

**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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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

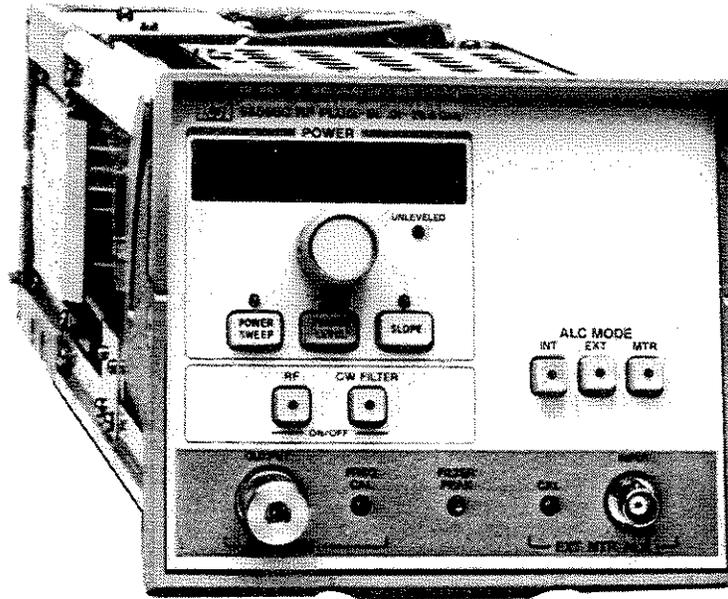


Any servicing, adjustment, maintenance, or repair of this product must be performed only by qualified personnel.

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 | |
| Typically | ± 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) | + 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 | < -50 dBc | < -50 dBc | < -50 dBc | < -50 dBc | < -25 dBc |
| | < -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)

| |
|--|
| <p>Output Power Resolution Displayed: 0.1 dB Programmable/Settable: 0.01 dB</p> <p>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</p> |
| GENERAL CHARACTERISTICS |
| <p>Minimum Sweep Time: Single Band: 10 ms Full Band: 50 msec</p> <p>Band Switch Points: Internal band switch points at approximately 2.4 GHz, 7.0 GHz, 13.5 GHz, and 20.0 GHz</p> <p>RF Output Connector: 3.5 mm male</p> |

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 |
| Linearity¹ | ± 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.

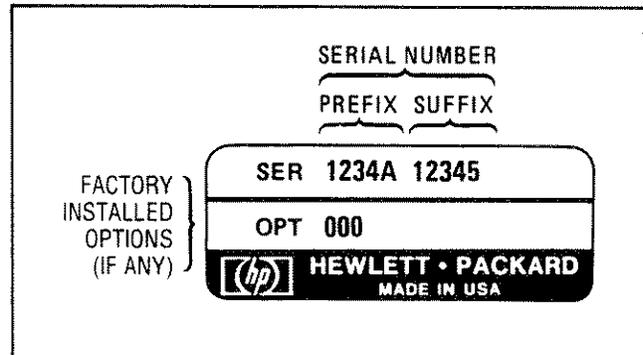


Figure 1-2. Typical Serial Number Label

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

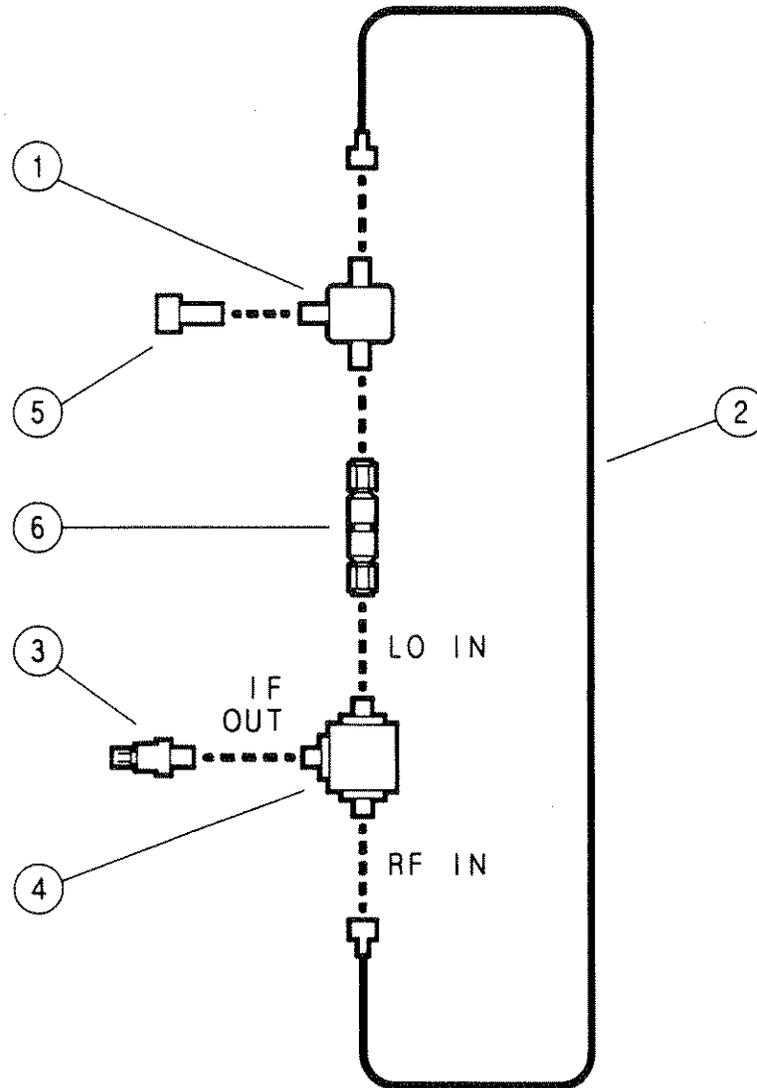
The HP 8350/plug-in combination is compatible with the HP 8510 vector network analyzer.

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.

Section 2. Installation

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 $+75^{\circ}\text{C}$ (-40° to $+167^{\circ}\text{F}$).

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

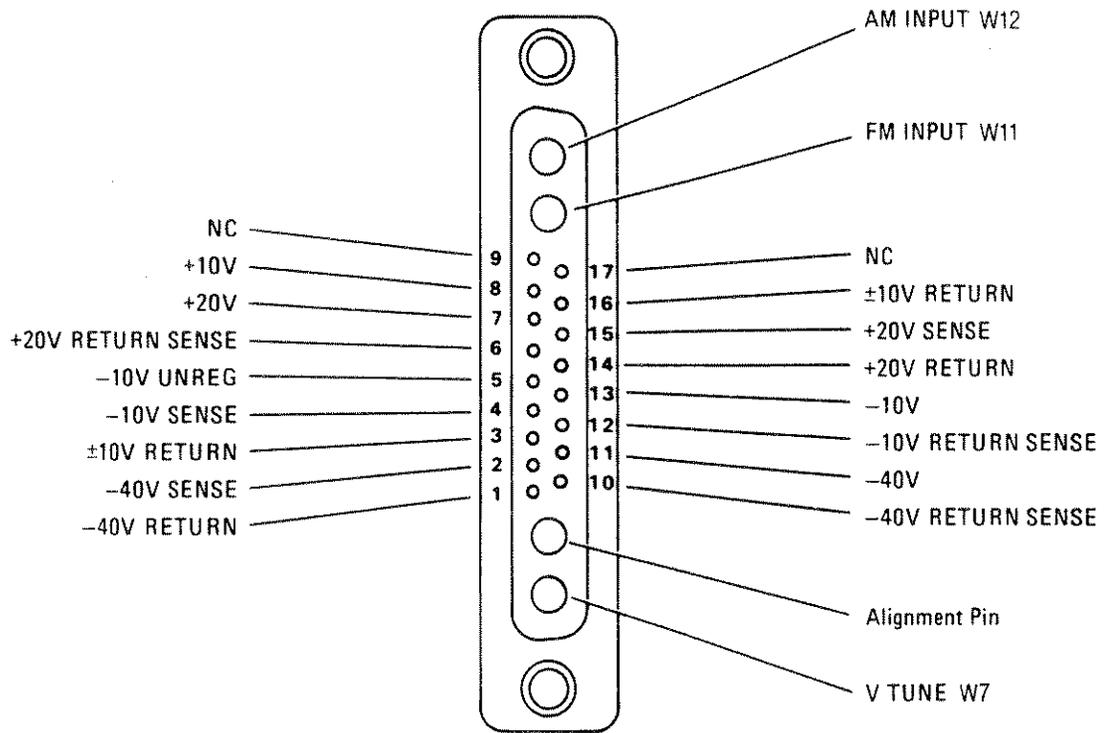


Figure 2-1. Interface Signals on Rear Panel Connector P1 (Front View)

PLUG-IN INTERFACE CONNECTOR P2

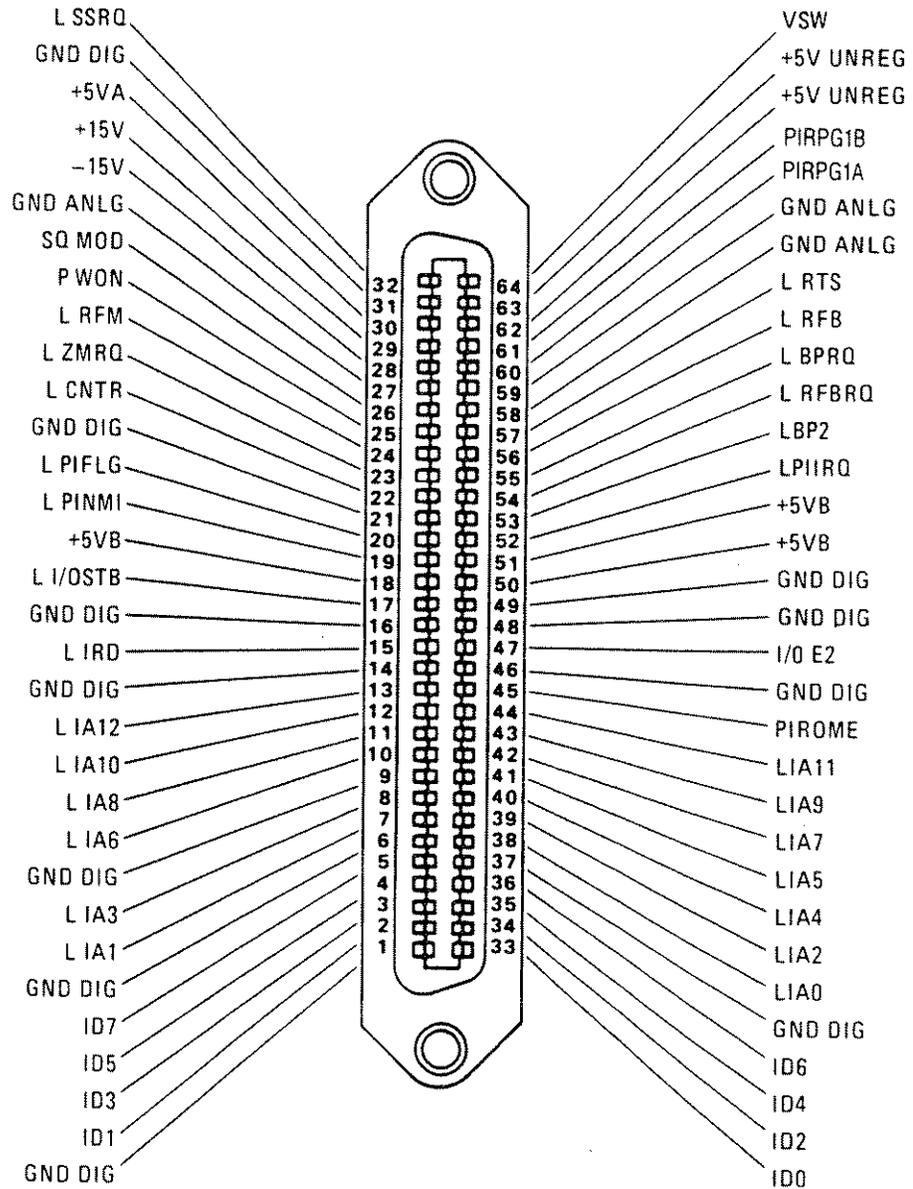
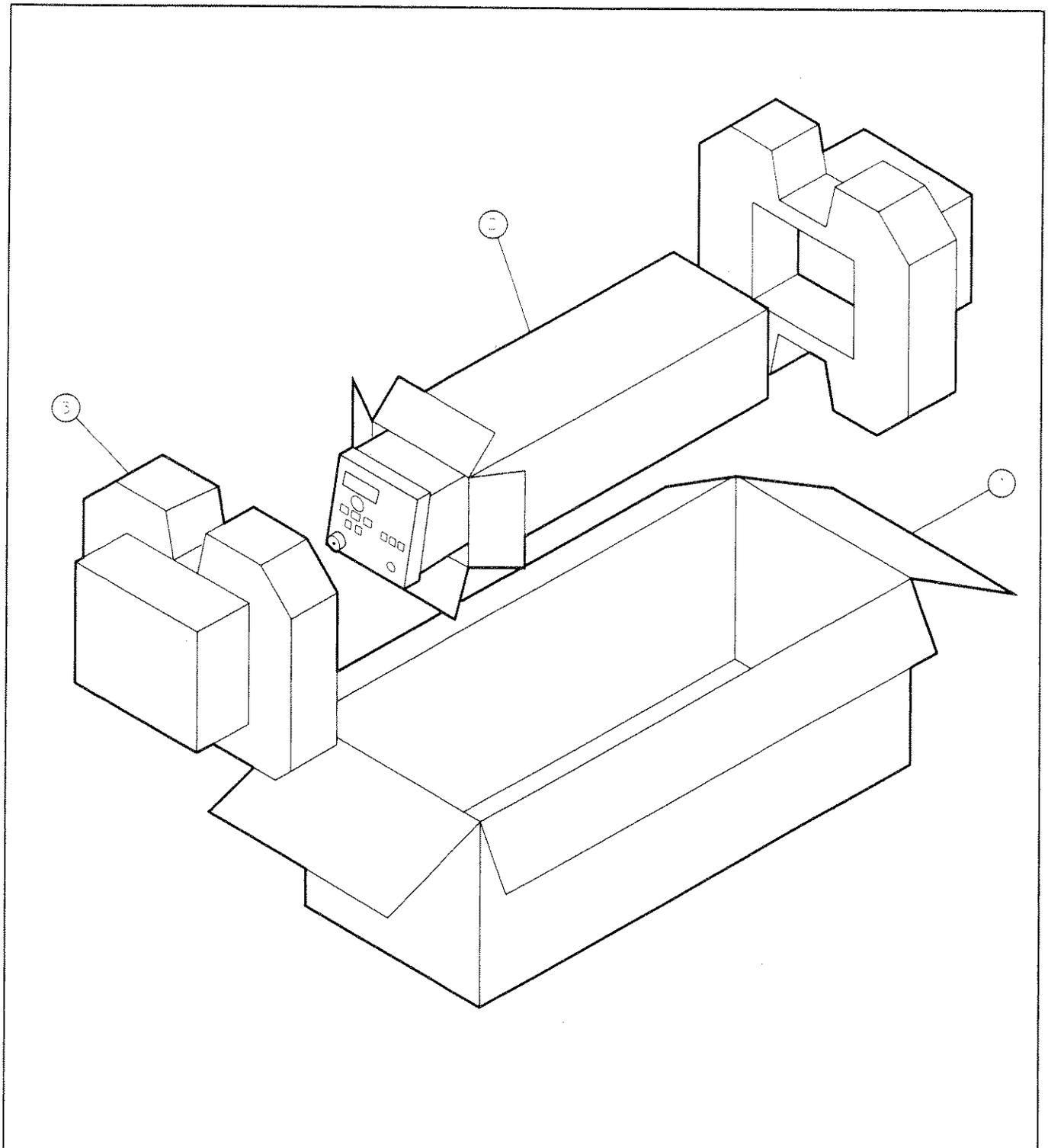


Figure 2-2. Interface Signals on Rear Panel Connector P2 (Front View)



| 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

Section 3. Operation

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.

