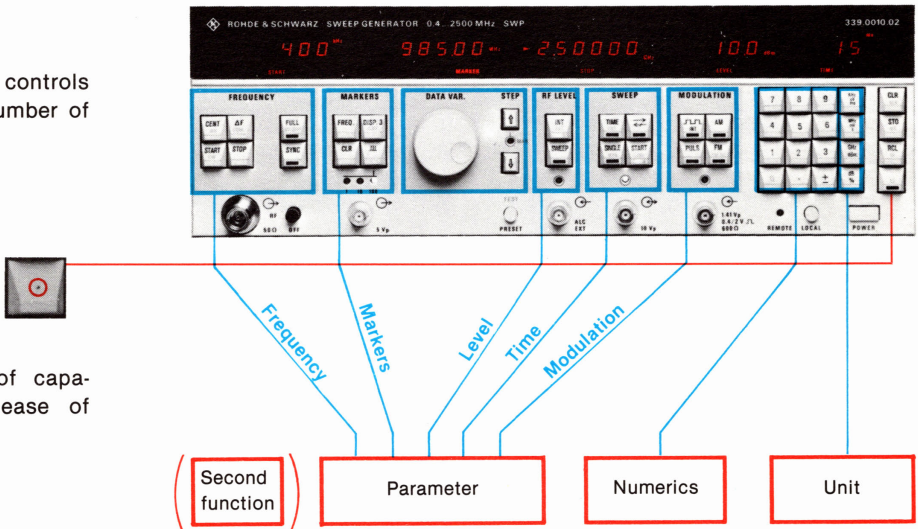
### Second functions

A separate key (bottom of row to the right of the keypad) is provided to call up additional and special functions, offering a maximum of capabilities without restraining the ease of operation.

### Data entry

Data can be entered  
via keypad (right)  
via rotary knob  
via step keys (next page)  
with the step size freely selected.

### Data entry through keypad



### Example

Centre frequency entry 2.45 GHz

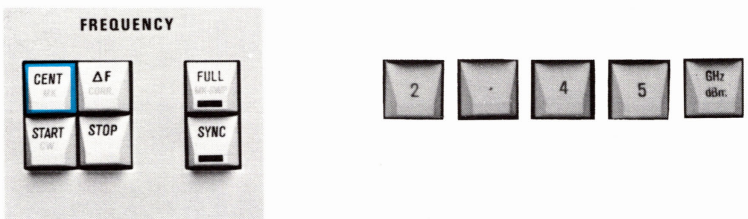


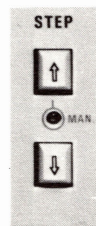
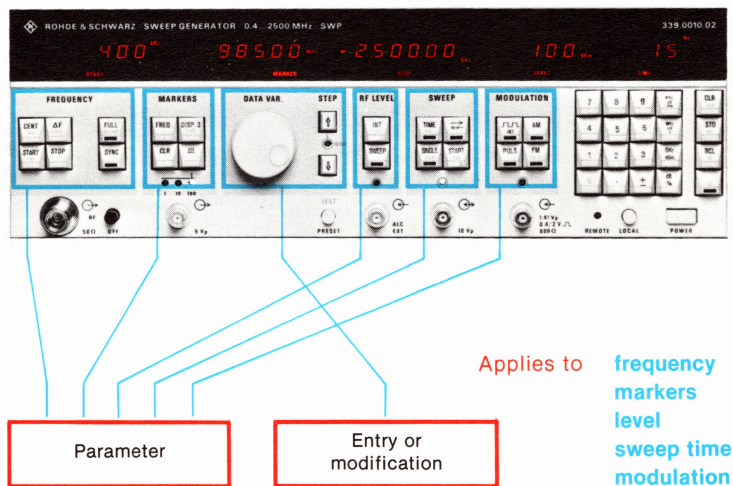
Illustration on right:  
Data entry  
through keypad



# OPERATION

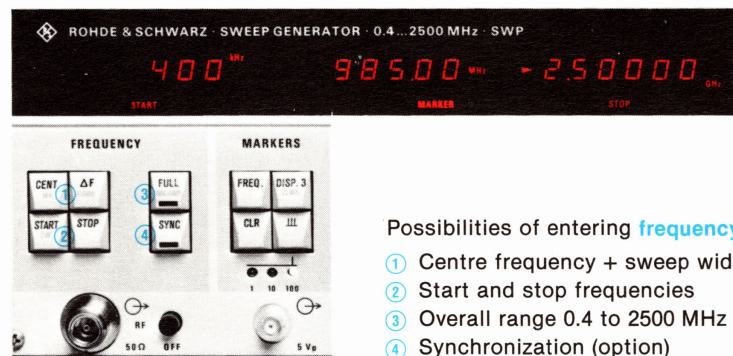
## Operating Convenience

All instrument settings can be entered or modified using the **ROTARY KNOB** and **STEP KEYS** with the corresponding parameter key pressed.



The step size of the STEP key is selectable through the key-pad.

## Frequency and marker setting



Possibilities of entering **frequency**:

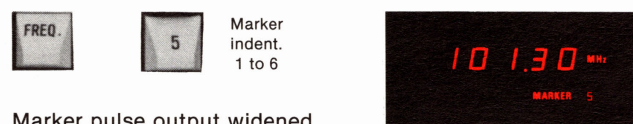
- ① Centre frequency + sweep width
- ② Start and stop frequencies
- ③ Overall range 0.4 to 2500 MHz
- ④ Synchronization (option)

**Markers:**

Total of six variable markers

## Marker presentation

### One marker



Marker pulse output widened

### Three markers (display of markers 2, 3 and 5)



The three markers selected are highlighted by widened marker pulses.



