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## RF Preselector

20 Hz to 2 GHz

For the HP 8566B or 8568B  
Spectrum Analyzer

Model

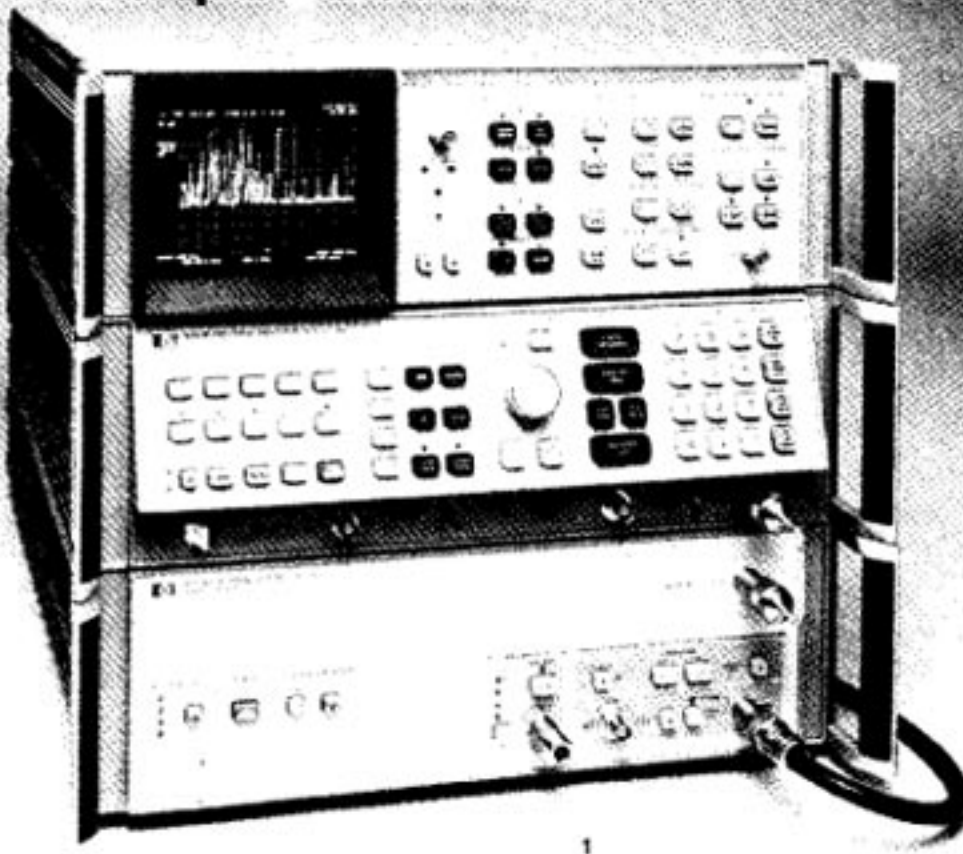
HP 85685A



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Your High-Performance  
Spectrum Analyzer  
Can Also Be  
A Test Receiver





# Measurements With A General-Purpose Spectrum Analyzer

Add the HP 85685A RF Preselector to the HP 8566B or 8568B general-purpose spectrum analyzer, and you have a test receiver for specialized applications. The RF Preselector enhances these high-performance spectrum analyzers with tracking filters and preamplifiers that cover the 20 Hz to 2 GHz range. The spectrum analyzer/test receiver is sensitive to low-level signals while providing overload protection from out-of-band signals. The result, for tests in the presence of high-level interference, is a measurement range 30 dB greater than that of the spectrum analyzer alone. (The improvement is even greater in the presence of broadband pulse-interference.)

The test receiver is easy to operate; simply use the spectrum analyzer controls without concern for

preselector settings. The preselector automatically adjusts input-filter tracking, and the spectrum analyzer reports preselector operating conditions on the CRT display. For remote operation with a computer, the receiver system is fully HP-IB\* programmable.

You now have more than just a dedicated receiver — you have a versatile spectrum analyzer with calibrated swept-frequency display, and a sensitive receiver with input selectivity. For the first time, the best features of a spectrum analyzer and a test receiver are combined into a single, multi-purpose instrument.