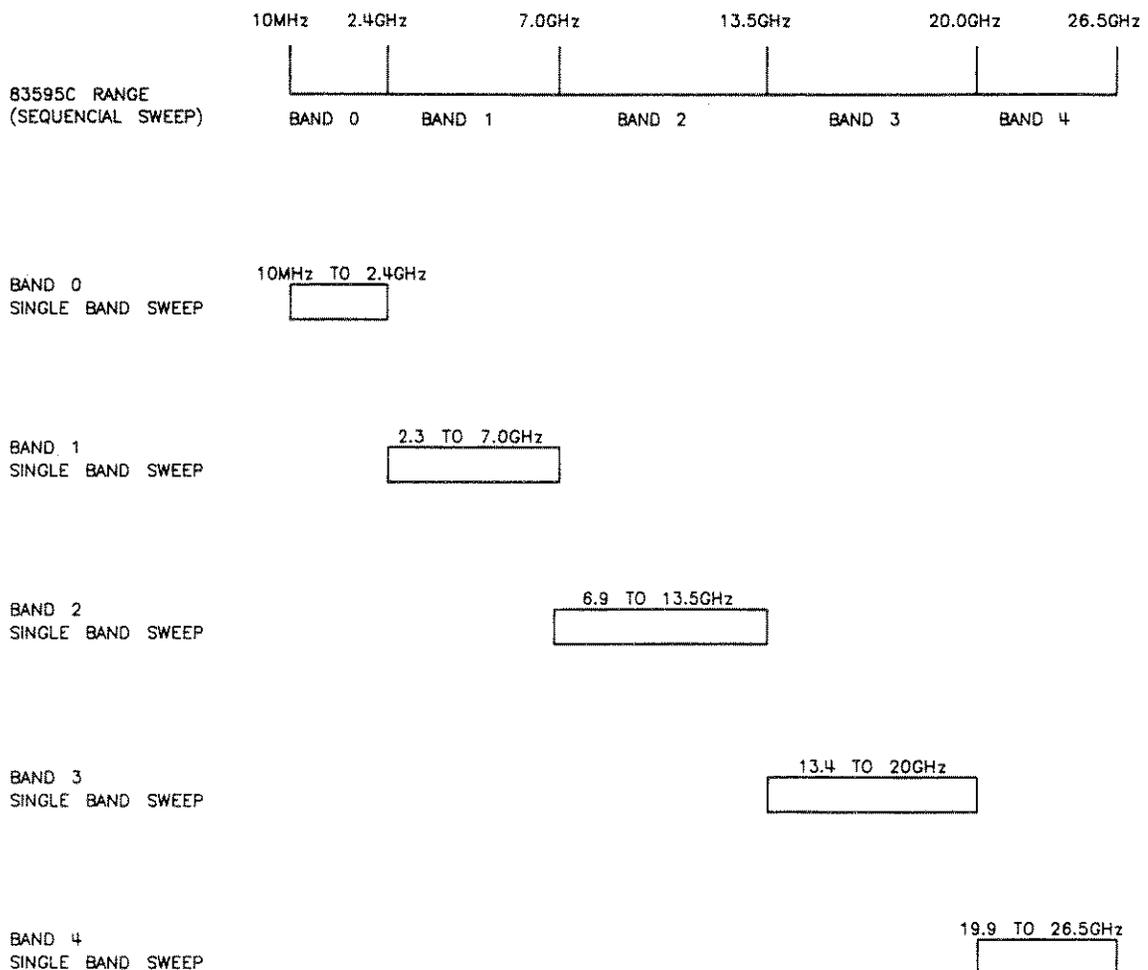


Figure 3-1. Bandswitching in Sequential and Single Band Sweep Modes

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.

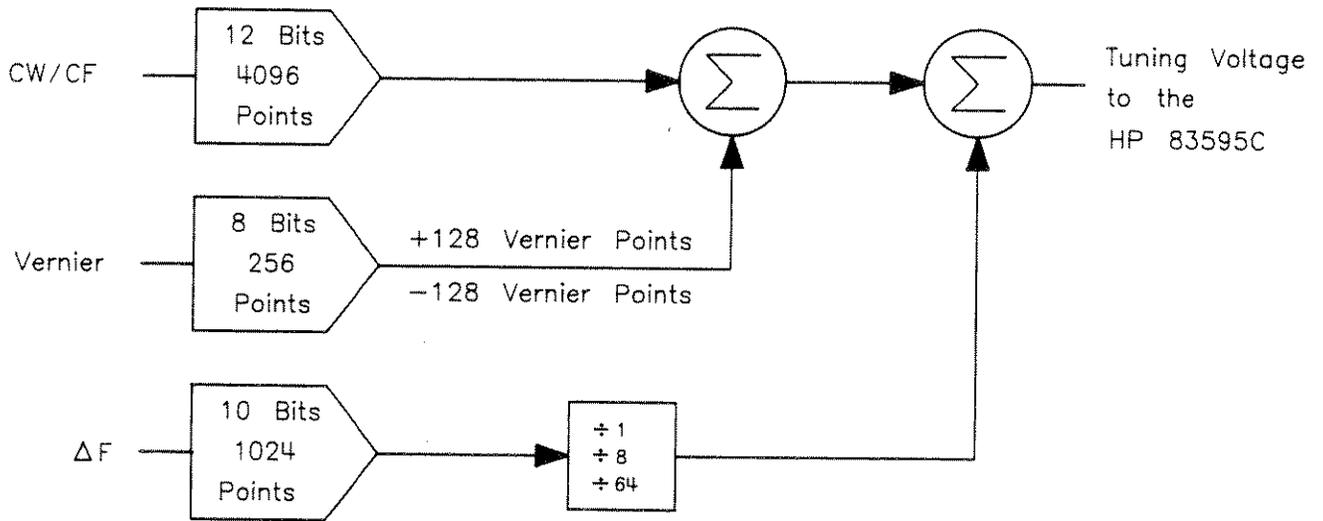


Figure 3-2. Simplified Tuning Voltage Block Diagram

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

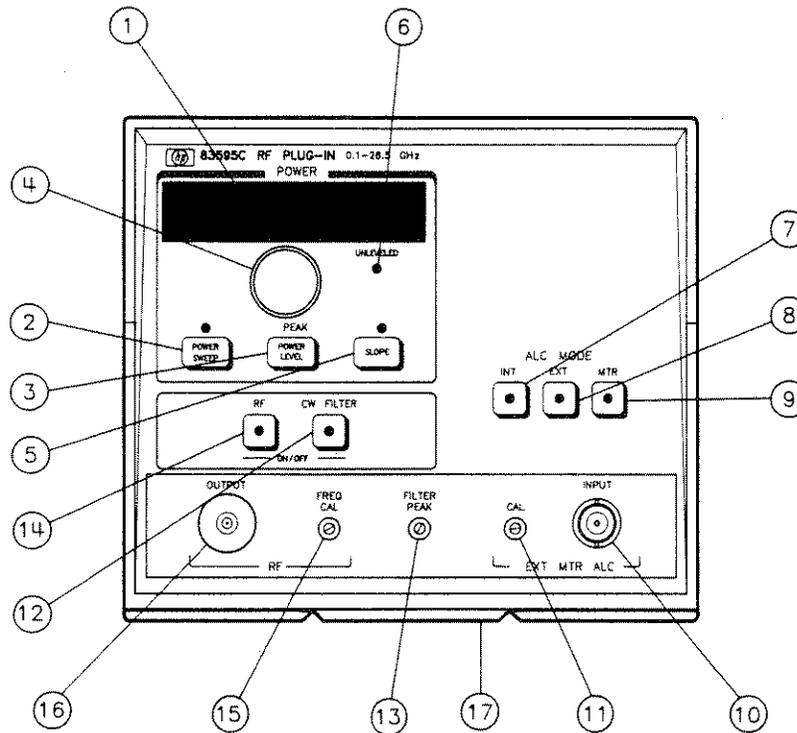


Figure 3-3. Standard Front Panel

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

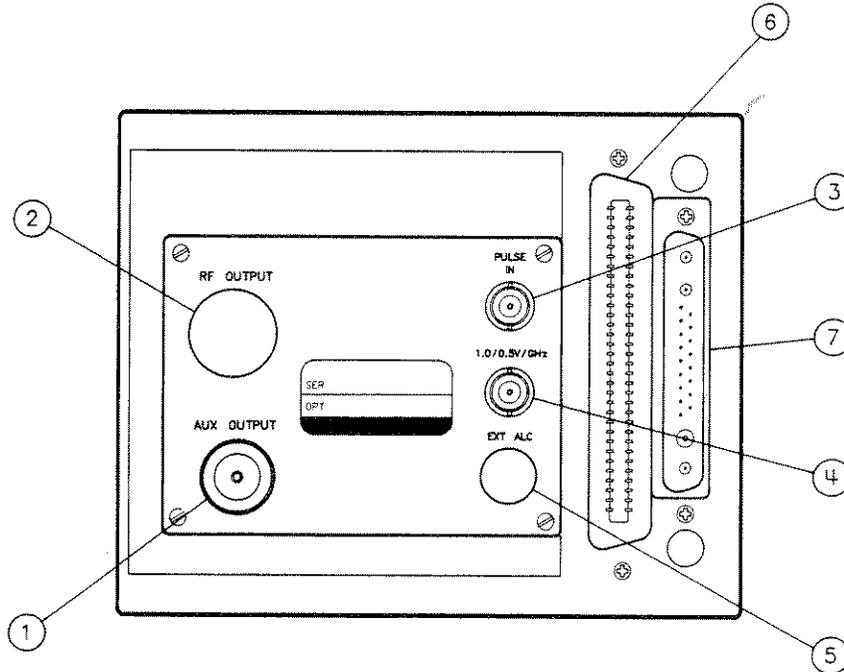


Figure 3-4. Rear Panel

- AUX OUTPUT.** Type-N, 50 Ω connector that provides a 2.3 to 7.0 GHz fundamental oscillator output at approximately 0 dBm.
- RF OUTPUT.** Replaces front panel RF output connector on Option 004 plug-ins.
- PULSE IN.** External pulse or square-wave modulation input (TTL levels).
- 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.
- EXT ALC.** Replaces front panel EXT ALC connector on Option 004 plug-ins.
- RF PLUG-IN INTERFACE CONNECTOR.** Connector through which the plug-in receives and sends digital and analog signals from and to the sweep oscillator.
- 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).

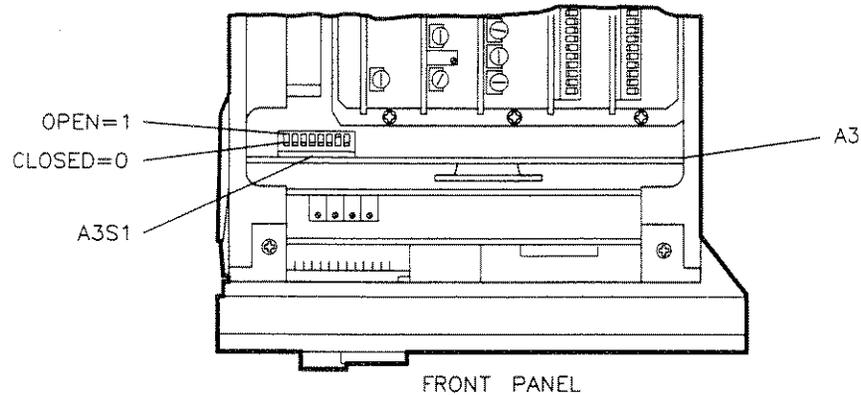


Figure 3-5. A3S1 Configuration Switch Location

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.

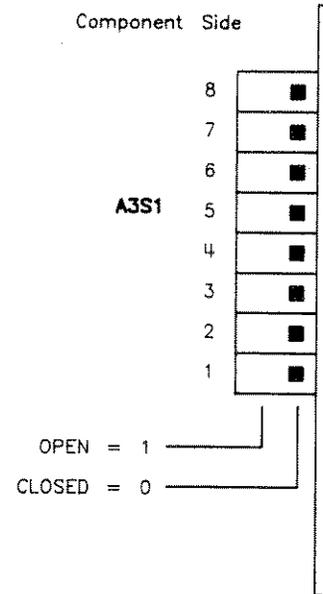
Table 3-3. AS31 Configuration Switch Settings

| 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.

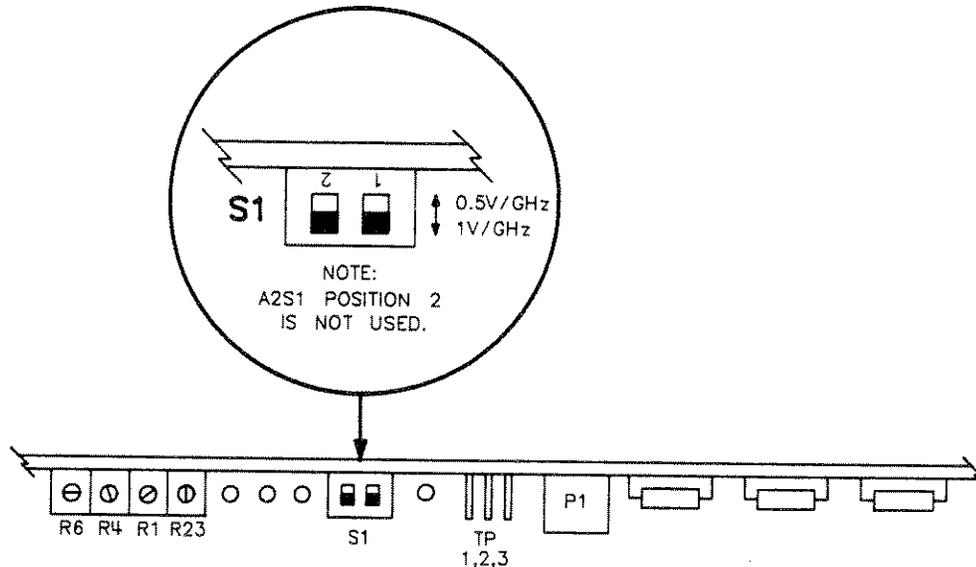


Figure 3-6. Frequency Reference Output Selection Switch, A2S1

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.

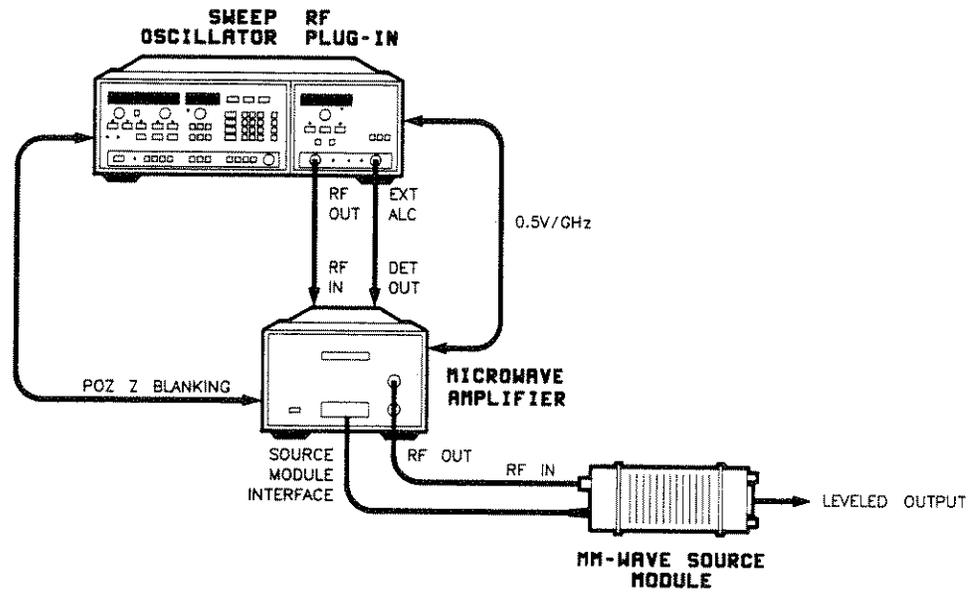


Figure 3-7. Typical Millimeter-wave Test Setup

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.

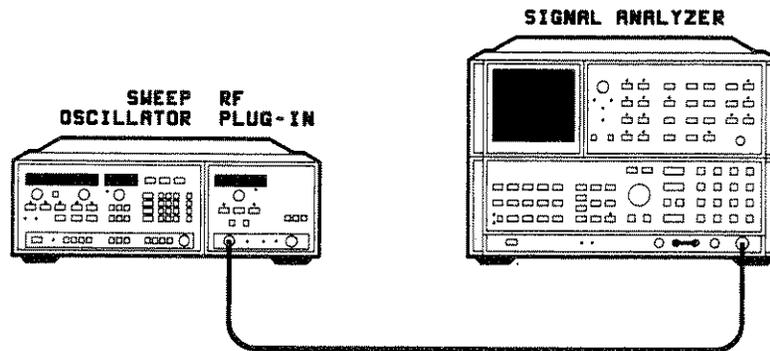


Figure 3-8. HP 83595C Front Panel Frequency Calibration Setup

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.