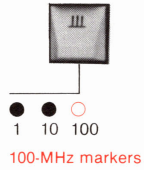
### Example



In this case there is no display of start and stop frequencies or of centre frequency and sweep width.

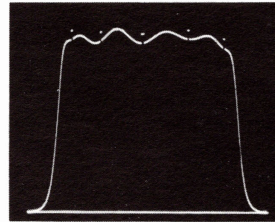
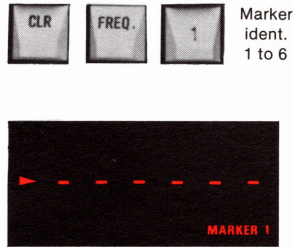


## Harmonic markers



A marker scale with 100-, 10- or 1-MHz spacings is obtained – using an option – in addition to the variable markers. Broader pulses highlight the 10-MHz markers in the 1-MHz scale and the 100-MHz markers in the 10-MHz scale.

## Blanking of particular markers



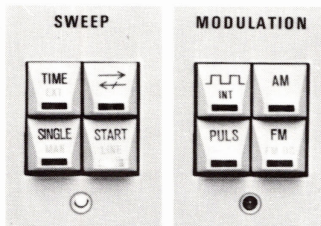
Identification of marker indicated on display

## Level entry



Entered in dBm, mV or  $\mu$ V.  
Level sweeping up to 10 dB is possible also with simultaneous frequency sweeping.

## Sweep and modulation



### INT or EXT sweep

INT mode: Return sweep of RF signal can be blanked out  
Manual operation  
AC supply-synchronized sweep selectable  
Single sweep using START key or external trigger signal

### Modulation modes

INT: 1 kHz squarewave  
EXT: AM, pulse, FM or FM-DC

## Second functions

Additional settings, activated through key ...



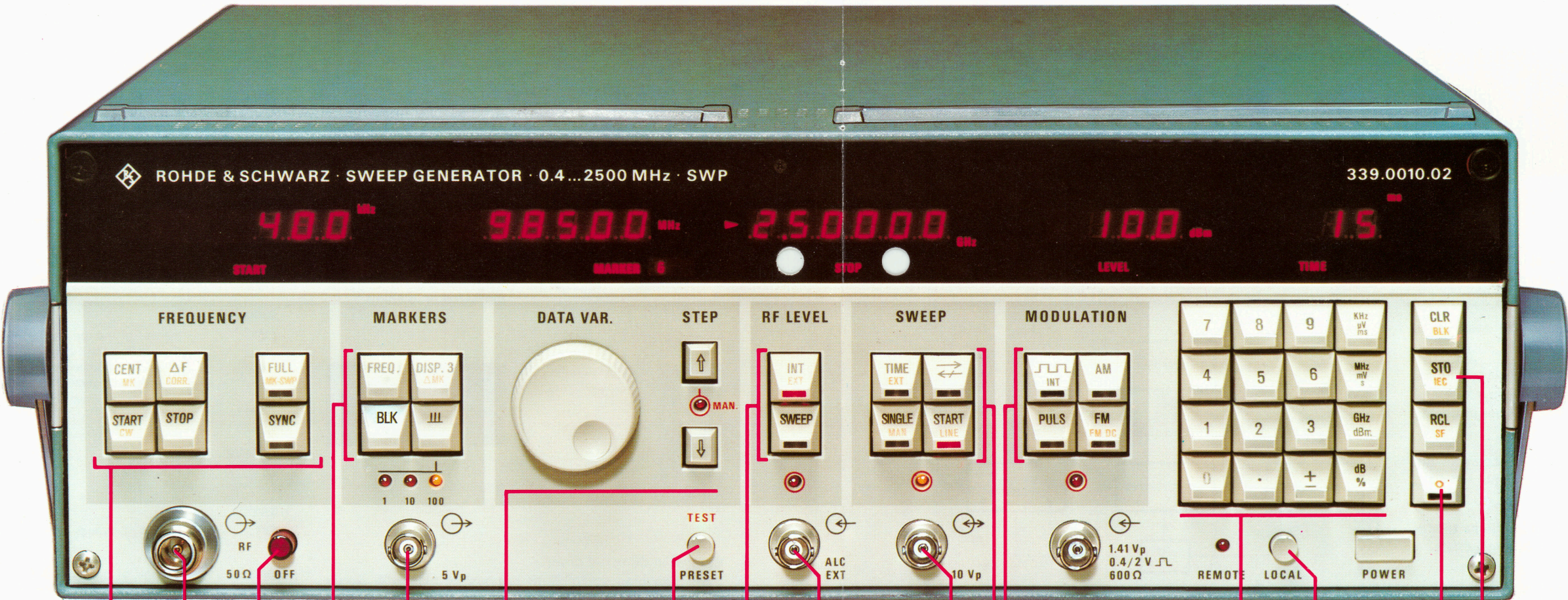
Parameter Key	Function	Display
<b>FREQUENCY</b>		
MK	Centre frequency is replaced by any selected marker frequency	<b>CENT MARKER</b>
CORR.	In operation without Synchronizer, frequency correction up to 10 MHz is possible with the rotary knob and is preserved in the case of frequency changes	
MK-SWP	Start and stop frequencies each correspond to a freely selectable marker. Application: sweep magnifier	<b>START MARKER</b> <b>STOP MARKER</b>
CW	CW mode can be called up directly (not only through $\Delta f = 0$ )	
<b>MARKERS</b>		
$\Delta$ MK	Instead of the marker frequency the difference between two selectable markers is displayed. Application: bandwidth measurements, e.g. between markers 2 and 5	<b>MARKERS 2 to 5</b>
<b>RF LEVEL</b>		
EXT	External ALC	⊙
<b>SWEEP</b>		
EXT	Sweeping through external sawtooth	⊙
MAN	Change of generator frequency within selected sweep bandwidth using rotary knob	⊙
LINE	AC supply-synchronized sweep	⊙
<b>MODULATION</b>		
FM DC	Coupling for external FM DC signal. Application: external synchronization	⊙
<b>STEP</b>		
MAN	The step size for the data variation using the STEP keys can be selected through the keypad	⊙
<b>CLR BLK</b>		
BLK	All multiplex displays are switched off	
<b>STO IEC</b>		
IEC	Display of the set IEC-bus address. This address can simultaneously be changed through the keypad	<b>IEC..</b>
<b>RCL SF</b>		
SF	Call of special functions	<b>SF..</b>
<b>TEST</b>		
	With the second function of the PRESET key a self-test of the SWP functions can be triggered. Also displayed:	<b>FIRMWARE IDENTIFICATION</b>