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\*HP-IB is Hewlett-Packard's hardware, software, documentation and support for IEEE-488 and IEC-625, worldwide standards for interfacing instruments.

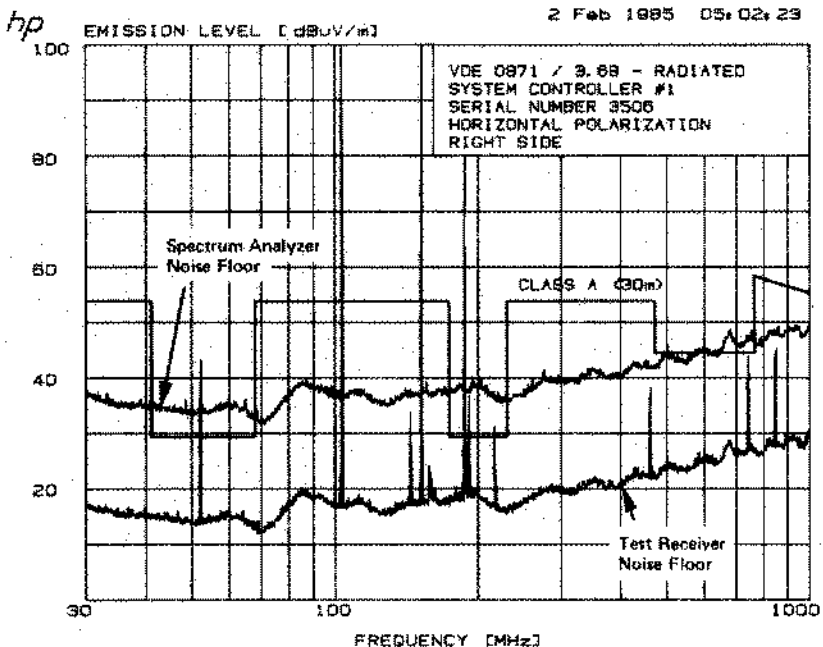
## THE HP 85685A PRESELECTOR ADDS

- Automatic Filter Tracking
- Input Overload Protection
- Low System Noise

## TO THE HP 8566B AND 8568B SPECTRUM ANALYZERS

# EMI Testing

## According to CISPR Publication 16\* Recommendations



Combining the HP 85685A RF Preselector with the HP 8566B or 8568B Spectrum Analyzer and the HP 85650A Quasi-Peak Adapter produces an EMI receiver with the characteristics recommended in CISPR Publication 16. The RF Preselector provides the measurement sensitivity and overload protection needed for FCC and VDE radiated emission testing at open sites. For commercial and MIL-STD conducted EMI tests, the low-frequency input tolerates large impulses and Line Impedance Stabilization Network (LISN) tran-

sients. A built-in calibrator ensures  $\pm 2.0$  dB absolute-amplitude accuracy as required by the FCC and VDE. For measurement confidence, a linearity check tests for system overload and distortion.

The sample display shows results for VDE 0871 emission testing at an open site. To prevent overload from the high-level ambient signals, a spectrum analyzer needs input attenuation. This, however, increases displayed noise, which can mask the low-level emissions. Using the RF Preselector in this test eliminates the need for adding attenuation. The noise of the spectrum analyzer, as shown, exceeds the VDE limit, but the spectrum analyzer/test receiver noise is more than 10 dB below the lowest limit.

For more information on EMI testing, including MIL-STD measurements from 20 Hz to 22 GHz, refer to the EMI Measurement Solutions brochure (HP literature no. 5954-2703). To automate EMI measurements, use the HP 85864B EMI Measurement Software.

\*Comite International Special Des Perturbations Radio-electriques (CISPR) Publication 16 is the "C.I.S.P.R. specification for radio interference measuring apparatus and measurement methods."