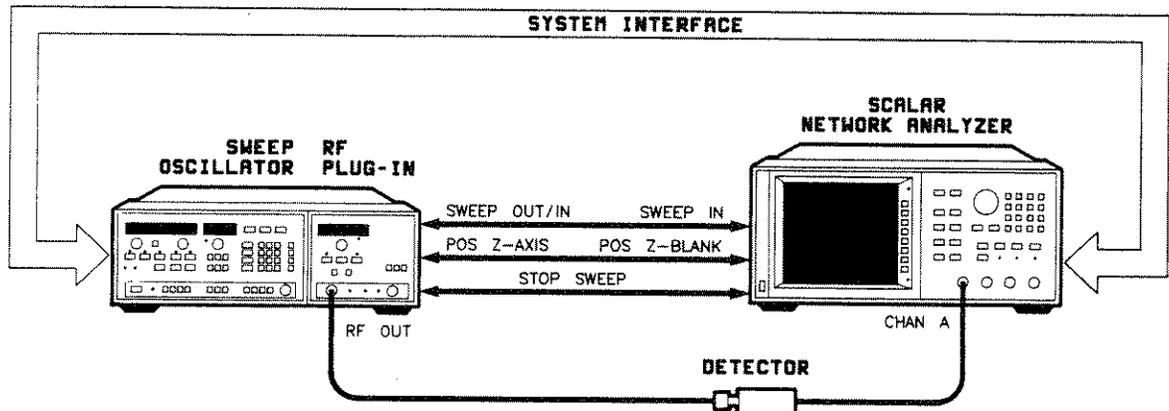


Figure 3-9. Peaking RF Output Power Setup

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.

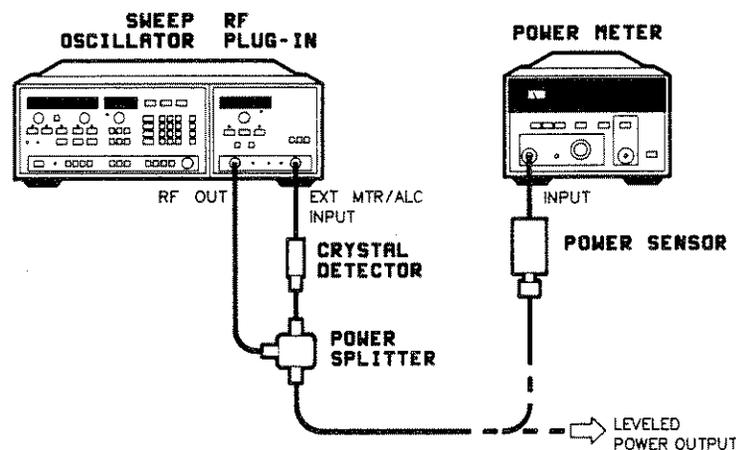


Figure 3-10. External Crystal Detector Leveling Setup

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.

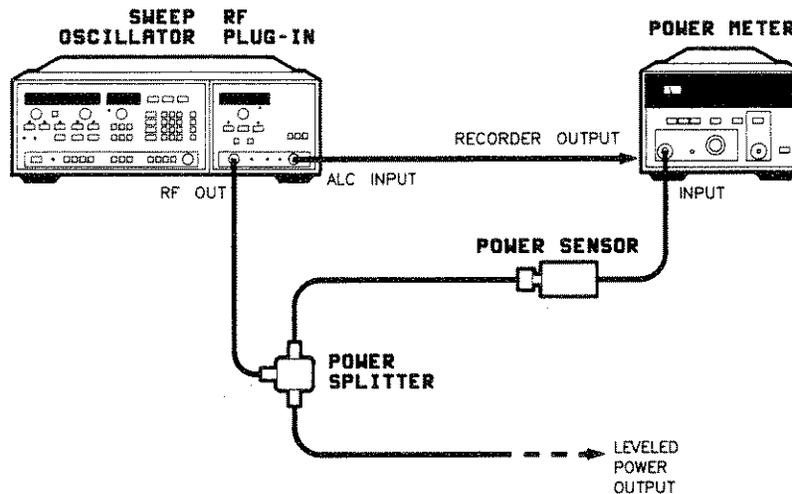


Figure 3-11. External Power Meter Leveling Set Up

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.

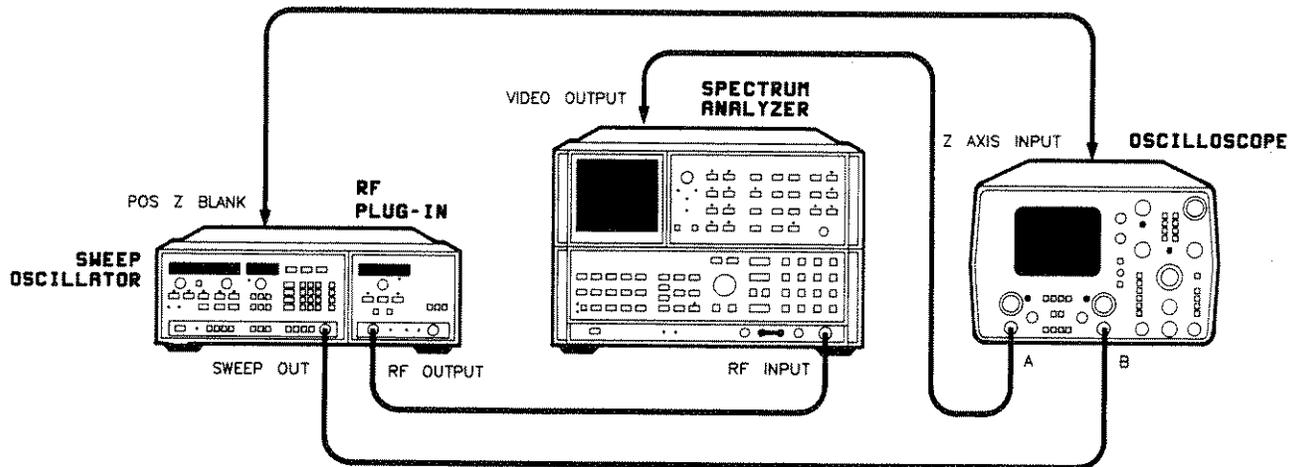


Figure 4-1. Frequency Range and Accuracy Tests Setup

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.

- Increase the analyzer center frequency until no signal is visible on the oscilloscope.
- Slowly decrease the analyzer center frequency until the signal on the oscilloscope just peaks.
- 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:

- [INSTR PRESET]
- [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 |

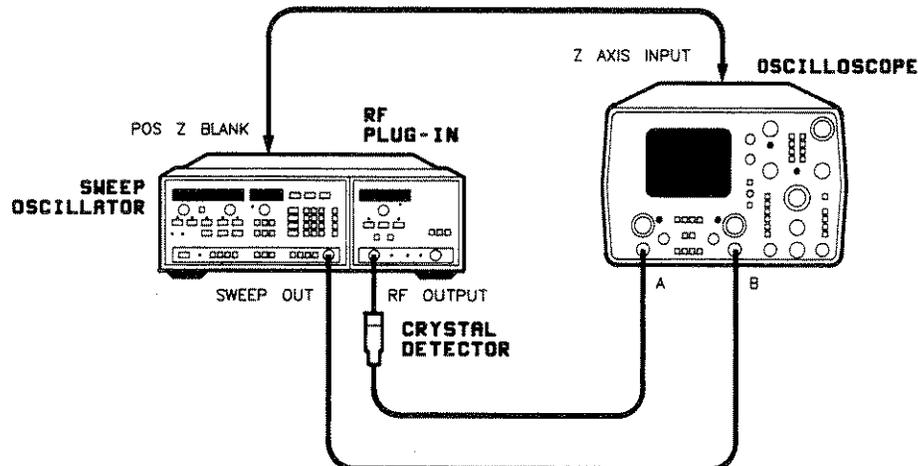


Figure 4-2. Swept Power Measurement Test Setup

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.

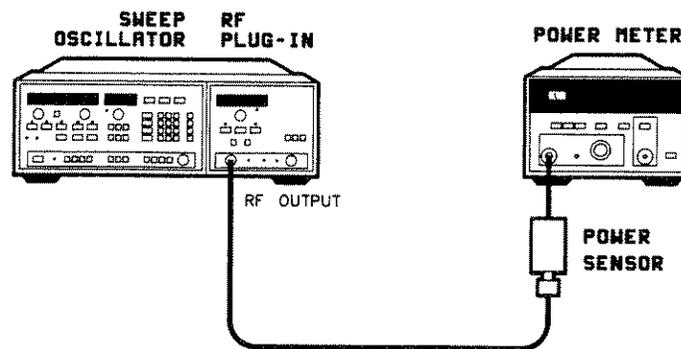


Figure 4-3. Maximum Leveled Output Power, Output Power Variations, and Power Level Accuracy Test Setup

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.

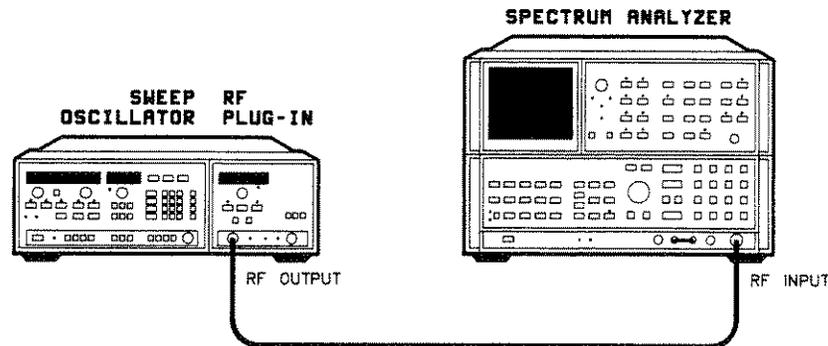


Figure 4-4. Frequency Stability Test Setup

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)

4. 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 |

5. On the spectrum analyzer, press:

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

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

[▼]

7. On the spectrum analyzer, press [PEAK SEARCH]. Record the absolute frequency change (MARKER Δ) on the test record. Then press [OFF].

8. 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.

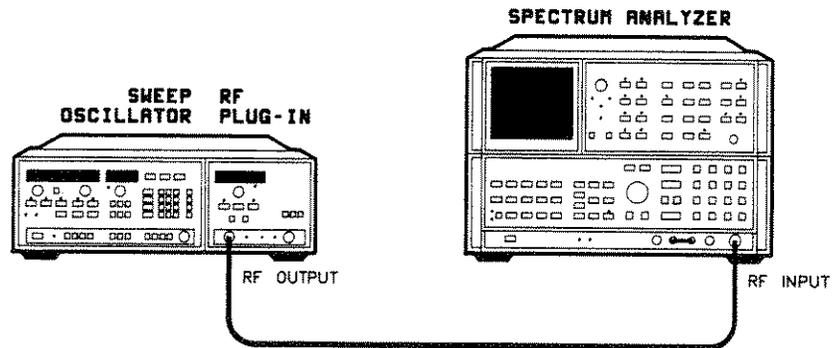


Figure 4-5. Residual FM Test Setup

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.

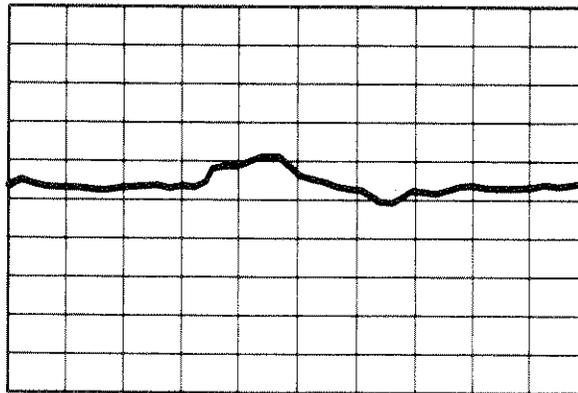


Figure 4-6. Residual FM Signal as Displayed on the Spectrum Analyzer

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.

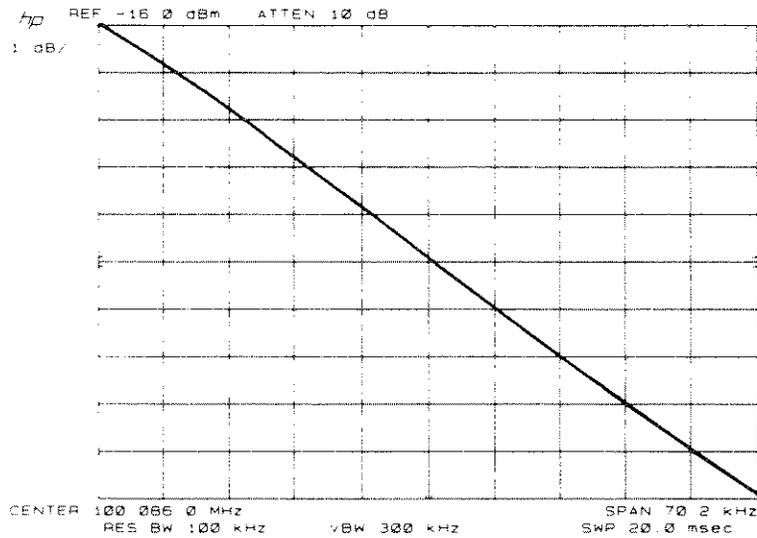


Figure 4-7. Determining Spectrum Analyzer FM Sensitivity

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.

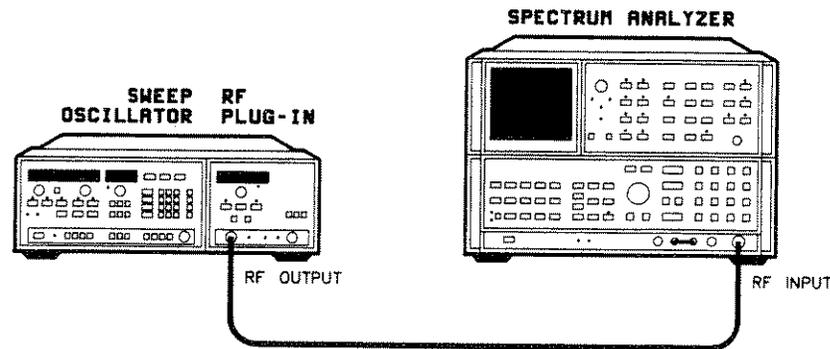


Figure 4-8. Spurious Signal Test Setup

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.

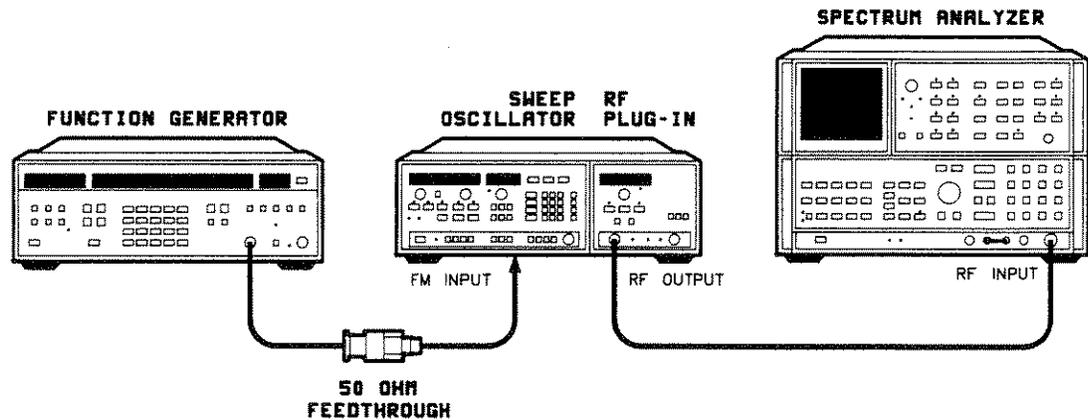


Figure 4-9. External Frequency Modulation Test Setup

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.

