

TRANSCEIVER TEST EQUIPMENT

RF Communications Test Set

HP 8920A



HP 8920A RF Communications Test Set

The HP 8920A is a full-feature, one-box test set designed to meet the communication test needs of both service and manufacturing environments. Combining 22 complete instruments, the HP 8920A offers the full functionality needed in testing land mobile radios, cellular phones, and communications systems.

Test and Troubleshoot Faster

The HP 8920A decreases standard test and troubleshooting time by simplifying standard measurement tasks and providing more needed capability in one box. Transmitters and receivers are simply characterized with single-key RX, TX, and duplex tests. All measured results are displayed on a single screen as either digital measurements or analog bar graphs. All settings and measurements are easily accessed and changed using the front-panel knob, and all settings can be saved in nonvolatile save/recall register for future access.

Minimize Production Test Costs

The HP 8920A's Built-in I-BASIC Computer combined with the HP 11807A Radio Test Software provides a complete solution for automated radio test in the production environment. Production costs are lowered by increasing throughput with decreased test times and automating measurements without the added expense of an external controller. Test equipment costs are also reduced as the HP 8920A allows you to replace several individual instruments with one.

Standard Features Summary

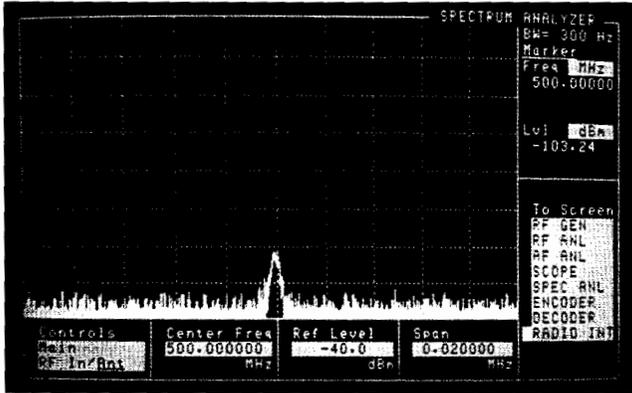
- Synthesized AM/FM signal generator to 1 GHz
- AM/FM modulation analyzer
- Duplex offset generator
- SSB demodulator
- RF power meter
- RF frequency counter/frequency error meter
- Audio frequency counter
- AF power meter
- AC/DC voltmeter
- SINAD meter
- Distortion meter
- Two variable audio sources
- Digital oscilloscope
- Built-in I-BASIC controller
- $2\mu\text{V}$ sensitivity (typically $<1\mu\text{V}$)

Optional Features Summary

- Spectrum analyzer and tracking generator
- Signaling source and analyzer
- Cellular-phone test capability
- Function generator
- DC current meter
- HP-IB/RS-232 interface buses for remote programming
- Radio test software
- Radio interface card

Spectrum Analyzer with Tracking Generator

The HP 8920A's optional synthesized spectrum analyzer measures signals from 400 kHz to 1 GHz with variable spans from 5 kHz to 1 GHz (full span). The tuneable marker provides automatic readout of frequency and amplitude, or of relative frequency or amplitude from a reference. The tracking generator included with the spectrum analyzer allows for swept characterization of devices with fully settable amplitude and sweep spans (to 1 GHz).



Sensitive Receiver: 2 μ V sensitivity (typically <1 μ V), available through the ANT IN port, allows for off-the-air monitoring of low-level signals. For measuring high-power signals, the HP 8920A can accept 100 W intermittently (for 10 seconds) or 60 W continuous.

Signaling Encoder and Decoder

The optional signaling encoder and decoder support all common signaling formats, including tone sequential, digital paging, DTMF, and cellular signaling. Common standards are list-selectable and easily modified for different user formats. The decoder displays the tone or digital sequence transmitted, and the duration of the tone or tone pair. For digital paging transmitters, the decoder will display the address/code, the message, and the transmission rate.

HP 11807A Radio Test Software

The HP 11807A is an easy-to-use software solution for automatic testing of radio receivers and transmitters. Running on the HP 8920A's built-in I-BASIC computer, the HP 11807A offers a complete selection of tests for land mobile radios, cellular phones, and communication systems. Its flexibility and modularity allow you to select and change test sequences, test parameters, and pass/fail limits without programming expertise. All test results are displayed on the screen and can be documented with hard-copy printouts when an external printer is added.

The HP 11807A system support tests (Option 100) give technicians automated test capability for commonly performed tasks on communications systems. System support tests include cable-fault location, intermodulation-products calculation, frequency scanning, and field-strength measurement.

Cellular-Phone Testing

The HP 8920A tests the most common cellular phones when the signaling option (Option 004) is combined with the HP 11807A software for cellular tests. Three levels of phone testing are available: manual phone troubleshooting, quick functional checkout, and full parametric testing to system specifications. Cellular formats supported include AMPS, TACS, NMT 450, NMT 900, and JTACS. In addition to phone testing, the features and performance of the HP 8920A make it an ideal solution for base station. Test channels are easily characterized using the duplex test function, and duplexers and combiners are easily tuned using the spectrum analyzer with the tracking generator.

Specifications Summary

Signal Generator

RF Frequency

Range: 250 kHz to 1 GHz

Accuracy and stability: Same as reference oscillator ± 0.015 Hz

Output

Range: -137 to -19 dBm into 50 Ω (RF in/out)

-127 to +7 dBm into 50 Ω (duplex out)

Level accuracy: ± 1.8 dB (RF in/out)

± 1.5 dB (duplex out)

Typically ± 1.0 dB for all levels

Modulation

FM (ac/dc-coupled)

FM deviation: 100 kHz; 0.25 to 250 MHz

(Rates > 25 Hz) 50 kHz; 250 to 500 MHz

100 kHz; 500 to 1000 MHz

FM rate: DC to 75 kHz (3 dB BW)

FM accuracy: ≤ 10 kHz dev: $\pm 7.5\%$ of setting ± 50 Hz

>10 kHz dev: $\pm 7.5\%$ of setting ± 500 Hz

AM

AM depth: 0% to 90%

AM rate: 20 Hz to 25 kHz (3 dB BW)

AM accuracy: $\leq 10\%$ AM: $\pm 5\%$ of setting $\pm 1.0\%$ AM

>10% AM: $\pm 5\%$ of setting $\pm 1.5\%$ AM

Audio Generator

Frequency range: DC to 25 kHz

Output level range: 0.1 mV to 4 V rms

Output impedance: <1 Ω

RF Analyzer

RF Frequency Measurement

Measurement range: 400 kHz to 1 GHz

Accuracy: ± 1 Hz plus timebase accuracy

RF Power Measurement

Measurement range: 1 mW to 60 W continuous

100 W for 10 s/min

Accuracy: $\pm 10\%$ of reading ± 1 mW (for inputs ≥ 200 mW)

FM Measurement

Frequency range: 5 to 1000 MHz

Deviation: 20 Hz to 75 kHz

Sensitivity: 2 μ V (typically <1 μ V)

Accuracy: $\pm 4\%$ of reading plus residual FM and noise contribution

Residual FM and noise: <20 Hz (0.3 to 3 kHz rms)

AM Measurement

Frequency range: 10 to 1000 MHz

Depth: 0% to 95%

Accuracy: $\pm 5\%$ of reading $\pm 1.5\%$ AM

SSB Measurement

Frequency range: 400 kHz to 1 GHz

Bandwidth (3 dB): 20 Hz to 70 kHz

AF Analyzer

Frequency Measurement

Measurement range: 20 Hz to 400 kHz

TRANSCEIVER TEST EQUIPMENT

RF Communications Test Set (cont'd)

HP 8920A

Accuracy: $\pm 0.02\%$ plus resolution plus reference oscillator accuracy

AC/DC Voltage Measurement

AC Range: 0 to 30 Vrms

AC Accuracy: $\pm 3\%$ of reading $\pm 150 \mu\text{V}$ rms

DC Range: 100 mV to 42V

DC Accuracy: $\pm 1.0\%$ of reading $\pm 45 \text{ mV}$

SINAD/Distortion Measurement

Fundamental frequency: 1 kHz $\pm 5 \text{ Hz}$

Distortion range: 0.1% to 100%

Accuracy: $\pm 1 \text{ dB}$ (0.5 to 100% distortion)

SINAD range: 0 to 60 dB

Accuracy: $\pm 1 \text{ dB}$ (0 to 46 dB SINAD)

Audio Filters

Standard: 50 Hz HPF, 300 Hz HPF, 300 Hz LPF, 3 kHz LPF, 15 kHz LPF, 750 μs de-emphasis, 1 kHz notch

Optional: C-Message, CCITT, 400 Hz HPF, 4 kHz BPF, 6 kHz BPF

Oscilloscope Specifications

Bandwidth (3 dB): 2 Hz to 50 kHz

Scale/Division: 10 mV to 10V

Time/Division: 10 μs to 100 ms

Spectrum Analyzer Specifications (Option 002)

Frequency range: 400 kHz to 1 GHz

Frequency span/resolution bandwidth (coupled):

Span	Bandwidth
$\leq 50 \text{ kHz}$	300 Hz
$\leq 300 \text{ kHz}$	1 kHz
$\leq 5 \text{ MHz}$	3 kHz
$\leq 50 \text{ MHz}$	30 kHz
$> 50 \text{ MHz}$	300 kHz

