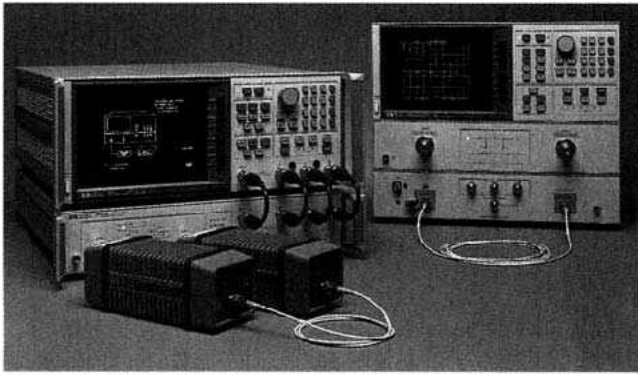


# LIGHTWAVE TEST EQUIPMENT

## Lightwave Component Analyzer

HP 8702B, 8703A

- 300 kHz to 20 GHz modulation frequency
- Calibrated measurements of high-speed optical, electro-optical, and electrical components



HP 8702B & 8703A

### Lightwave Component Analyzer

As the transmission rate or bandwidth of fiber optic systems is pushed upward, high frequency design considerations become key. Both the HP 8702B and 8703A measure each of the elements that transmit these wide bandwidths. They make calibrated measurements of lasers or LED transmitters, photodiode receivers, optical fibers, and the electrical components they work with. The lightwave component analyzers operate with a swept modulation frequency to precisely characterize how these components operate on the high-speed, information-bearing signal. Information on how each component responds independent of the others provides insight into how systems can be predicted and improved.

Both the HP 8702B and 8703A operate at a fixed wavelength and sweep the frequency of the intensity modulation signal over the bandwidth you select. The HP 8702B has transducers (lightwave source and receivers), which allow it to operate at 850, 1300, and 1550 nm. The HP 8703A can operate at 1300 and 1550 nm. These sources and receivers come with calibration data to allow calibrated measurements of the electro-optical components.

### Measure Optical Components

Measurements can be made of such components as connectors, splitters, couplers, and lenses, as well as fiber itself. This yields modulation bandwidth, insertion loss, length, and optical return loss. In the distance-time domain, reflections can be located without the dead zone typical of OTDR type measurements. Transmission measurements can also be displayed in the distance-time domain to view the impulse or step response of the component. Delay and dispersion are easily viewed in this manner.

### Measure Electro-Optical Components

Often the limiting elements in a fiber optic system are the electro-optical components (for example, lasers, APD's, PIN photodiodes, and modulators), which convert the electrical information to optical or vice versa. The conversion efficiency or responsivity of these devices is a function of many variables. The characterized lightwave source and receiver in the lightwave component analyzer allows each of these devices to be uniquely tested. Data can be displayed in the frequency domain as the modulation frequency response or in the time domain as the step response.

### Measure Electrical Components

When used to measure linear electrical components such as amplifiers, filters, and transmission lines, the lightwave component analyzers have the full measurement capability of a microwave network analyzer. Typical measurements are bandwidth, insertion loss/gain, phase, impedance, match, and group delay.

### Measure Both Transmission and Reflection Characteristics

Complete characterization of component behavior depends on knowing how the signal is transmitted through it and how it is reflected back. For optical reflections, the lightwave component analyzers use a lightwave directional coupler to make the reflection measurements. Data can be presented in the modulation frequency domain or in the distance-time domain to locate and measure the

- 850, 1300, or 1550 nm operation
- Reflection measurements with <1mm resolution up to 50 dB optical dynamic range

source of the reflection. Because of the wide measurement bandwidth, single reflections can be located with <1mm of resolution and up to 50 dB optical dynamic range and 100 dB electrical dynamic range. For electrical reflection measurements, the analyzer uses a test set to perform the measurement. Results, such as impedance, can then be displayed.