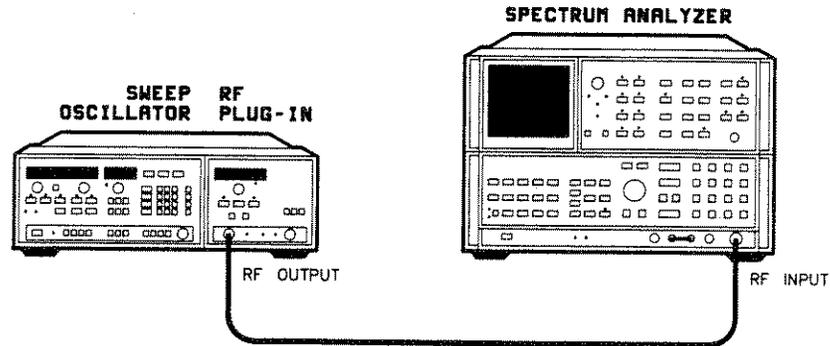


Figure 4-10. Square-Wave On/Off Ratio and Symmetry Test Setup

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.

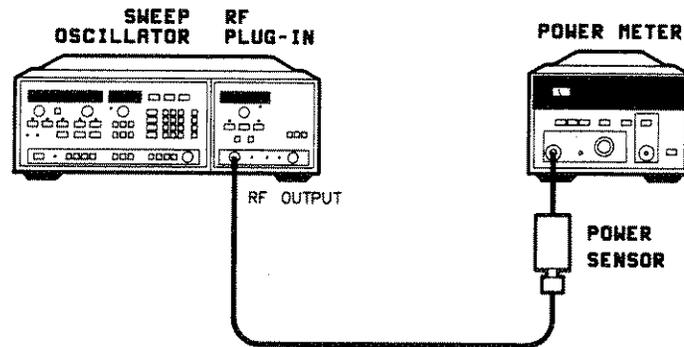


Figure 4-11. Step Attenuator Accuracy Test Setup

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* _____ | | Temperature* _____ | | | |
| (*optional) | | | | | |
| 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 | | | | | |
| 0.01 to 2.4 GHz | 21. | +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 Levelled 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 levelled 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 Fundamental Frequency = 15 GHz Fundamental Frequency = 22 GHz | 12. | Spur Frequency = 5 GHz Harmonic Non-Harmonic Spur Frequency = 20 GHz Harmonic Non-Harmonic | < -50 dBc _____ < -50 dBc _____ < -50 dBc _____ < -50 dBc _____ | _____ _____ _____ _____ _____ _____ | _____ _____ _____ _____ _____ _____ | |
| | 12. | Spur Frequency = 5 GHz Harmonic Non-Harmonic Spur Frequency = 10 GHz Harmonic Non-Harmonic | < -50 dBc _____ < -50 dBc _____ < -50 dBc _____ < -50 dBc _____ | _____ _____ _____ _____ _____ _____ | _____ _____ _____ _____ _____ _____ | |
| | 12. | Spur Frequency = 5.5 GHz Harmonic Non-Harmonic | < -50 dBc _____ < -50 dBc _____ | _____ _____ _____ _____ _____ _____ | _____ _____ _____ _____ _____ _____ | |
| | 4-6. EXTERNAL FREQUENCY MODULATION TEST Direct Coupled Cross-over Coupled | 6. | 100 Hz CW = 5 GHz | ± 12 MHz | _____ | _____ |
| | | 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 | _____ | _____ |
| 18. | | CW = 22 GHz 1 MHz | ± 7 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 Verificaton 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

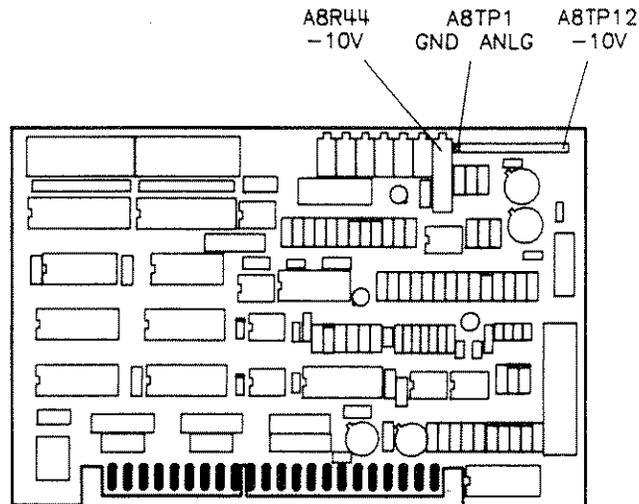


Figure 5-1. -10V Reference Adjustment Location

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 |

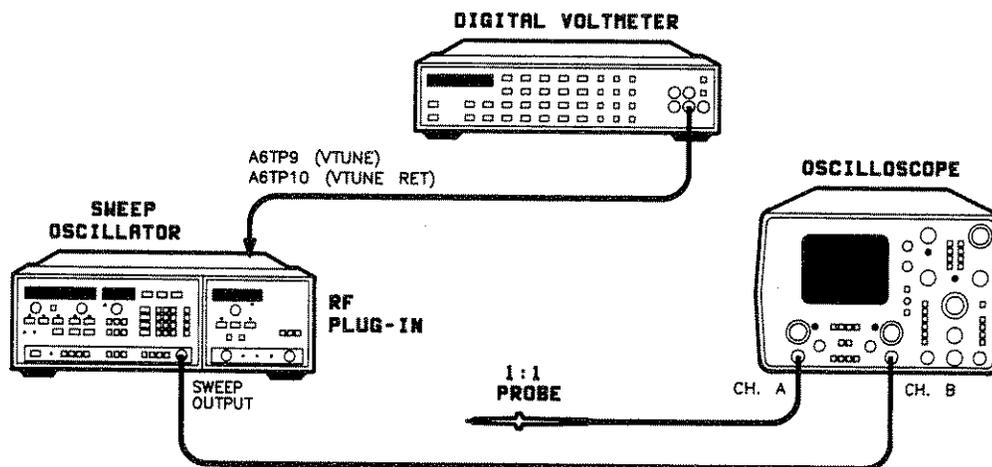


Figure 5-2. Sweep Control Adjustments Test Setup

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)

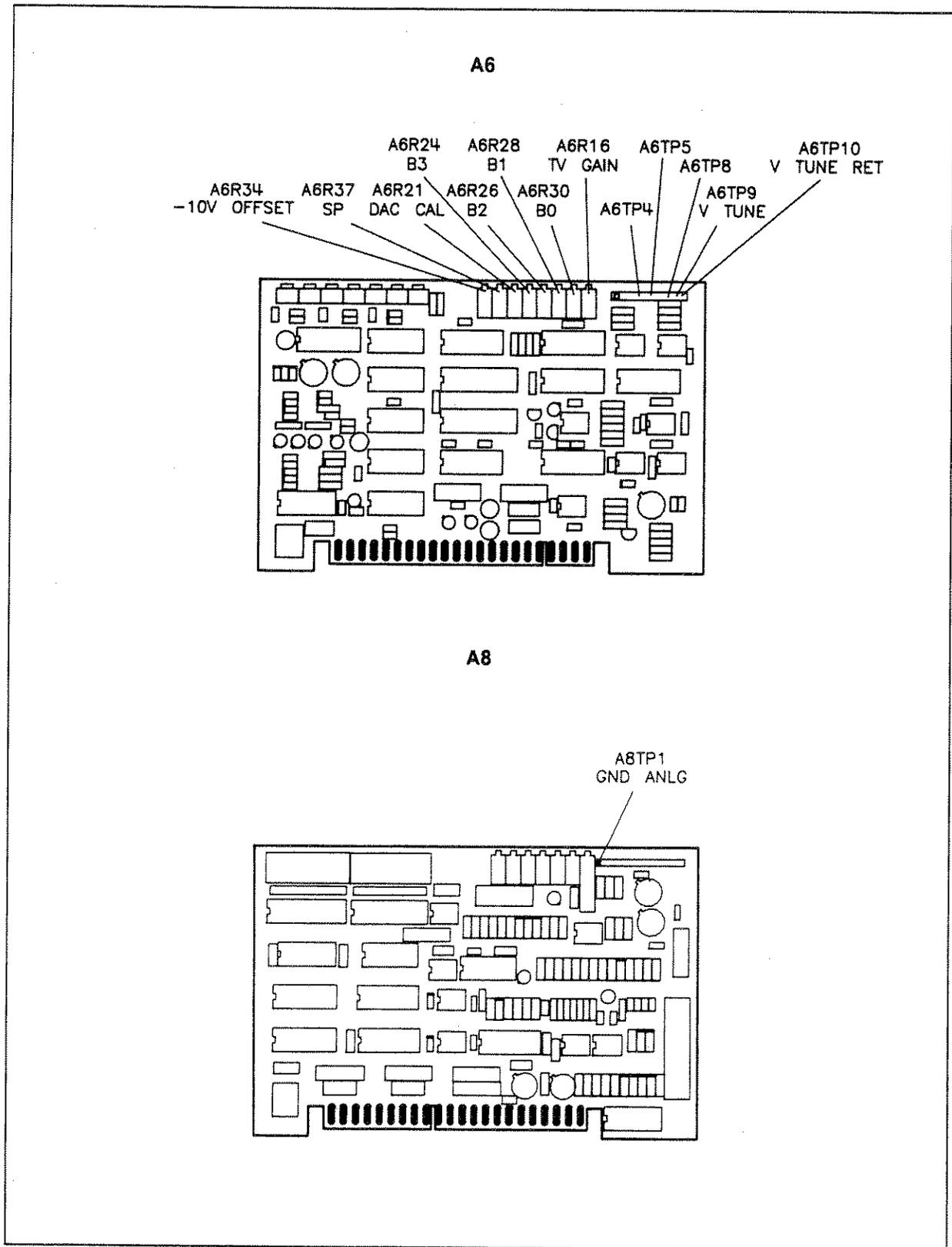


Figure 5-3. Sweep Control Adjustment Locations

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)

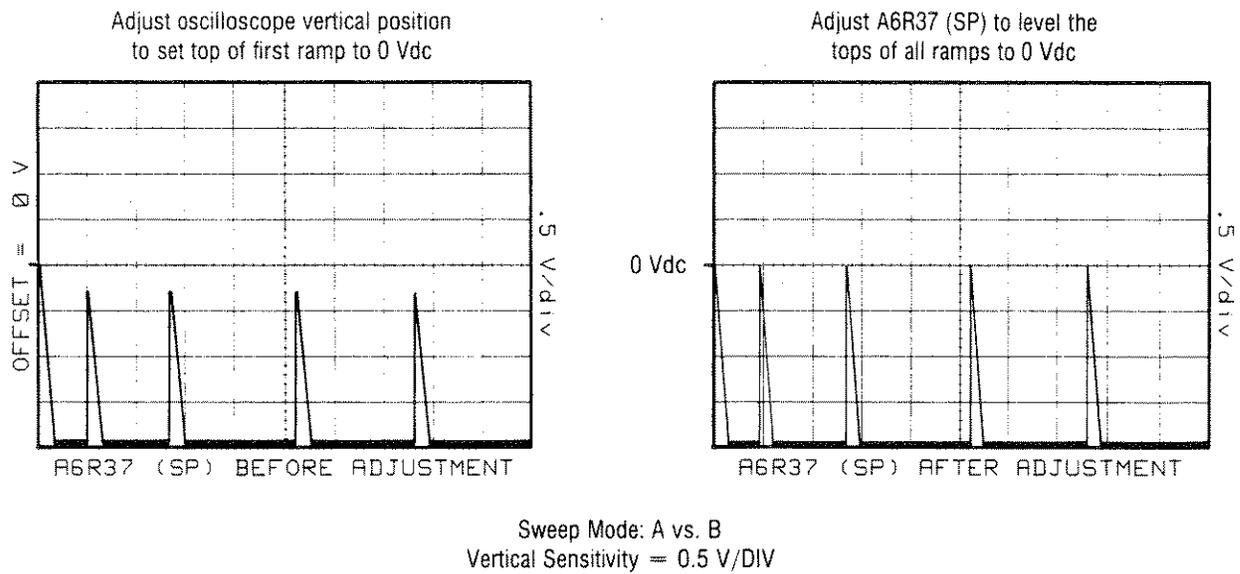


Figure 5-4. Sweep Control Adjustment Waveforms

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.

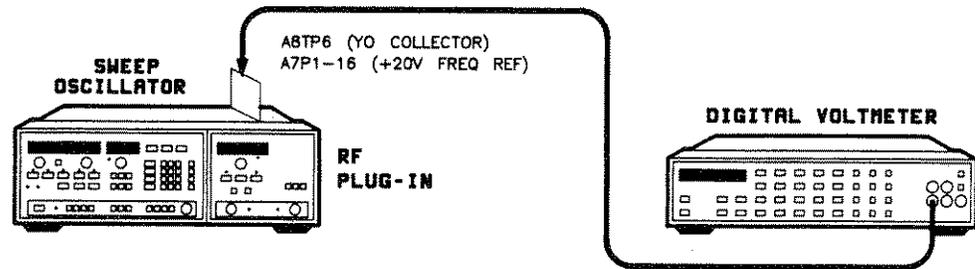


Figure 5-5. YO and YTM/YTF DAC Calibration Test Setup

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)

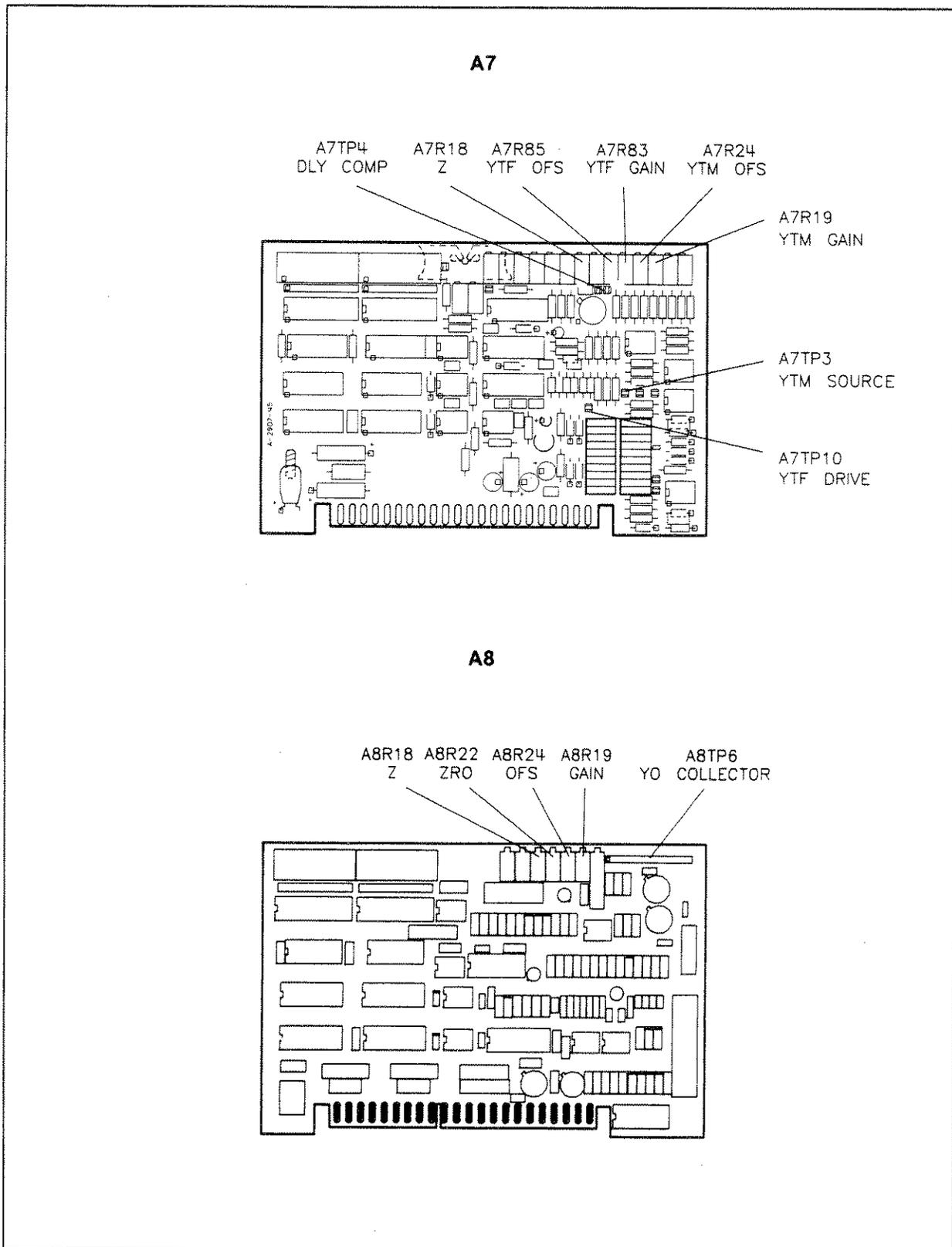


Figure 5-6. YO and YTM/YTF DAC Calibration Adjustment Locations

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

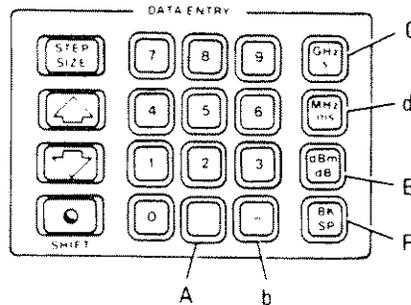


Figure 5-7. Front Panel Hexadecimal Entry Keys

- 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 |

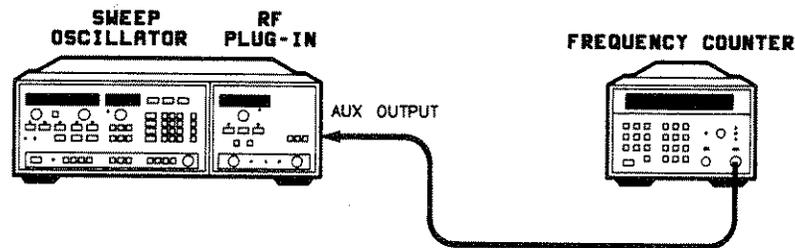


Figure 5-8. Preliminary Frequency Accuracy Test Setup

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.

