

**HP 83595C
RF PLUG-IN
(Including Options 002 and 004)**

SERIAL NUMBERS

This manual applies directly to HP 83595C RF plug-in having serial number prefix 3050A.

For additional information about serial numbers, refer to INSTRUMENTS COVERED BY MANUAL in Section 1.

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**HEWLETT
PACKARD**

CERTIFICATION

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (NIST, formerly NBS), to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.

WARRANTY

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of delivery, or, in the case of certain major components listed in the Operating and Service manual, for the specified period. During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. HP SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCLUSIVE REMEDIES

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. HP SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

ASSISTANCE

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

SAFETY CONSIDERATIONS

GENERAL

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation. This product has been designed and tested in accordance with international standards.



The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

SAFETY SYMBOLS



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual (refer to Table of Contents).



Indicates hazardous voltages.



Indicates earth (ground) terminal.

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

BEFORE APPLYING POWER

Verify that the product is configured to match the available main power source per the input power configuration instructions provided in this manual.

If this product is to be energized via an auto-transformer make sure the common terminal is connected to the neutral (grounded side of the mains supply).

SERVICING

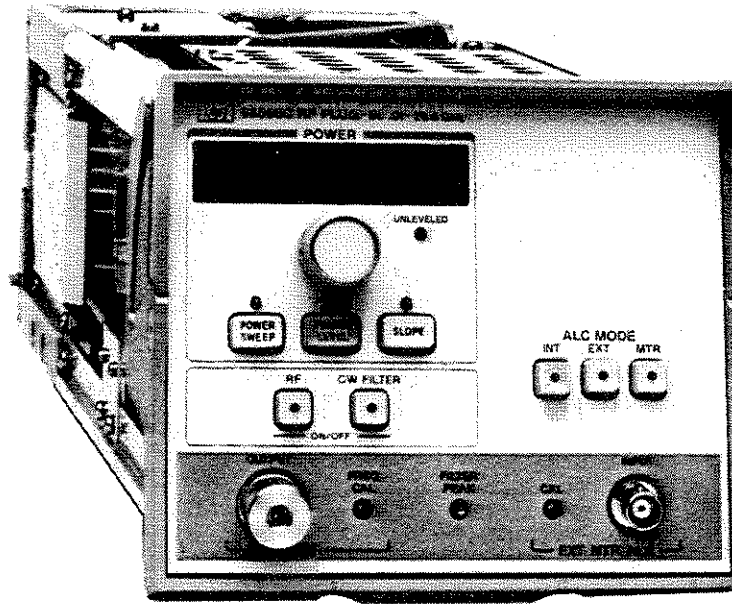


Any servicing, adjustment, maintenance, or repair of this product must be performed only by qualified personnel.

Adjustments described in this manual may be performed with power supplied to the product while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside this product may still be charged even when disconnected from their power source.

To avoid a fire hazard, only fuses with the required current rating and of the specified type (normal blow, time delay, etc.) are to be used for replacement.



HP 83595C



HP Part Number 83525-20013

Figure 1-1. HP 83595C RF Plug-in and Accessory Cable

Section 1. General Information

INTRODUCTION

This manual contains the information necessary to install, operate, test, adjust, and service the HP 83595C RF plug-in. This manual is divided into eight major sections:

Section 1. General Information

This section includes a brief description of the instrument, lists the specifications, supplemental characteristics, options and accessories available, and explains instrument identification.

Section 2. Installation

This section provides information for initial inspection of the instrument, preparation for use, storage, and shipment.

Section 3. Operation

This section explains the frequency resolution characteristics of the instrument in CW (continuous wave) and swept frequency modes. Operating instructions include FM (frequency modulation) switch parameter settings, and crystal and power meter leveling instructions. A description of front and rear panel features and plug-in error codes is also given.

Section 4. Performance Tests

This section gives the procedures to verify published instrument specifications.

Section 5. Adjustments

This section gives the procedures to adjust and align the RF plug-in after repair, or if the instrument fails a performance test.

Section 6. Replaceable Parts

This section includes the information required to order replaceable parts and assemblies.

Section 7. Backdating

This section contains information on earlier shipment configurations.

Section 8. Service

This section provides an overall instrument block diagram with troubleshooting and repair procedures. Each instrument assembly has a separate service sheet which contains a circuit description, schematic diagram, component location diagram, and troubleshooting information.

DESCRIPTION

HP 83595C RF Plug-in

The HP 83595C is an RF plug-in designed for use with the HP 8350 sweep oscillator. The standard HP 83595C provides simultaneous high power and low harmonics over its frequency range of 0.01 to 26.5 GHz. It has a maximum leveled power output of +13 dBm from 0.01 to 20 GHz, +10 dBm from 20 to 26.5 GHz, and <-50 dBc harmonics above 1.5 GHz. Figure 1-1 shows the RF plug-in and the accessory cable supplied.

OPTIONS

Option 002 – 60 dB Attenuator

An Option 002 instrument contains a digitally controlled attenuator just before the RF output. Up to 60 dB of attenuation in 10 dB steps is automatically selected as required to attenuate the RF output power to the indicated level. The continuously variable power level function operates as in a standard instrument with the data entry controls.

Option 004 – Rear Panel RF Output

An Option 004 instrument has the RF output connector and the EXT/MTR ALC input connector on the rear panel instead of the front panel.

Option W30 – Extended Service

Option W30 adds two additional years of return-to-HP hardware support, to follow the first year of warranty. Option W30 can be ordered at the time of sale only. Instruments ordered with Option W30 are identified on the serial number label, or on a special identification label supplied with the instrument.

Option 910 – Extra Operating and Service Manual

A standard instrument is supplied with one operating and service manual. Option 910 provides an additional operating and service manual. To order extra manuals after the initial shipment, use the manual part number listed on the title page of this manual.

SPECIFICATIONS

Table 1-1 lists instrument specifications. These specifications are the performance standards or limits against which the instrument is tested. Specifications apply after one hour warm-up. Table 1-2 lists supplemental performance characteristics. These are not specifications, but are intended to provide additional information useful to your application by giving typical (but not warranted) performance parameters.

Table 1-1. Specifications (1 of 3)

FREQUENCY CHARACTERISTICS						
	Band 0	Band 1	Band 2	Band 3	Band 4	Full Band
Range (GHz)	0.01 to 2.4	2.4 to 7.0	7.0 to 13.5	13.5 to 20.0	20.0 to 26.5	0.01 to 26.5
Accuracy (25° ± 5°C)						
CW Mode	± 5 MHz	± 5 MHz	± 10 MHz	± 10 MHz	± 12 MHz	
<i>Typically</i>	± 2 MHz	± 2 MHz	± 3 MHz	± 4 MHz	± 5 MHz	
All Sweep Modes ¹	± 15 MHz	± 20 MHz	± 25 MHz	± 30 MHz	± 35 MHz	± 50 MHz
Frequency Markers ¹	± (15 MHz ²)	± (20 MHz ²)	± (25 MHz ²)	± (30 MHz ²)	± (35 MHz ²)	± (50 MHz ²)
Stability						
With 10 dB Power						
Level Change	± 200 kHz	± 200 kHz	± 400 kHz	± 600 kHz	± 800 kHz	± 800 kHz
Residual FM (peak) ³	< 5 kHz	< 5 kHz	< 7 kHz	< 9 kHz	< 12 kHz	
OUTPUT CHARACTERISTICS						
	Band 0	Band 1	Band 2	Band 3	Band 4	Full Band
Range (GHz)	0.01 to 2.4	2.4 to 7.0	7.0 to 13.5	13.5 to 20.0	20.0 to 26.5	0.01 to 26.5
Maximum Leveled Power (25°C) ^{4,5}	+ 13 dBm (20mW)	+ 13 dBm (20mW)	+ 13 dBm (20mW)	+ 13 dBm (20mW)	+ 10 dBm (10mW)	+ 10 dBm (10mW)
With Option 002 ^{5,6}	+ 13 dBm (20mW)	+ 12 dBm (15.8mW)	+ 12 dBm (15.8mW)	+ 12 dBm (15.8mW)	+ 8 dBm (6.3mW)	+ 8 dBm (6.3mW)
Power Level Accuracy ⁷						
Internally Leveled	± 1.5 dB	± 1.3 dB	± 1.3 dB	± 1.4 dB	± 1.7 dB	± 1.8 dB
With Option 002 ^{8,9}	± 1.7 dB	± 1.5 dB	± 1.5 dB	± 1.6 dB	± 1.9 dB	± 2.0 dB
Power Variation ¹⁰						
Internally Leveled	± 0.9 dB	± 0.7 dB	± 0.7 dB	± 0.8 dB	± 0.9 dB	± 2.0 dB
Spurious Signals ¹⁰						
Harmonics	< -25 dBc < 1.5 GHz	< -50 dBc	< -50 dBc	< -50 dBc	< -50 dBc	< -25 dBc
Non-Harmonics	< -50 dBc > 1.5 GHz < -25 dBc	< -50 dBc	< -50 dBc	< -50 dBc	< -50 dBc	< -25 dBc

1. For sweep times > 100 ms.
2. + 0.5% of sweep width.
3. 10 Hz to 10 kHz bandwidth, CW mode with CW filter on.
4. Typically degrades 0.1 dB/°C, for temperatures above 25°C.
5. 1 dB lower for Option 004.
6. 60 dB step attenuator.
7. Includes power level variations.
8. At 0 dB attenuator step.
9. Attenuator switch points are every 10 dB, starting at -2 dBm.
10. At specified maximum power or below.

Table 1-2. Specifications (2 of 3)

MODULATION CHARACTERISTICS		
External FM		
Maximum Deviations for Modulation Frequencies		
Modulation Frequencies	Cross-Over Coupled	Direct Coupled
DC to 100 Hz	± 75 MHz	± 12 MHz
100 Hz to 1 MHz	± 7 MHz	± 7 MHz
1 MHz to 2 MHz	± 5 MHz	± 5 MHz
2 MHz to 10 MHz	± 1 MHz	± 1 MHz
External AM		
Maximum Input: 15V		
Internal AM		
Selectable (by internal jumper in HP 8350) to 1 kHz or 27.8 kHz square-wave modulation.		
On/Off Ratio: >30		
Symmetry: 40/60		
External Pulse Modulation		
Pulse input: TTL compatible		
0.001 to 26.5 GHz: Square-wave modulation up to 30 kHz		
0.01 to 2.4 GHz		
Rise/Fall Time, typical: 15 ns		
Minimum RF Pulse Width, typical		
Internally Leveled: 1 μs		
Unleveled (power set to +23 dBm): 200 ns		
2.4 to 26.5 GHz		
Rise/Fall Time, typical: 10 ns		
Minimum RF Pulse Width, typical		
Internally Leveled: 1 ms		
Unleveled (power set to +23 dBm): 100 ns		
On/Off Ratio, typical: >80 dB		
OUTPUT CHARACTERISTICS		
Minimum Settable Power: -2 dBm		
With Option 002: -62 dBm		
Attenuator Accuracy (± dB referenced from the 0 dB setting)		
Attenuation Step	Accuracy	
10	0.5	
20	0.6	
30	0.7	
40	1.0	
50	1.2	
60	1.6	

Table 1-2. Specifications (3 of 3)

Output Power Resolution

Displayed: 0.1 dB

Programmable/Settable: 0.01 dB

Power Sweep Range with power level set to minimum ALC range (with Option 002 Power Sweep cannot activate an attenuator step)

Calibrated Range: >12 dB

With Option 002: >10 dB

GENERAL CHARACTERISTICS

Minimum Sweep Time:

Single Band: 10 ms

Full Band: 50 msec

Band Switch Points: Internal band switch points at approximately 2.4 GHz, 7.0 GHz, 13.5 GHz, and 20.0 GHz

RF Output Connector: 3.5 mm male

Table 1-2. Supplemental Characteristics

FREQUENCY CHARACTERISTICS						
	Band 0	Band 1	Band 2	Band 3	Band 4	Full Band
Range (GHz)	0.01 to 2.4	2.4 to 7.0	7.0 to 13.5	13.5 to 20.0	20.0 to 26.5	0.01 to 26.5
Linearity ¹	± 2 MHz	± 2 MHz	± 4 MHz	± 6 MHz	± 10 MHz	± 15 MHz
Stability						
With Temperature (per °C)	± 200 kHz	± 200 kHz	± 400 kHz	± 600 kHz	± 800 kHz	± 800 kHz
With 3:1 Load SWR	± 100 kHz	± 100 kHz	± 200 kHz	± 300 kHz	± 400 kHz	± 400 kHz
With Time ²	± 100 kHz	± 100 kHz	± 200 kHz	± 300 kHz	± 400 kHz	± 400 kHz
OUTPUT CHARACTERISTICS						
<p>Power Variation Externally Leveled (excluding coupler/detector variation) Negative Crystal detector (sweep time >100 ms) or HP 432A/B/C, 436A or 438A Power Meter (sweep time ≥100 sec): ±0.3 dB With Temperature: ± 0.1 dB/°C</p> <p>Power Sweep (with Option 002 Power Sweep cannot activate an attenuator step) Accuracy (including linearity): ± 1.5 dB Resolution (displayed): 0.1 dB</p> <p>Slope Compensation (with Option 002 Slope Compensation cannot activate an attenuator step) Calibrated Range: up to 5 dB/GHz, up to 10 dB for full sweep Linearity: 0.2 dB Resolution (displayed): 0.01 dB/GHz</p> <p>Residual AM in 100 kHz Bandwidth: < -50 dBc</p> <p>Source Output VSWR (50Ω nominal) Internally Leveled: <1.9</p>						
MODULATION CHARACTERISTICS						
<p>External AM Frequency Response: 100 kHz Range of Amplitude Control: 15 dB Sensitivity: 1 dB/V Input Impedance: 10 kΩ</p>						
GENERAL CHARACTERISTICS						
<p>Frequency Reference Output: (switch selectable): 1V/GHz ± 25 mV (<2.4 GHz) 0.5V/GHz ± 100 mV (>2.4 GHz)</p> <p>Auxiliary Output: rear panel 2.3 to 7.0 GHz fundamental oscillator output, nominally 0 dBm.</p> <p>Weight: Net 7.1 kg (15.7 lb); Shipping 10.2 kg (22.5 lb)</p>						

1. With respect to the SWEEP OUT voltage.
2. In a ten minute period after one hour warm-up at selected CW frequency.

INSTRUMENTS COVERED BY THIS MANUAL

A serial number label is attached to the instrument rear panel (see figure 1-2). The serial number is in two parts:

- The first four digits followed by a letter comprise the serial number prefix.
- The last five digits are a sequential suffix, unique to each instrument.

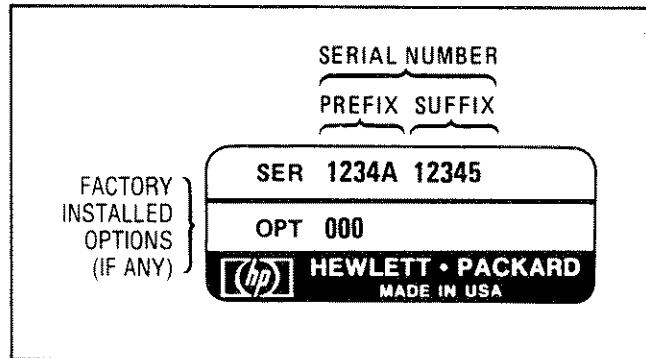


Figure 1-2. Typical Serial Number Label

The instrument you received with this manual is covered by this manual without change. Any other instrument with one of the serial number prefixes listed on the title page is also described by this manual.

Other instruments differ from the instruments covered directly by this manual. Those differences are documented in the "Manual Backdating" section. See the "Manual Backdating" section if the serial number prefix of your instrument is not listed on the title page.

ORDERING MANUAL/MICROFICHE

A manual part number and a microfiche part number are listed on the title page of this manual. You can use either part number to order extra copies of this manual. Microfiche are 10 X 15 cm (4 X 6 in) microfilm transparencies that contain reduced photocopies of the manual pages.

EQUIPMENT REQUIRED BUT NOT SUPPLIED

For a complete sweep oscillator unit, the plug-in must be installed in an HP 8350 sweep oscillator (see section 2, "Installation").

EQUIPMENT AVAILABLE

Service Accessories

Table 1-3 lists the service accessories available for servicing the HP 83595C and the HP 8350.

Table 1-3. Service Accessories

Name	HP Part Number	Description
Service Accessories Kit	08350-60020	HP 8350 Sweep Oscillator/RF plug-in service accessories kit
RF plug-in extender cables	08350-60034*	Extends RF plug-in Interface connector (P2)
	08350-60035*	Extends RF plug-in Power Supply Interface connector (P1)
44-pin printed circuit board extender	08350-60031*	Extends printed circuit boards
IC test clips	1400-0734*	16-pin IC test clip
	1400-0979*	20-pin IC test clip
	1400-1097*	40-pin IC test clip
Hex Balldriver	8710-0523*	Removes HP 8350 front panel hold down plate hex screws
Adjustment tool	8830-0024	Fits miniature adjustment slot on potentiometers
Wrenches	09555-20097	5/16 inch slotted box/open end
	8710-0846	15/64 inch open end
Service cables	8120-1578	18 inch Coax with SMA (m) connector on each end
Adapters	1250-1743	3.5 mm (m) to Type-N (m)
	1250-1750	3.5 mm (m) to Type-N (f)
	1250-1744	3.5 mm (f) to Type-N (m)
	1250-1745	3.5 mm (f) to Type-N (f)
	1250-1404	Type-N (f) to SMA (f)
	1250-1158	SMA (f) to SMA (f)
	1250-1748	3.5 mm (m) to 3.5 mm (m)
1250-1749	3.5 mm (f) to 3.5 mm (f)	
Delay Line Discriminator		See figure 1-3

* Part of the Service Accessories Kit.

Power Meters and Crystal Detectors

A Hewlett-Packard power meter, or a negative polarity crystal detector can be used to externally level the plug-in RF output. See section 3, "Operation", for detailed information.

HP 8756/8757 Scalar Network Analyzer

The HP 8350/plug-in combination is compatible with the HP 8756 and 8757 scalar network analyzers.

HP 8510 Vector Network Analyzer

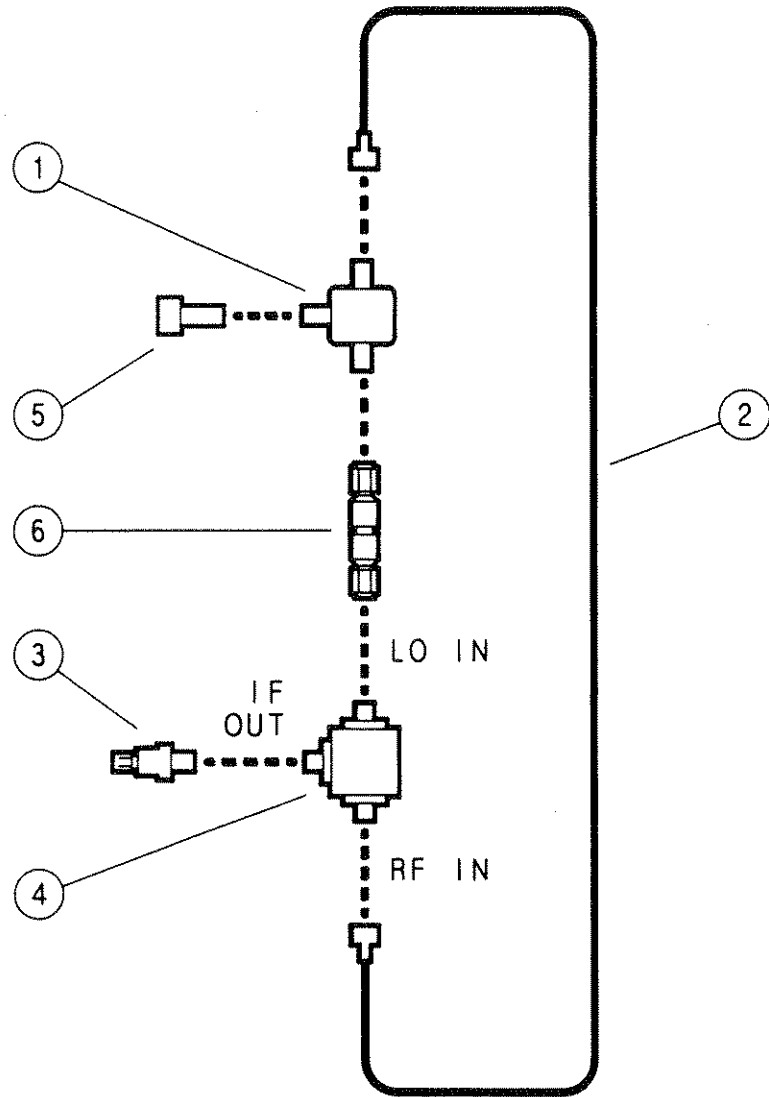
The HP 8350/plug-in combination is compatible with the HP 8510 vector network analyzer.

RECOMMENDED TEST EQUIPMENT

Table 1-4 lists the equipment required to test and adjust the RF plug-in. Other equipment may be substituted if it meets or exceeds the indicated critical specifications. Adapters may be required that are not listed or shown in the equipment set-ups.

Table 1-4. Recommended Test Equipment

Instrument	Critical Specification	Recommended Model/ P/N (Part Number)
Sweep Oscillator	no substitute	HP 8350
Digital Voltmeter (DVM)	Accuracy: $\pm 0.01\%$ Input Impedance: $\geq 10\text{ M}\Omega$ Computing Math	HP 3456A
Function Generator	Frequency Range: 0.1 Hz to 10 MHz Output Level: 10 V p-p into 50 Ohms	HP 3325A
Power Meter	Power Range: +20 to -30 dBm	HP 436A
Power Sensor	Frequency Range: 50 MHz to 26.5 GHz	HP 8485A
Oscilloscope	Dual Channel Bandwidth: DC to 100 MHz Vertical Sensitivity: $< 5\text{ mV/DIV}$ External Sweep Capability	HP 1741A
Oscilloscope Probe	1:1 General Purpose Probe	HP 10437A
Spectrum Analyzer	no substitute	HP 8566B
Detector	Compatible with Scalar Network Analyzer Frequency Range: .01 to 26.5 GHz	HP 85025B/E
Crystal Detector	Frequency Response: 0.05 to 26.5 GHz Maximum Input Power: 200 mW	HP 8473C/D
Power Splitter	Frequency Range: DC to 26.5 GHz Maximum Input Power: +27 dBm	HP 11667B
Scalar Network Analyzer		HP 8757
RF Cable	$< 2\text{ dB}$ insertion loss at 26.5 GHz	85100-60001
50 ohm feedthru	BNC	HP 10100C
PC Board Extender	44-pin, extends printed circuit boards	HP P/N 08350-60031
Attenuator	3.5 mm	HP 8493C Option 010
Frequency Counter	Frequency Range: 0.01 to 26.5 GHz Input Impedance: 50 ohms Resolution $< 1\text{ MHz}$	HP 5343A



Item	Description	HP Part Number
1	Power Splitter	HP 11667B
2	Delay Line: 23.5 cm (9.2 inches) in length, SMA male connectors	83550-20034
3	Adapter: BNC (f) to SMA (m)	1250-1200
4	Mixer: Doubled Balanced RHG Electronics Part No. DMS 1-26 RGH Electronics, Laboratories, Inc. Deer Park, NY 11729	0955-0307
5	Adapter: Type-N (m) to 3.5 mm (m)	1250-1743
6	Adapter: 3.5 mm (m) to 3.5 mm (m)	1250-1748

Figure 1-3. Delay Line Discriminator

Manufacturer's Declaration

NOTE

This is to certify that this product meets the radio frequency interference requirements of Directive FTZ 1046/1984. The German Bundespost has been notified that this equipment was put into circulation and has been granted the right to check the product type for compliance with these requirements.

Note: If test and measurement equipment is operated with unshielded cables and/or used for measurements on open set-ups, the user must insure that under these operating conditions, the radio frequency interference limits are met at the border of his premises.

Model HP 83595C

NOTE

Hiermit wird bescheinigt, dass dieses Gerät/System in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes/Systems angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Zusatzinformation für Mess- und Testgeräte:

Werden Mess- und Testgeräte mit ungeschirmten Kabeln und/oder in offenen Messaufbauten verwendet, so ist vom Betreiber sicherzustellen, dass die Funk-Entstörbestimmungen unter Betriebsbedingungen an seiner Grundstücksgrenze eingehalten werden.

INTRODUCTION

Along with plug-in installation instructions, this section provides information on the following:

- Initial inspection.
- Damage claims.
- Preparation for use.
- Packaging.
- Storage.
- Shipment.

INITIAL INSPECTION

If the shipping container or cushioning material is damaged, keep it until the contents of the shipment are checked for completeness, and the instrument is checked both mechanically and electrically.

Procedures for checking electrical performance are given in section 4, "Performance Tests." If the plug-in and mainframe do not pass the electrical performance tests, see section 8, "Service."

Notify your nearest Hewlett-Packard office if any of the following conditions exist:

- The instrument does not pass the performance tests and, using the troubleshooting procedures in this manual, you cannot correct the problem.
- The instrument does not pass the performance tests and you do not wish to troubleshoot the instrument yourself.
- The shipping contents are incomplete.
- There is mechanical damage or a defect.

Notify the carrier if the shipping container is damaged or if the cushioning material shows signs of stress. Keep all shipping material for the carrier's inspection. Hewlett-Packard will arrange for repair or replacement without waiting for a claim settlement.

PREPARATION FOR USE

Power Requirements

When properly installed, the RF plug-in receives all power from the HP 8350 Sweep Oscillator through the rear panel interface connectors.

Configuration Switches

Configuration switch A3S1 is an 8-section multiple switch located on the A3 digital interface assembly. Six of the eight sections correspond to separate RF plug-in functions, and can be modified, as required for your application. See section 3, "Operation", for a complete description of the configuration switch and instructions on how to set each function.

Frequency Reference Output Selection Switch

The plug-ins shipped with the frequency reference output selection switch A2S1 set to 1.0 V/GHz. Use this switch to select either 1.0 or 0.5 V/GHz. See section 3 for instructions on setting this switch.

Interconnections

The RF plug-in has two rear panel interconnections to the HP 8350 Sweep Oscillator:

- The power supply interface connector (P1)
- The RF plug-in interface connector (P2)

See figures 2-1 and 2-2 for the pins and associated signals of these connectors.

Mating Connectors



The RF output connector J1 is a 3.5 mm male connector. Inspect and clean this connector prior to use to avoid damage to the connector or invalid measurements.

Operating Environment

The following are the permissible environmental limits for operation of the RF plug-in. Operating within these limits, no damage will occur to the instrument. See "Specifications" in "General Information" for environmental limitations on specified performance.

Temperature: 0 to +55°C (+32 to +131°F).

Humidity: Non-condensing environment.

Altitude: Up to 4,572 metres (15,000 feet).

Cooling: When the RF plug-in is properly installed in the HP 8350 Sweep Oscillator, the RF plug-in receives all its airflow cooling by forced ventilation from the sweep oscillator fan.

A diagram of the airflow cooling paths within the sweep oscillator appears in the *HP 8350 Sweep Oscillator Operating and Service Manual* installation section. Ensure that all airflow passages in both instruments are clear before installing the RF plug-in in the sweep oscillator.

Installation Instructions

To use the RF plug-in, it must be installed properly in an HP 8350 Sweep Oscillator:

1. Turn the sweep oscillator off.
2. To prevent damage, remove all connectors and accessories from the plug-in front and rear panel connectors.

3. Fully raise the plug-in latching handle. The handle should raise easily and hold that position by spring tension.
4. Ensure that the sweep oscillator plug-in channel is clear; align the plug-in in the channel and slide it carefully into place. It should slide back easily, without binding.

NOTE: The latching handle slot engages with the locking pin just before the plug-in is fully seated in position.

5. While still pushing in on the plug-in, press the latching handle down until it is fully latched (down), and the plug-in front panel is aligned with the sweep oscillator front panel.

STORAGE AND SHIPMENT

The instrument must be stored or shipped in environments within the following limits:

Environment

Temperature: -40° to +75°C (-40° to +167°F).

Humidity: Non-condensing environment.

Altitude: Up to 15,240 metres (50,000 ft).

Packaging

Containers and materials identical to those used in factory packaging are available through your Hewlett-Packard office (see figure 2-3). If you choose to package the instrument with commercially available material, follow these instructions:

1. Wrap the instrument in heavy paper.
2. Use a strong shipping container. A double-wall carton made of 159 kg (350 lb) test material is adequate.
3. Use a 76 to 102 mm (3 to 4 in.) layer of shock absorbing material around all sides of the instrument to provide a firm cushion and prevent movement inside the container.
4. Seal the shipping container securely.
5. Mark the shipping container *FRAGILE*.

Returning an Instrument for Service

If you ship the instrument to a Hewlett-Packard office or service center, include a blue service tag (found at the end of this section), on which you provide the following information:

1. Your company name and address.
2. A technical contact person within your company, and their complete phone number.
3. The complete model and serial number of the instrument.
4. The type of service required.
5. Any other information that may expedite service.

When you make an inquiry, either by correspondence or by telephone, refer to the instrument by model number and full serial number.

POWER SUPPLY PLUG-IN INTERFACE CONNECTOR P1

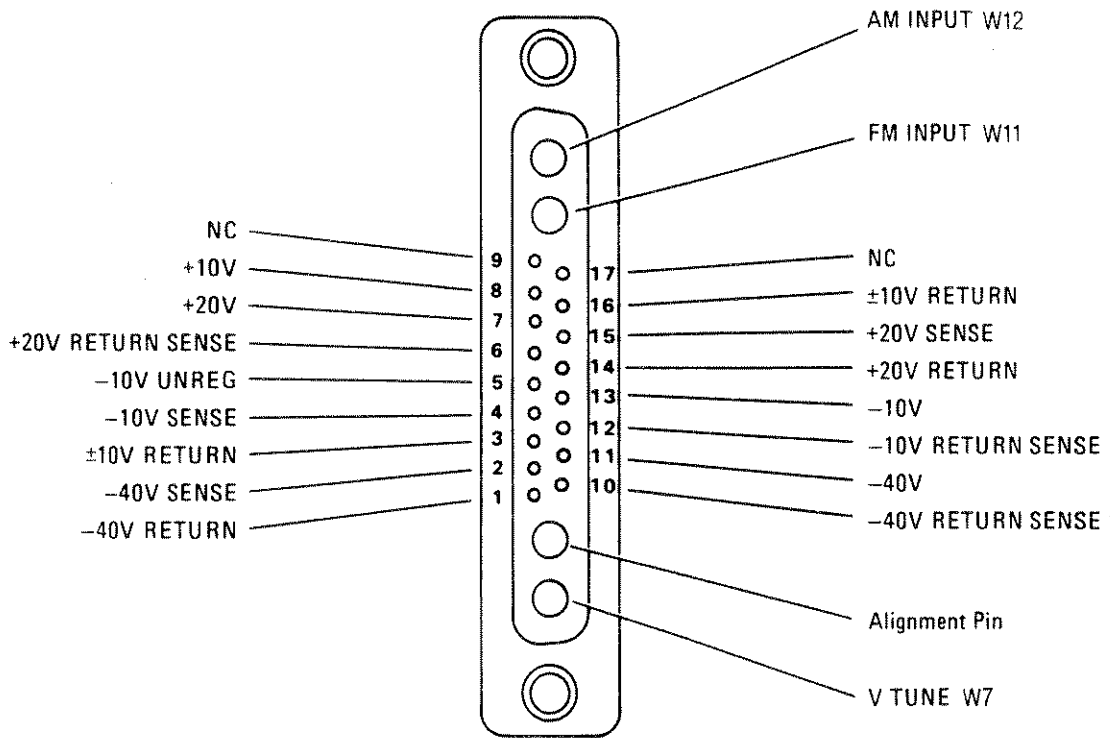


Figure 2-1. Interface Signals on Rear Panel Connector P1 (Front View)

PLUG-IN INTERFACE CONNECTOR P2

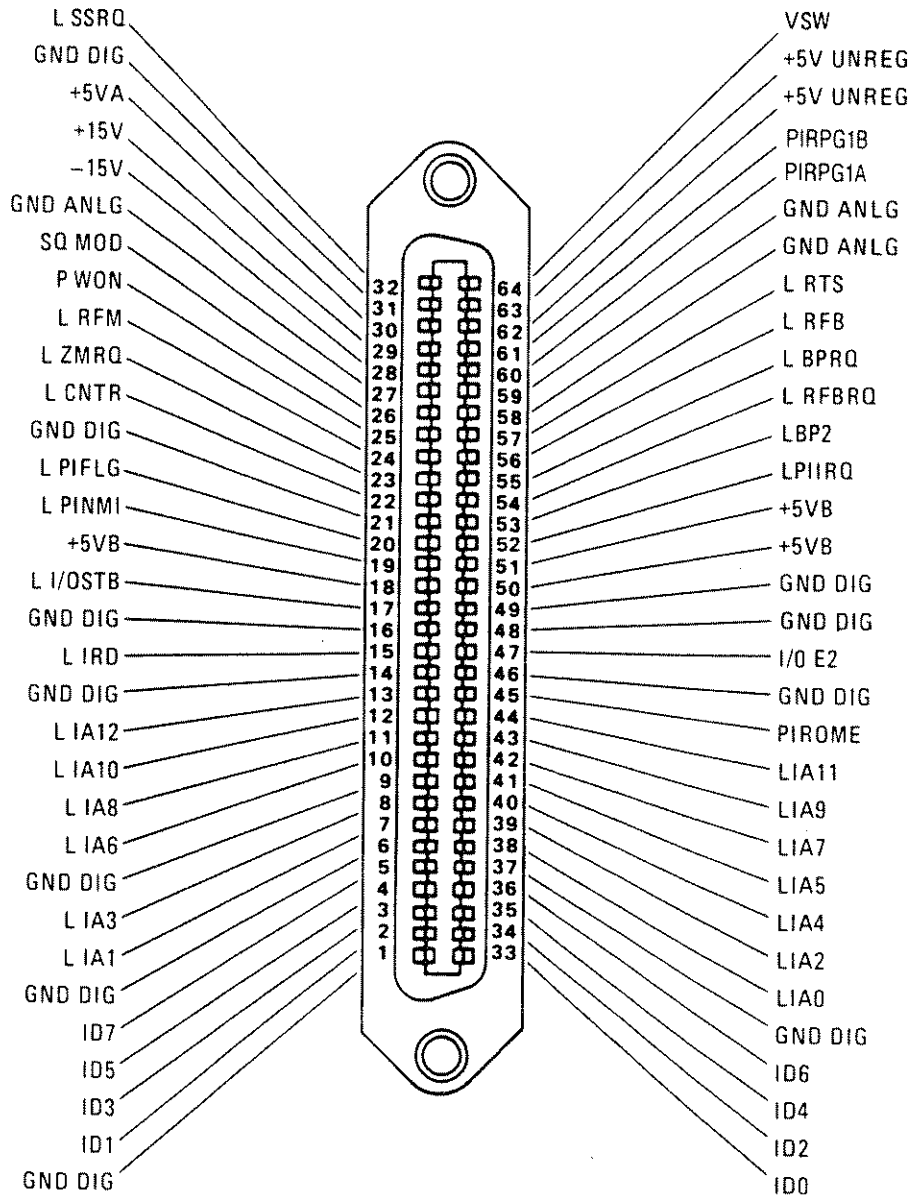
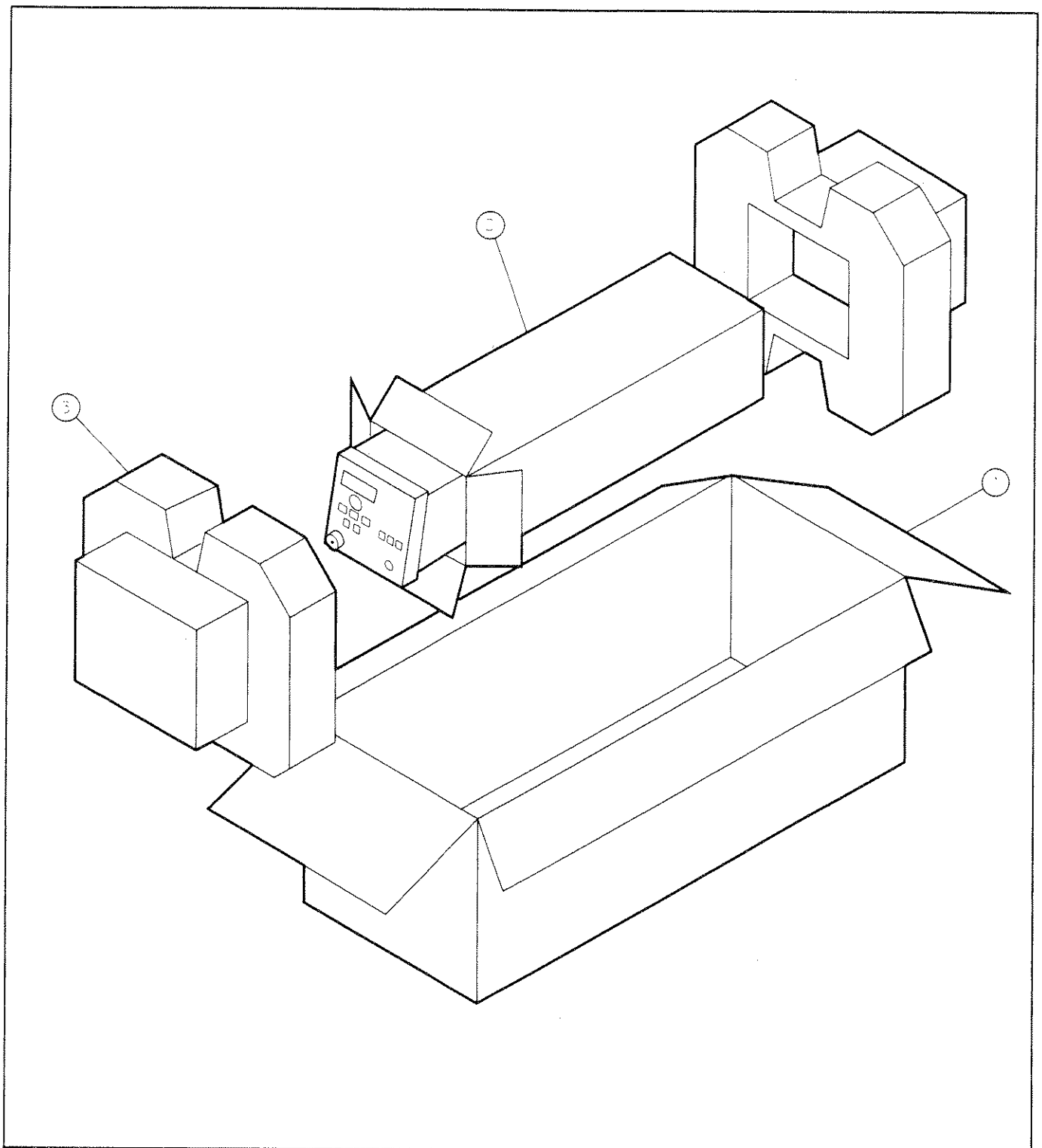


Figure 2-2. Interface Signals on Rear Panel Connector P2 (Front View)



Item	Quantity	HP Part Number	C D	Description
1	1	9211-4781	0	Outer Carton
2	1	9211-4782	1	Inner Carton
3	2	5180-8469	3	Foam Pads
	1	9222-0943	1	Anti-static Bag - to cover instrument

Figure 2-3. Packaging for Shipment Using Factory Packaging Material

INTRODUCTION

This section is divided into four major sections:

- "Operating Characteristics" explains the bandswitching and frequency resolution characteristics in CW and swept modes.
- Front and rear panel features.
- "Operating Instructions" includes information on the following:
 - RF plug-in configuration switch.
 - Frequency reference output selection switch.
 - Operator's checks.
 - Internal/external detector and power meter leveling.
 - External FM and AM modulation.
 - RF power control.
 - Alternate sweep mode.
 - HP-IB.
 - Firmware revision number.
- "Operator's Maintenance" includes information on the following:
 - Plug-in error codes.
 - Fuses.

NOTE: Some of the procedures in this section require common RF adapters that are not shown or listed. Choose the appropriate adapter for the equipment and the cables used.

Operating Characteristics

BANDSWITCHING

The HP 83595C provides an RF output of 0.01 to 26.5 GHz in five bands. When you sweep a range of frequencies larger than a single band, the switching between these bands happens automatically.

Figure 3-1 shows the bandswitching points in the sequential and single band sweep modes. If you select sweep frequencies carefully, you can avoid potential problems associated with bandswitching such as sweep time, stability, or switching discontinuities.

If your application requires a large frequency range (over two or more bandswitch points), the minimum recommended frequency sweep time is 100 ms. This allows enough time for the bandswitch operation and for fundamental oscillator settling time. Because the time required to switch from one frequency band to another is fixed (approximately 15 ms), SWEEP TIME indicates the time of the actual frequency sweep only. As the sweep time is reduced, the bandswitch time becomes significant with respect to the actual frequency sweep time.

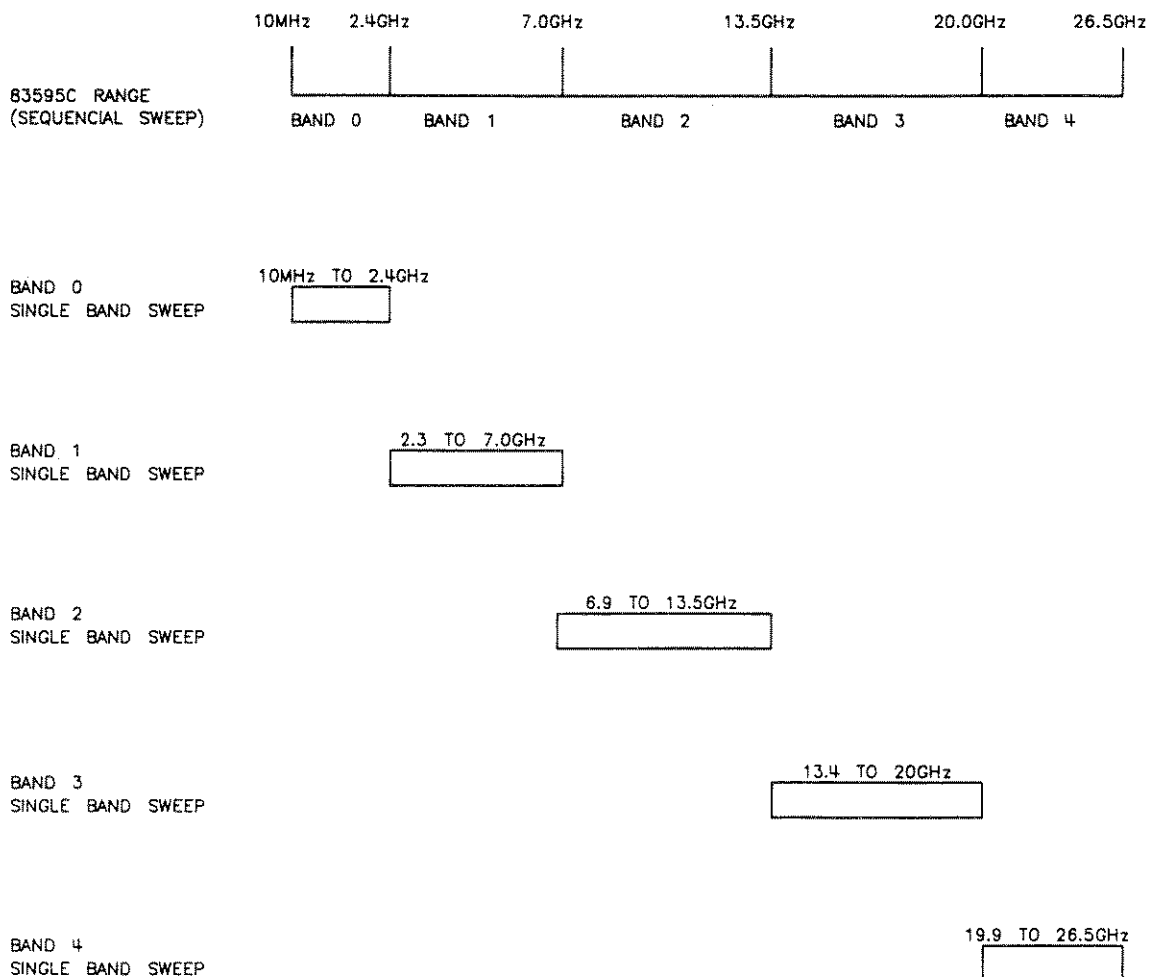


Figure 3-1. Bandswitching in Sequential and Single Band Sweep Modes

FREQUENCY RESOLUTION

Input Resolution

Input resolution is the number of bits used in the HP 8350 Sweep Oscillator's DACs (digital to analog converters) to generate the tuning voltage for a given mode of operation. Table 3-1 cross references input resolution with each DAC.

Table 3.1 Input Resolution

	ΔF Display Frequency Width				
	0 MHz	124 MHz	1 GHz	4.2 GHz	26.0 GHz
DISPLAYED RESOLUTION	100 kHz	1 MHz	1 MHz	10 MHz	
ΔF DISPLAY INDICATION	000.0 MHz	0000. MHz	0000. MHz	00.00 GHz	

Figure 3-2 is a simplified block diagram of the sweep oscillator frequency tuning circuits. The tuning voltage is the sum of three DAC outputs. Because the microprocessor computes the START/STOP sweep mode into a CF (center frequency) and a ΔF sweep width, the operation of all sweeps are set with a center frequency and sweep width. The center frequency is set by the CF and vernier DACs, and the sweep width is determined by the ΔF DAC.

The CF DAC has 12 bits (4096 points) across the plug-in frequency band (including a 2% overrange and 2% underrange of the band). The analog output, 0 to 10 V, is used to specify the plug-in output center frequency. The CF DAC has a resolution of 0.024% (2.4 mV) over the full band (including overrange).

Center frequency resolution is enhanced by a summed voltage from the 8-bit (256 points) vernier DAC whose range is set to $\pm 0.048\%$ of the plug-in bandwidth (including overrange). Vernier resolution is $\pm 0.048\%$ bandwidth divided by 256 (equal to four points on the 12-bit CF DAC: two points on either side of CF). This increases CF resolution to 0.00038% (0.04 mV), and improves the CF relative accuracy by a similar factor. The absolute resolution accuracy depends on the CF DAC.

NOTE: When adjusting the vernier through its end point, the CF DAC is incremented or decremented by the total value of the vernier (2 points on the CF DAC). The center frequency accuracy is now dependent on the linearity of the CF DAC (0.005% of bandwidth).

The ΔF DAC has 10 bits (1024 points). The analog input to this DAC, -10 to $+10$ V, produces an even sweep on either side of the center frequency. The ΔF resolution improves with narrower sweep widths. In broad sweeps, the resolution is 0.1% of the full band. Sweep widths less than 1/8 of the full band have a range resolution of 0.012% of full band, and sweep widths less than 1/64 of full band have a resolution of 0.0015% of full band.

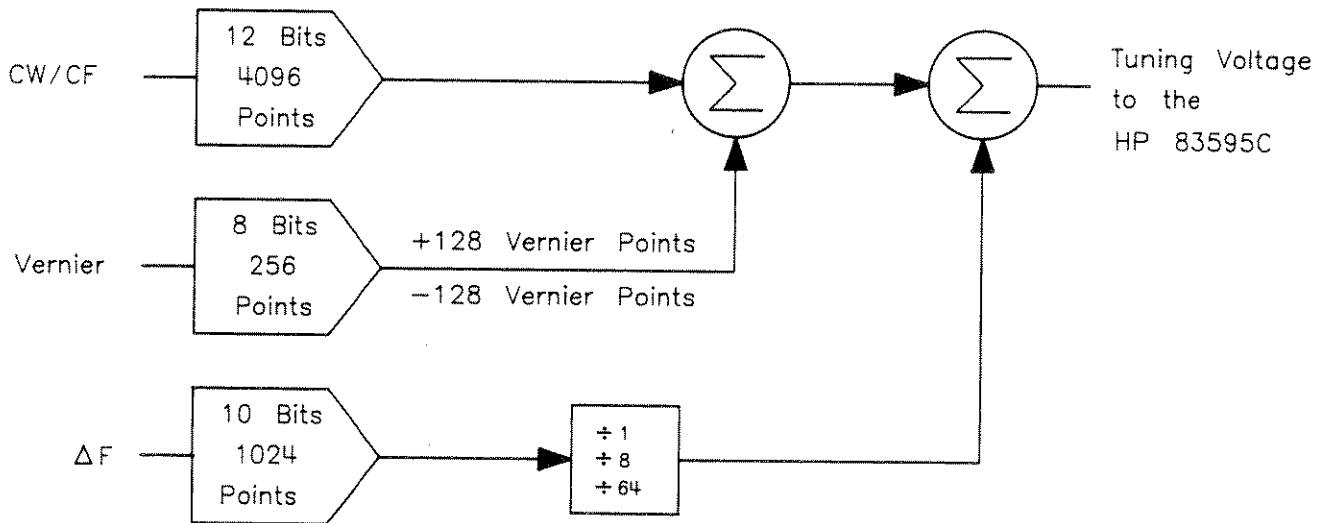


Figure 3-2. Simplified Tuning Voltage Block Diagram

Display Resolution

Displayed frequency resolution is the number of digits displayed on the HP 8350 Sweep Oscillator FREQUENCY displays.

The center frequency is displayed with 1 MHz resolution in CW mode. Vernier values are always displayed at a 10 kHz resolution. In CF mode, the display resolution for center frequency varies depending on the span width (see table 3-2).

Any sweep that crosses a plug-in bandswitch point will have a display resolution ≥ 10 MHz.

Table 3-2. ΔF Sweep Mode Displayed Resolution

	0 MHz	517 MHz	4.23 GHz	12.48 GHz
DISPLAYED RESOLUTION	100 kHz	1 MHz	10 MHz	
Δ DISPLAY INDICATION	X.X MHz XX.X MHz XXX.X MHz	XXX MHz X.XXX GHz	X.XX GHz XX.XX GHz	

Front Panel Features

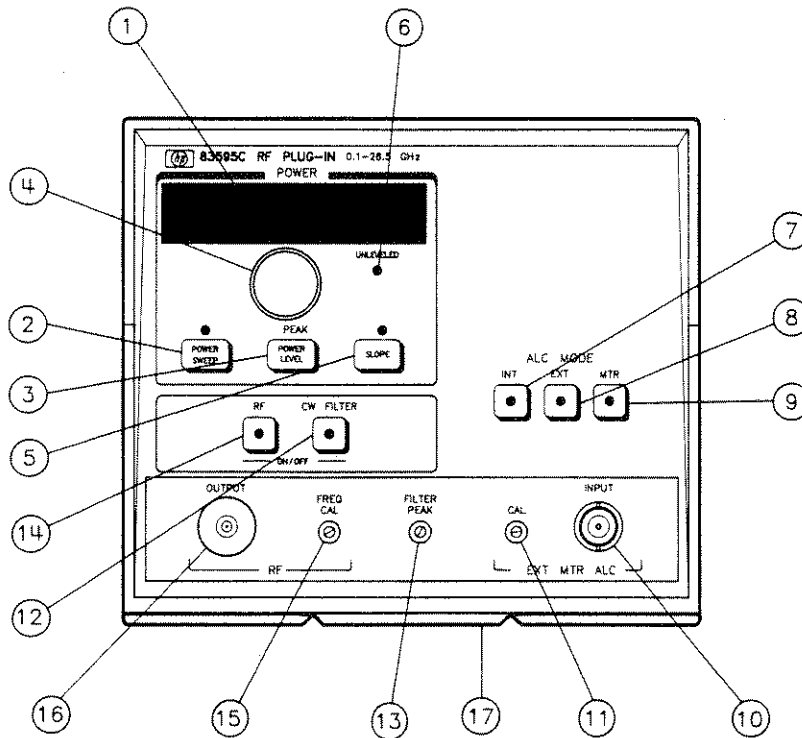


Figure 3-3. Standard Front Panel

1. **POWER DISPLAY.** Provides a readout of the selected power in dBm (with a resolution of one tenth of a dB), dB/GHz (with a resolution of one hundredth of a dB), or dB/SWP (with a resolution of one tenth of a dB).
2. **[POWER SWEEP].** Sets an increase in power relative to sweep (dB/SWP).
3. **[POWER LEVEL].** Sets the RF output power level.
[SHIFT] [POWER LEVEL]. Adjusts the YTM to track the YIG oscillator above the first switch point (2.4 GHz) for peaking maximum output power.
4. **POWER CONTROL KNOB.** Also called "RPG". Controls power level, power sweep, or power slope.
5. **[SLOPE].** Sets the frequency slope compensation in \pm dB/GHz (used with lossy devices or waveguide).
[SHIFT SLOPE]. Locks the ALC loop. Allows independent control of the internal step attenuator (Option 002).
6. **UNLEVELED lamp.** Lights if the output power is unleveled.
7. **[INT].** Selects internal ALC (the plug-in's internal crystal detector/coupler).
8. **[EXT].** Selects external ALC (negative crystal detector).
9. **[MTR].** Selects power meter ALC (see "External Power Meter Leveling").

10. **ALC INPUT.** BNC connector for power meter or external crystal leveling inputs (rear panel on Option 004).
11. **CAL.** Offset control to calibrate output power in power meter or external leveling modes (rear panel on Option 004).
12. **[CW FILTER].** In CW mode, enables an oscillator tuning voltage filter to remove FM noise at the RF output (automatically disabled in swept mode).
13. **FILTER PEAK.** Peaks RF power.
14. **[RF ON/OFF].** Turns RF power on and off. Useful for power meter zeroing.
15. **FREQ CAL.** Fine frequency adjust, used for frequency calibration in band 0.
16. **RF OUTPUT.** Precision 3.5 mm male RF output connector (rear panel on Option 004).
17. **PLUG-IN LATCH HANDLE.** Removes, installs, and latches the RF plug-in into the HP 8350 Sweep Oscillator.

Rear Panel Features

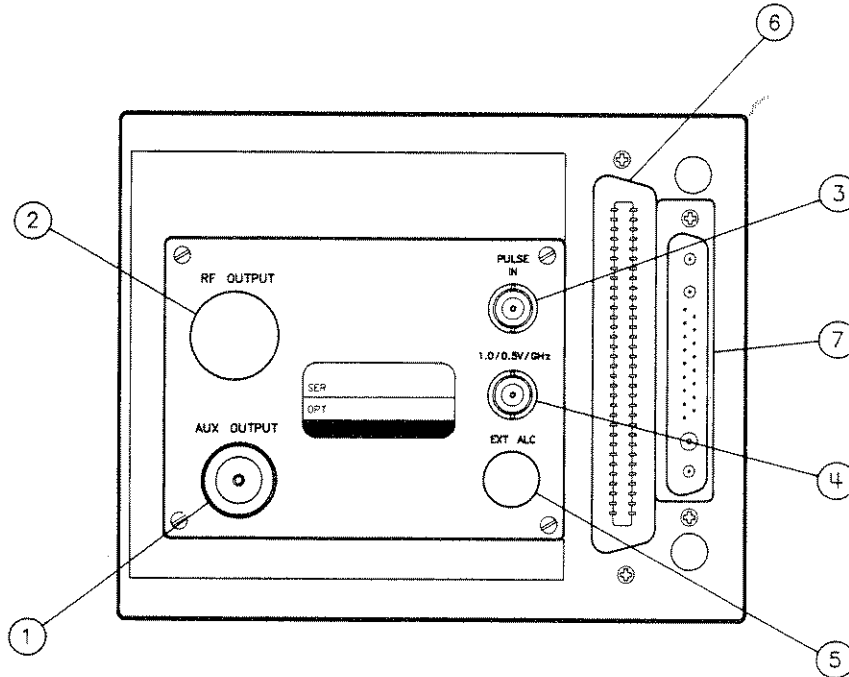


Figure 3-4. Rear Panel

1. **AUX OUTPUT.** Type-N, 50 Ω connector that provides a 2.3 to 7.0 GHz fundamental oscillator output at approximately 0 dBm.
2. **RF OUTPUT.** Replaces front panel RF output connector on Option 004 plug-ins.
3. **PULSE IN.** External pulse or square-wave modulation input (TTL levels).
4. **1.0/0.5 V/GHz.** Internally selectable BNC connector output (1.0 or 0.5 V/GHz) that corresponds to the RF output frequency. The 1.0 V/GHz has a frequency range of 0.01 to 18.0 GHz; the 0.5 V/GHz has a frequency range of 0.01 to 26.5 GHz. Figure 3-6 shows how to set the frequency reference output selection switch A2S1.
5. **EXT ALC.** Replaces front panel EXT ALC connector on Option 004 plug-ins.
6. **RF PLUG-IN INTERFACE CONNECTOR.** Connector through which the plug-in receives and sends digital and analog signals from and to the sweep oscillator.
7. **RF PLUG-IN POWER SUPPLY INTERFACE CONNECTOR.** Connector through which the plug-in receives power supplies, AM input, FM input, and VTUNE from the sweep oscillator.

Operating Instructions

RF PLUG-IN CONFIGURATION SWITCH

A3S1. This configuration switch is located on the A3 digital interface assembly (figure 3-5).

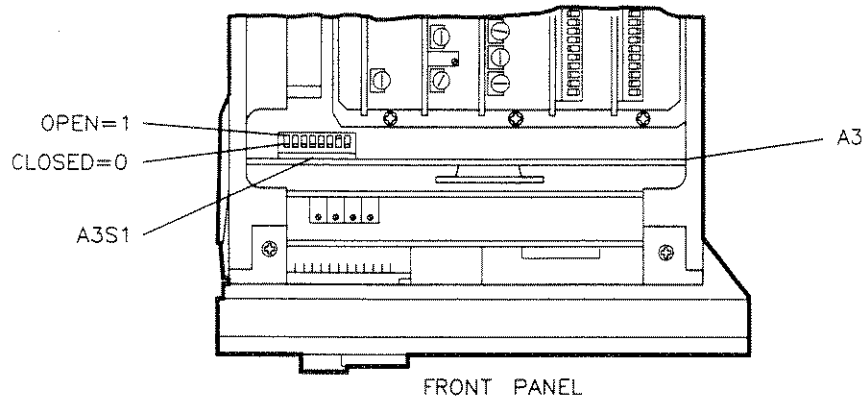


Figure 3-5. A3S1 Configuration Switch Location

The eight-section configuration switch is set at the factory for a combination of operating modes (see table 3-3). Using six of the eight sections, you can select other operating modes (also defined in table 3-3).

NOTE: Configuration switch settings override the HP 8350 non-volatile memory settings at instrument preset. If you change the switch settings, you must press **[INSTR PRESET]** to load memory with the new configuration.

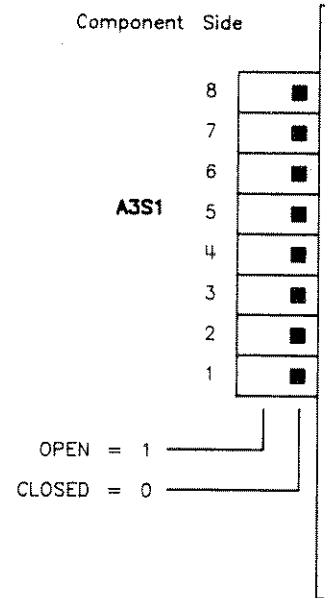
Table 3-3. AS31 Configuration Switch Settings

Description	Switch Number							
	1	2	3	4	5	6	7	8
Normal Sweep	0	x	x	x	x	x	x	x
Sequential Sweep Only	1	x	x	x	x	x	x	x
No RF Power at Instrument Preset	x	x	x	1	x	x	x	x
Maximum RF Power at Instrument Preset	x	x	x	0	x	x	x	x
- 6 MHz/V FM Sensitivity	x	x	x	x	1	x	x	x
- 20 MHz/V FM Sensitivity	x	x	x	x	0	x	x	x
Direct-Coupled FM (- 20 MHz/V)	x	x	x	x	x	1	x	x
Cross-Over Coupled FM	x	x	x	x	x	0	x	x
Step Attenuator Installed	x	x	x	x	x	x	1	x
No Step Attenuator	x	x	x	x	x	x	0	x

Switch A3S1 is set from the factory as follows:

Switch No.	Position
1	0
2	0
3	0
4	0
5	0
6	0
7	*
8	0

**"1" if Option 002 installed; "0" if Option 002 not installed.



NOTES:

Switch positions:

- 1 = Open = High
- 0 = Closed = Low (Ground)
- X = Don't Care

FREQUENCY REFERENCE OUTPUT SELECTION SWITCH

Use position 1 on A2S1 to set the frequency reference. See figure 3-6.

