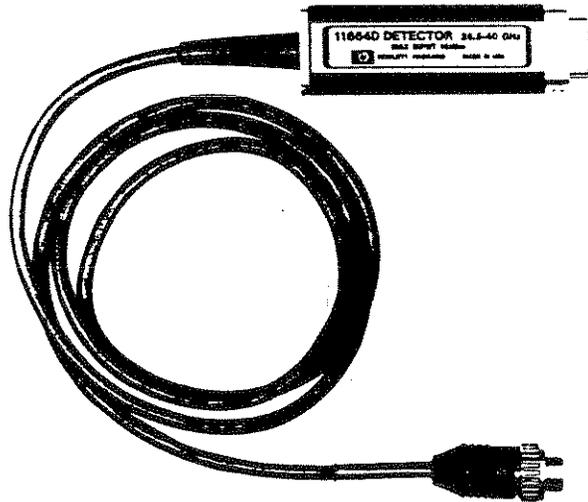


# HP 11664D DETECTOR



**HEWLETT  
PACKARD**



Figure 1-1. HP 11664D Detector

## SECTION I GENERAL INFORMATION

### 1-1. INTRODUCTION

1-2. This manual contains operating and service information for the Hewlett-Packard Model 11664D detector, the instrument and accessories supplied.

1-3. On the title page of this manual is a microfiche part number that can be used to order 10 x 15 cm (4 x 6 in) microfilm transparencies of this manual. Each microfiche contains photocopies of up to 98 manual pages. The microfiche package includes the latest Manual Changes Supplement and all pertinent service notes.

### 1-4. SPECIFICATIONS

1-5. Listed in Table 1-1 are the performance specifications for the HP 11664D detector. These are performance standards or limits against which the instrument may be tested.

### 1-6. SAFETY CONSIDERATIONS

1-7. The voltages present in the HP 11664D are not in the range to warrant more than normal caution.

### 1-8. Safety Symbol

**CAUTION**

The **CAUTION** sign calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to or destruction of the equipment. Do not proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.

### 1-9. INSTRUMENTS COVERED BY MANUAL

1-10. The contents of this manual apply directly to all instruments, unless a yellow Manual Changes supplement is included with the

manual. An instrument manufactured after the printing of this manual may have features that do not appear in this manual. In that case, a Manual Changes supplement documenting the differences will be provided with the manual.

1-11. In addition to change information, the supplement may contain information for correcting errors in the manual. To keep this manual as current as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is keyed to its print date and part number, both of which appear on the title page. Changes may be keyed to specific serial numbers, in which case the relevant serial numbers will be noted on the first page of the supplement. Complimentary copies of the supplement are available from your local Hewlett-Packard office listed at the back of this manual.

### 1-12. DESCRIPTION

1-13. The HP 11664D detector is designed to be used with either the HP 8755C swept amplitude analyzer, or the HP 8756A scalar network analyzer. The HP 11664D detects RF signal levels from  $-50$  to  $+10$  dBm in the frequency range of 26.5 to 40 GHz. The use of three HP 11664D detectors, and two waveguide directional couplers enables simultaneous (amplitude only) transmission and reflection measurements via the analyzer CRT.

1-14. The HP 11664D detector and the input stages of the HP 8755C/8756A use ac detection. This detection scheme requires a 27.8 kHz squarewave amplitude modulation of the RF input signal. Additional information is provided in Paragraph 1-7, **EQUIPMENT REQUIRED BUT NOT SUPPLIED**.

### 1-15. OPTIONS

1-16. Option 910, extra manual. The standard instrument is supplied with one Operating and Service Manual. Option 910 instruments are supplied with two manuals.

**1-17. ACCESSORIES SUPPLIED**

1-18. Accessories supplied are shown in Figure 1-1.

**Instrument Case.** The HP 11664D should be stored in its case when not in use. The case helps to protect the instrument from damage.

**Hex Balldriver.** Use the 3/32 inch hex balldriver to tighten or loosen hex screws when making wave guide connectons.

**Flange Cover.** When the HP 11664D is not in use, the wave guide should be protected by the use of the flange cover.

**Cable Markers.** Cable markers are used for identification when more than one detector is used in a test setup.

**1-19. EQUIPMENT REQUIRED BUT NOT SUPPLIED**

1-20. To use the instrument, the following equipment is required:

**Network Analyzer.** The HP 8755C swept amplitude analyzer or the HP 8756A scalar network analyzer, with two or three HP 11664D detectors, measures amplitude levels of -50 to +10 dBm and amplitude ratios up to 60 dB.