FRONT-PANEL DETAILS

Operating controls, front outputs/inputs

FRONT-PANEL DETAILS



**Frequency entry**  
Centre frequency + sweep width | Overall range  
Start frequency + stop frequency | Synchronizer

**Marker selection**  
Variable markers 1 to 6,  
harmonic markers

Signal switchoff

RF output sweeper/signal generator/synthesizer

**Data variation**  
Rotary knob and  
step keys

Marker signal output

Basic  
setting;  
self-test

Selection of  
level control  
and sweep mode

Input for  
external  
level control

**Modulation  
selection**

**Sweep mode**  
Int/ext,  
AC supply-synchronized,  
single sweep, manual

Sawtooth signal (deflection)  
output/input

**Switchover to  
second function**

Switchover to manual mode  
(with remote control)

**Keypad**  
Numerical value and unit

**Memory** for nine  
complete front-panel  
setups



# REMOTE CONTROL/OPTIONS

## Programming

**IEC-bus interface.** The Sweep Generator SWP has an IEC-bus interface and is therefore particularly suitable for **use in automatic test systems**. All functions can be remote-controlled. In addition, the IEC-bus address can be changed via the keypad and read out on the display.



IEC-bus address displayed on SWP

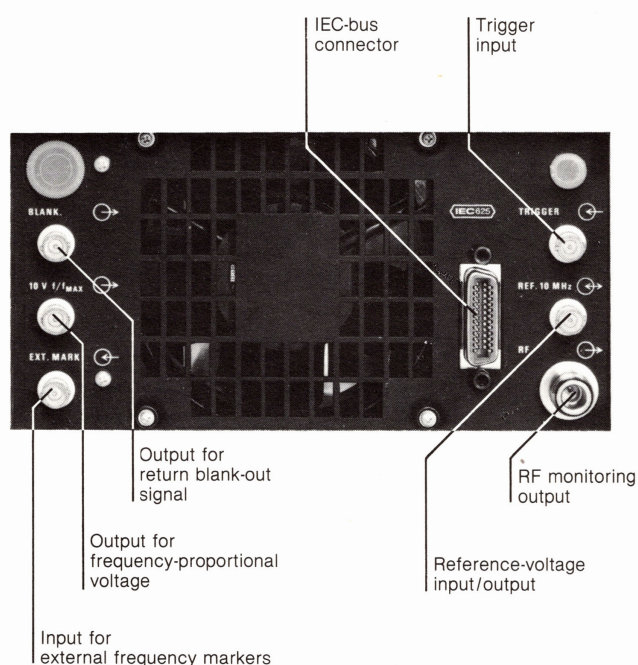
**Functions.** In addition to the conventional **listener function**, the SWP provides for "talker", "learn mode" and "service request".

In the **talker mode** all SWP settings and the self-test results can be transferred to the bus.

With the **learn mode**, manually entered settings can be stored in the external computer (of the test system) and sent back at any time. This greatly facilitates programming work.

**Service request** is important when a fault occurs in the equipment; moreover it is useful, for example, when a sweep is terminated.

In designing the IEC-bus control of the SWP particular importance has been attached to easy programmability.



Rear panel of SWP

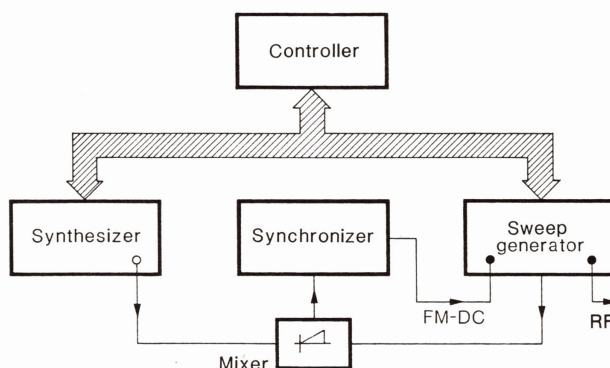
## Extensions (options)

**Synchronizer SWP-B1.** In conjunction with the Synchronizer option the Sweep Generator SWP offers synthesizer performance down to 100 kHz. All **frequency settings**, including the markers, are **crystal-referenced** and spurious FM is greatly reduced. This opens up numerous and novel applications for the sweep generator.