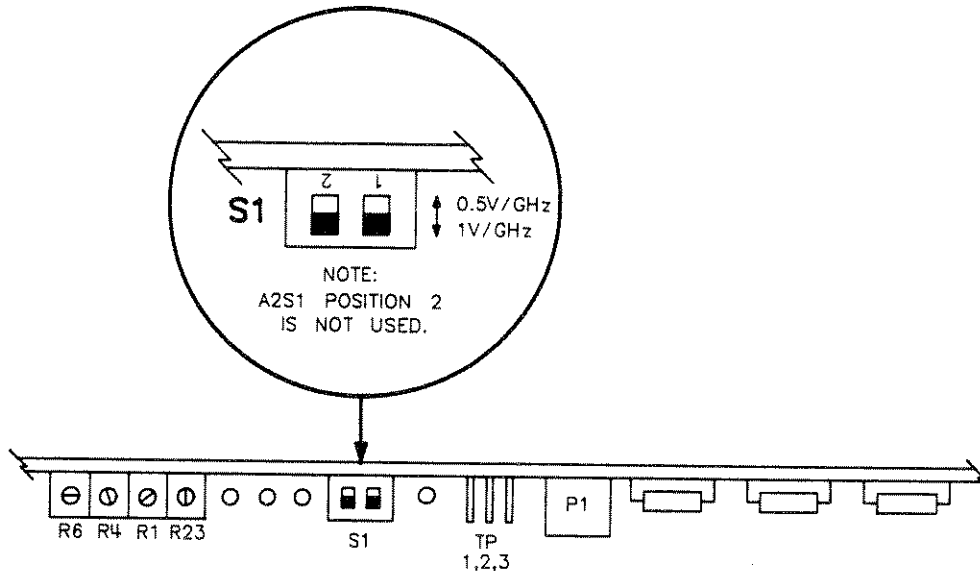


Figure 3-6. Frequency Reference Output Selection Switch, A2S1

OPERATOR'S CHECKS

The operator's checks in the operating information portion of the *HP 8350 Sweep Oscillator Operating and Service Manual* provide a quick evaluation (local and remote) of the main functions of both the sweep oscillator and the plug-in.

If the instruments do not pass the operator's checks, the trouble may be in either unit. If you suspect the plug-in, refer to section 8 of this manual.

MILLIMETER-WAVE APPLICATION

Figure 3-7 shows a typical millimeter-wave test setup using an HP 83595C RF Plug-in. Note that an HP 8349B Microwave Amplifier is required to produce the power level required by the millimeter-wave source module. Also notice that the HP 83550 series millimeter-wave source modules use the 0.5 V/GHz as a frequency reference; this 1.0/0.5 V/GHz frequency reference output is switch selectable on the A2 interface assembly.

For details on millimeter wave applications, refer to the *HP 83590 Series Source System Guide* located in any millimeter-wave source module manual.

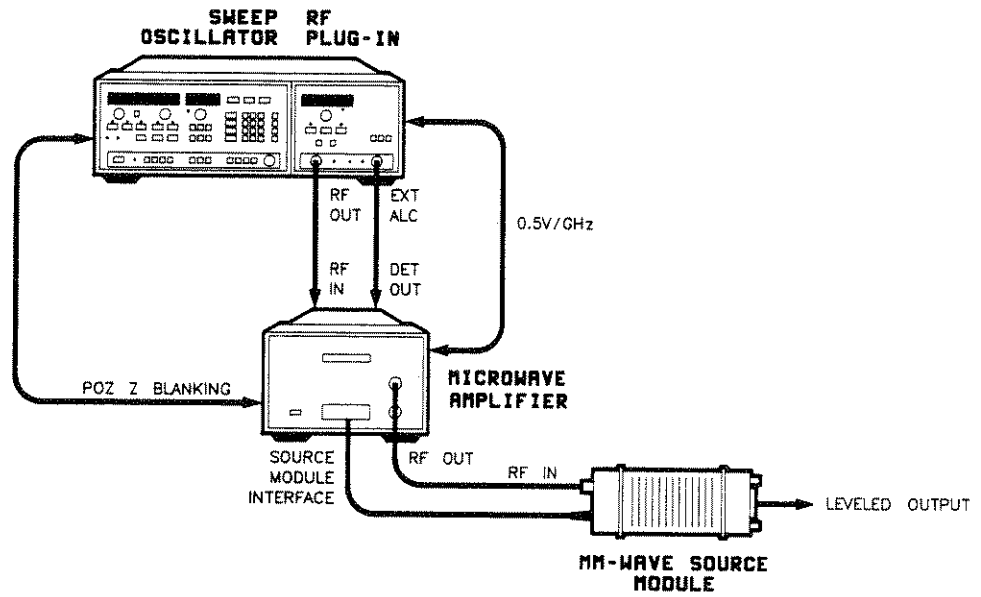


Figure 3-7. Typical Millimeter-wave Test Setup

CAUTION

Turn the HP 8349B AC power OFF before connecting or disconnecting the source module interface cable.

FRONT PANEL FREQUENCY CALIBRATION

NOTE: Unless the HP 83595C band 0 RF output frequency is calibrated, the plug-in may not meet frequency accuracy specifications. The 50 MHz point is checked for accuracy using a spectrum analyzer, however a frequency counter can also be used.

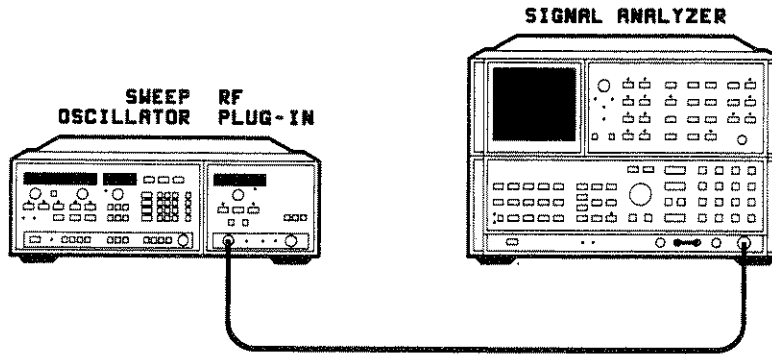


Figure 3-8. HP 83595C Front Panel Frequency Calibration Setup

Equipment

Sweep Oscillator	HP 8350
Spectrum Analyzer	HP 8566B

Procedure

1. Connect the equipment as shown in figure 3-8. Turn on the instruments and let them warm up at least 30 minutes.

NOTE: Verify that the plug-in RF power is on, either by instrument preset or by using the RF on/off key.

2. On the spectrum analyzer, press

[INSTR PRESET] [CF] [5] [0] [MHz] [FREQ SPAN] [2] [0] [MHz].

3. On the sweep oscillator, press

[INSTR PRESET] [CW] [5] [0] [MHz].

4. On the plug-in, adjust the FREQ CAL control for a spectrum analyzer display of 50.0 MHz.

RF OUTPUT POWER PEAKING

Due to normal operation and internal RF component tolerances, it may be necessary to peak the RF output power to maximum specified output power in the internal leveled operating mode. Both the front panel FILTER PEAK adjustment and the PEAK function optimize output power by adjusting tracking between the YTM and YO.

NOTE: The PEAK function can be used to peak the output power of the plug-in over a specific frequency range. This function returns to its default setting at instrument preset or at AC power cycle.

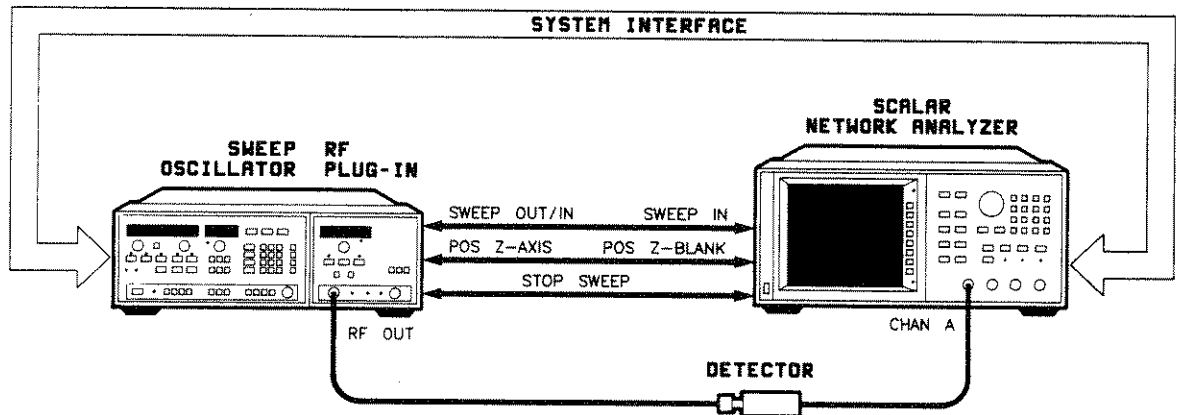


Figure 3-9. Peaking RF Output Power Setup

Equipment

Sweep Oscillator	HP 8350
Scalar Network Analyzer	HP 8757
Detector	HP 85025B/11664E

Procedure

1. Connect the equipment as shown in figure 3-9 and let the instruments warm up at least 30 minutes.
2. On the sweep oscillator, press [INSTR PRESET]. Select the frequency range over which the power is to be peaked. Set the sweep time for the fastest possible sweep over the selected range.
3. On the plug-in, select external leveling without any external crystal detector connected. This causes the power to be unleveled.
4. On the network analyzer, press [SCALE] [AUTOSCALE].
5. On the plug-in, press [SHIFT] [POWER LEVEL]. Use the plug-in RPG to maximize the RF power over the frequency range selected in step 2.

INTERNAL LEVELING

Internal leveling, the most convenient method of RF output leveling, is the default mode at instrument preset. A portion of the RF output power is internally coupled/detected and the resulting DC voltage is applied to the ALC circuit to maintain a constant power output.

EXTERNAL CRYSTAL DETECTOR LEVELING

The RF output power can be leveled externally using a negative output crystal detector and either a power splitter or a directional coupler. The directional coupler does not have as great an insertion loss as the 6 dB insertion loss of the power splitter, giving you a higher maximum leveled output power, but typically it has more ripple and slope.

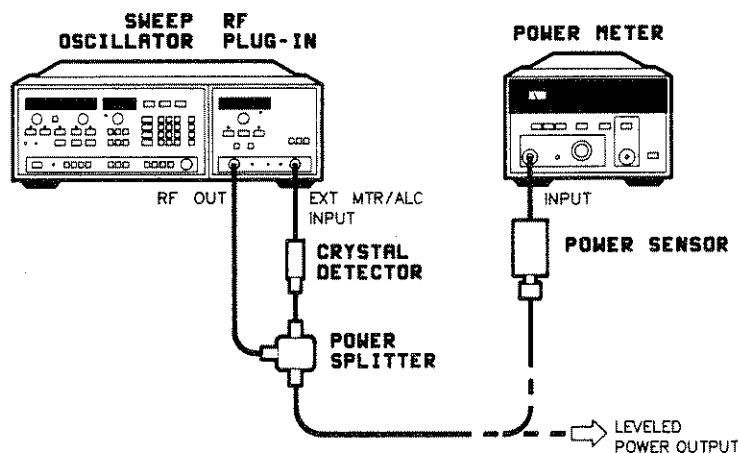


Figure 3-10. External Crystal Detector Leveling Setup

Equipment

Sweep Oscillator	.....	HP 8350
Power Meter	.....	HP 436A
Power Sensor	.....	HP 8485A
Crystal Detector: 3.5(m) to BNC(m)	.....	HP 8473C
Power Splitter	.....	HP 11667B

Procedure

1. Connect the equipment as shown in figure 3-10. Turn the instruments on and let them warm up for at least 30 minutes.
2. Zero and calibrate the power meter and sensor.
3. On the sweep oscillator, press **[INSTR PRESET] [CW] [1] [GHz]**.
4. On the plug-in, press **[EXT]**. With the power meter set to the proper cal factor, adjust the CAL adjustment for a power meter reading equal to the plug-in front panel reading.

To use leveled RF output power to test external equipment, make the connection at the point marked **LEVELED POWER OUTPUT** in figure 3-10.

EXTERNAL POWER METER LEVELING

RF output power can be leveled using a power meter and either a power splitter or a directional coupler. For best power level accuracy in this mode, limit the sweep time to 50 seconds or longer.

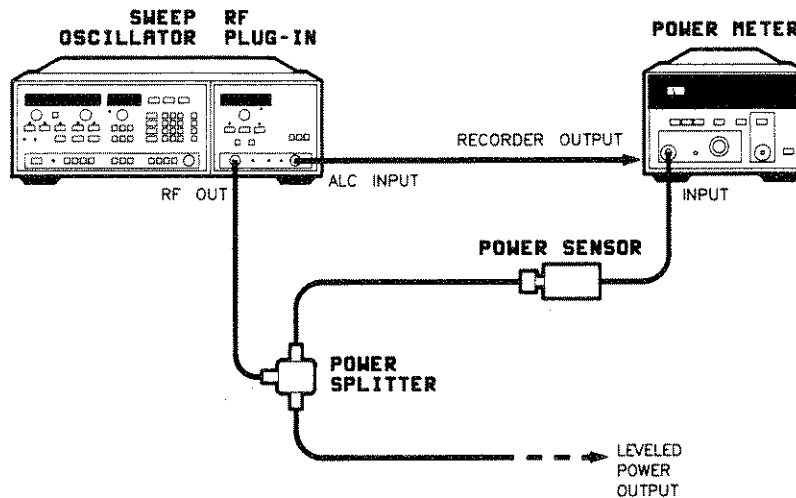


Figure 3-11. External Power Meter Leveling Set Up

Equipment

Sweep Oscillator	HP 8350
Power Meter	HP 432/436/437/438
Power Sensor	HP 8485A
Power Splitter	HP 11667B

Procedure

1. Turn the instruments on and let them warm up at least 30 minutes.
2. Zero and calibrate the power meter/sensor. Connect the equipment as shown in figure 3-11. Temporarily connect a 50 Ω load or a 10 dB attenuator to the remaining power splitter output.
3. On the sweep oscillator, press **[INSTR PRESET]** **[CW]**.
4. On the RF plug-in, press **[MTR]** to select power meter leveling. Set the output power to the value desired at the output of the power splitter. (For best results, the power should be greater than +2 dBm.)
5. Adjust the ALC CAL for a reading of the value chosen in step 4. Press **[RANGE HOLD]** on the power meter.
6. On the sweep oscillator, set the SWEEP TIME to 50 seconds. Press **[START]** **[SINGLE]** to set the single sweep mode.

Press **[SINGLE]** again to start a sweep.

NOTE: If you press **[SINGLE]** a third time, the sweep stops. Once you set single sweep, this key acts like an on/off switch for the sweep.

To use leveled RF output power to test external equipment, make the connection at the point marked **LEVELED POWER OUTPUT** in figure 3-11.

EXTERNAL FM

To frequency modulate (FM) the RF output signal, apply an external modulation signal to the sweep oscillator rear panel FM INPUT connector. A positive going voltage decreases the output frequency; a negative going voltage increases the output frequency.

The RF plug-in configuration switch (A3S1) sets the modulating signal sensitivity (see table 3-3). Coupling (set for cross-over coupling) is changeable.

EXTERNAL AM

There are two types of external amplitude modulation:

Pulse Modulation

Pulsed or square-wave modulation can be applied to the plug-in rear panel PULSE IN connector. This input provides an on/off power ratio of greater than 60 dB (typically) below specified maximum leveled power.

With leveled power, pulse repetition rates can be up to 100 kHz (typically) at frequencies of 0.01 to 26.5 GHz.

Amplitude Modulation

The sweep oscillator rear panel AM INPUT provides a power change of 1 dB/V. Frequency response is limited to approximately 100 kHz.

For maximum modulation depth (maximum modulation index), set the plug-in power level to the middle of the output power range.

A positive DC voltage at the AM INPUT causes a decrease in the RF output power; a negative voltage causes an increase in output power.

RF POWER CONTROL

Power Level

The RF output power level is controlled (in all ALC modes) by the front panel rotary pulse generator (RPG), the sweep oscillator data entry controls (keypad and step keys), or through HP-IB control via the sweep oscillator. A front panel LED indicates when the RF output becomes unlevelled. Calibrated power level is available during internal leveling only.

The [RF ON/OFF] key turns the RF output off. When the LED in the center of the key is on, the power is on. The plug-in can be set to have either maximum specified power or RF power OFF at instrument preset (see table 3-3).

Power Sweep

When this function is enabled (LED on), the RF output power can be swept over a selected power range. The power sweep starting point power level is the level set before you turn the power sweep function on. The useable range is limited by the dynamic range of the ALC loop which is adjustable from -2 dBm to the maximum power output available (for example, on the standard plug-in <20 GHz = 15 dB/SWP; >20 GHz = 12 dB/SWP).

The power sweep width can be entered via the keyboard, step keys, or the RF plug-in RPG. The power sweep end point level is determined by the sum of the starting power level and the power sweep. Power sweep is turned off and reset to 0 dB/SWP at instrument preset.

Slope

When this function is enabled (LED on), the frequency slope compensation can be set via the keyboard, step keys, or the plug-in RPG. This allows positive slope compensation for devices with linear losses proportional to frequency (cables). The settable range (-0 to $+5$ dB/GHz) is limited by the dynamic range of the ALC loop. Slope is turned off and reset to 0 dB/SWP at instrument preset.

HP-IB

Except for the ALC CAL, FILTER PEAK, and FREQ CAL functions, all front panel functions can be altered by computer control via the sweep oscillator HP-IB connection.

FIRMWARE REVISION NUMBER

To see the firmware revision number (in the plug-in POWER display window), press [SHIFT] [9] [9] on the sweep oscillator. For system (scalar, vector network analyzers) compatibility requirements, contact your local HP sales/service office.

OPERATOR'S MAINTENANCE

ERROR CODES

The sweep oscillator and the RF plug-in have a series of internal power-on self tests that, if a failure occurs, indicate an error code on either the sweep oscillator FREQUENCY or the plug-in POWER display.

Error codes E001 through E049 are specific to the sweep oscillator. Refer to the *HP 8350 Operating and Service Manual*.

Error codes E050 through E099 are specific to the RF plug-in. See section 8 of this manual for more information.

FUSES

The RF plug-in power supplies are fused in the sweep oscillator. Refer to the *HP 8350 Operating and Service Manual* for fuse locations and replacement instructions.

Section 4. Performance Tests

INTRODUCTION

Use the procedures in this section to test the electrical performance of the sweep oscillator/plug-in combination. Use the specifications listed in table 1-1, in "General Information", as the performance standards. You do not need access to the interior of the plug-in to perform these tests.

NOTE: Let the sweep oscillator and plug-in warm up for at least one hour before you begin a performance test. The A3S1 switch 1 on the plug-in must be in the closed position when beginning these tests.

NOTE: Frequency measurements require a spectrum analyzer, rather than a frequency counter. Use the *peak search* function to read the frequency value. For information on reading frequency with a spectrum analyzer, refer to the analyzer operation manual.

EQUIPMENT REQUIRED

The equipment required to test the plug-in is listed in table 1-4, in "General Information". Any equipment that satisfies the critical specifications listed in the table may be substituted for the recommended model. Adapters may be required that are not listed or shown in the equipment set-ups.

OPERATION VERIFICATION

To verify operation, perform the following tests:

- Frequency Range and Accuracy.
- Output Amplitude.

You can verify HP-IB functions using the program listed in section IV of the *HP 8350 Operating and Service Manual*.

These tests provide reasonable assurance that the sweep oscillator and plug-in are functioning properly, and should meet the needs of an incoming inspection (80% verification).

TEST RECORD

The test record, at the end of this section, provides a tabulated index of the performance tests, their acceptable limits, and a column for recording actual measurements. Use this test record when you perform a calibration (100% verification).

RELATED ADJUSTMENTS

Table 4-1 lists the performance tests and their related adjustments (see the "Adjustments" section). If the plug-in fails a performance test, the associated adjustments may correct the problem.

CALIBRATION CYCLE

Perform the tests in this section at least once every twelve months.

Table 4-1. Performance Tests and Related Adjustments

Performance Tests	Related Adjustments
4-1. Frequency Range and Accuracy CW Frequency Accuracy Swept Frequency Accuracy Frequency Marker Accuracy	5-1 through 5-4 5-2 through 5-6, 5-10 5-1 through 5-6, 5-10
4-2. Output Amplitude Maximum Leveled Power, Output Power Variations Power Level Accuracy Power Sweep	5-6 through 5-9 5-12 through 5-16 5-6 through 5-9 5-12, 5-13 5-15
4-3. Frequency Stability	
4-4. Residual FM	
4-5. Spurious Signals	5-8
4-6. External Frequency Modulation	5-16
4-7. Square-Wave On/Off Ratio and Symmetry	5-14
4-8. Step Attenuator Accuracy (Option 002)	

4-1. Frequency Range and Accuracy Tests

Description

This is a group of 3 tests which must be performed in the order given. A spectrum analyzer is used to check the CW frequency range, swept frequency range, and frequency marker accuracy of the plug-in. In swept mode the analyzer is used as a frequency meter with its video output displayed on an oscilloscope. The oscilloscope is swept by the sweep oscillator.

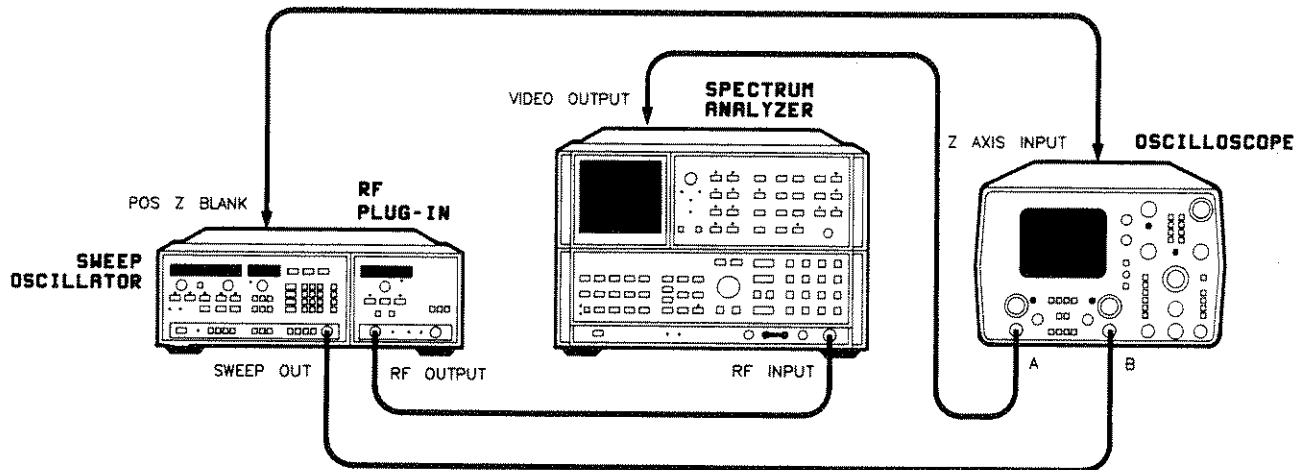


Figure 4-1. Frequency Range and Accuracy Tests Setup

Equipment

Sweep Oscillator Mainframe	HP 8350
Spectrum Analyzer	HP 8566B
Oscilloscope	HP 1741A

Procedure: CW Frequency Accuracy

1. Connect the equipment as shown in figure 4-1. Press **[INSTR PRESET]** on both the sweep oscillator and the spectrum analyzer. Allow the equipment to warm up for one hour.
2. On the sweep oscillator press **[CW] [5] [0] [MHz]**.
3. On the spectrum analyzer, press:

[REFERENCE LEVEL] [1] [3] [+ dBm]
[CENTER FREQUENCY] [5] [0] [MHz]
[FREQUENCY SPAN] [5] [0] [MHz]

4-1. Frequency Range and Accuracy Tests (cont'd)

4. If necessary, adjust the FREQ CAL pot on the plug-in front panel:

The 50 MHz signal should be visible near mid-screen. If not, adjust the frequency calibration adjustment (FREQ CAL) until the signal is centered.

Verify that the signal increases in frequency as you increase the sweep oscillator's CW frequency.

5. On the sweep oscillator/plug-in:

Press **[CW] [1] [GHz]** (the first frequency in table 4-2 for band 0)

Allow a few seconds for the signal to settle.

6. On the spectrum analyzer, press:

[CENTER FREQUENCY] [1] [GHz] (the same frequency as in step 5)
[PEAK SEARCH]

On the test record, enter the marker frequency displayed on the analyzer.

7. Repeat steps 5 and 6 for all values listed in table 4-2 beginning with the lowest frequency for band 0. Test from the first to the last frequency listed in each band, sequentially from band 0 through band 4. (This will avoid band crossover problems.)

NOTE: Refer to step 8 to test the final frequency (26.5 GHz) in band 4.

Table 4-2. CW Frequencies

	Frequency (GHz)		
Band 0	1.0	2.2	
Band 1	4.0	2.5	6.8
Band 2	10.0	7.1	14.0
Band 3	17.0	14.0	19.8
Band 4	22.0	20.5	26.5*

* Refer to step 8 to test this frequency.

8. The spectrum analyzer is not specified to 26.5 GHz. To test this plug-in frequency, disconnect the RF INPUT of the analyzer from the RF OUTPUT of the plug-in. Now connect the analyzer RF INPUT to the AUX OUTPUT on the rear panel of the plug-in. Set the sweep oscillator to a CW frequency of 26.5 GHz and set the spectrum analyzer to a center frequency of 6.625 GHz. Record the output frequency on the test record.

NOTE: 26.5 GHz is generated in band 4 by multiplying the fundamental oscillator frequency of 6.625 GHz by 4. This same frequency is available at the AUX OUTPUT. Therefore, the frequency output in step 8 should be 6.625 GHz \pm 3 MHz (26.5 GHz \pm 12 MHz divided by 4). If a frequency counter capable of measuring 26.5 GHz is available, it may be used rather than measuring the AUX OUTPUT.

4-1. Frequency Range and Accuracy Tests (cont'd)

Procedure: Swept Frequency Accuracy

9. On the sweep oscillator/plug-in, connect the RF OUTPUT to the RF INPUT of the analyzer, and press:
[INSTR PRESET]
SWEEP [TIME] [1] [0] [0] [ms]
10. On the oscilloscope:
Set Sweep: **[A vs B]**
Set B Channel: 1 V/div, DC coupled
Adjust the horizontal width and position for a full screen display.
Set A Channel: 0.2 V/div, DC coupled
Center the display
11. On the spectrum analyzer, press:
[INSTR PRESET]
[REFERENCE LEVEL] [1] [3] [+dBm]
[FREQUENCY SPAN] [0] [Hz]
[VIDEO BW] [3] [MHz]
12. Set the spectrum analyzer START center frequency to the value for full band (table 4-3). Press:
[CENTER FREQUENCY] [1] [0] [MHz]
13. Set the spectrum analyzer START resolution bandwidth to the value for full band (table 4-3). Press:
[RES BW] [3] [0] [0] [kHz]
14. On the spectrum analyzer, press **[CENTER FREQUENCY]** and adjust the center frequency until a peaked signal is just visible on the far left side of the oscilloscope display:
 - a. *Decrease* the analyzer center frequency until no signal is visible on the oscilloscope.
 - b. Slowly *increase* the analyzer center frequency until the signal on the oscilloscope just peaks.
 - c. Record the spectrum analyzer center frequency on the test record as start frequency.
15. On the plug-in:
 - a. Disconnect the RF output.
 - b. Connect the plug-in AUX output to the spectrum analyzer.
16. Set the spectrum analyzer STOP center frequency to the value for full band (table 4-3). Press:
[CENTER FREQUENCY] [6] [.] [6] [2] [5] [GHz]
17. Set the spectrum analyzer STOP resolution bandwidth to the value for full band (table 4-3). Press:
[RES BW] [3] [MHz]

4-1. Frequency Range and Accuracy Tests (cont'd)

18. Adjust the spectrum analyzer center frequency until a peaked signal is just visible on the far right side of the oscilloscope display:

NOTE: You may have to adjust the oscilloscope brightness or persistence.

- a. *Increase* the analyzer center frequency until no signal is visible on the oscilloscope.
- b. Slowly *decrease* the analyzer center frequency until the signal on the oscilloscope just peaks.
- c. Record the displayed analyzer center frequency value on the test record as stop frequency.

NOTE: There are other signals visible due to the instrument bands (0 through 4).

Table 4-3. Swept Frequency Accuracy Frequencies and Tolerances

PLUG-IN		SPECTRUM ANALYZER			
Band	Start/Stop (GHz)	START		STOP	
		Resolution Bandwidth	Center Frequency	Resolution Bandwidth	Center Frequency
Full	0.01/26.5	300 kHz	0.01 GHz	3 MHz	6.625 GHz
0	0.01/2.4	300 kHz	0.01 GHz	3 MHz	2.4 GHz
1	2.4/7.0	3 MHz	2.4 GHz	3 MHz	7.0 GHz
2	7.0/13.5	3 MHz	3.5 GHz	3 MHz	6.75 GHz
3	13.5/20.0	3 MHz	4.5 GHz	3 MHz	6.667 GHz
4	20.0/26.5	3 MHz	5.0 GHz	3 MHz	6.625 GHz

19. Change the sweep oscillator/plug-in start and stop frequencies to the next band in table 4-3.

20. Repeat steps 12 through 19 for each band in table 4-3 using the AUX OUTPUT to test the 26.5 GHz points.

Procedure: Frequency Marker Accuracy

21. On the plug-in, disconnect the AUX OUTPUT and connect the front panel RF OUTPUT to the spectrum analyzer RF INPUT. Press:

- a. [INSTR PRESET]
- b. [TIME] [.] [1] [s]

22. On the spectrum analyzer, press:

[INSTR PRESET]
 [REFERENCE LEVEL [1] [3] [+ dBm]
 [FREQUENCY SPAN [0] [Hz]

4-1. Frequency Range and Accuracy Tests (cont'd)

23. On the sweep oscillator, press:

[M1] [1] [GHz] (the first marker frequency in table 4-4)

Table 4-4. Frequency Marker Accuracy

Band	Sweep Range (GHz)	Marker Frequencies (GHz)				
Full	0.01 to 26.5	1.0	4.0	12.0	18.0	22.0
0	0.01 to 2.4	1.0	2.0			
1	2.4 to 7.0	3.0	6.0			
2	7.0 to 13.5	8.0	12.0			
3	13.5 to 20.0	15.0	18.0			
4	20.0 to 26.5	21.0	22.0			

24. On the oscilloscope, decrease the intensity so the marker is clearly visible.

25. On the spectrum analyzer, press:

[CENTER FREQUENCY] [1] [GHz] (the marker frequency set in step 23)

26. Adjust the analyzer center frequency until the signal peak is centered on the marker displayed on the oscilloscope:

- Using the horizontal position knob, center the marker on a vertical graticule.
- Increase the oscilloscope intensity until the signal peak is visible.
- Adjust the analyzer center frequency until the signal peak is centered on the same vertical graticule as the marker.

NOTE: When the signal peak is centered on the marker, the signal intensity increases. To improve the visibility of the markers, decrease channel B on the oscilloscope as needed.

27. Record the analyzer center frequency value on the test record.

NOTE: Each marker is 0.4% of the sweep width (with a 26.5 GHz sweep, for example, the marker is approximately 106 MHz wide). For the best accuracy, center the signal peak within the highlighted marker width.

28. Repeat steps 23 through 27 for each marker frequency in each band in table 4-4. When changing bands, reset the start and stop frequencies on the sweep oscillator/plug-in to the frequencies given in the table. Press:

[START] and enter the start frequency in GHz. Then press:

[STOP] and enter the stop frequency in GHz.

4-2. Output Amplitude Tests

Description

This is a group of 4 tests which must be performed in the order given. First, an oscilloscope is used to check the swept power. Then a power meter is used to check power level accuracy, maximum leveled output power, and power variations. Finally, the power sweep range is measured.

NOTE: In all tests, adjust the power meter cal factor for the frequency under test as indicated on the power sensor.

Equipment

Sweep Oscillator Mainframe	HP 8350
Dual Channel Oscilloscope	HP 1741A
Crystal Detector	HP 8473C/D
Power Meter	HP 436A
Power Sensor	HP 8485A

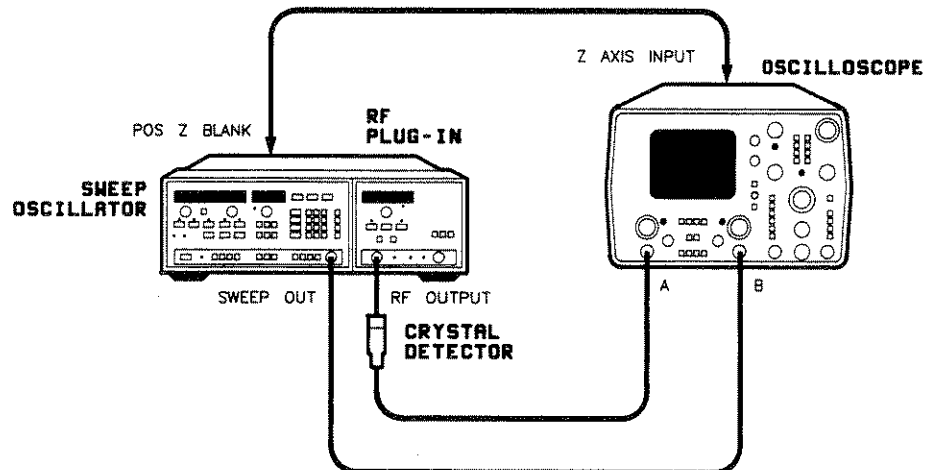


Figure 4-2. Swept Power Measurement Test Setup

Procedure: Swept Power Measurement

1. Connect the equipment as shown in figure 4-2.

2. On the oscilloscope, set:

Sweep: [A vs B]
B channel: 1V/div, DC coupled
A channel: Adjust as necessary

3. On the sweep oscillator, press:

[INSTR PRESET]
[STOP] [2] [0] [GHz]
DISPL BLANK ON (light on)

4. On the plug-in, set the power level. Press:

[POWER LEVEL] [1] [3] [dBm] (set to 12 dBm for Option 002)

4-2. Output Amplitude Tests (cont'd)

5. Adjust the oscilloscope for best overall visibility.
6. On the sweep oscillator:
Vary the sweep speed from 50 ms to 1s.
Note any oscillations or power drop-outs (pay close attention to bandswitch points).
7. On the sweep oscillator, press:
[INSTR PRESET]
8. Adjust the oscilloscope for best overall visibility.
9. On the sweep oscillator:
Vary the sweep speed from 50 ms to 1s.
Note any oscillations or power drop-outs (pay close attention to bandswitch points).

NOTE: An oscillation or power drop-out can cause the instrument to fail the power level tests. If an oscillation or drop-out occurs in step 6 or 10, refer to table 4-1 for related adjustments.

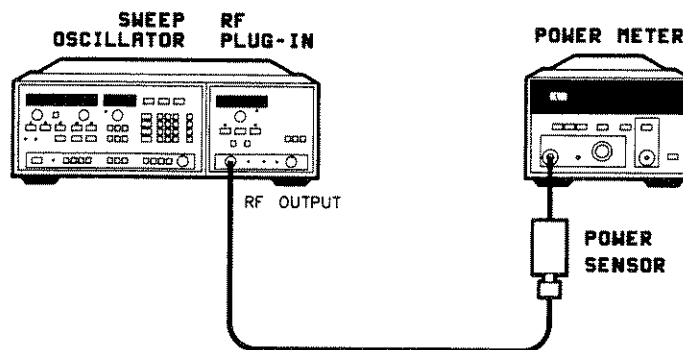


Figure 4-3. Maximum Leveled Output Power, Output Power Variations, and Power Level Accuracy Test Setup

Procedure: Maximum Leveled Output Power and Output Power Variations

10. Calibrate the power meter/sensor as follows:
 - a. Set the calibration factor to 100%.
 - b. With the power sensor disconnected from any source, press **[SENSOR ZERO]**.
 - c. Connect the power sensor to the POWER REF OUTPUT and press **[POWER REF]**.
 - d. Using the CAL ADJ, adjust the power meter to read -00.0 dBm.
 - e. Press **[POWER REF]** to turn the reference off.
11. Disconnect the power sensor from the power meter and press **[dBm]**. Connect the sensor to the plug-in RF output.
12. Connect the equipment as shown in figure 4-3.

4-2. Output Amplitude Tests (cont'd)

13. On the sweep oscillator, press:

[INSTR PRESET]
[TIME] [.] [2] [s].

14. On the sweep oscillator/plug-in, set the start/stop frequencies and power level for the first values listed in table 4-5. Press:

[STOP] [2] [.] [4] [GHz]
[POWER LEVEL] [1] [3] [dBm]

Table 4-5. Maximum Leveled Power for Plug-in Frequency Ranges

Frequency Range (GHz)	Maximum Leveled Power (dBm)	
	Standard	Option 002
0.01 to 2.4	+ 13.0	+ 13.0
2.4 to 7.0	+ 13.0	+ 12.0
7.0 to 13.5	+ 13.0	+ 12.0
13.5 to 20.0	+ 13.0	+ 12.0
20.0 to 26.5	+ 10.0	+ 8.0

15. Increase the plug-in output power until the unlevelled light just comes on.

Slowly decrease the power level until the light just goes out.

Press [TIME] and slowly increase the sweep time with the FREQUENCY/TIME control from minimum sweep time to 1s. If the unlevelled light comes on, decrease the power level until it just goes out.

16. Press SWEEP [MAN] and slowly tune the FREQUENCY/TIME control across the band. If the unlevelled light comes on at any point, decrease the power level until the light just goes out and continue sweeping.
17. When the unlevelled light remains out as you tune across the band, note the minimum power level on the power meter. Set the plug-in to the frequency point at which this minimum power level occurs.
18. On the power meter, adjust the calibration factor for the frequency set in step 17. Record the power meter reading on the test record.
19. On the sweep oscillator/plug-in, reset the output power to the maximum level indicated in table 4-5 for the current frequency range.
20. On the power meter, press [dB REF].
21. On the sweep oscillator:
- Press SWEEP [MAN] and slowly tune the FREQUENCY/TIME control through the entire frequency range. Note the maximum power variation, as measured by the power meter. This is the maximum peak-to-peak power variation.
- Divide the peak-to-peak power variation by two, and record the peak power variation on the test record for the current frequency range.
22. On the power meter, press [dBm].

4-2. Output Amplitude Tests (cont'd)

Procedure: Power Level Accuracy

23. Repeat steps 14 through 22 for each frequency range listed in table 4-5. (To set start frequencies, press **[START]** and enter the start frequency in GHz.)
24. On the sweep oscillator/plug-in, set the first frequency range and power level using the values in table 4-6. Press:
[START] [1] [0] [MHz]
[STOP] [2] [.] [4] [GHz]
[POWER LEVEL] [1] [3] [dBm]
25. Press **SWEEP [MAN]** and tune the **FREQUENCY/TIME** control across the frequency range. Observe the power meter and record, on the test record, the greatest power deviation from the power level set on the plug-in.
26. On the sweep oscillator/plug-in, press **[POWER LEVEL]**, change the power level to each power level on the test record for this frequency range, and repeat step 25 for each of these power levels.

Table 4-6. Maximum Power Level Accuracy

Frequency Range (GHz)	Power Level (dBm)	
	Standard	Option 002
0.01 to 2.4	+13.0	+13.0
2.4 to 7.0	+13.0	+12.0
7.0 to 13.5	+13.0	+12.0
13.5 to 20.0	+13.0	+12.0
20.0 to 26.5	+10.0	+ 8.0

27. Repeat steps 24 and 25 for the remaining frequency ranges in table 4-6.

Procedure: Power Sweep

28. On the sweep oscillator/plug-in, press:

[INSTR PRESET]
[CF] [2] [GHz]
[POWER LEVEL] [-] [2] [dB]
[Δf] [1] [0] [MHz]
[MAN] [0] [MHz] (this sets the frequency at the beginning of the Δf range)
[POWER SWEEP] [2] [5] [dB] (POWER SWEEP light on)

29. On the power meter, press **[dB REF]**.

30. On the sweep oscillator:

Press **SWEEP [MAN]** and slowly tune the **FREQUENCY/TIME** control across the sweep until the unlevelled light comes on (or the power meter indicates OVER RANGE).

Slowly tune the **FREQUENCY/TIME** control back until the unlevelled light just goes out (or the power meter indicates a dB value again).

31. On the test record, record the value displayed on the power meter.

4-3. Frequency Stability Test

Description

A spectrum analyzer is used to check the frequency change caused by a 10 dB output power level change.

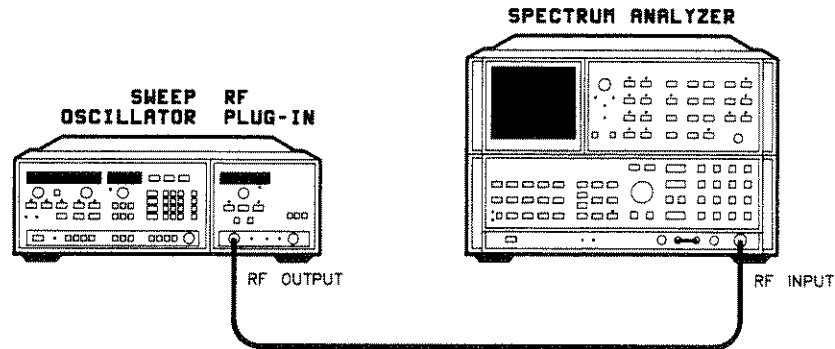


Figure 4-4. Frequency Stability Test Setup

Equipment

Sweep Oscillator Mainframe	HP 8350
Spectrum Analyzer	HP 8566B

Procedure

1. Connect the equipment as shown in figure 4-4. Turn the equipment on. On both the sweep oscillator and the spectrum analyzer, press **[INSTR PRESET]**, and allow one hour warm up.
2. On the spectrum analyzer, press:
[REFERENCE LEVEL] [1] [3] [+dBm]
[FREQUENCY SPAN] [2] [0] [MHz]
3. On the sweep oscillator/plug-in, set the power level step size to 10 dBm. Press:
[POWER LEVEL] [STEP SIZE] [1] [0] [dBm]

4-3. Frequency Stability Test (cont'd)

- On the sweep oscillator/plug-in, set the first frequency range and power level in table 4-7. Press:

[CW] [2] [.] [2] [GHz]
[POWER LEVEL] [1] [3] [dBm]

To minimize drift, wait several minutes (settling time) before continuing.

Table 4-7. CW Frequency Change with 10 dB Power Level Change

Band	CW Frequency (GHz)	Power Level (dBm)	
		Standard	Option 002
0	2.2	13	13
1	6.0	13	12
2	12.0	13	12
3	18.0	13	12
4	21.0	10	8

- On the spectrum analyzer, press:

[CENTER FREQUENCY] [2] [.] [2] [GHz] (the CW frequency from step 3)
[PEAK SEARCH] [SIGNAL TRACK] (light on)
MARKER [Δ]

- On the sweep oscillator/plug-in, decrease the power level by 10 dBm (the power level step size was set in step 3). Press:

[▼]

- On the spectrum analyzer, press [PEAK SEARCH]. Record the absolute frequency change (MARKER Δ) on the test record. Then press [OFF].
- Repeat steps 4 through 6 for the remaining values listed in table 4-7.

4-4. Residual FM Test

Description

The residual FM is measured by slope-detecting the CW signal using a linear portion of a spectrum analyzer resolution bandwidth filter, in the zero-span mode.

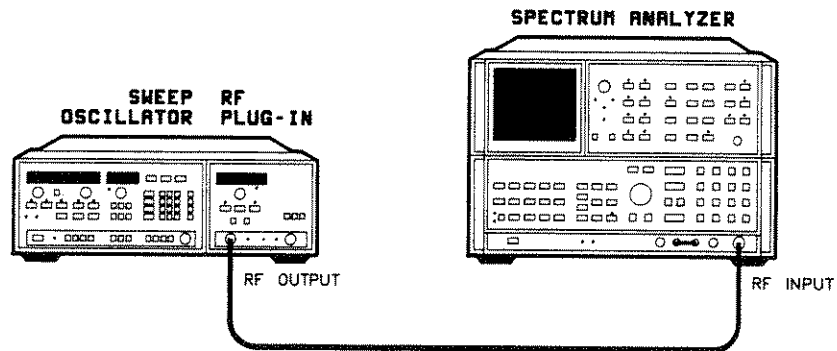


Figure 4-5. Residual FM Test Setup

Equipment

Sweep Oscillator Mainframe	HP 8350
Spectrum Analyzer	HP 8566B

Procedure

1. Connect the equipment as shown in figure 4-5. Press **[INSTR PRESET]** on both the sweep oscillator and the spectrum analyzer. Allow the equipment to warm up for one hour.
2. On the sweep oscillator/plug-in, set the first CW frequency range in table 4-8. press:

[CW] [2] [.] [2] [GHz]

Wait about 1 minute for the signal to settle.

Table 4-8. Residual FM CW Frequencies

Band	CW Frequency (GHz)
0	2.2
1	6.8
2	13.3
3	19.5
4	22.0

4-4. Residual FM Test (cont'd)

3. On the spectrum analyzer, press

[REFERENCE LEVEL] [1] [0] [+dBm]
[PEAK SEARCH] [SIGNAL TRACK] (light on)
[FREQUENCY SPAN] [1] [MHz]
[MKR→REF LVL]
[RES BW] [1] [0] [0] [kHz]
[VIDEO BW] [1] [0] [kHz]
[SIGNAL TRACK] (light off)
[ENTER dB/DIV] [1] [dB]
[REFERENCE LEVEL]

4. Press

[▼] 6 times

5. Press

[FREQUENCY SPAN] [0] [Hz]
[SWEEP TIME] [.] [1] [sec]
[CENTER FREQUENCY]

6. Use the analyzer RPG knob to keep the signal centered (see figure 4-6). It may be off the screen at first.

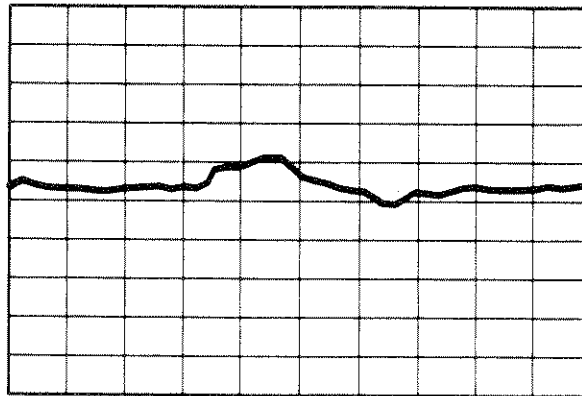


Figure 4-6. Residual FM Signal as Displayed on the Spectrum Analyzer

7. Press [VIEW], then [CLEAR WRITE] several times and note the largest peak-to-peak vertical deviation in divisions (1 div. = 1 dB \cong 7 kHz).
8. One vertical division \cong 7 kHz (see note below).
Peak-to-peak deviation in kHz = (value from step 7) times 7 kHz.

Divide the peak-to-peak deviation by two. Record this peak value on the test record.
9. Repeat steps 2 through 8 for the remaining frequencies listed in table 4-8.

4-4. Residual FM Test (cont'd)

NOTE: You can check the remaining frequencies by simply changing both the sweep oscillator/plug-in CW frequency, and the spectrum analyzer center frequency, to the next test frequency. If the signal does not appear on the display, press **[CENTER FREQUENCY]** and slowly turn the analyzer RPG knob clock-wise/counter clock-wise until the signal is centered on the screen.

NOTE: The spectrum analyzer vertical sensitivity is nominally 7 kHz/div (see "Spectrum Analyzer Vertical Sensitivity"). To determine the maximum allowable deviation (divisions on the analyzer display), double the FM specification (peak), and divide that number by 7.

Example: Specification = 5 kHz (peak)

$$5 \times 2 = 10 \text{ (peak-to-peak)}$$

$$10/7 = 1.4 \text{ divisions}$$

Spectrum Analyzer Vertical Sensitivity

Follow this procedure if you wish to determine the exact sensitivity of your spectrum analyzer.

On the spectrum analyzer:

1. Connect CAL OUT to RF INPUT.
2. Press

```
[INSTR PRESET]
[FREQUENCY SPAN] [7] [0] [kHz]
[CENTER FREQUENCY] [1] [0] [0] [.] [1] [MHz]
[RES BW] [1] [0] [0] [kHz]
[REFERENCE LEVEL] [1] [6] [-dBm]
[ENTER dB/DIV] [1] [dB]
```

4-4. Residual FM Test (cont'd)

3. Adjust the frequency span and center frequency for a diagonal trace from the top left corner to the lower right corner of the CRT (see figure 4-7).
4. Note the frequency span. Divide this number by 10. This is the FM sensitivity, which should be approximately 7 kHz/div.

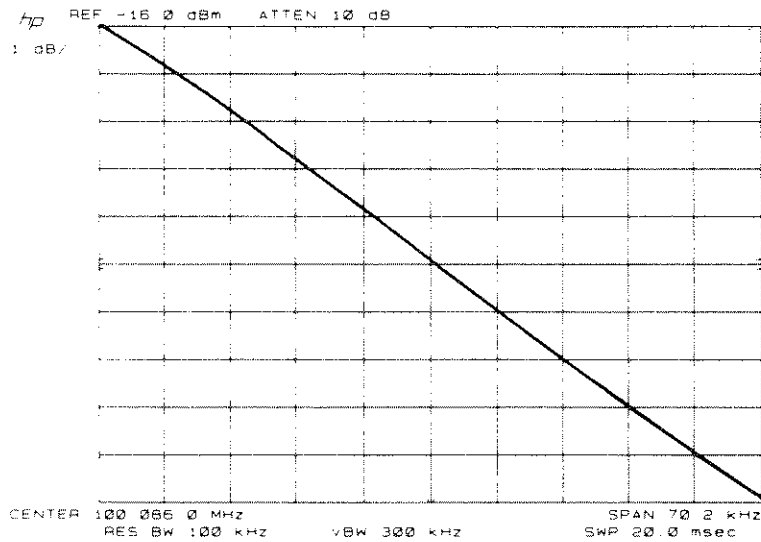


Figure 4-7. Determining Spectrum Analyzer FM Sensitivity

4-5. Spurious Signals Test

Description

The plug-in output signal is displayed on a spectrum analyzer to verify that harmonic and non-harmonic spurious signals are at or below the specified level. The fundamental oscillator frequency is multiplied by two in band 2, by 3 in band 3, and by 4 in band 4. Because of this, spurious signals that appear at one-half of the indicated output frequency in band 2, one-third or two-thirds of the output frequency in band 3, and one-fourth, one-half, or three-fourths of the output frequency in band 4, are considered harmonic related signals.

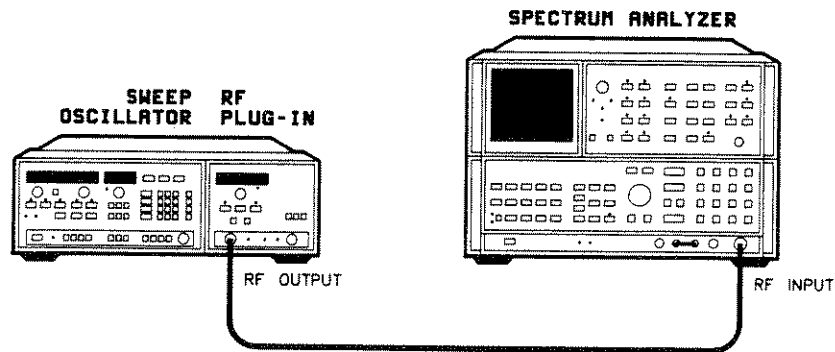


Figure 4-8. Spurious Signal Test Setup

Equipment

Sweep Oscillator Mainframe	HP 8350
Spectrum Analyzer	HP 8566B
RF Cable	HP Part Number 85100-60001

Procedure

1. Connect the equipment as shown in figure 4-8. Allow one hour warm up.

NOTE: The spectrum analyzer originates some mixing products that may appear on the display. With the settings that follow, the harmonics in this test may be below the noise floor of your spectrum analyzer. In order to achieve the accuracy required in this test, use a cable with <2 dB loss at 26.5 GHz, such as the one recommended in "Equipment."

0.01 to 2.4 GHz

2. On the sweep oscillator/plug-in, press:

[INSTR PRESET]
[STOP] [2] [.] [4] [GHz]
[POWER LEVEL] [1] [3] [dBm]
SWEEP [MAN]

3. On the spectrum analyzer, press:

[0-2.5 GHz]
[REFERENCE LEVEL][1] [3] [+ dBm]

4-5. Spurious Signals Test (cont'd)

4. On the sweep oscillator:

Slowly adjust the FREQUENCY/TIME control through the entire range and check the amplitude of harmonic and non-harmonic spurious signals relative to the fundamental signal.

Record the worst case data on the test record.

Above 1.25 GHz, switch the range of the spectrum analyzer (by pressing [STOP] [5] [GHz]) to view the second and third harmonics.

2.4 to 20 GHz

5. On the spectrum analyzer and sweep oscillator/plug-in, press:

[INSTR PRESET]

6. On the sweep oscillator, press:

[STOP] [2] [0] [GHz]
[POWER LEVEL] [1] [3] [dBm] (10 dBm for Option 002)

7. On the spectrum analyzer, press:

[REFERENCE LEVEL] [1] [3] [+ dBm]
[FREQUENCY SPAN] [5] [0] [MHz]

8. On the sweep oscillator, press:

[CW] [4] [GHz] (the first spur frequency in table 4-9)

Table 4-9. Spur and Fundamental Frequencies

Spur Frequency (GHz)			Fundamental Frequency (GHz)
4.0	6.0	8.0	2.0
8.0	12.0	16.0	4.0
5.0	20.0		10.0
5.0	10.0		15.0
5.5			22.0

9. On the spectrum analyzer, press:

[CENTER FREQUENCY] [4] [GHz] (the spur frequency from step 8)
[PEAK SEARCH]
[MKR → CF]
[PRESEL PEAK]
MARKER [Δ]

10. On the sweep oscillator, press:

[CW] [2] [GHz] (from table 4-9, the fundamental frequency for the spur frequency set in step 8)

4-5. Spurious Signals Test (cont'd)

11. If no spurs are visible, record PASS on the test record, press MARKER [OFF] on the spectrum analyzer, and continue with step 13. Otherwise, on the spectrum analyzer, press:

[PEAK SEARCH]
[MKR→CF]
[PRESEL PEAK]
[PEAK SEARCH]

12. Note the amplitude dB reading displayed on the spectrum analyzer as MARKER Δ . Record this on the test record as the harmonic related value for the fundamental frequency in step 10. Then press MARKER [OFF] on the spectrum analyzer.
13. Repeat steps 8 through 12 for all of the spur values for the fundamental frequencies of 2, 4, 10, and 15 GHz (table 4-9.)

20 to 26.5 GHz

14. On the sweep oscillator, press:

[INSTR PRESET]
[POWER LEVEL] [10] [dBm] (8 dBm for Option 002)

15. Repeat steps 8 through 12 for all of the spur values for the fundamental frequency of 22 GHz.

NOTE: Use this procedure to determine the relative amplitude of any suspected spur or harmonic. Use the frequency of the spur as it appears on the spectrum analyzer; use the frequency of the fundamental as indicated on the sweep oscillator.

4-6. External Frequency Modulation Test

Description

As the RF output is modulated with an external sine wave (at 100 Hz, 1, 2, and 10 MHz), the FM deviation is measured on a spectrum analyzer. With 100 Hz, the FM deviation is measured by noting the frequency shift of the displayed signal. At the higher modulation frequencies, the deviation is measured using Bessel functions.

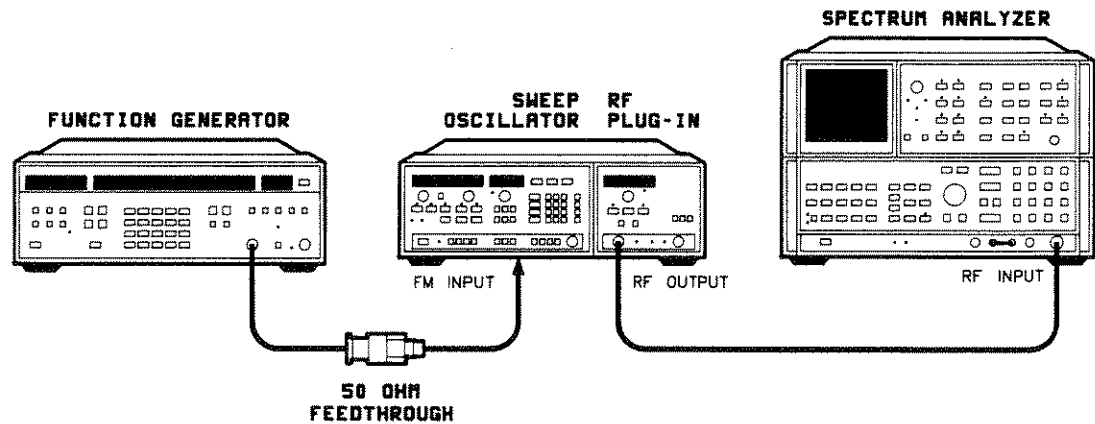


Figure 4-9. External Frequency Modulation Test Setup

Equipment

Sweep Oscillator Mainframe	HP 8350
Spectrum Analyzer	HP 8566B
Function Generator	HP 3325A
50 Ω Feedthrough	HP 10100C

Procedure

1. Ensure that the plug-in configuration switch (A3S1) is set to -20 MHz/V, Direct Coupled FM (switch 6 is open; see section 5 for details).
2. Connect the equipment as shown in figure 4-9, but do *not* connect the function generator to the FM input yet. Turn all instruments on and allow 1 hour warm up.

4-6. External Frequency Modulation Test (cont'd)

100 Hz Modulation

3. On the sweep oscillator/plug-in, press:

[INSTR PRESET]
[CW] [5] [GHz]
[CW FILTER] (light off)

4. On the spectrum analyzer, press:

[INSTR PRESET]
[REFERENCE LEVEL] [1] [0] [+ dBm]
[PEAK SEARCH]
[SIGNAL TRACK] (light on)
[FREQUENCY SPAN] [5] [0] [MHz]
[SIGNAL TRACK] (light off)

The spectrum analyzer is now set to 5 MHz/div.

5. On the function generator:

Connect the sine wave output as shown in figure 4-9. Then press:

[FREQ] [1] [0] [0] [Hz]
[AMPTD] [5] [0] [0] [mV] (this is peak-to-peak)

Slowly increase the modulation amplitude until the deviation (displayed on the spectrum analyzer) either stops increasing, or becomes asymmetrical about the center.

6. Record the maximum deviation from the center in MHz (from the CRT) on the test record.

Disconnect the function generator from the FM input.

7. On the plug-in change the A3S1 configuration switch to cross-over coupled (switch 6 closed). Then press [INSTR PRESET] on the sweep oscillator.
8. To verify cross-over coupling, repeat steps 3 through 6 for the following frequencies using a spectrum analyzer frequency span of 250 MHz rather than 50 MHz.

- 5 GHz
- 10 GHz
- 15 GHz
- 22 GHz

1, 2, and 10 MHz Modulation

9. On the sweep oscillator, press:

[CW] [5] [GHz] (CW frequency from table 4-10)

10. On the function generator, press:

[FREQ] [1] [MHz] (function generator modulation frequency from table 4-10)
[AMPTD] [1] [0] [mV]

4-6. External Frequency Modulation Test (cont'd)

Table 4-10. CW Frequencies for 1, 2, and 10 MHz Frequency Modulation

Function Generator Modulation Frequency (MHz)	CW Frequency (GHz)	Frequency Span (MHz)	Resolution Bandwidth (kHz)
1	5, 10, 15, 22	4.5	30
2	5	4.5	30
10	5	22	100

11. On the spectrum analyzer, press:

[INSTR PRESET]
[REFERENCE LEVEL] [1] [0] [+ dBm]
[PEAK SEARCH]
[SIGNAL TRACK] (light on)
[FREQUENCY SPAN] [4] [.] [5] [MHz] (frequency span from table 4-11)
[RES BW] [3] [0] [kHz] (from table 4-11)
[SIGNAL TRACK] (light off)

12. On the function generator, connect the output as shown in figure 4-9.

1 MHz Modulation Frequency:

13. Increase the function generator output amplitude until the *first* sideband on either side of the fundamental signal nulls. Continue increasing the output until the first sideband nulls a *second* time (typically 700 mV p-p input signal).

