HP 8510C Family Network Analyzer

Configuration Guide

45 MHz to 110 GHz

The HP 8510C is a modular family of compatible products. For flexibility in specifying a solution that meets your exact needs, a system is typically ordered as separate line items. For those who wish ordering convenience, complete bundled systems are available. Whether ordering individual components or a bundled system, all HP 8510C network analyzers include one-year, on-site service and installation. For systems built from individual components, installation may be ordered separately. A PC running HP Basic Rev 6.3 or higher under Windows® (3.1/95/NT) is recommended for installation and service.

Complete Systems

HP 8510XF Family 110 GHz Single Sweep Systems (45 MHz to 110 GHz)

The HP 8510XF family has two models which are complete single-connection, single-sweep vector network analyzer systems that offer S-parameter measurements over an ultra-broadband frequency in a 1.0 mm coaxial connector. The broadest frequency model covers 45 MHz to 110 GHz. A lower frequency model is available covering 45 MHz to 85 GHz. Both systems are designed to facilitate easy connection to wafer probe hardware while still preserving excellent RF measurement performance. In addition, the system can be used to make coaxial measurements (to interface to a coaxial fixture or a coaxial DUT) using the same millimeter head configuration.

❏ **HP E7340A Single-Connection Single-Sweep Network Analyzer System** (2 to 85 GHz)

The HP E7340A is a complete system configured with an HP 8510C, a 20 GHz and a 50 GHz synthesizer, two 85 GHz S-parameter test heads and a millimeter test set controller. The instruments are integrated in the system rack, the system is fully tested and a complete system verification is performed prior to shipment from Hewlett-Packard. Installation is included at no additional charge. The HP E7340A system does not include calibration kits or test port cable sets.

System components include:
HP 8510C network analyzer
HP E7342A millimeter subsystem
HP 83621B synthesizer
HP 83651B synthesizer
System rack

- ❏ **Option 005** add (45 MHz to 2 GHz) low frequency extension
- ❏ **Option 006** add RF pass thru (Provides coupled output of 50 GHz source for additional test set(s). Additional test set(s) must have Option 001 installed.)
- ❏ **Option 010** add time domain
- ❏ **Option 230** 220/240 V line voltage operation
- ❏ **Option W31** add two years additional on-site service

❑ **HP E7350A Single-Connection Single-Sweep Network Analyzer System** (2 to 110 GHz)
The HP E7350A is a complete system configured with an HP 8510C, a 20 GHz and a 50 GHz synthesizer, two 110 GHz S-parameter test heads and a millimeter test set controller. The instruments are integrated in the system rack, the system is fully tested and a complete system verification is performed prior to shipment from Hewlett-Packard. Installation is included at no additional charge. The HP E7350A system does not include calibration kits or test port cable sets.

System components include:
HP 8510C network analyzer
HP E7352A millimeter subsystem
HP 83621B synthesizer
HP 83651B synthesizer
System rack

❑ **Option 005** add (45 MHz to 2 GHz) low frequency extension
❑ **Option 006** add RF pass thru (Provides coupled output of 50 GHz source for additional test set(s). Additional test set(s) must have Option 001 installed.)
❑ **Option 010** add time domain
❑ **Option 230** 220/240 V line voltage operation
❑ **Option W31** add two years additional on-site service

❑ **HP 85107B Network Analyzer System** (45 MHz to 50 GHz)
The HP 85107B is a complete system configured with a 50 GHz synthesizer, 50 GHz S-parameter test set and 2.4 mm measurement accessories. The instruments are integrated in the system rack, the system is fully tested and a complete system verification is performed prior to shipment from the factory. Installation is included at no additional charge.

System components include:
HP 8510C network analyzer   HP 85056A calibration kit
HP 8517B test set with Option 002   HP 85133F cable set
HP 83651B synthesizer   HP 85043C rack

❑ **Option 001** add 3.5 mm measurement accessories (HP 85052B and 85134F)
❑ **Option 005** add step attenuators and bias tees to the HP 8517B
❑ **Option 007** add high power and high dynamic range configuration to the HP 8517B
❑ **Option 010** add time domain capability to the HP 8510C
❑ **Option 230** 220/240 V line voltage operation
❑ **Option W31** add two years additional on-site service

❑ **HP 8510SX Network Analyzer System** (45 MHz to 26.5 GHz)
The HP 8510SX is a complete system configured with a 26.5 GHz synthesizer, 26.5 GHz S-parameter test set and a complete set of 3.5 mm measurement accessories. The instruments are integrated in the system rack, the system is fully tested and a complete system verification is performed prior to shipment from the factory. Installation is included at no additional charge.

System components include:
HP 8510C network analyzer   HP 85052C calibration kit
HP 8515A test set   HP 11752D gage kit
HP 83631B synthesizer   HP 85131F cable set
HP 85043C rack

❑ **Option 001** add 7 mm accessories (HP 85050C and 85132F)
❑ **Option 010** add time domain capability to HP 8510C
❑ **Option 230** 220/240 V line voltage operation
❑ **Option W31** add two years additional on-site service

❏ **HP 8510E Network Analyzer System** (45 MHz to 20 GHz)
The HP 8510E is a complete unracked system configured with a 20 GHz synthesizer, 20 GHz
S-parameter test set and 3.5 mm connector accessories. Installation is not included.