Use of the Synchronizer option is particularly interesting for **narrowband sweeping** ( $\Delta f < 1$  MHz) and for **CW operation** ( $\Delta f = 0$ ), permitting measurements on crystal filters to be performed with the SWP.

Synchronization occurs at 1-kHz intervals. Settling time is less than 100 ms. In the wideband sweep mode the frequency counter ensures accurate setting of the start frequency and of the variable frequency markers.

**SWP + Synchronizer replaces several instruments.** With crystal-referenced frequency setting the SWP performs tasks which up to now called for several instruments; an example is shown below.



Conventional test setup comprising several instruments. Test setups equipped with SWP are shown on pages 9 and 10

Conventional systems for high frequencies require for the accurate frequency setting of the sweeper either an external synthesizer and a synchronizer or a microwave counter and – in some cases – a controller.

All this accessory equipment is superseded by the Sweep Generator SWP fitted with the Synchronizer option. This simplifies the test assembly and cuts down on purchase cost.

**Reference Oscillator SWP-B11.** This option improves the frequency stability of the Synchronizer (reducing the effects of temperature and crystal aging).

**Attenuator SWP-B7.** Using the Attenuator option the output level can be set in 0.1-dB steps from +10 dBm to –110 dBm.

**Harmonic Marker SWP-B9.** This option permits the display of markers with 100/10/1-MHz spacings. The markers representing the higher value (10 or 100 MHz) are highlighted by broader marker pulses. External marker signals can also be applied.



## Fields of Application

### ► General sweep techniques

Clear display of start and stop frequencies, marker frequencies (up to six markers) level and sweep time

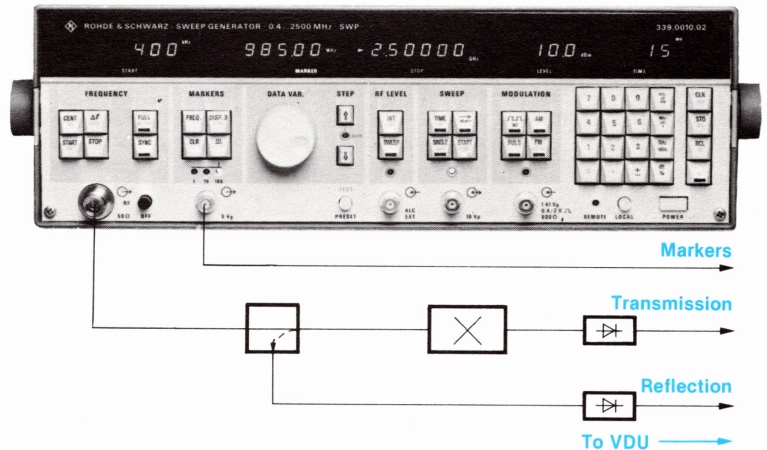
All settings variable by rotary knob or STEP keys

Rapid switchover to a maximum of nine front-panel setups

Crystal-filter measurement

Linearity measurement on active test items by level sweep (compression measurement)

### Examples



### ► Network analysis

The SWP is an ideal add-on to the Vector Analyzer ZPV in the range 100 kHz to 2000 MHz for