HP 8702B

### HP 8702B Lightwave Component Analyzer

Standard configuration requires an HP 8702B, an RF interface kit, a lightwave source, lightwave receiver, and fiber cable. All HP 8340xB sources have built-in optical isolators for reduced reflection sensitivity and improved optical source match compared to the A models. A lightwave directional coupler is required for reflection measurements.

### HP 8702B Accessories

#### Lightwave Source Modules

All with directly modulated Fabry-Perot lasers.  
 HP 83400A/B, 300 kHz to 3 GHz, 1300 nm, 9/125  $\mu$ m fiber  
 HP 83401A, 300 kHz to 3 GHz, 1300 nm, 50/125  $\mu$ m fiber  
 HP 83402A/B, 300 kHz to 6 GHz, 1300 nm, 9/125  $\mu$ m fiber  
 HP 83403A/B, 300 kHz to 3 GHz, 1550 nm, 9/125  $\mu$ m fiber  
 HP 83404A/B', 300 kHz to 3 GHz, 850 nm, 50/125  $\mu$ m fiber

#### Lightwave Receiver Modules

All with PIN photodiodes.  
 HP 83410C, 300 kHz to 3 GHz, 1300/1550 nm, 62.5/125  $\mu$ m fiber  
 HP 83411C, 300 kHz to 6 GHz, 1300/1550 nm, 9/125  $\mu$ m fiber  
 HP 83411D, 300 kHz to 6 GHz, 1300/1550 nm, 9/125  $\mu$ m fiber  
 HP 83412B, 300 kHz to 3 GHz, 850 nm, 62.5/125  $\mu$ m fiber

#### Lightwave Directional Couplers

A three-port, directional coupler for making reflection measurements and monitoring transmission signals. The couplers have a nominal 3 dB coupling factor.

HP 11890A 9/125  $\mu$ m fiber  
 HP 11891A 50/125  $\mu$ m fiber

#### RF Interface Kit

HP 11889A

This kit contains the RF accessories required to operate the HP 8702 when a test set is not used. Contains a power splitter, a 20 dB pad, SMA accessories and adapters for the analyzer.

#### Probe Power Supply

HP 11899A

This power supply provides regulated dc power to a number of Hewlett-Packard products. Compatible products include: HP 1124A, HP 85024A, HP 41800A probes as well as the HP 8340x and HP 8341x lightwave sources and receivers.

The following sticker applies to the HP 83404A:



# LIGHTWAVE TEST EQUIPMENT

## Lightwave Component Analyzer (cont'd)

HP 8702B, 8703A

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### S-Parameter Test Set

HP 85046A 300 kHz to 3 GHz  
HP 85047A 300 kHz to 6 GHz

These test sets provide the capability to measure impedance and transmission characteristics of two-port electrical devices in either forward or reverse direction with a single connection. The HP 85047A is required for 6 GHz operation.

### Calibration Kit

HP 85033C 3.5 mm

Contains precision 3.5 mm standards used to calibrate the HP 8702 for electrical measurements of components with 3.5 mm or SMA connectors.

### Polarization Controller

HP 11894A

The polarization of light can be easily and precisely adjusted using this general-purpose instrument. It offers a full range of polarization control via three polarization paddles.

### Workspace Cabinet

HP 11895A

This cabinet fits beneath an HP 8702 system making the system easier to use and reducing required bench space.