System components include:
HP 8510C network analyzer   HP 85052D calibration kit
HP 8514B test set with Option 002   HP 85131D cable set
HP 83621B synthesizer

  ❏ **Option 002** add step attenuators and bias tees to HP 8514B
  ❏ **Option 005** replace HP 85052D with 85052B calibration kit
  ❏ **Option 010** add time domain capability to HP 8510C
  ❏ **Option W31** add two years additional on-site service

❏ **HP 85106D Millimeter-Wave Network Analyzer Subsystem** (33 GHz to 110 GHz)
When combined with the appropriate HP 85104A series test set modules (see page 5) and 11644A series
calibration kits, the HP 85106D provides a complete system for measurements in the millimeter-wave
frequency range. The instruments are integrated in a 1600 mm system rack. It is fully tested and a complete
system verification is performed prior to shipment from the factory. Installation is included at no
additional charge.

HP 85106D system consists of: HP 83621B synthesizer (2 total)
HP 8510C network analyzer   1600 mm rack
HP 85105A test set controller
Must also order appropriate HP 85104A series test set modules and 11644A series calibration kit for complete system.

  ❏ **Option 001** add microwave test set (Adds HP 8517B, 85056A, 85133F and Option 050 to HP 85105A,
     replaces HP 83621B with 83651B.)
  ❏ **Option 007** add high power and high dynamic range configuration to the HP 8517B
     (must also have Option 001)
  ❏ **Option 010** add time domain capability to the HP 8510C
  ❏ **Option 230** 220/240 V line voltage operation
  ❏ **Option W31** add two years additional on-site service

❏ **HP 85108A Pulsed-RF Network Analyzer System** (2 GHz to 20 GHz)
Based on an HP 8510C with Option 008, this system provides the capability to measure the amplitude and phase
response of a device or component being driven with a pulsed-RF input signal. The instruments are integrated
in a 1600 mm system rack. It is fully tested and a complete system verification is performed prior to shipment
from the factory. Installation is included at no additional charge.

System components include:
HP 8510C network analyzer with Option 008   HP 83622B synthesizer with Options 001/004/008
HP 85110A test set   HP 83623L synthesizer with Options 004/008
1600 mm rack
Calibration kits and test port cables in the appropriate connector interface are not included and must be ordered separately.

  ❏ **Option 010** add time domain capability to the HP 8510C
  ❏ **Option 230** 220/240 V line voltage operation
  ❏ **Option W31** add two years additional on-site service
     Other configurations are available for systems covering frequency ranges 500 MHz to 20 GHz and 2 GHz to
     50 GHz. Customized pulsed bias configurations for high power (>100W) and narrow pulses (<1μsec) can be
     integrated into any pulsed-RF system.

❏ **HP 85108L Pulsed-RF Network Analyzer System** (45 MHz to 2 GHz)
Based on an HP 8510C with Option 008, this system provides the capability to measure the amplitude and phase
response of a device or component being driven with a pulsed-RF input signal. The instruments are integrated
in a 1600 mm system rack, the system is fully tested and a complete system verification is performed prior to
shipment from the factory. Installation is included at no additional charge.

System components include:

HP 8510C network analyzer with Option 008   HP 83620B synthesizer with Options 001/004/008/H80
HP 85110L test set   HP 83620B synthesizer with Options 004/008/H80
1600 mm rack

Calibration kits and test port cables in the appropriate connector interface are not included and must be ordered separately.

- ❏ **Option 010** add time domain capability to HP 8510C
- ❏ **Option 230** 220/240 V line voltage operation
- ❏ **Option W31** add two years additional on-site service
  Customized pulsed bias configurations for high power (>100W) and narrow pulses (<1μsec) can be integrated into any pulsed-RF system.

❏ **HP 85122A High Frequency Device Modeling System** (45 MHz to 20 GHz)
When combined with the HP 85190 series high frequency IC-CAP software, along with Cascade probes or ICM fixtures, the HP 85122A can be used to model BJT, FET, MOS and diode devices. All instruments are integrated in a 1600 mm system rack prior to shipment from the factory. Installation is included at no additional charge.

System components include:

HP 8510C network analyzer   HP 4142B Option 400/410 DC source/monitor
HP 8514B test set   HP 85131F cable set
HP 83621B synthesizer   1600 mm rack
HP 11612A Option K10/K20 force/sense bias networks

Probes, fixtures, calibration kits, HP 85190 series software and workstation must be ordered separately.

- ❏ **Option 230** provides system cabinet set up for 220/240 V operation
  Custom configurations available to meet other frequency coverage and power requirements.

System Components

For flexibility in specifying a solution that meets your exact needs, a system can be ordered as separate line items. A complete system includes the HP 8510C network analyzer, a test set, compatible source and measurement accessories. All major system components (network analyzer, test sets and sources) include one-year on-site service.