Plus full span capability

Display range: 80 dB

Tracking Generator

(Included with Option 002)

Frequency range: 400 kHz to 1 GHz

Frequency offset: Frequency span endpoints \pm frequency offset cannot be $< 400 \text{ kHz}$ or $> 1 \text{ GHz}$

Output level range: Same as signal generator

Sweep modes: Normal and inverted

Signaling Encode/Decode (Option 004)

CDCSS, DTMF, 1 TONE, 2 TONE, 5/6 TONE SEQUENTIAL (EIA, CCITT, CCIR, ZVEI, EEA, Euro, NATEL), RPC1 (Pocsag), GOLAY, AMPS, TACS, NMT-450, NMT-900

DC Current Meter (Option 003)

Measurement range: 0 to 10 A (usable to 15 A)

Accuracy: The greater of: $\pm 10\%$ of reading or $\pm 30 \text{ mA}$

Reference Oscillator Specifications

TCXO (Standard)

Temperature: 1 ppm (0 to $+55^\circ \text{C}$)

Aging: $< 2 \text{ ppm/year}$

OCXO (Option 001)

Temperature: 0.05 ppm (0 to $+55^\circ \text{C}$)

Aging: $< 0.5 \text{ ppm/year}$ ($< 1 \text{ ppm}$ in 1st year)

Remote Programming (Option 003)

HP-IB: Hewlett-Packard's implementation of IEEE Standard 488.2

RS-232: Three-wire RJ-11 connector used for serial data in and out

Baud Rates: 300, 1200, 2400, 4800, 9600, and 19200 selectable

General Specifications

Size: 188 mm H \times 330 mm W \times 456 mm D

Weight: 15.9 kg (35 lbs)

CRT Size: 7 \times 10 cm

Operating Temperature: 0 to $+55^\circ \text{C}$

AC: 100/120/220/240 V, 48 to 440 Hz, approx. 80 watts

DC: 11 to 28 V, approx 120 watts

Leakage: At Signal Generator output frequency and level $< 40 \text{ dBm}$ typical leakage is $< 0.5 \mu\text{V}$ induced in a resonant dipole antenna 1 inch from any surface except the rear panel. Spurious leakage levels are typically $< 1 \mu\text{V}$ in a resonant dipole antenna.

Ordering Information

HP 8920A RF Communications Test Set	Price
HP 8920A RF Communications Test Set	\$13,800
Opt 001 High stability timebase	\$600
Opt 002 Spectrum analyzer with tracking generator	\$1,500
Opt 003 HP-IB/RS-232/current measurement	\$600
Opt 004 Tone/digital signaling	\$600
Opt 005 256 k RAM memory	\$500
Opt 010 400 Hz high-pass filter	\$300
Opt 011 CCITT weighting filter	\$300
Opt 012 4 kHz bandpass filter	\$300
Opt 013 C-Message weighting filter	\$300
Opt 014 6 kHz bandpass filter	\$600
Opt 020 Radio interface card	\$2,000
Opt 908 Rack flange kit (5061-9677)	\$400
Opt 910 Extra operating/quick reference manual (08920-90010 and 08920-90012)	\$100 ☎
Opt W30 Three-year warranty	\$335

HP 11807A Radio Test Software

(requires Option 005 on HP 8920A)

Opt 001 North American FM tests	\$500
Opt 002 European PM tests	\$500
Opt 003 AM tests	\$500
Opt 004 AMPS/EAMPS cellular tests	\$1,500
Opt 005 TACS/ETACS cellular tests	\$1,500
Opt 006 NMT cellular tests	\$1,500
Opt 007 JTACS cellular tests	\$1,500
Opt 100 System support tests	\$75

Optional Accessories

08920-61060 Antenna	\$30
08920-61059 Microphone	\$50
08920-80027 DC Battery Pack (24 V)	\$150
08920-80028 Battery Charger	\$250
08920-90034 IBASIC Reference/HP 8920A Programming Manual	\$113 ☎
08920-90036 Service Kit	\$250 ☎
08920-61061 Connector Kit	\$50
HP 85700A 32 Kbyte SRAM memory card	\$100
HP 85702A 128 Kbyte SRAM memory card	\$175
HP 85704A 256 Kbyte SRAM memory card	\$350
HP 85705A 512 Kbyte SRAM memory card	\$525

Available Literature

	Ref #
HP 8920A Technical Data Sheet	5952-2799
Service Applications/Brochure	5952-2797
Manufacturing Application/Brochure	5952-2796
Cellular Applications/Brochure	5091-0902
HP 11807A Technical Data Sheet	5091-0903

☎ For off-the-shelf shipment, call 800-452-4844.