NOTE: The fundamental signal nulls twice before the first sideband reaches the second null.

For a ± 7 MHz deviation, the first sideband must null twice with a negligible (< 200 kHz) frequency shift of the fundamental signal. Record PASS or FAIL on the test record.

14. Repeat steps 9 through 13 to test the 1 MHz modulation on the remaining CW frequencies (see table 4-10).

2 MHz Modulation Frequency:

15. Repeat steps 9 through 12 setting the frequency generator to the modulation frequency of 2 MHz. Use table 4-10 for the remaining settings.
16. Increase the function generator output amplitude until the *fundamental* signal nulls (typically 500 mV p-p input signal).

For a ± 5 MHz deviation, the fundamental signal must null with a negligible (< 200 kHz) frequency shift. Record PASS or FAIL on the test record.

4-6. External Frequency Modulation Test (cont'd)

10 MHz Modulation Frequency:

17. Repeat steps 9 through 12 setting the frequency generator to the modulation frequency of 10 MHz. Use table 4-10 for the remaining settings.
18. Increase the function generator output amplitude until the *first* sideband is less than 26 dB below the unmodulated fundamental signal (typically 100 mV p-p input signal). If the two visible sidebands are unequal, use the one with the lower amplitude.

For a ± 1 MHz deviation, the sideband must be less than 26 dBc with a negligible (< 200 kHz) frequency shift of the fundamental signal. Record PASS or FAIL on the test record.

4-7. Square-Wave On/Off Ratio and Symmetry Test

Description

The on/off ratio is checked on the amplitude axis of a video triggered spectrum analyzer display. The symmetry is checked by calculating the on/off ratio on the frequency axis.

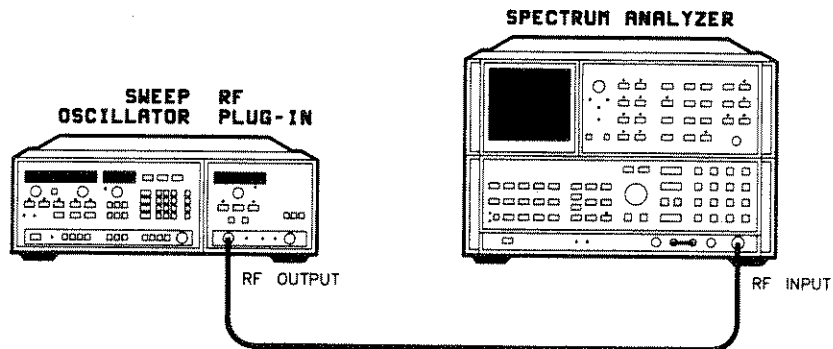


Figure 4-10. Square-Wave On/Off Ratio and Symmetry Test Setup

Equipment

Sweep Oscillator Mainframe	HP 8350
Spectrum Analyzer	HP 8566B

Procedure

1. Connect the equipment as shown in figure 4-10. Turn all instruments on and allow 1 hour warm up.
2. On the sweep oscillator/RF plug-in, press:
[INSTR PRESET]
[CW] [5] [GHz]
3. On the spectrum analyzer, press:
[INSTR PRESET]
[REFERENCE LEVEL] [1] [0] [+ dBm]
[PEAK SEARCH] [SIGNAL TRACK] (light on)
[RES BW] [3] [MHz]
[FREQUENCY SPAN] [0] [Hz]

[SIGNAL TRACK] (light off)
[FREQUENCY SPAN] [0] [GHz]
[MKR→REF LVL]
4. On the sweep oscillator, turn the square wave modulation on. Press:
[MOD] (light on)

4-7. External Frequency Modulation Test (cont'd)

5. On the spectrum analyzer, press TRIGGER [VIDEO].

Then, depending on how the sweep oscillator is configured, set the sweep time for either 1 kHz or 27.8 kHz modulation:

For 1 kHz: [SWEEP TIME] [.] [5] [msec]

For 27.8 kHz: [SWEEP TIME] [5] [0] [μ sec]

6. On the spectrum analyzer:

Adjust the video trigger LEVEL and intensity for a stable signal. Record the on/off ratio (peak to top of noise floor signal) on the test record.

Measuring 4 dB below the peak of the ON cycle, record the ratio in percent of the ON state to the ON plus OFF state, as the square wave symmetry on the test record.

4-8. Step Attenuator Accuracy Test (Option 002)

Description

Each of the 3 sections of the attenuator is tested at three different frequencies using a power meter.

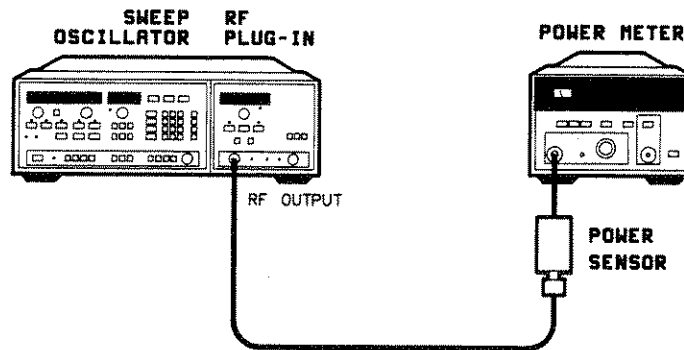


Figure 4-11. Step Attenuator Accuracy Test Setup

Equipment Required

Sweep Oscillator Mainframe	HP 8350
Power Meter	HP 436A
Power Sensor	HP 8485A

Procedure

1. Calibrate the power sensor as follows:
 - a. Set the calibration factor to 100%.
 - b. With the power sensor disconnected from any source, press **[SENSOR ZERO]**.
 - c. Connect the power sensor to the POWER REF OUTPUT and press **[POWER REF]**.
 - d. Using the CAL ADJ, adjust the power meter to read -00.0.
 - e. Press **[POWER REF]** to turn the reference off.
2. Connect the equipment as shown in figure 4-11.
3. On the power meter, press **[dBm]**.
4. On the sweep oscillator/plug-in press:
[PRESET] [CW] [4] [GHz]
5. On the power meter press **[dB [REF]]**.
6. On the sweep oscillator/plug-in press:
[SHIFT] [0] [0] [2] [BK SP] [0] [0] [M2] (address 2F00)

4-8. Step Attenuator Accuracy Test (Option 002) (cont'd)

7. Press the following key sequences on the sweep oscillator to test the 10 dB, 20 dB, and 30 dB sections of the attenuator. For each key sequence, record the power meter reading on the test record for the appropriate frequency.

[8] [1] (10 dB)

[8] [2] (20 dB)

[8] [4] (30 dB)

8. On the test record, add the 3 values recorded for this frequency (81 + 82 + 84) and enter the result for the total (about 60 dB).
9. On the sweep oscillator/plug-in, change the frequency to 18 GHz. Press [CW] [1] [8] [GHz].

On the power meter, press [dB [REF]].

On the sweep oscillator/plug-in, press [SHIFT] [0] [0] [M2] and repeat steps 7 and 8 for this frequency.

10. On the sweep oscillator/plug-in, change the frequency to 26.5 GHz. Press [CW] [2] [6] [.] [5] [GHz].

On the power meter, press [dB [REF]].

On the sweep oscillator/plug-in, press [SHIFT] [0] [0] [M2] and repeat steps 7 and 8 for this frequency.

Table 4-11. Performance Test Record (1 of 7)

HP 83595C RF PLUG-IN		Tested by _____			
Serial No. _____		Date _____			
Humidity* _____ (*optional)		Temperature* _____			
SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT
4-1. FREQUENCY RANGE AND ACCURACY TEST					
CW Frequency Accuracy					
	6.	CW Frequency = 1.0 GHz	.995 GHz	_____	1.005 GHz
		CW Frequency = 2.2 GHz	2.195 GHz	_____	2.205 GHz
		CW Frequency = 4.0 GHz	3.995 GHz	_____	4.005 GHz
		CW Frequency = 2.5 GHz	2.495 GHz	_____	2.505 GHz
		CW Frequency = 6.8 GHz	6.795 GHz	_____	6.805 GHz
		CW Frequency = 10.0 GHz	9.99 GHz	_____	10.01 GHz
		CW Frequency = 7.1 GHz	7.09 GHz	_____	7.11 GHz
		CW Frequency = 14.0 GHz	13.99 GHz	_____	14.01 GHz
		CW Frequency = 17.0 GHz	16.99 GHz	_____	17.01 GHz
		CW Frequency = 14.0 GHz	13.99 GHz	_____	14.01 GHz
		CW Frequency = 19.81 GHz	19.79 GHz	_____	19.81 GHz
		CW Frequency = 22.0 GHz	21.998 GHz	_____	22.012 GHz
		CW Frequency = 20.5 GHz	20.488 GHz	_____	20.512 GHz
	8.	CW Frequency = 26.5 GHz	6.622 GHz	_____	6.628 GHz
Swept Frequency Accuracy					
Full Band					
	14.	Start 10 MHz ± 50 MHz	0 MHz	_____	60 MHz
	18.	Stop 26.5 GHz ± 50 MHz	6.611 GHz	_____	6.639 GHz
Band 0					
	14.	Start 10 MHz ± 15 MHz	0 MHz	_____	25 MHz
	18.	Stop 2.4 GHz ± 15 MHz	2.385 GHz	_____	2.415 GHz
Band 1					
	14.	Start 2.4 GHz ± 20 MHz	2.38 GHz	_____	2.420 GHz
	18.	Stop 7.0 GHz ± 20 MHz	6.98 GHz	_____	7.02 GHz
Band 2					
	14.	Start 7.0 GHz ± 25 MHz	6.975 GHz	_____	7.025 GHz
	18.	Stop 13.5 GHz ± 25 MHz	13.475 GHz	_____	13.525 GHz
Band 3					
	14.	Start 13.5 GHz ± 30 MHz	13.47 GHz	_____	13.53 GHz
	18.	Stop 20.0 GHz ± 30 MHz	19.97 GHz	_____	20.03 GHz
Band 4					
	14.	Start 20.0 GHz ± 35 MHz	19.965 GHz	_____	20.035 GHz
	18.	Stop 26.5 GHz ± 35 MHz	6.61625 GHz	_____	6.63375 GHz

Table 4-11. Performance Test Record (2 of 7)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT
4-1. FREQUENCY RANGE AND ACCURACY TEST (cont'd.)					
Frequency Marker Accuracy					
Full Band	27.	M1 at 1 GHz	.818 GHz	_____	1.182 GHz
		M1 at 4 GHz	3.818 GHz	_____	4.182 GHz
		M1 at 12 GHz	11.818 GHz	_____	12.182 GHz
		M1 at 18 GHz	17.818 GHz	_____	18.182 GHz
		M1 at 22 GHz	21.818 GHz	_____	22.182 GHz
Band 0		M1 at 1 GHz	.973 GHz	_____	1.027 GHz
		M1 at 2 GHz	1.973 GHz	_____	2.027 GHz
Band 1		M1 at 3 GHz	2.957 GHz	_____	3.043 GHz
		M1 at 6 GHz	5.957 GHz	_____	6.043 GHz
Band 2		M1 at 8 GHz	7.942 GHz	_____	8.058 GHz
		M1 at 12 GHz	11.942 GHz	_____	12.058 GHz
Band 3		M1 at 15 GHz	14.937 GHz	_____	15.063 GHz
		M1 at 18 GHz	17.937 GHz	_____	18.063 GHz
Band 4		M1 at 21 GHz	20.932 GHz	_____	21.068 GHz
		M1 at 22 GHz	21.932 GHz	_____	22.068 GHz
4-2. OUTPUT AMPLITUDE TEST Standard or Option 004*					
Maximum Leveled Output Power	18.				
0.01 to 2.4 GHz		+13 dBm	+13 dBm	_____	
2.4 to 7.0 GHz		+13 dBm	+13 dBm	_____	
7.0 to 13.5 GHz		+13 dBm	+13 dBm	_____	
13.5 to 20.0 GHz		+13 dBm	+13 dBm	_____	
20.0 to 26.5 GHz		+10 dBm	+10 dBm	_____	
0.01 to 26.5 GHz		+10 dBm	+10 dBm	_____	
Output Power Variation	21.				
0.01 to 2.4 GHz		+13 dBm		_____	±.9 dB
2.4 to 7.0 GHz		+13 dBm		_____	±.7 dB
7.0 to 13.5 GHz		+13 dBm		_____	±.7 dB
13.5 to 20.0 GHz		+13 dBm		_____	±.8 dB
20.0 to 26.5 GHz		+10 dBm		_____	±.9 dB
0.01 to 26.5 GHz		+10 dBm		_____	±2.0 dB

* For option 004 instruments, max leveled output power is 1 dB less than shown.

Table 4-11. Performance Test Record (3 of 7)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT
4-2. OUTPUT AMPLITUDE TEST (cont'd.)					
Power Level Accuracy					
0.01 to 2.4 GHz	25.	+13 dBm	-1.5 dB	_____	+1.5 dB
		+5 dBm	-1.5 dB	_____	+1.5 dB
		-2 dBm	-1.5 dB	_____	+1.5 dB
2.4 to 7.0 GHz	25.	+13 dBm	-1.3 dB	_____	+1.3 dB
		+5 dBm	-1.3 dB	_____	+1.3 dB
		-2 dBm	-1.3 dB	_____	+1.3 dB
7.0 to 13.5 GHz	25.	+13 dBm	-1.3 dB	_____	+1.3 dB
		+5 dBm	-1.3 dB	_____	+1.3 dB
		-2 dBm	-1.3 dB	_____	+1.3 dB
13.5 to 20 GHz	25.	+13 dBm	-1.4 dB	_____	+1.4 dB
		+5 dBm	-1.4 dB	_____	+1.4 dB
		-2 dBm	-1.4 dB	_____	+1.4 dB
20 to 26.5 GHz	25.	+10 dBm	-1.7 dB	_____	+1.7 dB
		+4 dBm	-1.7 dB	_____	+1.7 dB
		-2 dBm	-1.7 dB	_____	+1.7 dB
Power Sweep	31.	2 GHz	15 dB	_____	
4-2. OUTPUT AMPLITUDE TEST Option 002*					
Maximum Leveled Output Power	18.				
0.01 to 2.4 GHz		+13 dBm	+13 dBm	_____	
2.4 to 7.0 GHz		+12 dBm	+12 dBm	_____	
7.0 to 13.5 GHz		+12 dBm	+12 dBm	_____	
13.5 to 20 GHz		+12 dBm	+12 dBm	_____	
20 to 26.5 GHz		+8 dBm	+8 dBm	_____	
0.01 to 26.5 GHz		+8 dBm	+8 dBm	_____	

* For option 004 instruments, max leveled output power is 1 dB less than shown.

Table 4-11. Performance Test Record (4 of 7)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT
4-2. OUTPUT AMPLITUDE TEST Option 002 (cont'd.)					
Output Power Variation					
0.01 to 2.4 GHz	21.	+13 dBm		_____	±.9 dB
2.4 to 7.0 GHz		+12 dBm		_____	±.7 dB
7.0 to 13.5 GHz		+12 dBm		_____	±.7 dB
13.5 to 20.0 GHz		+12 dBm		_____	±.8 dB
20 to 26.5 GHz		+8 dBm		_____	±.9 dB
0.01 to 26.5 GHz		+8 dBm		_____	±2.0 dB
Power Level Accuracy					
0.01 to 2.4 GHz	25.	+13 dBm	-1.7 dB	_____	+1.7 dB
		+5 dBm	-1.7 dB	_____	+1.7 dB
		-2 dBm	-1.7 dB	_____	+1.7 dB
2.4 to 7.0 GHz	25.	+12 dBm	-1.5 dB	_____	+1.5 dB
		+5 dBm	-1.5 dB	_____	+1.5 dB
		-2 dBm	-1.5 dB	_____	+1.5 dB
7.0 to 13.5 GHz	25.	+12 dBm	-1.5 dB	_____	+1.5 dB
		+5 dBm	-1.5 dB	_____	+1.5 dB
		-2 dBm	-1.5 dB	_____	+1.5 dB
13.5 to 20.0 GHz	25.	+12 dBm	-1.6 dB	_____	+1.6 dB
		+5 dBm	-1.6 dB	_____	+1.6 dB
		-2 dBm	-1.6 dB	_____	+1.6 dB
20 to 26.5 GHz	25.	+8 dBm	-1.9 dB	_____	+1.9 dB
		-2 dBm	-1.9 dB	_____	+1.9 dB
Power Sweep	31.	2 GHz	15 dB	_____	

Table 4-11. Performance Test Record (5 of 7)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT
4-3. FREQUENCY STABILITY TEST					
Frequency Change with 10 dB Power Level Change					
Band 0	7.	2.2 GHz		_____	200 kHz
Band 1		6.0 GHz		_____	200 kHz
Band 2		12.0 GHz		_____	400 kHz
Band 3		18.0 GHz		_____	600 kHz
Band 4		21.0 GHz		_____	800 kHz
4-4. RESIDUAL FM TEST	8.	CW 2.2 GHz		_____	5 kHz peak
		CW 6.8 GHz		_____	5 kHz peak
		CW 13.3 GHz		_____	7 kHz peak
		CW 20 GHz		_____	9 kHz peak
		CW 22 GHz		_____	12 kHz peak
4-5. SPURIOUS SIGNAL TEST					
0.01 to 2.4 GHz	4.	Harmonic <1.5 GHz	< -25 dBc	_____	
		Harmonic >1.5 GHz	< -50 dBc	_____	
		Non-Harmonic	< -50 dBc	_____	
Fundamental Frequency = 2 GHz	12.	Spur Frequency = 4 GHz		_____	
		Harmonic	< -50 dBc	_____	
		Non-Harmonic	< -50 dBc	_____	
		Spur Frequency = 6 GHz		_____	
		Harmonic	< -50 dBc	_____	
		Non-Harmonic	< -50 dBc	_____	
		Spur Frequency = 8 GHz		_____	
		Harmonic	< -50 dBc	_____	
		Non-Harmonic	< -50 dBc	_____	
Fundamental Frequency = 4 GHz	12.	Spur Frequency = 8 GHz		_____	
		Harmonic	< -50 dBc	_____	
		Non-Harmonic	< -50 dBc	_____	
		Spur Frequency = 12 GHz		_____	
		Harmonic	< -50 dBc	_____	
		Non-Harmonic	< -50 dBc	_____	
		Spur Frequency = 16 GHz		_____	
		Harmonic	< -50 dBc	_____	
		Non-Harmonic	< -50 dBc	_____	

Table 4-11. Performance Test Record (6 of 7)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT
4-5. SPURIOUS SIGNAL TEST (cont'd)					
Fundamental Frequency = 10 GHz	12.	Spur Frequency = 5 GHz Harmonic Non-Harmonic Spur Frequency = 20 GHz Harmonic Non-Harmonic	< -50 dBc < -50 dBc < -50 dBc < -50 dBc	_____ _____ _____ _____	
Fundamental Frequency = 15 GHz	12.	Spur Frequency = 5 GHz Harmonic Non-Harmonic Spur Frequency = 10 GHz Harmonic Non-Harmonic	< -50 dBc < -50 dBc < -50 dBc < -50 dBc	_____ _____ _____ _____	
Fundamental Frequency = 22 GHz	12.	Spur Frequency = 5.5 GHz Harmonic Non-Harmonic	< -50 dBc < -50 dBc	_____ _____	
4-6. EXTERNAL FREQUENCY MODULATION TEST					
Direct Coupled	6.	100 Hz CW = 5 GHz	± 12 MHz	_____	
Cross-over Coupled	6.	100 Hz CW = 5 GHz	± 75 MHz	_____	
		100 Hz CW = 10 GHz	± 75 MHz	_____	
		100 Hz CW = 15 GHz	± 75 MHz	_____	
		100 Hz CW = 22 GHz	± 75 MHz	_____	
	13.	CW = 5 GHz 1 MHz	± 7 MHz	_____	
	16.	CW = 5 GHz 2 MHz	± 5 MHz	_____	
		CW = 10 GHz 1 MHz	± 7 MHz	_____	
		CW = 15 GHz 1 MHz	± 7 MHz	_____	
		CW = 22 GHz 1 MHz	± 7 MHz	_____	
	18.	CW = 5 GHz 10 MHz	± 1 MHz	_____	
4-7. SQUARE-WAVE ON/OFF RATIO AND SYMMETRY TEST					
CW at 5 GHz	6.	On/Off Ratio	> 30 dB	_____	
		Symmetry	40%	_____	60%

Table 4-11. Performance Test Record (7 of 7)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT	
4-8. STEP ATTENUATOR ACCURACY TEST (Option 002)	7	CW Frequency = 4 GHz				
		81 (10 dB)	9.5 dB	_____	10.5 dB	
		82 (20 dB)	19.4 dB	_____	20.6 dB	
		84 (30 dB)	29.3 dB	_____	30.7 dB	
		8	Total (60 dB)	58.4 dB	_____	61.6 dB
		7	CW Frequency = 18 GHz			
			81 (10 dB)	9.5 dB	_____	10.5 dB
			82 (20 dB)	19.4 dB	_____	20.6 dB
			84 (30 dB)	29.3 dB	_____	30.7 dB
		8	Total (60 dB)	58.4 dB	_____	61.6 dB
		7	CW Frequency = 26.5 GHz			
			81 (10 dB)	9.5 dB	_____	10.5 dB
			82 (20 dB)	19.4 dB	_____	20.6 dB
			84 (30 dB)	29.3 dB	_____	30.7 dB
		8	Total (60 dB)	58.4 dB	_____	61.6 dB

Table 4-12. Operation Verification Record (1 of 4)

HP 83595C RF PLUG-IN					
Serial No. _____			Tested by _____		
			Date _____		
SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT
4-1. FREQUENCY RANGE AND ACCURACY TEST					
CW Frequency Accuracy					
	6.	CW Frequency = 1.0 GHz	.995 GHz	_____	1.005 GHz
		CW Frequency = 2.2 GHz	2.195 GHz	_____	2.205 GHz
		CW Frequency = 4.0 GHz	3.995 GHz	_____	4.005 GHz
		CW Frequency = 2.5 GHz	2.495 GHz	_____	2.505 GHz
		CW Frequency = 6.8 GHz	6.795 GHz	_____	6.805 GHz
		CW Frequency = 10.0 GHz	9.99 GHz	_____	10.01 GHz
		CW Frequency = 7.1 GHz	7.09 GHz	_____	7.11 GHz
		CW Frequency = 14.0 GHz	13.99 GHz	_____	14.01 GHz
		CW Frequency = 17.0 GHz	16.99 GHz	_____	17.01 GHz
		CW Frequency = 14.0 GHz	13.99 GHz	_____	14.01 GHz
		CW Frequency = 19.80 GHz	19.79 GHz	_____	19.81 GHz
		CW Frequency = 22.0 GHz	21.998 GHz	_____	22.012 GHz
		CW Frequency = 20.5 GHz	20.488 GHz	_____	20.512 GHz
	8.	CW Frequency = 26.5 GHz	6.622 GHz	_____	6.628 GHz
Swept Frequency Accuracy					
Full Band					
	14.	Start 10 MHz ± 50 MHz	0 MHz	_____	60 MHz
	18.	Stop 26.5 GHz ± 50 MHz	6.611 GHz	_____	6.639 GHz
Band 0					
	14.	Start 10 MHz ± 15 MHz	0 MHz	_____	25 MHz
	18.	Stop 2.4 GHz ± 15 MHz	2.385 GHz	_____	2.415 GHz
Band 1					
	14.	Start 2.4 GHz ± 20 MHz	2.38 GHz	_____	2.420 GHz
	18.	Stop 7.0 GHz ± 20 MHz	6.98 GHz	_____	7.02 GHz
Band 2					
	14.	Start 7.0 GHz ± 25 MHz	6.975 GHz	_____	7.025 GHz
	18.	Stop 13.5 GHz ± 25 MHz	13.475 GHz	_____	13.525 GHz
Band 3					
	14.	Start 13.5 GHz ± 30 MHz	13.47 GHz	_____	13.53 GHz
	18.	Stop 20.0 GHz ± 30 MHz	19.97 GHz	_____	20.03 GHz
Band 4					
	14.	Start 20.0 GHz ± 35 MHz	19.965 GHz	_____	20.035 GHz
	18.	Stop 26.5 GHz ± 35 MHz	6.61625 GHz	_____	6.63375 GHz

Table 4-12. Operation Verification Record (2 of 4)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT
4-1. FREQUENCY RANGE AND ACCURACY TEST (cont'd.)					
Frequency Marker Accuracy					
Full Band	27	M1 at 1 GHz	.818 GHz	_____	1.182 GHz
		M1 at 4 GHz	3.818 GHz	_____	4.182 GHz
		M1 at 12 GHz	11.818 GHz	_____	12.182 GHz
		M1 at 18 GHz	17.818 GHz	_____	18.182 GHz
		M1 at 22 GHz	21.818 GHz	_____	22.182 GHz
Band 0		M1 at 1 GHz	.973 GHz	_____	1.027 GHz
		M1 at 2 GHz	1.973 GHz	_____	2.027 GHz
Band 1		M1 at 3 GHz	2.957 GHz	_____	3.043 GHz
		M1 at 6 GHz	5.957 GHz	_____	6.043 GHz
Band 2		M1 at 8 GHz	7.942 GHz	_____	8.058 GHz
		M1 at 12 GHz	11.942 GHz	_____	12.058 GHz
Band 3		M1 at 15 GHz	14.937 GHz	_____	15.063 GHz
		M1 at 18 GHz	17.937 GHz	_____	18.063 GHz
Band 4		M1 at 21 GHz	20.932 GHz	_____	21.068 GHz
	M1 at 22 GHz	21.932 GHz	_____	22.068 GHz	
4-2. OUTPUT AMPLITUDE TEST Standard or Option 004*					
Maximum Leveled Output Power					
	18.				
0.01 to 2.4 GHz		+13 dBm	+13 dBm	_____	
2.4 to 7.0 GHz		+13 dBm	+13 dBm	_____	
7.0 to 13.5 GHz		+13 dBm	+13 dBm	_____	
13.5 to 20.0 GHz		+13 dBm	+13 dBm	_____	
20.0 to 26.5 GHz		+10 dBm	+10 dBm	_____	
0.01 to 26.5 GHz	+10 dBm	+10 dBm	_____		
Output Power Variation					
	21.				
0.01 to 2.4 GHz		+13 dBm		_____	± .9 dB
2.4 to 7.0 GHz		+13 dBm		_____	± .7 dB
7.0 to 13.5 GHz		+13 dBm		_____	± .7 dB
13.5 to 20.0 GHz		+13 dBm		_____	± .8 dB
20.0 to 26.5 GHz		+10 dBm		_____	± .9 dB
0.01 to 26.5 GHz	+10 dBm		_____	± 2.0 dB	

* For option 004 instruments, max leveled output power is 1 dB less than shown.

Table 4-12. Operation Verification Record (3 of 4)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT
4-2. OUTPUT AMPLITUDE TEST (cont'd.)					
Power Level Accuracy					
0.01 to 2.4 GHz	25.	+13 dBm	-1.5 dB	_____	+1.5 dB
		+5 dBm	-1.5 dB	_____	+1.5 dB
		-2 dBm	-1.5 dB	_____	+1.5 dB
2.4 to 7.0 GHz	25.	+13 dBm	-1.3 dB	_____	+1.3 dB
		+5 dBm	-1.3 dB	_____	+1.3 dB
		-2 dBm	-1.3 dB	_____	+1.3 dB
7.0 to 13.5 GHz	25.	+13 dBm	-1.3 dB	_____	+1.3 dB
		+5 dBm	-1.3 dB	_____	+1.3 dB
		-2 dBm	-1.3 dB	_____	+1.3 dB
13.5 to 20 GHz	25.	+13 dBm	-1.4 dB	_____	+1.4 dB
		+5 dBm	-1.4 dB	_____	+1.4 dB
		-2 dBm	-1.4 dB	_____	+1.4 dB
20 to 26.5 GHz	25.	+10 dBm	-1.7 dB	_____	+1.7 dB
		+4 dBm	-1.7 dB	_____	+1.7 dB
		-2 dBm	-1.7 dB	_____	+1.7 dB
Power Sweep	31.	2 GHz	15 dB	_____	
4-2. OUTPUT AMPLITUDE TEST Option 002*					
Maximum Leveled Output Power	18.				
0.01 to 2.4 GHz		+13 dBm	+13 dBm	_____	
2.4 to 7.0 GHz		+12 dBm	+12 dBm	_____	
7.0 to 13.5 GHz		+12 dBm	+12 dBm	_____	
13.5 to 20 GHz		+12 dBm	+12 dBm	_____	
20 to 26.5 GHz		+8 dBm	+8 dBm	_____	
0.01 to 26.5 GHz		+8 dBm	+8 dBm	_____	

* For option 004 instruments, max leveled output power is 1 dB less than shown.

Table 4-12. Operation Verification Record (4 of 4)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	LOWER LIMIT	MEASURED VALUE	UPPER LIMIT
4-2. OUTPUT AMPLITUDE TEST Option 002 (cont'd.)					
Output Power Variation					
0.01 to 2.4 GHz	21.	+13 dBm		_____	±.9 dB
2.4 to 7.0 GHz		+12 dBm		_____	±.7 dB
7.0 to 13.5 GHz		+12 dBm		_____	±.7 dB
13.5 to 20.0 GHz		+12 dBm		_____	±.8 dB
20 to 26.5 GHz		+8 dBm		_____	±.9 dB
0.01 to 26.5 GHz		+8 dBm		_____	±2.0 dB
Power Level Accuracy					
0.01 to 2.4 GHz	25.	+13 dBm	-1.7 dB	_____	+1.7 dB
		+5 dBm	-1.7 dB	_____	+1.7 dB
		-2 dBm	-1.7 dB	_____	+1.7 dB
2.4 to 7.0 GHz	25.	+12 dBm	-1.5 dB	_____	+1.5 dB
		+5 dBm	-1.5 dB	_____	+1.5 dB
		-2 dBm	-1.5 dB	_____	+1.5 dB
7.0 to 13.5 GHz	25.	+12 dBm	-1.5 dB	_____	+1.5 dB
		+5 dBm	-1.5 dB	_____	+1.5 dB
		-2 dBm	-1.5 dB	_____	+1.5 dB
13.5 to 20.0 GHz	25.	+12 dBm	-1.6 dB	_____	+1.6 dB
		+5 dBm	-1.6 dB	_____	+1.6 dB
		-2 dBm	-1.6 dB	_____	+1.6 dB
20 to 26.5 GHz	25.	+8 dBm	-1.9 dB	_____	+1.9 dB
		-2 dBm	-1.9 dB	_____	+1.9 dB
Power Sweep	31.	2 GHz	15 dB	_____	

Section 5. Adjustments

INTRODUCTION

This section provides adjustment procedures for the HP 83595C RF Plug-in. These procedures should be used only in the following cases:

- After replacement of a part or component.
- When performance tests show that the plug-in has not met the specifications of table 1-1.

Table 5-1 lists all of the adjustments by reference designation, adjustment name, adjustment number, and description. Table 5-2 lists each assembly and its related adjustment.

NOTE: Allow the plug-in and the sweep oscillator mainframe to warm up for 30 minutes prior to making any adjustments. Use a *non-metallic* adjustment tool whenever possible.

SAFETY CONSIDERATIONS

Although this instrument has been designed in accordance with international safety standards, this manual contains information, cautions, and warnings which must be followed to ensure safe operation and to retain the instrument in safe condition. Service and adjustments should be performed only by a skilled person who is aware of the hazards.

WARNING

Voltages exist in this instrument which can cause personal injury. Additionally, capacitors inside the instrument may still be charged even if the instrument is disconnected from its power source.

EQUIPMENT REQUIRED

The equipment required for the adjustment procedures is listed in table 1-4 in section 1. If the recommended test equipment is not available, other equipment may be used if its performance meets the critical specifications listed in the table. The specified equipment required for each adjustment is also listed at the beginning of each adjustment procedure. Adapters may be required that are not listed or shown in the equipment setup.

RELATED ADJUSTMENTS

Interactive adjustments are noted in the adjustment procedures. Table 5-2 indicates, by adjustment number, the adjustments that must be performed if an assembly has been repaired or replaced or if an adjustment has been made to an assembly. The adjustment procedures are given in the proper order to allow for interrelated adjustments.

Table 5-1. Adjustments (1 of 2)

Adjustment Number and Name		Description	Potentiometers Affected
5-1.	-10V Reference on A8 YO Driver	Adjusts the -10V reference power	A8R44 (-10V)
5-2.	Sweep Control Adjustments	Scales the HP 8350 VTUNE (tuning voltage) for use by the A7 YTM and A8 YO driver assemblies. Also optimizes the bandswitch sequencing.	A6R16 (TV GAIN), A6R21 (DAC CAL), A6R24 (B3), A6R26 (B2), A6R28 (B1), A6R30 (B0), A6R34 (-10V Offset) A6R37 (SP)
5-3.	YO and YTM/YTF DAC Calibration	Calibrates the voltage tune and offset DACs on the A8 YO driver and A7 YTM assemblies. Optimizes the YTM/YTF delay compensation circuits.	A7R18 (Z), A7R19 (GAIN), A7R24 (OFS), A7R83 (YTF GAIN), A7R85 (YTF OFS), A8R18 (Z), A8R19 (GAIN), A8R22 (ZRO), A8R24 (OFS)
5-4.	Frequency Accuracy	Matches the displayed frequency to the plug-in output frequency by programming in a correction factor.	A8S1 (OFFSET), A8S2 (GAIN)
5-5.	Band Overlap	The gain of the variable gain amplifier (A6) is adjusted for a smooth frequency transition between bands.	A6R24 (B3), A6R26 (B2), A6R28 (B1)
5-6.	YO Retrace Compensation	Fine tunes the retrace compensation circuit to maximize the YO frequency settling time during bandswitch.	A8R55 (RTC COMP)
5-7.	YO Delay Compensation	Optimizes delay compensation circuit for fast sweep speeds.	A8R10 (HI), A8R12 (LO), A8R18 (Z)
5-8.	Slow Speed YTM/YTF to YO Tracking	Optimizes the output power by tracking the passband of the YTM with the output of the YIG oscillator	A7S1 (OFFSET), A7S2 (GAIN)
5-9.	SRD Bias	Sets the SRD bias for the YTM to obtain maximum output power.	A6R12 (C), A6R63 (3HL), A6R68 (2H), A6R69 (3H), A6R70 (4H), A6R73 (2L), A6R74 (3L), A6R75 (4L)

Table 5-1. Adjustments (2 of 2)

Adjustment Number and Name		Description	Potentiometers Affected
5-10.	YTM Delay Compensation	The YTM delay compensation circuit is adjusted to optimize the YTM to YO tracking over varying sweep rates. Adjusts the YTF tracking, gain, offset, and delay compensation.	A7R10 (SGL HI), A7R12 (SGL LO), A7R42 (SEQ HI), A7R43 (SEQ LO), A7R45 (SEQ TC), A7R46 (SGL TC), A7R51 (B1 OFS), A7R55 (RTC COMP), A7R76 (B1 GAIN) A7R78 (T) A7R105 A7R202 (YTF GAIN), A7R207 (YTF OFFSET)
5-11.	Frequency Reference 1V/GHz Output	The frequency reference rear panel output is adjusted for a 1V/GHz output.	A2R1 (GAIN), A2R4 (OFFSET), A2R6 (BAND 0 OFFSET), A2R23 (BAND 0 GAIN)
5-12.	ALC Adjustment	Compensates for DC offsets in the detected RF path and the main ALC amplifier. Optimizes ALC flatness.	A4R1 (SLP), A4R7 (0 HI), A4R8 (1 HI), A4R9 (0 MD), A4R10 (1 MD), A4R12 (1 LO), A4R13 (0 LO), A4R14 (BIAS), A5R34 (BP1), A5R36 (BP2), A5R38 (BP3), A5R40 (BP4), A5R41 (SL1), A5R42 (SL2), A5R43 (SL3), A5R44 (SL4), A5R48 (SLP), A4R78, A4R81 (OFS1), A4R82 (OFS2), A4R107 (CL2) A4R111 (CL1)
5-13.	ALC Gain Adjustment	Maximizes ALC loop gain without producing oscillations.	A4R15 (GAIN)
5-14.	Squarewave Symmetry Adjustment	Minimizes squarewave overshoot and adjusts the duty cycle.	A4C23 (SYM 1), A4R92*, A4R99 (SYM 2)
5-15.	Power Sweep	Output of the power sweep circuit is adjusted for correct sweep.	A5R50 (PWSP)
5-16.	FM Driver	The FM driver high frequency offset is adjusted for a zero volt drive with no FM applied.	A5C14 (LO), A5R19 (FM OFFSET) A5R31*, A5R75 (HI)

* Selected Value Resistor

Table 5-2. Related Adjustments

Assembly Changed or Repaired	Related Assemblies (in order of Adjustments)	Perform the Following Adjustments
A1/A2 Front Panel	A2	5-11
A3 Digital Interface	A3	(Refer to table 3-3 in "Operation")
A4 ALC	A4, A5	5-12 through 5-14
A5 FM	A4, A5	5-12 through 5-16
A6 Sweep Control	A6, A8, A7	5-2 through 5-10
A7 YTM Driver	A6, A8, A7	5-2 through 5-10
A8 YO Driver	A6, A8, A7	5-2 through 5-10
A11 Cavity Oscillator	A4, A5	5-12 through 5-14
A12 YIG Tuned Multiplier	A6, A8, A7, A2	5-2 through 5-11
A13 2.2 to 7.0 GHz Oscillator	A6, A8, A7, A2, A5	5-2 through 5-7, 5-10, 5-11, and 5-16
A14 Power Amplifier	A4, A5	5-12 through 5-14
A15 DC Return	A4, A5	5-12 through 5-14
A16 Modulator/Splitter	A4, A5	5-12 through 5-14
A17 0.01 to 2.4 GHz Amplifier	A4, A5	5-12 through 5-14
A18 Modulator/Mixer	A4, A5	5-12 through 5-14
A21 Amplifier	A4, A5	5-12 through 5-14
DC1 Directional Detector	A4, A5	5-12 through 5-14
DC2 Directional Coupler	A4, A5	5-12 through 5-14

5-1. -10 Volt Reference on A8 YO Driver

DESCRIPTION

The -10 volt reference voltage source on the A8 YO driver board is used as a reference voltage for the DACs on the A4 ALC, A6 sweep control, A7 YTM driver, and A8 YO driver boards. The -10 volt reference output voltage is set by the A8R44 -10V adjustment while monitoring A8TP12.

EQUIPMENT

Digital Voltmeter HP 3456A
Sweep Oscillator Mainframe HP 8350

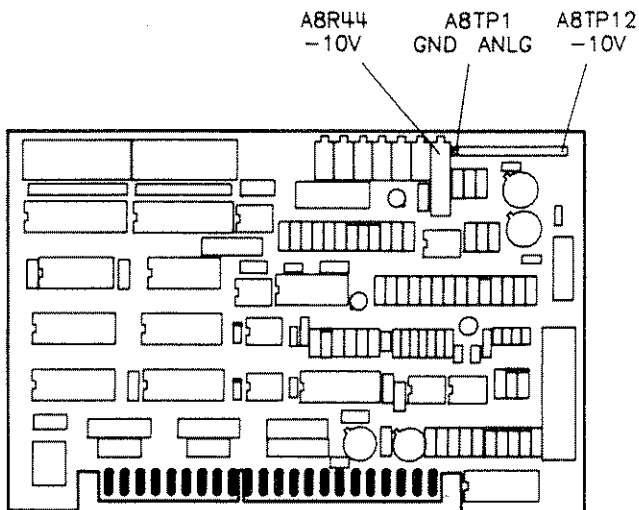


Figure 5-1. -10V Reference Adjustment Location

PROCEDURE

1. Connect the DVM HI to A8TP12 (-10V) with DVM LO to A8TP1 (GND ANLG).
2. Adjust A8R44 (-10V) for a DVM reading of -10 ± 0.001 V dc. See figure 5-1 for -10 volt reference adjustment location.

5-2. Sweep Control Adjustments

DESCRIPTION

With the tuning voltage (VTUNE) set to +10V (CW frequency of 26.5 GHz), the tuning voltage buffer is set for unity gain, and the DAC CAL adjustment is set to equalize the bandswitch comparator DAC and tuning voltage buffer inputs to the variable gain amplifier (DAC CAL is set for 0V at A6TP4). The -10V OFFSET adjustment is then set to offset the variable gain amplifier output by -10V. The gain of the variable gain amplifier is then calibrated at the low end of each frequency band. The plug-in is then swept across its full frequency range and SP is adjusted to set the bandswitch points.

EQUIPMENT

Digital Voltmeter	HP 3456A
Oscilloscope	HP 1741A
1:1 Probe	HP 10008B
Sweep Oscillator Mainframe	HP 8350

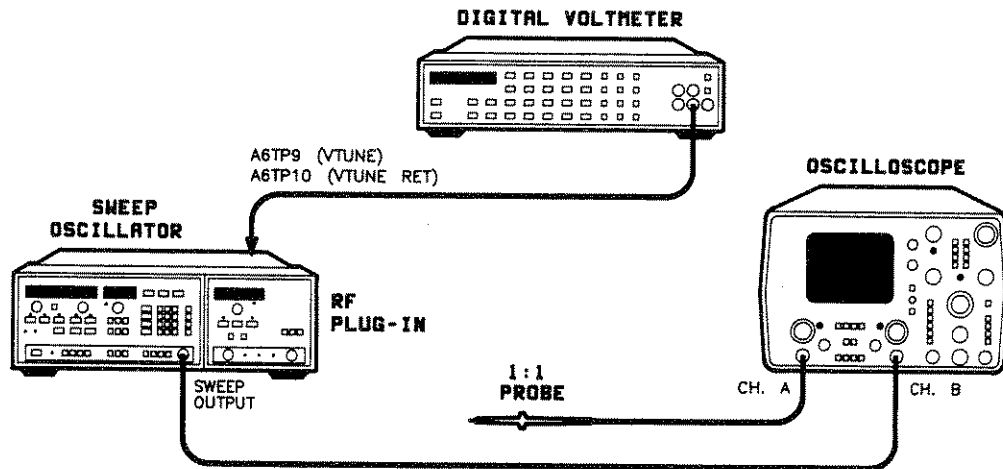


Figure 5-2. Sweep Control Adjustments Test Setup

PROCEDURE

1. Ensure that A3S1 switch position 1 is in the OPEN (up) position. See table 3-3 in "Operation" for configuration information. (NOTE: An [INSTR PRESET] must be performed *everytime* the switch position is changed)
2. Set up the equipment as shown in figure 5-2 with the DVM HI connected to A6TP9 (V TUNE) and DVM LO connected to A6TP10 (V TUNE RET). See figure 5-3 for test point location. Do not connect the oscilloscope probe yet.
3. On the sweep oscillator/plug-in, press:

[INSTR PRESET] [CW] [2] [6] [.] [5] [GHz]

5-2. Sweep Control Adjustments (Cont'd)

Adjust the sweep oscillator FREQ VERNIER for a DVM reading of 10 ± 0.001 V dc.

NOTE: The following voltage measurement procedures on the A6 sweep control board are made with DVM LO connected to A8TP1 (which is electrically the same as motherboard ground).

4. Connect DVM HI to A6TP5 and adjust A6R16 (TV GAIN) for a DVM reading of -10 ± 0.001 V dc. See figure 5-3 for sweep control adjustment locations.
5. Connect DVM HI to A6TP4 and adjust A6R21 (DAC CAL) for a DVM reading of 0 ± 0.001 V dc.
6. Connect DVM HI to A6TP8 (BV TUNE) and adjust A6R34 for a DVM reading of -10 ± 0.001 V dc.
7. On the sweep oscillator/plug-in, press:
[CW] [2] [0] [GHz]
8. Connect DVM HI to A6TP5 and adjust the sweep oscillator FREQ VERNIER control for a DVM reading of -7.54624 ± 0.00005 V dc.
9. Connect DVM HI to A6TP8 and adjust A6R24 (B3) for a DVM reading of 0 ± 0.001 V dc.

5-2. Sweep Control Adjustments (Cont'd)

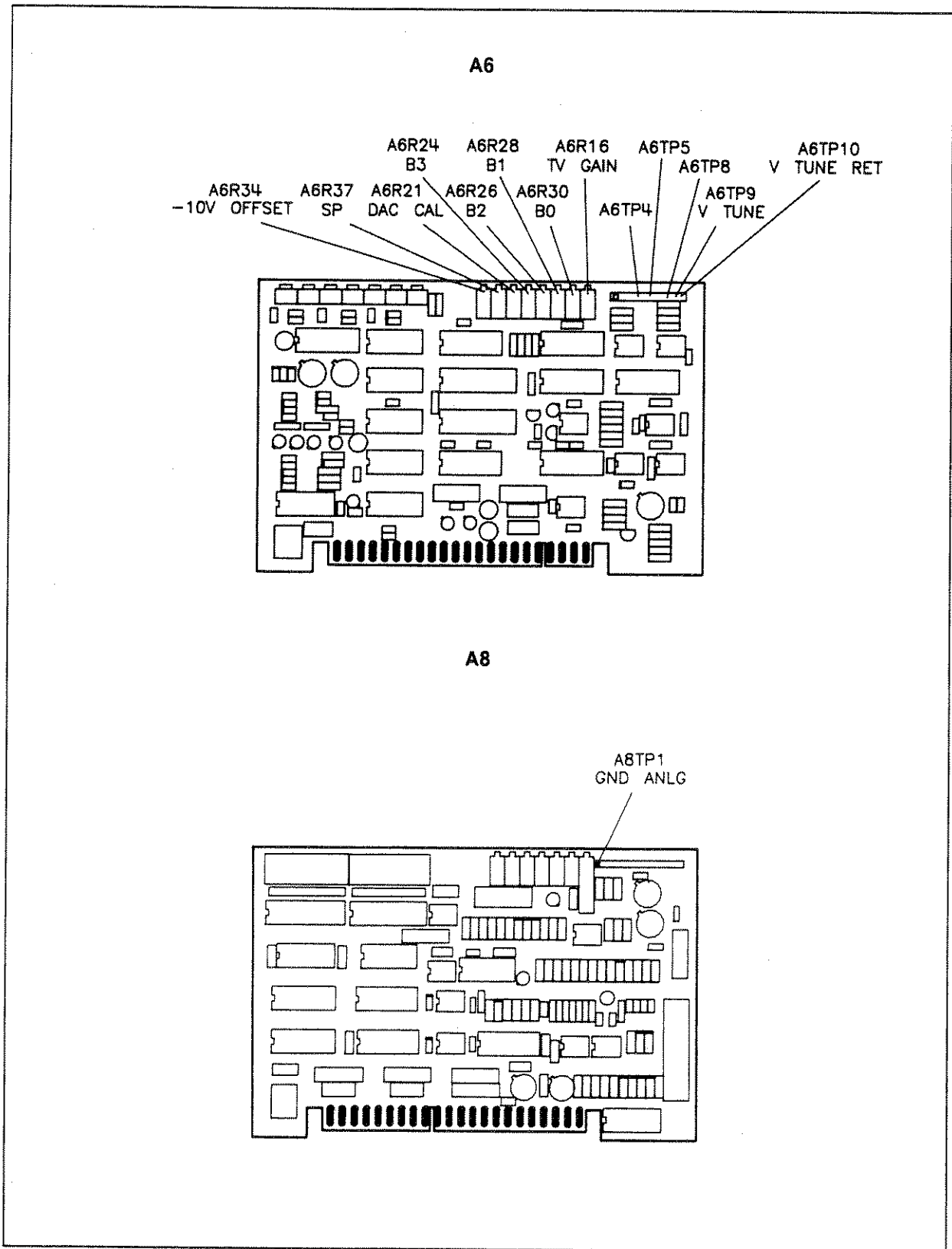


Figure 5-3. Sweep Control Adjustment Locations

5-2. Sweep Control Adjustments (Cont'd)

10. On the sweep oscillator/plug-in, press:

[CW] [1] [3] [.] [5] [GHz]

11. Connect DVM HI to A6TP5 and adjust the sweep oscillator FREQ VERNIER control for a DVM reading of -5.09249 ± 0.00005 V dc.

12. Connect DVM HI to A6TP8 and adjust A6R24 (B3) for a DVM reading of 0 ± 0.001 V dc.

13. Repeat steps 7 through 12 until the voltage at A6TP8 is optimized at 20 GHz and at 13.5 GHz (A6R24 is the adjustment for both bands 3 and 4.)

14. On the sweep oscillator/plug-in, press:

[CW] [7] [GHz]

15. Connect DVM HI to A6TP5 and adjust the sweep oscillator FREQ VERNIER control for a DVM reading of -2.63873 ± 0.00005 V dc.

16. Connect DVM HI to A6TP8 and adjust A6R26 (B2) for a DVM reading of 0 ± 0.001 V dc.

17. On the sweep oscillator/plug-in, press:

[CW] [2] [.] [4] [GHz]

18. Connect DVM HI to A6TP5 and adjust the sweep oscillator FREQ VERNIER control for a DVM reading of -0.90223 ± 0.00005 V dc.

19. Connect DVM HI to A6TP8 and adjust A6R28 (B1) for a DVM reading of 0 ± 0.001 V dc.

20. On the sweep oscillator/plug-in, press:

[CW] [1] [0] [MHz]

21. Connect DVM HI to A6TP5 and adjust the sweep oscillator FREQ VERNIER control for a DVM reading of 0 ± 0.00005 V dc.

22. Connect DVM HI to A6TP8 and adjust A6R30 (B0) for a DVM reading of 0 ± 0.001 V dc.

23. On the sweep oscillator/plug-in, press:

[INSTR PRESET]

24. Set the oscilloscope settings as follows:

Select A vs B

Set CHAN A for 0.5V/DIV, DC coupled

Connect the oscilloscope probe to A6TP8.

25. Adjust the oscilloscope vertical position control to set the top of the first full 0 to -10 volt sweep ramp on the center line as shown in figure 5-4.

5-2. Sweep Control Adjustments (Cont'd)

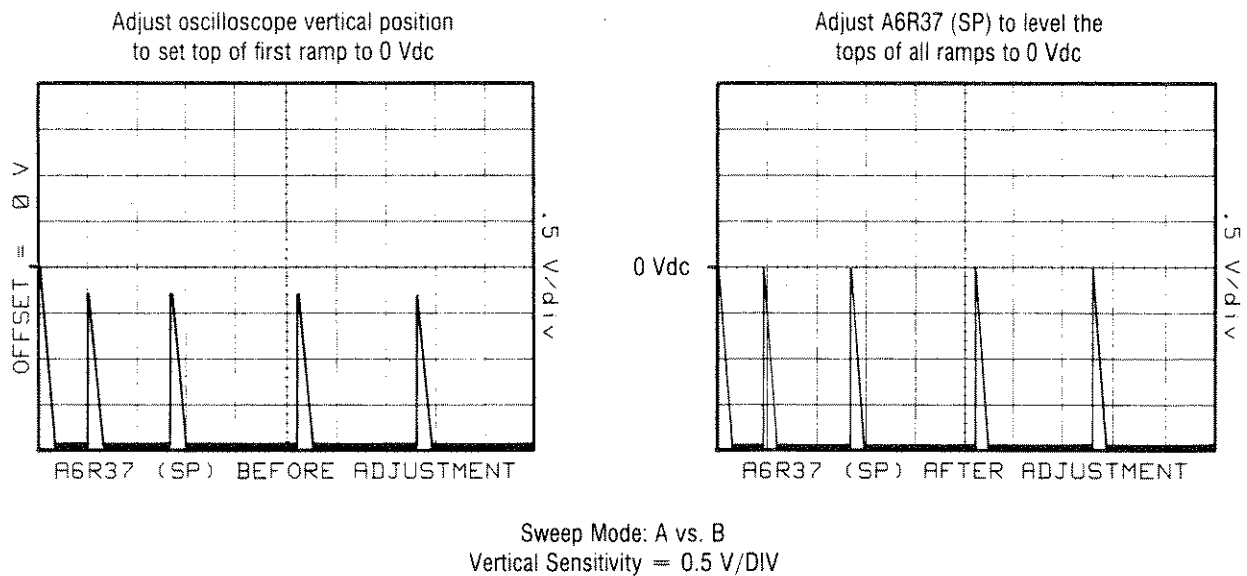


Figure 5-4. Sweep Control Adjustment Waveforms

26. Adjust A6R37 (SP) to bring the tops of the remaining 0 to -10 volt sweep ramps to the center graticule as shown in figure 5-4.
27. Reset A3S1 switch position 1 to the closed (down) position. See table 3-3 in "Operation" for switch configuration information.

5-3. YO and YTM/YTF DAC Calibration

DESCRIPTION

The sweep oscillator is set for a CW frequency of 26.5 GHz and then fine-tuned for a tuning voltage (VTUNE) of +10 V. The hex data write feature of the sweep oscillator is used to load each DAC with either all ones or all zeros. The A8 YO driver is adjusted first. With both the scaled voltage tune and offset DACs loaded with all zeros, the YO collector output is monitored and the +20 V tracking amplifier ZRO adjustment is set. Each DAC is then loaded with all ones and the respective offset or gain adjustment is set. The A7 YTM/YTF driver is adjusted the same way. The sweep oscillator is then set into the swept CW mode and the delay compensation circuits on both A7 and A8 are adjusted for 0 V output.

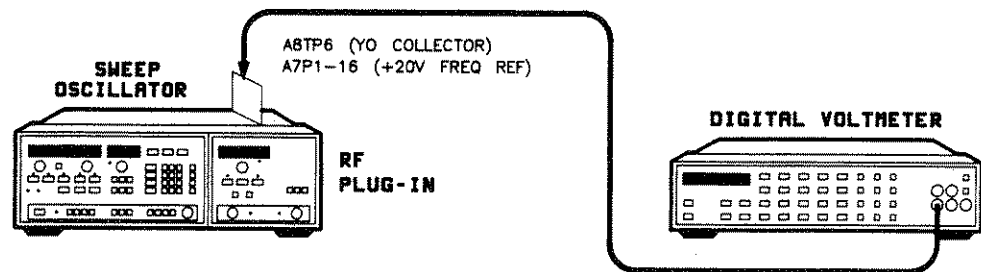


Figure 5-5. YO and YTM/YTF DAC Calibration Test Setup

EQUIPMENT

Digital Voltmeter	HP 3456A
Sweep Oscillator Mainframe	HP 8350

PROCEDURE:

1. Connect the equipment as shown in figure 5-5. First connect the DVM to A6TP9 (VTUNE) and the reference probe to A6TP10 (VTUNE RET). See figure 5-6 for test point and adjustment locations. Place the A7 board on the extender.
2. On the sweep oscillator, press
[INSTR PRESET] [CW] [2] [6] [.] [5] [GHz]
3. Adjust the sweep oscillator FREQ VERNIER for a DVM reading of $+10 \pm 0.001$ V dc.
4. Float the ground on the DVM. Connect the DVM to A8TP6 (YO collector) with the reference probe connected to A7P1-16 (+20V FREQ REF).

5-3. YO and YTM/YTF DAC Calibration (Cont'd)

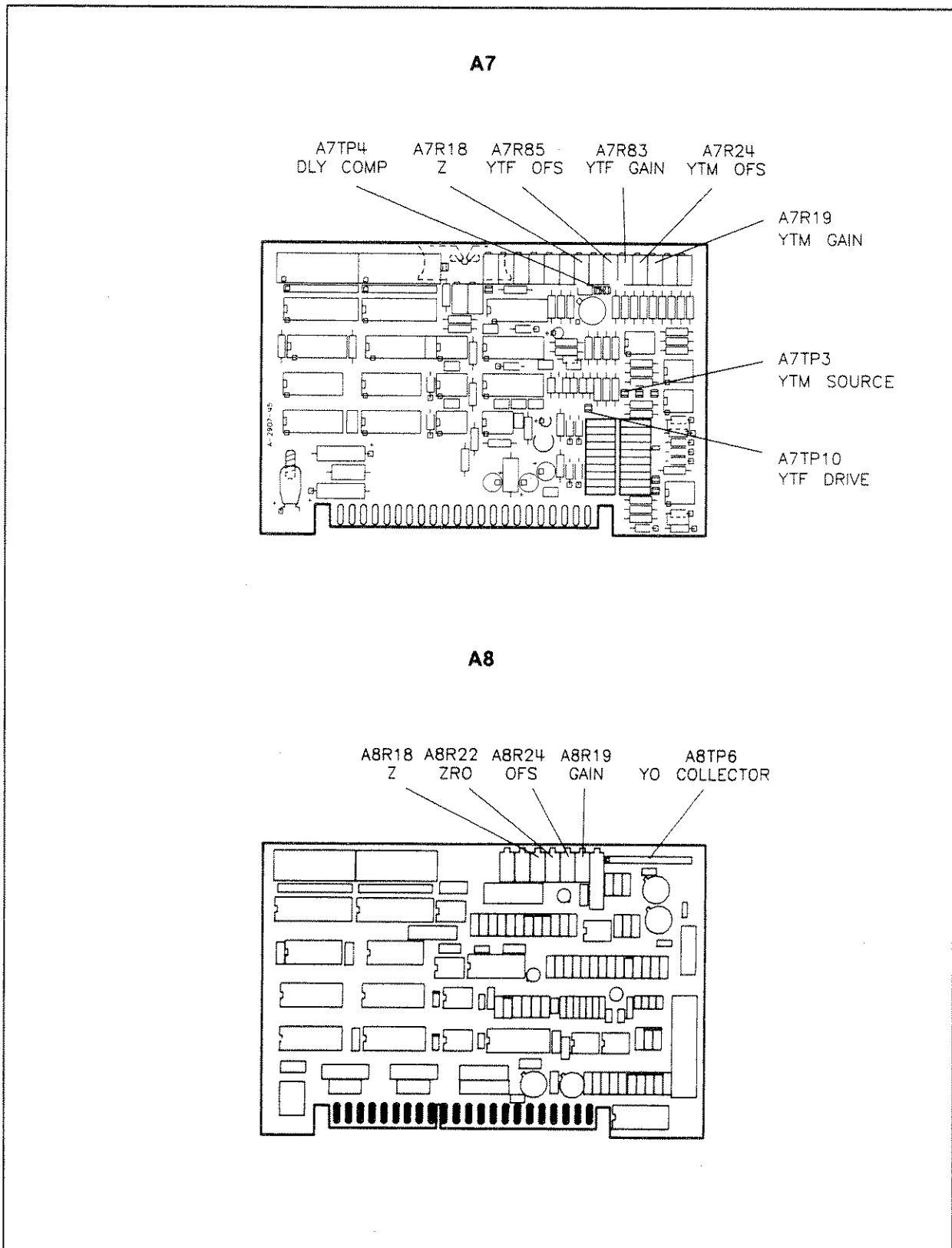


Figure 5-6. YO and YTM/YTF DAC Calibration Adjustment Locations

5-3. YO and YTM/YTF DAC Calibration (Cont'd)

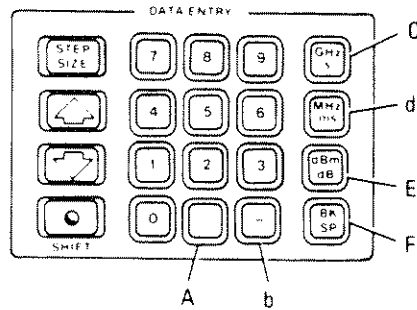


Figure 5-7. Front Panel Hexadecimal Entry Keys

- Use the hex data write feature to write all zeros to both DACs on the A8 YO driver:

[SHIFT] [0] [0]	Enter hex data command
[2] [GHz] [8] [0]	Address location 2C80
[M2]	Hex data write
[0] [0]	Enter hex data 00
[▲] [0] [0]	Increment address to 2C81 and write 00
[▲] [0] [0]	Increment address to 2C82 and write 00
[▲] [0] [0]	Increment address to 2C83 and write 00

- Adjust A8R22 (ZRO) for a DVM reading of -7.000 ± 0.001 V dc.
- Use the hex data write feature to write zeros to the scaled voltage tune DAC and ones to the offset DAC as follows:

[▼] [▼] [▼]	Decrement address to 2C80
[0] [BKSP]	Enter hex data 0F
[▲] [0] [F]	Increment address to 2C81 and write 0F
[▲] [0] [F]	Increment address to 2C82 and write 0F
[▲] [0] [F]	Increment address to 2C83 and write 0F

- Adjust A8R24 (OFS) for a DVM reading of -20.000 ± 0.001 V dc.
- Use the hex data write feature to write ones to the scaled voltage tune DAC and zeros to the offset DAC as follows:

[▼] [▼] [▼]	Decrement address to 2C80
[F] [0]	Enter hex data F0
[▲] [F] [0]	Increment address to 2C81 and write F0
[▲] [F] [0]	Increment address to 2C82 and write F0
[▲] [F] [0]	Increment address to 2C83 and write F0

5-3. YO and YTM/YTF DAC Calibration (Cont'd)

10. Adjust A8R19 (GAIN) for a DVM reading of -26.500 ± 0.001 V dc.

11. Use the hex data write feature to write all zeros to both DACs on the A7 YTM/YTM driver as follows:

[▲][▲][▲][▲][▲]	Increment address to 2C88
[0][0]	Enters hex data 00
[▲][0][0]	Increment address to 2C89 and write 00
[▲][0][0]	Increment address to 2C8A and write 00
[▲][0][0]	Increment address to 2C8B and write 00

12. Set the front panel FILTER PEAK potentiometer to its mid-range. Connect the DVM to A7TP10 (YTF SOURCE) with the reference probe at A8TP1 (GND ANLG). The DVM should read 0.000 ± 0.0001 . If not, adjust the FILTER PEAK potentiometer.

