

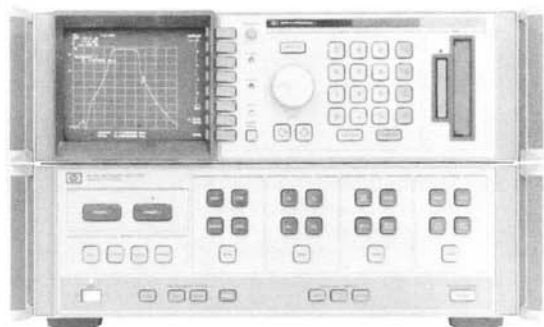
NETWORK ANALYZERS

Microwave Network Analyzers, 45 MHz to 110 GHz

8510 Series

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- 45 MHz to 110 GHz frequency range
- "Real Time" error-corrected measurements
- 60 dB effective directivity and source match



HP 8510B

Description

The HP 8510 series microwave vector network analyzers provide a complete solution for characterizing the linear behavior of either active or passive networks over the 45 MHz to 40 GHz frequency range. A complete system comprises the HP 8510B network analyzer, an S-parameter test set, and a compatible RF source. For millimeter-wave measurement needs, complete systems operating to 110 GHz can be configured.

Measurement results can be displayed on one of two independent, yet identical, channels. The channels may be displayed individually, or simultaneously, with results presented in either log/linear magnitude, phase, or group delay format on rectangular or polar coordinates. Direct measurement of impedance is possible with the Smith chart format. The value and frequency of the data can be read with one of five independent markers. The entire measurement trace can be copied directly to a plotter, such as the HP 7440A, 7475A, or 7550A without the need of an external computer. Also, a list of the trace values can be sent to a printer such as the HP 2225A.

Powerful measurement enhancement functions are also available. Data averaging can be employed to narrow the effective receiver IF bandwidth, extending dynamic range and increasing signal-to-noise ratio. Trace smoothing aids in the interpretation of measurement results and is used to control the aperture of group delay measurements. The equivalent of an electronic line stretcher is available with the electrical delay function.

Built-in storage provides the capability to save and recall up to eight different front panel states, eight separate calibrations, and eight separate measurements in nonvolatile memory. Extension of the internal storage capacity is possible via the built-in tape cassette unit or an external disc drive.

High Performance

Along with the capability to completely characterize a microwave network with a single connection over the extremely broad 45 MHz to 40 GHz frequency range, the HP 8510 system offers wide dynamic range. Depending on the test set used, 80 dB to 100 dB of dynamic range is available. The precision IF processing and detection system contributes as little as ± 0.05 dB and ± 0.5 degree measurement uncertainty at a level of 50 dB below the reference. Meaningful resolutions of 0.001 dB, 0.01 degree, and 0.01 nanosecond are easily available.

- 80 dB to 100 dB dynamic range
- 0.001 dB, 0.01 degree, 0.01 nanosecond measurement resolution
- Time domain analysis

"Real Time" Error Correction

The HP 8510's built-in, high speed computer provides the capability to characterize and effectively remove the impact of systematic errors through accuracy enhancement techniques. Effective directivity and source match can be improved to as much as 60 dB. The data processing speed of the system is such that a fully error-corrected, 401 point trace of data is updated in under one second. This virtual "real time" display of error-corrected data means that you can easily adjust your test device while it's being measured, with the assurance that you are viewing the data at the highest possible accuracy.

Time Domain Analysis

The HP 8510 (with option 010) has the capability of displaying the time domain response of a network, obtained by computing the Inverse Fourier Transform of the frequency domain response. The time domain response displays the reflection coefficient of the network versus time, which displays the magnitude and location of each individual discontinuity, or else the transmission coefficient versus time, which displays each individual transmission path.

RF Sources

The recommended system source for the HP 8510B is the HP 8360 synthesized sweeper. It provides 1 Hz frequency resolution, phase-locked narrowband sweeps, and fully synthesized start frequencies for broadband ramp sweeps. All HP 8360-series synthesized sweepers are compatible with the HP 8510B. However, the HP 83621A (20 GHz) and 83631A (26 GHz) models are optimized for HP 8510B system operation. Both the HP 8340-series synthesized sweeper and HP 8350B-series sweep oscillators are also compatible with the HP 8510B.