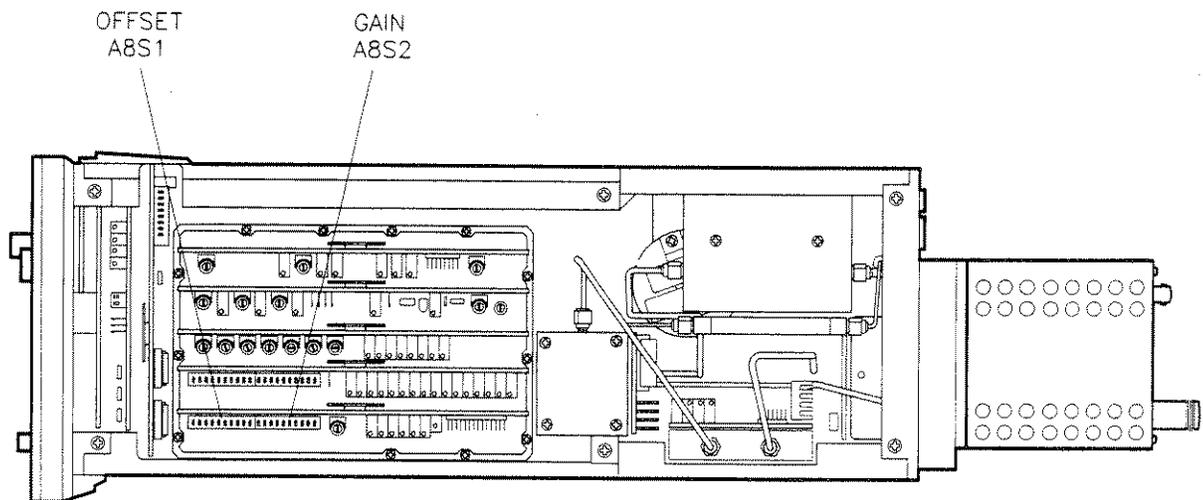


Figure 5-9. Frequency Calibration Adjustment Location

5-4. Frequency Accuracy (Cont'd)

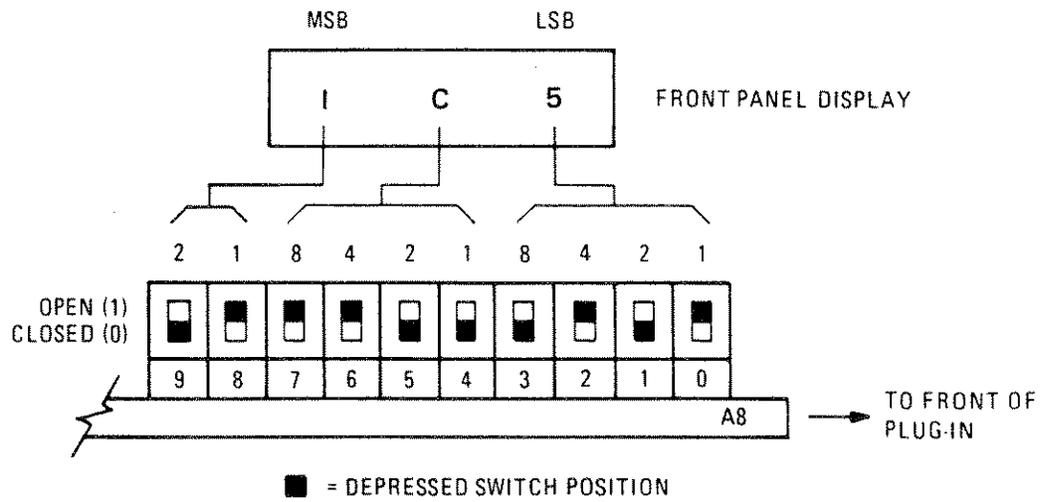


Figure 5-10. A8S1 and A8S2 Frequency Calibration Switch Configuration

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 |

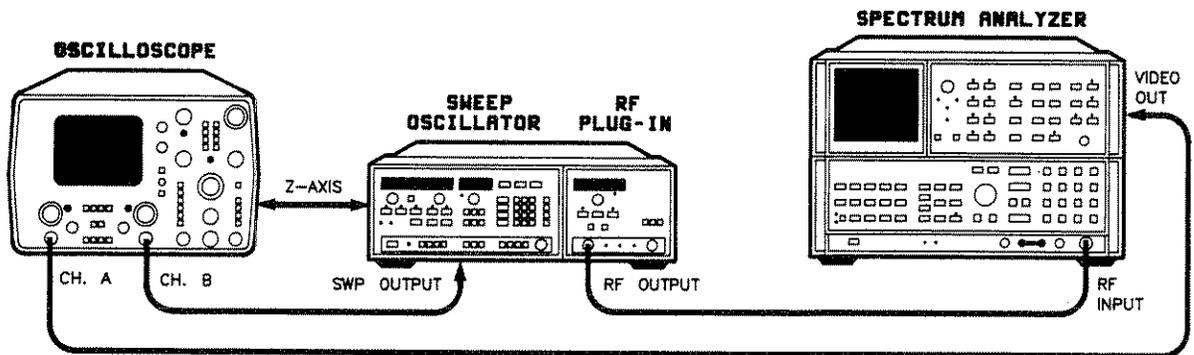


Figure 5-11. Band Overlap Adjustment Test Setup

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)

- 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.
- 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.

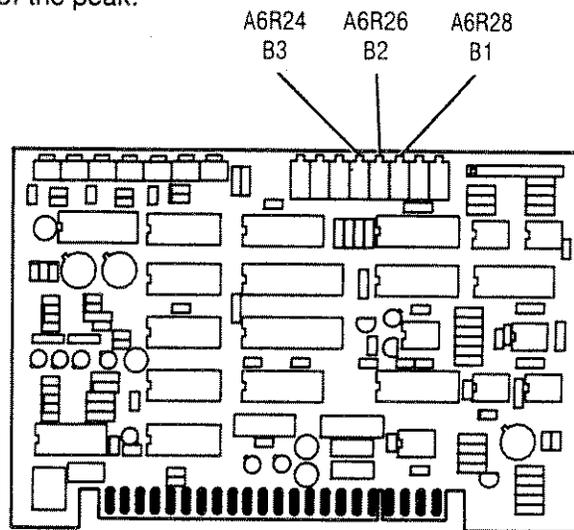


Figure 5-12. Band Overlap Adjustment Locations

- 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.

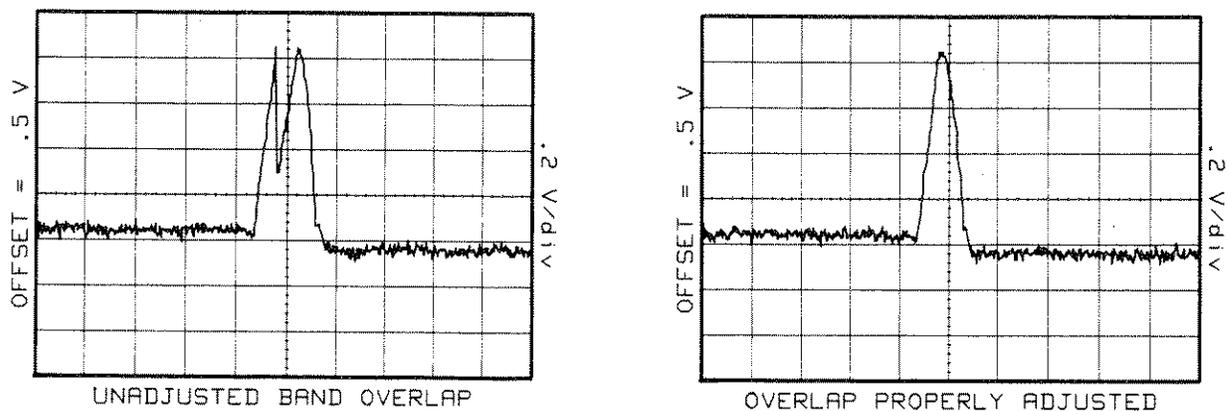


Figure 5-13. Band Overlap Adjustment Waveform

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 |

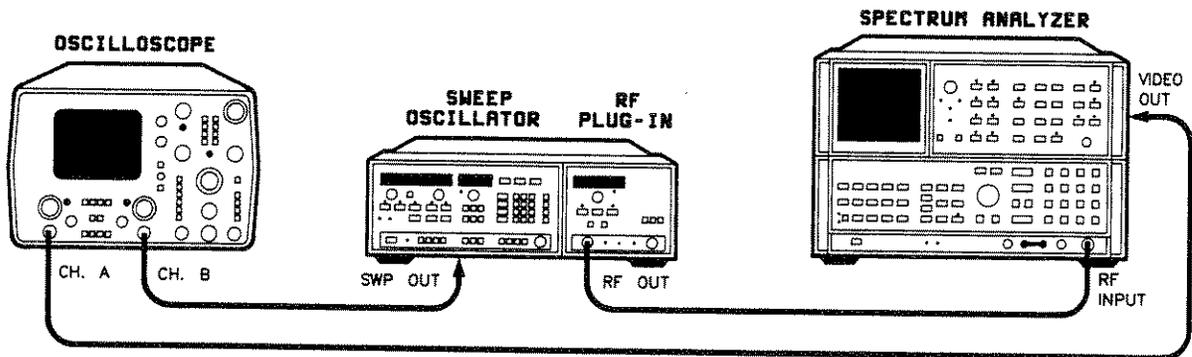


Figure 5-14. YO Retrace Compensation Test Setup

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)

- 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

- Adjust the vertical position of channel A on the oscilloscope to bring the trace to center screen.
- Adjust the spectrum analyzer center frequency to 7.0 GHz with zero frequency span.
- 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.

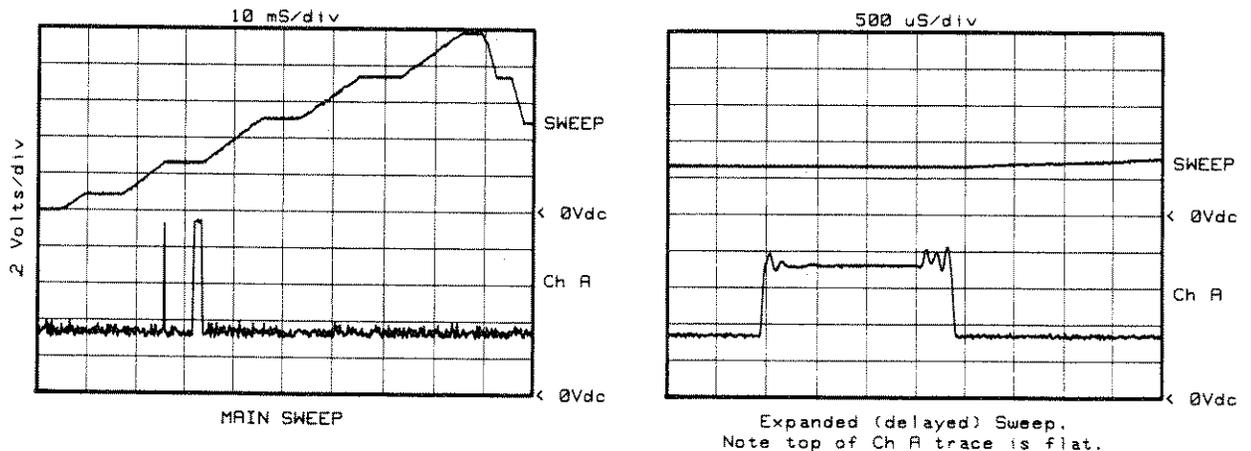


Figure 5-15. YO Retrace Compensation Pulse

- Set the oscilloscope for delayed sweep. Adjust the delayed sweep to set the frequency peak near center screen.
- 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)

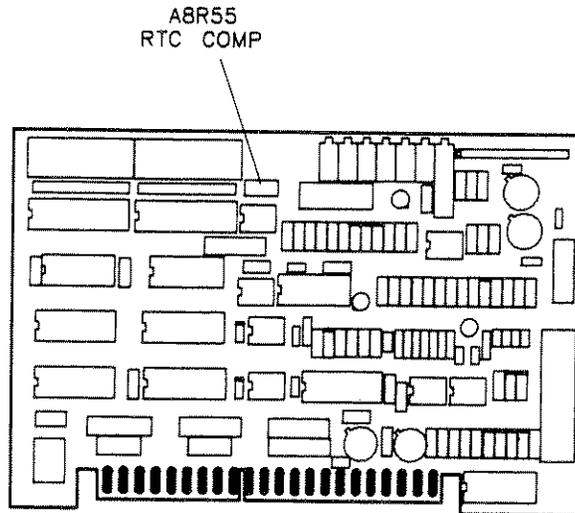


Figure 5-16. YO Retrace Compensation Adjustment Location

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 |

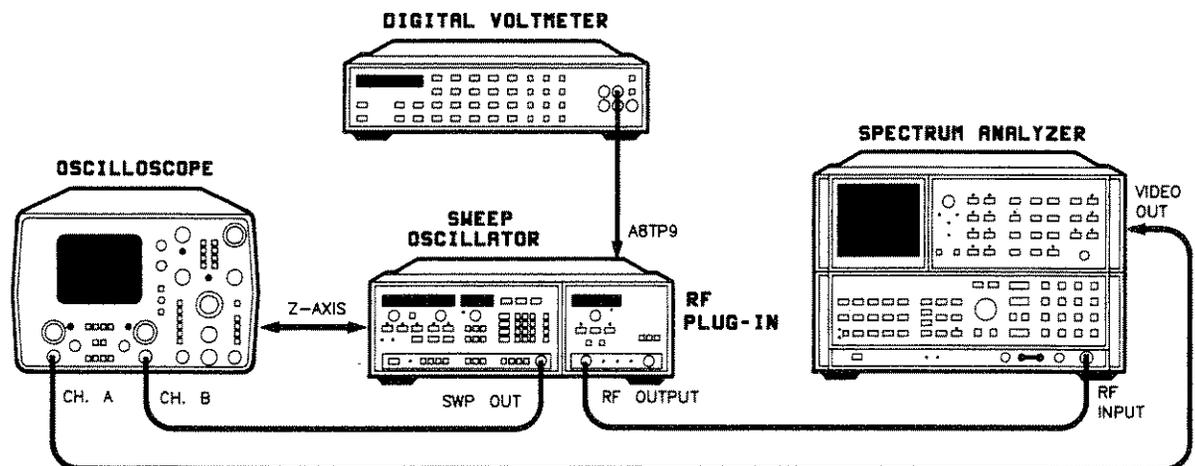


Figure 5-17. YO Delay Compensation Test Setup

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.