13. Use the hex data write feature to write zeros to the scaled voltage tune DAC and to write ones to the offset DAC as follows:

[▼][▼][▼]	Decrement address to 2C88
[0][BK SP]	Enter hex data 0F
[▲][0][F]	Increment address to 2C89 and write 0F
[▲][0][F]	Increment address to 2C8A and write 0F
[▲][0][F]	Increment address to 2C8B and write 0F

14. Connect the DVM to A7TP3 (reference probe at A8TP1). Adjust A7R24 (OFS) for a DVM reading of -7.000 ± 0.001 V dc.

15. Connect the DVM to A7TP10 (with the reference probe still at A8TP1). Adjust A7R85 (YTF OFS) for a DVM reading of -7.605 ± 0.001 V dc.

16. Use the hex data write feature to write ones to the scaled voltage tune DAC and to write zeros to the offset DAC as follows:

[▼][▼][▼]	Decrement address to 2C88
[BK SP][0]	Enter hex data F0
[▲][F][0]	Increment address to 2C89 and write F0
[▲][F][0]	Increment address to 2C8A and write F0
[▲][F][0]	Increment address to 2C8B and write F0

17. Connect the DVM to A7TP3. Adjust A7R19 (GAIN) for a DVM reading of -2.500 ± 0.001 V dc.

18. Connect the DVM to A7TP10. Adjust A7R83 (YTF GAIN) for a DVM reading of -2.715 ± 0.001 V dc.

19. On the sweep oscillator, press:

[INSTR PRESET][SHIFT][CW]

20. Connect the DVM to A7TP4 with reference to A8TP1 (GND ANLG).

21. Adjust A7R18 (Z) for a DVM reading of 0.000 ± 0.001 V dc.

22. Connect the DVM to A8TP9 with reference to A8TP1 (GND ANLG).

23. Adjust A8R18 (Z) for a DVM reading of 0.000 ± 0.001 V dc.

5-4. Frequency Accuracy

DESCRIPTION

The plug-in CW frequency is set first to the low end and then to the high end of band 2. When the output frequency matches the front panel frequency display, the calibration switches on A8 are set for the appropriate correction factor. A8S1 affects the lower portion of the band and A8S2 affects the high portion of the band.

NOTE: Ensure that A3S1 switch 1 is closed.

EQUIPMENT

Frequency Counter	HP 5343A
Sweep Oscillator Mainframe	HP 8350

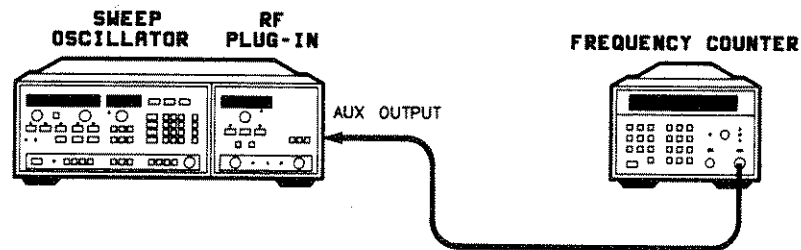


Figure 5-8. Preliminary Frequency Accuracy Test Setup

PROCEDURE

1. Connect the equipment as shown in figure 5-8 with the frequency counter connected to the plug-in rear panel AUX OUTPUT connector.
2. Adjust the plug-in FREQ CAL control to the center of its mechanical range.
3. On the sweep oscillator/plug-in, press:
[INSTR PRESET] [CW] [6] [.] [9] [GHz] [SAVE_n] [1]
[CW] [1] [3] [.] [5] [GHz] [SAVE_n] [2]
4. On the frequency counter, press:
[SET] [.] [2] [ENTER]

5-4. Frequency Accuracy (Cont'd)

This sets the frequency counter in a mode which displays twice the input frequency. This step compensates for the frequency of the rear panel AUX OUTPUT (the YO fundamental frequency), which is half of the sweep oscillator output frequency in band 2.

Low End Frequency Calibration

5. On the sweep oscillator/plug-in, press:

[RECALLn] [1] (The sweep oscillator FREQUENCY display should show 6.900 GHz.)

[SHIFT] [9] [0] (selects the low end frequency calibration mode)

6. Adjust the plug-in control knob to display 6.900 ± 0.003 GHz on the frequency counter.
7. Set switch A8S1 for the hexadecimal value shown in the plug-in POWER display (see table 8-4 in "Service"). See figure 5-9 for the location of the frequency calibration switches. See figure 5-10 for an illustration of the calibration switch configuration.

8. On the sweep oscillator/plug-in, press:

[INSTR PRESET] [RECALLn] [1]

Verify that the frequency counter reads 6.900 ± 0.010 GHz.

High End Frequency Calibration

9. On the sweep oscillator/plug-in, press:

[RECALLn] [2] (The sweep oscillator FREQUENCY display should show 13.500 GHz.)

[SHIFT] [9] [1] (selects the high end frequency calibration mode)

10. Adjust the RF plug-in control knob to display 13.500 ± 0.003 GHz on the frequency counter.
11. Set switch A8S2 for the value shown in the RF plug-in POWER display in the same manner as in step 7.
12. On the sweep oscillator/plug-in, press:

[INSTR PRESET] [RECALLn] [2] (Verify that the frequency counter reads 13.500 ± 0.010 GHz.)

[RECALLn] [1]

13. Manually adjust the sweep oscillator FREQUENCY control across band 2 (6.9 to 13.5 GHz) and check for frequency counter readings to ensure that they correspond to the sweep oscillator FREQUENCY display reading within ± 5 MHz. If necessary, repeat steps 5 through 12.

14. On the frequency counter, press:

[SET] [.] [4] [ENTER]

This sets the frequency counter to display 4 times the input frequency.

15. On the sweep oscillator/plug-in, press:

[CW] [2] [6] [.] [5] [GHz]

5-4. Frequency Accuracy (Cont'd)

16. Verify that the frequency counter displays $26.5 \text{ GHz} \pm 12 \text{ MHz}$. If necessary, repeat steps 5 through 13.
17. On the sweep oscillator/plug-in, press:
[INSTR PRESET] [CW] [5] [0] [MHz]
18. On the frequency counter, press:
[RESET] and connect the RF OUTPUT of the plug-in to the LOW FREQUENCY INPUT of the counter.
19. While observing the frequency counter display, adjust the **FREQ CAL** control for 50 MHz, then verify that the RF output increases when the CW frequency is increased by a few MHz.

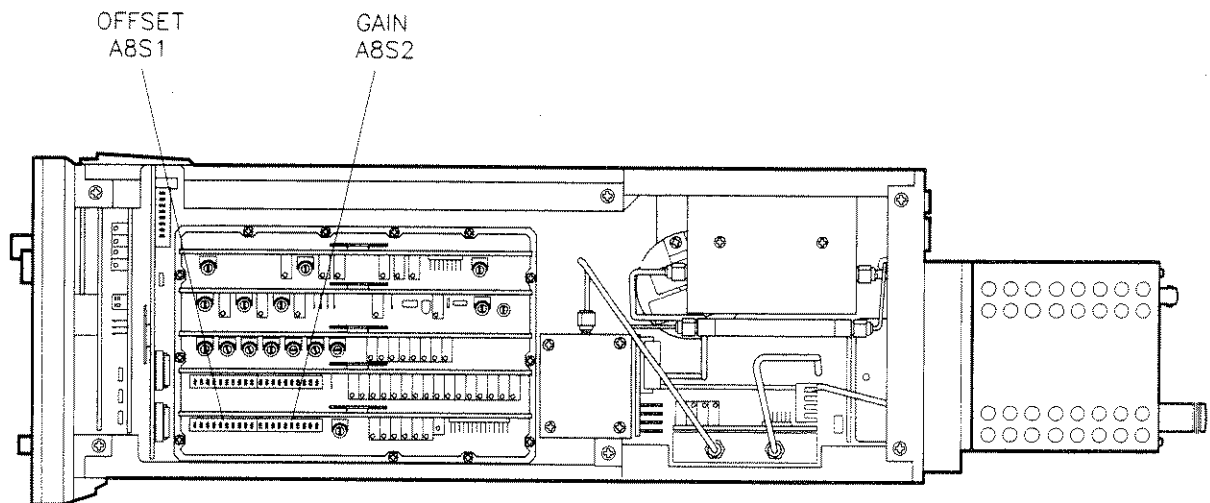


Figure 5-9. Frequency Calibration Adjustment Location

5-4. Frequency Accuracy (Cont'd)

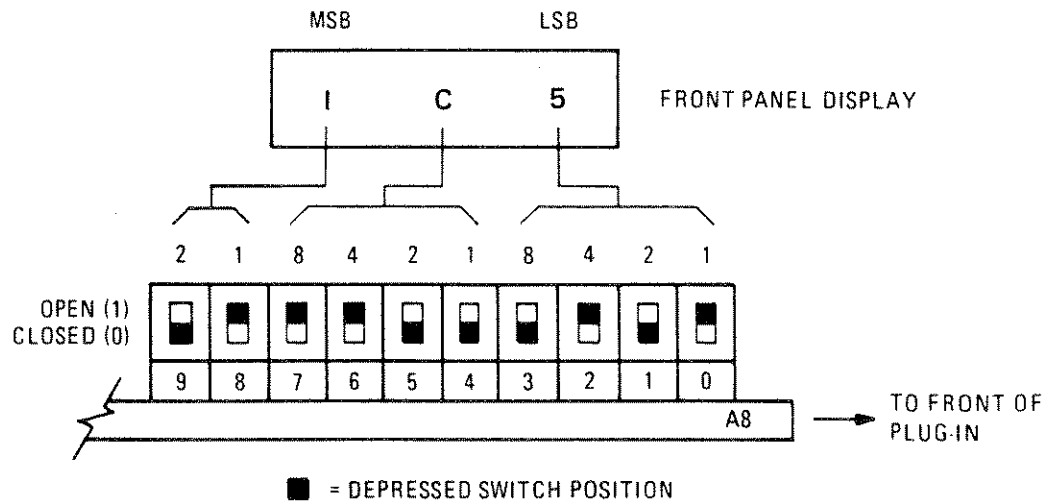


Figure 5-10. A8S1 and A8S2 Frequency Calibration Switch Configuration

5-5. Band Overlap

DESCRIPTION

The plug-in is swept across each bandswitch point. A spectrum analyzer is set to the bandswitch frequency, and the gain of the variable gain amplifier on the A6 sweep control assembly is adjusted for a smooth frequency transition between bands.

NOTE: If the RF unlevelled light remains on during this test, skip this section and instead perform this adjustment after section 5-8.

EQUIPMENT

Sweep Oscillator Mainframe	HP 8350
Oscilloscope	HP 1741A
Spectrum Analyzer	HP 8566B

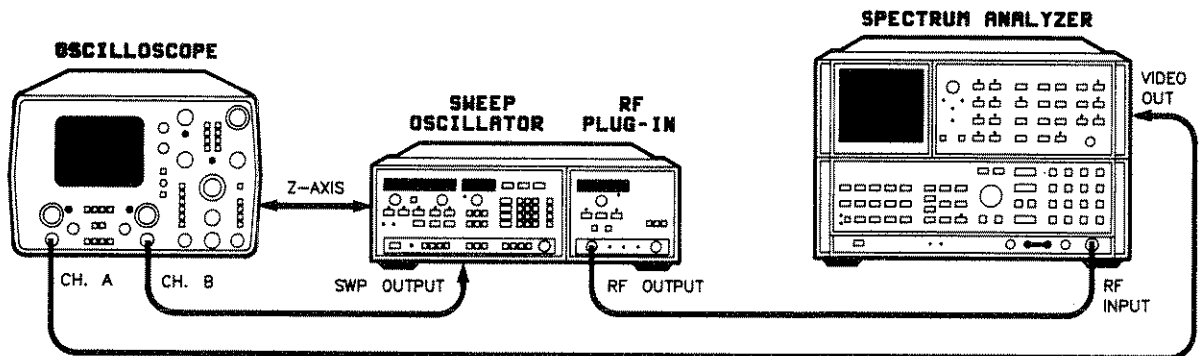


Figure 5-11. Band Overlap Adjustment Test Setup

PROCEDURE

NOTE: A3S1 must be set to the factory-set position. See table 3-3 in "Operation" for switch configuration information.

1. Connect the equipment as shown in figure 5-11. Preset both instruments.

2. On the sweep oscillator/plug-in, press:

[CF] [2] [.] [4] [GHz] [Δ F] [2] [5] [0] [MHz]

3. On the spectrum analyzer, press:

[CENTER FREQUENCY] [2] [.] [4] [5] [GHz]

[FREQUENCY SPAN] [0] [MHz]

[RESOLUTION BANDWIDTH] [3] [MHz]

5-5. Band Overlap (Cont'd)

4. Set the oscilloscope for A vs B display mode to display amplitude versus frequency. Set channel A to 0.2V/DIV. Center the display on the screen. The bandswitch point will be at or near center screen. It is identified by a shift in the noise floor displayed on the oscilloscope.
5. Adjust the spectrum analyzer center frequency to almost center the signal peak upon the bandswitch point. Leave the bandswitch point slightly off center so that the signal peak occurs during the rising or falling edge of the peak.

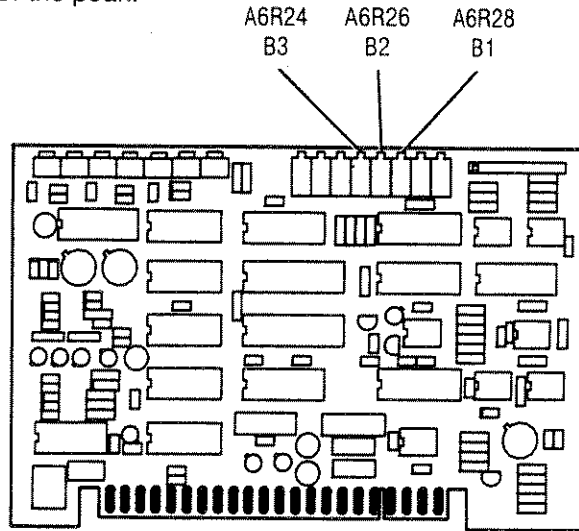


Figure 5-12. Band Overlap Adjustment Locations

6. Adjust A6R28 (B1) to bring the right side peak over to the switch point so that the right half of this peak mates with the left half of the other as shown in figure 5-13. See figure 5-12 for the adjustment location. The peak should be undisturbed as it moves through the bandswitch point.

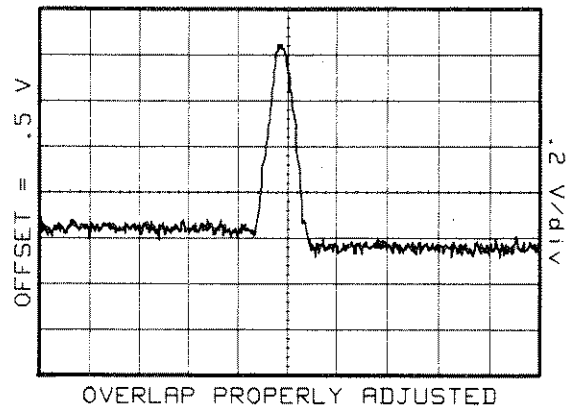
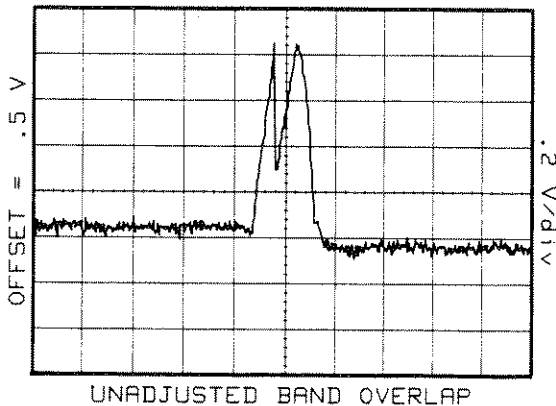


Figure 5-13. Band Overlap Adjustment Waveform

5-5. Band Overlap (Cont'd)

7. On the spectrum analyzer, press:
[CENTER FREQUENCY] [7] [GHz]
8. On the sweep oscillator/plug-in, press:
[CF] [7] [GHz]
9. Repeat steps 5 and 6 but this time adjust A6R26 (B2) in step 6.
10. On the spectrum analyzer, press:
[CENTER FREQUENCY] [1] [3] [.] [5] [GHz]
11. On the sweep oscillator/plug-in, press:
[CF] [1] [3] [.] [5] [GHz]
12. Repeat steps 5 and 6, adjusting A6R24 (B3) in step 6.
13. On the spectrum analyzer, press:
[CENTER FREQUENCY] [2] [0] [GHz]
14. On the sweep oscillator/plug-in, press:
[CF] [2] [0] [GHz]
15. Repeat steps 5 and 6, adjusting A6R24 (B3) in step 6 for the best compromise between bands 3 and 4.

5-6. YO Retrace Compensation

DESCRIPTION

During sweep retrace and each bandswitch, the YO frequency is forced to the start frequency of the next band by the retrace compensation circuit. This circuit is adjusted to maximize the YO frequency settling time before sweeping the next band. A spectrum analyzer is set to the YO frequency for the start of the next band. The width of the spectrum analyzer frequency peak corresponds to how long the YO has settled at the correct start frequency.

EQUIPMENT

Sweep Oscillator Mainframe	HP 8350
Spectrum Analyzer	HP 8566B
Oscilloscope	HP 1741A

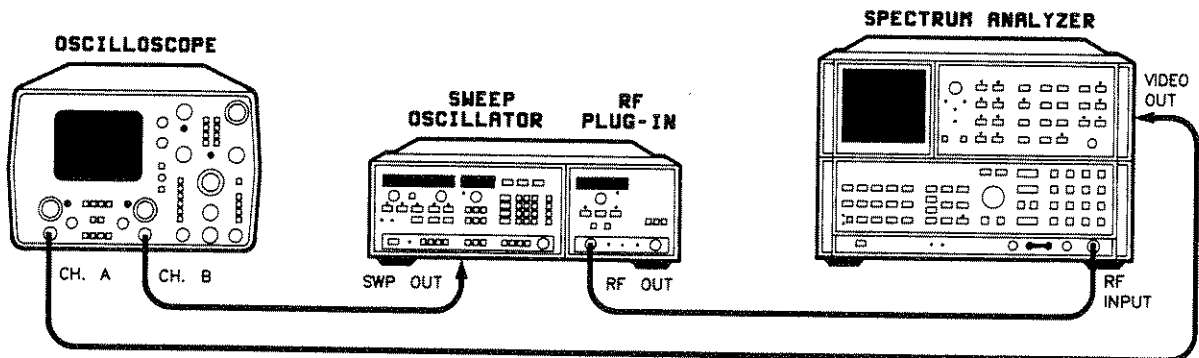


Figure 5-14. YO Retrace Compensation Test Setup

PROCEDURE

NOTE: This procedure requires that A3S1 is set to the factory-set position. See table 3-3 in "Operation" for switch configuration information.

1. Connect the equipment as shown in figure 5-14. Do *not* connect the sweep oscillator POS Z BLANK to the oscilloscope.
2. On the sweep oscillator/plug-in, press:

[INSTR PRESET]

5-6. YO Retrace Compensation (Cont'd)

3. Set the oscilloscope as follows:

Set channel B to 2V/DIV, DC coupled
Set channel A to 0.2V/DIV, DC coupled
Set horizontal sweep for 5 msec/DIV
Set delayed sweep for 0.5 msec/DIV
Set display to CHOP
Set trigger to B
Set sweep mode to MAIN

4. Adjust the vertical position of channel A on the oscilloscope to bring the trace to center screen.
5. Adjust the spectrum analyzer center frequency to 7.0 GHz with zero frequency span.
6. Use the oscilloscope's trigger and the delayed sweep vernier to set the intensified, delayed part of the trace on the bandswitch point between bands 1 and 2 as shown in figure 5-15a. (The trace intensity may need to be reduced to improve visibility.) A bandswitch point is where the sweep is not vertically increasing. If a frequency peak is not visible as in the bottom of figure 5-15a, then change the center frequency of the spectrum analyzer slightly until clearly visible.

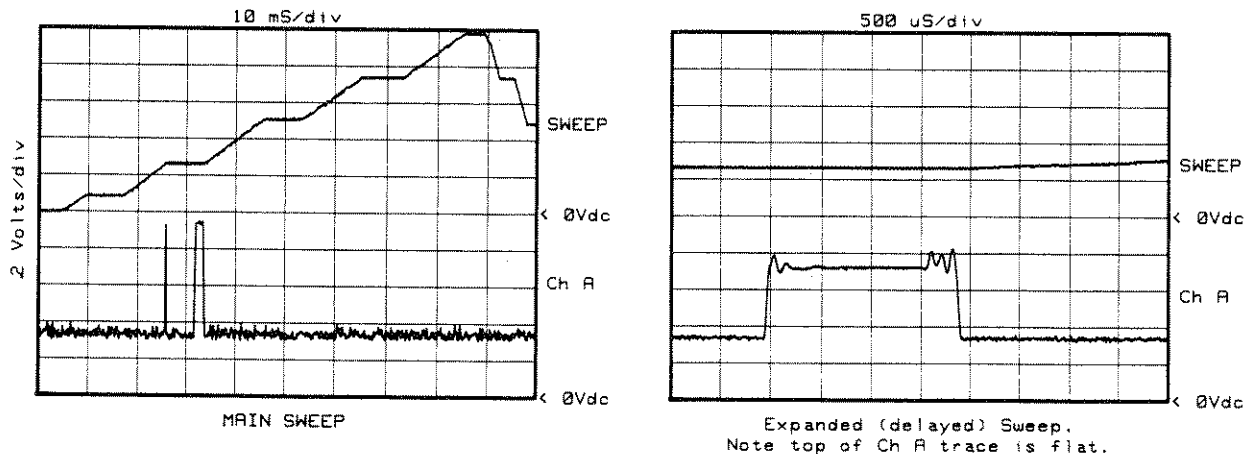


Figure 5-15. YO Retrace Compensation Pulse

7. Set the oscilloscope for delayed sweep. Adjust the delayed sweep to set the frequency peak near center screen.
8. Start with A8R55 (RTC COMP) fully clockwise and adjust it for the widest and flattest frequency peak while moving the spectrum analyzer center frequency slightly to track the bandswitch frequency. A well adjusted retrace compensation pulse is shown in figure 5-15b. The pulse plateau will remain flat even when the amplitude is changed by slightly adjusting the spectrum analyzer center frequency. Any slant in the pulse plateau as its amplitude changes signifies that adjustment of A8R55 is required.

5-6. YO Retrace Compensation (Cont'd)

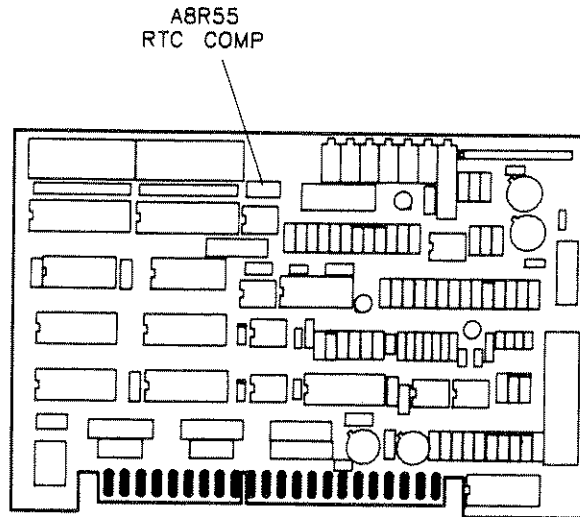


Figure 5-16. YO Retrace Compensation Adjustment Location

9. Select main sweep on the oscilloscope and adjust the delayed sweep vernier or main trigger level to move the delayed portion of the sweep to the bandswitch point between bands 2 and 3.
10. Adjust the spectrum analyzer center frequency to 13.5 GHz. If the frequency peak is not visible, it may be necessary to slightly adjust the center frequency of the analyzer.
11. On the oscilloscope, select delayed sweep and adjust the delayed sweep to set the frequency peak near center screen. If the previous band 1 to band 2 adjustment was made properly, this bandswitch point will look the same. If not, repeat steps 4 through 10 for the best compromise.

5-7. YO Delay Compensation

DESCRIPTION

This circuit compensates for the delay in the RF sweep output that occurs at fast sweep speeds. A spectrum analyzer is used to generate a frequency-dependent marker which is aligned with a tuning ramp-dependent marker generated from the sweep oscillator mainframe. Sweep time is decreased and delay in the YO is observed as the difference between the two marker frequency peaks.

Delay compensation adjustments are made while observing the shift between marker peaks at a sweep time of 10 milliseconds (worst case for single-band sweeps). At sweep times greater than 100 ms, delay should not exceed +15 MHz (the difference between CW and swept frequency accuracies).

EQUIPMENT

Sweep Oscillator Mainframe	HP 8350
Digital Voltmeter	HP 3456A
Oscilloscope	HP 1741A
Spectrum Analyzer	HP 8566B

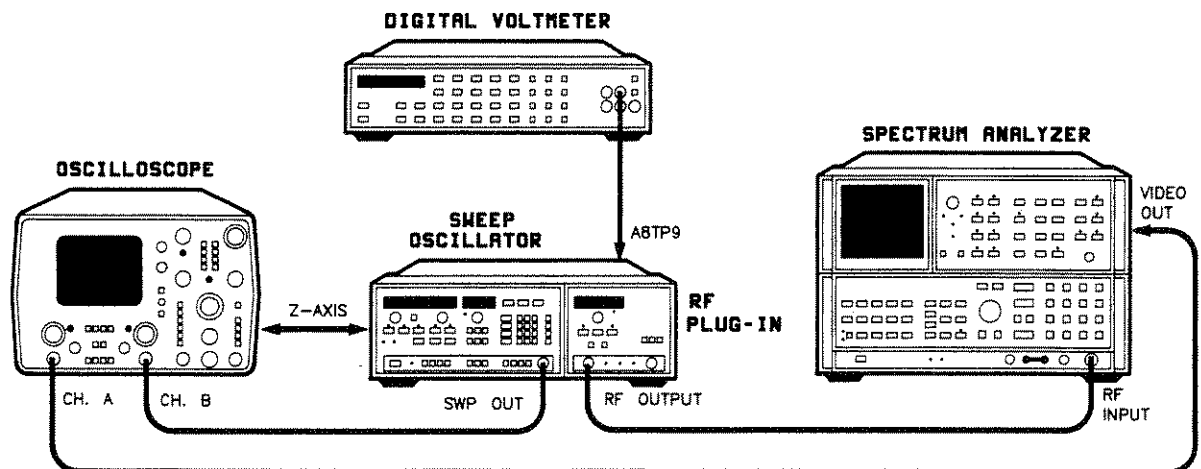


Figure 5-17. YO Delay Compensation Test Setup

PROCEDURE

NOTE: A3S1 must be set to the factory-set position. See table 3-3 in "Operation" for switch configuration information.

1. Connect the equipment as shown in figure 5-17.

5-7. YO Delay Compensation (Cont'd)

2. On the sweep oscillator/plug-in, press **[INSTR PRESET] [CW]**
3. Measure and note the voltage at A8TP9. (A8TP1 = ground)
4. On the sweep oscillator/plug-in, press:
[CF] [Δ F] [0] [MHz]
5. Adjust A8R18 (Z) for a DVM reading equal to the voltage noted in step 3. Remove the DVM test leads. See figure 5-18 for adjustment locations.
6. On the sweep oscillator/plug-in, press:
**[INSTR PRESET]
[START] [6] [.] [9] [GHz]
[STOP] [1] [3] [.] [5] [GHz]
[TIME] [1] [0] [ms]
[SAVE n] [2]
[TIME] [2] [0] [0] [ms]
[SAVE n] [1]**
7. On the spectrum analyzer, press:
**[INSTR PRESET]
[CENTER FREQUENCY] [7] [.] [2] [GHz]
[FREQUENCY SPAN] [0] [Hz]
[RES BW] [1] [MHz]
[SINGLE]**
8. Set the oscilloscope as follows:
Select A vs B mode
Set channel A to 0.5V/DIV, DC coupled
Set channel B to 0.1V/DIV, DC coupled
9. On the oscilloscope, position the frequency peak to center screen with the horizontal position control. Press oscilloscope MAG X 10. Reposition the peak near center screen with the horizontal position control.
10. On the sweep oscillator/plug-in, press:
[RECALL n] [2]
11. Adjust A8R12 (LO) so that there is little horizontal shift in the frequency peak between slow and fast sweeps (recall 1 and 2).
12. On the sweep oscillator/plug-in, press:
[RECALL n] [1]

5-7. YO Delay Compensation (Cont'd)

13. On the spectrum analyzer, press:

[CENTER FREQUENCY] [1] [3] [.] [2] [GHz]

14. Set the oscilloscope channel B switch to 2V/DIV.

15. Adjust the horizontal position control so the peak is near the center line of the screen.

16. On the sweep oscillator/plug-in, press:

[RECALLn] [2]

17. Adjust the A8R10 (HI) so that there is no horizontal shift in position of the frequency peak between fast and slow sweeps (recall 1 and 2).

18. Repeat steps 9 through 17 until no further adjustment of A8R10 (HI) and A8R12 (LO) is necessary.

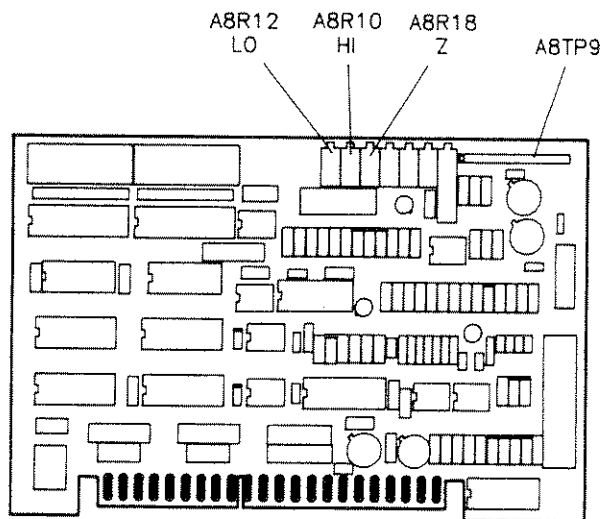


Figure 5-18. YO Delay Compensation Adjustment Locations

5-8. Slow Sweep YTM/YTF to YO Tracking

DESCRIPTION

The plug-in is set to sweep bands 1 through 4 (2.4 to 26.5 GHz), and the ALC is opened by selecting the EXT ALC MODE. The SRD bias for the YTM is preset (if not previously adjusted) and will require further adjustments according to the SRD bias adjustment. Prior to this adjustment, the offset and gain DACs for the YTM and YTF are loaded with the proper correction factors. The output power is peaked for each mode, and the appropriate hexadecimal correction factor is entered with the calibration switches. Once YTM/YTF to YO tracking has been performed, the SRD bias adjustment should be performed.

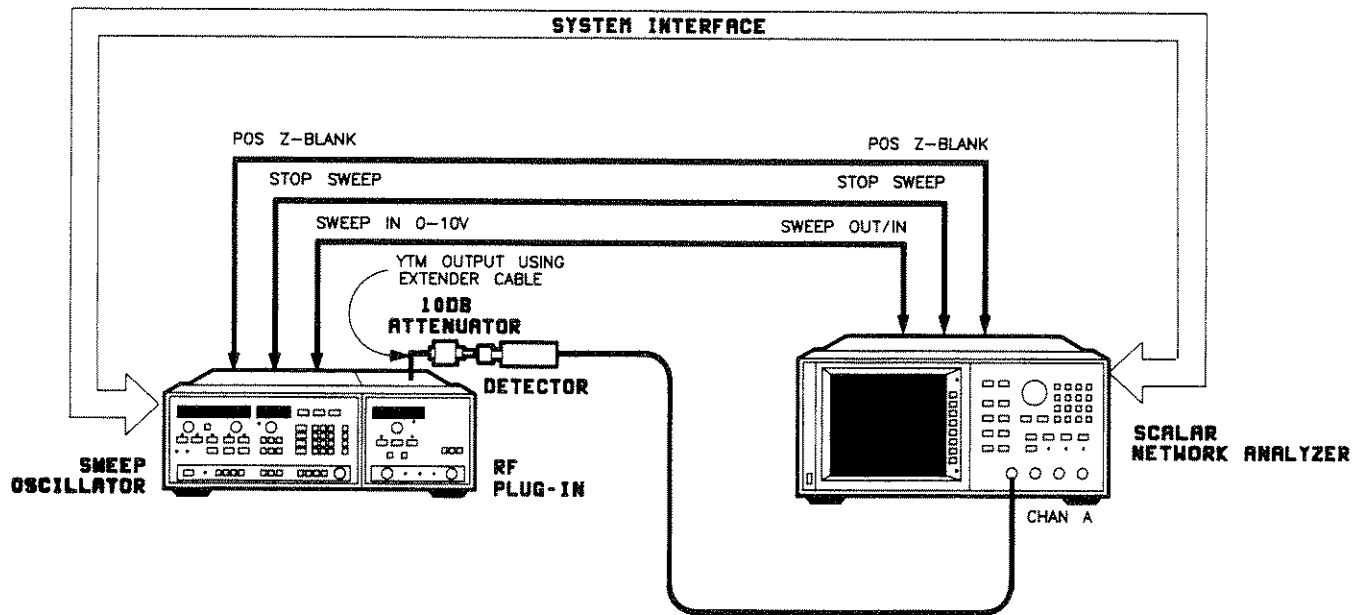


Figure 5-19. Slow Speed YTM to YO Tracking Test Setup

EQUIPMENT

Scalar Network Analyzer	HP 8757
Detector	HP 85025B/E
10 dB Attenuator	HP 8493C Option 010
Sweep Oscillator Mainframe	HP 8350
Extender Board	HP 08350-60031
Service Cable	HP 83525-20013

PROCEDURE

1. Connect the equipment as shown in figure 5-19 with the plug-in A6 sweep control board on the extender board. Press **[PRESET]** on the analyzer.

5-8. Slow Sweep YTM/YTF to YO Tracking (Cont'd)

2. On the sweep oscillator/plug-in, press:

[START] [2] [.] [4] [GHz]
[TIME] [5] [0] [0] [ms]
ALC MODE **[EXT]** (unleveled light on)

3. Select 5 dB/DIV display resolution on the network analyzer and center the display. Turn off channel 2.

NOTE: A3S1 must be set to the factory-set position. See table 3-3 in "Operation" for switch configuration information.

NOTE: During this adjustment, a localized drop in power may occur. This drop in power is due to the YTM being overdriven and is called squegging. Adjustment of the diode bias for bands 2 through 4 will eliminate diode squegging. If squegging occurs in band 2, adjust A6R68 and A6R73. If it occurs in band 3, adjust A6R69 and A6R74. For band 4, adjust A6R70 and A6R75.

5. For a newly replaced A6 board only:

Set A6R63 (3HL) to mid-range (see figure 5-20 for adjustment locations).

Set A6R78 (T) and A6R12 (C) one quarter turn from the full counterclockwise position.

6. On the sweep oscillator/plug-in, press:

[SHIFT] [9] [2] (enables the offset DAC subroutine)

Using the plug-in power control knob, peak the 7 to 10 GHz portion of the trace.

7. Enter the number displayed on the plug-in POWER DISPLAY into A7S1 as shown in figure 5-22. See figure 5-21 for the switch location.

8. On the sweep oscillator/plug-in, press:

[SHIFT] [9] [3] (enables the gain DAC subroutine)

Using the plug-in POWER control, peak the middle and high positions of the trace.

9. Enter the number displayed on the plug-in POWER display into A7S2 as shown in figure 5-22. See figure 5-21 for the switch location.

10. Repeat steps 6 through 9 until maximum power output is obtained. Output power at 26.5 GHz should be about +7 dBm (the analyzer displays -3 dBm due to the 10 dB attenuator).

11. On the sweep oscillator, press **[INSTR PRESET]**. The new calibration data is now entered from the current switch settings.

5-8. Slow Sweep YTM/YTF to YO Tracking (Cont'd)

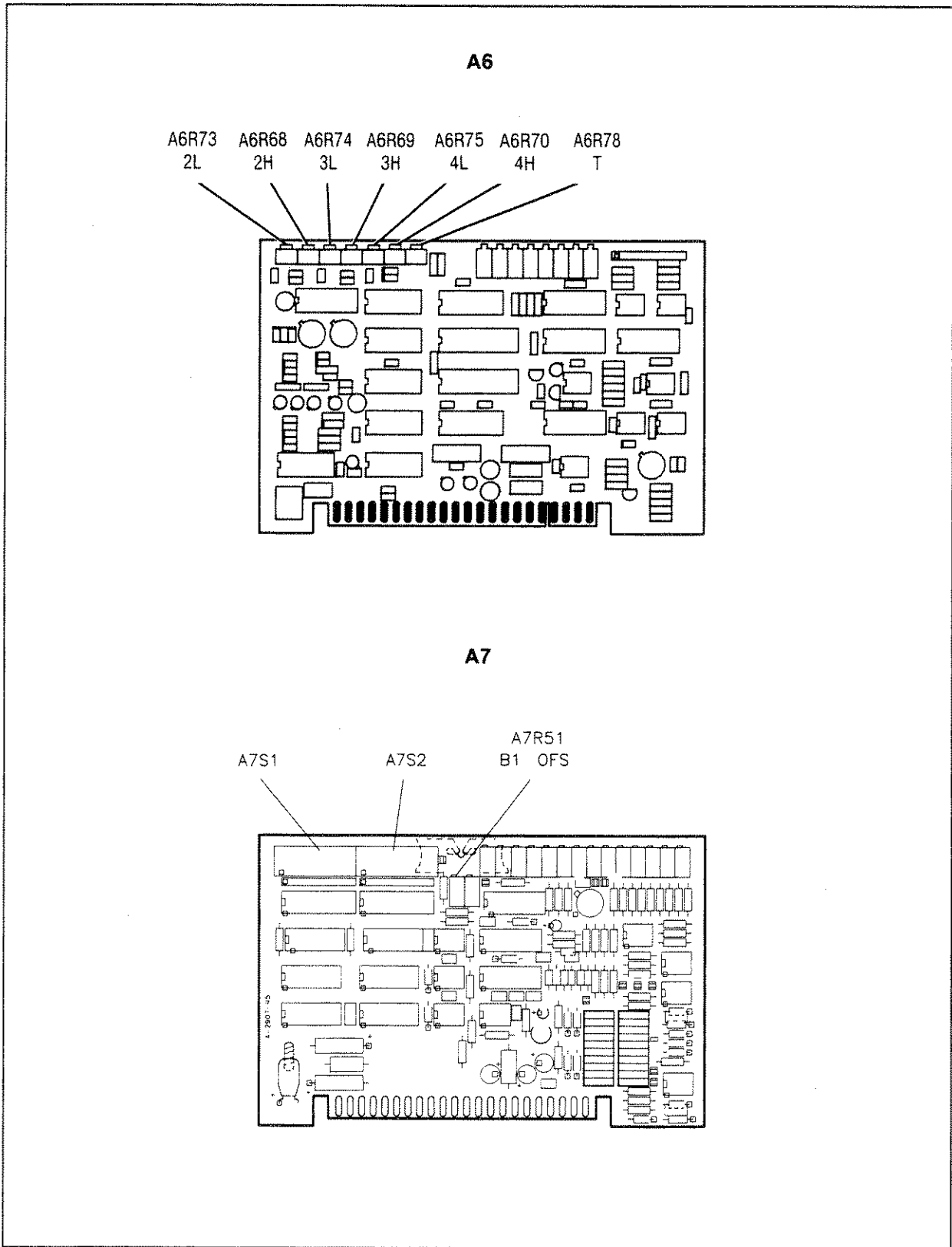


Figure 5-20. Slow Speed YTM to YO Tracking Adjustment Locations

5-8. Slow Sweep YTM/YTF to YO Tracking (Cont'd)

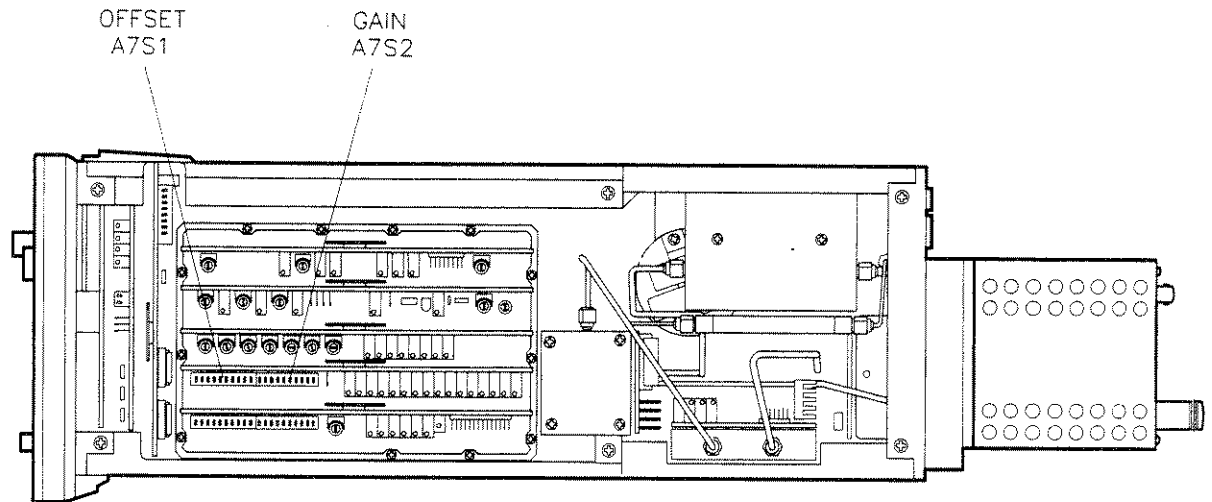


Figure 5-21. YTM to YO Tracking Calibration Switch Locations

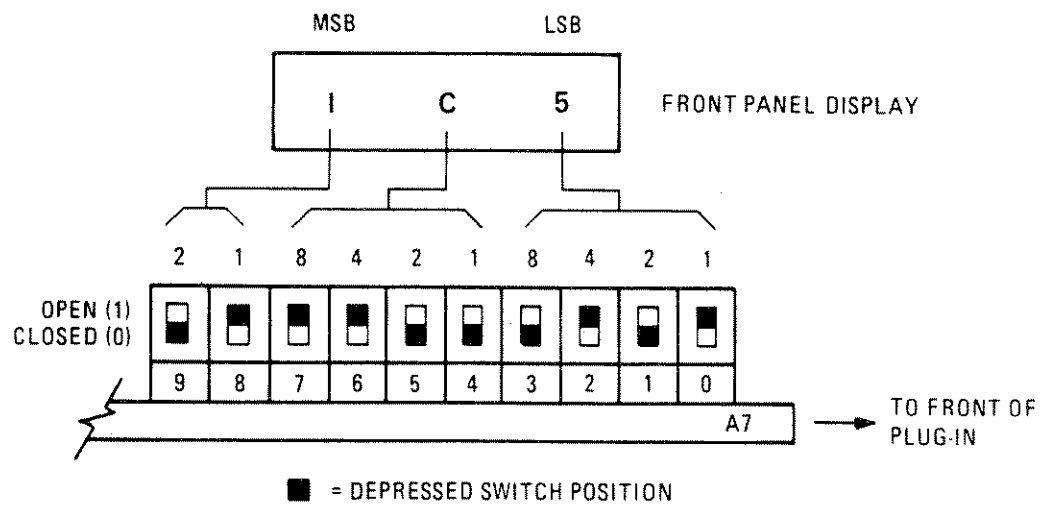


Figure 5-22. YTM to YO Tracking Calibration Switch Configuration

5-9. SRD BIAS

DESCRIPTION

The high power SRD bias is set by peaking the displayed trace on the network analyzer with A6R68 (2H) and A6R73 (2L) in band 2, A6R69 (3H) and A6R74 (3L) in band 3, and A6R70 (4H) and A6R75 (4L) in band 4. The low and mid power SRD bias is adjusted by monitoring A6TP3 and setting a reference line to -0.5 V.

EQUIPMENT

Scalar Network Analyzer	HP 8757
Detector	HP 85025B/E
Oscilloscope	HP 1740A
Extender Board	HP Part Number 08350-60031
Sweep Oscillator Mainframe	HP 8350
Service Cable	HP Part Number 83525-20013

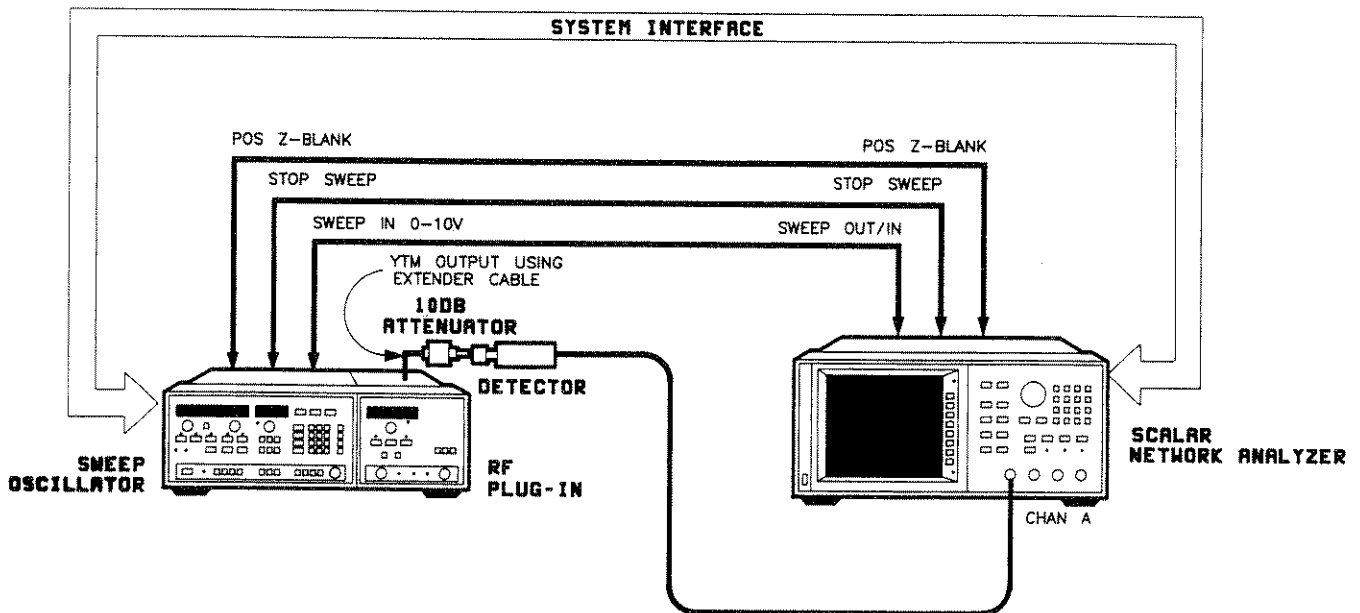


Figure 5-23. High Power SRD Bias Adjustment Test Setup

PROCEDURE

NOTE: A3S1 must be in the factory-set position. See table 3-3 in "Operation" for switch configuration information.

5-9. SRD BIAS (Cont'd)

High Power SRD Bias

1. Connect the equipment as shown in figure 5-23 with the service cable connected to the output of the plug-in YTM and the plug-in A6 board on the extender board. The oscilloscope is not used in this part of the adjustment.
2. On the sweep oscillator/plug-in, press:
[INSTR PRESET] [START] [7] [GHz]
3. Set the network analyzer display resolution for 5 dB/DIV and center the display.
4. Preset A6R78 (T) to 1/4 turn from full counterclockwise.
5. Adjust A6R73 (2L) and A6R68 (2H) until band 2 is at maximum power across the band. A6R73 adjusts the low frequency end of band 2 and A6R68 adjusts the high end. See figure 5-24 for adjustment locations.
6. Adjust A6R74 (3L) and A6R69 (3H) until band 3 is at maximum power across the band. A6R74 adjusts the low frequency end of band 3 and A6R69 adjusts the high end.
7. Adjust A6R75 (4L) and A6R70 (4H) until band 4 is at maximum power across the band. A6R75 adjusts the low frequency end of band 4 and A6R70 adjusts the high end.

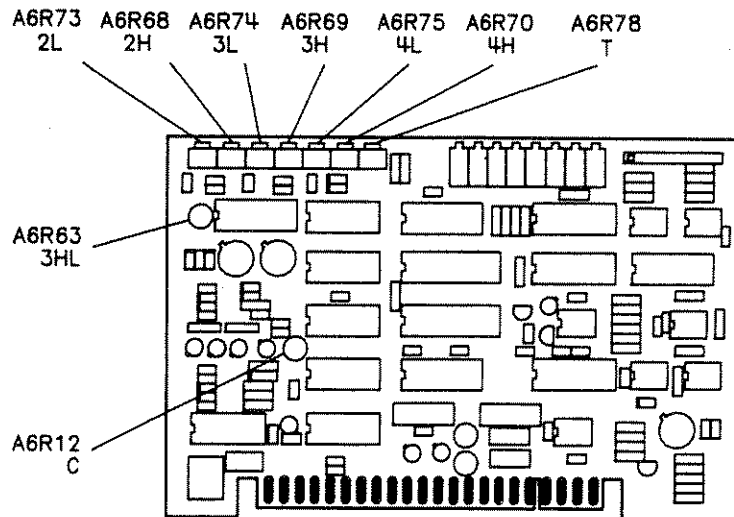


Figure 5-24. SRD Bias Adjustment Locations

8. Repeat steps 5 through 7 until optimum power is obtained across the display.
Next, adjust 2L, 3L, and 4L about 1/10 of a turn *counterclockwise* (or enough to decrease the power in each band by about 1 dB). This stabilizes the bias so that squegging will not occur.
9. Check the YTM to YO tracking to ensure that it has not changed (see adjustment 5-7). If retracking is necessary, adjust A6R68, R69, R73, R74, and R75 as necessary to eliminate squegging.

5-9. SRD BIAS (Cont'd)

Low and Mid-Power SRD Bias

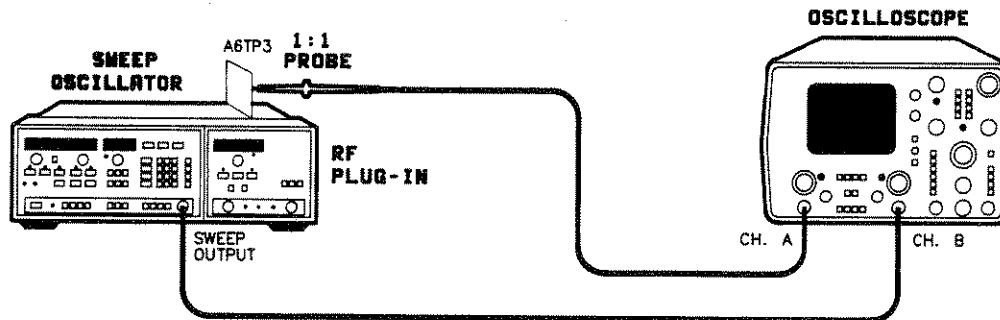


Figure 5-25. Low and Mid-Power SRD Bias Adjustment Test Setup

10. Connect the equipment as shown in figure 5-25. The output of the YTM should remain disconnected.
11. On the sweep oscillator/plug-in, press:
 - [INSTR PRESET] (press this key twice)
 - [START] [7] [GHz]
 - [MOD] (light is on)
12. Set up the oscilloscope as follows:
 - Select A vs B mode
 - Set channel B to 1V/DIV, DC coupled
 - Set channel A to 0.5V/DIV (using a 1:1 probe)
 - Set channel A ground reference to 2 divisions above the bottom of the graticule.
13. With the oscilloscope probe at A6TP3, two traces are displayed on the oscilloscope (see figure 5-26). The upper trace is segmented and extends to approximately +2-4 V. The lower trace is also segmented but can be adjusted.
 - Adjust A6R63 (3HL) to obtain the flattest possible lower trace across the display. Then adjust A6R12 (C) to set this trace to a -0.5 V level.
14. Replace the A6 board into the plug-in.

5-9. SRD BIAS (Cont'd)

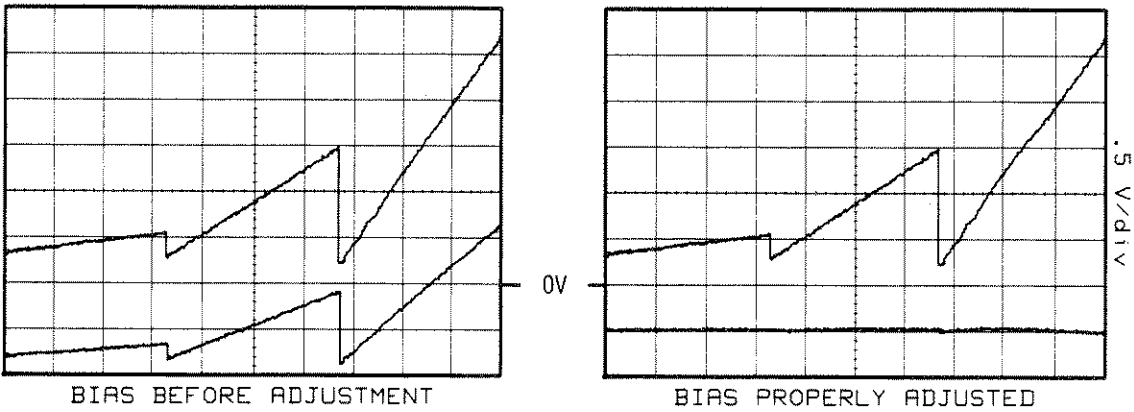


Figure 5-26. Low and Mid-Power Bias Adjustment

5-10. YTM Delay Compensation

NOTE: A3S1 must be set to the factory-set position. See table 3-3 in "Operation" for switch configuration information. Saving and recalling registers can be done on either the sweep oscillator or the network analyzer. The results are identical, but using the network analyzer provides faster response.

DESCRIPTION

EQUIPMENT

Scalar Network Analyzer	HP 8757
Detector	HP 85025B/E
10 dB Attenuator	HP 8493C Option 010
Sweep Oscillator Mainframe	HP 8350
Extender Board	HP Part Number 08350-60031

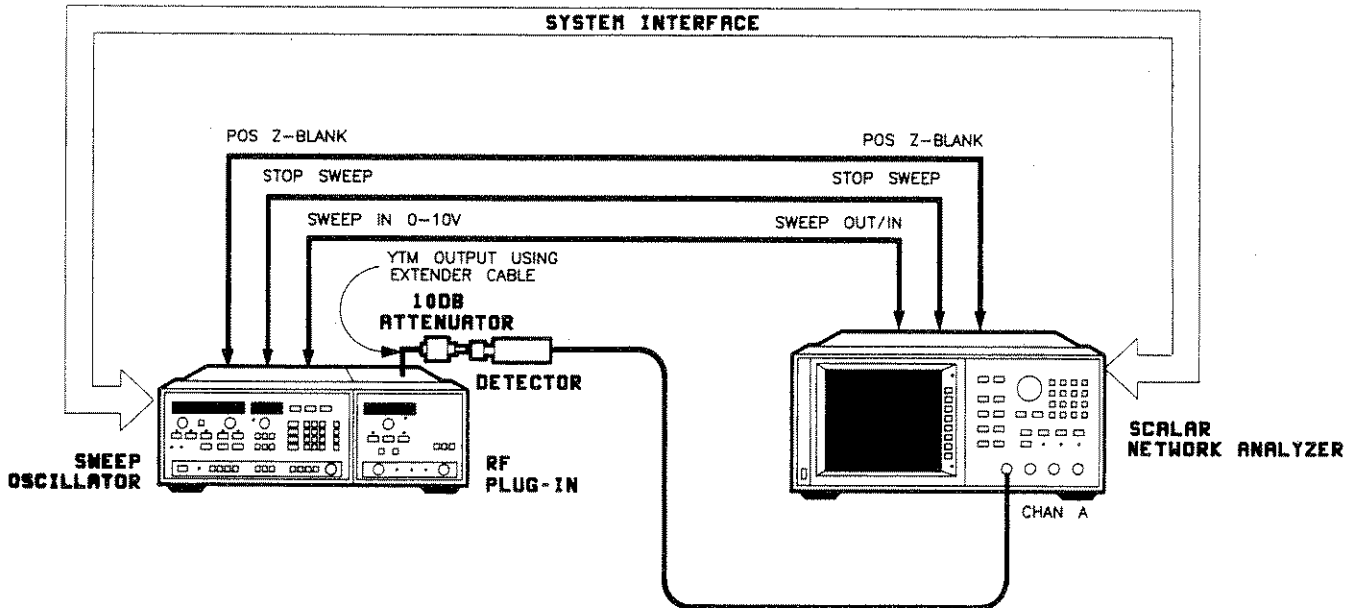


Figure 5-27. YTM Delay Compensation Test Setup

PROCEDURE

1. Connect the equipment as shown in figure 5-27. Preset A7R45 (SEQ TC) fully counterclockwise (see figure 5-28 for adjustment locations).
2. Preset the network analyzer. Turn off channel 2. Set the number of trace points per trace to 101.

5-10. YTM Delay Compensation (Cont'd)

3. On the sweep oscillator/plug-in, press:

[START] [2] [.] [4] [GHz]
 [TIME] [.] [0] [5] [s]
 ALC MODE [EXT] (light is on)
 [M1] [7] [GHz]
 [M2] [1] [3] [.] [5] [GHz]
 [M3] [2] [0] [GHz]

4. On the network analyzer, press:

[SCALE] [AUTOSCALE] (The beginning of the sweep is now band 1, the end is band 4, and each band is defined with markers.)

5. On the sweep oscillator/plug-in, press:

[SAVE_n] [1]
 [TIME] [.] [5] [sec]
 [SAVE_n] [2]
 [RECALL_n] [1]

6. Adjust A7R45 (SEQ TC) for the maximum power at the beginning of band 3 without decreasing the power at the beginning of band 4.
7. Adjust A7R43 (SEQ LO) for the maximum power in band 2 without substantially decreasing power in the other bands.