System Rack

HP 85043A System Rack Kit

The HP 85043A system rack stands 123.7 cm (48.7") high, 60 cm (23.6") wide, and 80 cm (31.5") deep. Complete with support rails and AC power distribution (suitable for 50 to 60 Hz, and 110-240 Vac), it includes rack mounting hardware for all instruments. Therman design is such that no rack fan is needed.

System Software

HP 85161A Measurement Automation Software

The HP 85161A Measurement Automation Software provides a more simplified and flexible user interface to the HP 8510B system. The program leads the operator through the measurement sequence one step at a time, from system setup and calibration, to device measurement and hardcopy output. Complete measurement configurations can be saved to disc for later recall. Also, data printout formats can be customized by the operator.

The HP 85161A software is designed for use with HP 9000 Series 200 or 300 computers and the BASIC operating system (3.0 or higher).

Ordering Information

HP 8510B Network Analyzer	\$34,100
Option 010 Time Domain Capability	9,800
Option W30 2 Years Additional Hardware Service	add \$670
HP 85043A System Rack Kit	2,900
HP 85161A Measurement Automation Software	1,500
Option 630 3 1/2" disc media	N/C
Option 655 5 1/4" disc media	N/C

Price

\$34,100

9,800

add \$670

2,900

1,500

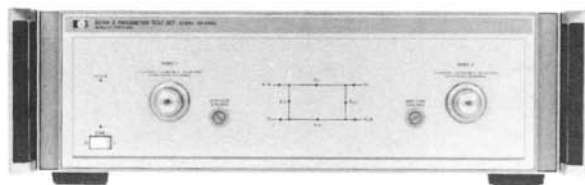
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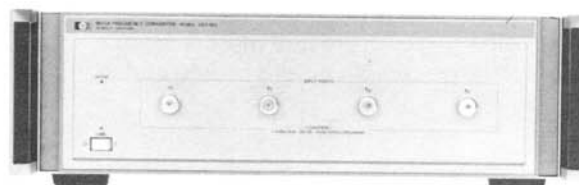
NETWORK ANALYZERS

Test Sets

8510 Series



HP 8515A



HP 8511A

S-Parameter Test Sets

Several S-parameter test sets are available for the HP 8510B network analyzer for broadband coaxial measurements from 45 MHz to 40 GHz. The HP 8514B, 8515A, and 8516A test sets have a dual port architecture which develops a separate reference channel for each incident port. RF switching is done with a single built-in electronic switch. For active device measurements, the test sets include the ability to apply DC bias (external) to the test port center conductors. Also available are two 90 dB step attenuators (60 dB in the HP 8516A) which allow control of the port 1 and port 2 signal levels.

High Dynamic Range Configurations

The HP 8514B and 8516A test sets are coupler-based. Two alternate coupler configurations are available. The standard configuration is symmetrical and has identical dynamic range performance in both forward (S21) and reverse (S12) transmission measurements. The port 1 step attenuator allows reduction of the port 1 output power for forward measurements, and the port 2 attenuator allows reduction of the port 2 output power for reverse measurements.

With the Option 003 configuration, the port 2 coupler is reversed. For forward measurements, the port 2 signal is sampled directly through the main arm of the port 2 coupler. Since coupling loss is removed, dynamic range is increased in the forward direction. Since the port 2 step attenuator is in-line with the port 2 sampler, the power incident on port 2 may be reduced. With Option 003, up to 1 Watt may be input into port 2.

HP 8511A Frequency Converter

With the HP 8511A Frequency Converter, the HP 8510 becomes a general purpose four-channel magnitude/phase receiver. Add your own power splitters for transmission measurements, and bridges or directional couplers for reflection measurements. Since one input is used for system phase-lock, the other three inputs are available for measurements of multi-port devices, subsystems, and antennas. All four inputs have precision 3.5 mm (f) connectors.

Multiple Test Set Operation

A single HP 8510B system may be configured with two test sets. In this configuration, the test sets have different addresses, and the user may select between them from the front panel of the HP 8510 without reconnections. This capability is useful, for example, when combining a microwave coaxial test set with a millimeter-wave test set in the same HP 8510 system.

IF switching (option 001). In the multiple test set configuration, the 20 MHz IF signal is daisy-chained from the test sets to the HP 8510. This capability requires test set option 001 in one of the two test sets.

RF switching. The RF signal must be routed to the desired test set using an HP 33311C coaxial RF switch and an HP 11713A switch driver. The switch driver is controlled automatically by the HP 8510B over the HP 8510 system interface.