**Sweep Oscillator.** The HP 8350A/B sweep oscillator, used with an HP 83572A/B RF plug-in (Option 006), provides the RF input signal. The HP 8350A/B internally modulates the RF output

signal with a 27.8 kHz square wave signal when the front panel [  $\square$  MOD ] button is enabled.

**1-21. EQUIPMENT AVAILABLE**

**1-22. Directional Couplers**

1-23. Reflection measurements require the use of two HP 752C single directional couplers to separate the reference, incident, and reflected signals. Reflection and transmission measurements can be made concurrently with this setup.

**1-24. Accessories**

1-25. The following accessories are available for the HP 11664D detector:

HP 11679A	.....	7.5 metre (25 foot)
		extension cable
HP 11679B	.....	60 metre (200 foot)
		extension cable
HP 11548A	.....	R-Band waveguide holder
		(used with waveguide stand)
HP 11540A	.....	Waveguide stand.
		Locks waveguide holder
		at any height from
		70 to 133 mm (2.7 to 5.25 in).

**1-26. RECOMMENDED TEST EQUIPMENT**

1-27. Equipment required for testing the HP 11664D is listed in Table 1-3. Other equipment may be substituted if it meets or exceeds the critical specifications indicated in the table.

Table 1-1. Specifications

<b>Frequency Range</b>	26.5 to 40 GHz
<b>Flatness</b>	$\pm 1.5$ dB
<b>Return Loss</b>	$\geq 12$ dB ( $\leq 1.67$ SWR)
<b>Input Power Range</b>	+10 to -50 dBm
<b>Operating Temperature Range: Storage Temperature Range:</b>	0° to +55°C (+32° to +131°F) -40° to +75°C (-40° to +167° F)
<b>Connector</b>	EIA Size WR28 Waveguide UG-599/ $\mu$ Cover Flange
<b>Dimensions</b>	Cable length is 1.2 metres (4 feet)
<b>Weight</b>	Net 0.24 kg (8 oz)
<b>Input Damage Level</b>	+16 dBm (40 mW) RF Power

Table 1-2. Recommended Test Equipment

Instrument Type	Critical Specification	Suggested Model
Frequency Source	Frequency: 26.5 to 40 GHz Provides 27.8 kHz Modulation Signal	HP 8350B sweep oscillator with HP 83572B RF plug-in Option 001/006
Network Analyzer	Powers three HP 11664D detectors Processes/Displays elected Signals	HP 8756A or HP 8755C with HP 182T/ HP 180 series display mainframe
Directional Coupler	Frequency: 26.5 to 40 GHz Directivity: $\geq 40$ dB Coupling: 3 dB	HP R752A
Directional Coupler (two required)	Frequency: 26.5 to 40 GHz Directivity: $\geq 40$ dB Coupling: 10 dB	HP R752C
Detector (two required)	Frequency: 26.5 to 40 GHz Return Loss: $\geq 12$ dB	HP 11664D
Sliding Short	Frequency: 26.5 to 40GHz Waveguide: WR28 Flange: UG-599/ $\mu$	HP R920B
Rotary Vane Attenuator	Frequency: 26.5 to 40 GHz Accuracy: $\pm 2\%$ of reading or 0.1 dB, whichever is greater Range: 0-50 dB Waveguide: WR28 Flange: UG-599/ $\mu$	HP R3828A
Power Meter	Compatible with a 26.5 to 40 GHz thermistor mount Accuracy: $\pm 0.2\%$	HP 432A
Thermistor Mount	Frequency: 26.5 to 40 GHz	HP R486A
Sliding Load	Frequency: 26.5 to 40 GHz SWR: 1.01 Power Rating: .5W Waveguide: WR28 Flange: UG-599/ $\mu$	HP R914B

## SECTION II INSTALLATION

### 2-1. INTRODUCTION

2-2. This section contains information concerning initial inspection, preparation for use, mating connectors, storage and shipment.

### 2-3. INITIAL INSPECTION

2-4. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness, and the instrument has been checked both mechanically and electrically.