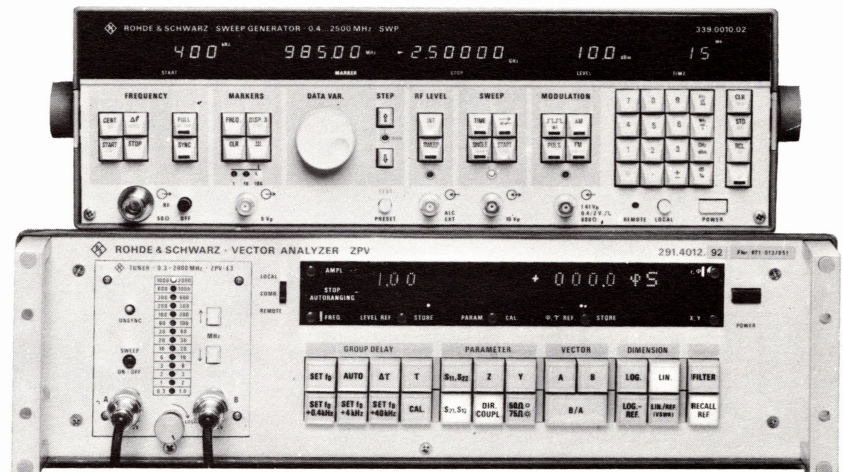
Vector measurements

Impedance measurements

Transmission measurements

Group-delay measurements

S-parameter measurements



### ► Multisignal measurement

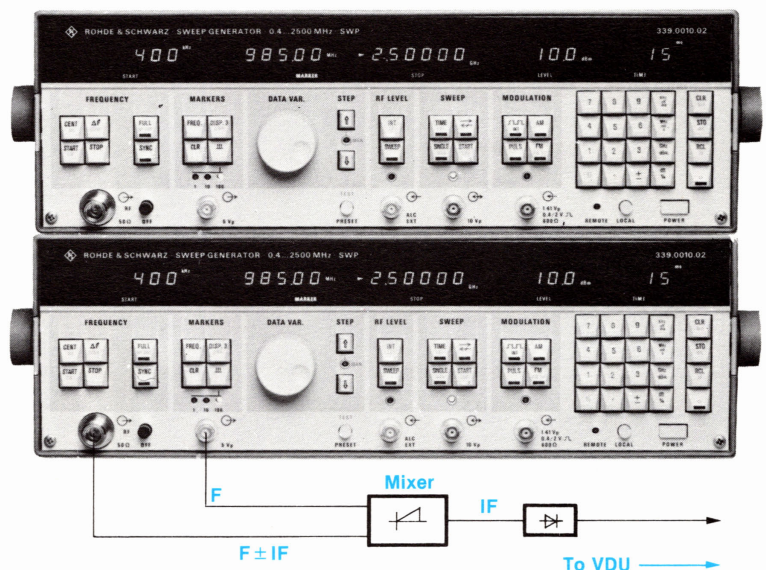
SWP (top) for automatic sweep

SWP (bottom) for single sweep triggered by upper SWP

Synchronized sweep of two or more SWPs with frequency offset (e.g. of IF)

Uses:

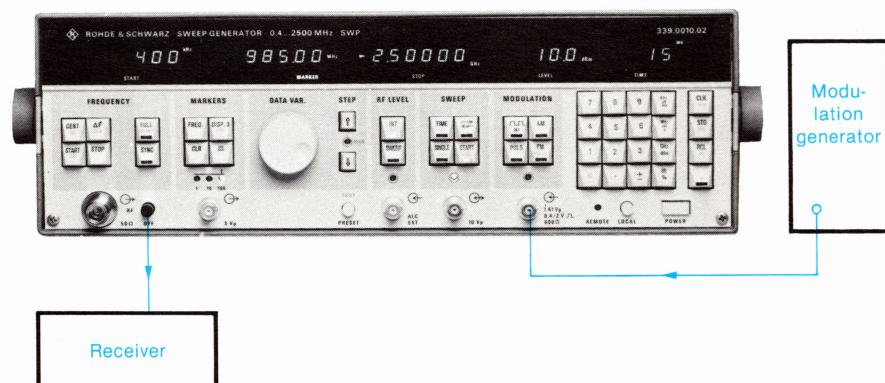
Measurement on transposers, mixers, tuners; intermodulation measurement





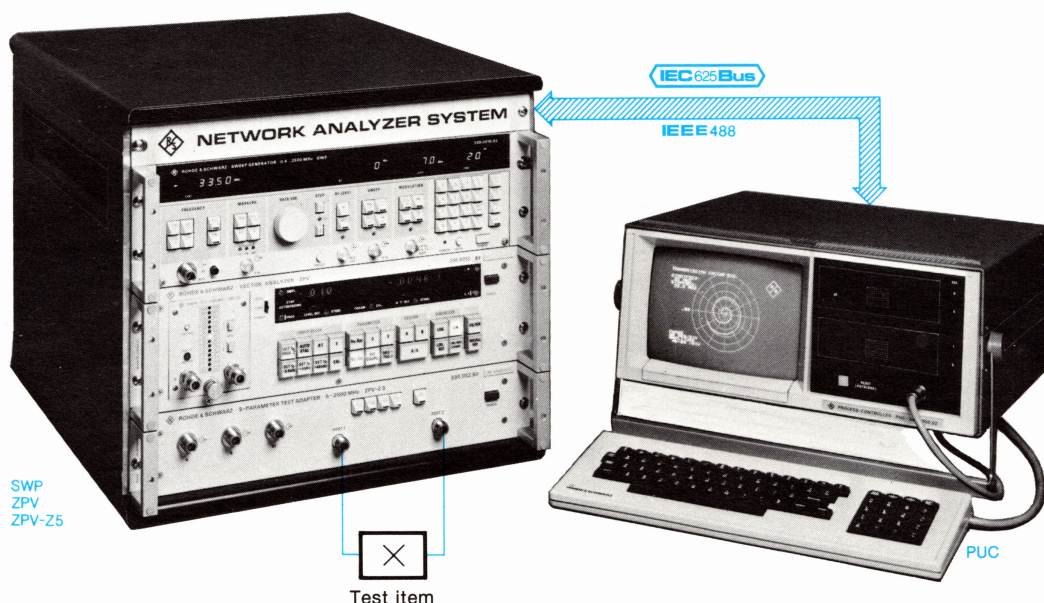
# APPLICATIONS / SPECIFICATIONS

## ► Use as signal generator (AM or FM)



Low spurious FM (with Synchronizer option) and versatile modulation capabilities open for the Sweep Generator SWP fields of application reserved formerly to conventional signal generators, for example, measurements on receivers.