Test Set General Information

	HP 8514B	HP 8515A	HP 8516A
Frequency range (GHz)	0.045 to 20	0.045 to 26.5	0.045 to 40
Test ports (port 1 or 2): Nominal operating power level (dBm)	0 to -5	-5 to -25	-10 to -20
Test Port Connector type	3.5 mm (M)		2.4 mm (M)
Impedance DC bias	50 ohm nominal 500 mA, 40 Vdc maximum		
Attenuation range (incident signal)	0 to 90 dB, in 10 dB steps (0 to 60 dB for HP 8516A)		

Ordering Information

HP 8511A Frequency Converter	Price
Option 001: Add IF switching	\$19,200
Option W30: 2 years additional hardware service	add \$2,500
HP 8514B S-Parameter Test Set	add \$350
Option 001: Add IF switching	\$27,300
Option 002: Delete step attenuators and bias tees	add \$2,500
Option 003: High forward dynamic range	less \$6,500
Option W30: 2 years additional hardware service	n/c
HP 8515A S-Parameter Test Set	add \$540
Option 001: Add IF switching	\$38,300
Option 002: Delete step attenuators and bias tees	add \$2,500
Option W30: 2 years additional hardware service	less \$7,000
HP 8516A S-Parameter Test Set	add \$750
Option 001: Add IF switching	\$40,000
Option 002: Delete step attenuators and bias tees	add \$2,500
Option 003: High forward dynamic range	less \$7,000
Option W30: 2 years additional hardware service	n/c
	add \$740

NETWORK ANALYZERS

Millimeter-wave Measurement System

8510 Series

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The HP 8510B system can be easily configured for making measurements at the millimeter-wave frequencies. Hewlett-Packard offers hardware for configuring systems in the 26.5 to 40 GHz, 33 to 50 GHz, 40 to 60 GHz, 50 to 75 GHz, and 75 to 110 GHz waveguide bands. These S-parameter configurations allow both forward and reverse measurements to be made with a single connection to the device under test. The greatest convenience and highest accuracy is assured through the TRL (Thru-Reflect-Line) calibration technique, which is now possible with a millimeter-wave S-parameter configuration.

HP 85106B Millimeter-wave Network Analyzer Subsystem

The HP 85106B millimeter-wave network analyzer subsystem includes an HP 8510B network analyzer, an HP 85105A millimeter-wave controller, an HP 83621A synthesized source, an HP 8350B/83540A source (LO), and an HP 9122C dual disk drive, all mounted in a single bay rack with extendable worksurface. The HP 9122C disk drive and system set-up disk that are part of the HP 85106B system make the retrieval of system states fast and easy. System installation at your facility and one year on-site service are included with the HP 85106B at no additional cost. Two HP 85104A series test set modules are required to complete the system. Precision calibration kits and verification kits are also available for these waveguide bands.

The HP 85106B can be configured as a combination microwave/millimeter-wave S-parameter system with Option 001. This option adds an HP 8516A microwave test set, HP 85133D test port return cable set, HP 85056A calibration kit and appropriate cabling for convenient switching between mm-wave operation and microwave operation with no re-connections required.

The HP 8510B's external phase-locked control allows the use of the economical HP 8350B sweep oscillator as the local oscillator (LO) source. However, a synthesizer can also be used as the LO source when faster measurement speeds are desired. Option 002 substitutes an HP 83621A synthesized source for the HP 8350B/83540A source as the local oscillator.

Option 010 adds time domain capability to the HP 8510B for transferring frequency domain data to the time domain for observing the effects of impedance discontinuities as a function of distance or time.

HP 85104A Series Test Set Modules

An HP R/Q/U/V/W 85104A test set module contains all of the necessary waveguide hardware (frequency multiplier, isolators, directional couplers and harmonic mixers) compactly integrated into one box. Any pair of the test set modules can be connected to the HP 85105A millimeter-wave controller for S-parameter millimeter-wave measurement capability. These modules are easy to maneuver and make the system extremely simple to set-up.

HP 11644A Series Calibration Kits

Each HP R/Q/U/V/W 11644A precision calibration kit contains two straight waveguide test port sections with precision flanges, a flush short circuit, a precision quarter-wavelength shim, and a sliding or fixed load termination. In addition to providing the "offset" for the offset short and offset load, the shim is also used as the "line" standard for a TRL calibration. The standards in the kit allow you to take full advantage of the built-in accuracy enhancement and data processing features of the HP 8510B.