### Ordering Information

**HP 8702B** Lightwave Component Analyzer

**Opt 006** 6 GHz Receiver Operation

**Opt 011** Delete Time Domain

**Opt 802** Add Disk Drive & Cable

**HP 83400A** Lightwave Source

**HP 83400B** Lightwave Source

**HP 83401A** Lightwave Source

**HP 83402A** Lightwave Source

**HP 83402B** Lightwave Source

**HP 83403A** Lightwave Source

**HP 83403B** Lightwave Source

**HP 83404A** Lightwave Source

**HP 83404B** Lightwave Source

**HP 83410C** Lightwave Receiver

**HP 83411C** Lightwave Receiver

**HP 83411D** Lightwave Receiver

**HP 83412B** Lightwave Receiver

**HP 11890A** Lightwave Coupler

**HP 11891A** Lightwave Coupler

**HP 11899A** RF Interface Kit

**HP 11894A** Polarization Controller

**Opt 01X** Add Connectors

**HP 11895A** Workspace Cabinet

**HP 85046A** S-parameter Test Set

**HP 85047A** S-parameter Test Set

### Price

\$34,600

+ \$3,000

- \$5,300

+ \$1,545

\$13,000

\$17,500

\$13,000

\$15,000

\$19,500

\$13,000

\$17,500

\$12,700

\$17,500

\$6,150

\$4,600

\$12,000

\$6,000

\$3,900

\$3,900

\$1,500

\$1,500

+ \$1,400

\$450

\$9,000

\$10,800

### HP 8703A Lightwave Component Analyzer

- 130 MHz to 20 GHz Modulation Frequency
- 1300 and 1550 nm operation
- FP and DFB lasers



HP 8703A

### HP 8703A Lightwave Component Analyzer

Standard configuration includes an internal 1300 nm Fabry-Perot (FP) laser and one 1300/1550 nm receiver. Optional 1300 or 1550 nm DFB internal laser sources are also available. The external lightwave source input (Option 100) is used with the HP 83424A or 83425A<sup>1</sup> Lightwave CW Sources for additional 1550 or 1300 nm DFB wavelength flexibility.

### 20 GHz Lightwave Test Set, Source, Modulator, and Receiver



HP 83420A, 83421A, 83422A, 83423A

### HP 83420A Lightwave Test Set

Includes a 1300 nm FP laser, modulator, receiver, and directional coupler. Basic lightwave component analyzer tests from 130 MHz to 20 GHz can be made when the HP 83420A is combined with an external controller and an HP 8510, HP 8720/H80, HP 8719/H80, or HP 8757 microwave analyzer system.

### 20 GHz Lightwave Sources and Receivers

HP 83421A Lightwave Source

HP 83422A Lightwave Modulator

HP 83423A Lightwave Receiver

For standalone applications, these instruments have modulation frequency ranges of 130 MHz to 20 GHz.

### Ordering Information

**HP 8703A** Lightwave Component Analyzer

**Opt 01X** Select Optical Connector

**Opt 100** External Lightwave Source Input

**Opt 210** 1550 nm DFB Laser

**Opt 220** 1300 nm DFB Laser

**Opt 300** Additional Lightwave Receiver

**Opt 802** Add Disk Drive & Cable

**Opt 830** Add HP 3.5 mm Cal Kit & Cable

**HP 83424A** Lightwave CW Source-1550 nm

**Opt 100** External Lightwave Source Input

**HP 83425A** Lightwave CW Source-1300 nm

**Opt 100** External Lightwave Source Input

**HP 83420A** Lightwave Test Set

**Opt 01X** Connector Option

**Opt 100** External Lightwave Source Input

**Opt 210** 1550 nm DFB laser

**Opt 220** 1300 nm DFB laser

**HP 83421A** Lightwave Source

**Opt 01X** Connector Option

**Opt 100** External Lightwave Source Input

**Opt 210** 1550 nm DFB Laser

**Opt 220** 1300 nm DFB Laser

**HP 83422A** Lightwave Modulator

**Opt 01X** Connector Option

**HP 83423A** Lightwave Receiver

**Opt 01X** Connector Option

**Opt 300** Additional Lightwave Receiver

### Price

\$108,500

\$0

+ \$2,800

+ \$15,000

+ \$10,500

+ \$10,900

+ \$1,545

+ \$5,100

\$27,500

+ \$2,800

\$24,100

+ \$2,800

\$47,500

\$0

+ \$2,800

+ \$15,000

+ \$10,500

\$29,500

\$0

+ \$2,800

+ \$15,000

+ \$10,500

\$20,000

\$0

\$13,500

\$0

+ \$10,900

<sup>1</sup>The following sticker applies to the HP 83425A:

