NETWORK ANALYZERS
RF Economy Network Analyzers, 300 kHz to 3000 MHz
HP 8711B, 8712B, 8713B, 8714B

- 300 kHz to 3000 MHz (1300 MHz in HP 8711B and HP 8712B)
- Internal 3.5-inch disk drive (LIF/DOS formats)
- Narrowband and broadband detection
- "Real time" sweep speed (50 ms/sweep)

- Integrated transmission/reflection test set
- Synthesized 1 Hz resolution source
- Internal HP Instrument BASIC
- 100 dB of system dynamic range
- AM delay

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NEW

DESIGNED FOR
HP-IB
SYSTEMS

HP RF Economy Network Analyzers

The HP economy network analyzers (ENAs) offers speed, accuracy, and measurement versatility at a price that makes them ideal for high-volume RF component manufacturing. Characterize the transmission/reflection frequency response or measure the insertion loss, delay, power, or SWR of a variety of RF components. The RF ENA instruments are compact, integrated, and provide fast, simple, and accurate RF testing.

An integrated synthesized source and transmission/reflection test set enable complete swept frequency characterization of RF components with a single connection. The internal synthesized source is a fast (50 ms/sweep) and stable (1 Hz resolution) stimulus for testing narrowband devices. The sensitive receivers of these RF ENAs have both narrowband and broadband detection which makes the instrument ideal for testing the linear and nonlinear components of RF systems. Broadband detection allows characterization of frequency translation devices, while narrowband detection provides more than 100 dB of dynamic range for testing high-rejection, narrowband devices. Calibrated external scalar detectors are used to measure remote DUTs and amplitude modulation delay. Power sweep enables testing of amplifier gain compression.

Optional HP Instrument BASIC (IBASIC) puts computer automation capabilities inside the instrument, simplifying measurement setups and testing. A built-in, LIF/DOS-format, 3.5-inch disk drive allows unlimited storage of instrument states, measurement and calibration data, and IBASIC programs.

The integrated source, receiver, test set display, and disk drive make these network analyzers easy to use—ideal for manufacturing, incoming inspection, and maintenance.

Designed for Manufacturing

The HP RF economy network analyzers were designed for high-volume manufacturing. Their simplicity, ease of use, and automated, time-saving features reduce device test time.

The RF ENAs simultaneously display multiple measurement parameters, such as insertion loss and return loss characteristics on the CRT. Over 100 internal save-recall registers speed device testing. Internal storing and recalling of complete instrument states saves time and reduces operating errors.

Powerful marker-search functions speed final test of components by calculating and displaying in real time specified device characteristics (maximum, minimum, and 3 dB bandwidth gain slope and flatness), along with measurement data.

Limit testing allows comparison of measured data to user-defined test limits and displays the results on the instrument's screen. This feature ensures devices are aligned and tested to the same specifications at all production stations.

HP IBASIC and the built-in-disk drive simplify measurement automation and reduce system cost. IBASIC's unique keystroke recording capability automates manual measurements without any programming. Use an IBM-compatible PC and the analyzer's DOS disk format to control your measurement system and transfer data directly to popular MS-DOS programs. Printers and plotters are supported through serial, parallel, and HP-IB interfaces.

HP 8711B and HP 8713B

These two members of the family offer economical magnitude measurements. They are low-cost RF component test systems with an excellent price for performance to lower your production costs and increase your competitiveness. The HP 8711B has a frequency range of 300 kHz to 1300 MHz, while the HP 8713B has a frequency range of 300 kHz to 3000 MHz.

Optional AM delay allows measurement of delay through frequency-translating devices.

Two independent display channels can measure and display two measurements, such as reflection and transmission, in a variety of useful formats.

AM Delay

Delay is an important measure of the nonlinearity of a device's phase response versus frequency. Amplitude modulation delay can measure delay in frequency-translating devices where phase differential will not work. The analyzer measures delay using two calibrated external scalar detectors, the HP 86200B or 86201B.