HP 11645A Series Verification Kits

Each HP R/Q/U/V/W 11645A verification kit contains a standard section, mismatch section, and a 20 dB and 50 dB attenuator. The devices in the kit are shipped with nominal data and uncertainties traceable to the US National Institute of Standards and Technology (NIST).

Ordering Information

	Price
HP 85106B mm-Wave Network Analyzer Subsystem	TBA
Opt 001 Add Microwave Test Set (HP 8516A) and 2.4 mm Accessories	\$50,600
Opt 002 Synthesized LO (HP 83621A) for the fastest measurement speed	\$18,900
Opt 010 add Time Domain Capability to the HP 8510B	\$9,800

Test Set Modules (order 2 each)

HP R85104A WR-28 (26.5 to 40 GHz) Test Set Module	TBA
HP Q85104A WR-22 (33 to 50 GHz) Test Set Module	TBA
HP U85104A WR-19 (40 to 60 GHz) Test Set Module	TBA
HP V85104A WR-15 (50 to 75 GHz) Test Set Module	TBA
HP W85104A WR-10 (75 to 110 GHz) Test Set Module	TBA

Calibration Kits

HP R11644A WR-28 (26.5 to 40 GHz) Calibration Kit	\$3,600
HP Q11644A WR-22 (33 to 50 GHz) Calibration Kit	\$3,850
HP U11644A WR-19 (40 to 60 GHz) Calibration Kit	\$4,200
HP V11644A WR-15 (50 to 75 GHz) Calibration Kit	\$4,200
HP W11644A WR-10 (75 to 110 GHz) Calibration Kit	\$4,400

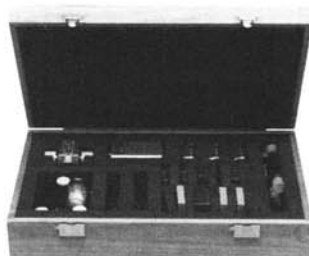
Verification Kits

HP R11645A WR-28 (26.5 to 40 GHz) Verification Kit	TBA
HP Q11645A WR-22 (33 to 50 GHz) Verification Kit	TBA
HP U11645A WR-19 (40 to 60 GHz) Verification Kit	TBA
HP V11645A WR-15 (50 to 75 GHz) Verification Kit	TBA
HP W11645A WR-10 (75 to 110 GHz) Verification Kit	TBA

NETWORK ANALYZERS

Microwave Network Analyzer Accessories

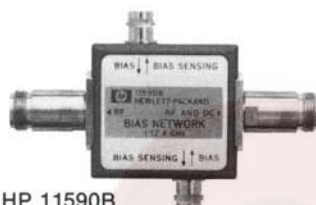
8510, 8719/8720 Series



HP 85041A



HP 8717B



HP 11590B



HP 11612A

Active Device Test

Hewlett-Packard offers an extensive array of accessories designed for the needs of active device test and measurement, including fixtures, bias supplies, bias networks, and application software.

HP 85041A Transistor Test Fixture Kit

The HP 85041A transistor test fixture (TTF) kit is a comprehensive measurement system for testing and characterizing stripline packaged microwave transistors. Only useful when used with the HP 85014B active device measurement software.

Frequency Range: dc to 18 GHz

Transistor Package Inserts: 70 mil and 100 mil

Verification Devices: Short and through circuits

Connectors: precision 7 mm

Accessories Supplied: fixture stand, torque tool, tweezers, and lid opening tool

HP 8717B Transistor Bias Supply

The HP 8717B transistor bias supply provides manual or automatic biasing for transistor testing. This supply 8717B has two meters for independently monitoring current and voltage. Bias connections are conveniently selected for all transistor configurations with a front panel switch.

Voltage Ranges: 1.3, 10, 30, 100 V

Current Ranges: 0.1, 0.3, 1, 3, 10, 30, 100, 300, 1000 mA

Accuracy: 4% of full scale for both current and voltage

Option 001: programmable D/A converter

Option 011: programming cable for HP Series 200/300 computers

HP 11608A Transistor Fixture

Function: provides the capability of completely characterizing stripline transistors. A through-line microstrip and bolt-in grounding structure machineable by customer is included.