Analyzer (A required system component)

❏ **HP 8510C Network Analyzer**
- ❏ **Option 008** pulsed-RF measurement capability
  Requires HP 85110A or 85110L S-parameter test set.
  Also, see HP 85108A or 85108L pulsed-RF network analyzer system.
- ❏ **Option 010** add time domain capability
- ❏ **Option 908** add rack flange kit
- ❏ **Option 910** add extra operating, programming and service manual set
- ❏ **Option 913** add rack flange and handles kit
- ❏ **Option 916** add extra operating and programming manual
- ❏ **Option W31** add two years additional on-site service
- ❏ **Option 1BN** add MIL-STD 45662A calibration certificate
- ❏ **Option 1BP** add MIL-STD 45662A calibration certificate and test data

Test Sets (Choose One)

❏ **HP 8514B S-parameter Test Set** (45 MHz to 20 GHz)
With rugged 3.5 mm connector test ports.
❏ **HP 8515A S-parameter Test Set** (45 MHz to 26.5 GHz)
With rugged 3.5 mm connector test ports.
❏ **HP 8517B S-parameter Test Set** (45 MHz to 50 GHz)
With rugged 2.4 mm connector test ports.
❏ **HP 85110A Pulsed-RF S-parameter Test Set** (2 to 20 GHz)
For use with HP 8510C Option 008. Includes rugged 3.5 mm connector test ports and four built-in step attenuators to independently set power level to all four downconverter channels.
Requires two HP 8360 series synthesized sources for complete operation (HP 83622B and 83624B).

❑ **HP 85110L Pulsed-RF S-parameter Test Set** (45 MHz to 2 GHz)

For use with HP 8510C Option 008. Includes rugged 3.5 mm connector test ports and four built-in step attenuators to independently set power level to all four downconverter channels.

Requires two HP 8360 series synthesized sources for complete operation (HP 83620B-H80, two each).

❑ **HP 8511A Frequency Converter** (45 MHz to 26.5 GHz)

3.5 mm connector ports.

❑ **HP 8511B Frequency Converter** (45 MHz to 50 GHz)

2.4 mm connector ports.

Note: HP 8511A/B require external, customer-furnished couplers, or signal separating devices to provide complete test set capability. A source with front panel RF power output may be more suitable for HP 8511-based applications.

Test Set Options

Option Description		HP 8514B	HP 8515A	HP 8517B	HP 85110A	HP 85110L	HP 8511A/B
001	Add IF switching for multiple test set operation	X	X	X	X	X	X
002	Delete step attenuators and bias tees	X	X	X			
003	High forward dynamic range configuration (degrades reverse transmission dynamic range)	X					
004	High power configuration (moves port 2 attenuator in front of b2 sampler)			X			
007	High dynamic range configuration (adds buffer amplifiers)			X			
1BN	Add MIL-STD 45662A calibration certificate	X	X	X			X
1BP	Add MIL-STD 45662A calibration certificate and test data	X	X	X			X
908	Add rack flange kit	X	X	X	X		X
913	Add rack flange and handles kit	X	X	X	X		X
910	Extra operating and service manual	X	X	X	X		X

Millimeter-Wave Test Sets and Controllers

Banded Waveguide Millimeter-Wave Subsystem (Components of HP 85106D)

❑ **HP 85105A Millimeter-Wave Test Set Controller**

Requires addition of two HP 85104A series modules for complete waveguide S-parameter test set operation. Includes IF switching (Option 001) and 26.5 GHz RF switching for multiple test set operation.

❑ **Option 004** rear panel connections for HP 85104A modules

❑ **Option 050** 50 GHz RF source switch (Required when used with HP 83651B 50 GHz source.)

Must also order two test set modules for complete waveguide S-parameter test set operation for each waveguide band:

- ❏ **Q85104A test set module** (33 GHz to 50 GHz)
    - ❏ **Option W31** add two years additional on-site service
- ❏ **U85104A test set module** (40 GHz to 60 GHz)
    - ❏ **Option W31** add two years additional on-site service
- ❏ **V85104A test set module** (50 GHz to 75 GHz)
    - ❏ **Option W31** add two years additional on-site service
- ❏ **W85104A test set module** (75 GHz to 110 GHz)
    - ❏ **Option W31** add two years additional on-site service

Single-Connection Single-Sweep Millimeter-Wave Subsystem (Components of HP 8510XF)
❏ **HP E7342A Millimeter Subsystem 2 to 85 GHz**

Consists of two 85 GHz test heads and a millimeter test set controller.
- ❏ **Option 005** add 45 MHz to 2 GHz low frequency extension
- ❏ **Option 006** add RF pass thru (Provides coupled output of 50 GHz source for additional test set(s). Additional test set(s) must have Option 001 installed.)

❏ **HP E7352A Millimeter Subsystem 2 to 110 GHz**

Consists of two 110 GHz test heads and a millimeter test set controller.
- ❏ **Option 005** add 45 MHz to 2 GHz low frequency extention
- ❏ **Option 006** add RF pass thru (Provides coupled output of 50 GHz source for additional test set(s). Additional test set(s) must have Option 001 installed.)