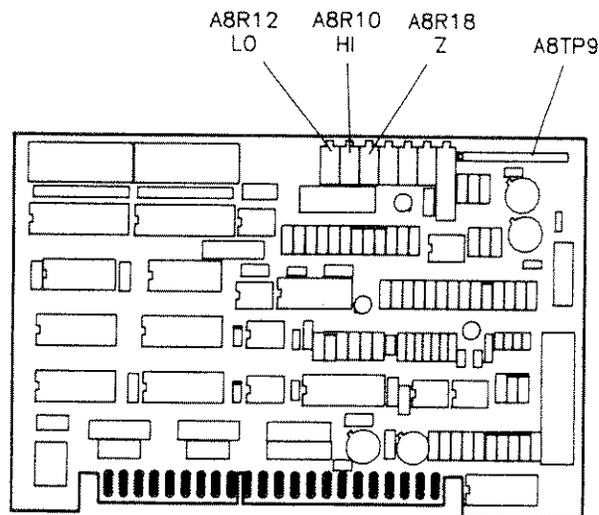


Figure 5-18. YO Delay Compensation Adjustment Locations

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.

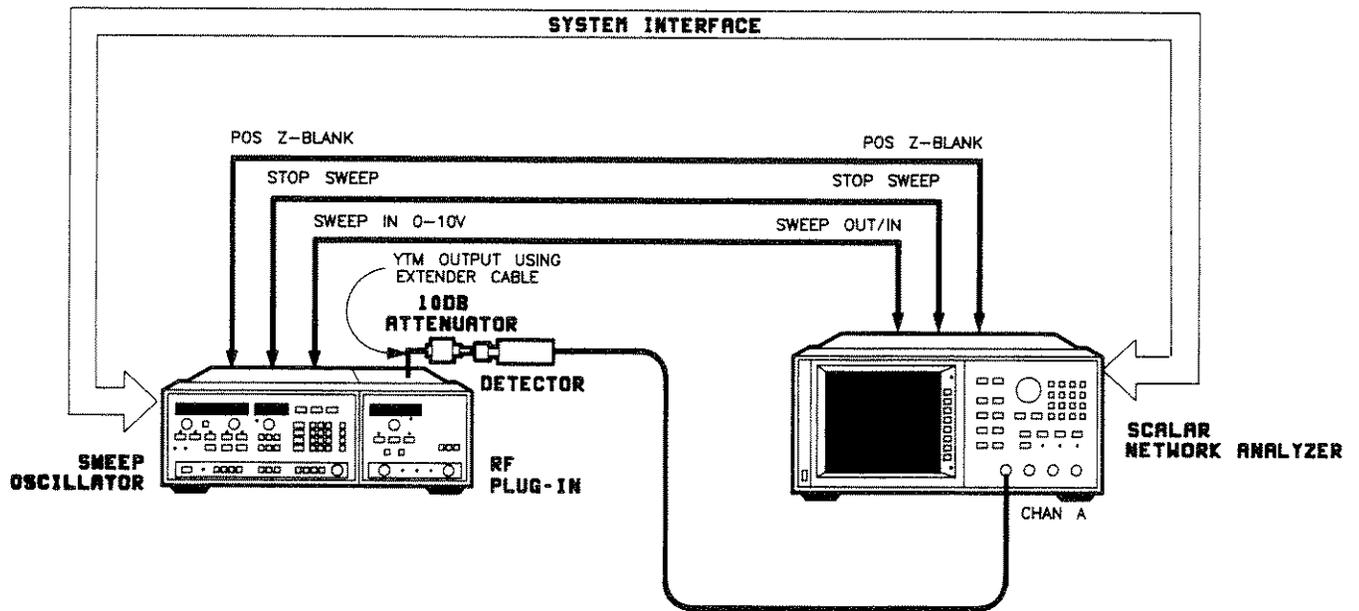


Figure 5-19. Slow Speed YTM to YO Tracking Test Setup

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)

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

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

- 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.

- 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.

- 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.

- 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.

- 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.

- 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.

- 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).

- 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)

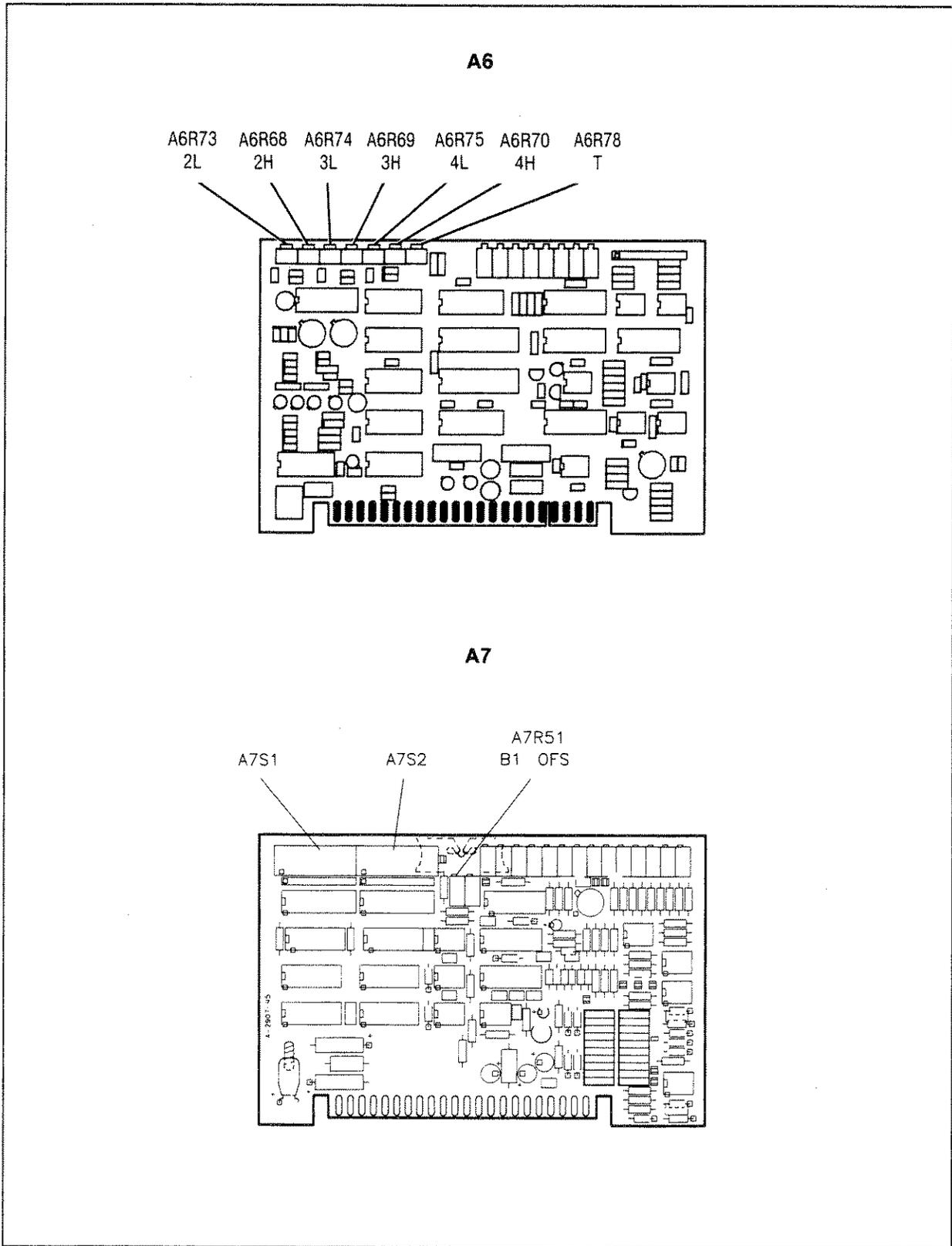


Figure 5-20. Slow Speed YTM to YO Tracking Adjustment Locations

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

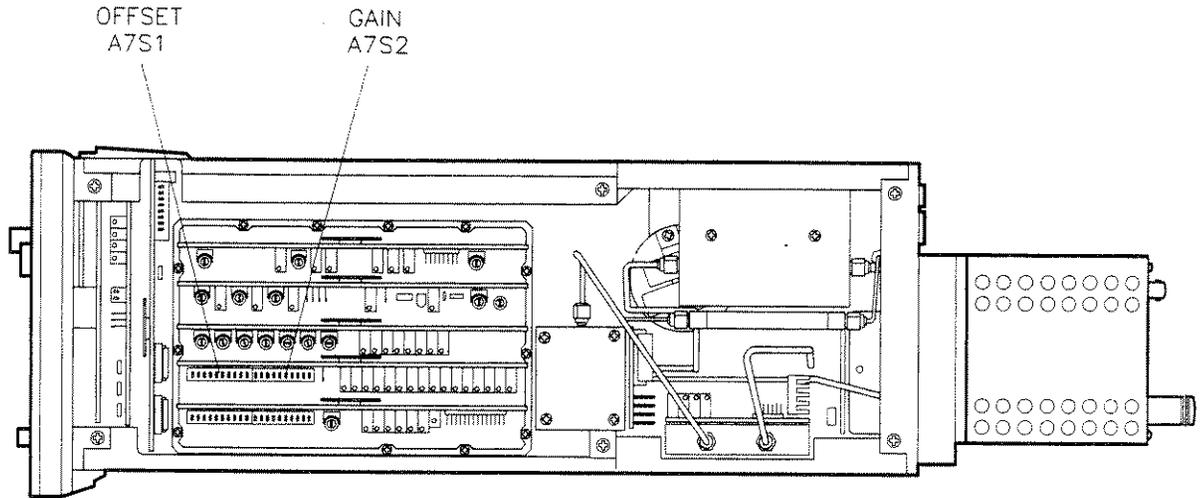


Figure 5-21. YTM to YO Tracking Calibration Switch Locations

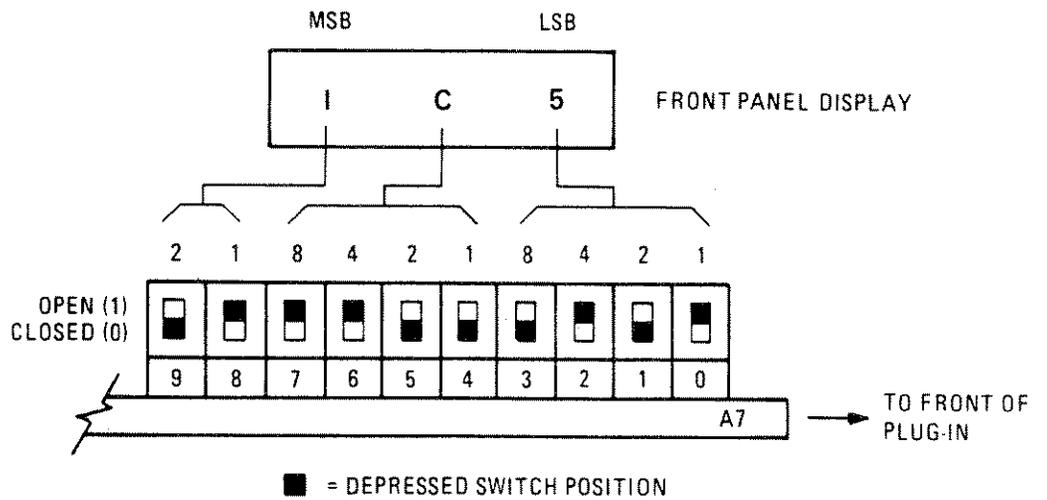


Figure 5-22. YTM to YO Tracking Calibration Switch Configuration

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 |

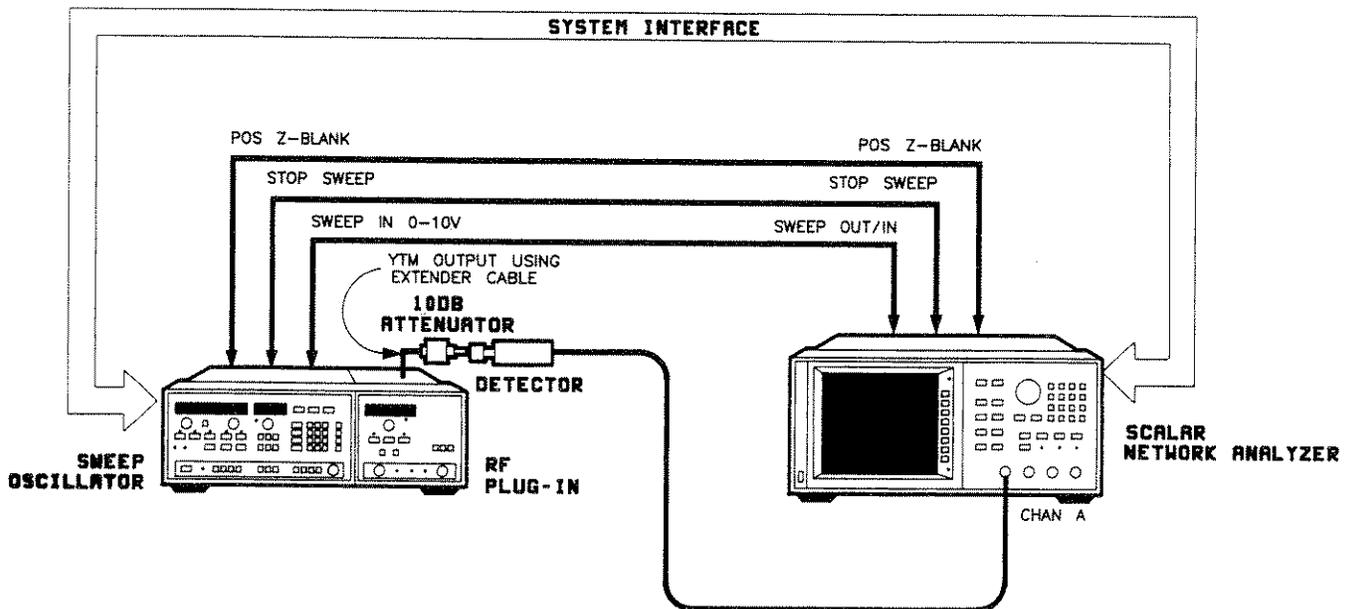


Figure 5-23. High Power SRD Bias Adjustment Test Setup

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.