This technique is simple and reliable, but is not useful for measuring devices with internal AGC, or those that operate in saturation.
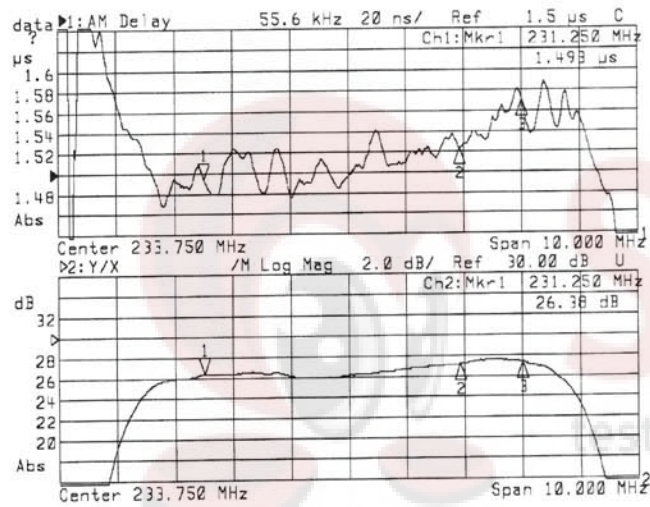
HP 8712B and HP 8714B

These two members of the RF ENA family offer higher performance RF vector measurement capabilities, including phase, complex impedance, and linear group delay. When combined with optional amplitude modulation (AM) delay, these products satisfy your most demanding RF measurement needs. The HP 8712B has a frequency range of 300 kHz to 1300 MHz, while the HP 8714B has a frequency range of 300 kHz to 3000 MHz.

Two independent display channels can simultaneously measure and display two measurements, such as reflection and delay, in a variety of useful formats including complex impedance and SWR, on rectangular, polar, or Smith charts.

Comprehensive, Fast, Economical Cable Test

Cable that does not meet specifications is an expensive problem for manufacturers, installers, and maintainers. Option 100 verifies manufacturers' data and fully tests cable that may have suffered invisible damage during shipment.

A thorough cable test requires measuring loss, impedance, structural return loss (SRL), and fault location. Now, all these capabilities are available with option 100. Some tests, like SRL using a variable impedance bridge, also require considerable operator craft. Option 100 automates SRL measurements, for faster testing and less operator training.

Structural return loss (SRL) is the ratio of incident to the reflected signal, giving the reflection coefficient referenced to the cable's impedance. Periodic disturbances can cause SRL in the cable. These disturbances, usually created by either manufacturing problems or a reel-handling incident, are too small by themselves to cause a problem. However, reflections from each one can sum together coherently, causing significant reflections at a frequency with a wavelength that corresponds to the disturbance spacing times two.

Option 100 fault location also includes convenient features unavailable with any other solution. Accurate measurements require that the operator know the velocity factor and cable loss per 100 feet. Often, the manufacturers' specifications are not immediately available, or not precise. Option 100 has the ability to utilize a known short length of cable and determine these parameters.

Additionally, if there are multiple reflections from cable faults or connectors, the total energy reflected could affect the measurement accuracy of subsequent faults. The multi-bump correction automatically compensates for the energy reflected from each fault in measuring subsequent faults. Connecting large reels of cable to the instrument will typically require a long type-N 75 ohm cable. HP has 10 foot, 15 foot, and 30 foot low loss, phase stable cables available for this purpose.

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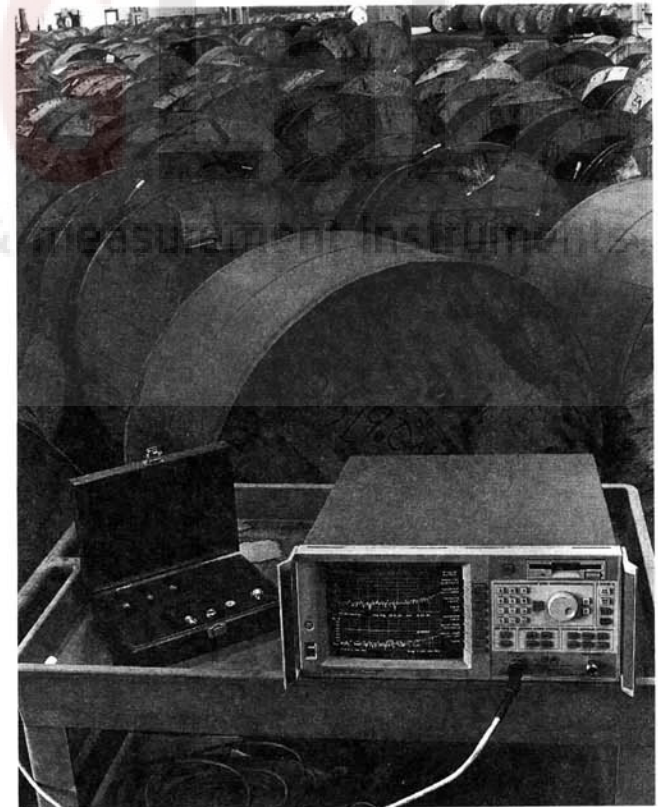
NETWORK ANALYZERS

RF Economy Network Analyzers, 300 kHz to 3000 MHz (cont'd)
HP 8711B, 8712B, 8713B, 8714B

Switching Test Sets

Switching test sets provide fast and convenient measurements in both forward and reverse directions.