Sources
Choose an HP 8360 series synthesized sweeper
- ❏ **HP 83651B Synthesized Sweeper** (45 MHz to 50 GHz)
- ❏ **HP 83631B Synthesized Sweeper** (45 MHz to 26.5 GHz)
- ❏ **HP 83621B Synthesized Sweeper** (45 MHz to 20 GHz)
- ❏ **HP 83620B-H80 Synthesized Sweeper** (45 MHz to 2 GHz) for HP 85110L only
- ❏ **HP 83622B Synthesized Sweeper** (2 GHz to 20 GHz) for HP 85110A
- ❏ **HP 83623L Synthesized Sweeper** (45 MHz to 20 GHz) for HP 85110A

Common Options for RF Sources

Option	Description
W31	Add two years additional on-site service
1BN	Add MIL-STD 45662A calibration certificate
1BP	Add MIL-STD 45662A calibration certificate and test data
908	Add rack flange kit and test data
910	Extra service manual
913	Add rack flange and handles kit

Measurement Accessories
There are measurement accessories for seven device connector types: 7 mm, 3.5 mm, 2.92 mm, 2.4 mm, 1.85 mm, 1.0 mm and Type-N. Calibration kits include standards that are required for vector error correction. Verification kits include standards used to verify system performance specifications. Test port return cables extend the ports of the test set and connect to the device under test. HP 85130X adapter sets convert test set ports to the same connector type (acting as a test port saver) or to a different connector type.

Electronic Calibration
Electronic calibration (ECal) is a precision, single-connection, one- or two-port calibration technique that uses fully traceable electronic standards. ECal replaces the traditional calibration technique that uses mechanical standards. ECal requires fewer connections and removes the intensive operator interaction, which is prone to errors. A full, two-port calibration can be accomplished with a single connection of the ECal module and minimal operator interaction. This results in a faster and more repeatable calibration.

An electronic calibration system consists of an HP 85060C control unit and one or more ECal (HP 8506XA) modules. The control unit interfaces with the HP 8510B/C, 8719C/D, 8720C/D, 8722C/D and 8753C/D vector network analyzers. It drives the ECal modules, computes the error coefficients and downloads the error coefficients into the vector network analyzer.

ECal Control Unit

Model	Description
HP 85060C	Electronic calibration control unit required to drive HP 8506XA ECal modules.
HP 85060C Option 001	As above with front panel connectors.

ECal Modules

ECal Model	Connector Type	Frequency Range (GHz)	Description
HP 85060A*	7 mm	1 - 18	7 mm electronic cal kit. To add frequency coverage from 45 MHz order Option 001.
HP 85062A*	3.5 mm	1 - 26.5	3.5 mm electronic cal kit. To add frequency coverage from 45 MHz order Option 001. ECal module(s) provided with one male and one female connector unless ordered with Option 00M or 00F.
HP 85064A*	Type-N	1 - 18	Type-N electronic cal kit. To add frequency coverage from 45 MHz order Option 001. ECal module(s) provided with one male and one female connector unless ordered with Option 00M or 00F.

*requires an HP 85060C control unit

ECal Module Options

Option	Description	HP 85060A	HP 85062A	HP 85064A
001	Adds a low band calibration module .045 - 2 GHz	X	X	X
00M	Calibration modules having two male connectors		X	X
00F	Calibration modules having two female connectors		X	X
1BN	MIL-STD 45662A calibration certification	X	X	X
1BP	MIL-STD 45662A calibration with test data	X	X	X
910	Extra operating and service manual	X	X	X
UK6	Commercial calibration certificate with test data	X	X	X

Calibration Kits

Error correction requires that the systematic errors in the measurement system be characterized by measuring known devices (standards) over the frequency range of interest with the process of calibration. All calibration kits contain standards used for this purpose. The standards in the 3.5 mm, 2.4 mm and Type-N calibration kits use the precision slotless connector (PSC-3.5, PSC-2.4 and PSC-N). Unless otherwise noted all coaxial calibration kits include connector gages and a torque wrench. Option 002 provides calibration kit data on magnetic tape for use with the HP 8510A/B.