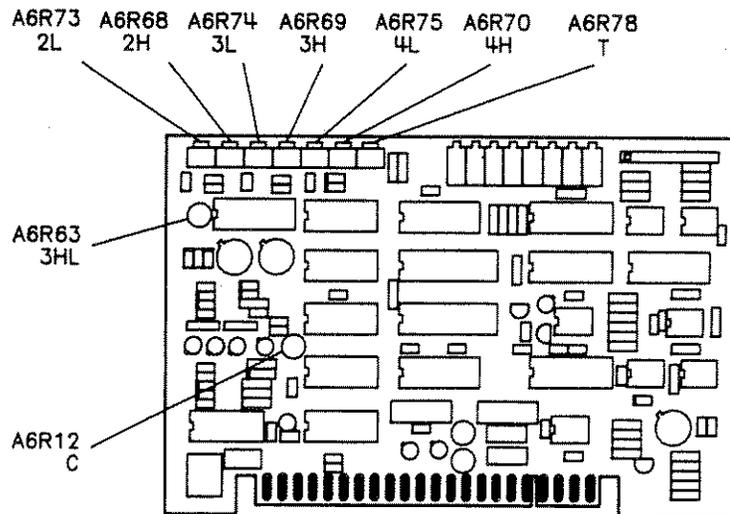


Figure 5-24. SRD Bias Adjustment Locations

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

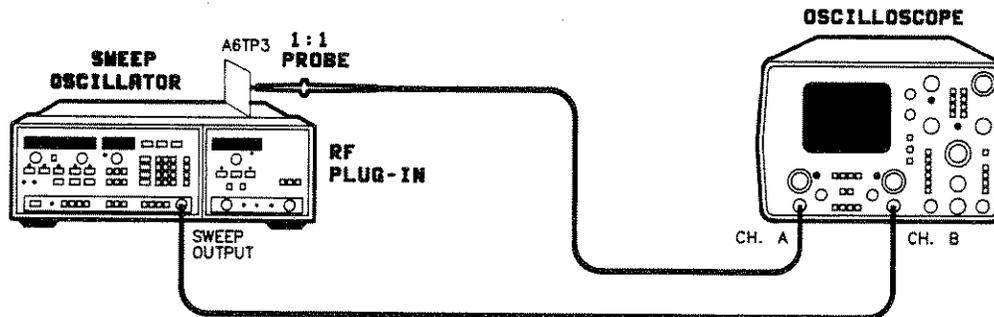


Figure 5-25. Low and Mid-Power SRD Bias Adjustment Test Setup

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)

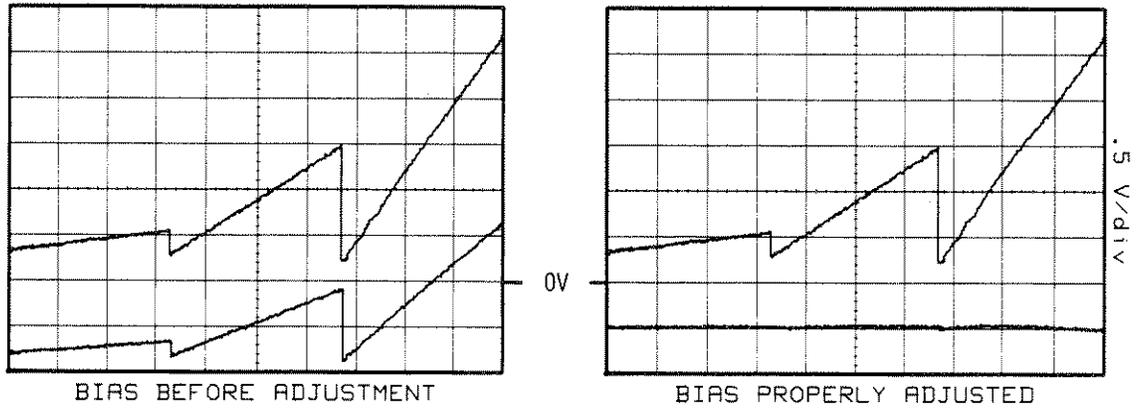


Figure 5-26. Low and Mid-Power Bias Adjustment

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 |

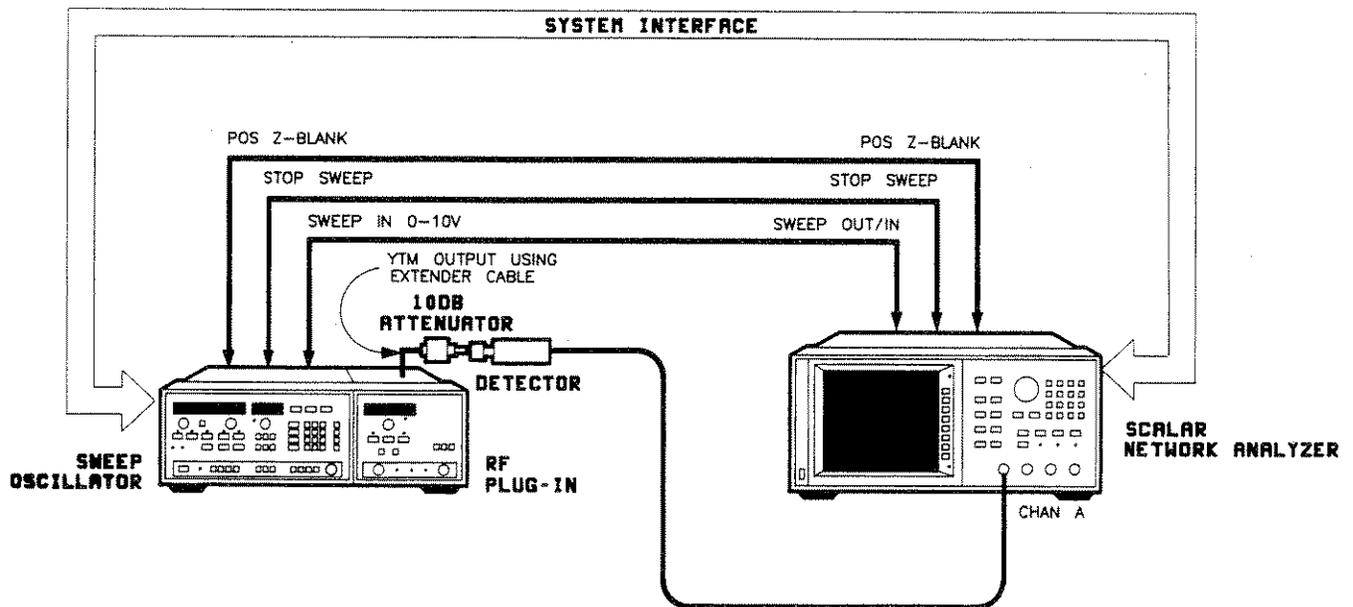


Figure 5-27. YTM Delay Compensation Test Setup

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.

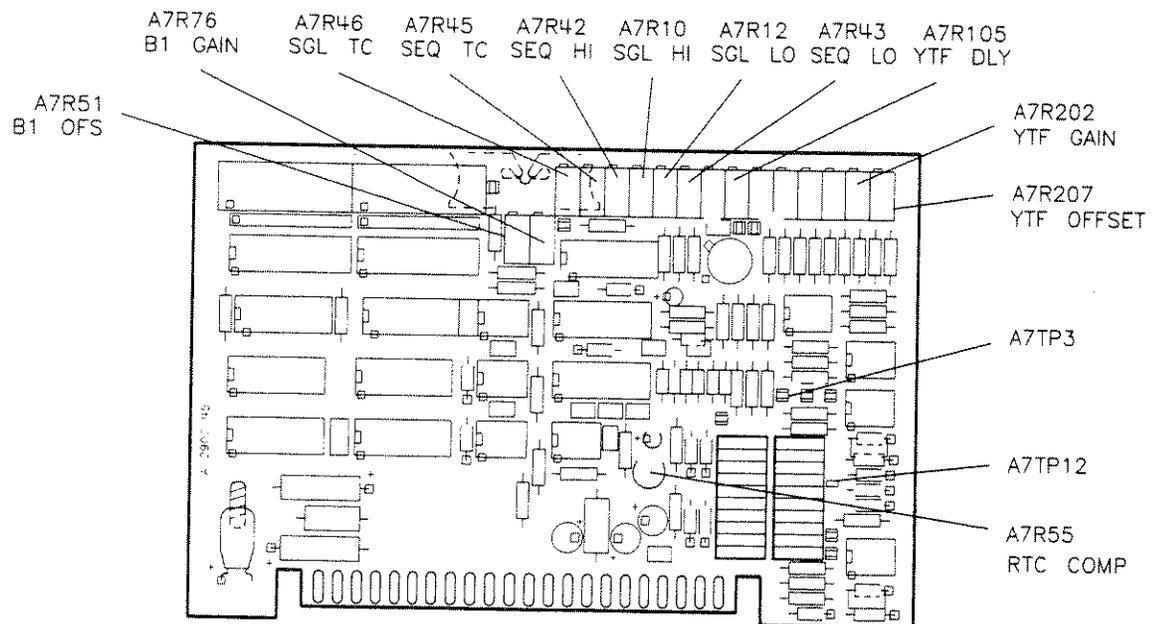


Figure 5-28. YTM Delay Compensation Adjustment and Test Point Locations

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 |

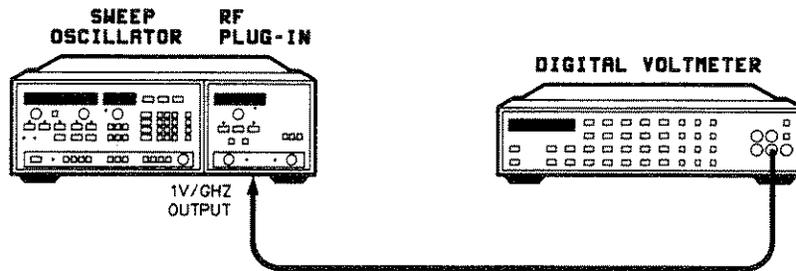


Figure 5-29. Frequency Reference 1V/GHz Output Test Setup

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)

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

Band 0

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

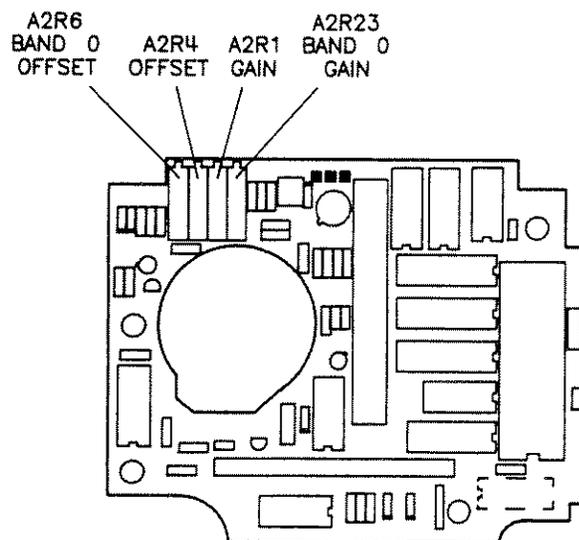


Figure 5-30. Frequency Reference Adjustment Locations

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 |

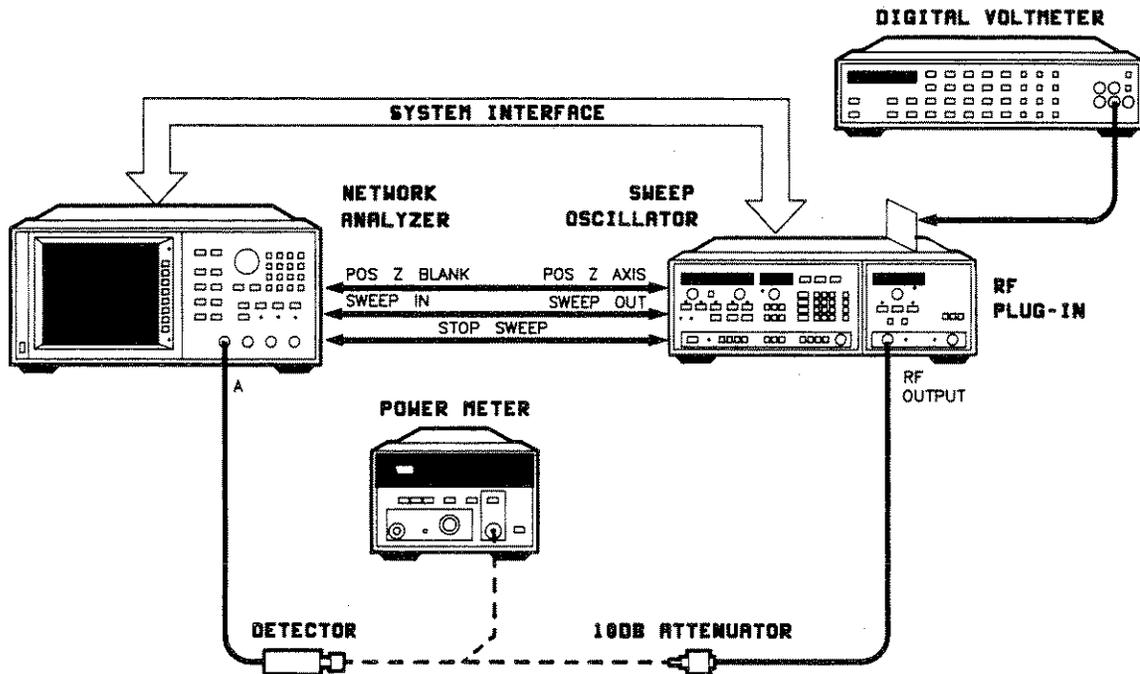


Figure 5-31. ALC Adjustment Test Setup

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.

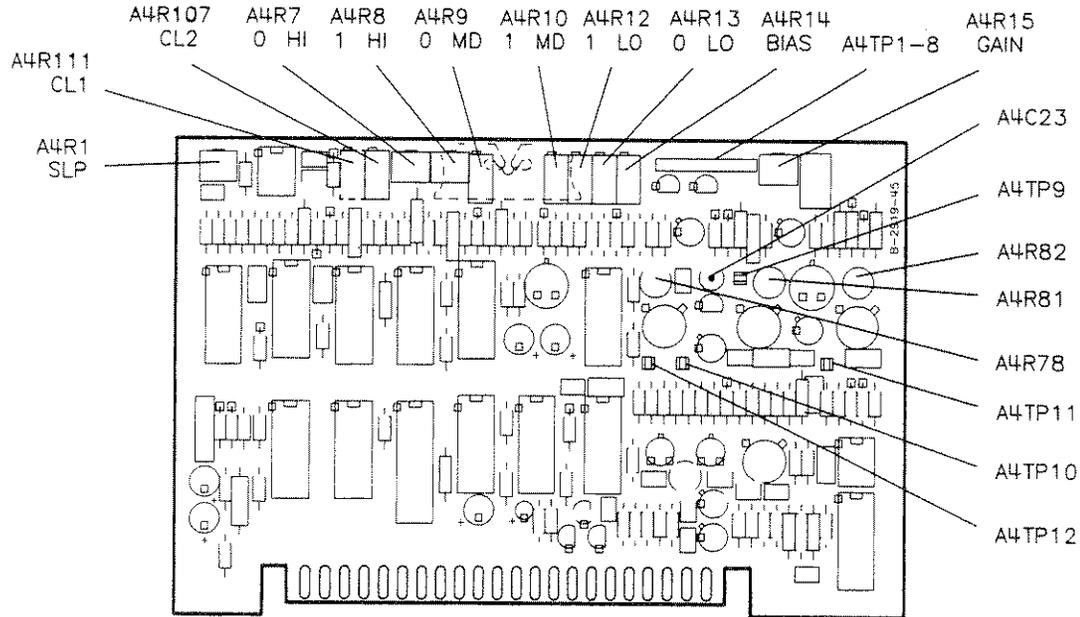


Figure 5-32. ALC Adjustment Locations

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)

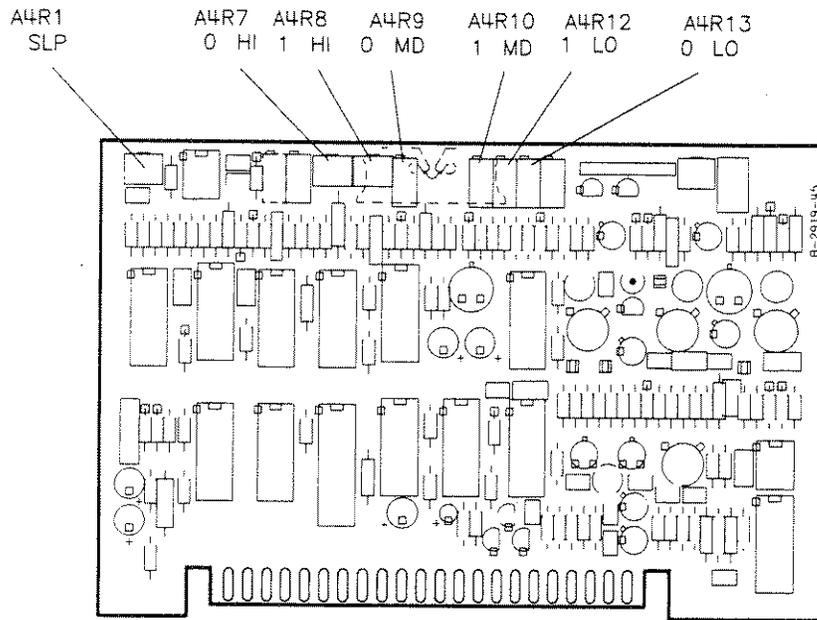


Figure 5-33. Internal Leveled Flatness Adjustment Locations

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.