# Signal Monitoring

## In the Presence of High-Level Interference

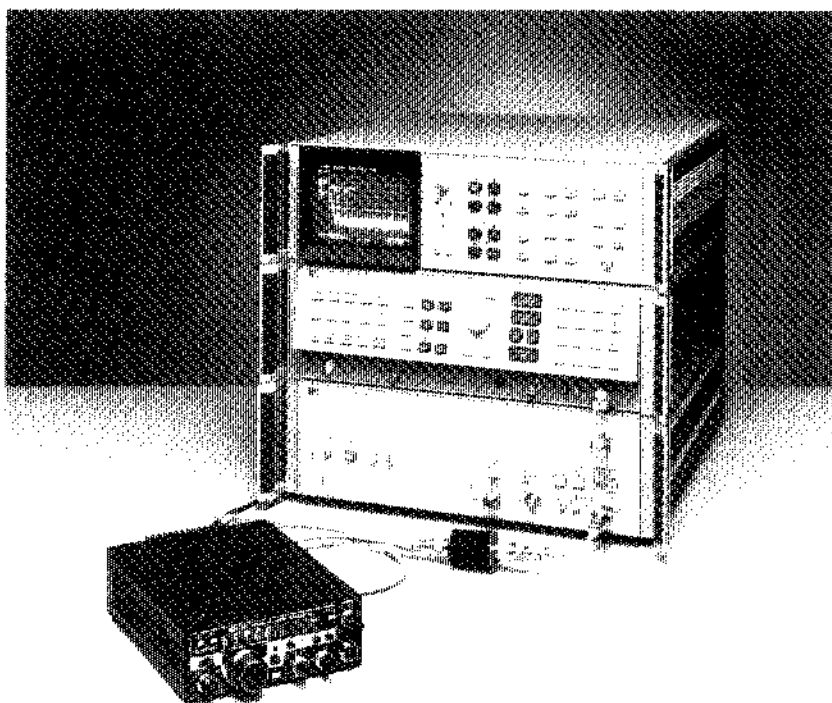
The RF Preselector gives the HP 8566B or 8568B Spectrum Analyzer the sensitivity and selectivity of a receiver. The spectrum analyzer/test receiver measures signals within the preselector filter passband and rejects out-of-band interference by 40 dB. Even in the presence of interference with a total input power of +10 dBm, your test receiver can monitor signals down to -150 dBm.

The RF Preselector improves signal reception for the broadband signal environment of a mobile test station. In the 150-170 MHz Business Band, the RF Preselector reduces interference from radio and TV broadcast stations and from amateur radios. For the 800-900 MHz Cellular Radio Band, the spectrum analyzer/test receiver makes field strength measurements on cellular base-station transmitters while rejecting interference from cellular mobile transmitters.



# Transmitter Spurious Testing

## With Fast, Wideband Measurements



Reduce transmitter-spurious test time by adding the RF Preselector to your HP 8566B or 8568B Spectrum Analyzer. The preselector decreases input overload from the out-of-band carrier and thereby increases the range for measuring low-level signals. Compared to the spectrum analyzer alone, the spectrum analyzer/test receiver uses a wider resolution bandwidth for the same measurement range, resulting in a faster sweep time. For example, to measure spurious signals over a 1 GHz frequency range at -100 dB relative to the transmitter carrier, a spectrum analyzer by itself takes 3000 seconds, but when configured as a test receiver it requires only 3 seconds.

# SPECIFICATIONS

Specifications describe the instrument's warranted performance over the temperature range of 0°C to +55°C unless otherwise noted. Typical values for the specified parameters represent probable but non-warranted performance. Nominal values provide useful but non-warranted information about functional performance.

## TEST RECEIVER



The following system specifications apply when the HP 85685A RF Preselector (RFP) operates with the HP 8566B or 8568B Spectrum Analyzer (SA) and with or without the HP 85650A Quasi-Peak Adapter (QPA). The test receiver system is fully HP-IB programmable. Refer to the specific instrument data sheets for more detailed information.

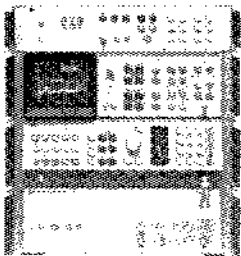
### FREQUENCY

PARAMETER	SPECIFICATION
Frequency Range RFP Bypass <sup>1</sup>	20 Hz - 1.5 GHz with HP 8568B 20 Hz - 2.0 GHz with HP 8566B 20 Hz - 18 GHz (nominal) with HP 8566B
Frequency Resolution (SA)	1 Hz
Frequency Accuracy (SA)	$\pm$ [tuned frequency $\times$ freq. reference error] Hz for SA zero span
Frequency Reference Error (SA)	Stability <sup>2</sup> $< 10^{-8}$ Drift $< 2 \times 10^{-7}$ /year
Frequency Selectivity <sup>3</sup> 3 dB Resolution BW (SA)	10 Hz - 3 MHz in 1, 3, 10 sequence