Mechanical Calibration Kit	Connector Type	Frequency Range (GHz)	Description
HP 85050B	7 mm	0.045 - 18	Contains open and short circuits, fixed and sliding terminations.
HP 85050C	7 mm	0.045 - 18	Precision kit. Contains standards for TRL calibration, including precision airline. Also contains open and short circuits and fixed termination.
HP 85050D	7 mm	0.045 - 18	Economy kit. Contains open and short circuits and precision fixed termination. Gages not included.
HP 85052B	3.5 mm	0.045 - 26.5	Contains open and short circuits, fixed and sliding terminations and in-series adapters.
HP 85052C	3.5 mm	0.045 - 26.5	Precision kit. Contains standards for TRL calibration, including precision airlines. Also contains open and short circuits, fixed terminations and in-series adapters. Gages not included.
HP 85052D	3.5 mm	0.045 - 26.5	Economy kit. Contains open and short circuits, precision fixed termination, and in-series adapters. Gages not included.
HP 85054B	Type-N	0.045 - 18	Contains open and short circuits, fixed and sliding terminations, in-series adapters and 7mm-to-Type-N adapters.
HP 85054D	Type-N	0.045 - 18	Economy kit. Contains open and short circuits, fixed terminations, in-series adapters and 7mm-to-Type-N adapters. Gages not included.
HP 85056A	2.4 mm	0.045 - 50	Contains open and short circuits, fixed and sliding terminations and in-series adapters.
HP 85056D	2.4 mm	0.045 - 50	Economy kit. Contains open and short circuits, fixed terminations and in-series adapters. Gages not included.
HP 85056K	2.92/2.4 mm	0.045 - 50	Contains 2.4 mm open and short circuits, fixed loads and 2.92 mm adapters.
HP 85058D	1.85 mm	0.045 - 65	Economy kit. Contains open and short circuits, fixed terminations and 1.85 mm (m-m, f-f and m-f) adapters. Gages not included.
HP 85059A	1.0 mm	0.045 - 110	Broadband coaxial precision calibration kit consists of a 1.0 mm short, 1.0 mm open, and 1.0 mm broadband load. It also includes offset-shorts covering 50 to 110 GHz. Gages not included.
HP 11904S	2.92 mm	0.045 - 40	Must be used with HP 85056A/D 2.4 mm calibration kit. Includes four 2.92 mm-to-2.4 mm adapters. Gages not included.
HP X11644A	WR-90	8.2 - 12.4	
HP P11644A	WR-62	12.4 - 18	
HP K11644A	WR-42	18.0 - 26.5	
HP R11644A	WR-28	26.5 - 40	Contains standards for TRL calibration. Includes precision waveguide section, short circuit and fixed or sliding terminations. Gages not included.
HP Q11644A	WR-22	33 - 50	
HP U11644A	WR-19	40 - 60	
HP V11644A	WR-15	50 - 75	
HP W11644A	WR-10	75 - 110	

Verification Kits

Verification kits are used to verify the performance specifications of an HP 8510 system. All kits include a precision Z_0 airline, mismatched airline and fixed attenuators. Measured data and uncertainties traceable to the U.S. National Institute of Standards and Technology (NIST) are included with each kit. Compliance with MIL-STD 45662A is available for an extra charge (Option 1BP). Option 002 provides verification kit data on magnetic tape for use with the HP 8510A/B.

Choose a verification kit for each connector type required.

Verification Kit	Connector Type	Frequency Range (GHz)	Verification Kit	Connector Type	Frequency Range (GHz)
HP 85051B	7 mm	0.045 - 18	HP R11645A	WR-28	26.5 - 40
HP 85053B	3.5 mm	0.045 - 26.5	HP Q11645A	WR-22	33 - 50
HP 85055A	Type-N	0.045 - 18	HP U11645A	WR-19	40 - 60
HP 85057B	2.4 mm	0.045 - 50	HP V11645A	WR-15	50 - 75
			HP W11645A	WR-10	75 - 110

Test Port Cables and Adapters

Test port cables and adapter sets are available for various connector types. Special test port adapter sets convert the rugged 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 test port 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/8517A). 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. Choose one of the configurations shown.

Configuration A. This cable arrangement is for applications where the device under test is connected directly to the test set port. This setup offers the best mechanical rigidity for device connection. To adapt the test set port (port 1) to the device under test, choose the appropriate special adapter set. In addition to converting the test port to the desired interface, these adapters also function as "test port savers" which protect the test set from damage and wear due to heavy use.

CONFIGURATION A

network analyzer test set

test port adapter

device under test

single cable
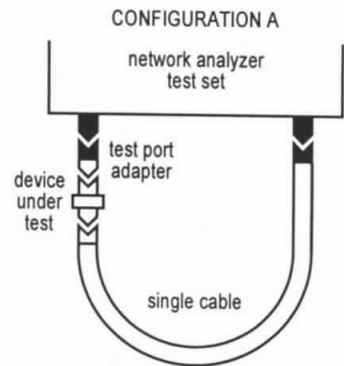
For HP 8514B/8515A/85110A/85110L Test Sets (3.5 mm rugged test port connector)

	Cables/Adapter	Connector Type (on device side of cable/adapter)
For 3.5 mm devices	HP 85131C semi-rigid cable or	3.5 mm (f)
	HP 85131E flexible cable	3.5 mm (f)
	HP 85130D adapter set	3.5 mm (m and f)
For 7 mm devices	HP 85132C semi-rigid cable or	7 mm
	HP 85132E flexible cable	7 mm
	HP 85130B adapter set	7 mm
For Type-N devices	Use 7 mm cables and the 7 mm-to-Type-N adapters included in the HP 85054B/D Type-N calibration kit	

For HP 8517B Test Sets (2.4 mm rugged test port connectors)

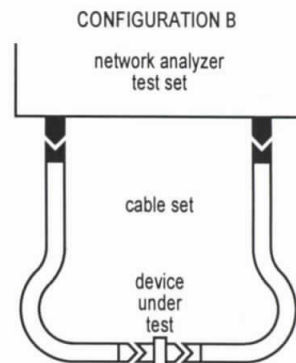|	Cables/Adapters	Connector Type (on device side of cable/adapter)
For 2.4 mm devices	HP 85133C semi-rigid cable or	2.4 mm (f)
	HP 85133E flexible cable	2.4 mm (f)
	HP 85130G adapter set	2.4 mm (m and f)
For 3.5 mm devices	HP 85134C semi-rigid cable or	3.5 mm (f)
	HP 85134E flexible cable	3.5 mm (f)
	HP 85130F adapter set	3.5 mm (m and f)
For 7 mm devices	HP 85135C semi-rigid cable or	7 mm
	HP 85135E flexible cable	7 mm
	HP 85130E adapter set	7 mm

Configuration B. This cable arrangement is for applications where the device under test is connected between cable ends. This setup offers more flexibility when connecting to the device under test.