## ► Automatic s-parameter test system



### Data of SWP - without options

Frequency range/sweep range	0.4 to 2500 MHz
Frequency/sweep setting	via keypad or rotary knob a) start and stop frequencies or b) centre frequency and sweep width
Frequency display	6 digits in GHz, MHz or kHz; resolution: 10 kHz
Resolution of sweep-width setting	up to 20 MHz $\approx 10$ kHz > 20 to 250 MHz $\approx 60$ kHz > 250 MHz $\approx 600$ kHz
Error limits of frequency setting	CW $12 \text{ MHz} \pm 0.5 \text{ MHz}/^\circ\text{C}$ START <sup>1)</sup> $\leq 0.01 \cdot \Delta f$ in addition $\Delta f$ <sup>1)</sup> $\leq 2\%$
Output level (with options see right)	CW 0 to +10 dBm or 224 to 707 mV into 50 $\Omega$ AM 0 to +4 dBm or 112 to 354 mV into 50 $\Omega$
Setting	via keypad or knob
Display	4 digits in mV, $\mu\text{V}$ or dBm/dB; resolution: 1% of setting or 0.1 dB
Output level error	$\leq \pm 0.5 \text{ dB}$ at 100 MHz
Frequency-response flatness	$\leq \pm 1 \text{ dB}$ (typ. $\pm 0.5 \text{ dB}$ ), referred to 100 MHz
Output	50 $\Omega$ , VSWR $\leq 1.25$ ; N female connector
Spectral purity	
Spurious FM	
(sweep width < 20 MHz)	< 5 kHz peak (30 Hz to 20 kHz)
Harmonics <sup>2)</sup>	> 30 dB, typ. > 40 dB down
Spurious signals <sup>3)</sup>	$\geq 50 \text{ dB}$ down at 0.4 to 2000 MHz $\geq 35 \text{ dB}$ down at > 2000 to 2500 MHz

Level sweep	
Setting	via keypad or knob
Setting range	0 to 10 dB
Display/resolution	4 digits in dB, mV, $\mu\text{V}$ /0.1 dB
Error	$\leq 0.5 \text{ dB}$
RF monitoring output	N female connector on rear panel, Z $\approx 50 \Omega$
Level into 50 $\Omega$	$\approx 26 \text{ dB}$ below RF output level
with Attenuator option	$\approx -18 \text{ dBm}$ CW $\approx -24 \text{ dBm}$ with AM
External level control	suitable for external detectors with positive detection voltage
Connector	BNC female, Z $\approx 100 \text{ k}\Omega$
Frequency sweep	internal or external
Internal sweep	0.01 to 100 s
Setting	via keypad or knob, resolution: 1/10/100 ms
External sweep <sup>3)</sup>	via BNC female connector, Z $\approx 100 \text{ k}\Omega$
Sweep voltage	0 to 10 V
Frequency markers	6 adjustable markers
Setting	via keypad or knob, resolution: 10 kHz $\pm 0.1\%$ of sweep width setting
Display	6 digits in GHz, MHz, kHz; 1 or 3 markers
Error limits <sup>1)</sup>	$\pm 12 \text{ MHz} \pm 0.5 \text{ MHz}/^\circ\text{C} \pm 0.02 \Delta f$
Marker output	BNC female connector, $\approx 5 \text{ V}$

<sup>1)</sup> Sweep time > 100 ms.

<sup>2)</sup> With 50  $\Omega$  termination, without AM.

<sup>3)</sup> Marker generation not possible with external sweep.



## Data of SWP – without options (continued)

<b>Reference oscillator</b>	10 MHz
Crystal aging	$< \pm 1 \times 10^{-6}/\text{month}$
Temperature effect	$< \pm 1 \times 10^{-6}/^{\circ}\text{C}$
Output/input	
(switched internally)	BNC female connector on rear panel
Output level	TTL
Input requirement for external reference	$\approx 0.5 \text{ V rms}$
<b>Amplitude modulation</b>	internal and external; internal in CW mode only
Modulation frequencies	
Internal, squarewave	1 kHz
External, AM	carrier freq. mod. freq. > 10 to 2500 MHz 0 to 10 kHz > 1 to 10 MHz 0 to 3 kHz 0.4 to 1 MHz 0 to 1 kHz
Modulation depth	0 to 80 %
Setting	via keypad or knob
Display	3 digits
Resolution for 0 to 9.9 % mod.	0.1 % steps
10 to 80 % mod.	1 % steps
Error	$\leq 8 \%$ of mod. depth
Modulation distortion with undistorted ext. signal	$\leq 5 \%$ for $f_{\text{mod}} = 1 \text{ kHz}$ and 80 % modulation
Input for ext. signal	BNC female connector, $Z = 600 \Omega$
Input requirement	1 V $\pm 1 \%$ or 1.41 V with DC
<b>Frequency modulation</b>	external
Frequency range	DC to 100 kHz ( $\pm 1.5 \text{ dB}$ )
Frequency deviation (CW)	0 to 10 MHz
Sweep width up to 2.5 MHz	0 to 125 kHz
Setting	via keypad or knob
Display	3 digits in MHz or kHz
Resolution	$\leq 1.2 \%$ or 125 Hz
Error	typ. $< 5 \%$ for $f_{\text{mod}} = 1 \text{ kHz}$
Modulation distortion with undistorted mod. signal	$\leq 1 \%$ for $f_{\text{mod}} = 1 \text{ kHz}$ and $\Delta f \leq 100 \text{ kHz}$
Input for ext. signal	BNC female connector, $Z = 600 \Omega$
Input requirement	1 V $\pm 1 \%$ or 1.41 V with DC
<b>Pulse modulation</b>	external (only without synchronization)
Carrier frequency range	20 to 2500 MHz
Rise and fall times	$< 0.1 \mu\text{s}$
Pulse repetition frequency	50 Hz to 50 kHz
Minimum pulse width	10 $\mu\text{s}$
On/off ratio	$> 80 \text{ dB}$ (test bandwidth $\leq 10 \text{ kHz}$ )
Input for ext. signal	BNC female connector, $Z \approx 600 \Omega$
Input requirement	$> 2 \text{ V}$ / $< 0.5 \text{ V}$ (for on/off), max. 5 V
<b>Blanking output</b>	BNC female connector on rear panel
Level	TTL High on forward sweep Low on return sweep
<b>Output for frequency-proportional voltage</b>	BNC female connector on rear panel, $Z \approx 100 \Omega$
Level	$\sim 10 \text{ V}$ for $f_{\text{max}} = 2500 \text{ MHz}$
Maximum load	$\geq 10 \text{ k}\Omega$
<b>Remote control</b>	for all operating modes and for data transfer in listener and talker functions
IEC-bus interface	in line with IEC 625-1 and IEEE 488, connector: 24-way Amphenol
Functions	SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1