## AMPLITUDE

PARAMETER	SPECIFICATION
Measurement Range	-150 to +30 dBm (-43 to +137 dB $\mu$ V) (nominal)
Gain Compression (0 dB atten. for RFP and SA) Inside RFP Passband Outside RFP Passband	$< 1$ dB (nominal) for input $\leq -30$ dBm $< 1$ dB (nominal) for input $\leq +10$ dBm
Displayed Average Noise Level (0 dB atten. for RFP and SA, 10 Hz resolution BW)	$< -132$ dBm (-25 dB $\mu$ V) for input 9 kHz - 1 MHz <sup>4</sup> $< -150$ dBm (-43 dB $\mu$ V) for input = 1-1500 MHz $< -147$ dBm (-40 dB $\mu$ V) for input $\leq 2.0$ GHz
Broadband Signal Sensitivity <sup>5,6</sup> (0 dB atten. for RFP and SA, 1 MHz impulse BW <sup>7</sup> )	$< 31$ dB $\mu$ V/MHz (nominal) for input $< 1$ MHz <sup>4</sup> $< 13$ dB $\mu$ V/MHz (nominal) for input = 1-1500 MHz $< 16$ dB $\mu$ V/MHz (nominal) for input $\leq 2.0$ GHz
Second Harmonic Distortion (0 dB atten. for RFP and SA) For -35 dBm input signal: Within RFP Passband Outside RFP Passband	$< -55$ dBc (nominal), Equiv. SOI = +20 dBm $< -75$ dBc (nominal), Equiv. SOI = +40 dBm
Third Order Intermodulation (0 dB atten. for RFP and SA) For two -35 dBm input signals: Within RFP Passband Outside RFP Passband	$< -40$ dBc (nominal), Equiv. TOI = -15 dBm $< -110$ dBc (nominal), Equiv. TOI = +20 dBm
Residual Responses (RFP input terminated, 0 dB atten. for RFP and SA)	$< -90$ dBm for input 2 kHz - 1 MHz $< -112$ dBm for input $\geq 1$ MHz $< -120$ dBm (typical) for input $\geq 1$ MHz
Amplitude Accuracy <sup>8</sup> (+10° to +30°C, 10 dB SA atten., 0-20 dB RFP atten.) RFP Bypass	$\pm 2.0$ dB for input $< 1.0$ GHz $\pm 3.0$ dB for input $\geq 1.0$ GHz SA specification plus: $\pm 0.5$ dB (nominal) for input $\leq 2.0$ GHz $\pm 1.0$ dB (nominal) for input $> 2.0$ GHz

## CISPR EMI RECEIVER



The following system specifications apply when the HP 85685A RF Preselector (RFP) operates with the HP 8566B or 8568B Spectrum Analyzer (SA) and with the HP 85650A Quasi-Peak Adapter (QPA). The EMI receiver system has the characteristics recommended in CISPR Publication 16 and is fully HP-IB programmable. Refer to the specific instrument data sheets for more information.

### FREQUENCY

PARAMETER	SPECIFICATION
Frequency Range	10 kHz - 1 GHz
Frequency Resolution (SA)	1 Hz
Frequency Accuracy (SA)	$\pm$ [tuned frequency $\times$ freq. reference error] Hz
Frequency Reference Error (SA)	Stability <sup>2</sup> $< 10^{-8}$ Drift $< 2 \times 10^{-7}$ /year
Frequency Selectivity <sup>9</sup> CISPR 6 dB Bandwidth (QPA)	200 Hz for input = 10-150 kHz (Band A) 9 kHz for input = 150 kHz - 30 MHz (Band B) 120 kHz for input = 30-1000 MHz (Band C, D)

## AMPLITUDE

PARAMETER	SPECIFICATION
Measurement Range	+137 dB $\mu$ V to noise floor (refer to Amplitude Sensitivity table)
Amplitude Accuracy <sup>8</sup> (+10° to +30°C, 0-20 dB RFP atten.)	$\pm 2.0$ dB for 10 dB SA atten. $\pm 2.5$ dB for 0 dB SA atten.
Calibration <sup>10</sup>	Automatic calibration for absolute amplitude with Comb Generator (RFP)
Linearity Check	3 dB input attenuator test for system overload and distortion (RFP)
Impulsive Signal Tolerance	Input #1 withstands LISN transients (RFP) Input #2 withstands CISPR calib. pulses (RFP)
Detection <sup>9</sup>	Peak and Average (SA), Quasi-Peak (QPA)
Audio Output	Speaker with volume control (QPA)

## AMPLITUDE SENSITIVITY

EMI RECEIVER		SPECIFICATION	
FREQUENCY BAND	RESOLUTION BANDWIDTH (6 dB)	AVERAGE NOISE <sup>6</sup> (RFP/SA atten. = 0 dB)	QUASI-PEAK NOISE (RFP/SA atten. = 0 dB)
10-150 kHz (Band A)	200 Hz	-12 dB $\mu$ V <sup>4</sup> -17 dB $\mu$ V typical	-15 dB $\mu$ V (nominal)
150 kHz - 1 MHz (Band B)	9 kHz	+4 dB $\mu$ V -1 dB $\mu$ V typical	0 dB $\mu$ V (nominal)
1-30 MHz (Band B)	9 kHz	-13 dB $\mu$ V -16 dB $\mu$ V typical	-11 dB $\mu$ V (nominal)
30-1000 MHz (Band C, D)	120 kHz	-1 dB $\mu$ V -6 dB $\mu$ V typical	0 dB $\mu$ V (nominal)



## HP 85685A RF PRESELECTOR

The following instrument specifications apply to the HP 85685A RF Preselector (RFP).

### INPUT

PARAMETER	SPECIFICATION	
	INPUT #1	INPUT #2
Frequency Range RFP Bypass <sup>1</sup>	20 Hz - 50 MHz	20 MHz - 2 GHz DC - 18 GHz (nom.)
Connector Type	BNC, 50 Ω (nominal)	Type N, 50 Ω (nom.)
Fuse Blow Time	< 0.1 sec for > +35 dBm	N/A
Maximum Safe Input Power Average Power	+30 dBm (1 Watt)	
Impulsive Signals ≥ 10 dB RFP atten. ≥ 20 dB RFP atten.	100 Watts peak for a 10μs pulse	
	2,000 Watts peak for a 10μs pulse <sup>11</sup> (nominal)	N/A
DC Voltage	0 Volts	
Standing Wave Ratio (SWR) <sup>12</sup> ≥ 10 dB RFP atten. 0 dB RFP atten. RFP Bypass	< 1.5:1 < 1.5:1 (nominal) N/A	< 1.5:1 < 2.0:1 (nominal) < 1.5:1 (nominal)
Attenuator Range Linearity Check	0-50 dB in 10 dB steps (nominal) Add 3 dB (nominal)	
Filter Characteristics Fixed Filter BW (3 dB)	BW range = 10 kHz - 1 MHz (nom.) for input < 2 MHz	
Tracking Filter BW (3 dB)	10% (nom.) of tuned freq. for input = 2-55 MHz 5% (nom.) of tuned freq. for input = 55-500 MHz 20 MHz (nom.) for input = 500-2000 MHz	
Stopband Attenuation	> 40 dB (nominal)	
Preamplifier Gain	20 dB (nominal) for 0 dB RFP atten.	

## ORDERING INFORMATION

### HP 85685A RF Preselector

- Option 010, Rack Mount Slide Kit
- Option 908, Rack Flange Kit without Handles
- Option 910, Extra Manual
- Option 913, Rack Flange Kit with Handles

### Firmware Compatibility Options (see compatibility specifications above)

- HP 85685A Option 066, Firmware Upgrade Kit\* for HP 8566B
- HP 85685A Option 068, Firmware Upgrade Kit\* for HP 8568B
- HP 8566A+01K Retrofit Kit
- HP 8568A+01K Retrofit Kit

### HP 8566B Spectrum Analyzer

### HP 8568B Spectrum Analyzer

### HP 85650A Quasi-Peak Adapter

### ACCESSORIES

#### HP 85864B EMI Measurement Software

Transit Case, HP P/N 1540-0663

EMI Accessories<sup>13</sup>: Antennas, LISN's, Current Probes, and Amplifiers

\*Full \$1,000.00 credit is given if old firmware board is returned within 90 days. Request M62 exchange board credit when ordering HP 85685A — one credit per order.