2-5. Section IV contains procedures for checking electrical performance. If the instrument does not pass these electrical tests, or shipping contents are incomplete, or there is mechanical damage or defect, notify your nearest Hewlett-Packard office. If the shipping container is damaged, or the cushioning material shows signs of stress, notify the carrier as well as Hewlett-Packard. Keep the shipping materials for the carrier's inspection. Hewlett-Packard will arrange for repair or replacement without waiting for claim settlement.

### 2-6. PREPARATION FOR USE

#### 2-7. Power Requirements

2-8. Power for the Model 11664D Detector (0.35 watts) is supplied by the network analyzer.

#### 2-9. Connecting the HP 11664D Detector

2-10. Connect the HP 11664D to the HP 8755C/8756A as follows:

1. Insert the DC connector of the HP 11664D into the HP 8755C/8756A mating connector. The HP 11664D connector is keyed; the plug should be inserted with the key downward.
2. Secure the dc connector in the analyzer by turning the outer shell clockwise.

3. Connect the HP 11664D to the RF output as follows:

**CAUTION**

**Do not apply more than +16 dBm RF power into the HP 11664D.**

Using the 3/32 inch hex balldriver supplied, connect the HP 11664D to the RF output with four 4-40 socket head cap screws. The HP part numbers for the two screw sizes most often used are 3030-0209 (.5 inch) and 3030-0349 (.312 inch). Use a 4-40 double chamfer hex nut where required (HP part number 2260-0001).

#### 2-11. Mating Connector

2-12. The input connector to the HP 11664D is EIA size WR 28 waveguide. This waveguide should mate directly with a UG-599/U cover flange, and can be mated to a UG-318/U cover flange with the use of an HP 11516A waveguide adapter.

#### 2-13. Detector Lead Identification

2-14. Coded cable clips are furnished for lead identification. Place matching clips on either end of the cable.

#### 2-15. Operating Environment

**2-16. Temperature:** 0°C to +55°C (+32°F to +131°F).

**2-17. Humidity:** Up to 95%. Protection should be provided from temperature extremes, which can cause condensation within the instrument.

**2-18. Altitude:** Up to 7,620 metres (25,000 feet).

## 2-19. STORAGE AND SHIPMENT

### 2-20. Environment

2-21. The instrument may be stored or shipped in environments within the following limits:

Temperature .....  $-25^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$   
( $-13^{\circ}\text{F}$  to  $+167^{\circ}\text{F}$ )  
Humidity ..... Up to 95%  
Altitude ..... Up to 7,620 metres (25,000 feet)

2-22. Protection should be provided from temperature extremes, which can cause condensation within the instrument.

### 2-23. Packaging

**2-24. Original Packaging.** Storage boxes and packing materials identical to those used in factory packaging are available through Hewlett-Packard offices. If the instrument is being returned to Hewlett-Packard for servicing, attach a tag indicating the type of service required, return address, model number, and full serial number. Ensure that the container is marked

**FRAGILE** to assure careful handling. In any correspondence, refer to the instrument by model number and full serial number.

**2-25. Other Packaging.** The following general instructions should be used for repackaging with commercially available materials:

1. Wrap the instrument in heavy paper or plastic. If shipping to a Hewlett-Packard office or service center, attach a tag indicating the type of service required, return address, model number, and full serial number.
2. Use a strong shipping container. A double wall carton made of 350-pound test material is adequate.
3. Use enough shock absorbing material (3 to 4 inch layer) around all sides of the instrument to provide firm cushion and prevent movement inside the container.
4. Seal the shipping container securely.
5. Mark the shipping container **FRAGILE** to assure careful handling.

## SECTION III OPERATION

### 3-1. INTRODUCTION

3-2. This section contains information concerning operation of the HP 11664D detector.

### 3-3. FEATURES

3-4. Features of the HP 11664D are shown in Figure 3-1.

### 3-5. OPERATOR'S CHECK

3-6. An Operator's Check that is applicable to the HP 11664D is included in the Operator's Check provided in both the HP 8755C and the HP 8756A Operating and Service Manuals. When

checking an HP 11664D, use a vane attenuator (HP R382A) as the microwave test device, and use two directional couplers (HP R752C) to form the signal separation device.

### 3-7. OPERATING PRECAUTIONS

**CAUTION**

Do not apply more than +16 dBm RF CW power to the HP 11664D, or damage may occur

Do not drop the HP 11664D, or subject it to mechanical shock. The diode is easily damaged.