For HP 8514B/8515A/85110A/85110L Test Sets (3.5 mm rugged test port connectors)

	Cables/Adapters	Connector Type (on device side of cable/adapter)
For 3.5 mm devices	HP 85131D semi-rigid cable set or	3.5 mm (m and f)
	HP 85131F flexible cable set	3.5 mm (m and f)
For 7 mm devices	HP 85132D semi-rigid cable set or	7 mm
	HP 85132F flexible cable set	7 mm
For Type-N devices	Use 7 mm cables and the 7 mm-to-Type-N adapters included in the HP 85054B/D Type-N calibration kit	

For HP 8517B Test Sets (2.4 mm rugged test port connectors)

	Cables/Adapters	Connector Type (on device side of cable/adapter)
For 2.4 mm devices	HP 85133D semi-rigid cable set or	2.4 mm (m and f)
	HP 85133F flexible cable set	2.4 mm (m and f)
For 3.5 mm devices	HP 85134D semi-rigid cable set or	3.5 mm (m and f)
	HP 85134F flexible cable set	3.5 mm (m and f)
For 7 mm devices	HP 85135D semi-rigid cable set or	7 mm
	HP 85135F flexible cable set	7 mm

CONFIGURATION B

network analyzer test set

cable set

device under test

For HP 8510XF Systems (1.0 mm test port connectors)

	Cables/Adapters	Connector Type
For 1.0 mm devices	HP 11500I 1.0 mm test port cable	1.0 mm (m and f)
	HP 11500J 1.0 mm test port cable	1.0 mm (m and f)
For V-band waveguide devices	HP V281C adapter V-band waveguide	1.0 mm (f) to V-band waveguide devices
	HP V281D adapter V-band waveguide	1.0 mm (m) to V-band waveguide devices
For W-band waveguide devices	HP W281C adapter W-band waveguide	1.0 mm (f) to W-band waveguide devices
	HP W281D adapter W-band waveguide	1.0 mm (m) to W-band waveguide devices

Test Configuration Accessories

Power Meter
❏ **HP 437B Power Meter**
Required for use with test port power flatness correction feature.

Bias Supply
❏ **HP 6626A Precision DC Power Supply**
For connection to HP 851XA test set bias input, also order HP 14852A.
❏ **HP 14852A Bias Interconnect Cable**

Bias Networks
For supplying DC bias externally from the test set. Standard S-parameter test sets include bias networks.
❏ **HP 11590B Bias Network** (100 MHz to 12.4 GHz) with Type-N connectors (0.5A maximum current)
Option 001 (100 MHz to 18 GHz) with 7 mm connectors (0.5A maximum current)
❏ **HP 11612A Bias Network** (45 MHz to 26.5 GHz) with 3.5 mm connectors (0.5A maximum current)
  ❏ **Option 001** 2 amps maximum current (400 MHz to 26.5 GHz)
❏ **HP 11612B Bias Network** (45 MHz to 50 GHz) with 2.4 mm connectors (0.5A maximum current)

Amplifier
❏ **HP 8349B Microwave Amplifier** (2 GHz to 20 GHz)
May be used to increase input power level to S-parameter test sets and increase system dynamic range.
  ❏ **Option 001** recommended (rear panel in/out installed) for use in racked configurations

System Rack
❏ **HP 85043C System Rack Kit**
132 cm (52 in.) high x 60 cm (23.6 in.) wide x 90.5 cm (35.6 in.) deep. Supplied with anti-static mat (part number 85043-80013), support rails, rack mounting kits (Option 913) and power distribution. Includes two HP 10833A HP-IB cables for connecting system peripherals to HP 8510C.
  ❏ **Option 230** 220/240 V line operation

System Software
Compatible with a PC, running HP Basic Rev 6.3 or higher under Windows (3.1/95/NT). Comes in 3-1/2 inch disk media.
❏ **HP 85161B Measurement Automation Software**
❏ **HP 85070B Materials Measurement Software/Probe Kit** (PC version)
  ❏ **Option 300** HP 9000 series 300, 9816, or 9836 version
❏ **HP 85071B Materials Measurement Software** (PC version)
  ❏ **Option 300** HP 9000 series 300, 9816, or 9836 version

Peripherals
Hardcopy results may be output directly to a printer or plotter over the system bus (HP-IB compatible) or serial output ports (RS-232-C) without the need of an external computer. Measurement data, calibration sets and kits and instrument states may be stored on disk using either the built-in disk drive or an external disk drive. HP-IB cables must be ordered for each peripheral. Two serial interface (RS-232-C) cables are included with HP 8510C.