## Data of options

### Synchronizer SWP-B1

Frequency Range	
Sweep width $\leq 1 \text{ MHz}$	100 kHz to 2500 MHz
$> 1 \text{ MHz}$	400 kHz to 2500 MHz
Resolution	
Frequency indication	
Sweep width $\leq 1 \text{ MHz}$	1 kHz
$> 1 \text{ MHz}$	10 kHz
Start-frequency setting	
Sweep width $\leq 1 \text{ MHz}$	1 kHz
$> 1 \text{ MHz}$	10 kHz
Marker frequency	
Sweep width $\leq 1 \text{ MHz}$	1 kHz
$> 1 \text{ MHz}$	10 kHz
Sweep-width setting	
Sweep width $\leq 1 \text{ MHz}$	0.25 to 1.6 kHz
$> 1 \text{ MHz}$	as without SWP-B1 option
Frequency error (CW)	as for reference oscillator
$\Delta f \leq 1 \text{ MHz}$ :	
START	as for reference oscillator $\pm 2 \text{ kHz}$
$\Delta f$	typ. $< 2 \%$ $\pm 1 \text{ kHz}$
$\Delta f > 1 \text{ MHz}$ :	
START	$\leq \pm 5 \times 10^{-4} \Delta f + 20 \text{ kHz}$
$\Delta f$	$\leq 2 \%$ (sweep time $> 100 \text{ ms}$ )
Marker-frequency error	reference error $\pm 3 \times 10^{-3}$ of sweep width set $\pm \frac{1}{2} \text{ kHz}$

### Typical spurious FM (CW operation, FM on)

Weighting	peak CCIR (30 Hz to 20 kHz)	CCITT
Frequency range		
0.1 to 20 MHz	25 Hz	5 Hz
$> 20$ to 200 MHz	$< 100 \text{ Hz}$	$< 15 \text{ Hz}$
$> 200$ to 2500 MHz	$< 250 \text{ Hz}$	$< 50 \text{ Hz}$
Amplitude modulation	0 to 50 % (external only; as without SWP-B1 option)	
Frequency modulation <sup>1)</sup> (CW)		
FM frequency range		
0.1 to 20 MHz	0.05 to 50 kHz	
$> 20$ to 2500 MHz	0.05 to 20 kHz	
Frequency response flatness	$\leq \pm 2 \text{ dB}$ referred to 1 kHz	
Frequency deviation		
0.1 to 20 MHz	max. 100 kHz	
$> 20$ to 100 MHz	0 to $5 \times \frac{f(\text{MHz})}{f_{\text{mod}}(\text{kHz})}$ kHz, 100 kHz max.	
$> 100$ to 2500 MHz	0 to $\frac{500}{f_{\text{mod}}(\text{kHz})}$ kHz, 100 kHz max.	
Resolution		
up to 10 kHz deviation	10 to 375 Hz	
up to 100 kHz deviation	0.1 to 3.75 kHz	
Error	typ. $< 5 \%$ + $0.5 \times$ resolution	
Modulation distortion with undistorted ext. signal	$\leq 0.5 \%$ with $f_{\text{mod}} = 1 \text{ kHz}$	
Pulse modulation	not possible with Synchronizer switched on	

### Spurious signals

(terminated with 50  $\Omega$ , without AM)

$> 200 \text{ kHz}$ from carrier	down $\geq 50 \text{ dB}$ for 0.1 to 2000 MHz down $\geq 35 \text{ dB}$ for $> 2000 \text{ MHz}$
3 to 200 kHz from carrier	down typ. 45 dB for 0.1 to 2000 MHz down $\geq 35 \text{ dB}$ for $> 2000 \text{ MHz}$
Sweep time	20 ms to 1 s

### Reference Oscillator SWP-B11

Crystal aging	$< \pm 1 \times 10^{-6}/\text{year}$
Temperature effect	$< \pm 1 \times 10^{-7}$ in range 0 to 50 $^{\circ}\text{C}$

### Attenuator SWP-B7

Attenuation range	120 dB in 2-dB steps
Attenuation error	$\leq \pm (0.2 \text{ dB} + 1.3 \%$ of attenuation), 1 dB max.
Typical error	$\pm (0.1 \text{ dB} + 0.6 \%$ of attenuation), 0.5 dB max.
Characteristic impedance	50 $\Omega$
VSWR up to 1 GHz	$\leq 1.2$
up to 2.5 GHz	$\leq 1.4$
Output level of SWP fitted with attenuator	$\sim 110$ to $+10 \text{ dBm}$ (0.7 $\mu\text{V}$ to 707 mV)
with AM	$\sim 110$ to $+4 \text{ dBm}$ (0.7 $\mu\text{V}$ to 354 mV), into 50 $\Omega$
Resolution	0.1 dB

### Harmonic Marker SWP-B9 <sup>2)</sup>

Marker spacing selectable via keypad	100/10/1 MHz (AM switched off)
Marker output	$\approx 5 \text{ V}$ , BNC female connector
Frequency error	$< 1 \times 10^{-6}/\text{month}$ $< 1 \times 10^{-6}/^{\circ}\text{C}$ $\pm 0.2 \%$ of sweep-width setting $\pm 50 \text{ kHz}$
External marker input	BNC female connector on rear panel
Level requirement	$-3$ to $+3 \text{ dBm}$
Marker-frequency range	5 to 2500 MHz; $\Delta f \geq 4 \text{ MHz}$

<sup>1)</sup> With FM, spurious frequencies may occur at  $\leq 300 \text{ Hz}$  from the carrier.