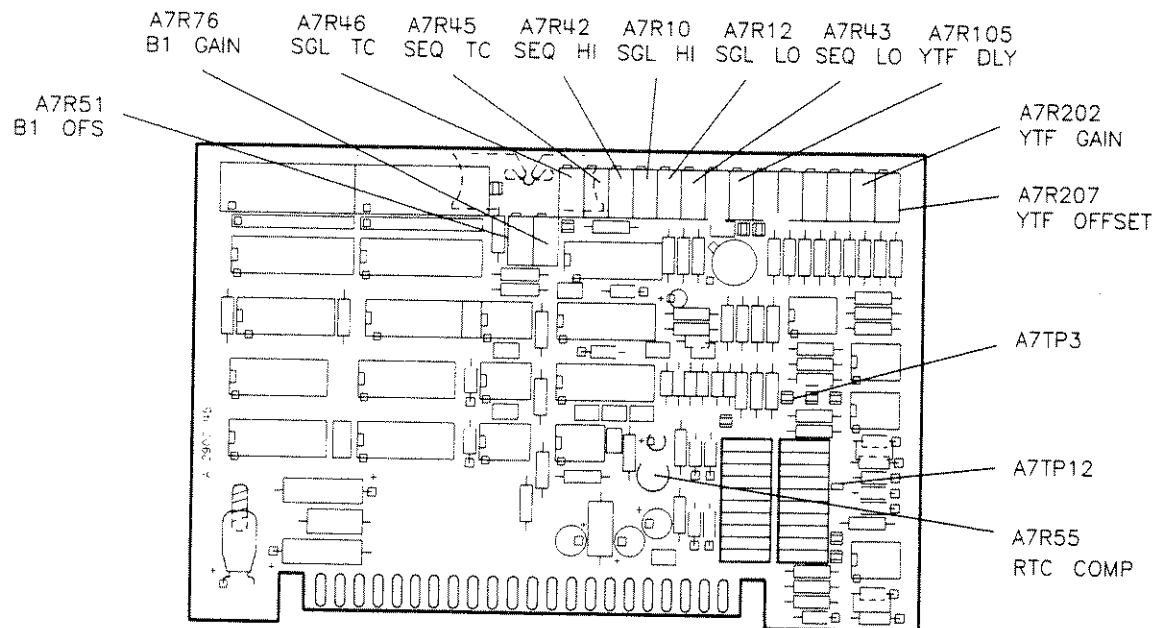


Figure 5-28. YTM Delay Compensation Adjustment and Test Point Locations

5-10. YTM Delay Compensation (Cont'd)

8. Adjust A7R42 (SEQ HI) for the maximum power at the ends of band 3 and 4.
9. On the network analyzer, alternate between **[RECALL] [1]** and **[RECALL] [2]** while readjusting A7R42 (SEQ HI) and A7R43 (SEQ LO) as necessary to minimize power level changes.
10. On the sweep oscillator/plug-in, press **[RECALLn] [1]**.
11. Vary the sweep oscillator START FREQUENCY control from 2.4 MHz to 13 GHz to check for power variations. Readjust A7R42 (SEQ HI), A7R43 (SEQ LO), and A7R55 (RTC COMP) as necessary to minimize any drop in power (particularly near 20 GHz). The worst case drop should not exceed 1 dB as the start frequency is varied. If this is not possible, repeat adjustment 5-7, YTM to YO tracking.
12. On the sweep oscillator/plug-in, press **[RECALLn] [1]**.
13. Repeatedly press SWEEP TRIGGER **[SINGLE]** while watching the displayed power level. Readjust A7R42 (SEQ HI) and A7R43 (SEQ LO) as necessary to minimize the power level difference between a 50 msec single sweep and a 50 msec internal sweep.
14. Preset A7R46 (SGL TC) fully counterclockwise.
15. On the sweep oscillator/plug-in, press:

[RECALLn] [1]
[START] [6] [.] [9] [GHz]
[STOP] [1] [3] [.] [5] [GHz]
[TIME] [.] [0] [4] [sec]
[SAVE] [3]

16. While continuously changing the SWEEP TIME control for a sweep speed from 40 ms to 200 ms, adjust A7R12 (SGL LO) to maximize power at the low end of band 2. In the same manner, adjust A7R10 (SGL HI) to maximize the power at the high end of band 2. Then adjust A7R46 (SGL TC) to maximize the power at the extreme start of the band.
17. On the sweep oscillator/plug-in, press:

[START] [1] [3] [.] [4] [GHz]
[STOP] [2] [0] [GHz]
[TIME] [.] [0] [4] [sec]

Vary the sweep speed as in step 16 and note any drop in power. If the change with sweep time is greater than 1 dB, make slight adjustments to A7R10 (SGL HI) and A7R12 (SGL LO).

18. On the sweep oscillator/plug-in, press:

[START] [2] [0] [GHz]
[STOP] [2] [6] [.] [5] [GHz]
[TIME] [.] [0] [4] [sec]

Vary the sweep speed as in step 16. If the change with sweep time is greater than 1 dB, adjust A7R10 and A7R12.

5-10. YTM Delay Compensation (Cont'd)

19. Repeat steps 15 and 16 to verify that the best compromise is obtained across all bands.
20. Remove the service cable from the YTM and reconnect W34 to the YTM. Connect the detector and attenuator to the RF OUTPUT of the plug-in.

YTF to YTM Tracking

21. Switch off AC power to the sweep oscillator/plug-in and remove the A4 board. Remove A4J3 and replace the A4 board. Switch on AC power.
22. On the plug-in, set the FILTER PEAK control to mid-range. On the sweep oscillator, press:
[RECALLn] [1]
[TIME] [.] [5] [sec]
If needed, adjust the reference level of the network analyzer to view the entire trace. Then press **[SAVE n] [1]** on the sweep oscillator.
23. Adjust A7R207 (YTF OFFSET) to peak the low portion of band 1.
24. Adjust A7R202 (YTF GAIN) to peak the middle and upper portions of band 3 and band 4 and to minimize ripple in band 3.
25. Repeat steps 23 and 24 until maximum power output is obtained. The YTF is now tracking the YTM and both of these should be tracking the YO.
26. On the sweep oscillator/plug-in, press **[STOP] [7] [GHz]**.
27. Adjust A7R51 (B1 OFS) and A7R76 (B1 GAIN) to maximize the minimum power points of the band 1 displayed trace. Ignore any trace squegging.

YTF Delay Compensation

28. On the sweep oscillator/plug-in, press **[RECALLn] [1]**. While continuously changing the SWEEP TIME control from 50 to 500 ms, adjust A7R105 to maximize power over the swept range. If the power variation with sweep speed is greater than 1 dB, repeat this procedure beginning with step 1 and adjusting the pots to slightly different positions.
29. Switch off power to the sweep oscillator/plug-in and remove the A4 board. Replace the A4J3 jumper and reinstall the board.

Threshold Adjustment

30. Turn on power and connect the detector to the RF output of the plug-in.
31. On the analyzer, press:
[PRESET] [SCALE] [AUTOSCALE]
32. On the sweep oscillator/plug-in, press:
[START] [7] [GHz]
33. Starting with A6R78 (T) fully counterclockwise, slowly turn the potentiometer clockwise until squegging (oscillation or break-up) first occurs. Then turn the potentiometer 1/8 turn counterclockwise.

5-11. Frequency Reference 1V/GHz Output

DESCRIPTION

The frequency reference rear panel output is adjusted for 1V/GHz output. (For example: 1GHz = 1 Volt; 2 GHz = 2 Volts.) The frequency accuracy adjustment must be performed before this adjustment is performed.

EQUIPMENT

Digital Voltmeter HP 3456A
Sweep Oscillator Mainframe HP 8350

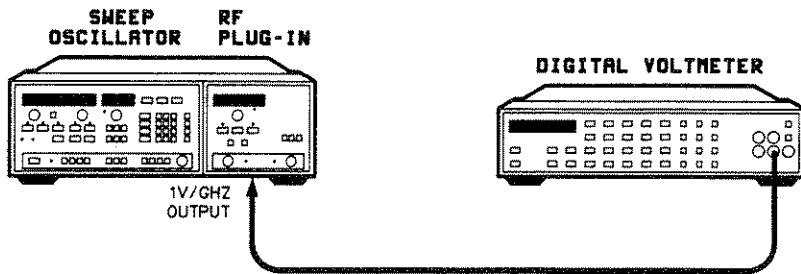


Figure 5-29. Frequency Reference 1V/GHz Output Test Setup

PROCEDURE

NOTE: A2S1 must be set for 1V/GHz output (pushed towards rear of plug-in). See table 3-3 in "Operation" for switch configuration information.

1. Connect the equipment as shown in figure 5-29 with the DVM connected to the rear panel 1V/GHz frequency reference connector, J4.

Bands 1 through 4

2. On the sweep oscillator/plug-in, press:

[INSTR PRESET]
[CW] [3] [GHz]

5-11. Frequency Reference 1V/GHz Output (Cont'd)

- Adjust A2R4 (OFFSET) for a DVM reading of 3.000 ± 0.005 V dc (see figure 5-30 for the adjustment locations).
- On the sweep oscillator/plug-in, press:
[CW] [1] [8] [GHz]
- Adjust A2R1 (GAIN) for a DVM reading of 18.000 ± 0.005 V dc.
- Repeat steps 2 through 5, if necessary, until the indicated voltages are obtained.

Band 0

- On the sweep oscillator/plug-in, press:
[CW] [1] [0] [MHz]
- Adjust A2R6 (BAND 0 OFFSET) for a DVM reading of 0.010 ± 0.005 V dc.
- On the sweep oscillator/plug-in, press:
[CW] [2] [GHz]
- Adjust A2R23 (BAND 0 GAIN) for a DVM reading of 2.000 ± 0.005 V dc.
- Repeat steps 7 through 10, if necessary, until the indicated voltages are obtained.

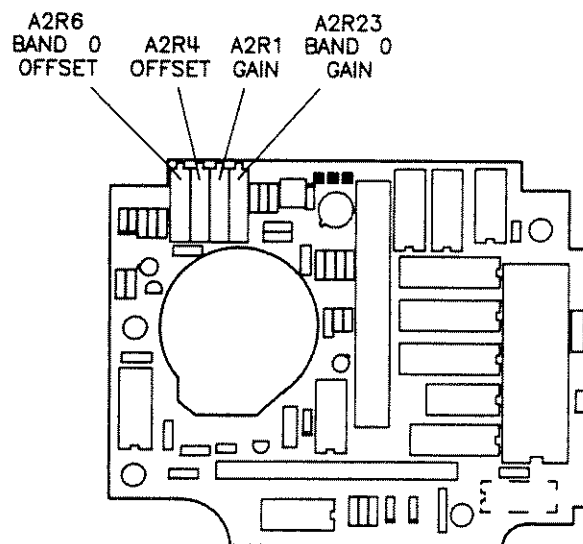


Figure 5-30. Frequency Reference Adjustment Locations

5-12. ALC Adjustment

NOTE: Complete adjustment of the leveling loop requires that 3 adjustments (5-12 through 5-14) be performed in the order given.

DESCRIPTION

This adjustment compensates for dc offsets in the detected RF path and the main ALC amplifier. Power is calibrated and low band flatness is optimized.

Four parallel circuits on the A5 assembly provide adjustments for ALC flatness. BP1 through BP4 and SL1 through SL4 determine the shape of the flatness compensation signal.

EQUIPMENT

Sweep Oscillator Mainframe	HP 8350
Digital Voltmeter	HP 3456A
Power Meter	HP 436A
Scalar Network Analyzer	HP 8757
Detector	HP 85025B/E
Extender Board	HP 08350-60031
10 dB Attenuator	HP 8493C Option 010

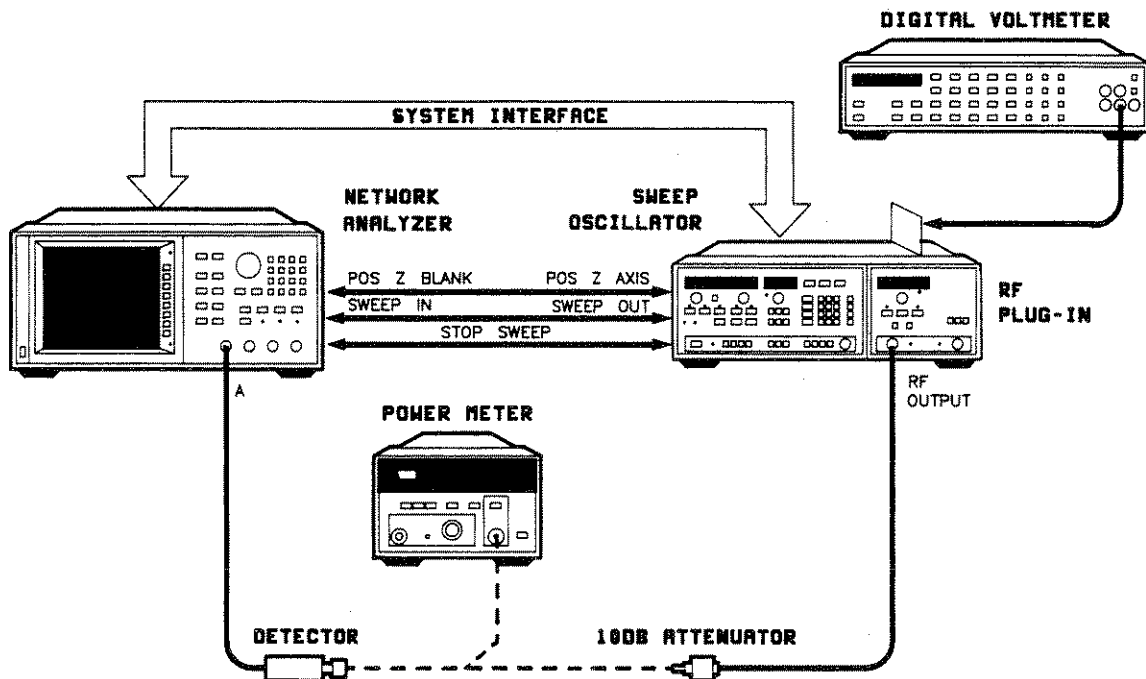


Figure 5-31. ALC Adjustment Test Setup

5-12. ALC Adjustment (Cont'd)

PROCEDURE

NOTE: A3S1 must be set to the factory-set position. See table 3-3 in "Operation" for switch configuration information. Saving and recalling registers can be done on either the sweep oscillator or the network analyzer. The results are identical, but using the network analyzer provides faster response.

ALC Clamp Adjustment

1. Connect the equipment as shown in figure 5-31. With AC power off, remove the A5 FM driver board. Place the A4 assembly on an extender board. Switch power on to all of the instruments.
2. On the network analyzer, press **[PRESET]** and turn channel 2 off. Set the reference line to mid-screen and the scale to 2 dB/Div.
3. On the sweep oscillator, press:
[START] [2] [.] [4] [GHz]
[STOP] [7] [GHz]
ALC MODE **[EXT]**
4. On the network analyzer, press:
[CURSOR] [MIN] [CRSR→REF LVL]
5. Adjust A4R111 (CL1) to clamp the minimum output at +15 dBm (a cursor reading of +5 dBm due to the 10 dB attenuator).
6. On the sweep oscillator, press:
[START] [7] [GHz]
[STOP] [2] [6] [.] [5] [GHz]
7. On the network analyzer, press **[MAX]**.
8. Adjust A4R107 (CL2) to clamp the maximum output at +18 dBm (a cursor reading of 8 dBm).

ALC Offset Adjustment

9. Turn off the network analyzer's power. On the sweep oscillator, press **[INSTR PRESET]** (twice), then **[CW]**. Ensure the square wave modulation is off.

For a newly replaced A4 board only, set the following adjustments as follows:

A4R81 (OFS 1)	Midrange
A4R82 (OFS 2)	Midrange
A4R78 (OFS 3)	Midrange
A4R15 (GAIN)	Midrange
A4R7 (0 HI)	Fully CW
A4R8 (1 HI)	Fully CW
A4R14 (BIAS)	Midrange
A4R1 (SLP)	Midrange

5-12. ALC Adjustment (Cont'd)

10. Measure the voltage between A4TP9 and A4TP10. See figure 5-32 for adjustment locations. Adjust A4R81 (OFS 1) for 0.000 ± 0.001 V dc.

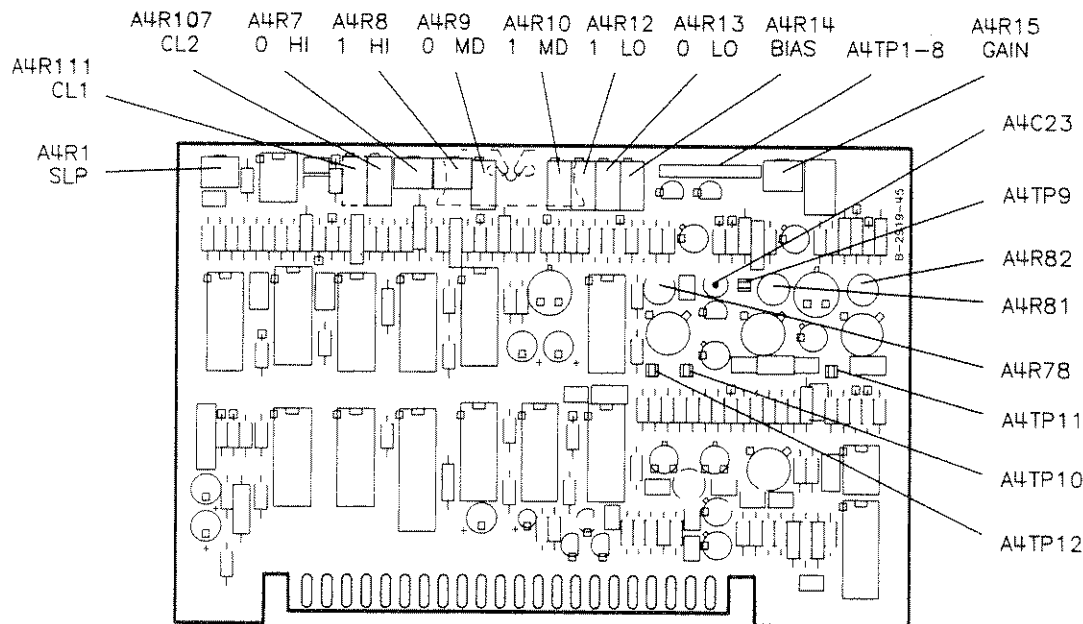


Figure 5-32. ALC Adjustment Locations

11. Attach a jumper from A4TP11 to ground. Connect DVM HI to A4TP4 (reference to ground, pin 15) and adjust A4R82 (OFS 2) for a DVM reading of 0.000 ± 0.001 V dc. Remove the jumper.
12. Connect the DVM between A4TP12 and A4TP9. Adjust A4R78 (OFS 3) for a DVM reading of 0.000 ± 0.001 V dc.
13. On the sweep oscillator/plug-in, press:
 - [CW] [5] [0] [MHz]**
 - [RF]** (turns RF power off)
 Connect DVM HI to A4TP7 (ground to P1 pin 42) and adjust A4R14 (BIAS) for a DVM reading of 0.000 ± 0.001 V dc; then press:
 - [RF]** (turns RF power back on)
14. Turn the sweep oscillator line power off. Remove the A4 assembly from the extender board and reinsert the A4 assembly directly into the instrument. Also reinsert the A5 FM assembly. Turn the sweep oscillator line power on.

ALC Level Adjustment

15. Turn on the network analyzer, then:

Press **[PRESET]**.
 Turn off channel 2.
 Center the reference line.
 Set the scale to 1 dB/div.
 Set the mode to DC.
 Turn on the cursor.

5-12. ALC Adjustment (Cont'd)

16. With no connection to the detector, press **[CAL] [DC DET ZERO] [AUTOZRO]** on the network analyzer.

Connect the detector to the 10 dB attenuator and the attenuator to the 0 dBm power reference output of the power meter. Turn on the power meter reference oscillator.

On the network analyzer, press **[DISPLAY] [MEAS→MEM] [MEAS-MEM]**. The analyzer cursor will now read 0 dB which corresponds to 0 dBm.

Connect the detector/attenuator combination to the plug-in RF OUTPUT.

NOTE: In the following steps, use either the sweep oscillator or the network analyzer to save/recall settings. The results are the same, but the network analyzer responds faster.

17. On the sweep oscillator/network analyzer, press:

(Sweep Oscillator)	[START] [5] [0] [MHz]
(Sweep Oscillator)	[STOP] [7] [GHz]
(Sweep Oscillator)	[POWER LEVEL] [-] [2] [dBm]
(Network Analyzer)	[REF] [-] [2] [dBm/dB]
(Network Analyzer)	[SAVE_n] [1]
(Sweep Oscillator)	[POWER LEVEL] [7] [dBm]
(Network Analyzer)	[REF] [7] [dBm/dB]
(Network Analyzer)	[SAVE_n] [2]
(Sweep Oscillator)	[POWER LEVEL] [1] [3] [dBm]
(Network Analyzer)	[REF] [1] [3] [dBm/dB]
(Network Analyzer)	[SAVE_n] [3]

Low power sweep is now in register 1, medium power is in register 2, and high power is in register 3. Preset A5 pots BP1 through BP4 to full clockwise. (See step 28)

18. On the sweep oscillator/plug-in, press:

[RECALL_n] [1]

Adjust A4R13 (0 LO) to center band 0 (first 3 1/2 divisions) on the center reference line.

19. On the sweep oscillator/plug-in, press:

[RECALL] [2]

Adjust A4R9 (0 MD) to center band 0 (first 3 1/2 divisions) on the center reference line.

20. Repeat steps 18 and 19 until both low and midpower ranges of band 0 are calibrated and no readjustment is necessary.

21. On the sweep oscillator/plug-in, press:

[RECALL] [3]

Adjust A4R7 (0 HI) to center band 0 (first 3 1/2 divisions) at center screen.

5-12. ALC Adjustment (Cont'd)

22. On the sweep oscillator/plug-in, press:

[RECALL] [1]

Adjust A4R1 (SLP) for best overall flatness from 10 MHz to 2.4 GHz as observed on the network analyzer. Alternate with the register 3 adjustment while adjusting A4R1 for the best flatness compromise. Repeat steps 18 through 21 if required.

23. On the sweep oscillator/plug-in, press:

[RECALL] [1]

Adjust A4R12 (1 LO) to center band 1 (last 6 1/2 divisions) on the center reference line.

24. On the sweep oscillator/plug-in, press:

[RECALL] [2]

Adjust A4R10 (1MD) to center band 1 (last 6 1/2 divisions) on the center reference line.

25. On the sweep oscillator/plug-in, press:

[RECALL] [3]

Adjust A4R8 (1 HI) to center band 1 (last 6 1/2 divisions) on the center reference line.

26. Repeat steps 22 through 25 using RECALL 1, 2, and 3 until the best flatness is obtained at all three power settings is achieved.

ALC Internal Leveled Flatness

27. On the sweep oscillator/plug-in, press:

[RECALLn] [3]

[STOP] [2] [6] [.] [5] [GHz]

28. Set the following adjustments as indicated. See figure 5-33 for adjustment locations.

A5R34 (BP1)	Fully CW
A5R36 (BP2)	Fully CW
A5R38 (BP3)	Fully CW
A5R40 (BP4)	Fully CW
A5R41 (SL1)	Midrange
A5R42 (SL2)	Midrange
A5R43 (SL3)	Midrange
A5R44 (SL4)	Midrange

5-12. ALC Adjustment (Cont'd)

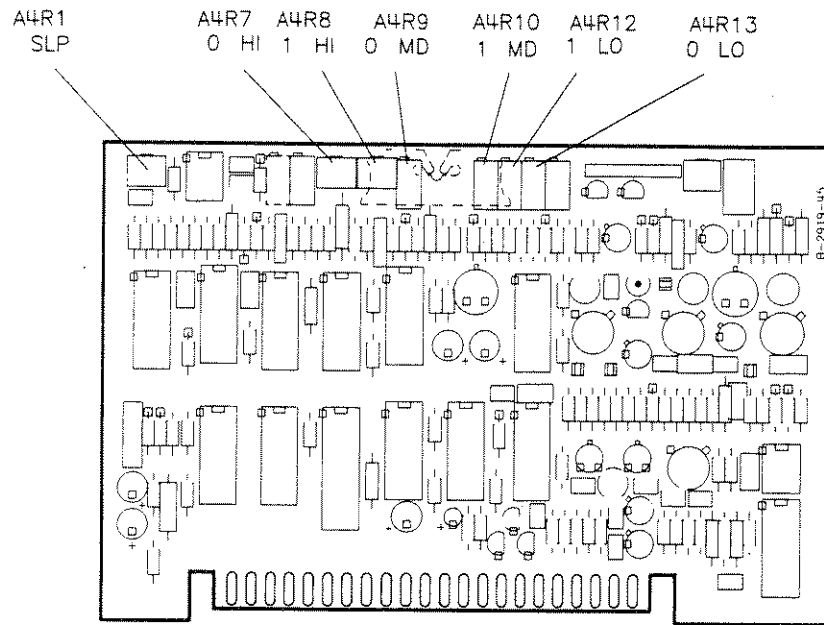


Figure 5-33. Internal Levelled Flatness Adjustment Locations

29. On the sweep oscillator/plug-in adjust the overall slope adjust, A5R48 (SLP), for the flattest display, as shown on the network analyzer. See figure 5-34.

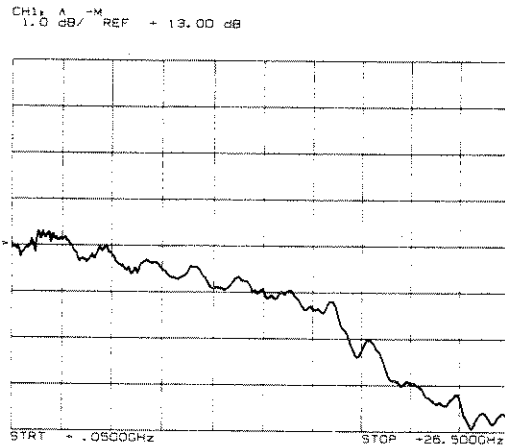


Figure 5-34. Trace Before Adjustments

5-12. ALC Adjustment (Cont'd)

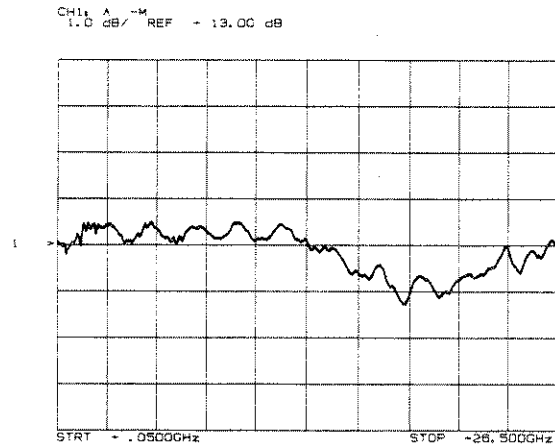


Figure 5-35. Trace After Main Slope Adjustment

30. The following adjustments affect the displayed output from left to right, with A5R34 (BP1) and A5R41 (SL1) having the greatest effect. The breakpoint and slope adjustments are done in pairs. A5R34 (BP1) and A5R41 (SL1) will be adjusted before continuing to A5R36 (BP2) and A5R42 (SL2) and so on. Identify the breakpoint (see figure 5-36).
31. Adjust A5R34 (BP1) so that the adjustment point lies as closely on the breakpoint as possible. Use the scale function of the network analyzer to increase the displayed resolution if needed.
32. Adjust A5R41 (SL1) to rotate the slope and bring it closer to a flatter display (see figure 5-37).
33. Repeat steps 31 and 32 until the flattest display is obtained.

5-12. ALC Adjustment (Cont'd)

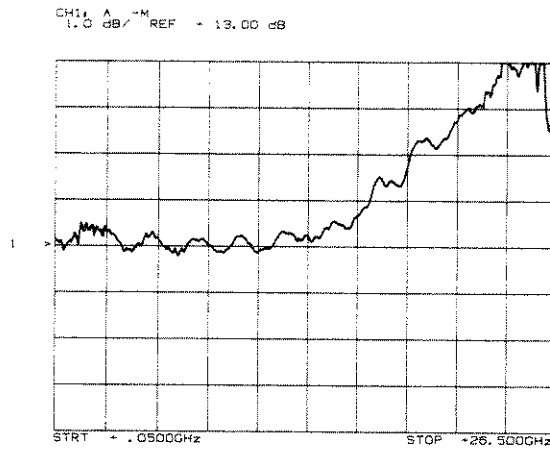


Figure 5-36. Breakpoint adjusted to start having effect at 13 GHz; SL pot full clockwise

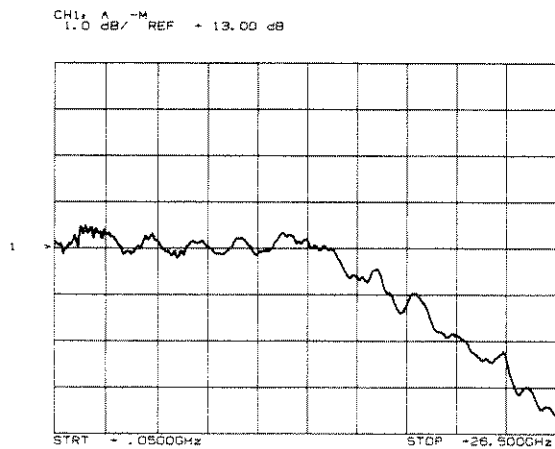


Figure 5-37. As above but with SL pot full counter clockwise

34. Repeat steps 30 through 33 for the following adjustment pairs:

- A5R36 (BP2) and A5R42 (SL2)
- A5R38 (BP3) and A5R43 (SL3)
- A5R40 (BP4) and A5R44 (SL4)

5-12. ALC Adjustment (Cont'd)

The final properly adjusted trace should be similar to figure 5-38. If the trace is *not* adjusted properly, return to the preset conditions of the potentiometers. Do not attempt to begin readjustment from the middle of the procedure.

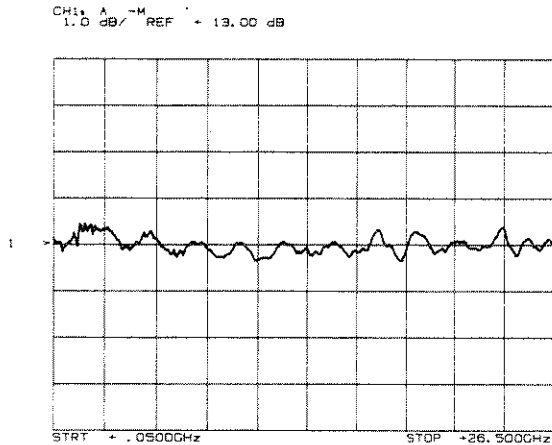


Figure 5-38. Properly Adjusted Power

Since the flatness of the RF power, when adjusted this way, depends on the flatness of the detector used, check the RF output flatness at several points with a power meter (make sure the cal factor is set properly). Especially check the output above 20 GHz. If necessary repeat steps 28 through 33 using the power meter to measure the flatness.

5-13. ALC Gain Adjustment

NOTE: Complete adjustment of the leveling loop requires that 3 adjustments (5-12 through 5-14) be performed in the order given.

DESCRIPTION

A4R15 (GAIN) at the inverting input of A4U9, adjusts the gain of the main ALC amplifier. A4R15 (GAIN) is adjusted for maximum possible gain without producing ALC loop oscillations.

EQUIPMENT

Sweep Oscillator Mainframe	HP 8350
Oscilloscope	HP 1741A
Crystal Detector	HP 8473C
Function Generator	HP 3325A
10 dB Attenuator	HP 8493C Option 010
50 Ohm Feedthrough Termination	HP 10100C

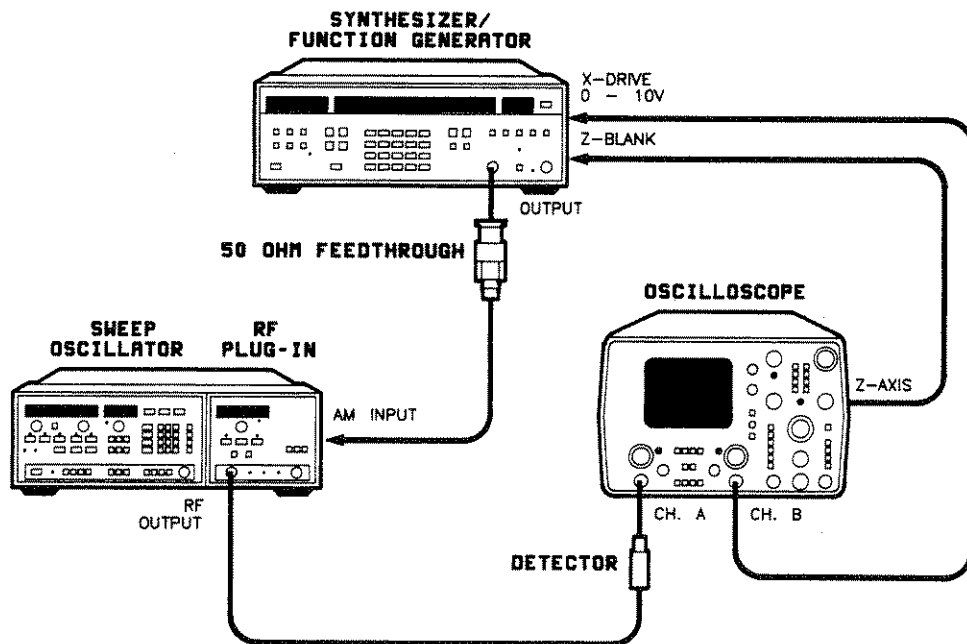


Figure 5-39. ALC Gain Adjustment Test Setup

PROCEDURE

1. Connect the equipment as shown in figure 5-39.

5-13. ALC Gain Adjustment (Cont'd)

2. On the sweep oscillator/plug-in, press:

[INSTR PRESET] SWEEP [MAN]
[POWER LEVEL] [0] [dBm]

3. Set the oscilloscope controls as follows:

Select A vs B mode to display a modulation frequency versus amplitude plot.

Set channel A for 0.01V/DIV, AC coupled.

Set channel B for 1V/DIV, DC coupled.

Adjust horizontal position and channel A vertical position controls for a stable display at midscreen.

4. Set the function generator as follows:

START FREQUENCY	100 Hz
STOP FREQUENCY	300 kHz
START CONTINUE	ON
FUNCTION	SINE
AMPLITUDE	1V peak-to-peak
OFFSET	0
TIME	150 msec

5. Adjust the far left side of the modulated signal for two divisions peak-to-peak by using the CAL on the channel A knob. See figure 5-40.

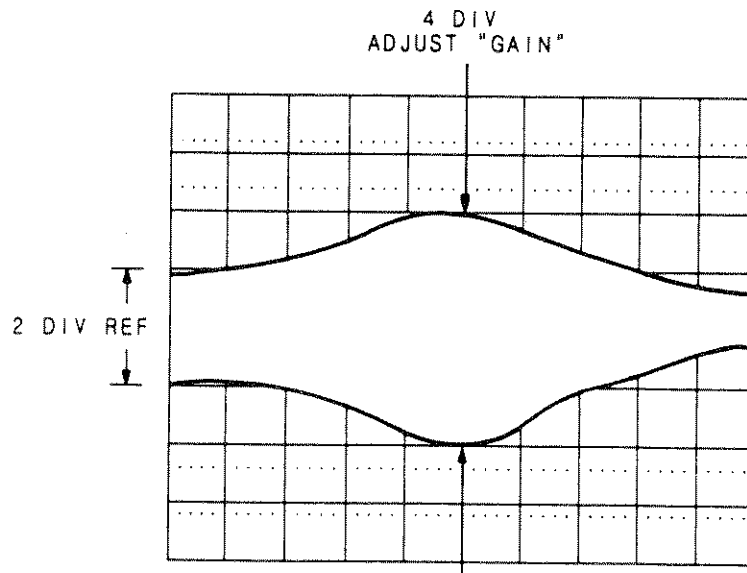


Figure 5-40. ALC Gain Adjusted Correctly (Worst Case)

6. While monitoring channel A, manually sweep the entire plug-in frequency range and adjust A4R15 (GAIN) for four divisions of peaking at the plug-in frequency where the highest gain peaking occurs. See figure 5-40. Figure 5-41 shows the adjustment location.

5-13. ALC Gain Adjustment (Cont'd)

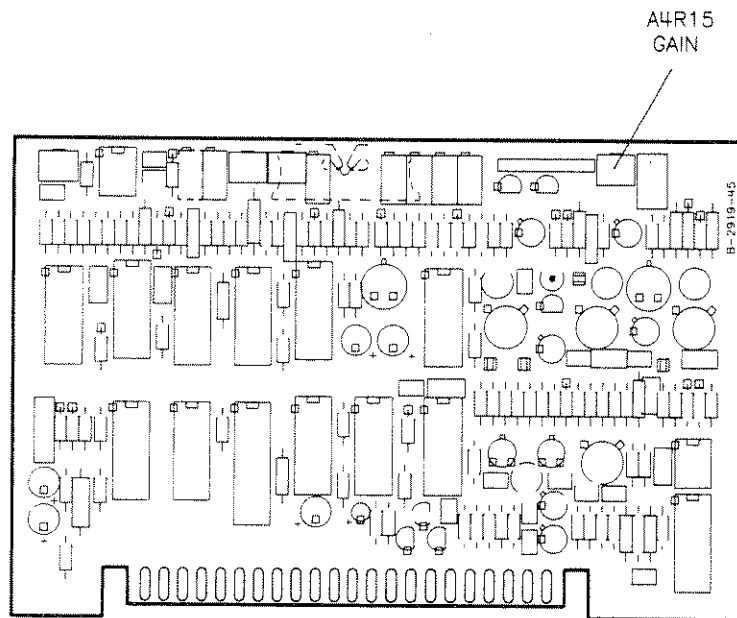


Figure 5-41. ALC Gain Adjustment Location

5-14. Squarewave Symmetry Adjustment

NOTE: Complete adjustment of the leveling loop requires that 3 adjustments (5-12 through 5-14) be performed in the order given.

PROCEDURE

A4C23 (SYM 1) and A4R99 (SYM 2) minimize overshoot of the squarewave. A4R92 adjusts the duty cycle of the squarewave in bands 1 through 4.

NOTE: A3S1 must be in the factory-set position. See table 3-3 in "Operation" for switch configuration information.

EQUIPMENT

Sweep Oscillator Mainframe	HP 8350
Oscilloscope	HP 1741A
Crystal Detector	HP 8473C

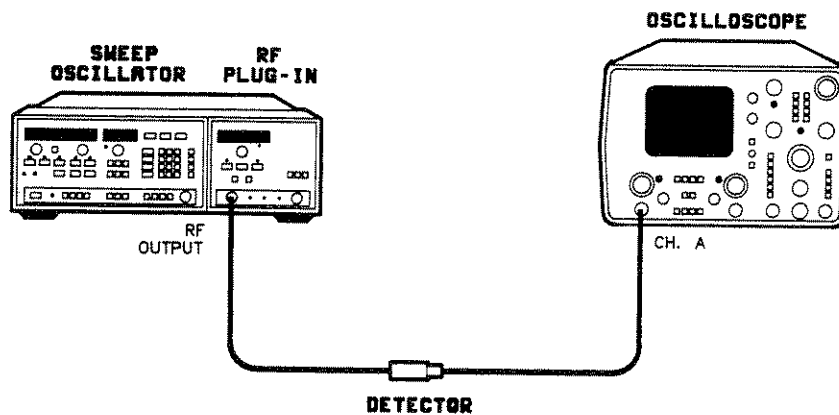


Figure 5-42. Squarewave Symmetry Adjustment Test Setup

PROCEDURE

1. Connect the equipment as shown in figure 5-42 with A4 on an extender board. With A4 on an extender board, there may be a slight frequency peak on the detected signal. This will disappear when the board is mounted in the plug-in.

5-14. Squarewave Symmetry Adjustment (Cont'd)

2. On the sweep oscillator/plug-in, press:

[INSTR PRESET] [CW] [1] [GHz] [MOD] (light on)
[POWER LEVEL] [2] [dBm]

NOTE: Do not overdrive the detector as this will distort the squarewave.

3. Set the oscilloscope as follows:

Select MAIN SWEEP with 10 μ s/DIV time.
Set channel A to 0.005V/DIV, 50 Ω input.
Set channel B to 1V/DIV.

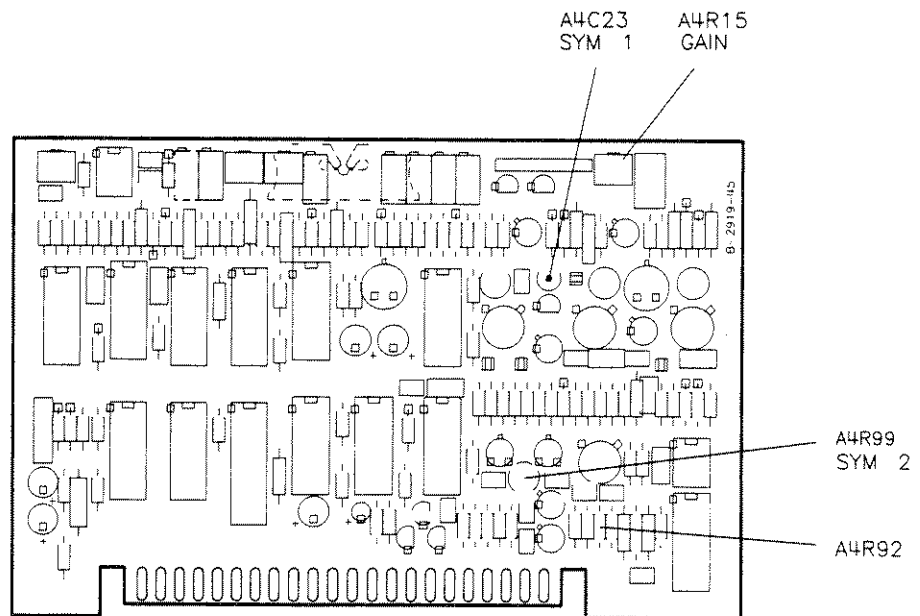


Figure 5-43. Squarewave Symmetry Adjustment Locations

4. Alternately adjust A4C23 (SYM 1) and A4R99 (SYM 2) for the waveform shown in figure 5-44. Adjust for minimum overshoot and ripple during the *on* portion (most negative) of the squarewave. Figure 5-43 shows adjustment locations.
5. On the sweep oscillator/plug-in, press:
[CW] [5] [GHz]
Check that the squarewave resembles that shown in figure 5-44. If not adjust A4C23 and A4R99 for the best squarewave while alternately checking the squarewave at 1 GHz.
6. Repeat step 5 for 10 GHz, 15 GHz, and 26.5 GHz. Optimize the shape of the squarewave over the entire range of the plug-in. Pay close attention to the changes between band 0 and bands 1, 2, 3, and 4. There will be slight variations at each end of the plug-in's range.
7. If you are unable to obtain the correct waveshape, you may need to adjust the value of A4R92. Replace A4R92 with a potentiometer having a midrange value the same as that of A4R92. Vary its resistance until 50% duty cycle is obtained in bands 1 through 4. Remove the potentiometer and measure its value. Replace the potentiometer with a fixed resistor closest to the measured value.

5-14. Squarewave Symmetry Adjustment (Cont'd)

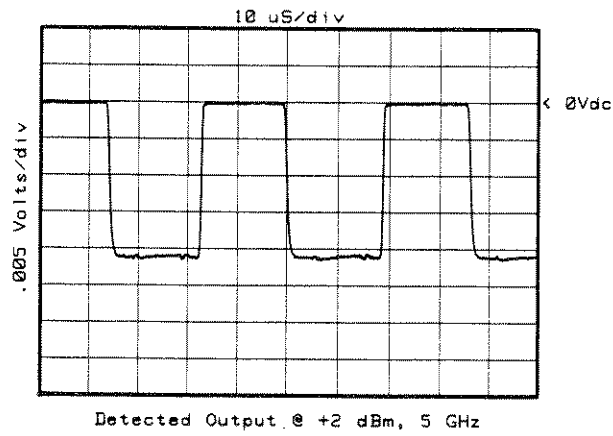


Figure 5-44. Optimum Squarewave

5-15. Power Sweep

DESCRIPTION

A 10 dB/sweep power sweep mode is selected and the output is displayed on the network analyzer. The output of the power sweep circuit is adjusted for the correct sweep.

EQUIPMENT

Sweep Oscillator Mainframe	HP 8350
Scalar Network Analyzer	HP 8757
Detector	HP 85025B/E
10 dB Attenuator	HP 8493C Option 010

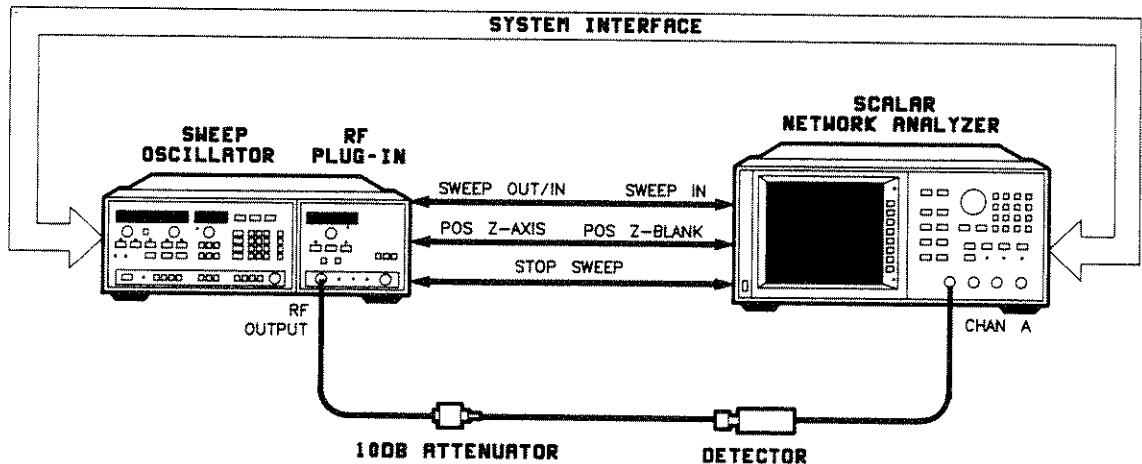


Figure 5-45. Power Sweep Adjustment Test Setup

PROCEDURE

1. Connect the equipment as shown in figure 5-45.
2. On the network analyzer, press
[PRESET] and turn off channel 2.
3. On the sweep oscillator/plug-in, press:
[SHIFT] [CW] [1] [GHz]
[POWER LEVEL] [-] [2] [dB]
[POWER SWEEP] [1] [5] [dB]

5-15. Power Sweep (Cont'd)

4. On the network analyzer, press:

[SCALE] [AUTOSCALE]
[CURSOR] [MIN] [CURSOR Δ] [MAX]

5. While observing the network analyzer display of the POWER SWEEP output, adjust A5R50 (PWSP) for 15 dB/sweep (as displayed by the cursor Δ reading on the network analyzer). See figure 5-46 for adjustment location. Figure 5-47 shows a properly adjusted power sweep scaled at 5 dB/division.

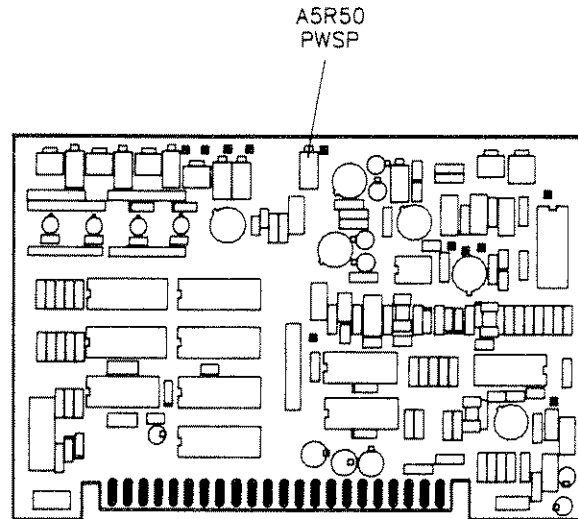


Figure 5-46. Power Sweep Adjustment Location

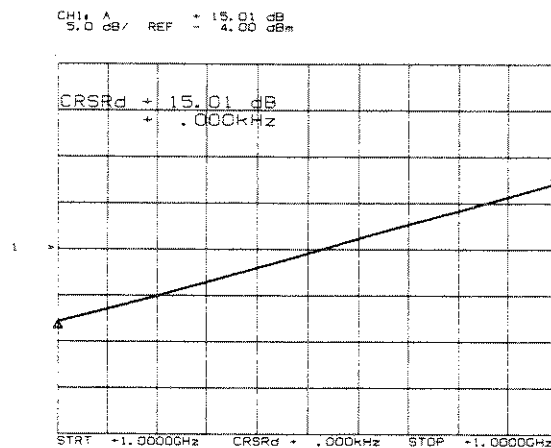


Figure 5-47. Power Sweep After Adjustment

5-16. FM Driver

DESCRIPTION

The FM driver high frequency offset is adjusted for a zero volt drive with no FM applied. A delay-line discriminator is used to detect and display FM on an oscilloscope. Adjustments are made for best overall frequency response from 100 Hz to 10 MHz. Compliance to a specification of ± 3 dB is checked between 100 Hz and 2 MHz.

EQUIPMENT

Sweep Oscillator Mainframe	HP 8350
Digital Voltmeter	HP 3456A
Oscilloscope	HP 1741A
Function Generator	HP 3325A
Frequency Counter	HP 5343A
50 Ohm Feedthru Termination	HP 10100C
Delay Line Discriminator	(See figure 1-3 in "General Information")

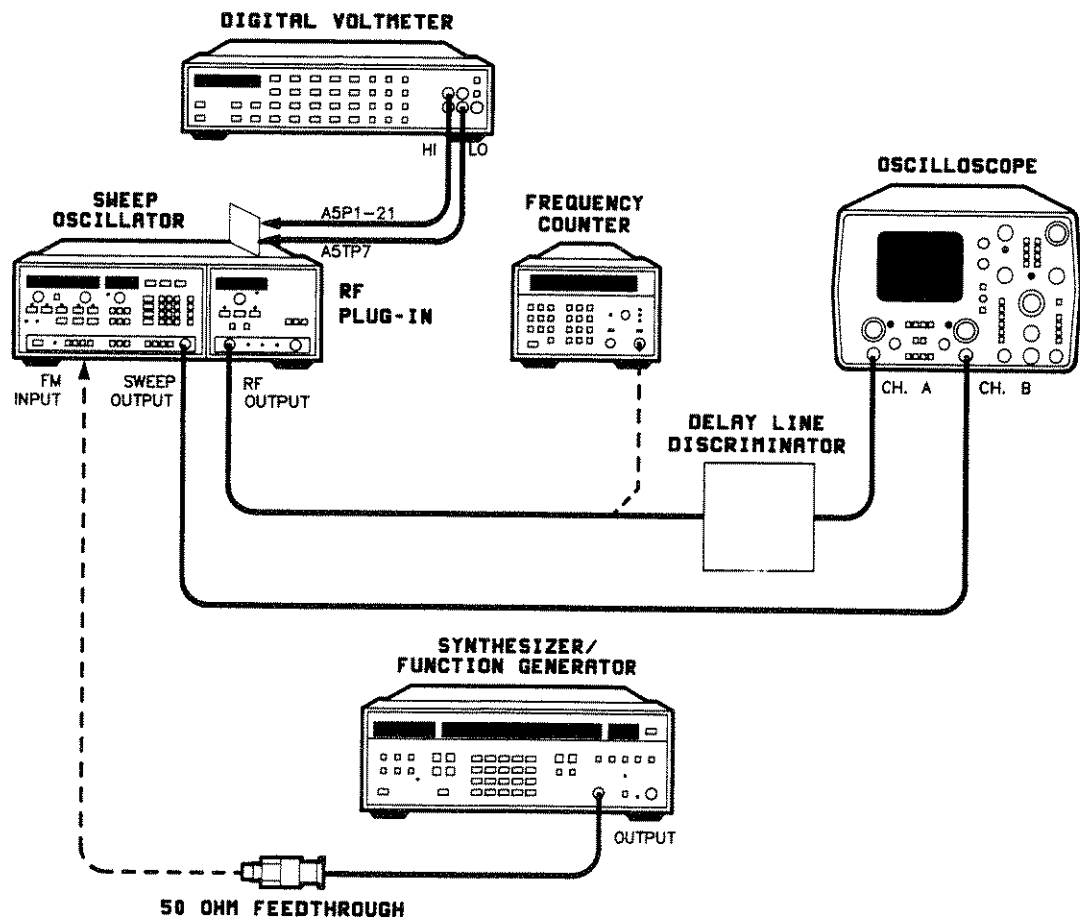


Figure 5-48. FM Adjustment Test Setup

5-16. FM Driver (Cont'd)

PROCEDURE

1. The equipment in figure 5-48 will be configured in the following procedure. In the interim, allow 30 minutes for warmup for each instrument.

FM Offset

2. Turn off the sweep oscillator AC power and place the plug-in A5 FM driver assembly on the extender board.
3. Turn on the sweep oscillator AC power and connect DVM HI to the A5 board connector pin 21 and connect DVM LO to A5TP7 (ground). Adjust A5R19 (FM OFFSET) for 0.00 ± 0.0001 V. See figure 5-49.
4. Turn off the sweep oscillator AC power and disconnect the DVM from the test points. Remove the extender board and reinstall the A5 FM driver board in the instrument.
5. Turn on the sweep oscillator AC power and press:

[PRESET] [CW] [1] [0] [GHz]

6. Set the oscilloscope as follows:

Select A vs B mode
Set channel A to 0.005V/DIV; input 50 Ω
Set channel B to 1V/DIV; input DC

Center the trace on the screen.

Flatness

7. Connect the frequency counter to the plug-in RF output. Apply +1 V dc to the rear panel FM INPUT with the function generator. A shift in frequency of approximately -20 MHz should occur on the frequency counter. This is the correct FM sensitivity. If a frequency shift of -6 MHz is indicated, reset switch 5 on A3S1 to 0 and press **[PRESET]**. See table 3-3 in "Operation" for switch configuration information.
8. Set the function generator as follows:

FREQUENCY	10 MHz
FUNCTION	SINE
AMPLITUDE	Adjust the amplitude for a 200 mV peak-to-peak output into 50 ohms.
9. Connect the equipment as shown in figure 5-48 with the delay line discriminator connected to the RF OUTPUT of the plug-in and the function generator connected to the rear panel FM INPUT connector of the sweep oscillator.
10. Set ground reference on the oscilloscope to center line. Adjust the sweep oscillator CW FREQUENCY and CW VERNIER for a waveform at the center of the oscilloscope CRT.

5-16. FM Driver (Cont'd)

11. Adjust channel A CAL (sensitivity) for a trace four divisions peak-to-peak, centered on the screen. (This sets up a 100% amplitude reference.) If the trace is not centered, adjust the CW vernier slightly.
12. Sweep the function generator frequency from 100 Hz to 100 kHz. Select resistor A5R31 (see figure 5-52) so the amplitude at 100 Hz and at 100 kHz are the same ± 0.2 divisions on the screen.

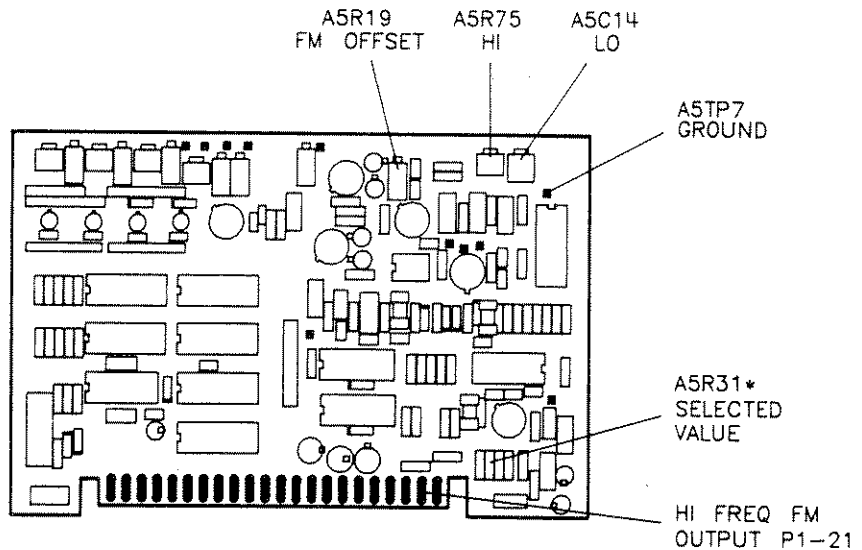


Figure 5-49. FM Driver Adjustment Location

13. Sweep the function generator frequency from 100 Hz to 10 MHz. Alternate between adjustments A5C14 (LO) and A5R75 (HI) to obtain the most constant overall response from 100 Hz to 10 MHz.
14. Check that the +3 dB flatness specification is met between 100 Hz and 2 MHz as follows. Sweep the function generator frequency between 100 Hz and 2 MHz. On the oscilloscope, the maximum point (+3 dB) can be as great as 5.6 divisions, and the minimum point (-3 dB) can be as small as 2.8 divisions. See figure 5-50.

5-16. FM Driver (Cont'd)

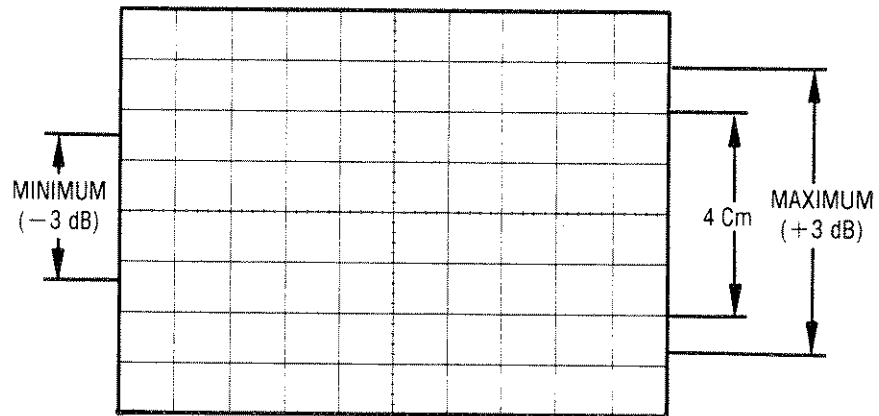


Figure 5-50. Flatness Response

15. If the flatness response in step 14 is not met, repeat steps 12 and 13 and make compromise adjustments in the 100 Hz to 2 MHz range to meet the flatness requirements.

Section 6. Replaceable Parts

INTRODUCTION

This section contains information for ordering parts. Table 6-1 lists the assemblies that are available for exchange or are under two-year warranty. Table 6-2 lists abbreviations used in the parts list and the names and addresses that correspond to the manufacturer's code numbers. Table 6-3 lists all replaceable parts in reference designator order. The quantities listed are the quantities *per assembly* for that part the first time it is listed in that assembly.

TWO-YEAR WARRANTY AND RESTORED EXCHANGE PARTS

A two-year warranty applies to both an original component and to one that is purchased as a replacement part either new or restored through the support life of the instrument. The restored exchange parts program allows a defective component to be exchanged for a factory-restored part that provides a substantial reduction in replacement cost. In addition, if the original component is covered by a two-year warranty, the exchanged component will also have a two-year warranty from the date of purchase. Table 6-1 identifies the components within the instrument that have a two-year warranty as well as those that are available as restored exchange parts.