Frequency range: db to 12.4 GHz.

Reflection coefficient: <0.05, dc to 4 GHz; <0.07, 4.0 to 8.0 GHz; >0.15, 8 to 12.4 GHz.

Package Styles

Opt 003: 0.205 inch diameter packages.

Calibration references: option 003 only, short circuit termination and a 50-ohm through-section.

Connectors: APC-7 hybrid.

Weight: net, 0.9 kg (2 lb); shipping, 1.4 kg (3 lb.).

Size: 25 H x 143 W x 89 mm D (1" x 5.63" x 3.5").

Bias Networks

Bias networks are available for applying DC bias to the center conductor of a coaxial line which can be connected to a device under test. The bias network also provides a DC block to the RF input port.

Bias Network	11590B	11590B Opt 001	11612A	11612B
Frequency Range (GHz)	.1-12.4	.1-18	.045-26.5	.045-50
Connectors				
RF Input	Type N (f)	7 mm	3.5 mm (f)	2.4 mm (f)
RF Output	Type N (f)	7 mm	3.5 mm (m)	2.4 mm (f)
DC Bias	BNC (f)	BNC (f)	SMB snap-on (m)*	SMB snap-on (m)*
Insertion Loss (max)	0.8 dB	0.8 dB, .1-12.4 GHz 1.2 dB, 12.4-18 GHz	0.8 dB, .045-12.4 GHz 1.3 dB, 12.4-26.5 GHz	0.8 dB, .045-12.4 GHz 1.3 dB, 12.4-26.5 GHz 26.5-50 GHz
Return Loss (min)	19 dB	19 dB, .1-12.4 GHz 14 dB, 12.4-18 GHz	20 dB, .045-8 GHz 18 dB, 8-18 GHz 14 dB, 18-26.5 GHz	20 dB, .045-8 GHz 18 dB, 8-18 GHz 14 dB, 18-26.5 GHz 10 dB, 26.5-50 GHz
Bias current (max)	500 mA	500 mA	500 mA**	500 mA
Bias voltage (max)	100V	100V	40V	40V

*Cable included, SMB(f) to BNC(m).

**Option 001 provides for 2 Amps maximum bias current over the 400 MHz to 26.5 GHz frequency range. Higher bias currents may be applied with pulsed operation.

HP 11635A Bias Decoupling Network

The HP 11635A bias decoupling network is a recommended accessory for prevention of bias oscillations when biasing microwave bipolar transistors with any HP bias network or s-parameter test set. Installing the HP 11635A between the bias supply and the base bias network prevents low frequency oscillations.

Application Software

Hewlett-Packard offers application software packages that complement the HP 8510 system providing automated calibration and measurement capability. Software is available for HP Series 200/300 desktop computers using BASIC 2.0, 3.0, 4.0 or 5.0 operating systems on both 3 1/2" and 5 1/4" disc media.

HP 85014B/C Active Device Measurement Application Pac

The HP 85014B/C software pac provides the capability for measurement of RF and microwave transistors (HP 85014B for the HP 8510B and HP 85014C for HP 8719A/8720B). Features include automated device biasing with the HP 6626A precision power supply or HP 8717B bias supply, system calibration, and de-embedding of s-parameters when using the HP 85041A transistor test fixture. It is also usable with other HP transistor fixtures as well as user-designed fixtures. Plotted and listed output of device S, H, Y, and Z parameters, as well as the device amplifier summary and termination summary are provided. Also available is the capability to store and retrieve s-parameter data in formats suitable for computer-aided-design applications.

Ordering Information

HP 85041A Transistor Test Fixture	\$5,500
HP 8717B Transistor Bias Supply	5,500
Option 001 Programmable Operation (GP-IO)	add 670
Option 011 Programming Cable	add 250
Option W30 2 Years Additional Hardware Service	add 100
HP 11590B Bias Network	675
HP 11612A Bias Network	700
Option 001 2 Amps maximum bias current	add 175
HP 11612B Bias Network	990
HP 11635A Bias Decoupling Network	275
HP 85014B/C Active Device Measurement Software	3,000
HP 11608A Transistor Fixture Customer Machineable	200
Option 003 0.205 inch diameter Package Style	

Price

NETWORK ANALYZERS

Microwave Network Analyzer Accessories

8510, 8719/8720 Series

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HP 85050C



HP 85053B

Microwave Network Analyzer Accessories

A wide range of accessories is available for both the HP 8719A/8720B and the HP 8510B series network analyzers, including calibration kits, verification kits, cables, and adapters for 7 mm, 3.5 mm, Type N and 2.4 mm connector interfaces. The standards used in the 3.5 mm, Type N and 2.4 mm connectors use the precision slotless connector (PSC-3.5, PSC-N and PSC-2.4).