<sup>2)</sup> With mismatch ( $\rho > 0.5$ ) and RF output levels  $\geq 0 \text{ dBm}$ , individual markers may drop out at sweep times  $< 50 \text{ ms}$ .

## General Data

Rated temperature range	+5 to +45 $^{\circ}\text{C}$
Storage temperature range	-40 to +70 $^{\circ}\text{C}$
Power supply	100/120/220/240 V $\pm 10 \%$ , 47 to 63 Hz (180 VA max.)
Dimensions, weight	470 mm $\times$ 162 mm $\times$ 483 mm, 22 kg

## Ordering information

<b>Order designation</b>	► Sweep Generator SWP
SWP for 0.4 to 2500 MHz	339.0010.02
SWP for 0.4 to 1000 MHz	339.0010.04
Accessories supplied	Power cable

### Options

Synchronizer	SWP-B1	339.5158.02
Reference Oscillator	SWP-B11	339.9618.02
RF Attenuator	SWP-B7	339.9718.02
Ext. Sweep Control	SWP-B8	339.9453.02
Harmonic Marker	SWP-B9	339.4716.02

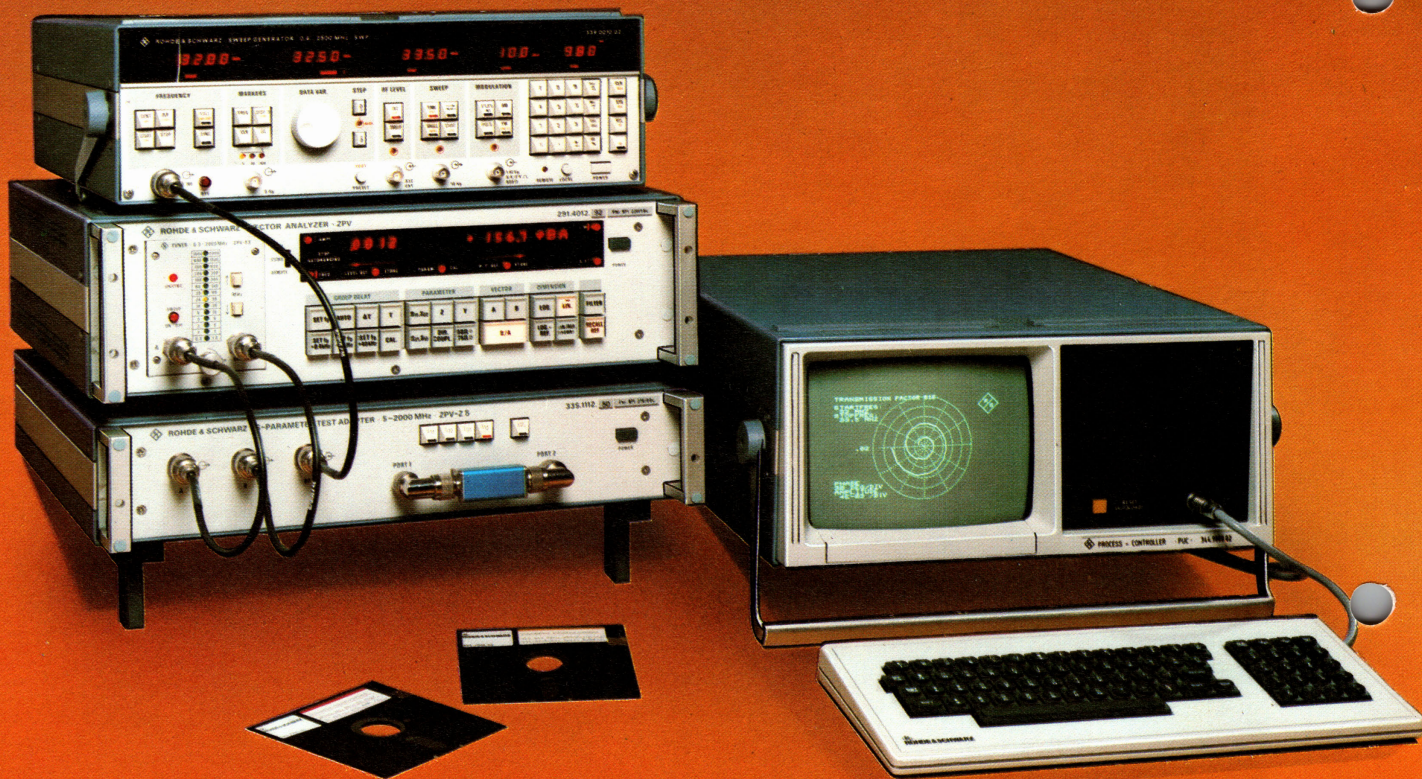
### Recommended extras

19" Adapter	SWP-Z9	339.9660.02
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# APPLICATION EXAMPLE

SWP used as RF signal source  
in computer-controlled test system for automatic s-parameter measurement



**ROHDE & SCHWARZ**

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