ORDERING INFORMATION

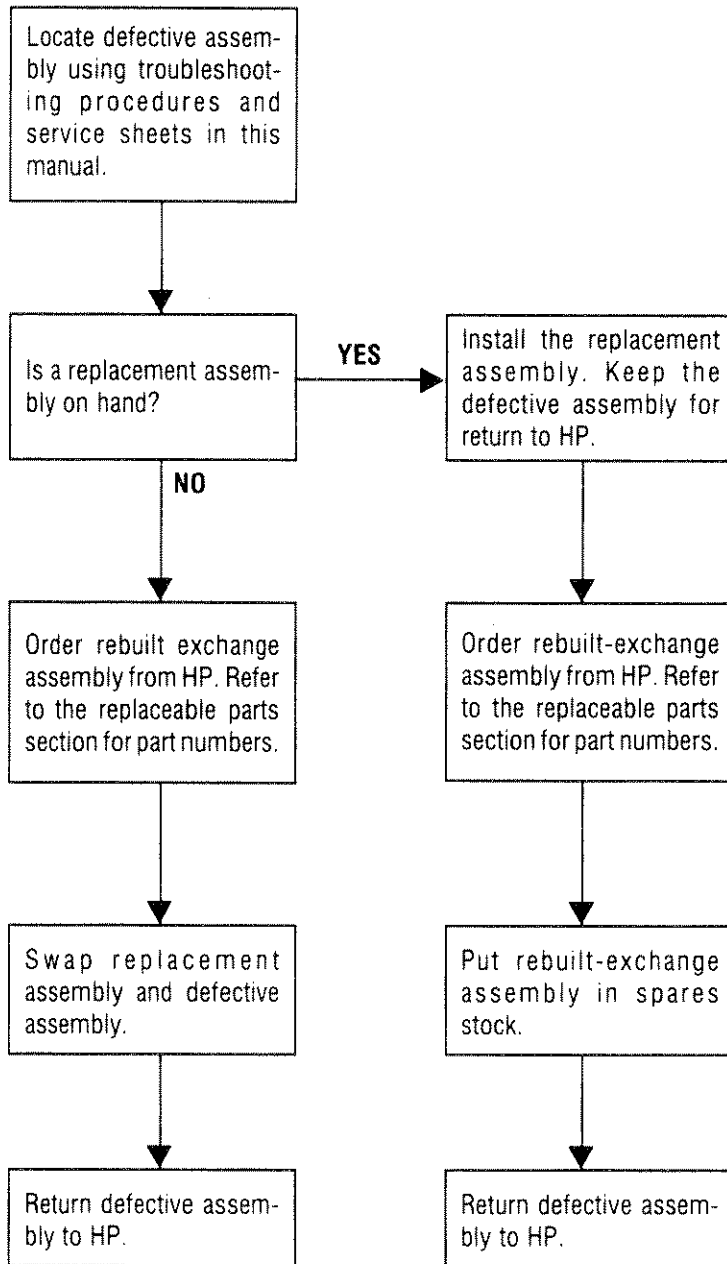
To order a part listed in the replaceable parts list, quote the HP part number with its check digit (CD), indicate the quantity, and address the order to the nearest Hewlett-Packard office. The check digit will ensure accurate processing of your order.

To order a part that is not listed in the replaceable parts list, include the instrument model number, instrument serial number, description and function of the part, and the quantity of parts required. Address the order to the nearest Hewlett-Packard office.

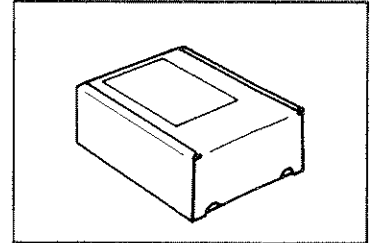
Table 6-1. Two Year Warranty and Restored Exchange Parts

Reference Designation	Description	Two-Year Warranty	Restored Exchange Part
A12	YTM	Yes	Yes
A13	YO 2.3 to 7.0 GHz	Yes	Yes
A14	2 to 7 GHz Power Amp	Yes	Yes
A16	Modulator/Splitter	Yes	Yes
A17	0.01 to 2.4 GHz Amp	Yes	Yes
A18	Modulator Mixer	Yes	Yes
A19	Attenuator	Yes	No
A20	YTF	Yes	Yes
A21	2.0 to 26.5 GHz Amp	Yes	Yes
DC1	Detector	Yes	No

Use this fast, efficient, economical method to keep your Hewlett-Packard instrument in service.

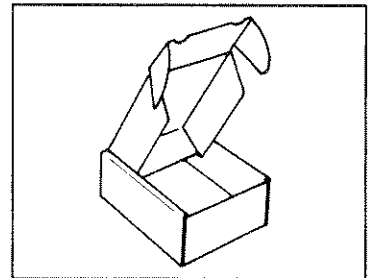


A.



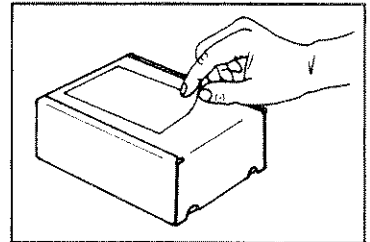
Rebuilt-exchange assemblies are shipped individually in boxes like this. In addition to the circuit assembly, the box contains:
Exchange assembly failure report
Return address label

B.



Open box carefully - it will be used to return defective assembly to HP. Complete failure report. Place it and defective assembly in box. Be sure to remove enclosed return address label.

C.



Seal box with tape. Inside U.S.A. *, stick preprinted return address label over label already on box, and return box to HP. Outside U.S.A., do not use address label; instead address box to the nearest HP office.

*HP pays postage on boxes mailed in U.S.A.

Figure 6-1. Module Exchange Program

Table 6-2. Reference Designations, Abbreviations, and Manufacturer's Code List (1 of 3)

REFERENCE DESIGNATIONS

A Assembly	FL Filter	S Switch
AT Attenuator, Isolator, Limiter, Termination	H Hardware	T Transformer
B Fan, Motor	J Electrical Connector (Stationary Portion), Jack	TB Terminal Board
C Capacitor	K Relay	TP Test Point
CP Coupler	L Coil, Inductor	U Integrated Circuit, Microcircuit
CR Diode, Diode Thyristor, Step Recovery Diode (SCR), Varactor	M Meter	V Electron Tube
DC Directional Coupler	MP Miscellaneous Mechanical Part	VR Breakdown Diode (Zener), Voltage Regulator
DS Annunciator, Lamp, Light Emitting Diode (LED), Signaling Device (Audible or Visible)	P Electrical Connector (Movable Portion), Plug	W Cable, Transmission Path, Wire
E Miscellaneous Electrical Part	Q Silicon Controlled Rectifier (SCR), Transistor, Triode Thyristor	X Socket
F Fuse	R Resistor	Y Crystal Unit (Piezoelectric, Quartz)
	RT Thermistor	Z Tuned Cavity, Tuned Circuit

ABBREVIATIONS

A		E
A Across Flats, Acrylic, Air (Dry Method), Ampere	CBL Cable	E Enamel (Insulation, Enhancement, Extension)
ADJ Adjust, Adjustment	CER Ceramic	E-MODE Enhancement Mode
AL Aluminum	CH Center Hole	EPROM Erasable Programmable Read Only Memory
ALC Alcohol, Automatic Level Control	CHAM Chamfer	EXCL Excluding, Exclusive
AMP Amperage	CHAN Channel	EXT Extended, Extension, External, Extinguish
AMPL Amplifier	COAX Coaxial	
ANDZ Anodized	COM Commercial, Common	F
ANLG Analog	CONN Connect, Connection, Connector	F Fahrenheit, Farad, Female, Film, (Resistor), Fixed, Flange, Flint, Flourine, Frequency
ASSY Assembly	CONT Contact, Continuous, Control, Controller	FDTHRU Feed Through
ASTBL Astable	CONV Converter	FEM Female
ATTEN Attenuation, Attenuator	CP Cadmium Plate, Candle Power, Centipoise, Conductive Plastic, Cone Point	FF Flange, Female Connection; Flip Flop
AWG American Wire Gauge	CRP Crepe, Crimp	FL Flash, Flat, Fluid
B	CTR Center	FLEX Flexible
BCKT Bracket	CURRNT Current	FLG Flange
BD Board, Bundle		FLTR Filter, Floater
BE Baume, Beryllium	D	FT Current Gain Bandwidth
BFR Before, Buffer	D Deep, Depletion, Depth, Diameter, Direct Current	FM Flange, Male Connection; Foam, Frequency Modulation Product (Transition Frequency); Feet, Foot
BLK Black, Blank, Block	D/A Digital-to-Analog	FXD Fixed
BNC Type of Connector	DAP Diallyl Phthalate	
BSC Basic	DB Decibel, Double Break	G
BVR Reverse, Breakdown Voltage	DC Direct Current, Double Contact	GEN General, Generator
C	DBL Double	GHZ Gigahertz
C Capacitance, Capacitor, Center Tapped, Centistoke, Ceramic, Cermet, Circular Mil Foot, Closed Cup, Cold, Compression	DCCR Decoder	GP General Purpose Group
	DEG Degree	GL Glass
	DIA Diameter	GRN Green
	DIFF Differential	GRV Grooved
	DIP Dual In-Line Package	
	DO Package Type Designation	
	DRVR Driver	

Table 6-2. Reference Designations, Abbreviations, and Manufacturer's Code List (2 of 3)

H		
H	Henry, Hermaphrodite, High, Hole Diameter, Hot, Hub Inside Diameter, Hydrogen	
HD	Hand, Hard, Head, Heavy Duty	
HEX	Hexadecimal, Hexagon, Hexagonal	
HGT	Height	
I		
IC	Collector Current, Integrated Circuit	
ID	Identification, Inside Diameter	
IF	Forward Current, Intermediate Frequency	
IMPD	Impedance	
IN	Inch, Indium	
INP	Input	
INS	Insert, Inside, Insulation, Insulator	
INT	Integral, Intensity, Internal	
INTL	Internal, International	
INV	Invert, Inverter	
J		
JFET	Effect Transistor	
K		
K	Kelvin, Key, Kilo, Potassium	
KB	Knob	
L		
LED	Light Emitting Diode	
LG	Length, Long	
LIN	Linear, Linear Taper, Linearity	
LK	Link, Lock	
LKG	Leakage, Locking	
LKWR	Lockwasher	
LS	Loudspeaker, Low Power Schottky, Series Inductance	
LUM	Luminous	
M		
M	Male, Maximum, Mega, Mil, Milli, Mode, Momentary, Mounting Hole Centers, Mounting Hole Diameter	
MA	Milliampere	
MACH	Machined	
MAX	Maximum	
MCD	Millacandela	
MICPROC	Microprocessor	
MIN	Miniature, Minimum, Minor, Minute	
MLD	Mold, Molded	
MM	Magnetized Material (Restricted Articles Code), Millimeter	
MO	Metal Oxide, Milliounce, Molybdenum	
MOD	Model, Modified Modular, Modulated, Modulator	
MOM	Momentary, Motherboard	
MTG	Mounting	
MTLC	Metallic	
MTR	Meter	
MULTIPLXR	Multiplexer	
MULTR	Multiplier	
MUW	Music Wire	
MW	Milliwatt	
N		
N-CHAN	N-Channel Metal Oxide Semiconductor	
NB	Niobium	
NCH	Notched	
NEG	Negative	
NH	Nanohenry	
NM	Nanometer, Nonmetallic	
NO	Normally Open, Number	
NPN	Negative Positive Negative (Transistor)	
NS	Nanosecond, Non-Shorting, Nose	
NYL	Nylon (Polyamide)	
O		
OCTL	Octal	
OD	Olive Drab, Outside Diameter	
OP	Operational	
OPT	Optical, Option, Optional	
OXD	Oxide	
P		
PAN-HD	Pan Head	
PC	Picocoulomb, Piece, Printed Circuit	
P.C.	Printed Circuit	
PCB	Printed Circuit Board	
PD	Pad, Palladium, Pitch Diameter, Power Dissipation	
PF	Picofarad; Pipe, Female Connection; Power Factor	
PKG	Package	
PL	Phase Lock, Plain, Plate, Plug	
PL-MTG	Plate Mounting	
PLSTC	Plastic	
PN	Part Number	
PNP	Positive Negative Positive (Transistor)	
POLYC	Polycarbonate	
POLYE	Polyester	
POLYI	Polyimide	
POS	Position, Positive	
POZI	Pozidrive Recess	
PRCN	Precision	
PRIM	Primary	
PRL	Parallel	
PRP	Purple, Purpose	
P/S	Power Supply	
PT	Part, Pint, Platinum, Point, Pulse Time	
PVC	Polyvinyl Chloride	
PW	Power Wirewound, Pulse Width	
Q		
QUAD	Set of Four	
R		
RBN	Ribbon	
RCVR	Receiver	
RECT	Rectangle, Rectangular, Rectifier	
RES	Research, Resistance, Resistor, Resolution	
RET	Retaining	
RF	Radio Frequency	
RFI	Radio Frequency Interference	
RFLTR	Regulator	
RKR	Rocker	
RND	Round	
RPG	Rotary Pulse Generator	
RR	Rear	
RVT	Rivet, Riveted	
S		
SCR	Screw, Scrub, Silicon Controlled Rectifier	
SEC	Secondary	
SER	Serial, Series	
SGL	Single	
SHFT	Shaft	
SHLDR	Shoulder	
SI	Silicon, Square Inch	
SIG	Signal, Significant	
SIP	Single In-Line Package	
SKT	Skirt, Socket	
SLDR	Solder	
SM	Samarium, Seam, Small, Square Meter, Sub Modular, Subminiature	
SMB	Subminiature, B Type (Snap-On Connector)	

Table 6-2. Reference Designations, Abbreviations, and Manufacturer's Code List (3 of 3)

SNP Snap	TO Package Type	W
SPCL Special	TPL Triple	W Watt, Wattage, White,
SQ Square	TRIG Trigger, Triggerable, Triggering, Trigonometry	WB Wide Band
SST Stainless Steel	TRMR Trimmer	WD Width, Wire
STDF Standoff	TRN Turn, Turns	WD Width, Wood
SZ Size	TTL Tan Translucent, Transistor, Transistor Logic	
T		X
T Tab Width, Taper, Teeth, Temperature, Tera, Tesla, Thermoplastic (Insulation), Thickness, Time, Timed, Tooth, Turns Ratio, Typical	U	XSTR Transistor
TA Ambient Temperature, Tantalum	UCD Microcandela	
TC Thermoplastic	UNCT Undercut	Y
TFE Polytetrafluoro - ethylene, Teflon	UF Microfarad	YIG Yttrium-iron-garnet
THD Thread, Threaded	V	YTM YIG Tuned Multiplier
THK Thick	V Vanadium, Variable, Violet, Volt, Voltage	
	VA Volt Ampere	Z
	VDC Volts, Direct Current	ZN-P Zinc Plate
	VID Video	ZNR Zener

MANUFACTURER'S CODE LIST

Mfr Code	Manufacturer Name	Mfr Code	Manufacturer Name
00545	NIPPON ELECTRIC CO	4G819	OVERLAND PRODUCTS CO
00000	ANY SATISFACTORY SUPPLIER	9N171	UNITRODE CORP
01121	ALLEN-BRADLEY CO.	00779	AMP INC
01295	TEXAS INSTR INC SEMICOND CMPNT DIV	01121	ALLEN-BRADLEY CO INC
02114	FERROXCUBE CORP	01295	TEXAS INSTRUMENTS INC
03888	K D I PYROFILM CORP	04222	AVX CORP
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	04713	MOTOROLA INC
06001	MEPCO ELECTA CORP	06540	AMATOM ELEK HARDWARE DIV OF MITE
06665	PRECISION MONOLITHICS INC	06665	PRECISION MONOLITHICS INC
07263	FAIRCHILD SEMICONDUCTOR DIV	09023	CORNELL-DUBILIER/SANGAMO
11236	CTS OF BERNE INC	15636	ELEC-TROL INC
13606	SPRAGUE ELECT CO SEMICONDUCTOR DIV	17856	SILICONIX INC
17856	SELICONIX INC	18324	SIGNETICS CORP
18324	SIGNETICS CORP	18873	DUPONT E I DE NEMOURS & CO
19701	MEPCO/ELECTRA CORP	19701	MEPCO/CENTRALAB INC
24355	ANALOG DEVICES INC	20940	MICRO-OHM CORP
24546	CORNING GLASS WORKS (BRADFORD)	24355	ANALOG DEVICES INC
25088	SIEMENS CORP	27014	NATIONAL SEMICONDUCTOR CORP
27014	NATIONAL SEMICONDUCTOR CORP	27264	MOLEX INC
28480	HEWLETT-PACKARD CO CORPORATE HQ	28480	HEWLETT PACKARD COMPANY
3L585	RCA CORP SOLID STATE DIV	34371	HARRIS CORP
30983	MEPCO/ELECTRA CORP	34649	INTEL CORP
32997	BOURNS INC TRIMPOT PROD DIV	50157	MIDWEST COMPONENTS
34371	HARRIS SEMICON DIV HARRIS-INTERTYPE	51167	ARIES ELECTRONICS INC
34649	INTEL CORP	52763	STETTNER & CO
56289	SPRAGUE ELECTRIC CO	55210	GETTIG ENGRG & MFG CO INC
72136	ELECTRO MOTIVE CORP	56289	SPRAGUE ELECTRIC CO
73138	BECKMAN INSTRUMENTS INC HELIPOT DIV	71468	ITT CORP
9N171	UNITRODE COMPUTER PRODUCTS CORP	73138	BECKMAN INDUSTRIAL CORP
91506	AUGAT INC	81073	GRAYHILL INC
G819	OVERLAND PRODUCTS CO	91506	AUGAT INC
6E259	AMETEK INC	91637	DALE ELECTRONICS INC
9N171	UNITRODE CORP	99800	AMER PRCN IND INC DELEVAN DIV

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	83592-60147	7	1	BOARD ASSEMBLY-FRONT PANEL (DOES NOT INCLUDE A1RPG1 ROTARY PULSE GENERATOR)	28480	83592-60147
A1C1	0160-4084	8	3	CAPACITOR-FXZD .1UF ±20% 50VDC CER	28480	0160-4084
A1C2	0180-3831	3	1	CAPACITOR-FXD 10UF ±20% 35VDC TA	28480	0180-3831
A1C3	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A1C4	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A1C5	0180-0552	9	1	CAPACITOR-FXD 220UF ±20% 10VDC TA	28480	0180-0552
A1DS1				NOT ASSIGNED		
A1DS2	1990-0487	7	2	LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	1990-0487
A1DS3	1990-0487	7	0	LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	1990-0487
A1DS4	1990-0670	0	5	LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	1990-0670
A1DS5	1990-0670	0		LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	1990-0670
A1DS6	1990-0486	6	1	LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	1990-0486
A1DS7				NOT ASSIGNED		
A1DS13				LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	1990-0670
A1DS14	1990-0670	0		LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	1990-0670
A1DS15	1990-0670	0		LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	1990-0670
A1DS16	1990-0670	0		LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	1990-0670
A1DS17	1990-0699	3	3	LED-LIGHT BAR MODULE LUM-INT=7MCD	28480	1990-0699
A1DS18	1990-0699	3		LED-LIGHT BAR MODULE LUM-INT=7MCD	28480	1990-0699
A1DS19	1990-0699	3		LED-LIGHT BAR MODULE LUM-INT=7MCD	28480	1990-0699
A1J1	1251-4827	1	1	CONNECTOR 50-PIN M POST TYPE	28480	1251-4827
A1R1	0698-3444	1	2	RESISTOR 316 1% .125W F TC=0±100	24546	C4-1/8-to-316T-F
A1R2	0698-3444	1		RESISTOR 316 1% .125W F TC=0±100	24546	C4-1/8-TO-316R-F
A1R3	2100-4022	0	3	RESISTOR-VAR CONTROL CP 10K 10% LIN	28480	2100-4022
A1R4	2100-4022	0		RESISTOR-VAR CONTROL CP 10K 10% LIN	28480	2100-4022
A1R5	2100-4022	0		RESISTOR-VAR CONTROL CP 10K 10% LIN	28480	2100-4022
A1R6	0698-8820	7	1	RESISTOR 4.64 1% .125W F TC=0±100	28480	0698-8820
A1R7	0757-0398	4	3	RESISTOR 75 1% .125W F TC=0±100	24546	C4-1/8-TO-75R0-F
A1R8	0757-0398	4		RESISTOR 75 1% .125W F TC=0±100	24546	C4-1/8-TO-75R0-F
A1R9	0757-0398	4		RESISTOR 75 1% .125W F TC=0±100	24546	C4-1/8-TO-75R0-F
A1S1	5060-9436	7	8	PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S2	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S3	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S4	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S5	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S6				NOT ASSIGNED		
A1S11				PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S12	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5069-9436
A1S13	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S14	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1U1	1810-0124	9	1	NETWORK-RES 16-DIP200.0 OHM X 8	28480	1810-0124
A1U2	1990-0738	1	1	DISPLAY-NUM-SEG 5-CHAR .152-H RED	28480	1810-0124
A1U3	1810-0403	7	1	NETWORK-RESISTOR R1-R15 330 OHM ±2%	01121	316A331
A1XDS17- A1XDS19				NOT ASSIGNED		
A1XU2	1251-5928	5	1	CONNECTOR 15-PIN M POST TYPE	28480	1251-5928
A1XU9	1200-0901	7	3	SOCKET-STRP 8-CONT SIP DIP-SLDR	28480	1200-0901
A1XU10	1200-0901	7		SOCKET-STRP 8-CONT SIP DIP-SLDR	28480	1200-0901
A1XU11	1200-0901	7		SOCKET-STRP 8-CONT SIP SIP-SLDR	28480	1200-0901
A1MP2	2950-0006	3	3	NUT-HEX-DBL-CHAM 1/4-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
A1MP4	0380-1233	9	3	SPACER-SPECIALTY .450 IN LG. .175 IN OD	28480	ORDER BY DESCRIPTION
A1MP3	2190-0067	4	3	WASHER-LK INTL T 1/4 IN .256-IN-ID	28480	2190-0067
A1MP7	0890-0052	9	1	TUBING-HS 1-D/ 5-RCVD .035-WALL POLYO	28480	0890-0052
A2	83595-60099	1	1	BOARD ASSEMBLY-SUB PANEL	28480	83595-60099
A2C1	0160-4084	8	4	CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A2C2	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A2C3	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A2C4				NOT ASSIGNED		
A2C5	0610-0174	9	1	CAPACITOR-FXD .47UF +80-20% 25VDC CER	28480	0160-0174
A2C6	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A2C7	0160-3879	7	1	CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2C8	0160-3875	3	1	CAPACITOR-FXD 22PF ±5% 200VDC CER 0±30	28480	0160-3875
A2C9	0160-4808	4	1	CAPACITOR-FXD 470PF ±5% 100VDC CER 0±3	04222	SA101A471JAAH
A2CR1	1901-0033	2	5	DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A2CR2	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A2CR3	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A2CR4				NOT ASSIGNED		
A2CR5				NOT ASSIGNED		
A2CR6	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A2CR7	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A2J1	1251-5926	3	1	CONNECTOR 50-PIN M POST TYPE	28480	1251-5926
A2J2				NOT ASSIGNED		
A2J3	1200-1204	5	1	SOCKET-IC 14-CONT DIP-SLDR	28480	1200-1204
A2K1	0490-0916	6	1	RELAY-REED 1A 500MA 100VDC 5VDC-COIL	28480	0490-0916
A2L1	9100-1618	1	1	INDUCTOR RF-CH*LD 5.6UH 10%	28480	9100-1618
A2P1	1251-5491	7	1	CONNECTOR 25-PIN F POST TYPE	28480	1251-5491
A2Q1	1854-0474	4	2	TRANSISTOR NPN SI PD=310MW FT=100MHz	04713	2N5551
A2Q2	1853-0316	1	1	TRANSISTOR-DUAL PNP PD=500MW	28480	1853-0316
A2Q3	1854-0474	4		TRANSISTOR NPN SI PD=310MW FT=100MHz	04713	2N5551
A2Q4	1854-0477	7	1	TRANSISTOR NON 2N2222A SI TO-18 PD=50MW	04713	2N2222A
A2R1	2100-3056	8	1	RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN	02111	43P502
A2R2	0698-7256	1	1	RESISTOR 6.81K 1% .05W F TC=0±100	00746	CR820
A2R3	0757-0466	7	1	RESISTOR 110K 1% .125W F TC=0±100	24546	C4-1/8-TO-1103-F
A2R4	2100-3054	6	1	RESISTOR-TRMR 50K 10% C SIDE-ADJ	03744	3006P-DM3-503
A2R5	0757-0462	6	1	RESISTOR 100K 1% .125W F TC=0±100	24546	C4-1/8-TO-1003-F
A2R6	2100-3054	6	2	RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	02111	43P503
A2R7	0698-7257	2	1	RESISTOR 7.5K 1% .05W TF TC=0±100	19701	5063J
A2R8	0757-0463	4	1	RESISTOR 82.5K 1% .125W TF TC=0±100	19701	SFR25H
A2R9	0698-7251	6	1	RESISTOR 4.22K 1% .05W TF TC=0±100	19701	5063J
A2R10	0698-6320	8	1	RESISTOR 5K 1% .125W TF TC=0±25	91637	CMF-55-1. T-9
A2R11	0698-6630	3	1	RESISTOR 20K 1% .125W TF TC=0±25	19701	5033R
A2R12	0698-3153	9	1	RESISTOR 3.83K 1% .125W F TC=0±100	24546	C4-1/8-TO-3831-F
A2R13	0698-3431	6	1	RESISTOR 23.7 1% .125W F TC=0±100	03888	PME55-1/8-TO-23R7-F
A2R14	0757-0438	3	1	RESISTOR 5.11K 1% .125W F TC=0±100	24546	C4-1/8-TO-5111-F
A2R15	0698-3156	2	1	RESISTOR 14.7K 1% .125W F TC=0±100	24546	C4-1/8-TO-1472-F
A2R16				NOT ASSIGNED		
A2R17	0757-0465	6	3	RESISTOR 100K 1% .125W F TC=0±100	24546	C4-1/8-TO-1003-F
A2R18	0698-3159	5	1	RESISTOR 26.1K 1% .125W TF TC=0±100	19701	SFR25H
A2R19				NOT ASSIGNED		
A2R20	0757-0442	9	1	RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-TO-1002-F
A2R21	0757-0465	6		RESISTOR 100K 1% .125W F TC=0±100	24546	C4-1/8-TO-1003-F
A2R22	0757-0465	6		RESISTOR 100K 1% .125K F TC=0±100	24546	C4-1/8-TO-1003-F
A2R23	2100-3054	6		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	02111	43P503
A2R24	0698-7260	7	3	RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-TO-1002-F
A2R25	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-TO-1002-F
A2R26	0698-7229	8	1	RESISTOR 511 1% .05W F TC=0±100	24546	C3-1/8-TO-511R-F
A2R27	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-TO-1002-F
A2R28	0698-7205	0	1	RESISTOR 51.1 1% .05W F TC=0±100	24546	C3-1/8-TO-51R1-F
A2R29	0698-5437	6	1	RESISTOR 12K 1% .125W TF TC=0±50	91637	CMF-55-1. T-2
A2TP1	0360-0535	0	3	TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A2TP2	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A2TP3	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A2U1	1826-0092	3	1	IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A2U2	1858-0047	5	2	TRANSISTOR ARRAY 16-PIN PLSTC DIP	13606	ULN-2003A
A2U3	1858-0047	5		TRANSISTOR ARRAY 16-PIN PLSTC DIP	13606	ULN-2003A
A2U4	1820-1416	5	1	IC SCHMITT-TRIG TTL LS INV HEX 1-INP	01295	SN74LS14N
A2U5	1820-1730	6	3	IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS273N
A2U6	1820-2150	6	1	IC MICPROC-ACCESS NMOS	34649	D8279-5
A2U7	1820-1730	6		IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS273N
A2U8	1820-1730	6		IS FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS273N
A2U9	1826-0417	6	1	IC SWITCH ANLG QUAD 16-DIP-C PKG	27014	LF13333D
A2U10	1858-0069	1	1	TRANSISTOR ARRAY 18-PIN PLSTC DIP	13606	ULN-2803A
A2U11				NOT ASSIGNED		
A2U12	1826-0205	0	1	IC TIMER TTL	18324	NE5556A
A2U13	1820-1199	1	1	IC INV TTL LS HEX 1-INP	01295	SN74LS04N
A2VR1	1902-0041	4	1	DIODE-ZNR 5.11V 5% DO-35 PD=4W	IN751A	07263
A2W1				NOT ASSIGNED		
A2W2				NOT ASSIGNED		
A2W3	0811-3587	5	2	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A2W4	0811-3587	5		RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A2MP2	0380-0773	0	4	SPACER-RVT-ON .5-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A2S1	3101-2751	1	1	SWITCH-RKR DIP 2-1A 0.06A 5VDC	00779	1-435802-3

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A3	83525-60080	6	1	BOARD ASSEMBLY-DIGITAL INTERFACE	28480	83525-60080
A3C1	0160-0127	2	4	CAPACITOR-FXD 1UF ±20% 50VDC CER	28480	0160-0127
A3C2	0160-0127	2		CAPACITOR-FXD 1UF ±20% 50VDC CER	28480	0160-0127
A3C3	0160-0127	2		CAPACITOR-FXD 1UF ±20% 50VDC CER	28480	0160-0127
A3C4	0160-0127	2		CAPACITOR-FXD 1UF ±20% 50VDC CER	28480	0160-0127
A3C5	0160-3537	4	1	CAPACITOR-FXD 680PF ±5% 100VDC MICA	28480	0160-3537
A3C6	0180-0500	7	1	CAPACITOR-FXD 47UF ±20% 20VDC TA	28480	0180-0500
A3J1	1251-5926	3	1	CONNECTOR 50-PIN M POST TYPE	28480	1251-5926
A3MP1				NOT ASSIGNED		
A3MP2	5040-6852	3	1	BD EXTR ORANGE	28480	5040-6852
A3MP3	5000-9043	6	5	PIN	28480	5000-9043
A3MP4	9320-5784	6	4	LBL IN MADE USA	28480	9320-5784
A3R1	0757-1094	9	1	RESISTOR 1.47K 1% .125W F TC=0 ± 100	00000	ORDER BY DESCRIPTION
A3R2	0698-3153	9	2	RESISTOR 3.83K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-3831-F
A3R3	0698-3153	9		RESISTOR 3.83K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-3831-F
A3R4	0698-7212	9	1	RESISTOR 100 1% .05W F TC=0 ± 100	24546	C3-1/8-T0-100R-F
A3S1	3101-2243	6	1	SWITCH-RKR DIP-RKR-ASSY 8-1A .05A 30VDC	28480	3101-2243
A3U1	83592-60104	6	1	ROM REPLACEMENT KIT (U1 NOT SEPARATELY REPLACEABLE)	28480	83592-60104
A3U2	83592-60104	6		ROM REPLACEMENT KIT (U2 NOT SEPARATELY REPLACEABLE)	28480	83592-60104
A3U3	1826-0180	0	1	IC TIMER TTL MONO/ASTBL	18324	NE555N
A3U4	1820-2081	2	1	IC NMOS	04713	MC68A21P
A3U5	1820-3093	8	1	IC-8000-SERIES PROGRAMMABLE TIMER	28480	1820-3093
A3U6	1820-1202	7	1	IC GATE TTL LS NAND TPL 3-INP	01295	SN74LS10N
A3U7	1820-1197	9	1	IC GATE TTL LS NAND QUAD 2-INP	01295	SN74LS00N
A3U8	1820-1416	5	4	IC SCHMITT-TRIG TTL LS INV HEX 1-INP	01295	SN74LS14N
A3U9	1820-1216	3	2	IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	SN74LS138N
A3U10	1820-1416	5		IC SCHMITT-TRIG TTL LS INV HEX 1-INP	01295	SN74LS14N
A3U11	1820-1416	5		IC SCHMITT-TRIG TTL LS INV HEX 1-INP	01295	SN74LS14N
A3U12	1810-0338	7	3	NETWORK-RES 16-DIP 100.0 OHM X 8	11236	761-3-R100
A3U13	1820-1216	3		IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	SN74LS138N
A3U14	1820-1491	6	1	IC BFR TTL LS NON-INV HEX 1-INP	01295	SN74LS367AN
A3U15	1820-1416	5		IC SCHMITT-TRIG TTL LS INV HEX 1-INP	01295	SN74LS14N
A3U16	1810-0338	7		NETWORK-RES 16-DIP 100.0 OHM X 8	11236	761-3-R100
A3U17	1820-2075	4	2	IC TRANSCEIVER TTL LS BUS OCTL	01295	SN74LS245N
A3U18	1820-2075	4		IC TRANSCEIVER TTL LS BUS OCTL	01295	SN74LS245N
A3U19	1810-0338	7		NETWORK-RES 16-DIP 100.0 OHM X 8	11236	761-3-R100
A3XU1	1200-0541	1	2	SOCKET-IC 24-CONT DIP DIP-SLDR	28480	1200-0541
A3XU2	1200-0541	1		SOCKET-IC 24-CONT DIP DIP-SLDR	28480	1200-0541
	7121-4611	2	4	LBL IN MADE USA	28480	7121-4611

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A4	83595-60087	7	1	BD ASSY-ALC	28480	83595-60087
A4C1	0160-3879	7	8	CAPACITOR-FXD .01UF ± 20% 100VDC CER	04222	SR201C103MAAH
A4C3	0180-2617	1	1	CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	56289	199D1131
A4C4	0160-0945	2	1	CAPACITOR-FXD 910PF ± 5% 100VDC MICA 0 + 7	09023	CD15FA911JO3
A4C6	0160-4084	8	7	CAPACITOR-FXD .1UF ± 20% 50VDC CER	56289	1C20X7R104M050B
A4C7	0160-3874	2	2	CAPACITOR-FXD 10PF ± .5PF 200VDC CER		FD12C0G2D100D
A4C8	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	56289	1C20X7R104M050B
A4C9	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	56289	1C20X7R104M050B
A4C10	0180-2697	7	4	CAPACITOR-FXD 10UF ± 10% 25VDC TA	56289	199D1141
A4C11	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	04222	SR201C103MAAH
A4C12	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	04222	SR201C103MAAH
A4C13	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	56289	1C20X7R104M050B
A4C14	0160-0127	2	1	CAPACITOR-FXD 1UF ± 20% 50VDC CER	04222	SR835E105MAAH
A4C15	0180-2697	7		CAPACITOR-FXD 10UF ± 10% 25VDC TA	56289	199D1141
A4C16	0180-2697	7		CAPACITOR-FXD 10UF ± 10% 25VDC TA	56289	199D1141
A4C17	0180-2697	7		CAPACITOR-FXD 10UF ± 10% 25VDC TA	56289	199D1141
A4C18	0180-2661	5	1	CAPACITOR-FXD 1UF ± 10% 50VDC TA	56289	199D1135
A4C19	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	56289	1C20X7R104M050B
A4C20	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	56289	1C20X7R104M050B
A4C21	0160-0572	1	2	CAPACITOR-FXD 2200PF ± 20% 100VDC CER	04222	SR201C222MAAH
A4C22	0160-3874	2		CAPACITOR-FXD 10PF ± .5PF 200VDC CER		FD12C0G2D100D
A4C23	0121-0448	8	1	CAPACITOR-V TRMR-CER 2.5-5PF 63V PC-MTG	52763	302-504-111
A4C25	0160-4084	8	1	CAPACITOR-FXD .1UF ± 20% 50VDC CER	56289	1C20X7R104M050B
A4C26	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	04222	SR201C103MAAH
A4C27	0160-3878	6	1	CAPACITOR-FXD 1000PF ± 20% 100VDC CER	04222	SR201C102MAAH
A4C28	0160-0572	1		CAPACITOR-FXD 2200PF ± 20% 100VDC CER	04222	SR201C222MAAH
A4C29	0160-3873	1	2	CAPACITOR-FXD 4.7PF ± .5PF 200VDC CER		FD12C0G2D4R7D
A4C30	0160-3873	1		CAPACITOR-FXD 4.7PF ± .5PF 200VDC CER		FD12C0G2D4R7D
A4C31	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	04222	SR201C103MAAH
A4C35	0160-4822	2	1	CAPACITOR-FXD 1000PF ± 5% 100VDC CER	04222	SA201A102JAAH
A4C36	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	04222	SR201C103MAAH
A4C37	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	04222	SR201C103MAAH
A4C38	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	04222	SR201C103MAAH
A4CR1	1901-1098	1	6	DIODE-SWITCHING 1N4150 50V 200MA 4NS	71468	
A4CR2	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	71468	
A4CR3	1901-0535	9	1	DIODE-SCHOTTKY SM SIG	28480	
A4CR4	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	71468	
A4CR5	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	71468	
A4CR7	1901-0535	9	3	DIODE-SCHOTTKY SM SIG	28480	
A4CR8	1901-0535	9		DIODE-SCHOTTKY SM SIG	28480	
A4CR9	1901-0535	9		DIODE-SCHOTTKY SM SIG	28480	
A4CR10	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	71468	
A4CR11	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	71468	
A4CR12	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	9N171	
A4J1	1258-0124	7	3	SHUNT-PROGRAMMABLE 1 DBL PIN SET .100	91506	8136-475G1
A4J2	1258-0124	7		SHUNT-PROGRAMMABLE 1 DBL PIN SET .100	91506	8136-475G1
A4J3	1258-0124	7		SHUNT-PROGRAMMABLE 1 DBL PIN SET .100	91506	8136-475G1
A4L1	9140-0210	1	1	INDUCTOR RF-CH-MLD 100UH ± 5% .166D-INX.	99800	1537-76
A4MP2	5040-6848	7	1	BOARD EXTRACTOR	28480	5040-6848
A4MP3	5000-9043	6	1	PIN	28480	5000-9043
A4Q1	1853-0007	7	1	TRANSISTOR PNP 2N3251 SI TO-18 PD = 360MW	04713	
A4Q2	1854-0404	0	1	TRANSISTOR NPN SI TO-18 PD = 360MW	04713	
A4Q3	1854-0295	7	2	TRANSISTOR-DUAL NPN PD = 400MW	04713	
A4Q5	1855-0386	9	2	TRANSISTOR J-FET 2N4392 N-CHAN D-MODE TO	04713	
A4Q6	1855-0386	9		TRANSISTOR J-FET 2N4392 N-CHAN D-MODE TO	04713	
A4Q7	1855-0423	5	6	TRANSISTOR MOSFET N-CHAN E-MODE TO-237 S	17856	
A4Q8	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE TO-237 S	17856	
A4Q9	1854-0295	7		TRANSISTOR-DUAL NPN PD = 400MW	04713	
A4Q10	1853-0316	1	2	TRANSISTOR-DUAL PNP PD = 500MW	34371	
A4Q11	1853-0316	1		TRANSISTOR-DUAL PNP PD = 500MW	34371	
A4Q12	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE TO-237 S	17856	
A4Q13	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE TO-237 S	17856	
A4Q14	1853-0451	5	2	TRANSISTOR PNP 2N3799 SI TO-18 PD = 360MW	04713	
A4Q15	1853-0451	5		TRANSISTOR PNP 2N3799 SI TO-18 PD = 360MW	04713	
A4Q16	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE TO-237 S	17856	
A4Q17	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE TO-237 S	17856	

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replacement Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A4R1	2100-2633	5	1	RESISTOR-TRMR 1K 10% TKF SIDE-ADJ 1-TRN	73138	82PAR1K
A4R2	0698-7267	4	1	RESISTOR 19.6K 1% .05W TF TC=0±100	19701	5063J
A4R7	2100-2516	3	1	RESISTOR-TRMR 100K 10% TKF SIDE-ADJ 1-TR	73138	82PAR100K
A4R8	2100-2515	2	1	RESISTOR-TRMR 200K 10% TKF SIDE-ADJ 1-TR	73138	82PAR200K
A4R9	2100-0670	6	3	RESISTOR-TRMR 10K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A4R10	2100-0670	6		RESISTOR-TRMR 10K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A4R12	2100-3753	2	1	RESISTOR-TRMR 200K 10% TKF SIDE-ADJ 17-T	73138	67XR
A4R13	2100-0544	3	4	RESISTOR-TRMR 100K 10% TKF SIDE-ADJ 17-T	73138	67XR
A4R14	2100-0670	6		RESISTOR-TRMR 10K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A4R15	2100-2489	9	1	RESISTOR-TRMR 5K 10% TKF SIDE-ADJ 1-TRN	73138	82PAR5K
A4R16	0698-7253	8	2	RESISTOR 5.11K 1% .05W TF TC=0±100	19701	5063J
A4R17	0698-7253	8		RESISTOR 5.11K 1% .05W TF TC=0±100	19701	5063J
A4R18	0698-7257	2	2	RESISTOR 7.5K 1% .05W TF TC=0±100	19701	5063J
A4R19	0698-7263	0	2	RESISTOR 13.3K 1% .05W TF TC=0±100	19701	5063J
A4R20	0698-7258	3	1	RESISTOR 8.25K 1% .05W TF TC=0±100	19701	5063J
A4R21	0698-7261	8	4	RESISTOR 11K 1% .05W TF TC=0±100	19701	5063J
A4R22	0698-7262	9	2	RESISTOR 12.1K 1% .05W TF TC=0±100	19701	5063J
A4R23	0698-7276	5	1	RESISTOR 46.4K 1% .05W TF TC=0±100	19701	5063J
A4R24	0698-7261	8		RESISTOR 11K 1% .05W TF TC=0±100	19701	5063J
A4R25	0698-7261	8		RESISTOR 11K 1% .05W TF TC=0±100	19701	5063J
A4R26	0698-7260	7	11	RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R27	0698-7231	2	1	RESISTOR 619 1% .05W TF TC=0±100	19701	5063J
A4R28	0698-7254	9	1	RESISTOR 5.62K 1% .05W TF TC=0±100	19701	5063J
A4R31	0698-7279	8	3	RESISTOR 61.9K 1% .05W TF TC=0±100	19701	5023R
A4R32	0698-7264	1	3	RESISTOR 14.7K 1% .05W TF TC=0±100	19701	5063J
A4R33	0698-7249	2	2	RESISTOR 3.48K 1% .05W TF TC=0±100	19701	5063J
A4R34	0698-3457	6	1	RESISTOR 316K 1% .125W TF TC=0±100	19701	SFR25H
A4R35	0698-7260	7		RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R36	0698-7261	8		RESISTOR 11K 1% .05W TF TC=0±100	19701	5063J
A4R38	0698-7243	6	7	RESISTOR 1.96K 1% .05W TF TC=0±100	19701	5063J
A4R39	0698-7282	3	1	RESISTOR 82.5K 1% .05W TF TC=0±100	19701	5023R
A4R40	0698-7279	8		RESISTOR 61.9K 1% .05W TF TC=0±100	19701	5023R
A4R41*	0698-7275	5		RESISTOR 38.3K 1% .05W TF TC=0±100	00000	ORDER BY DESCRIPTION
A4R42	0698-7256	1	2	RESISTOR 6.81K 1% .05W TF TC=0±100	19701	5063J
A4R43	0698-7270	9	1	RESISTOR 26.1K 1% .05W TF TC=0±100	19701	5063J
A4R44	0698-7233	4	1	RESISTOR 750 1% .05W TF TC=0±100	19701	5063J
A4R45	0698-7243	6		RESISTOR 1.96K 1% .05W TF TC=0±100	19701	5063J
A4R46	0698-7234	5	2	RESISTOR 825 1% .05W TF TC=0±100	19701	5063J
A4R48	0698-7238	9	1	RESISTOR 1.21K 1% .05W TF TC=0±100	19701	5063J
A4R49	0698-7205	0	3	RESISTOR 51.1 1% .05W TF TC=0±100	19701	5063J
A4R50	0757-0399	5	1	RESISTOR 82.5 1% .125W TF TC=0±100	19701	SFR25H
A4R51	0698-7236	7	2	RESISTOR 1K 1% .05W TF TC=0±100	19701	5063J
A4R52	0698-7229	8	2	RESISTOR 511 1% .05W TF TC=0±100	19701	5063J
A4R53	0698-7232	3	1	RESISTOR 681 1% .05W TF TC=0±100	19701	5063J
A4R54	0698-3151	7	1	RESISTOR 2.87K 1% .125W TF TC=0±100	19701	SFR25H
A4R56	0698-7260	7		RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R57	0698-7249	2		RESISTOR 3.48K 1% .05W TF TC=0±100	19701	5063J
A4R58	0698-7256	1		RESISTOR 6.81K 1% .05W TF TC=0±100	19701	5063J
A4R59	0698-7229	8		RESISTOR 511 1% .05W TF TC=0±100	19701	5063J
A4R60	0698-7247	0	1	RESISTOR 2.87K 1% .05W TF TC=0±100	19701	5063J
A4R61	0698-7219	6	1	RESISTOR 196 1% .05W TF TC=0±100	19701	5063J
A4R62	0698-7212	9	1	RESISTOR 100 1% .05W TF TC=0±100	19701	5063J
A4R63	0698-7243	6		RESISTOR 1.96K 1% .05W TF TC=0±100	19701	5063J
A4R64	0698-7243	6		RESISTOR 1.96K 1% .05W TF TC=0±100	19701	5063J
A4R68	0698-7222	1	1	RESISTOR 261 1% .05W TF TC=0±100	19701	5063J
A4R69	0698-7277	6	1	RESISTOR 51.1K 1% .05W TF TC=0±100	19701	5023R
A4R70	0698-7246	9	1	RESISTOR 2.61K 1% .05W TF TC=0±100	19701	5063J
A4R71	0698-7268	5	1	RESISTOR 21.5K 1% .05W TF TC=0±100	19701	5063J
A4R72	0698-7212	9	2	RESISTOR 100 1% .05W TF TC=0±100	19701	5063J
A4R73	0698-7212	9		RESISTOR 100 1% .05W TF TC=0±100	19701	5063J
A4R74	0698-7243	6		RESISTOR 1.96K 1% .05W TF TC=0±100	19701	5063J
A4R75	0698-7274	3	1	RESISTOR 38.3K 1% .05W TF TC=0±100	19701	5063J
A4R76	0698-7260	7		RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R77	0698-7260	7		RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R78	2100-1986	9	1	RESISTOR-TRMR 1K 10% TKF TOP-ADJ 1-TRN	73138	82PR1K
A4R79	0698-7260	7		RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R80	0698-7205	0		RESISTOR 51.1 1% .05W TF TC=0±100	19701	5063J
A4R81	2100-2030	6	2	RESISTOR-TRMR 20K 10% TKF TOP-ADJ 1-TRN	73138	82PR20K
A4R82	2100-2030	6		RESISTOR-TRMR 20K 10% TKF TOP-ADJ 1-TRN	73138	82PR20K
A4R83	0698-7234	5		RESISTOR 825 1% .05W TF TC=0±100	19701	5063J

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A4R84	0698-7232	3	1	RESISTOR 681 1% .05W TF TC=0±100	19701	5063J
A4R85	0698-7260	7		RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R86	0698-7251	6	2	RESISTOR 4.22K 1% .05W TF TC=0±100	19701	5063J
A4R87	0698-7243	6		RESISTOR 1.96K 1% .05W TF TC=0±100	19701	5063J
A4R88	0698-7264	1		RESISTOR 14.7K 1% .05W TF TC=0±100	19701	5063J
A4R89	0698-7263	0		RESISTOR 13.3K 1% .05W TF TC=0±100	19701	5063J
A4R90	0698-7264	1		RESISTOR 14.7K 1% .05W TF TC=0±100	19701	5063J
A4R91	0698-7240	3	1	RESISTOR 1.47K 1% .05W TF TC=0±100	19701	5063J
A4R92	0698-7280	1	1	RESISTOR 68.1K 1% .05W TF TC=0±100	19701	5023R
A4R93	0698-7260	7	1	RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R94	0698-7242	5	1	RESISTOR 1.78K 1% .05W TF TC=0±100	19701	5063J
A4R96	0698-7251	6		RESISTOR 4.22K 1% .05W TF TC=0±100	19701	5063J
A4R97	0698-7267	4	1	RESISTOR 19.6K 1% .05W TF TC=0±100	19701	5063J
A4R98	0698-7257	2		RESISTOR 7.5K 1% .05W TF TC=0±100	19701	5063J
A4R99	2100-1738	9	1	RESISTOR-TRMR 10K 10% TKF TOP-ADJ 1-TRN	73138	82PR10K
A4R100	0698-7262	9		RESISTOR 12.1K 1% .05W TF TC=0±100	19701	5063J
A4R101	0698-7263	0	1	RESISTOR 13.3K 1% .05W TF TC=0±100	19701	5063J
A4R102	0698-3440	7	1	RESISTOR 196 1% .125W TF TC=0±100	19701	SFR25H
A4R103	0757-0424	7	1	RESISTOR 1.1K 1% .125W TF TC=0±100	19701	SFR25H
A4R105	0698-7205	0		RESISTOR 51.1 1% .05W TF TC=0±100	19701	5063J
A4R106	0698-3440	7	1	RESISTOR 196 1% .125W TF TC=0±100	19701	SFR25H
A4R107	2100-0544	3		RESISTOR-TRMR 100K 10% TKF SIDE-ADJ 17-T	73138	67XR
A4R108	0698-8827	4	1	RESISTOR 1M 1% .125W TF TC=0±100	19701	SFR25H
A4R109	0698-7260	7		RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R110	0698-7243	6		RESISTOR 1.96K 1% .05W TF TC=0±100	19701	5063J
A4R111	2100-0544	3		RESISTOR-TRMR 100K 10% TKF SIDE-ADJ 17-T	73138	67XR
A4R112	0698-7260	7		RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R113	0698-7260	7		RESISTOR 10K 1% .05W TF TC=0±100	19701	5063J
A4R114	0698-7224	3	1	RESISTOR 316 1% .05W TF TC=0±100	19701	5063J
A4R115	0698-7236	7		RESISTOR 1K 1% .05W TF TC=0±100	19701	5063J
A4RT1	0837-0119	7	1	THERMISTOR TUB WITH AXL LEADS 5K-OHM	50157	3K502K
A4RT2	0837-0085	6	1	THERMISTOR ROD 680-OHM TC=+.7%/C-DEG	6E259	DG125-681-K
A4TP1	1251-5618	0	8	CONN-POST TYPE .100-PIN-SPCG 8-CONT	18873	68000-108
A4TP2	1251-5618	0		CONN-POST TYPE .100-PIN-SPCG 8-CONT	18873	68000-108
A4TP3	1251-5618	0		CONN-POST TYPE .100-PIN-SPCG 8-CONT	18873	68000-108
A4TP4	1251-5618	0		CONN-POST TYPE .100-PIN-SPCG 8-CONT	18873	68000-108
A4TP5	1251-5618	0		CONN-POST TYPE .100-PIN-SPCG 8-CONT	18873	68000-108
A4TP6	1251-5618	0		CONN-POST TYPE .100-PIN-SPCG 8-CONT	18873	68000-108
A4TP7	1251-5618	0		CONN-POST TYPE .100-PIN-SPCG 8-CONT	18873	68000-108
A4TP8	1251-5618	0		CONN-POST TYPE .100-PIN-SPCG 8-CONT	18873	68000-108
A4TP9	0360-0535	0	4	TERMINAL-TEST POINT .330IN ABOVE	4G819	
A4TP10	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A4TP11	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A4TP12	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A4U1	1826-1186	8	3	ANALOG SWITCH 4 SPST 16 -CERDIP	06665	
A4U2	1826-0616	7	2	IC OP AMP PRCN QUAD 14-DIP-C PKG	06665	
A4U3	1826-0610	1	2	ANALOG MULTIPLEXER 4 CHNL 16 -CERDIP	06665	
A4U4	1826-1186	8		ANALOG SWITCH 4 SPST 16 -CERDIP	06665	
A4U5	1826-0616	7		IC OP AMP PRCN QUAD 14-DIP-C PKG	06665	
A4U6	1826-0610	1		ANALOG MULTIPLEXER 4 CHNL 16 -CERDIP	06665	
A4U7	1820-1425	6	1	IC SCHMITT-TRIG TTL LS NAND QUAD 2-INP	01295	
A4U8	1826-1186	8		ANALOG SWITCH 4 SPST 16 -CERDIP	06665	
A4U9	1826-0319	7	2	IC OP AMP LOW-BIAS-H-IMPED TO-99 PKG	27014	
A4U10	1826-0065	0	1	IC COMPARATOR PRCN 8-DIP-P PKG	27014	
A4U11	1826-0752	2	1	D/A 12-BIT 16-CBRZ/SDR CMOS	24355	
A4U12	1820-1216	3	1	IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	
A4U13	1820-1730	6	1	IC FF TTL LS D-TYPE POS-EDGE-TRIG COM CL	01295	
A4U14	1820-1199	1	1	IC INV TTL LS HEX 1-INP	01295	
A4U15	1820-1198	0	1	IC GATE TTL LS NAND QUAD 2-INP	01295	
A4U16	1826-0021	8	1	IC OP AMP GP TO-99 PKG	27014	
A4U17	1826-0447	2	1	IC OP AMP WB TO-99 PKG	27014	
A4U18	1826-0319	7		IC OP AMP LOW-BIAS-H-IMPED TO-99 PKG	27014	
A4U19	1826-1049	2	1	IC OP AMP PRCN 8-DIP-C PKG	06665	
A4VR1	1902-3092	1	1	DIODE-ZNR 4.99V 2% DO-35 PD= .4W	04713	
A4VR2	1902-0111	9	1	DIODE-ZNR 1N753A 6.2V 5% DO-35 PD= .4W	04713	
A4VR3	1902-3070	5	1	DIODE-ZNR 4.22V 5% DO-35 PD= .4W	04713	
A4VR4	1902-0049	2	2	DIODE-ZNR 6.19V 5% DO-35 PD= .4W	04713	
A4VR5	1902-0049	2		DIODE-ZNR 6.19V 5% DO-35 PD= .4W	04713	
A4VR6	1902-0025	4	1	DIODE-ZNR 10V 5% DO-35 PD= .4W TC=+.06%	04713	
A4W4	8159-0005	0	2	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	55210	L-2007-1
A4W6	8159-0005	0		RESISTOR-ZERO OHMS 22 AWG LEAD DIA	55210	L-2007-1
A4X1	1251-4932	9	6	CONNECTOR-SGL CONT SKT .021-IN-BSC-SZ	91506	LSG-1AG14-1

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A5	83592-60005	6	1	BOARD ASSEMBLY-FM	28480	83592-60005
A5C1	0160-0575	4	2	CAPACITOR-FXD .047UF ± 20% 50VDC CER	28480	0160-0575
A5C2	0160-0572	1	1	CAPACITOR-FXD 2200PF ± 20% 100VDC CER	28480	0160-0572
A5C3	0160-4084	8	5	CAPACITOR-FXD .1UF ± 20% 50VDC CER	28480	0160-4084
A5C4	0160-0945	2	1	CAPACITOR-FXD 910PF ± 5% 100VDC MICA	28480	0160-0945
A5C5	0160-0575	4	2	CAPACITOR-FXD .047UF ± 20% 50VDC CER	28480	0160-0575
A5C6	0160-2247	1	1	CAPACITOR-FXD 3.9PF ± .25PF 500VDC CER	28480	0160-2247
A5C7	0160-3879	7	10	CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A5C8	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A5C9	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A5C10	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A5C11	0140-0198	5	1	CAPACITOR-FXD 200PF ± 5% 300VDC MICA	72136	DM15F201J0300WV1CR
A5C12	0160-2199	2	1	CAPACITOR-FXD 30PF ± 5% 300VDC MICA	28480	0160-2199
A5C14	0121-0446	6	1	CAPACITOR-V TRMR-CER 4.5-20PF 160V	28480	0121-0446
A5C15	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A5C16	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A5C17	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A5C18	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A5C20	0160-2249	3	2	CAPACITOR-FXD 4.7PF ± .25PF 500VDC CER	28480	0160-2249
A5C23	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	28480	0160-4084
A5C24	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	28480	0160-4084
A5C25	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A5C26	0160-3874	2	1	CAPACITOR-FXD 10PF ± .5PF 200VDC CER	28480	0160-3874
A5C27	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	28480	0160-4084
A5C28	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	28480	0160-4084
A5C29	0180-2617	1	4	CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	25088	D6R8GS1B35K
A5C30	0180-2617	1		CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	25088	D6R8GS1B35K
A5C31	0180-2617	1		CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	25088	D6R8GS1B35K
A5C32	0180-2617	1		CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	25088	D6R8GS1B35K
A5C33	0180-2207	5	1	CAPACITOR-FXD 100UF ± 10% 10VDC TA	56289	150D107X9010R2
A5C34	0180-0474	4	6	CAPACITOR-FXD 15UF ± 10% 20VDC TA	28480	0180-0474
A5C35	0180-0474	4		CAPACITOR-FXD 15UF ± 10% 20VDC TA	28480	0180-0474
A5C36	0180-0474	4		CAPACITOR-FXD 15UF ± 10% 20VDC TA	28480	0180-0474
A5C37	0180-0474	4		CAPACITOR-FXD 15UF ± 10% 20VDC TA	28480	0180-0474
A5C38	0180-0474	4		CAPACITOR-FXD 15UF ± 10% 20VDC TA	28480	0180-0474
A5C39	0180-0474	4		CAPACITOR-FXD 15UF ± 10% 20VDC TA	28480	0180-0474
A5C40	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A5C41	0160-2249	3		CAPACITOR-FXD 4.7PF ± .25PF 500VDC CER	28480	0160-2249
A5CR1	1901-0033	2	2	DIODE-GEN PRP 180V 200MA DO-35	9N171	1N645
A5CR2	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	1N645
A5CR3	1901-0047	8	2	DIODE-SWITCHING 20V 75MA 10NS	28480	1901-0047
A5CR4	1901-0047	8		DIODE-SWITCHING 20V 75MA 10NS	28480	1901-0047
A5CR5	1901-1098	1	4	DIODE-SWITCHING 1N4150 50V 200MA 4NS	15818	1N4150
A5CR6	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	15818	1N4150
A5CR7	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	15818	1N4150
A5CR8	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	15818	1N4150
A5CR9	1901-0535	9	1	DIODE-SM SIG SCHOTTKY	28480	1901-0535
A5K1	0490-0916	6	1	RELAY-REED 1A 500MA 100VDC 5VDC-COIL	28480	0490-0916
A5K2	0490-1063	6	1	RELAY-REED 2A 500MA 50VDC 5VDC-COIL 10VA	28480	0490-1063
A5L1	9100-1625	0	1	INDUCTOR RF-CH-MLD 33UH 5%	28480	9100-1625
A5L2	9100-1619	2	4	INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A5L3	9100-1619	2		INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A5L4	08503-80001	9	1	COIL TOROID	28480	08503-80001
A5L5	9100-1619	2		INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A5L6	9100-1619	2		INDUCTOR RF-CH-MLD 6.8UH 10%	28480	9100-1619
A5MP1				NOT ASSIGNED		
A5MP2	5040-6851	2	1	EXTRACTOR TAB	28480	5040-6851
A5MP3	5000-9043	6	1	PIN	28480	5000-9043
A5MP4	4330-0145	9	6	INSULATOR-BEAD GLASS	28480	4330-0145
A5MP5	9320-5784	6	1	LBL IN 83592	28480	9320-5784
A5MP6	7121-4611	2	1	LBL MADE IN USA	28480	7121-4611
A5MP7	1200-0173	5	4	INSULATOR-XSTR DAP-GL	2848	1200-0173
A5Q1	1854-0529	0	4	TRANSISTOR-DUAL NPN PD = 750MW	28480	1854-0529
A5Q2	1854-0529	0		TRANSISTOR-DUAL NPN PD = 750MW	28480	1854-0529
A5Q3	1854-0529	0		TRANSISTOR-DUAL NPN PD = 750MW	28480	1854-0529
A5Q4	1854-0529	0		TRANSISTOR-DUAL NPN PD = 750MW	28480	1854-0529
A5Q5	1854-1030	0	1	TRANSISTOR-DUAL NPN PD = 750MW	28480	1854-1030