Calibration Kits

Error-correction procedures require that the systematic errors in the measurement system be characterized by measuring known devices (standards) on the system over the frequency range of interest. All network analyzer calibration kits contain precision standard devices to characterize the systematic errors of the HP 8719A/8720B or 8510B network analyzer system.

The calibration kits also contain adapters to change the sex of the test port, connector gages for verifying and maintaining the connector interface, and a torque wrench for proper connection. Each kit contains standards definitions contained on tape for the HP 8510B. (These definitions are already included in the HP 8719A/8720B.)

Calibration Kit Summary

Calibration Kit	Connector Type	Frequency Range (GHz)	Performance Summary		Description	Price
			Directivity/Source Match at Fmax w/8719A/8720B	w/8510B		
85050B	7 mm	.045-18	45/30	52/41	Contains open and short circuits and fixed and sliding terminations.	\$4,500
85050C	7 mm	.045-18	n/a	60/60	Contains standards for TRL calibration on HP 8510B, including precision airline. Also contains open and short circuit and fixed termination.	\$5,400
85050D	7 mm	.045-18	36/30	40/35	Economy kit. Contains open and short circuits and precision-fixed termination. No gages included.	\$2,000
85052B	3.5 mm	.045-26.5	40/30	44/31	Contains open and short circuits (m and f) and fixed and sliding terminations (m and f), and in-series adapters.	\$7,500
85052D	3.5 mm	.045-26.5	36/29	36/30	Economy kit. Contains open and short circuits (m and f) and precision fixed termination (m and f), and in-series adapters. No gages included.	\$4,000
85054B	Type N	.045-18	40/30	42/32	Contains open and short circuits (m and f) and fixed and sliding terminations (m and f), in-series adapters, and 7mm to type N (m and f) adapters.	\$8,000
85054D	Type N	.045-18	34/28	34/28	Contains open and short circuits (M and F) and broadband fixed terminations, in series adapters, and 7mm-to-type N (M and F) adapters.	\$4,900
85056A ¹	2.4 mm	.045-40	n/a	38/33	Contains open and short circuits (m and f) and fixed and sliding terminations (m and f), in-series adapters, and 7mm to type N (m and f) adapters.	\$9,000
R11644A	WR-28	26.5-40	n/a	50/45	Contain flush short circuit, a precision shim used to make the offset short, and a sliding (R.Q.U) or fixed (V.W) termination. Also contain two straight sections with precision flanges.	\$3,600
Q11644A	WR-22	33-50	n/a	50/45		\$3,850
U11644A	WR-19	40-60	n/a	50/40		\$4,200
V11644A	WR-12	50-75	n/a	50/37		\$4,200
W11644A	WR-10	75-100	n/a	46/36		\$4,400

¹For measurements in the K-connector, order the HP 85056A 2.4mm calibration kit and the HP 11904S adapter kit.

Verification Kits

Measuring known devices, other than the calibration standards, is a straightforward way of verifying that the network analyzer system is operating properly. Hewlett-Packard offers verification kits that include precision airlines, mismatch airlines and precision fixed attenuators. Traceable measurement data for all devices is shipped with each kit on disc (for HP 8719A/8720B) and on tape (for HP 8510B).

Verification kits may be recertified by Hewlett-Packard. This recertification includes a new measurement of all standards, as well as new data and uncertainties. Certification in compliance with MIL-STD 45662 is also available.

Verification Kit Summary

Verification Kit	Connector Type	Frequency Range (GHz)	Price
85051B	7 mm	.045-18	\$3,000
85053B	3.5 mm	.045-26.5	\$3,000
85055A	Type N	.045-18	\$3,000
85057A	2.4 mm	.045-40	\$4,500

NETWORK ANALYZERS

Microwave Network Analyzer Accessories (cont'd)

8510, 8719/8720 Series

Test Port Return Cables and Adapters

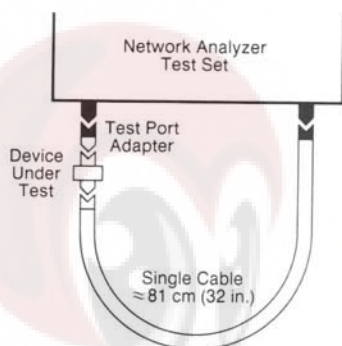
Test port cables and adapter sets are available for various connector types. The cable/adapter configurations are described below. All cables are designed with one end that connects directly to the special ruggedized ports of the network analyzer test set, and one end that connects to the device under test.