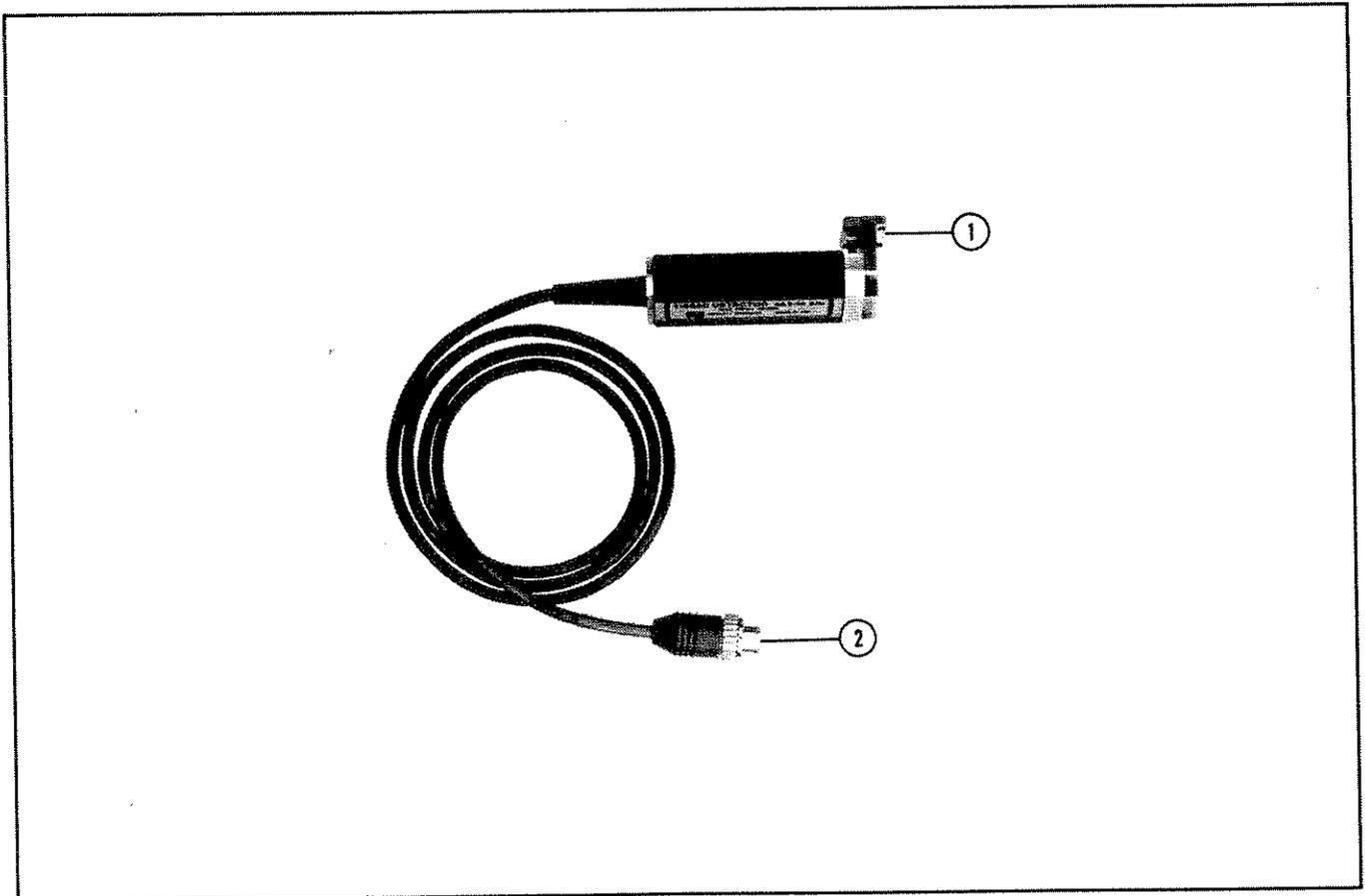


Figure 3-1. HP 11664D Features

**3-8. OPERATING INSTRUCTIONS**

3-9. Operating instructions are given in the Operating and Service Manuals for the HP 8755C and the HP 8756A analyzers, however, use the test setup shown in Figure 3-2.

**NOTE**

The 8756 SYSTEM INTERFACE and Stop Sweep are used ONLY on an HP 8350B or a modified HP 8350A.