Graphics Printers
HP C2114A DeskJet 500C Printer (RS-232-C interface)
HP C2168A DeskJet 560C Color Printer   HP C4555A DeskJet 870Cxi Color Printer
HP C4549A DeskJet 680C Color Printer   HP C3541A DeskJet 1600CM Color Printer (only prints in blk/wht)
HP C4567A DeskJet 682C Color Printer   HP C1645A PaintJet XL300 Color Graphics Printer
HP C4562A DeskJet 690C Color Printer   HP C2003A LaserJet 4L Printer
HP C4582A DeskJet 692C Color Printer   HP C3941A LaserJet 5L Printer
HP C4608A DeskJet 694C Color Printer   HP C3150A LaserJet 5P Printer
HP C4565A DeskJet 870Cse Color Printer   HP C3952A LaserJet 5N Printer

HP-IB Cables
❏ **HP 10833A 1-Meter HP-IB Cable**   ❏   **HP 10833D 0.5-Meter HP-IB Cable**
❏ **HP 10833B 2-Meter HP-IB Cable**

System Upgrades

Upgrades for HP 85106C, 85106C with Option 002 and 85106D ───────────────
(Option 002 on the HP 85106C replaced 8350B/83540A with 83621A/B)

HP 8510XF Upgrade (Single-Connection Single-Sweep System)
Upgrade consists of two test heads, a millimeter test set controller and an HP 83651B for RF source. It does not include calibration kits, test port cable sets, or rack.

❏ **HP E7346A Upgrade** from HP 85106C, 85106C with Option 002 and 85106D to a 2 GHz to 85 GHz HP 8510XF System
   ❏ **Option 005** add 45 MHz to 2 GHz low frequency extension
   ❏ **Option 006** add RF pass thru (Provides coupled output of 50 GHz source for additional test sets. Additional test set(s) must have Option 001 installed.)

❏ **HP E7356A Upgrade** from an HP 85106C, 85106C with Option 002 and 85106D to a 2 GHz to 110 GHz HP 8510XF System
   ❏ **Option 005** add 45 MHz to 2 GHz low frequency extension
   ❏ **Option 006** add RF pass thru (Provides coupled output of 50 GHz source for additional test sets. Additional test set(s) must have Option 001 installed.)

Upgrades for HP 85107B and 85109C ─────────────────────────────────

HP 8510XF Upgrade (Single-Connection Single-Sweep System)
Upgrade consists of two test heads, a millimeter test set controller, an HP 83621B for
LO source, and rack. It does not include calibration kits or test port cable sets.

❏ **HP E7345A Upgrade** from HP 85107B to a 2 GHz to 85 GHz 8510XF System
   ❏ **Option 005** add 45 MHz to 2 GHz low frequency extension
   ❏ **Option 006** add RF pass thru (Provides coupled output of 50 GHz source for additional test sets. Additional test set(s) must have Option 001 installed.)

❏ **HP E7355A Upgrade** from HP 85107B to a 2 GHz to 110 GHz 8510XF System
   ❏ **Option 005** add 45 MHz to 2 GHz low frequency extension
   ❏ **Option 006** add RF pass thru (Provides coupled output of 50 GHz source for additional test sets. Additional test set(s) must have Option 001 installed.)

Upgrades for HP 85109C with Option 002, 85106D with ───────────────── Option 001, and 85106C with Options 001 and 002
(Option 002 on the HP 85109C replaced the 8350B/83540A with the 83621A/83621B)
(HP 85106D: Option 001 added the 8517B and replaced the 83621B with the 83651B)
(HP 85106C: Option 001 and 002 added the 8517B, replaced the 83621A/B with the 83651A/B, and replaced the 8350B/83540A with the 83621A/B)

HP 8510XF Upgrade (Single-Connection Single-Sweep System)
Upgrade consists of two test heads and a millimeter test set controller. It does not include calibration kits, test port cable sets, or rack.

❏ **HP E7347A Upgrade** from HP 85106D with Option 001, 85106C with Options 001 and 002, and 85109C with Option 002 to a 2 GHz to 85 GHz HP 8510XF System.
   ❏ **Option 005** add 45 MHz to 2 GHz low frequency extention
   ❏ **Option 006** add RF pass thru (Provides coupled output of 50 GHz source for additional test sets. Additional test sets must have Option 001 installed.)

❏ **HP E7357A Upgrade** from HP 85106D with Option 001, 85106C with Options 001 and 002, and HP 85109C with Option 002 to a 2 GHz to 110 GHz HP 8510XF System.
   ❏ **Option 005** add 45 MHz low frequency extention
   ❏ **Option 006** add RF pass thru (Provides coupled output of 50 GHz source for additional test sets. Additional test set(s) must have Option 001 installed.)

Instrument and Firmware Upgrades

Upgrades for HP 8510A ————————————————————————

HP 8510C Upgrade (includes on-site installation by HP Customer Engineer)

❑ **HP 85103C** HP 8510A to 8510C upgrade (replaces the top unit on the HP 8510A)
   ❑ **Option 001** adds rack modification kit (for systems mounted in an HP 85043A system rack)
   ❑ **Option 002** adds HP 8360 series source compatibility kit for HP 8517A/B test sets
   ❑ **Option 003** adds HP 8360 series source compatibility kit for the HP 8514/15 test sets

Time Domain Upgrade

❑ **HP 85012A** time domain (Option 010) upgrade for HP 8510A (customer installed)

Upgrades for HP 8510B ————————————————————————

HP 8510C Upgrade (includes on-site installation by HP Customer Engineer)

❑ **HP 85103D** HP 8510B to HP 8510C upgrade (replaces the top unit on the HP 8510B)
   ❑ **Option 001** adds rack modification kit (for systems mounted in a HP 85043A system **rack)**
   ❑ **Option 002 adds HP 8360 series source compatibility kit for HP 8517A/B test sets**
   ❑ **Option 003 adds HP 8360 series source compatibility kit for the HP 8514/15 test sets**

Wideband IF Detector Upgrade (reference to HP 85108A for additional hardware requirements)

❑ **HP 85111A** pulsed-RF measurement capability upgrade for the HP 8510B
(upgrade adds circuitry to the HP 8510B and includes on-site installation by HP Customer Engineer.)

Time Domain Upgrade

❑ **HP 85012B** time domain (Option 010) upgrade for HP 8510B (customer installed)

Firmware Upgrades for HP 8510B

❑ **HP 11575E** revision 5.14 upgrade (customer installed)
Only for instruments with Rev 5.0 or higher currently installed.
   ❑ **Option 010** add time domain (for HP 8510B with previously installed Option 010)
❑ **HP 11575H** revision 6.54 upgrade (customer installed)
Only for instruments with Rev 6.3 or higher currently installed.
   ❑ **Option 010** add time domain (for HP 8510B with previously installed Option 010)
❑ **HP 11575F** revision 6.54 upgrade (customer installed)
For any revision of HP 8510B firmware currently installed.
   ❑ **Option 010** add time domain (for HP 8510B with previously installed Option 010)

Upgrades for HP 8510C ————————————————————————

Wideband IF Detector Upgrade (reference to HP 85108A for additional hardware requirements)

❑ **HP 85111B** pulsed-RF measurement capability upgrade for the HP 8510C
(upgrade adds circuitry to the 8510C and includes on-site installation by HP Customer Engineer)

Time Domain Upgrade

❑ **HP 85012C** time domain (Option 010) upgrade for HP 8510C (customer installed)

Firmware Upgrades for HP 8510C

❑ **HP 11575G** revision 6.54 upgrade (customer installed)
Only for instruments with Rev 6.0 or higher currently installed.
❑ **HP 11575J** revision 7.10 upgrade (customer installed)
For any revision of HP 8510C firmware currently installed.
   ❑ **Option 002** adds HP 8360 series source compatibility kit for HP 8517A/B test sets
   ❑ **Option 003** adds HP 8360 series source compatibility kit for the HP 8514/15 test sets

Test Set Upgrades ————————————————————————————————————
For any HP 8510 test set
❏ **HP 8511A K01** add IF switching (Option 001) for multiple test set operation

Miscellaneous Compatibility Upgrades ——————————————————————
❏ **HP 83601A** for HP 8510C with 83621/31A shipped prior to January 1, 1991
   Includes on-site installation by HP Customer Engineer.

Connector Repair Kits
Include tools for removing and replacing center conductor contacts of precision slotless connectors (PSC). Kits include ten replacement center conductor contacts.
❏ **HP 85052B Option K11 PSC-3.5 Connector Repair Kit**
❏ **HP 85054B Option K11 PSC-N Connector Repair Kit**

User Training Courses
❏ **HP 8510C+24D Basic Measurements Using the HP 8510**
   Three-day user training course. This basic measurements course is recommended to bring you up to speed with hands-on knowledge of the HP 8510C network analyzer's full capabilities.
❏ **HP 85101B+24D Advanced Progamming Course for the HP 8510A/B/C**
   Two-day training course on advanced programming topics using HP BASIC. Prior attendance in HP 8510B+24D training course is recommended.

System Installation
To include system installation by an HP Customer Engineer, order support Option +17A for each major system component (network analyzer, test sets and sources). Installation includes integration of system components and performance verification.

System Performance Verification
Recommended once per year. For on-site system performance verification, order Option +23R for each major system component (network analyzer, test sets and sources). Compliance with MIL-STD 45662A is an additional charge (where available).

For more information about Hewlett-Packard test and measurement products, applications, services, and for a current sales office listing, visit our web site, http://www.hp.com/go/tmdir. You can also contact one of the following centers and ask for a test and measurement sales representative.

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Englewood, CO 80155-4026
1 800 452 4844

Canada:
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5150 Spectrum Way
Mississauga, Ontario L4W 5G1
(905) 206 4725

Europe:
Hewlett-Packard
European Marketing Centre
P.O. Box 999
1180 AZ Amstelveen
The Netherlands
(31 20) 547 9900

Japan:
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Measurement Assistance Center
9-1, Takakura-Cho, Hachioji-Shi,
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