Special test port adapter sets are also available to convert the ruggedized ports of the network analyzer test set to the desired connector interface. Each kit contains two adapters, one male and one female.

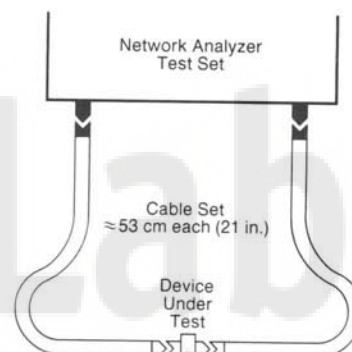
Both the cables and the special adapters have one special female connector which is designed to connect directly to the 3.5 mm test port (2.4 mm for HP 8516A). This side of the cable or adapter can only be connected to the test set port, and cannot be mated to a standard 3.5 mm (or 2.4 mm) male connector. The male test set ports, however, can be mated to a standard 3.5 mm (or 2.4 mm) female connector.

Choose one of the configurations shown.

CONFIGURATION A



CONFIGURATION B



Configuration A
For HP 8719A/8720B Network Analyzer or
HP 8514B/8515A Test Sets (3.5 mm test port)

	Cables/Adapters	Connector Type (on device side of cable/adapter)	Price
For 3.5 mm devices	85131C Semi-rigid Cable or 85131E Flexible Cable	3.5 mm (f)	\$700
	85130D Adapter Set ^a	3.5 mm (m or f)	\$990
	85132C Semi-rigid Cable or 85132E Flexible Cable	7 mm	\$600
For 7 mm devices	85130B Adapter Set	7 mm	\$1,600
	85130C Adapter Set	Type N (m or f)	\$700
For Type N devices	Use 7 mm cables and the 7 mm to N adapters included in the HP 85054B 10 calibration kit.		—

a. Recommended but not required.

Configuration B
For HP 8719A/8720B Network Analyzer or
HP 8514B/8515A Test Sets (3.5 mm test port)

	Cable Set	Connector Type (on device side of cables)	Price
For 3.5 mm devices	85131D Semi-rigid Cable Set or 85131F Flexible Cable Set	3.5 mm (one male, one female)	\$1,200
		3.5 mm (one male, one female)	\$2,800
For 7 mm devices	85132D Semi-rigid Cable Set or 85132F Flexible Cable Set	7 mm	\$1,000
		7 mm	\$2,600
For Type N devices	Use 7 mm cables and the 7 mm to N adapters in the 85054B 10 calibration kit.		—

Configuration A
For HP 8516A Test Set (2.4 mm test port)

	Cables/Adapters	Connector Type (on device side of cable/adapter)	Price
For 2.4 mm devices	85133C Semi-rigid Cable	2.4 mm (f)	\$900
	85130G Adapter Set ^a	2.4 mm (m or f)	\$990
For 3.5 mm devices	85134C Semi-rigid Cable or 85134E Flexible Cable	3.5 mm (f)	\$700
	85130F Adapter Set	3.5 mm (m or f)	\$1,800
			\$990
For 7 mm devices	85135C Semi-rigid Cable or 85135E Flexible Cable	7 mm	\$600
		7 mm	\$1,600
	85130E Adapter Set	7 mm	\$990

a. Recommended but not required.

Configuration B
For HP 8516A Test Set (2.4 mm test port)

	Cable Set	Connector Type (on device side of cables)	Price
For 2.4 mm devices	85133D Semi-rigid Cable Set	2.4 mm (one male, one female)	\$1,600
For 3.5 mm devices	85134D Semi-rigid Cable Set or 85134F Flexible Cable Set	3.5 mm (one male, one female)	\$1,200
		3.5 mm (one male, one female)	\$2,800
For 7 mm devices	85135D Semi-rigid Cable Set or 85135F Flexible Cable Set	7 mm	\$1,000
		7 mm	\$2,600