## OUTPUT

PARAMETER	SPECIFICATION
Comb Generator Line Spacing Line Amplitude SWR	100 kHz, 500 kHz, 1 MHz, 5 MHz (nominal)
	-40 to -60 dBm (nominal)
	< 1.5:1 (nominal)
HP-IB Interface* Private Bus Public Bus Interface Functions (Public Bus)	Digital bus and sweep control between RFP and SA
	IEEE 488-1978 bus
	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, CO, E1

## GENERAL

PARAMETER	SPECIFICATION
Temperature	0° to +55°C operating -40° to +75°C storage
Warm-up Time	30 minutes after cold start
Temp. Equilibrium	2 hours after warm-up
EMI	Conducted and radiated interference is in compliance with MIL-STD 461A Methods CE03 and RE02, CISPR publication 11 (1975), and Messemphaenger-Postverfuegung 526/527/79 (Kennzeichnung Mit F-Nummer/ Funksschutzzeichen).
Power Requirements	100, 120, 220, or 240 V RMS +5%, -10%; 50-400 Hz; 35 VA (nominal)
Weight	19 kg (42 lbs) net (nominal)
Size	133 mm (5.25") H x 425 mm (16.75") W x 508 mm (20.0") D (nominal)
Firmware Compatibility For RFP operation with:	
HP 8566B, firmware date ≥ 5.5.85	Compatible
HP 8566B, firmware date < 5.5.85	HP 85685A Option 066 required
HP 8566A, any firmware date	HP 8566A+01K Retrofit Kit required
HP 8568B, firmware date ≥ 14.1.85	Compatible
HP 8568B, firmware date < 14.1.85	HP 85685A Option 068 required
HP 8568A, any firmware date	HP 8568A+01K Retrofit Kit required

<sup>1</sup>The RFP Bypass switch connects Input #2 directly to the RF output.

<sup>2</sup>Refer to spectrum analyzer test and adjustment manual for correct frequency reference adjustment.

<sup>3</sup>Refer to spectrum analyzer data sheet for filter BW accuracy and filter shape.

<sup>4</sup>17 dB higher with HP 8566B for frequency < 50 kHz.

<sup>5</sup>Sensitivity is approximately equal to system peak noise level.

<sup>6</sup>Peak noise is nominally 8 dB higher than average noise.

<sup>7</sup>Measurement sensitivity is normalized to 1 MHz impulse BW which is about 1.6 times wider than 1 MHz resolution BW.

<sup>8</sup>Specifications apply after system calibration with the Comb Generator in the HP 85685A. Refer to HP 85685A operating manual for correct amplitude measurement technique.

<sup>9</sup>The system meets CISPR Publication 16 recommendations for resolution BW, detector time constant, and detector pulse response.

<sup>10</sup>System calibration can be verified with an external CISPR Standard Pulse Calibration Generator.

<sup>11</sup>Typical LISN transients.

<sup>12</sup>SWR is measured at the tuned frequency of the spectrum analyzer.

<sup>13</sup>Refer to the EMI Measurement Solutions Ordering Guide (HP P/N 5954-2702) for more information.



For more information, call your local HP sales office listed in the telephone directory white pages. Ask for the Electronic Instruments Department. Or write to Hewlett-Packard: **U. S. A.** — P. O. Box 10301, Palo Alto, CA 94303-0890. **Europe** — P. O. Box 999, 1180 AZ Amstelveen, the Netherlands. **Canada** — 6877 Goreway Drive, Mississauga, L4V 1M8, Ontario. **Japan** — Yokogawa-Hewlett-Packard Ltd., 3-29-21, Takaido-Higashi, Suginami-ku, Tokyo 168. Elsewhere in the world, write to Hewlett-Packard Intercontinental, 3495 Deer Creek Road, Palo Alto, CA 94304