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A5R1	0698-0083	8	4	RESISTOR 1.96K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1961-F
A5R2	0698-3154	0	4	RESISTOR 4.22K 1% .125W F TC=0±100	24546	CT4-1/8-T0-4221-F
A5R3	0698-3154	0		RESISTOR 4.22K 1% .125W F TC=0±100	24546	CT4-1/8-T0-4221-F
A5R4	0698-3154	0		RESISTOR 4.22K 1% .125W F TC=0±100	24546	CT4-1/8-T0-4221-F
A5R5	0698-3154	0		RESISTOR 4.22K 1% .125W F TC=0±100	24546	CT4-1/8-T0-4221-F
A5R6	0757-0439	4	2	RESISTOR 6.81K 1% .125W F TC=0±100	24546	CT4-1/8-T0-6811-F
A5R7	0757-0439	4		RESISTOR 6.81K 1% .125W F TC=0±100	24546	CT4-1/8-T0-6811-F
A5R8	0698-3158	4	1	RESISTOR 23.7K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2372-F
A5R9	0698-6360	6	6	RESISTOR 10K .1% .125W F TC=0±25	28480	0698-6360
A5R10	0699-0124	0	1	RESISTOR 10.2K .1% .125W F TC=0±25	28480	0699-0124
A5R11	0698-3155	1	1	RESISTOR 4.64K 1% .125W F TC=0±100	24546	CT4-1/8-T0-4641-F
A5R12	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1961-F
A5R13	0698-3446	3	1	RESISTOR 383 1% .125W F TC=0±100	24546	CT4-1/8-T0-383R-F
A5R14	0757-0394	0	2	RESISTOR 51.1 1% .125W F TC=0±100	24546	CT4-1/8-T0-51R1-F
A5R15	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0±100	24546	CT4-1/8-T0-51R1-F
A5R17	0757-0442	9	3	RESISTOR 10K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1002-F
A5R18	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1002-F
A5R19	2100-3749	6	2	RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN	28480	2100-3749
A5R20	0757-0458	7	1	RESISTOR 51.1K 1% .125W F TC=0±100	24546	CT4-1/8-T0-5112-F
A5R21	0698-3136	8	1	RESISTOR 17.8K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1782-F
A5R22	0698-6360	6		RESISTOR 10K .1% .125W F TC=0±25	28480	0698-6360
A5R23	0698-3151	7	1	RESISTOR 2.87K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2871-F
A5R26	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1961-F
A5R27	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1961-F
A5R28	0757-0382	6	2	RESISTOR 16.2 1% .125W F TC=0±100	19701	5033R-1/8-T0-16R2-F
A5R29	0757-0382	6		RESISTOR 16.2 1% .125W F TC=0±100	19701	5033R-1/8-T0-16R2-F
A5R30	0757-0398	4	1	RESISTOR 75 1% .125W F TC=0±100	24546	CT4-1/8-T0-75R0-F
A5R32	0757-0403	2	1	RESISTOR 121 1% .125W F TC=0±100	24546	CT4-1/8-T0-121R-F
A5R33	0698-7280	1	5	RESISTOR 68.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-6812-F
A5R34	2100-2574	3	4	RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	73138	82PAR500
A5R35	0698-7280	1		RESISTOR 68.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-6812-F
A5R36	2100-2574	3		RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	73138	82PAR500
A5R37	0698-7280	1		RESISTOR 68.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-6812-F
A5R38	2100-2574	3		RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	73138	82PAR500
A5R39	0698-7280	1		RESISTOR 68.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-6812-F
A5R40	2100-2574	3		RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	73138	82PAR500
A5R41	2100-3611	1	4	RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	28480	2100-3611
A5R42	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	28480	2100-3611
A5R43	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	28480	2100-3611
A5R44	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	28480	2100-3611
A5R45	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1002-F
A5R46	0757-0420	3	2	RESISTOR 750 1% .125W F TC=0±100	24546	CT4-1/8-T0-751-F
A5R47	0757-0420	3		RESISTOR 750 1% .125W F TC=0±100	24546	CT4-1/8-T0-751-F
A5R48	2100-3759	8	1	RESISTOR-TRMR 2K 10% C SIDE-ADJ 17-TRN	28480	2100-3759
A5R49	0698-7280	1		RESISTOR 68.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-6812-F
A5R50	2100-3749	6		RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN	28480	2100-3749
A5R51	0698-3156	2	2	RESISTOR 14.7K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1472-F
A5R52	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1472-F
A5R53	0757-0346	2	6	RESISTOR 10 1% .125W F TC=0±100	28480	0757-0346
A5R54	0757-0346	2		RESISTOR 10 1% .125W F TC=0±100	28480	0757-0346
A5R55	0757-0346	2		RESISTOR 10 1% .125W F TC=0±100	28480	0757-0346
A5R56	0757-0346	2		RESISTOR 10 1% .125W F TC=0±100	28480	0757-0346
A5R57	0757-0346	2		RESISTOR 10 1% .125W F TC=0±100	28480	0757-0346
A5R58	0757-0346	2		RESISTOR 10 1% .125W F TC=0±100	28480	0757-0346
A5R59	0698-6360	6		RESISTOR 10K .1% .125W F TC=0±25	28480	0698-6360
A5R60	0698-6360	6		RESISTOR 10K .1% .125W F TC=0±25	28480	0698-6360
A5R61	0698-6360	6		RESISTOR 10K .1% .125W F TC=0±25	28480	0698-6360
A5R62	0698-6360	6		RESISTOR 10K .1% .125W F TC=0±25	28480	0698-6360
A5R63	0757-0467	8	1	RESISTOR 121K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1213-F
A5R64	0698-6363	9	2	RESISTOR 40K .1% .125W F TC=0±25	28480	0698-6363
A5R65	0757-0289	2	1	RESISTOR 13.3K 1% .125W F TC=0±100	19701	5033R-1/8-T0-1332-F
A5R66	0698-6363	9		RESISTOR 40K .1% .125W F TC=0±25	28480	0698-6363
A5R67	0698-3447	4	6	RESISTOR 422 1% .125W F TC=0±100	24546	CT4-1/8-T0-422R-F
A5R68	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	CT4-1/8-T0-422R-F
A5R69	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	CT4-1/8-T0-422R-F
A5R70	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	CT4-1/8-T0-422R-F
A5R71	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	CT4-1/8-T0-422R-F
A5R72	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	CT4-1/8-T0-422R-F
A5R73	0757-0280	3	4	RESISTOR 1K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1001-F
A5R74	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1001-F

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A5R75	2100-2522	1	1	RESISTOR-TRMR 10K 10% C SIDE-ADJ 1-TRN	73138	82PAR10K
A5R76	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1001-F
A5R77	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1001-F
A5R78	0698-3158	4	1	RESISTOR 23.7K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2372-F
A5R79	0757-0403	2	1	RESISTOR 121 1% .125W F TC=0±100	24546	CT4-1/8-T0-121R-F
A5R80	0698-0082	7	1	RESISTOR 464 1% .125W F TC=0±100	24546	CT4-1/8-T0-4640-F
A5TP1	0360-0535	0	11	TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5TP2	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5TP3	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5TP4	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5TP5	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5TP6	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5TP7	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5TP8	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5TP9	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5TP10	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5TP11	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	28480	0360-0535
A5U1	1810-0206	8	1	NETWORK-RES 8-SIP 10.0K OHM X 7	11236	750-81-R10K
A5U2	1810-0208	0	1	NETWORK-RES 8-SIP 68.0K OHM X 7	11236	750-81-R68K
A5U3	1826-0416	5	3	IC SWITCH ANLG QUAD 16-DIP-C PKG	27014	LF13331D
A5U4	1810-0205	7	1	NETWORK-RES 8-SIP 4.7K OHM X 7	11236	750-81-R4.7K
A5U5	1810-0321	8	1	NETWORK-RES 8-SIP 220.0K OHM X 7	11236	750-81-R220K
A5U6	1820-1196	8	2	IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS174N
A5U7	1826-0092	3	1	IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A5U8	1826-0349	3	1	IC V RGLTR TO-39	07263	UA78M06HL
A5U9	1826-0558	6	1	IC 337 V RGLTR TO-39	27014	LM337H
A5U10	1826-0546	2	1	IC WIDEBAND AMPL VID TO-100 PKG	18324	NE592H
A5U11	1826-0476	7	1	IC SWITCH ANLG 8-DIP-P PKG	01295	TL601CP
A5U12	1826-0416	5		IC SWITCH ANLG QUAD 16-DIP-C PKG	27014	LF13331D
A5U13	1826-0416	5		IC SWITCH ANLG QUAD 16-DIP-C PKG	27014	LF13331D
A5U14	1826-0557	5	1	IC OP AMP GP QUAD 14-DIP-C PKG	27014	LM348J
A5U16	1820-1196	8		IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS174N
A5U17	1826-0699	6	1	D/A 8-BIT 16-CBRZ/SDR CMOS	24355	AD7524AD
A5U18	1820-1216	3	1	IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	SN74LS138N
A5U19	1826-0700	0	1	IC OP AMP WB 14-DIP-C PKG	34371	HA1-5195-5
A5U20	1820-0224	1	1	IC OP AMP SPCL TO-99 PKG	27014	LH0002CH
A5U21	1810-0366	1	1	NETWORK-RES 6-SIP 220.0 OHM X 5	11236	750-81-R220
A5VR1	1902-3002	3	2	DIODE-ZNR 2.37V 5% DO-7 PD= .4W TC=-.074%	28480	1902-3002
A5VR2	1902-3002	3		DIODE-ZNR 2.37V 5% DO-7 PD= .4W TC=-.074%	28480	1902-3002
A5W1	8159-0005	0	5	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A5W4	8159-0005	0		RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A5W5	8159-0005	0		RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A5W6	8159-0005	0		RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A5W7	8159-0005	0		RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3: Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A6	83592-60106	8	1	BOARD ASSEMBLY-SWEEP CONTROL	28480	83592-60106
A6C5	0180-2617	1	2	CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	25088	D6R8GS1B35K
A6C6	0180-2617	1	1	CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	25088	D6R8GS1B35K
A6C7	0180-2815	1	1	CAPACITOR-FXD 100UF ± 20% 10VDC TA	28480	0180-2815
A6C9	0180-0228	6	2	CAPACITOR-FXD 22UF ± 10% 15VDC TA	56289	150D226X9015B2
A6C10	0180-0228	6	6	CAPACITOR-FXD 22UF ± 10% 15VDC TA	56289	150D226X9015B2
A6C14	0180-3878	6	6	CAPACITOR-FXD 1000PF ± 20% 100VDC CER	28480	0160-3878
A6C15	0160-0573	2	1	CAPACITOR-FXD 4700PF ± 20% 100VDC CER	28480	0160-0573
A6C16	0160-3878	6	6	CAPACITOR-FXD 1000PF ± 20% 100VDC CER	28480	0160-3878
A6C17	0160-3878	6	6	CAPACITOR-FXD 1000PF ± 20% 100VDC CER	28480	0160-3878
A6C19	0160-0575	4	2	CAPACITOR-FXD .047UF ± 20% 50VDC CER	28480	0160-0575
A6C20	0160-3878	6	6	CAPACITOR-FXD 1000PF ± 20% 100VDC CER	28480	0160-3878
A6C21	0160-4084	8	2	CAPACITOR-FXD .1UF ± 20% 50VDC CER	28480	0160-4084
A6C22	0160-4084	8	8	CAPACITOR-FXD .1UF ± 20% 50VDC CER	28480	0160-4084
A6C23	0160-3879	7	2	CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A6C24	0160-3879	7	7	CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A6C25	0160-3878	6	6	CAPACITOR-FXD 1000PF ± 20% 100VDC CER	28480	0160-3878
A6C26	0160-3878	6	6	CAPACITOR-FXD 1000PF ± 20% 100VDC CER	28480	0160-3878
A6C27	0160-0575	4	4	CAPACITOR-FXD .047UF ± 20% 50VDC CER	28480	0160-0575
A6C28	0160-3874	2	1	CAPACITOR-FXD 10PF ± .5PF 200VDC CER	28480	0160-3874
A6CR1	1901-0535	9	3	DIODE-SM SIG SCHOTTKY	28480	1901-0535
A6CR2	1901-0535	9	9	DIODE-SM SIG SCHOTTKY	28480	1901-0535
A6CR3	1901-0535	9	9	DIODE-SM SIG SCHOTTKY	28480	1901-0535
A6CR4	1901-0050	3	7	DIODE-SWITCHING 80V 200MA 2NS DO-35	9N171	1N4150
A6CR5	1901-0050	3	3	DIODE-SWITCHING 80V 200MA 2NS DO-35	9N171	1N4150
A6CR6	1901-0050	3	3	DIODE-SWITCHING 80V 200MA 2NS DO-35	9N171	1N4150
A6CR7	1901-0050	3	3	DIODE-SWITCHING 80V 200MA 2NS DO-35	9N171	1N4150
A6CR10	1901-0050	3	3	DIODE-SWITCHING 80V 200MA 2NS DO-35	9N171	1N4150
A6CR11	1901-0050	3	3	DIODE-SWITCHING 80V 200MA 2NS DO-35	9N171	1N4150
A6CR12	1901-0050	3	3	DIODE-SWITCHING 80V 200MA 2NS DO-35	9N171	1N4150
A6CR13	1901-0033	2	1	DIODE-GEN PRP 180V 200MA DO-35	9N171	1N645
A6L1	9140-0137	1	2	INDUCTOR RF-CH-MLD 1MH 5%	28480	9140-0137
A6L2	9140-0137	1	1	INDUCTOR RF-CH-MLD 1MH 5%	28480	9140-0137
A6L3	08503-80001	9	1	COIL TOROID	28480	08503-80001
A6MP1				NOT ASSIGNED		
A6MP2	5040-6849	8	1	BD EXTR BLUE	28480	5040-6849
A6MP3	5000-9043	6	1	PIN	28480	5000-9043
A6MP4	7121-1153	1	1	LBL IN 83592	28480	7121-1153
A6Q1	1855-0423	5	3	TRANSISTOR MOSFET N-CHAN E-MODE TO-237	17856	VN10KM
A6Q2	1854-0477	7	2	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A6Q3	1855-0423	5	5	TRANSISTOR MOSFET N-CHAN E-MODE TO-237	17856	VN10KM
A6Q4	1854-0019	3	1	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A6Q5	1853-0405	9	2	TRANSISTOR PNP SI PD=300MW FT=850MHZ	04713	2N4209
A6Q6	1853-0405	9	9	TRANSISTOR PNP SI PD=300MW FT=850MHZ	04713	2N4209
A6Q7	1855-0423	5	5	TRANSISTOR MOSFET N-CHAN E-MODE TO-237	17856	VN10KM
A6Q9	1854-0477	7	7	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A6Q10	1853-0281	9	1	TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A6Q11	1854-0809	9	2	TRANSISTOR NPN 2N2369A SI TO-18 PD=360MW	28480	1854-0809
A6Q12	1854-0809	9	9	TRANSISTOR NPN 2N2369A SI TO-18 PD=360MW	28480	1854-0809
A6R4	0757-0466	7	1	RESISTOR 110K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1103-F
A6R5	0757-0280	3	3	RESISTOR 1K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1001-F
A6R6	0757-1094	9	1	RESISTOR 1.47K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1471-F
A6R7	0698-3446	3	1	RESISTOR 383 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-383R-F
A6R8	0698-7212	9	2	RESISTOR 100 1% .05W F TC=0 ± 100	24546	C3-1/8-T0-100R-F
A6R9	0698-7260	7	6	RESISTOR 10K 1% .05W F TC=0 ± 100	24546	C3-1/8-T0-1002-F
A6R10	0698-7267	4	1	RESISTOR 19.6K 1% .05W F TC=0 ± 100	24546	C3-1/8-T0-1962-F
A6R11	0698-7283	4	2	RESISTOR 90.9K 1% .05W F TC=0 ± 100	24546	C3-1/8-T0-9092-F
A6R12	2100-1738	9	1	RESISTOR-TRMR 10K 10% C TOP-ADJ 1-TRN	73138	82PR10K
A6R13	0757-0442	9	3	RESISTOR 10K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1002-F
A6R14	0757-0280	3	3	RESISTOR 1K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1001-F
A6R15	0698-8469	0	8	RESISTOR 6.99K 1% .1W F TC=0 ± 4	28480	0698-8469
A6R16	2100-3756	5	1	RESISTOR-TRMR 20 10% C SIDE-ADJ 17-TRN	28480	2100-3756
A6R17	0698-8469	0	0	RESISTOR 6.99K 1% .1W F TC=0 ± 4	28480	0698-8469
A6R18	0698-8469	0	0	RESISTOR 6.99K 1% .1W F TC=0 ± 4	28480	0698-8469
A6R19	0698-8469	0	0	RESISTOR 6.99K 1% .1W F TC=0 ± 4	28480	0698-8469
A6R20	0699-0642	7	1	RESISTOR 10K 1% .1W F TC=0 ± 5	28480	0699-0642
A6R21	2100-3757	6	1	RESISTOR-TRMR 100 10% C SIDE-ADJ 17-TRN	28480	2100-3757
A6R22	0699-0831	6	1	RESISTOR 9.95K 1% .1W F TC=0 ± 5	28480	0699-0831
A6R23	0699-0935	1	1	RESISTOR 40.423K 1% .1W F TC=0 ± 5	28480	0699-0935

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A6R24	2100-3732	7	2	RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	28480	2100-3732
A6R25	0699-0935	2	1	RESISTOR 40.423K .1% .1W F TC=0±5	28480	0699-0935
A6R26	2100-3732	7	1	RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	28480	2100-3732
A6R27	0699-0936	2	1	RESISTOR 57.014K .1% .1W F TC=0±5	28480	0699-0936
A6R28	2100-0545	4	1	RESISTOR-TRMR 1K 10% C SIDE-ADJ 17-TRN	28480	2100-0545
A6R29	0699-0937	3	1	RESISTOR 109.741K .1% .1W F TC=0±5	28480	0699-0937
A6R30	2100-3759	8	1	RESISTOR-TRMR 2K 10% C SIDE-ADJ 17-TRN	28480	2100-3759
A6R31	0698-8469	0		RESISTOR 6.99K .1% .1W F TC=0+4	28480	0698-8469
A6R32	0698-8469	0		RESISTOR 6.99K .1% .1W F TC=0+4	28480	0698-8469
A6R33	0698-8469	0		RESISTOR 6.99K .1% .1W F TC=0+4	28480	0698-8469
A6R34	2100-3755	4	1	RESISTOR-TRMR 50 10% C SIDE-ADJ 17-TRN	28480	2100-3755
A6R35	0698-8469	0		RESISTOR 6.99K .1% .1W F TC=0+4	28480	0698-8469
A6R36	0698-8827	4	1	RESISTOR 1M 1% .125W F TC=0±100	28480	0698-8827
A6R37	2100-3750	9	1	RESISTOR-TRMR 20K 10% C SIDE-ADJ 17-TRN	28480	2100-3750
A6R38	0698-8827	4	2	RESISTOR 1M 1% .125W F TC=0±100	28480	0698-8827
A6R39	0699-0154	6	1	RESISTOR 7.2K .1% .125W F TC=0±25	28480	0699-0154
A6R40	0698-8867	8	1	RESISTOR 7.35K .25% .125W F TC=0±50	28480	0698-8867
A6R41	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1002-F
A6R42	0698-3260	9	2	RESISTOR 464K 1% .125W F TC=0±100	28480	0698-3260
A6R43	0698-3150	6	2	RESISTOR 2.37K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2371-F
A6R44	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1002-F
A6R45	0698-3260	9		RESISTOR 464K 1% .125W F TC=0±100	28480	0698-3260
A6R46	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2371-F
A6R47	0698-7234	5	2	RESISTOR 825 1% .05W F TC=0±100	24546	C3-1/8-T0-825R-F
A6R48	0698-7234	5		RESISTOR 825 1% .05W F TC=0±100	24546	C3-1/8-T0-825R-F
A6R49	0698-7227	6	1	RESISTOR 422 1% .05W F TC=0±100	24546	C3-1/8-T0-422R-F
A6R50	0698-7219	6	1	RESISTOR 196 1% .05W F TC=0±100	24546	C3-1/8-T0-196R-F
A6R51	0698-7212	9		RESISTOR 100 1% .05W F TC=0±100	24546	C3-1/8-T0-100R-F
A6R52	0698-0084	0	1	RESISTOR 2.15K 1% .125W F TC=0±100	28480	0698-0084
A6R53	0698-3429	2	1	RESISTOR 19.6 1% .125W F TC=0±100	03888	PME55-1/8-T0-19R6-F
A6R54	0698-3453	2	1	RESISTOR 196K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1963-F
A6R55	0698-8827	4		RESISTOR 1M 1% .125W F TC=0±100	28480	0698-8827
A6R56	0698-3159	5	1	RESISTOR 26.1K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2612-F
A6R57	0698-3266	5	1	RESISTOR 237K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2373-F
A6R58	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1001-F
A6R59	0698-7236	7	2	RESISTOR 1K 1% .05W F TC=0±100	24546	C3-1/8-T0-1001-F
A6R60	0698-7277	6	2	RESISTOR 51.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-5112-F
A6R61	0698-7277	6		RESISTOR 51.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-5112-F
A6R62	0757-0458	7	1	RESISTOR 51.1K 1% .125W F TC=0±100	24546	CT4-1/8-T0-5112-F
A6R63	2100-2030	6	1	RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	73138	82PR20K
A6R64	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-F
A6R65	0757-0440	7	1	RESISTOR 7.5K 1% .125W F TC=0±100	24546	CT4-1/8-T0-7501-F
A6R66	0698-7272	1	1	RESISTOR 31.6K 1% .05W F TC=0±100	24546	C3-1/8-T0-3162-F
A6R67	0698-7253	8	1	RESISTOR 5.11K 1% .05W F TC=0±100	24546	C3-1/8-T0-5111-F
A6R68	2100-2516	3	3	RESISTOR-TRMR 100K 10% TKF SIDE-ADJ	03744	3329W-DM3-104
A6R69	2100-2516	3		RESISTOR-TRMR 100K 10% TKF SIDE-ADJ	03744	3329W-DM3-104
A6R70	2100-2516	3		RESISTOR-TRMR 100K 10% TKF SIDE-ADJ	03744	3329W-DM3-104
A6R71	0698-7237	8	1	RESISTOR 1.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-1101-F
A6R72	0698-7242	5	2	RESISTOR 1.78K 1% .05W F TC=0±100	24546	C3-1/8-T0-1781-F
A6R73	2100-2521	0	3	RESISTOR-TRMR 2K 10% C SIDE-ADJ 1-TRN	73138	82PAR2K
A6R74	2100-2521	0		RESISTOR-TRMR 2K 10% C SIDE-ADJ 1-TRN	73138	82PAR2K
A6R75	2100-2521	0		RESISTOR-TRMR 2K 10% C SIDE-ADJ 1-TRN	73138	82PAR2K
A6R76	0698-7283	4		RESISTOR 90.9K 1% .05W F TC=0±100	24546	C3-1/8-T0-9092-F
A6R77	0698-7285	6	1	RESISTOR 110K 1% .05W F TC=0±100	24546	C3-1/8-T0-1103-F
A6R78	2100-2692	6	1	RESISTOR-TRMR 1M 20% C SIDE-ADJ 1-TRN	73138	82PAR1M
A6R80	0698-7236	7	3	RESISTOR 1K 1% .05W F TC=0±100	24546	C3-1/8-T0-1001-F
A6R81	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-F
A6R82	0698-7243	6	1	RESISTOR 1.96K 1% .05W F TC=0±100	24546	C3-1/8-T0-1961-F
A6R83	0698-7242	5		RESISTOR 1.78K 1% .05W F TC=0±100	24546	C3-1/8-T0-1781-F
A6R84	0698-7238	9	1	RESISTOR 1.21K 1% .05W F TC=0±100	24546	C3-1/8-T0-1211-F
A6R85	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-F
A6R86	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-F
A6R87	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-F
A6TP1	1251-4672	4	10	CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A6TP2	1251-4672	4		CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A6TP3	1251-4672	4		CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A6TP4	1251-4672	4		CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A6TP5	1251-4672	4		CONNECTOR 10-PIN M POST TYPE	28480	1251-4672

See introduction to this section for ordering information.

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Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A6TP6	1251-4672	4		CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A6TP7	1251-4672	4		CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A6TP8	1251-4672	4		CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A6TP9	1251-4672	4		CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A6TP10	1251-4672	4		CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A6U1	1826-0720	4	2	IC SWITCH ANLG QUAD 16-DIP-C PKG	06665	SW-02FQ
A6U2	1820-1211	8	1	IC GATE TTL LS EXCL-OR QUAD 2-INP	01295	SN74LS86AN
A6U3	1820-1196	8	1	IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS174N
A6U4	1826-0720	4		IC SWITCH ANLG QUAD 16-DIP-C PKG	06665	SW-02FQ
A6U5	1826-1048	1	5	IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A6U6	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A6U8	1820-1112	8	2	IC FF TTL LS D-TYPE POS-EDGE-TRIG	01295	SN74LS74AN
A6U9	1820-1730	6	1	IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS273N
A6U10	1826-1186	8	2	ANALOG SWITCH 4 SPST 16 -CERDIP	06665	SW-06GQ
A6U11	1826-1186	8		ANALOG SWITCH 4 SPST 16 -CERDIP	06665	SW-06GQ
A6U12	1820-1112	8		IC FF TTL LS D-TYPE POS-EDGE-TRIG	01295	SN74LS74AN
A6U13	1820-2024	3	1	IC DRVR TTL LS LINE DRVR OCTL	01295	SN74LS244N
A6U14	1826-0065	0	2	IC COMPARATOR PRCN 8-DIP-P PKG	28480	1826-0065
A6U15	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A6U16	1820-1246	9	1	IC GATE TTL LS AND QUAD 2-INP	01295	SN74LS09N
A6U17	1820-1216	3	1	IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	SN74LS138N
A6U18	1826-0752	2	1	D/A 12-BIT 16-CBRZ/SDR CMOS	24355	AD7542BD
A6U19	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A6U20	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A6U21	1820-1202	7	1	IC GATE TTL LS NAND TPL 3-INP	01295	SN74LS10N
A6U22	1820-1197	9	1	IC GATE TTL LS NAND QUAD 2-INP	01295	SN74LS00N
A6U23	1826-0065	0		IC COMPARATOR PRCN 8-DIP-P PKG	28480	1826-0065
A6U24	1826-0092	3	1	IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A6U26	1826-0185	5	1	IC OP AMP SPCL TO-99 PKG	3L585	CA3080
A6U27	1826-0915	9	1	IC OP AMP LOW-BIAS-H-IMPD 8-DIP-C PKG	04713	MC34001BU
A6VR1	1902-3002	3	1	DIODE-ZNR 2.37V 5% DO-7 PD = .4WTC = -.074%	28480	1902-3002
A6W2	8159-0005	0	2	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005
A6W4	8159-0005	0		RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	8159-0005

See introduction to this section for ordering information.

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Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A7	83595-60095	7	1	BD AY-YTM/YTF DR	28480	83595-60095
A7C1	0160-4084	8	2	CAPACITOR-FXD .1UF ± 20% 50VDC CER	56289	1C20X7R104M050B
A7C2	0160-3877	5	3	CAPACITOR-FXD 100PF ± 20% 200VDC CER	04222	SR202C101MAAH
A7C3	0160-0574	3	2	CAPACITOR-FXD .022UF ± 20% 100VDC CER	04222	SR201C223MAAH
A7C4	0160-3879	7	2	CAPACITOR-FXD .01UF ± 20% 100VDC CER	04222	SR201C103MAAH
A7C5	0160-3877	5	5	CAPACITOR-FXD 100PF ± 20% 200VDC CER	04222	SR202C101MAAH
A7C6	0160-0574	3		CAPACITOR-FXD .022UF ± 20% 100VDC CER	04222	SR201C223MAAH
A7C7	0180-2617	1	2	CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	56289	199D1131
A7C8	0180-0116	1	1	CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	56289	150D685X9035B2-DYS
A7C9	0180-2815	1	1	CAPACITOR-FXD 100UF ± 20% 10VDC TA		T354J107M010AS
A7C10	0180-2617	1	1	CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	56289	199D1131
A7C11	0180-2814	0	1	CAPACITOR-FXD 22UF ± 20% 10VDC TA	56289	199D1146
A7C12	0160-0574	3		CAPACITOR-FXD .022UF ± 20% 100VDC CER	04222	SR201C223MAAH
A7C13	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	04222	SR201C103MAAH
A7C14	0160-3878	6	2	CAPACITOR-FXD 1000PF ± 20% 100VDC CER	04222	SR201C102MAAH
A7C15	0160-3878	6		CAPACITOR-FXD 1000PF ± 20% 100VDC CER	04222	SR201C102MAAH
A7C16	0160-0575	4	1	CAPACITOR-FXD .047UF ± 20% 50VDC CER	04222	SR205C473MAAH
A7C17	0180-2731	0	1	CAPACITOR-FXD 2.2UF ± 10% 20VDC TA	04222	M5-020-225-10/9038
A7C18	0160-3874	2	1	CAPACITOR-FXD 10PF ± .5PF 200VDC CER 0 ±		FD12C0G2D100D
A7C19	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	56289	1C20X7R104M050B
A7C20	0180-0228	6	1	CAPACITOR-FXD 22UF ± 10% 15VDC TA	56289	150D226X9015B2-DYS
A7C21	0180-2794	5	1	CAPACITOR-FXD 3.3UF ± 20% 35VDC TA	04222	MD6-035-335-20/9038
A7C22	0160-4535	4	2	CAPACITOR-FXD 1UF ± 10% 50VDC CER		RPE113-130X7R105K50V
A7C23	0160-4535	4		CAPACITOR-FXD 1UF ± 10% 50VDC CER		RPE113-130X7R105K50V
A7CR1	1901-0535	9	3	DIODE-SCHOTTKY SM SIG	28480	
A7CR2	1901-0539	3	1	DIODE-SCHOTTKY SM SIG	28480	
A7CR3	1901-0033	2	8	DIODE-GEN PRP 180V 200MA DO-35	9N171	
A7CR4	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	
A7CR5	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	
A7CR6	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	
A7CR7	1901-0535	9		DIODE-SCHOTTKY SM SIG	28480	
A7CR8	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	
A7CR9	1901-0535	9		DIODE-SCHOTTKY SM SIG	28480	
A7CR10	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	
A7CR11	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	
A7CR12	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	
A7L1	9140-0137	1	2	INDUCTOR RF-CH-MLD 1MH ± 5% .2D-INX.45LG	99800	2500-28
A7L2	9140-0137	1		INDUCTOR RF-CH-MLD 1MH ± 5% .2D-INX.45LG	99800	2500-28
A7L3	08503-80001	9	1	COIL TORROID	28480	08503-80001
A7MP2	5040-6844	3	1	BOARD EXTRACTOR	28480	5040-6844
A7MP3	5000-9043	6	1	PIN	28480	5000-9043
A7MP4	1251-7204	4	2	CONNECTOR 20-PIN M DUAL INLINE	51167	20-600-11
A7R1	0757-0443	0	1	RESISTOR 11K 1% .125W TF TC = 0 ± 100	19701	SFR25H
A7R2	0698-7233	4	1	RESISTOR 750 1% .05W TF TC = 0 ± 100	19701	5063J
A7R3	0698-7277	6	1	RESISTOR 51.1K 1% .05W TF TC = 0 ± 100	19701	5023R
A7R4	0757-0442	9	6	RESISTOR 10K 1% .125W TF TC = 0 ± 100	19701	SFR25H
A7R5	0698-3449	6	1	RESISTOR 28.7K 1% .125W TF TC = 0 ± 100	19701	SFR25H
A7R6	0698-7243	6	2	RESISTOR 1.96K 1% .05W TF TC = 0 ± 100	19701	5063J
A7R7	0698-7243	6		RESISTOR 1.96K 1% .05W TF TC = 0 ± 100	19701	5063J
A7R8	0698-7260	7	2	RESISTOR 10K 1% .05W TF TC = 0 ± 100	19701	5063J
A7R9	0698-7260	7		RESISTOR 10K 1% .05W TF TC = 0 ± 100	19701	5063J
A7R10	2100-3611	1	5	RESISTOR-TRMR 50K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R11	0757-0200	7	1	RESISTOR 5.62K 1% .125W TF TC = 0 ± 100	19701	SFR25H
A7R12	2100-3611	1		RESISTOR-TRMR 50K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R13	0757-0447	4	1	RESISTOR 16.2K 1% .125W TF TC = 0 ± 100	19701	SFR25H
A7R14	0757-0442	9		RESISTOR 10K 1% .125W TF TC = 0 ± 100	19701	SFR25H
A7R15	0698-3260	9	1	RESISTOR 464K 1% .125W TF TC = 0 ± 100	19701	SFR25H
A7R16	0757-0280	3	2	RESISTOR 1K 1% .125W TF TC = 0 ± 100	19701	SFR25H
A7R17	0698-3457	6	1	RESISTOR 316K 1% .125W TF TC = 0 ± 100	19701	SFR25H
A7R18	2100-3611	1		RESISTOR-TRMR 50K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R19	2100-3732	7	2	RESISTOR-TRMR 500 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R20	0699-2666	9	2	RESISTOR 37.94K ± 0.1% .1W TF TC = 0 + 4	19701	5023Z
A7R21	0683-6855	3	1	RESISTOR 6.8M 5% .25W CC TC = -900/+1100	01121	CB6855
A7R24	2100-3757	6	1	RESISTOR-TRMR 100 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R25	0699-2667	0	2	RESISTOR 13.56K ± 0.1% .1W TF TC = 0 + 4	19701	5023Z
A7R26	0698-8960	6	2	RESISTOR 750K 1% .125W TF TC = 0 ± 100	19701	SFR25H
A7R27	0699-1147	9	2	RESISTOR 9.53K .1% .1W TF TC = 0 + 4	19701	5023Z
A7R28	0757-0444	1	2	RESISTOR 12.1K 1% .125W TF TC = 0 ± 100	19701	SFR25H

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Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A7R33	0698-3453	2	2	RESISTOR 196K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R42	2100-0544	3	1	RESISTOR-TRMR 100K 10% TKF SIDE-ADJ 17-T	73138	67XR
A7R43	2100-3611	1		RESISTOR-TRMR 50K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R45	2100-3753	2	1	RESISTOR-TRMR 200K 10% TKF SIDE-ADJ 17-T	73138	67XR
A7R46	2100-3611	1		RESISTOR-TRMR 50K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R47	0698-7263	0	1	RESISTOR 13.3K 1% .05W TF TC=0 ± 100	19701	5063J
A7R48	0757-0440	7	1	RESISTOR 7.5K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R49	0698-6721	3	1	RESISTOR 19K 1% .125W TF TC=0 ± 25	19701	5033R
A7R50	0698-8827	4	2	RESISTOR 1M 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R51	2100-0670	6	3	RESISTOR-TRMR 10K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R52	0698-8827	4		RESISTOR 1M 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R53	0698-3159	5	2	RESISTOR 26.1K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R54	0698-8958	2	1	RESISTOR 511K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R55	2100-2031	7	1	RESISTOR-TRMR 50K 10% TKF TOP-ADJ 1-TRN	73138	82PR50K
A7R56	0757-0280	3		RESISTOR 1K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R57	0757-0290	5	1	RESISTOR 6.19K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R58	0757-0442	9		RESISTOR 10K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R60	0698-0084	9	2	RESISTOR 2.15K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R61	0698-0084	9		RESISTOR 2.15K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R63	0757-0444	1		RESISTOR 12.1K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R64	0757-0442	9		RESISTOR 10K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R65	0757-0442	9		RESISTOR 10K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R72	0698-8959	3	1	RESISTOR 619K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R74	0757-0418	9	2	RESISTOR 619 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R75	0757-0442	9		RESISTOR 10K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R76	2100-0670	6		RESISTOR-TRMR 10K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R77	0699-1148	0	1	RESISTOR 215K .1% .1W TF TC=0+4	19701	5023Z
A7R78	0698-3159	5		RESISTOR 26.1K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R80	0698-8960	6		RESISTOR 750K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R81	0757-0418	9		RESISTOR 619 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R82	0699-2666	9		RESISTOR 37.94K ± 0.1% .1W TF TC=0+4	19701	5023Z
A7R83	2100-3732	7		RESISTOR-TRMR 500 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R84	0699-2667	0		RESISTOR 13.56K ± 0.1% .1W TF TC=0+4	19701	5023Z
A7R85	2100-3757	6	1	RESISTOR-TRMR 100 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7R87	0698-8805	8		RESISTOR 10.35K 1% .1W TF TC=0+4	28480	0698-8805
A7R100	0698-3453	2		RESISTOR 196K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R102	0698-3162	0	2	RESISTOR 46.4K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R103	0698-3162	0		RESISTOR 46.4K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R105	2100-3754	3	1	RESISTOR-TRMR 1M 10% TKF SIDE-ADJ 17-TRN	73138	67XR
A7R202	2100-3611	1	1	RESISTOR-TRMR 50K 10% TKF SIDE-ADJ 17-TRN	00000	ORDER BY DESCRIPTION
A7R203	0698-3455	4	2	RESISTOR 261K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R204	0698-0085	0	1	RESISTOR 2.61K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R205	0698-3455	4		RESISTOR 261K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R206	0757-0438	3	1	RESISTOR 5.11K 1% .125W TF TC=0 ± 100	19701	SFR25H
A7R207	2100-0670	6		RESISTOR-TRMR 10K 10% TKF SIDE-ADJ 17-TR	73138	67XR
A7S1	3101-0471	8	2	SWITCH-DIP RKR 10-1A 0.05A 30VDC	81073	76YY2758S
A7S2	3101-0471	8		SWITCH-DIP RKR 10-1A 0.05A 30VDC	81073	76YY2758S
A7TP1	0360-0535	0	11	TERMINAL-TEST POINT .330IN ABOVE	4G819	
A7TP2	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A7TP3	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A7TP4	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A7TP5	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A7TP6	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A7TP7	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A7TP9	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A7TP10	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A7TP11	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	
A7TP12	0360-0535	0		TERMINAL-TEST POINT .330IN ABOVE	4G819	

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A7U1	1810-0277	3	2	NETWORK-RES 10-SIP 2.2K OHM X 9	91637	MSP10A01
A7U2	1810-0277	3		NETWORK-RES 10-SIP 2.2K OHM X 9	91637	MSP10A01
A7U3	1820-2024	3	2	IC DRVR TTL LS LINE DRVR OCTL	01295	
A7U4	1820-2024	3		IC DRVR TTL LS LINE DRVR OCTL	01295	
A7U5	1826-0180	0	1	IC TIMER TTL MONO/ASTBL	18324	
A7U7	1820-1568	8	1	IC BFR TTL LS BUS QUAD	01295	
A7U8	1820-1144	6	1	IC GATE TTL LS NOR QUAD 2-INP	01295	
A7U9	1826-0720	4		ANALOG SWITCH 4 SPST 16 -CERDIP	06665	
A7U10	1826-0720	4		ANALOG SWITCH 4 SPST 16 -CERDIP	06665	
A7U11	1826-0753	3	1	IC OP AMP LOW-BIAS-H-IMPQ QUAD 14-DIP-C	04713	
A7U12	1820-1196	8	1	IC FF TTL LS D-TYPE POS-EDGE-TRIG COM CL	01295	
A7U13	1826-0752	2	2	D/A 12-BIT 16-CBRZ/SDR CMOS	24355	
A7U14	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	
A7U16	1820-1216	3	1	IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	
A7U17	1826-0752	2		D/A 12-BIT 16-CBRZ/SDR CMOS	24355	
A7U18	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	
A7U19	1826-1349	5	1	IC OP AMP GP 8-DIP-C PKG	06665	
A7U20	1826-0758	8	1	IC MULTIPLIER ANLG TO-100 PKG	24355	
A7U21	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	
A7U22	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	
A7U23	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	
A7U24	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	
A7VR1	1902-0197	1	2	DIODE-ZNR 82V 5% PD=1W IR=5UA	04713	
A7VR2	1902-0041	4	1	DIODE-ZNR 5.11V 5% DO-35 PD= .4W	04713	
A7VR3	1902-0197	1		DIODE-ZNR 82V 5% PD=1W IR=5UA	04713	
A7VR4	1902-0041	4	1	DIODE-ZNR 5.11V 5% DO-35 PD= .4W	04713	
A7X1	1200-1257	8	2	SOCKET-IC 20-CONT DIP DIP-SLDR	00779	2-641612-2

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A8	83595-60089	9	1	BOARD ASSEMBLY-YO DRIVER	28480	83595-60089
A8C1	0160-4084	8	3	CAPACITOR-FXD .1UF ± 20% 50VDC CER	28480	0160-4084
A8C2	0160-4389	6	2	CAPACITOR-FXD 100PF ± 5PF 200VDC CER	28480	0160-4389
A8C3	0160-0161	4	1	CAPACITOR-FXD .01UF ± 10% 200VDC POLYE	28480	0160-0161
A8C4	0160-3879	7	3	CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A8C5	0160-4389	6		CAPACITOR-FXD 100PF ± 5PF 200VDC CER	28480	0160-4389
A8C6	0160-0575	4	1	CAPACITOR-FXD .047UF ± 20% 50VDC CER	28480	0160-0575
A8C7	0180-0116	1	3	CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	56289	150D685X9035B2
A8C8	0180-0116	1		CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	56289	150D685X9035B2
A8C9	0180-2815	1	1	CAPACITOR-FXD 100UF ± 20% 10VDC TA	28480	0180-2815
A8C10	0180-0116	1		CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	56289	150D685X9035B2
A8C11	0180-0228	6	2	CAPACITOR-FXD 22UF ± 10% 15VDC TA	56289	150D226X9015B2
A8C12	0160-0574	3	1	CAPACITOR-FXD .022UF ± 20% 100VDC CER	28480	0160-0574
A8C13	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	28480	0160-4084
A8C14	0160-3874	2	1	CAPACITOR-FXD 10PF ± .5PF 200VDC CER	28480	0160-3874
A8C15	0160-3878	6	3	CAPACITOR-FXD 1000PF ± 20% 100VDC CER	28480	0160-3878
A8C16	0160-3742	3	1	CAPACITOR-FXD 1UF ± 5% 50VDC	28480	0160-3742
A8C17	0180-0228	6		CAPACITOR-FXD 22UF ± 10% 15VDC TA	56289	150D226X9015B2
A8C18	0160-4084	8		CAPACITOR-FXD .1UF ± 20% 50VDC CER	28480	0160-4084
A8C19	0160-3878	6		CAPACITOR-FXD 1000PF ± 20% 100VDC CER	28480	0160-3878
A8C20	0180-2731	0	1	CAPACITOR-FXD 2.2UF ± 10% 20VDC TA	28480	0180-2731
A8C21	0180-2186	9	1	CAPACITOR-FXD 300UF ± 20% 30VDC TA	28480	0180-2186
A8C22	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A8C23	0160-3879	7		CAPACITOR-FXD .01UF ± 20% 100VDC CER	28480	0160-3879
A8C24	0160-3878	6		CAPACITOR-FXD 1000PF ± 20% 100VDC CER	28480	0160-3878
A8C25	0160-4801	7	1	CAPACITOR-FXD 100PF ± 5% 100VDC CER	28480	0160-4801
A8CR1	1901-0535	9	2	DIODE-SM SIG SCHOTTKY	28480	1901-0535
A8CR2	1901-0539	3	1	DIODE-SM SIG SCHOTTKY	28480	1901-0539
A8CR4	1901-0033	2	4	DIODE-GEN PRP 180V 200MA DO-35	9N171	1N645
A8CR5	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	1N645
A8CR6	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	1N645
A8CR7	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A8CR8	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-35	9N171	1N645
A8K1	0490-0916	6	1	RELAY-REED 1A 500MA 100VDC 5VDC-COIL	28480	0490-0916
A8L1	9140-0137	1	2	INDUCTOR RF-CH-MLD 1MH 5%	28480	9140-0137
A8L2	9140-0137	1		INDUCTOR RF-CH-MLD 1MH 5%	28480	9140-0137
A8L3	08503-80001	9	1	COIL TOROID	28480	08503-80001
A8MP1				NOT ASSIGNED		
A8MP2	5040-6846	5	1	BOARD EXTRACTOR	28480	5040-6846
A8MP3	5000-9043	6	1	PIN	28480	5000-9043
A8MP4	1251-7203	3	1	CONNECTOR 8-PIN M DUAL INLINE	28480	1251-7203
A8MP5	1200-0173	5	2	INSULATOR-XSTR DAP-GL	28480	1200-0173
A8Q1	1853-0281	9	2	TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A8Q2	1853-0281	9		TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A8Q3	1853-0044	2	2	TRANSISTOR PNP SI TO-39 PD=1W FT=200MHZ	28480	1853-0044
A8Q4	1853-0044	2		TRANSISTOR PNP SI TO-39 PD=1W FT=200MHZ	28480	1853-0044
A8R1	0757-0442	9	8	RESISTOR 10K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1002-F
A8R2	0698-0083	8	3	RESISTOR 1.96K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1961-F
A8R3	0757-0458	7	1	RESISTOR 51.1K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-5112-F
A8R4	0757-0442	9		RESISTOR 10K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1002-F
A8R5	0757-0462	3	1	RESISTOR 75K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-7502-F
A8R6	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1961-F
A8R7	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1961-F
A8R8	0757-0442	9		RESISTOR 10K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1002-F
A8R9	0757-0442	9		RESISTOR 10K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1002-F
A8R10	2100-0670	6	1	RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	28480	2100-0670
A8R11	0698-3155	1	1	RESISTOR 4.64K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-4641-F
A8R12	2100-3752	1	1	RESISTOR-TRMR 500K 10% C SIDE-ADJ 17-TRN	28480	2100-3752
A8R13	0757-0460	1	1	RESISTOR 61.9K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-6192-F
A8R14	0757-0442	9		RESISTOR 10K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1002-F
A8R15	0698-3452	1	1	RESISTOR 147K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1473-F
A8R16	0757-0280	3	2	RESISTOR 1K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-1001-F
A8R17	0698-3456	5	1	RESISTOR 287K 1% .125W F TC=0 ± 100	24546	CT4-1/8-T0-2873-F
A8R18	2100-3750	9	1	RESISTOR-TRMR 20K 10% C SIDE-ADJ 17-TRN	28480	2100-3750
A8R19	2100-3757	6	1	RESISTOR-TRMR 100 10% C SIDE-ADJ 17-TRN	28480	2100-3757
A8R20	0699-0797	3	1	RESISTOR 7.65K .1% .1W F TC=0+4	28480	0699-0797

See introduction to this section for ordering information.

*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A8R21	0698-6406	1	2	RESISTOR 8.54K .1% .1W F TC=0+4	28480	0698-6406
A8R22	2100-0545	4	1	RESISTOR-TRMR 1K 10% C SIDE-ADJ 17-TRN	28480	2100-0545
A8R23	0699-0799	5	1	RESISTOR 21.1K .1% .1W F TC=0+4	28480	0699-0799
A8R24	2100-3758	7	1	RESISTOR-TRMR 200 10% C SIDE-ADJ 17-TRN	28480	2100-3758
A8R25	0699-0798	4	1	RESISTOR 11.475K .1% .1W F TC=0+4	28480	0699-0798
A8R26	0757-0470	3	2	RESISTOR 162K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1623-F
A8R27	0698-8489	4	2	RESISTOR 15K .1% .1W F TC=0+4	28480	0698-8489
A8R28	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1002-F
A8R29	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1002-F
A8R30	0757-0470	3	3	RESISTOR 162K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1623-F
A8R31	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1002-F
A8R32	0757-0274	5	1	RESISTOR 1.21K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1211-F
A8R33	0698-3453	2	1	RESISTOR 196K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1963-F
A8R40	0698-8489	4	1	RESISTOR 15K .1% .1W F TC=0+4	28480	0698-8489
A8R41	0698-6406	1	1	RESISTOR 8.54K .1% .1W F TC=0+4	28480	0698-6406
A8R42	0698-8472	5	1	RESISTOR 2.653K .1% .1W F TC=0±5	28480	0698-8472
A8R43	0698-6409	4	1	RESISTOR 19.68K .1% .1W F TC=0+4	28480	0698-6409
A8R44	2100-3161	6	1	RESISTOR-TRMR 20K 10% C SIDE-ADJ 17-TRN	73138	89PR20K
A8R45	0699-0518	6	1	RESISTOR 11.489K .1% .1W F TC=0+4	28480	0699-0518
A8R46	0757-0416	7	3	RESISTOR 511 1% .125W F TC=0±100	24546	CT4-1/8-T0-511R-F
A8R47	0757-0416	7	7	RESISTOR 511 1% .125W F TC=0±100	24546	CT4-1/8-T0-511R-F
A8R48	0757-0416	7	7	RESISTOR 511 1% .125W F TC=0±100	24546	CT4-1/8-T0-511R-F
A8R49	0757-0465	6	3	RESISTOR 100K 1% .125W F TC=0±100	28480	0757-0465
A8R50	0757-0465	6	6	RESISTOR 100K 1% .125W F TC=0±100	28480	0757-0465
A8R51	0757-0465	6	6	RESISTOR 100K 1% .125W F TC=0±100	28480	0757-0465
A8R52	0757-0180	2	1	RESISTOR 31.6 1% .125W F TC=0±100	28480	0757-0180
A8R53	0698-3159	5	1	RESISTOR 26.1K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2612-F
A8R54	0698-8958	2	1	RESISTOR 511K 1% .125W F TC=0±100	28480	0698-8958
A8R55	2100-2517	4	1	RESISTOR-TRMR 50K 10% C SIDE-ADJ 1-TRN	73138	82PAR50K
A8R56	0757-0438	3	1	RESISTOR 5.11K 1% .125W F TC=0±100	24546	CT4-1/8-T0-5111-F
A8R57	0757-0465	6	1	RESISTOR 100K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1003-F
A8R58	0698-3457	6	1	RESISTOR 316K 1% .125W F TC=0±100	28480	0698-3457
A8R59	0757-0442	9	2	RESISTOR 10K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1002-F
A8R60	0698-0084	9	2	RESISTOR 2.15K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2151-F
A8R61	0698-0084	9	2	RESISTOR 2.15K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2151-F
A8R62	0698-3455	4	1	RESISTOR 261K 1% .125W F TC=0±100	24546	CT4-1/8-T0-2613-F
A8R63	0698-3152	8	1	RESISTOR 3.48K 1% .125W F TC=0±100	24546	CT4-1/8-T0-3481-F
A8R64	0757-0280	3	2	RESISTOR 1K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1001-F
A8R65	0698-3156	2	1	RESISTOR 14.7K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1472-F
A8R66	0757-0442	9	9	RESISTOR 10K 1% .125W F TC=0±100	24546	CT4-1/8-T0-1002-F
A8R67	0757-0290	5	1	RESISTOR 6.19K 1% .125W F TC=0±100	19701	5033R-1/8-T0-6191-F
A8R70	0698-7220	9	2	RESISTOR 215 1% .05W F TC=0±100	24546	C3-1/8-T0-215R-F
A8R71	0698-7220	9	2	RESISTOR 215 1% .05W F TC=0±100	24546	C3-1/8-T0-215R-F
A8S1	3101-0471	8	2	SWITCH-RKR DIP-RKR-ASSY 10-1A .05A 30VDC	28480	3101-0471
A8S2	3101-0471	8	2	SWITCH-RKR DIP-RKR-ASSY 10-1A .05A 30VDC	28480	3101-0471
A8TP1	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP2	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP3	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP4	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP5	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP6	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP7	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP8	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP9	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP10	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP11	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8TP12	1251-5925	2	12	CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8U1	1810-0277	3	2	NETWORK-RES 10-SIP 2.2K OHM X 9	91637	CSC10A01-222G/MSP10A01-
A8U2	1810-0277	3	2	NETWORK-RES 10-SIP 2.2K OHM X 9	91637	CSC10A01-222G/MSP10A01-
A8U3	1820-2024	3	2	IC DRVR TTL LS LINE DRVR OCTL	01295	SN74LS244N
A8U4	1820-2024	3	2	IC DRVR TTL LS LINE DRVR OCTL	01295	SN74LS244N
A8U5	1826-1048	1	6	IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A8U6	1826-0476	7	1	IC SWITCH ANLG 8-DIP-P PKG	01295	TL601CP
A8U7	1820-1568	8	1	IC BFR TTL LS BUS QUAD	01295	SN74LS125AN
A8U8	1820-1144	6	1	IC GATE TTL LS NOR QUAD 2-INP	01295	SN74LS02N
A8U9	1826-0180	0	1	IC TIMER TTL MONO/ASTBL	18324	NE555N
A8U10	1826-0753	3	1	IC OP AMP LOW-BIAS-H-IMPDP QUAD 14-DIP-C	04713	MC34004BL

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A8U11	1826-1048	1	*	IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A8U12	1826-0758	8	1	IC MULTIPLIER ANLG TO-100 PKG	28480	1826-0758
A8U13	1820-1196	8	1	IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS174N
A8U14	1826-1709	1	2	D/A 12-BIT 16-CBRZ/SDR CMOS	28480	1826-1709
A8U15	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A8U16	1820-1216	3		IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	SN74LS138N
A8U17	1826-1709	1		D/A 12-BIT 16-CBRZ/SDR CMOS	28480	1826-1709
A8U18	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A8U19	1826-0720	4	1	IC SWITCH ANLG QUAD 16-DIP-C PKG	06665	SW-02FQ
A8U20	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A8U21	1826-1048	1		IC OP AMP PRCN 8-DIP-C PKG	06665	OP-07CZ
A8VR1	1902-0197	1	1	DIODE-ZNR 82V 5% PD = 1W IR = 5UA	28480	1902-0197
A8VR2	1902-0625	0	3	DIODE-ZNR 1N829 6.2V 5% DO-7 PD = .25W	04713	1N829
A8VR3	1902-0625	0		DIODE-ZNR 1N829 6.2V 5% DO-7 PD = .25W	04713	1N829
A8VR4	1902-0625	0		DIODE-ZNR 1N829 6.2V 5% DO-7 PD = .25W	04713	1N829
A8VR5	1902-3070	5	1	DIODE-ZNR 4.22V 5% DO-35 PD = .4W	28480	1902-3070
A8XA1	1200-0455	6	1	SOCKET-IC 8-CONT DIP-SLDR	28480	1200-0455

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A9	83592-60087	4	1	BOARD ASSEMBLY-DRIVERS	28480	83592-60087
A9C1	0180-0291	3	1	CAPACITOR-FXD 1UF ± 10% 35VDC TA	56289	150D105X9035A2-DYS
A9C2	0180-1735	2	1	CAPACITOR-FXD .22UF ± 10% 35VDC TA	56289	150D224X9035A2-DYS
A9J1	1251-8743	8	1	CONN-POST TYPE .125-PIN-SPCG 24-CONT	28480	1251-8743
A9MP2	3050-1187	6	8	WASHER-FL MTLN NO. 8 .188-IN-ID	86928	5710-153-16
A9MP3	0380-0745	6	8	STANDOFF-RVT-ON .187-IN-LG 6-32-THD	73734	110211
A9MP4	0380-0322	5	3	SPACER-RVT-ON .062-IN-LG .152-IN-ID	14480	
A9MP5	1251-8551	6	2	CLIP-RETAINER-POST CONN	76381	3505-1
A9VR1	1902-0554	4	2	DIODE-ZNR 10V 5% PD = 1W IR = 10UA	04713	
A9VR2	1902-0554	4		DIODE-ZNR 10V 5% PD = 1W IR = 10UA	04713	
A9X1	1251-2313	6	8	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	00779	3-332070-5

See introduction to this section for ordering information.

*Indicates factory selected value.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A10	83595-60075	3	1	BOARD ASSEMBLY-MOTHER	28480	83595-60075
A10C1	0160-3879	7	7	CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A10C2	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A10C3	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A10C4	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A10C5	0160-1879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A10C6	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28470	0160-3879
A10C7	0160-1879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28280	0160-3879
A10CR1	1901-0033	2	1	DIODE-GEN PRP 180V 200MA DO-35	9N171	1N645
A10J1	1251-5926	3	1	CONNECTOR 50-PIN M POST TYPE	28480	1251-5926
A10J2	1251-6952	7	1	CONN-POST TYPE .100-PIN-SPCG 26-CONT	28480	1251-3196
A10J3	1251-3196	5	1	CONNECTOR 18-PIN M POST TYPE	28480	1251-3196
A10J4	1200-1205	6	2	SOCKET-IC 16-CONT DIP DIP-SLDR	00779	2-641610-2
A10J5	1200-1205	6	2	SOCKET-IC 16-CONT DIP DIP-SLDR	00779	2-641610-2
A10J6	1250-0257	1	1	CONNECTOR-RF SMB M PC 50-OHM	28480	1250-0257
A10J7	1251-8553	8	1	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	28480	1251-8553
A10MP1				NOT ASSIGNED		
A10MP2	1251-8851	6	2	POLARIZING KEY-PC EDGE CONN	28480	1251-8551
A10R1	0698-8812	7	1	RESISTOR 11% .125W F TC=0%100	28480	0698-8812
A10W1	8159-0005	0	1	JUMPER 1X22	28480	8159-0005
A10XA3	1251-1365	6	6	CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-0005
A10XA4	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-0005
A10XA5	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-0005
A10XA6	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-0005
A10XA7	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-0005
A10XA8	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-0005

See introduction to this section for ordering information.

*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A19	33325-60003	6	1	OPTION 002 ATTENUATOR 60DB	28480	33325-60003
MP29	83595-00008		1	BRACKET ATTENUATOR	28480	83595-00009
W15	83592-20048	3	1	CABLE RF SYTF/COUPLER	28480	83592-20048
W30	83595-20080		1	CABLE RF ATTENUATOR/F OUT	28480	83595-20080
W31	83595-20079		1	CABLE RF COUPLER/ATTENUATOR	28480	83595-20079
				OPTION 004		
MP44	83592-20062	1	1	PLUG BUTTON	28480	83592-20062
MP45	83592-20063	2	1	PLUG BUTTON	28480	83592-20063
W2	83592-60024	9	1	CABLE ALC R/SMB	28480	83592-60024
W15	83592-20048	3	1	CABLE RF SYTF/COUPLER	28480	83592-20048
W32	83592-20093	8	1	CABLE RF COUPLER/R OUT	28480	83592-20093
				OPTION 002 AND 004 INCLUDES MOST OPTION 002 AND 004 PARTS IN ADDITION TO THE FOLLOWING:		
W33	83595-20076	9	1	CABLE RF ATTENUATOR/REAR OUT	28480	83595-20076

See introduction to this section for ordering information.

*Indicates factory selected value.