**3-10. Typical Measurement Configuration**

3-11. Amplitude measurement with the HP 11664D/8755C or 8756A analyzer system requires a modulation envelope provided by 27.8 kHz amplitude modulation of the RF test signal. Test set connections will vary depending on the analyzer selected.

3-12. Figure 3-2 illustrates a typical setup with the HP 8350A/B sweep oscillator/RF plug-in.

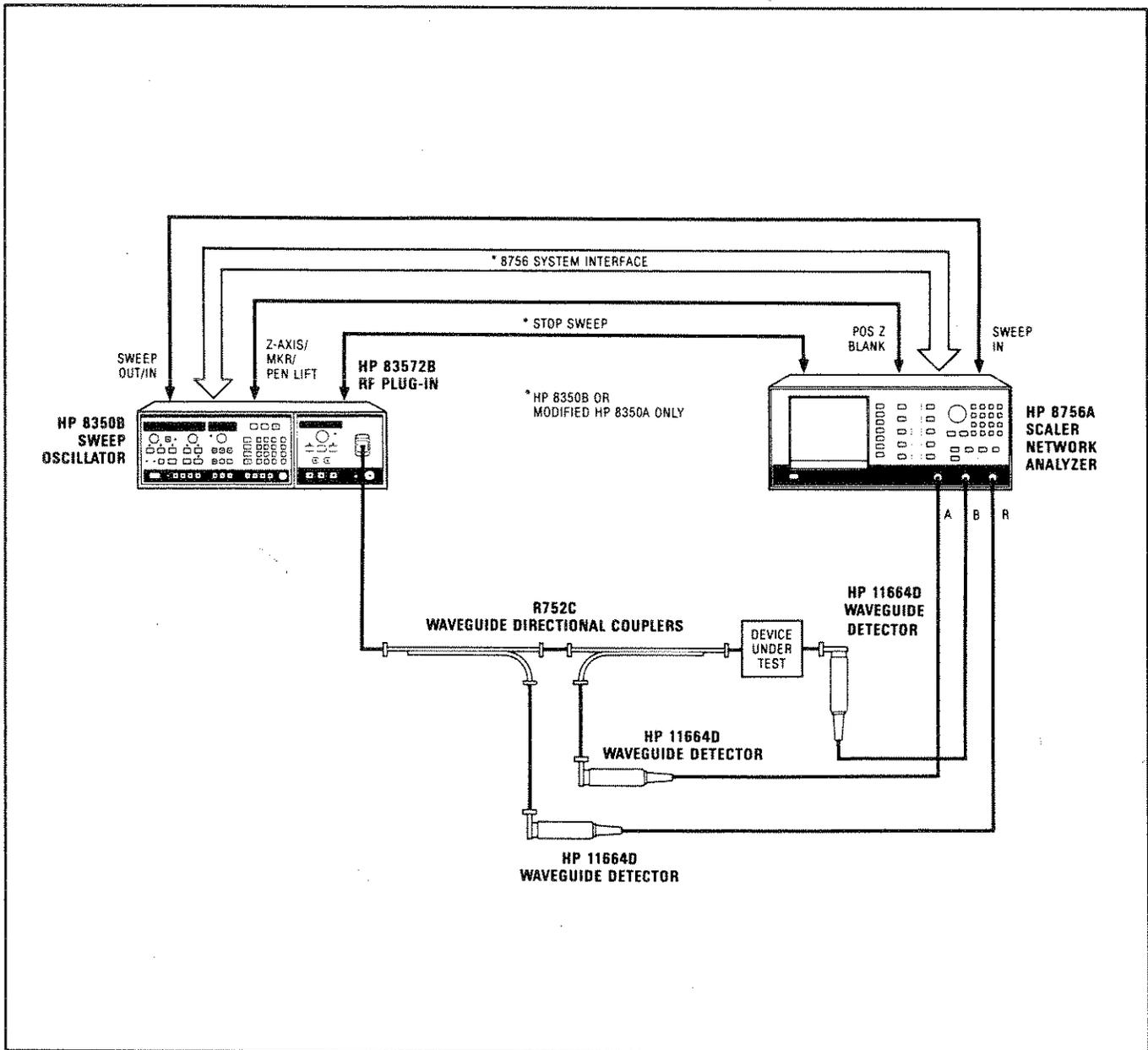


Figure 3-2. HP 11664D/8756A Typical Measurement Setup