Specifically designed for high-volume RF component manufacturing, switching test sets automatically switch the transmission and reflection test port connections between the network analyzer and the device under test. This allows measurement of forward and reverse parameters with a single connection. In manufacturing environments where extreme accuracy is not required, switching test sets are an economical alternative to a full S-parameter test set with full two-port error correction.

Special Option K02 is the two-port switching test set. In addition, multiport configurations are available upon request.

Calibration Kits

Accuracy enhancement removes systematic errors by measuring known devices (standards) over the frequency range of interest. Kits for the RF ENA family contain standards to characterize these errors.

HP 85032E 50 Ω Type-N Economy Calibration Kit

The HP 85032E contains 50 Ω type-N standards to calibrate network analyzers to measure devices with 50 Ω type-N connectors. Standards include a fixed termination, open circuit, and short circuit.

HP 85033D 3.5mm Calibration Kit

The HP 85033D contains 50 Ω 3.5 mm standards to calibrate network analyzers to measure devices with 50 n 3.5 mm connectors. Standards include a fixed termination, open circuit, and short circuit.

HP 85036E 75 Ω Type-N Economy Calibration Kit

The HP 85036E contains 75 Ω type-N standards to calibrate network analyzers to measure devices with 75 Ω type-N connectors. Standards include a fixed termination, open circuit, and short circuit.

HP 85039A 75 Ω Type-F Calibration Kit

The HP 85039A contains 75 Ω type-F standards to calibrate network analyzers to measure devices with 75 Ω type-F connectors. Standards include a fixed termination, open circuit, and short circuit.

Specifications Summary

	HP 8711/12	HP 8713/14
Source Characteristics		
Frequency Range		
Min freq:	300 kHz	300 kHz
Max freq:	1300 MHz	3000 MHz
Resolution:	1 Hz	1 Hz
Accuracy:	<5 ppm	<5 ppm
Output Characteristics		
Power Range (standard)		
<1000 MHz:	0 to 16 dBm	−5 to 10 dBm
>1000 MHz:	0 to 13 dB	−5 to 10 dBm
With Attenuator		
<1000 MHz:	−60 to 13 dBm	−60 to 7 dBm
>1000 MHz:	−60 to 10 dBm	−60 to 7 dBm
With 75 Ω:	reduces output by 3 dB	
With group delay:	reduces output by 3 dB	
Test Port Accuracy and Flatness		
Standard	±1.0 dB	±1.0 dB
Opt 1 EC:	±1.5 dB	±1.5 dB
Opt 1 E1:	±2.0 dB	±2.0 dB
Opt 1 EC & 1E1:	±3.0 dB	±3.0 dB
Signal Purity		
Harmonics	(at +7 dBm)	
<1 MHz:	<−20 dBc	<−30 dBc
>1 MHz:	<−30 dBc	<−30 dBc

Receiver Characteristics

	HP 8711/12	HP 8713/14
Frequency Range		
Narrowband:	300 kHz	300 kHz
	1300 MHz	3000 MHz
Broadband:	10 MHz	10 MHz
	1300 MHz	3000 MHz
Dynamic Range		
Narrowband:		
<5 MHz	>60 dB	>80 dB
>5 MHz	>100 dB	>100 dB
Broadband		
Internal:	>66 dB	>60 dB
External:	>66 dB	>66 dB
Maximum Input		
Narrowband:	10 dBm	10 dBm
	.8 dBm compression	
Broadband:	16 dBm	16 dBm
	.5 dBm compression	
Input Damage Level:	20 dBm	20 dBm

AM Delay Characteristics
Apertures: 55.56 kHz
Input Amplifier Range: −10 to +13 dBm
Resolution: .5 ns
Range: 30 μs (9000 m)
Accuracy: ±4 ns

Test Set Characteristics
Reflection Port Match: 20 dB
Transmission Port Match: 18 dB typical
System Directivity: 40 dB

RF Connectors
Test Ports:
All models are available in 50 Ω or 75 Ω type N (f)

Physical Characteristics
Size: 430 mm W × 180 mm H × 480 mm D (7 in × 17 in × 18.75 in)
Weight: Net, 20.5 kg (45 lb); shipping, 25 kg (55 lb)

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Detectors and Bridges

External detectors (50 Ω and 75 Ω) and bridges are available for remote device measurements and amplitude modulation delay measurements.