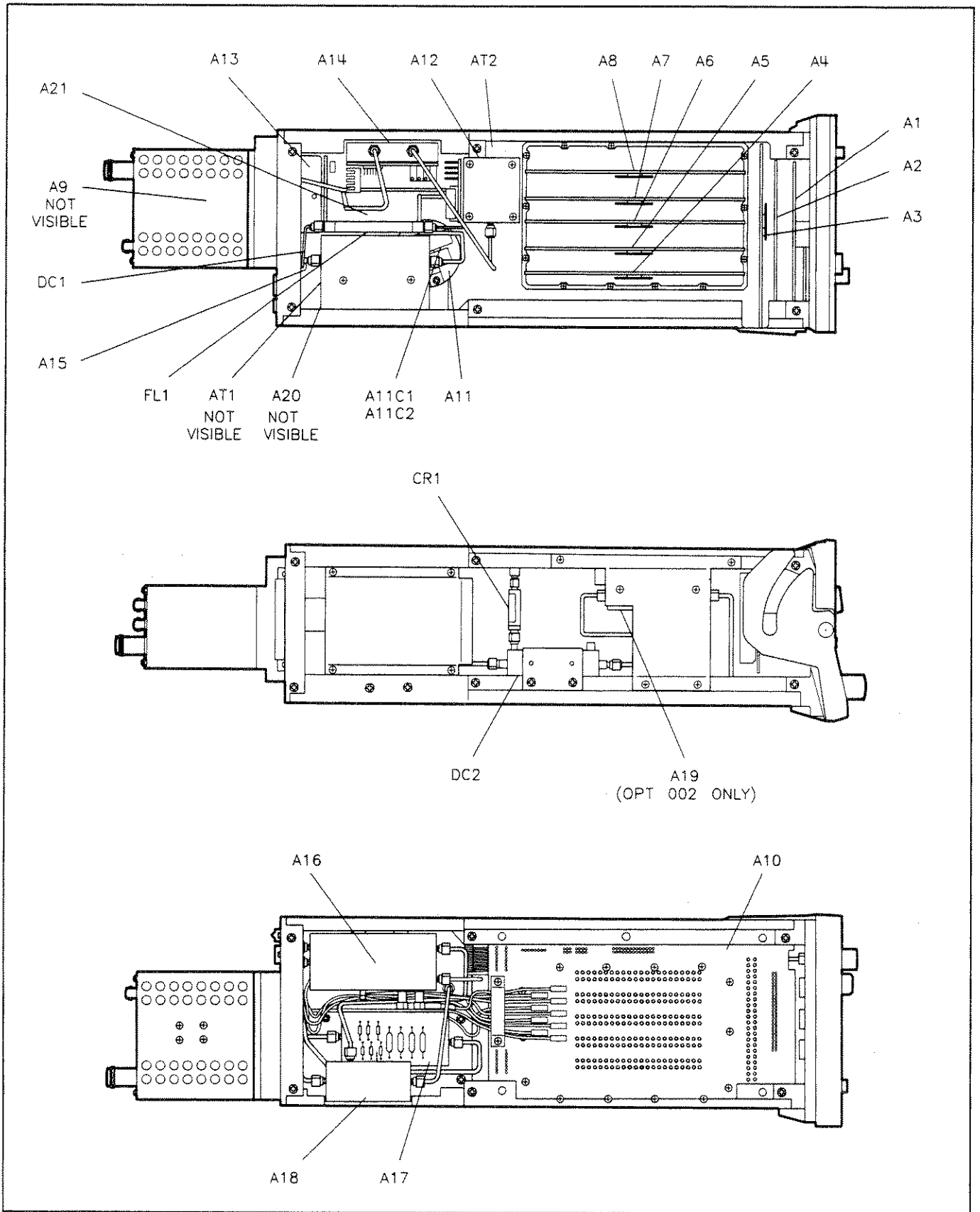


Figure 6-2. Major Assemblies (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
MAJOR ASSEMBLIES						
A1	83592-60147	7	1	BOARD ASSEMBLY - FRONT PANEL	28480	83592-60147
A2	83595-60099	1	1	BOARD ASSEMBLY - SUB PANEL	28480	83595-60099
A3	83525-60080	6	1	BOARD ASSEMBLY - DIGITAL INTERFACE	28480	83525-60080
A4	83595-60087	7	1	BOARD ASSEMBLY - ALC	28480	83595-60087
A5	83592-60005	6	1	BOARD ASSEMBLY - FM	28480	83592-60005
A6	83595-60106	1	1	BOARD ASSEMBLY - SWEEP CONTROL	28480	83595-60106
A7	83595-60095	7	1	BOARD ASSEMBLY - YTM DRIVER	28480	83595-60095
A8	83595-60089	9	1	BOARD ASSEMBLY - YO DRIVER	28480	83595-60089
A9	83592-60087	4	1	BOARD ASSEMBLY - DRIVERS	28480	83592-60087
A10	83592-60075	0	1	BOARD ASSEMBLY - MOTHER	28480	83592-60075
A11	86222-60007	7	1	CAVITY OSCILLATOR	28480	86222-60007
A11C1	0180-2216	0	1	CAPACITOR-FXD 350UF +75-10% 16VDC AL	56289	30D357G016DH2
A11C2	0180-3549	8	1	CAPACITOR-FXD 200UF +75-10% 25VDC AL	56289	30D207G025DH9
A12	83595-60111		1	YTM	28480	83595-60111
A12	83595-69111		1	RESTORED YTM	28480	83595-69111
A13	83592-60090	9	1	YO REPLACEMENT KIT (LOWER LEVEL PARTS ARE NOT AVAILABLE SEPARATELY)	28480	83592-60096
A14	5086-7559		1	POWER AMPLIFIER	28480	5086-7559
A14	5086-6559		1	RESTORED POWER AMPLIFIER REPLACEMENT KIT	28480	5086-6559
A15	5086-7238	7	1	DC RETURN	28480	5086-7238
A16	5086-7339	9	1	MODULATOR/SPLITTER	28480	5086-7339
A16	5086-6339	7	1	RESTORED MODULATOR/SPLITTER	28480	5086-6339
A17	5086-7217	2	1	AMPLIFIER 0.01 TO 2.4 GHZ	28480	5086-7217
A17	5086-6217	0	1	RESTORED AMPLIFIER 0.01 TO 2.4 GHZ	28480	5086-6217
A18	5086-7219	4	1	MODULATOR MIXER	28480	5086-7219
A18	5086-6219	2	1	RESTORED MODULATOR MIXER	28480	5086-6219
A19	33325-60003	6	1	STEP ATTENUATOR (OPTION 002 ONLY)	28480	33325-60003
A20	83595-60097		1	SWITCHED YTF	28480	83595-60097
A20	83595-69097		1	RESTORED SWITCHED YTF	28480	83595-69097
A21	5086-7511	9	1	AMPLIFIER 2 TO 26.5 GHZ	28480	5086-7511
A21	5086-6511	7	1	RESTORED AMPLIFIER 2 TO 26.5 GHZ	28480	5086-6511
AT1	0960-0638	6	1	ISOLATOR 2.0 TO 7.0 GHZ	28480	0960-0638
AT2	0960-0055	1	1	TERMINATION 50 OHM M SMA SHORT	28480	0960-0055
CR1	83595-60045	7	1	DETECTOR	28480	83595-60045
DC1	5086-7220	7	1	DIRECTIONAL DETECTOR	28480	5086-7220
DC2	0955-0125	5	1	COUPLER	28480	0955-0125
FL1	0955-0433	8	1	FILTER-LOW PASS 2.6 GHZ SMA	28480	0955-0433

Figure 6-2. Major Assemblies (2 of 2)

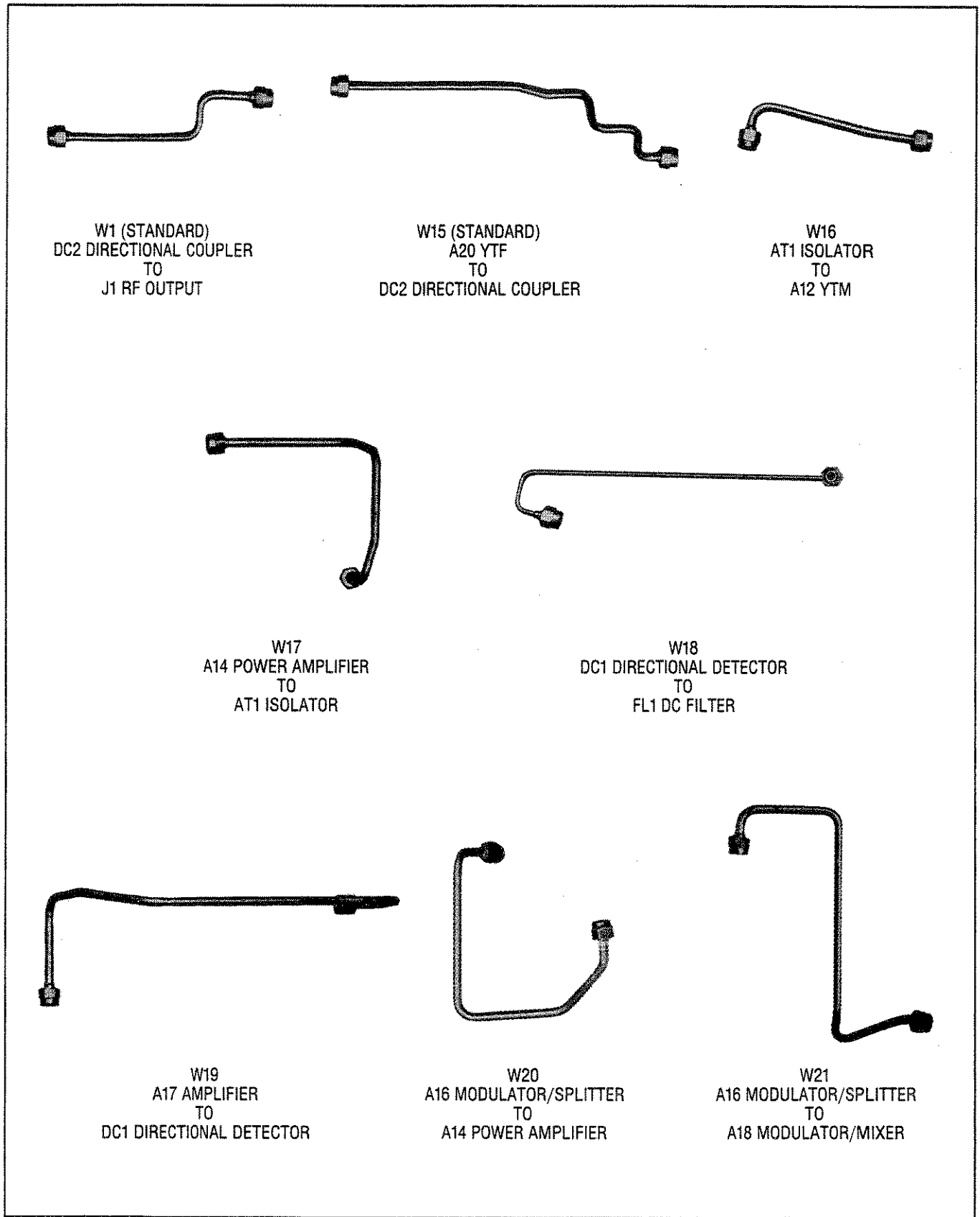


Figure 6-3. RF Cables (1 of 3)

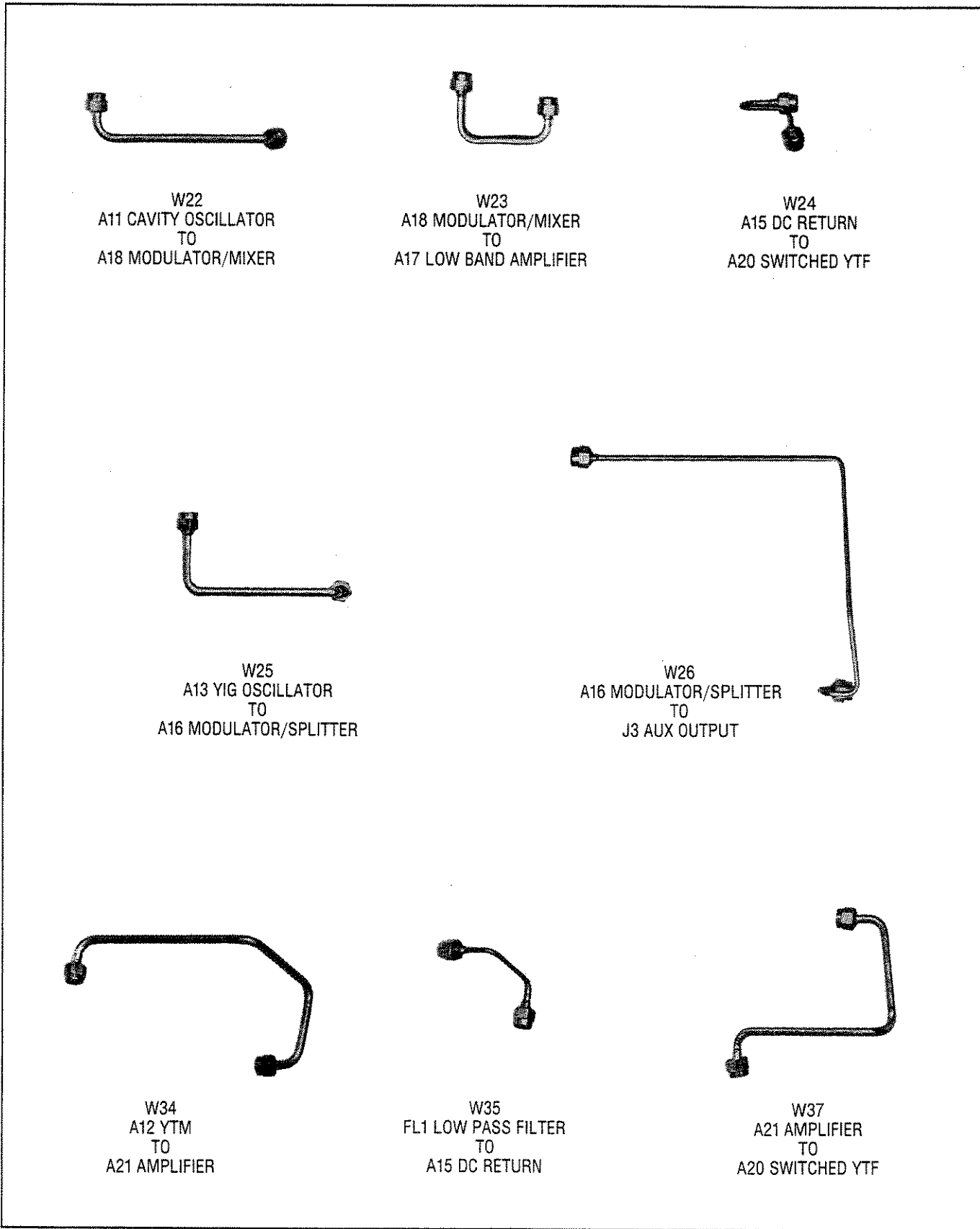
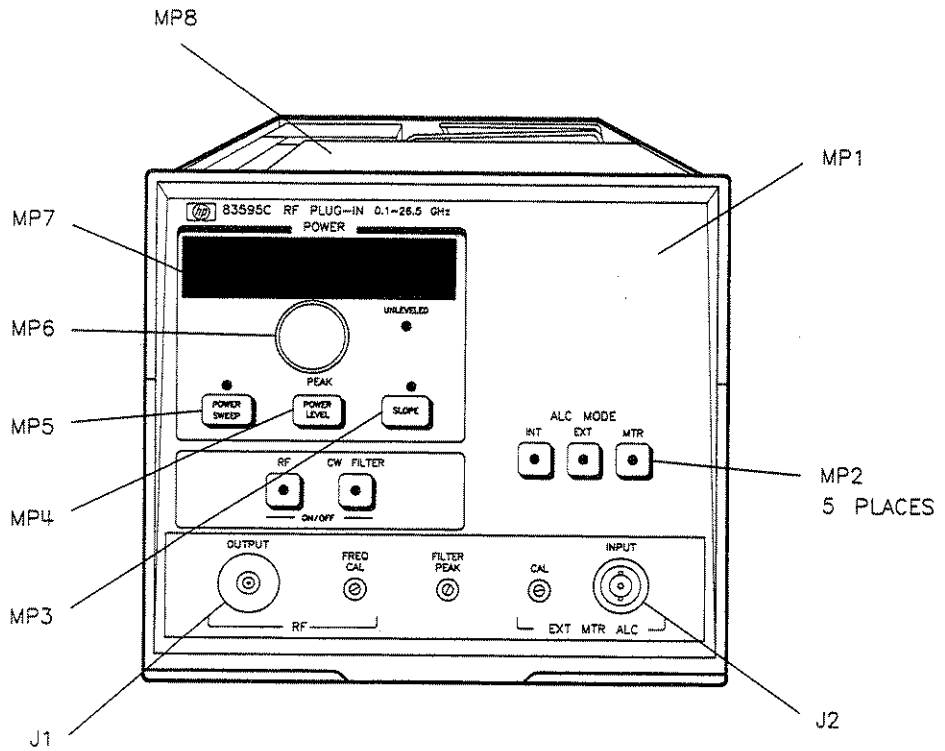


Figure 6-3. RF Cables (2 of 3)

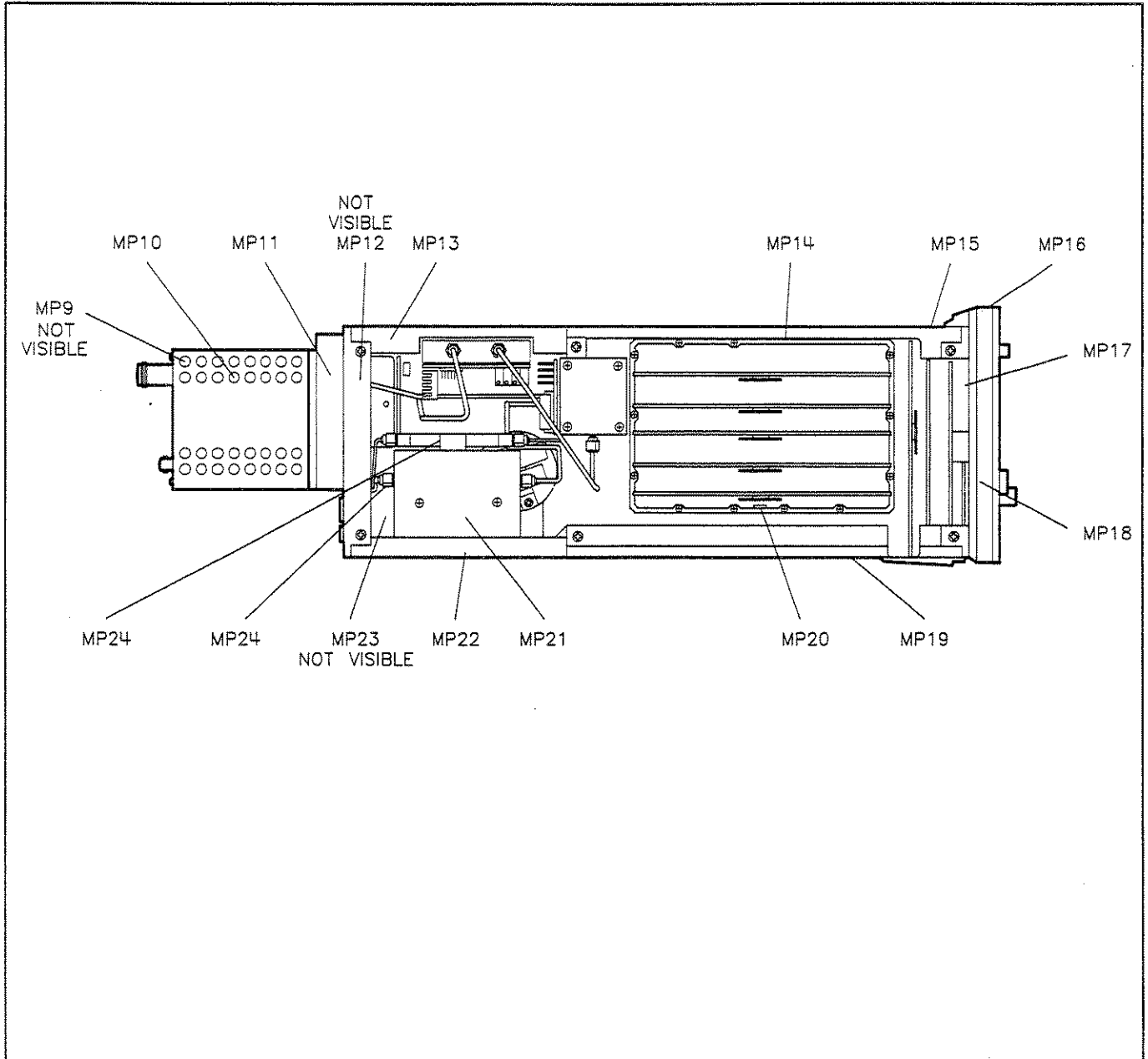
Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
W1	83595-20013	5	1	CABLES		
W2	83592-60021	6	1	CABLE-RF COUPLER/OUTPUT	28480	83595-20013
W3	83592-60025	0	1	CABLE COAX EXT/MTR ALC	28480	83592-60021
W4	83592-60082	9	1	CABLE ASSEMBLY RIBBON FRONT PANEL	28480	83592-60025
W5	83592-60090	9	1	CABLE ASSEMBLY RIBBON RF SECTION	28480	83592-60082
				CABLE COAX PULSE IN	28480	83592-60090
W6	83592-60013	6	1	CABLE COAX PULSE MOD	28480	83592-60013
W7	83525-60029	3	1	CABLE COAX VTUNE	28480	83525-60029
W8	83592-60012	5	1	CABLE COAX, GREY, DETECTOR	28480	83592-60012
W9	83592-60015	8	1	CABLE COAX, BLUE, FM	28480	83592-60015
W10	83592-60016	9	1	CABLE COAX, PURPLE, INT DET 0	28480	83592-60016
W11	83592-60020	5	1	CABLE COAX, GREEN, FM IN	28480	83592-60020
W12	83592-60011	4	1	CABLE COAX, BROWN, AM IN	28480	83592-60011
W13	82592-60014	7	1	CABLE COAX, YELLOW, MOD 1	28480	83592-60014
W14	83592-60082	9	1	CABLE COAX, RIBBON, RF SECTION	28480	82592-60082
W15	83592-20047	2	1	CABLE-RF DC2/YTM	28480	83592-20047
W16	83592-20083	6	1	CABLE-RF AT1/YTM	28480	83592-20083
W17	83595-20092	0	1	CABLE-RF POWER AMPLIFIER/AT1	28480	83595-20092
W18	83595-20084	8	1	CABLE-RF DET/DC FILTER	28480	83595-20084
W19	83592-20044	9	1	CABLE-RF LAMP/DETECTOR	28480	83592-20044
W20	83592-20085	8	1	CABLE-RF A16/A14	28480	83592-20085
W21	83592-20041	6	1	CABLE-RF A16/A18	28480	83592-20041
W22	83592-20030	3	1	CABLE-RF A11/A18	28480	83592-20030
W23	83592-20031	4	1	CABLE-RF A18/A17	28480	83592-20031
W24	83592-20035	8	1	CABLE-RF A15/A20	28480	83592-20035
W25	83592-20036	9	1	CABLE-RF A13/A16	28480	83592-20036
W26	83592-20092	7	1	CABLE-RF A16/J3 AUX OUTPUT	28480	83592-20092
W27	83592-60010	3	1	WIRING HARNESS, RF SECTION	28480	83592-60010
W28	83525-60024	8	1	CABLE ASSEMBLY POWER SUPPLY	28480	83525-60024
W29	83525-60056	6	1	CABLE ASSEMBLY RIBBON REAR CONNECTOR	28480	83525-60056
W30	83595-20080	6	1	CABLE RF ATTENUATOR/F OUT (OPTION 002)	28480	83595-20080
W31	83595-20079	3	1	CABLE RF COUPLER/ATTENUATOR (OPTION 002)	28480	83595-20079
W32	83592-20093	8	1	CABLE RF COUPLER/R OUT (OPTION 004)	28480	83592-20093
W33	83592-20094	9	1	CABLE RF ATTENUATOR/R OUT (OPTION 002/004)	28480	83592-20094
W34	83595-20065	7	1	RF CABLE 26 AMP/YTM	28480	83595-20065
W35	83595-20083	5	1	CABLE-FILTER/DC RETURN	28480	83595-20083
W36	83592-60083	0	1	CABLE ASSEMBLY-RIGHT SIDE	28480	83592-60083
W37	83595-20066	8	1	RF CABLE 26 AMP/YTF	28480	83595-20066

Figure 6-3. RF Cables (3 of 3)



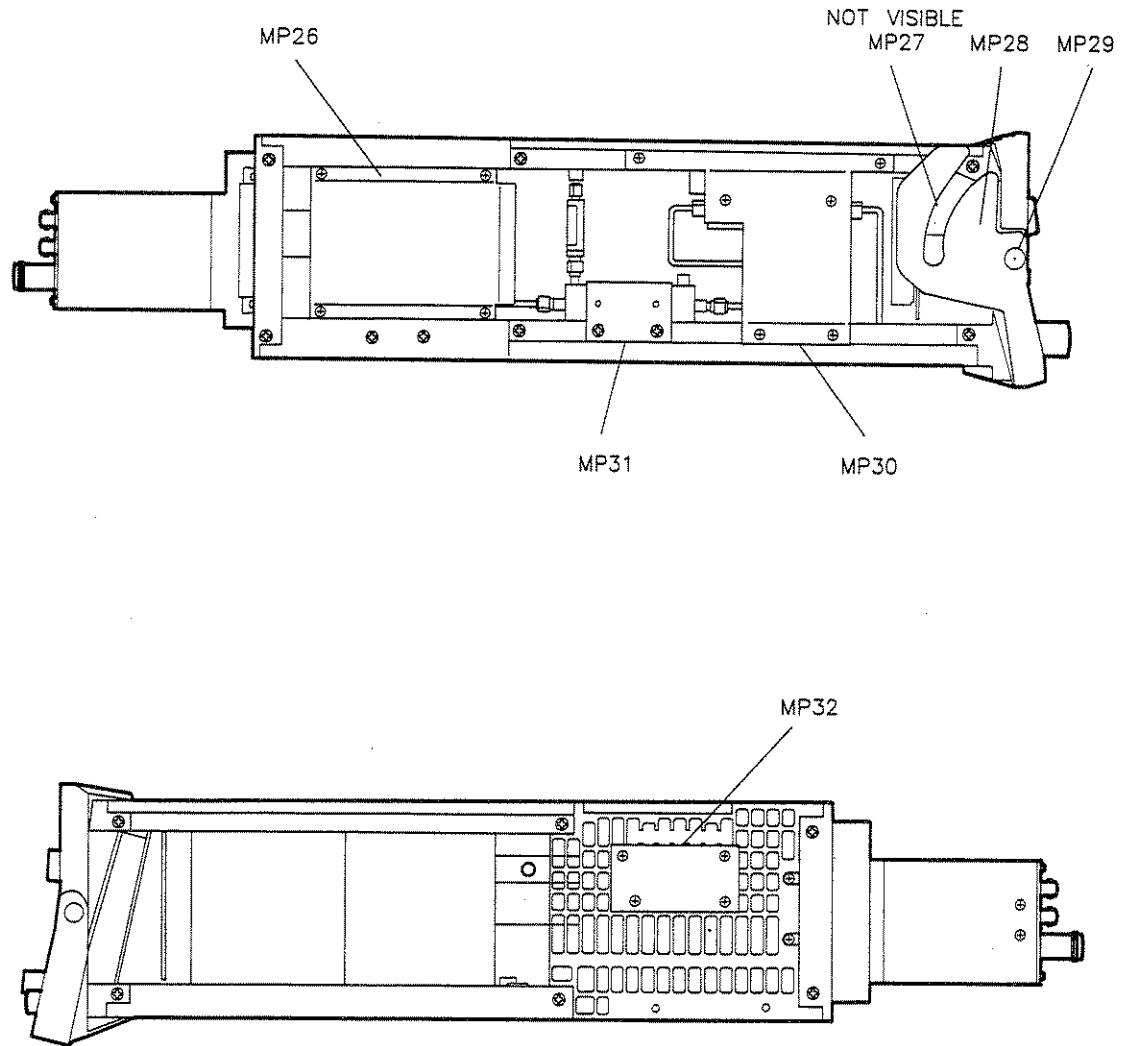
Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
MP1	83595-00006	1	1	FRONT PANEL - DRESS (STD AND OPTION 002)	28480	83595-00006
MP2	5041-0285	6	5	KEY - CAP LITE	28480	5041-0285
MP3	5041-1926	4	1	KEY - CAP SLOPE	28480	5041-1926
MP4	5041-1924	2	1	KEY - CAP POWER LEVEL	28480	5041-192424
MP5	5041-1925	3	1	KEY - CAP POWER SWEEP	28480	5041-1925
MP6	0370-3023	8	1	KNOB - 3/4 JACK .25-IND-ID	28480	0370-3023
MP7	83522-20028	5	1	WINDOW - DISPLAY	28480	83522-20028
MP8	83522-00019	5	1	COVER PC	28480	83522-00019

Figure 6-4. Major Mechanical Parts, Front View (1 of 6)



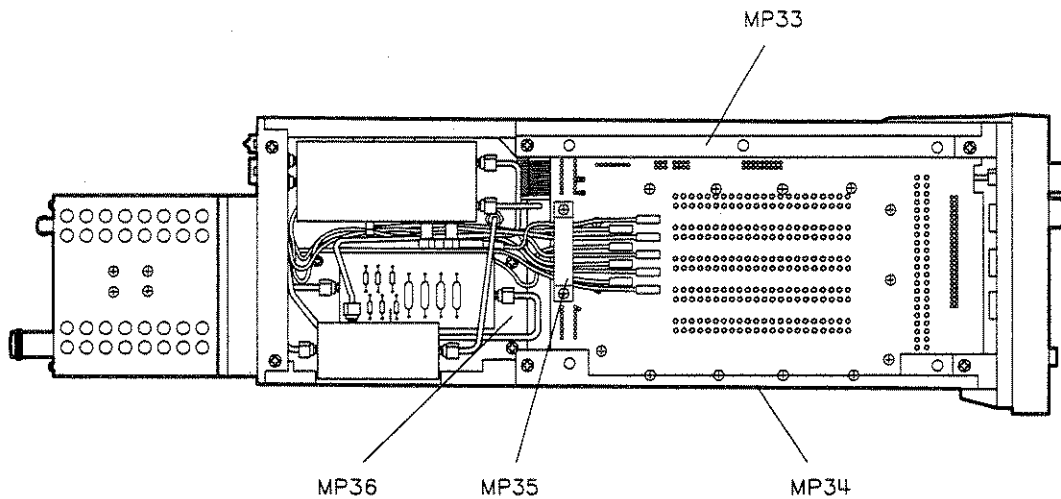
Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
MP9	83592-00026	5	1	CONNECTOR MOUNT ASSY TYPE-N	28480	83592-00026
MP10	83592-20081	4	1	BOX EXTRUSION	28480	83592-20081
MP11	0050-2032	9	1	CASTING - AL FRAME (RR)	28480	0050-2032
MP12	83592-20096	1	1	YO BRACKET - AL MACH	28480	83592-20096
MP13	83595-20075	9	1	CASTNG - AL HEAT SINK RF	28480	83595-20075
MP14	83592-20070	1	1	SHIELD ASSEMBLY (CARD CAGE)	28480	83592-20070
MP15	83592-20016	5	1	SIDERAIL - UPPER RIGHT	28480	83592-20016
MP16	83592-20074	5	1	CASTING FRONT	28480	83592-20074
MP17	0510-1267	6	5	RETAINER PUSH-ON KB-TO-SHFT EXT	28480	0510-1267
MP18	0960-0683	1	1	RPG (ROTARY PULSE GENERATOR)	28480	0960-0683
MP19	83592-20017	6	1	SIDERAIL - UPPER LEFT	28480	83592-20017
MP20	86290-00024	4	4	SPRING COMP CLIP	28480	86290-00024
MP21	83592-00008	5	1	SHIELD ISOLATOR	28480	83592-00008
MP22	0050-2066	9	1	CASTING - AL HEAT SINK RF	28480	0050-2066
MP23	83592-00006	3	1	BRACKET ISOLATOR	28480	83592-00006
MP24	83592-00013	0	1	BRACKET DET/DCB	28480	83592-00013
MP25	1400-0755	3	1	CABLE CLAMP	28480	1400-0755

Figure 6-4. Major Mechanical Parts, Top View (2 of 6)



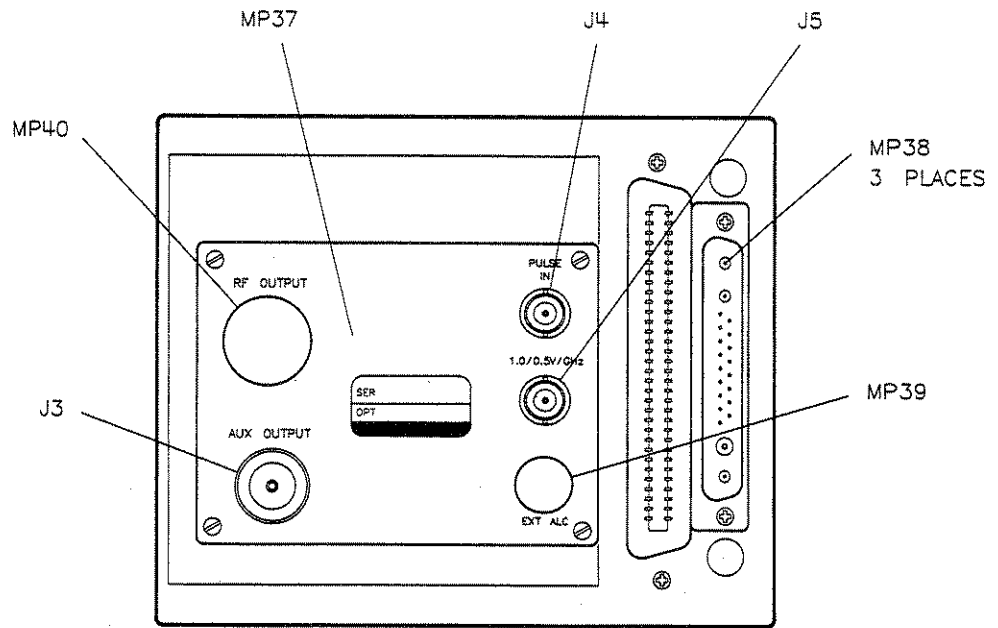
Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
MP26	83525-00010	6	1	GUARD	28480	83525-00010
MP27	1460-1851	8	1	SPACER WIREFORM MUW BLK OXD	28480	1460-1851
MP28	83525-20069	7	2	LATCH - SCREW	28480	83525-20069
MP29	83525-20071	1	1	LATCH	28480	83525-20071
MP30	83595-00008	6	1	BRACKET ATTENUATOR (OPTION 002)	28480	83595-00008
MP31	83592-00009	4	1	BRACKET COUPLER	28480	83592-00009
MP32	83595-00007	5	1	MOUNTING PLATE-AMPLIFIER	28480	83595-00007

Figure 6-4. Major Mechanical Parts, a) Left Side b) Right Side (3 of 6)



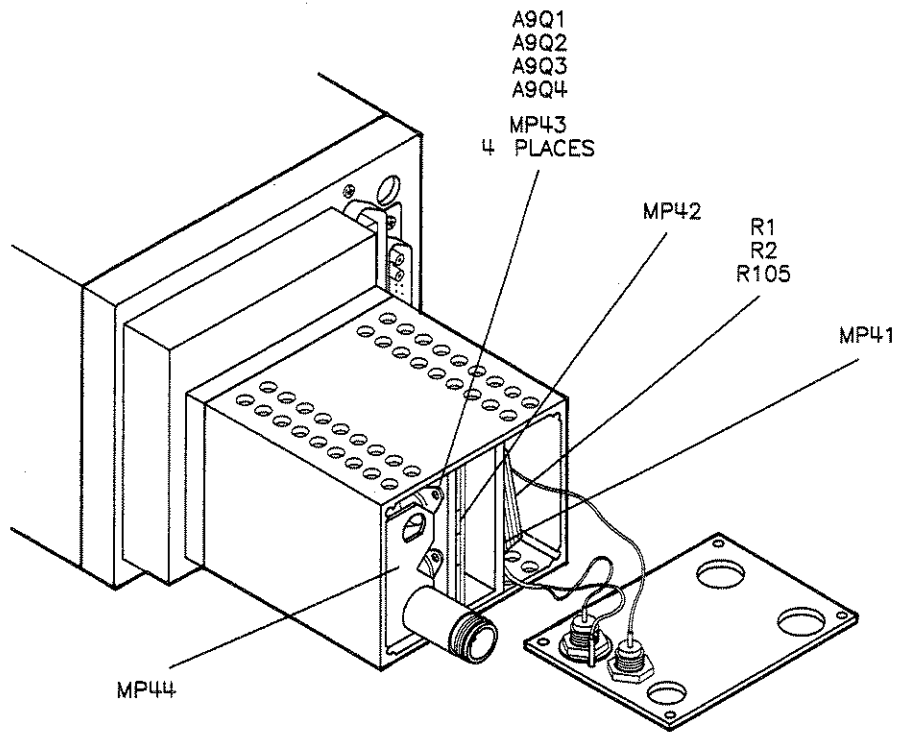
Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
MP33	83592-20018	7	1	SIDERAIL - LOWER LEFT	28480	83592-20018
MP34	83592-20015	4	1	SIDERAIL - LOWER RIGHT	28480	83592-20015
MP35	83592-00022	1	1	WIRE HOLDER	28480	83592-00022
MP36	83592-00004	9	1	BRACKET AMPLIFIER	28480	83592-00004

Figure 6-4. Major Mechanical Parts, Bottom View (4 of 6)



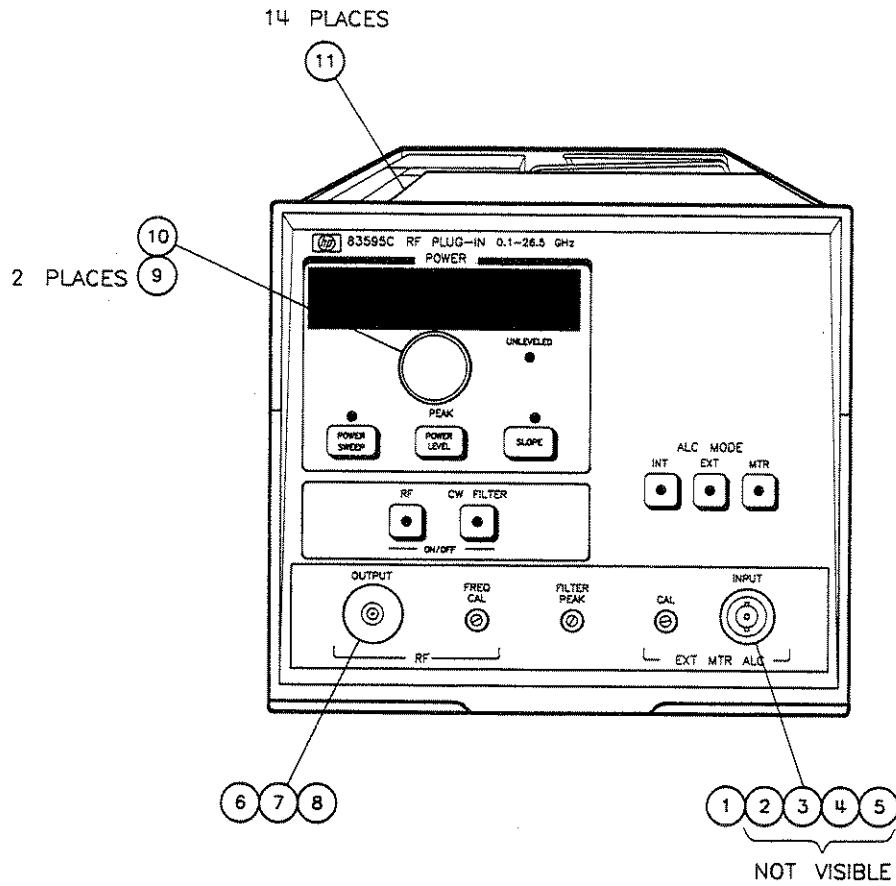
Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
MP37	83592-00029	8	1	PANEL - REAR	28480	83592-00029
MP38	5021-0906	6	3	BUSHING PLASTIC	28480	5021-0906
MP39	6960-0002	4	1	PLUG-HOLE 0.500 D (STANDARD)	28480	6960-0002
MP40	6960-0003	5	1	PLUG-HOLE 0.750 D (STANDARD)	28480	6960-0003

Figure 6-4. Major Mechanical Parts, Rear View (5 of 6)



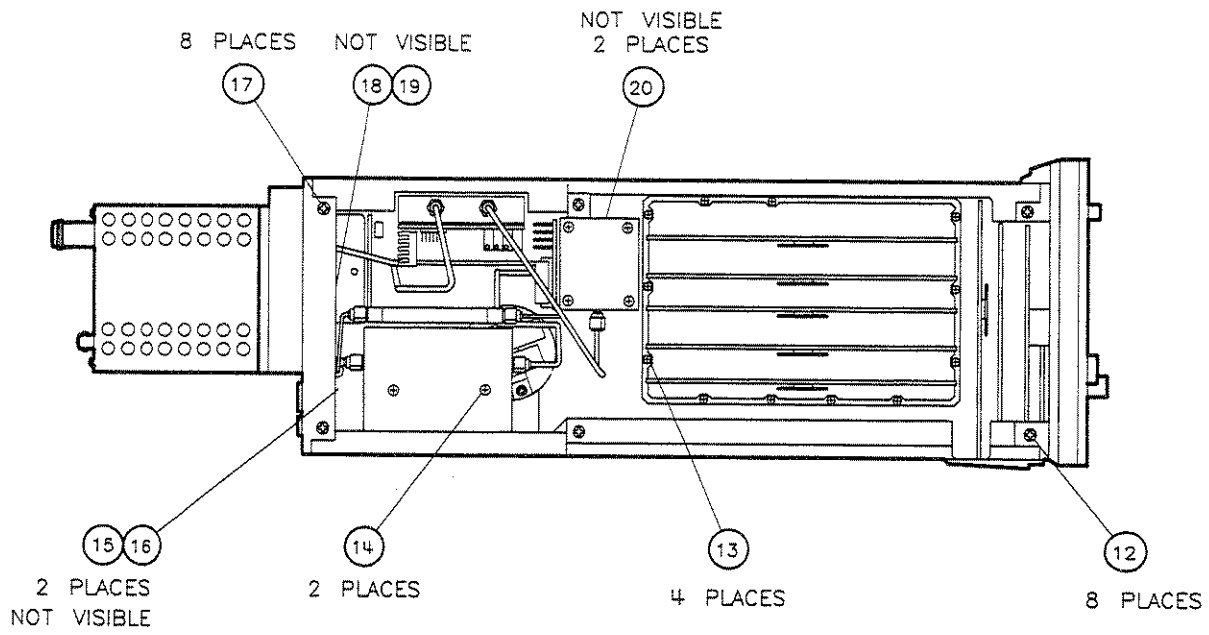
Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
R1, 2, 105	0811-3827	7	1	RESISTORS MATCHED SET	28480	0811-3827
MP41	83592-20082	5	1	TRANSISTOR MOUNT	28480	83592-20082
MP42	0330-0385	5	1	PAD	28480	0330-0385
MP43	1200-0043	8	4	INSULATOR	28480	1200-0043
MP44	83592-00020	9	1	BRACKET-CONN MOUNT AUX OUT	28480	83592-00020
A9Q1	1855-0527	0	1	TRANSISTOR	28480	1855-0527
A9Q2	1855-0527	0	1	TRANSISTOR	28480	1855-0527
A9Q3	1820-0080	7	1	TRANSISTOR	28480	1820-0080
A9Q4	1820-0430	1	1	TRANSISTOR	28480	1820-0430

Figure 6-4. Major Mechanical Parts, Inside Rear View (6 of 6)



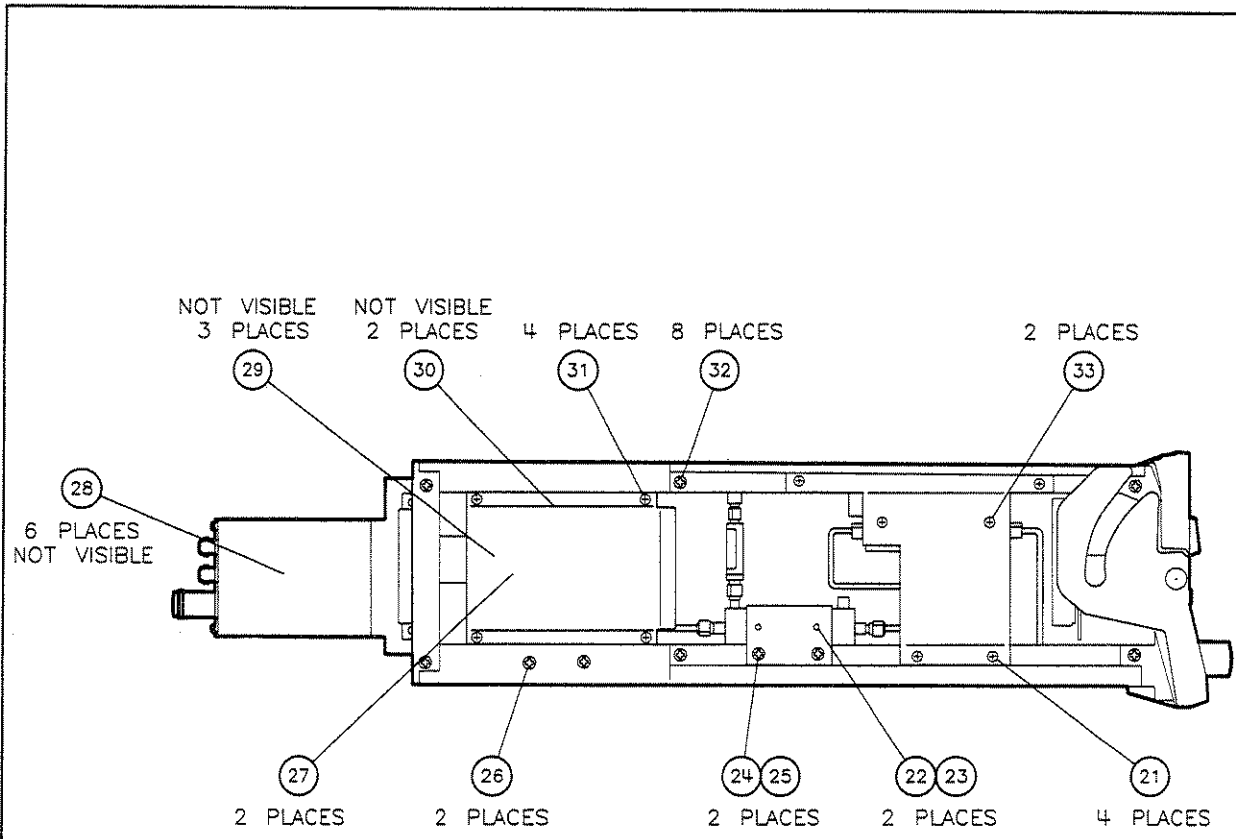
Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
1	1250-0118	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 5-OHM	03316	28JR128-1
2	5040-0345	7	2	INSULATOR CONN	28480	5040-0345
3	2190-0016	3	1	WASHER-LK INTL T3/8 IN .377 IN-ID	28480	2190-0016
4	0360-1190	5	1	TERMINAL-SLDR LUG PL-MTG FOR -#3/BSCR	28480	2360-1190
5	2950-0001	8	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
6	5061-5316	6	1	3.5MM CONNECTOR ASSEMBLY	28480	5060-5316
7	2190-0104	0	1	WASHER-LK INTL T7/16 IN .439-IN-ID	28480	2190-0104
8	2950-0132	6	1	NUT-HEX-DBL-CHAM 7/16-28-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
9	2190-0016	3	2	WASHER-LK INTL T3/8 IN .377 IN-ID	28480	2190-0016
10	2950-0001	8	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
11	0624-0099	1	14	SCREW-TPG 4-20 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION

Figure 6-5. Attaching Hardware, Front View (1 of 6)



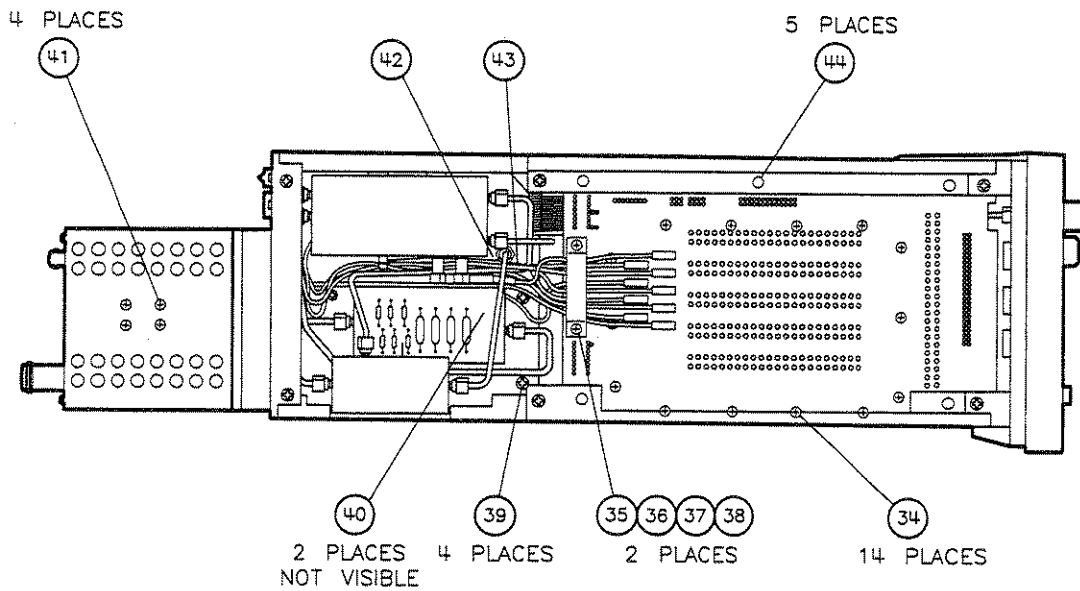
Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
12	2360-0333	8	8	SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	2360-0333
13	0570-0112	4	4	SCREW-MACH 0-80 .188-IN-LG FIL-HD-SLT	00000	ORDER BY DESCRIPTION
14	2200-0103	2	2	SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
15	0520-0126	5	2	SCREW-MACH 2-56 .125-IN-LG 100 DEG	28480	0520-0126
16	2200-0103	2	2	SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
17	2360-0334	9	8	SCREW-MACH 6-32 .312-IN-LG 100 DEG	28480	2360-0334
18	2360-0334	9	1	SCREW-MACH 6-32 .312-IN-LG 100 DEG	28480	2360-0334
19	2360-0117	6	1	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
20	2360-0333	8	1	SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	2360-0333

Figure 6-5. Attaching Hardware, Top View (2 of 6)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
21	2200-0103	2	4	SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
22	0520-0127	6	2	SCREW-MACH 2-56 .188-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
23	2190-0112	0	2	WASHER-LK HLCL NO.2 .088-IN-ID	28480	2190-0112
24	2200-0105	4	2	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
25	3050-0105	6	2	WASHER-FL MTLC NO.4 .125-IN-ID	28480	3050-0105
26	2510-0047	0	2	SCREW-MACH 8-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
27	2360-0117	6	2	SCREW-MACH 6-32 .275-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
28	2200-0103	2	6	SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
29	2360-0190	5	3	SCREW-MACH 6-32 .188-IN-LG 100 EG	28480	2360-0190
30	2200-0167	8	2	SCREW-MACH 4-40 .375-IN-LG 32 DEG	28480	2200-0167
31	2200-0101	0	4	SCREW-MACH 4-40 .188-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
32	2360-0115	4	8	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
33	2200-0140	7	2	SCREW-MACH 4-40 .25-IN-LG 100 DEG	28480	2200-0140

Figure 6-5. Attaching Hardware, Left Side (3 of 6)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
34	0624-0099	1	14	SCREW-TPG 4-20 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
35	2200-0107	6	2	SCREW-MACH 4-40 .372-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
36	2190-0401	0	2	WASHER-FL NM NO.4 .12-IN-ID .312-IN-OD	28480	2190-0401
37	3050-0105	6	2	WASHER-FL MTLC NO.4 .125-IN-ID	28480	3050-0105
38	2260-0009	3	2	NUT-HEX-W/LK SR 4-40-THD 094-IN-THK	00000	ORDER BY DESCRIPTION
39	2360-0115	4	4	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
40	2200-0140	7	2	SCREW-MACH 4-40 .25-IN-LG 100 DEG	28480	2200-0140
41	2200-0166	7	4	SCREW-MACH 4-40 .312-IN-LG 82 DEG	28480	2200-0166
42	2360-0334	9	1	SCREW-MACH 6-32 .312-IN-LG 100 DEG	28480	2360-0334
43	2360-0115	4	1	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
44	2360-0331	6	5	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION

Figure 6-5. Attaching Hardware, Bottom View (4 of 6)

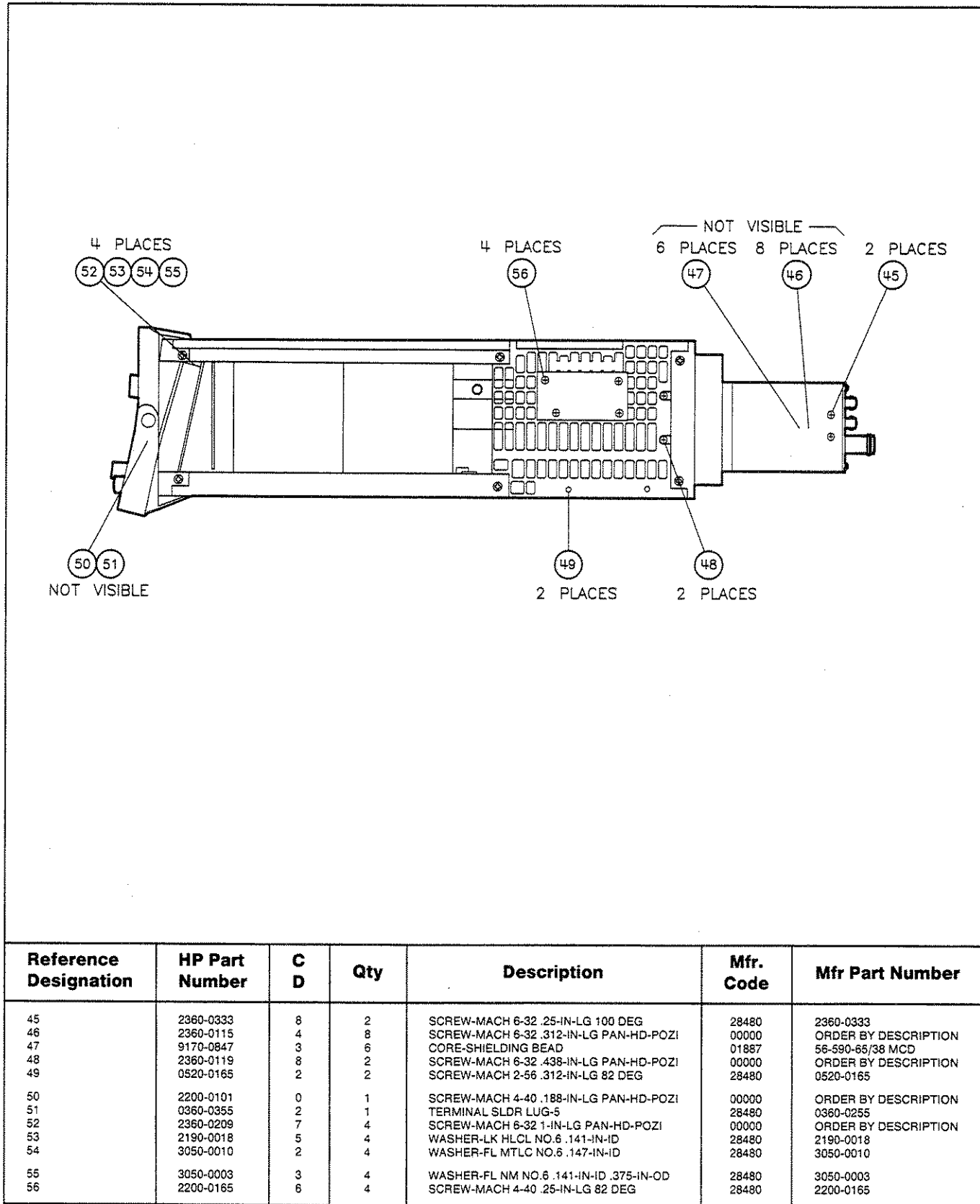
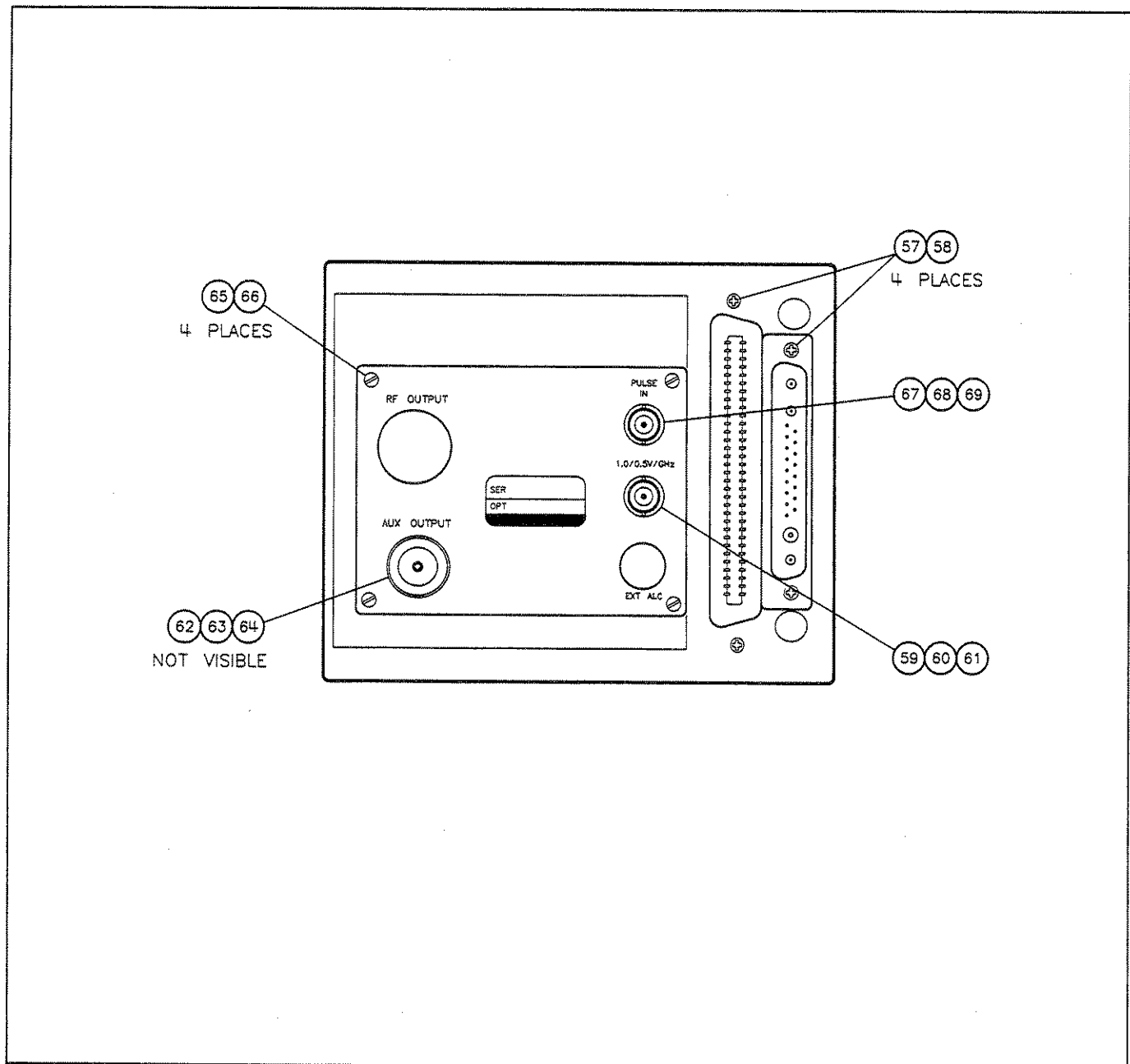


Figure 6-5. Attaching Hardware, Right Side (5 of 6)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr Part Number
57	2260-0009	3	4	NUT-HEX-W/LK WR 4-40-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
58	2200-0107	6	4	SCREW-MACH 4-40 .372-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
59	1250-0118	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	03316	28JR128-1
60	2190-0016	3	1	WASHER-LK INTL T3/8 IN .377 IN-ID	28480	2190-0016
61	2950-0001	8	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
62	5061-5386	0	1	CONNECTOR TYPE-N UTIL	28480	5061-5386
63	2190-0104	0	1	WASHER-LK INTL T7/16 IN. .439-IN-ID	28480	2190-0104
64	2950-0132	6	1	NUG-HEX-DBL-CHAM 7/16-28-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
65	2200-0569	4	4	SCREW-MACH 4-40 3.5 PAN-SL	00000	ORDER BY DESCRIPTION
66	2190-0019	8	4	WASHER-LK NO.4 .115-IN-ID	28480	2190-0019
67	1250-0118	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	03316	28JR128-1
68	0360-1632	0	1	TERMINAL-SLDR LUG LK-MTG FOR-#3/8SCR	28480	0360-1632
69	2950-0001	8	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION

Figure 6-5. Attaching Hardware, Rear View (6 of 6)

Table 6-4. Miscellaneous Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
	6010-1146	6		TOUCH-UP PAINT DOVE GREY PAINT (FOR FRONT FRAME AND LATCH)	28480	6010-1146
	6010-0949			OLIVE GREY PAINT (FOR REAR BOX EXTRUSION)	28480	6010-0949
	83595-60090	2	1	OPTION RETROFIT KITS OPTION 002 ATTENUATOR RETROFIT KIT	28480	83595-60090
	83595-60096	8	1	OPTION 004 REAR PANEL RETROFIT KIT	28480	83595-60096
	83595-90031	4	1	DOCUMENTATION HP 83595C OPERATING AND SERVICE MANUAL	28480	83595-90031
	08350-90092	4	1	HP 8350B OPERATING AND SERVICE MANUAL	28480	08250-90092
	5062-3983	1	1	RACK MOUNT KITS RACK MOUNT FLANGE KIT WITH HANDLES	28480	5062-3983
	5062-4071	0	1	RACK MOUNT FLANGE KIT FOR INSTRUMENTS WITH PREVIOUSLY SUPPLIED HANDLES	28480	5062-4071
	5062-3977	3	1	RACK MOUNT FLANGE KIT TO MOUNT INSTRUMENTS WITHOUT HANDLES	28480	5062-3977

See introduction to this section for ordering information.

*Indicates factory selected value.