HP 86200B 50 Ω Scalar Detector

An external scalar detector for use when measuring external 50 Ω devices.

HP 86201B 75 Ω Scalar Detector

An external scalar detector for use when measuring external 75 Ω devices.

HP 86205A 50 Ω Bridge

An external directional bridge that offers high directivity and excellent port match and is designed for 50 Ω device measurements.

HP 86207A 75 Ω Bridge

An external directional bridge that offers high directivity and excellent port match and is designed for 75 Ω device measurements.

Upgrade Kits

The following upgrade kits add optional measurement capability to existing HP RF ENA network analyzers.

HP 86223B Attenuator Upgrade Kit

Provides the necessary components to retrofit an HP RF ENA with a 60 dB step attenuator (Option lE1). Includes installation at an HP service center. Also available as HP p/n 08711-60060.

HP 86224B IBASIC Upgrade Kit

Provides the necessary components to retrofit an RF ENA with IBASIC capabilities (Option 1C2). Includes installation at an HP service center. Also available as HP p/n 08711-60061.

HP 86221A AM Delay Upgrade Kit, 50 Ω

Provides the necessary components to retrofit an RF ENA with AM delay capabilities (Option 1DA). Includes installation at an HP service center. Also available as HP p/n 08711-60062.

HP 86221B AM Delay Upgrade Kit, 75 Ω

Provides the necessary components to retrofit an RF ENA with AM delay capabilities (Option 1DB). Includes installation at an HP service center. Also available as HP p/n 08711-60063.

HP C1405A/ABA DIN Keyboard

PC keyboard to enhance editing capability (Option 1CL).

Test Port Cables

Replacement test port cables are available as HP part numbers. A 50 Ω BNC cable is standard for the RF ENAs.
HP 8120-1839 BNC Test Port Cable 50 Ω
HP 5063-0061 BNC Test Port Cable 75 Ω
HP 8120-4781 Type-N Cable, 50 Ω
HP 8120-2408 Type-N Cable, 75 Ω

Ordering Information

	Price
HP 8711B Network Analyzer	$9,500
HP 8712B Network Analyzer	$16,500
HP 8713B Network Analyzer	$14,500
HP 8714B Network Analyzer	$21,500
Opt lEC 75 Ω System Impedance	$0
Opt lE1 60 dB Attenuator	$1,000
Opt 1C2 IBASIC Capability	$1,200
Opt IDA 50 Ω AM Delay	$3,500
Opt 1DB 75 Ω AM Delay	$3,500
Opt 1CL DIN Keyboard	$125
Opt 1CM Rack Mount	$75
Opt 100 Fault Location/SRL	$1,500
HP 86223B Attenuator Upgrade Kit	$1,200
HP 86224B IBASIC Upgrade Kit	$1,200
HP 86226B Firmware Upgrade Kit	$100
HP C1405B DIN Keyboard	$97
HP 85032E 50 Ω Calibration Kit	$665
HP 85036E 75 Ω Calibration Kit	$665
HP 11853A Type-N Accessory Kit	$510
HP 11854A BNC Accessory Kit	$510
HP 11855A Type-N Accessory Kit	$510
HP 11856A BNC Accessory Kit	$510
HP 86200B 50 Ω Scalar Detector	$800
HP 86201B 75 Ω Scalar Detector	$800
HP 86205A 50 Ω Bridge	$1,325
HP 86207A 75 Ω Bridge	$1,325
HP 86211A Type-N to Type-F Adapter Kit	$305
HP 8120-1839 BNC Test Port Cable, 50 Ω	$15
HP 5063-0061 BNC Test Port Cable, 75 Ω	$35
HP 8120-4781 Type-N Cable, 50 Ω	$200
HP 8120-2408 Type-N Cable, 75 Ω	$350
HP 86221B AM Delay Upgrade Kit 50 Ω	$3,500
HP 86225B AM Delay Upgrade Kit 75 Ω	$3,500
HP 8120-6737 Type-N 75 Ω Cable 10 ft male/male	$300
HP 8120-6740 Type-N 75 Ω Cable 10 ft male/female	$300
HP 8120-6738 Type-N 75 Ω Cable 15 ft male/male	$325
HP 8120-6741 Type-N 75 Ω Cable 15 ft male/female	$325
HP 8120-6739 Type-N 75 Ω Cable 30 ft male/male	$350
HP 8120-6742 Type-N 75 Ω Cable 30 ft male/female	$350
HP 1250-2713 Feed Thru Female/Female	$60

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