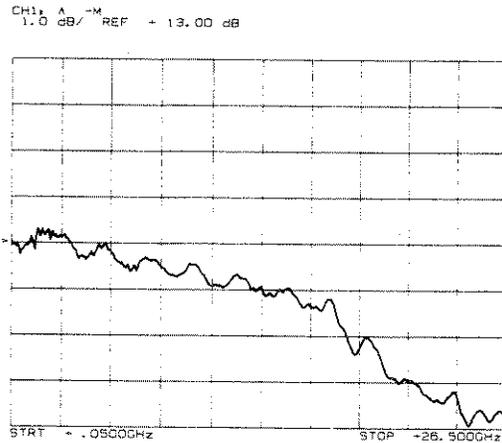


Figure 5-34. Trace Before Adjustments

5-12. ALC Adjustment (Cont'd)

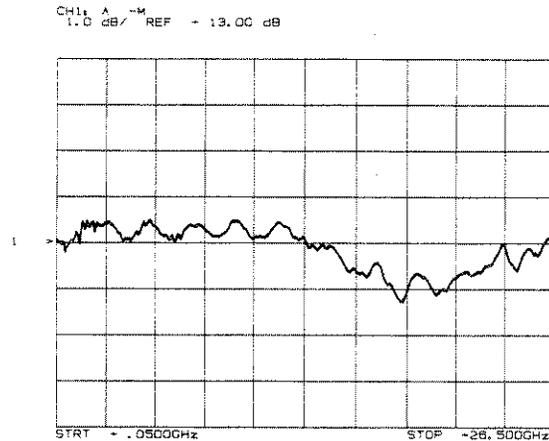


Figure 5-35. Trace After Main Slope Adjustment

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)

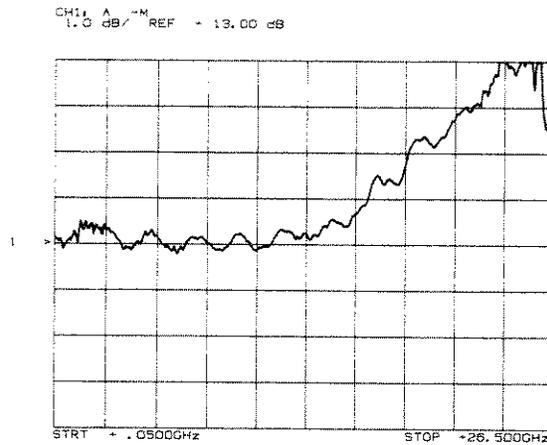


Figure 5-36. Breakpoint adjusted to start having effect at 13 GHz; SL pot full clockwise

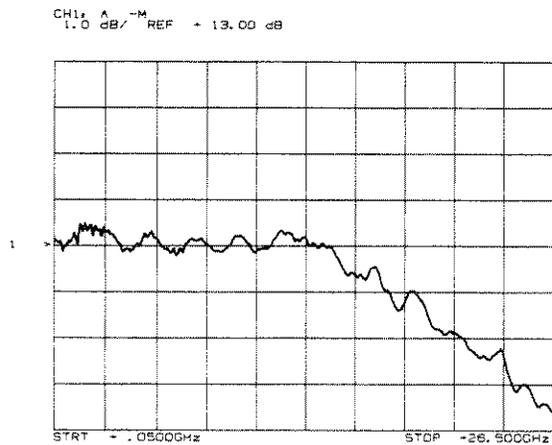


Figure 5-37. As above but with SL pot full counter clockwise

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.

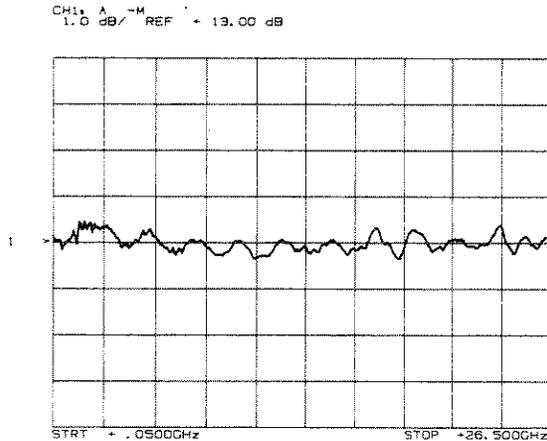


Figure 5-38. Properly Adjusted Power

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 |

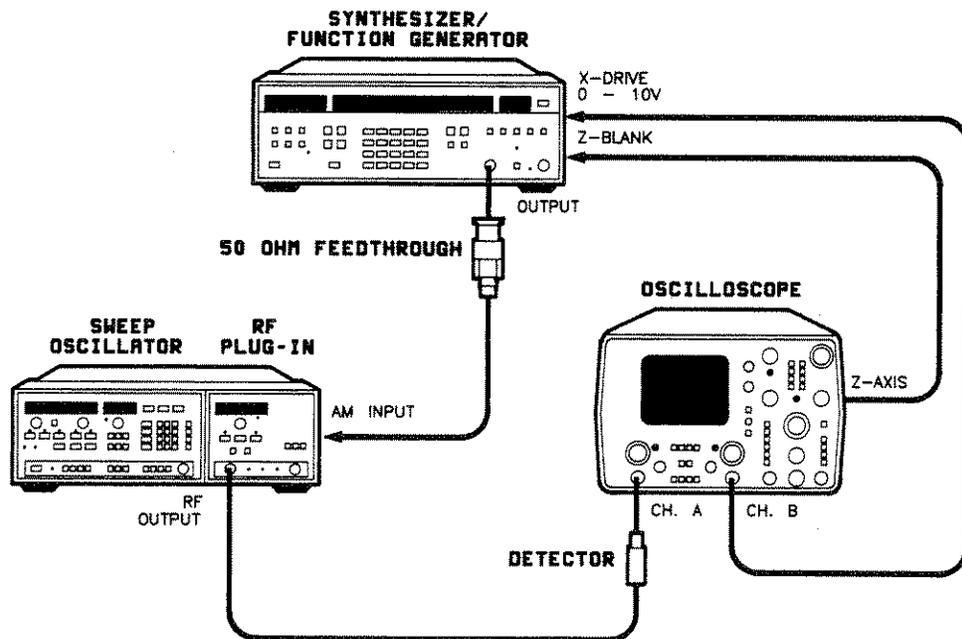


Figure 5-39. ALC Gain Adjustment Test Setup

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.

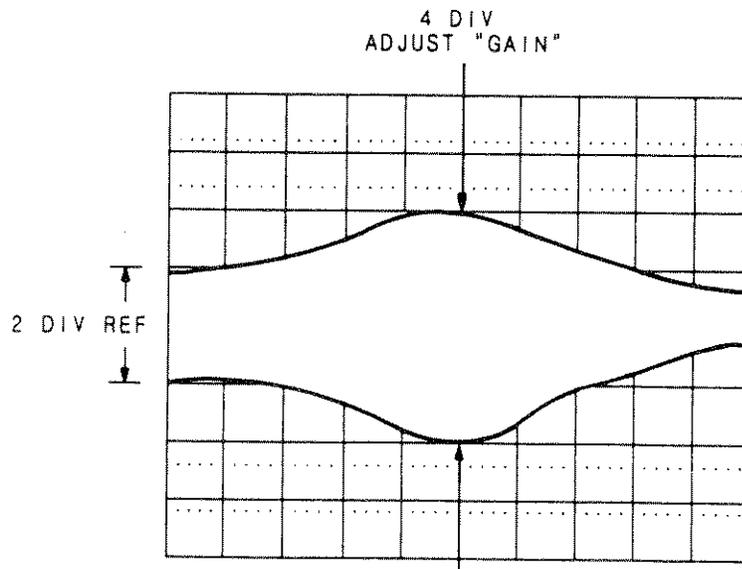


Figure 5-40. ALC Gain Adjusted Correctly (Worst Case)

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)

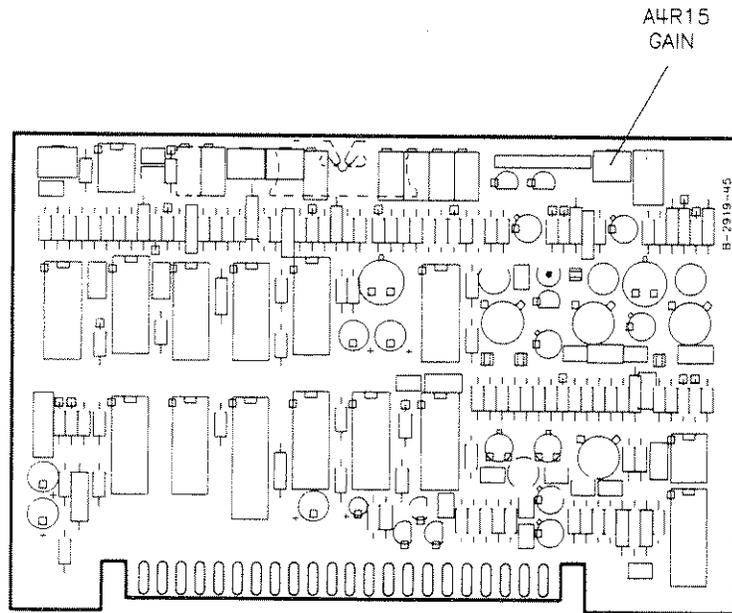


Figure 5-41. ALC Gain Adjustment Location

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 |

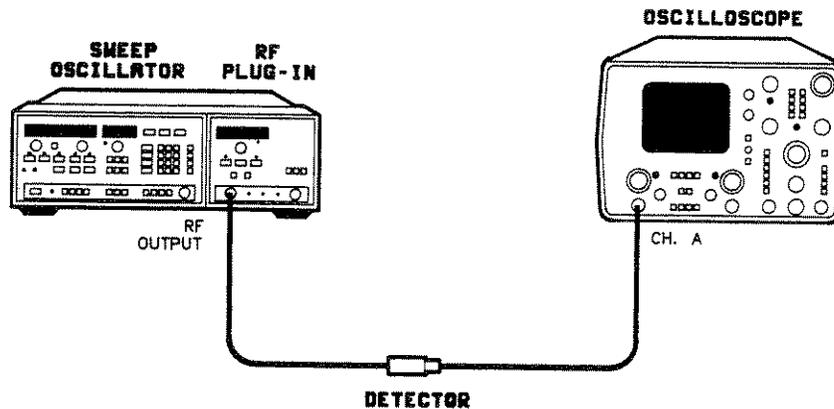


Figure 5-42. Squarewave Symmetry Adjustment Test Setup

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)

- 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.

- 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.

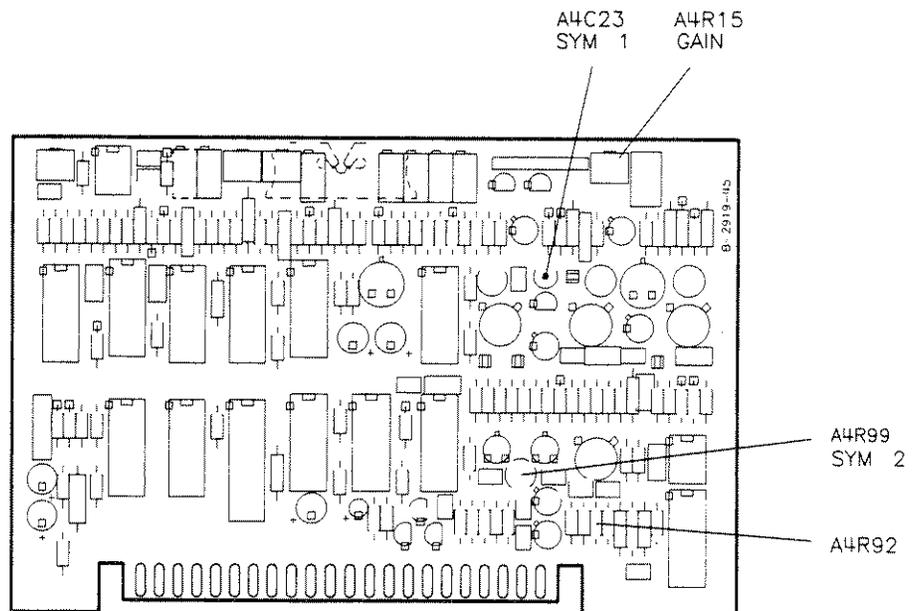


Figure 5-43. Squarewave Symmetry Adjustment Locations

- 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.
- 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.
- 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.
- 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)

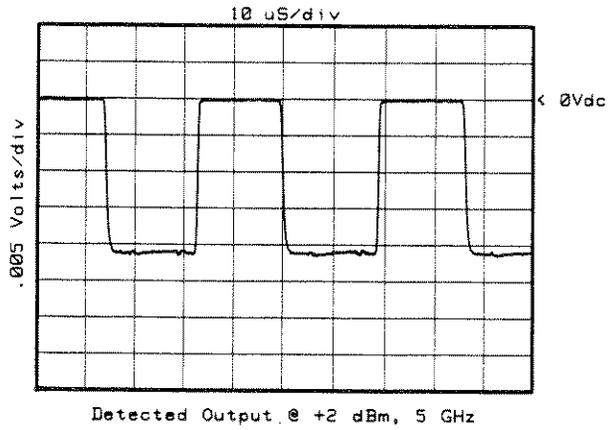


Figure 5-44. Optimum Squarewave

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 |

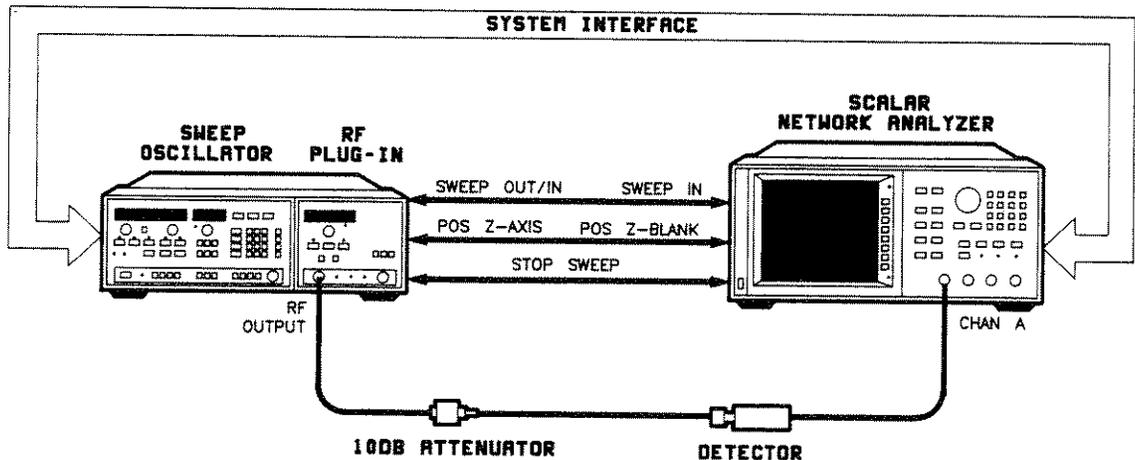


Figure 5-45. Power Sweep Adjustment Test Setup

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.

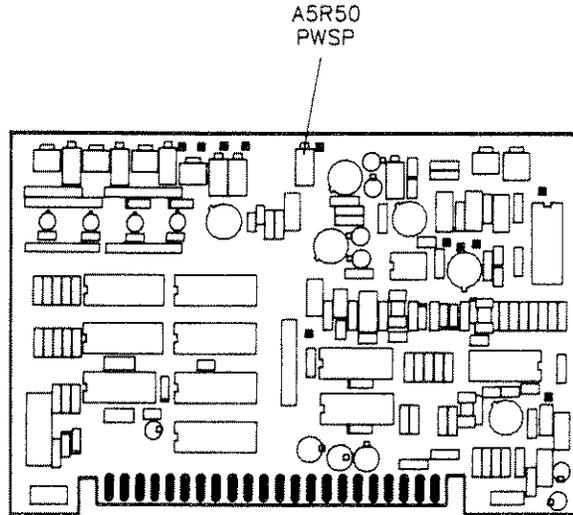


Figure 5-46. Power Sweep Adjustment Location

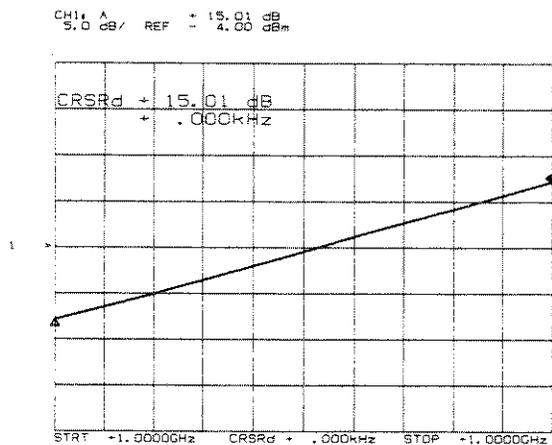


Figure 5-47. Power Sweep After Adjustment

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") |

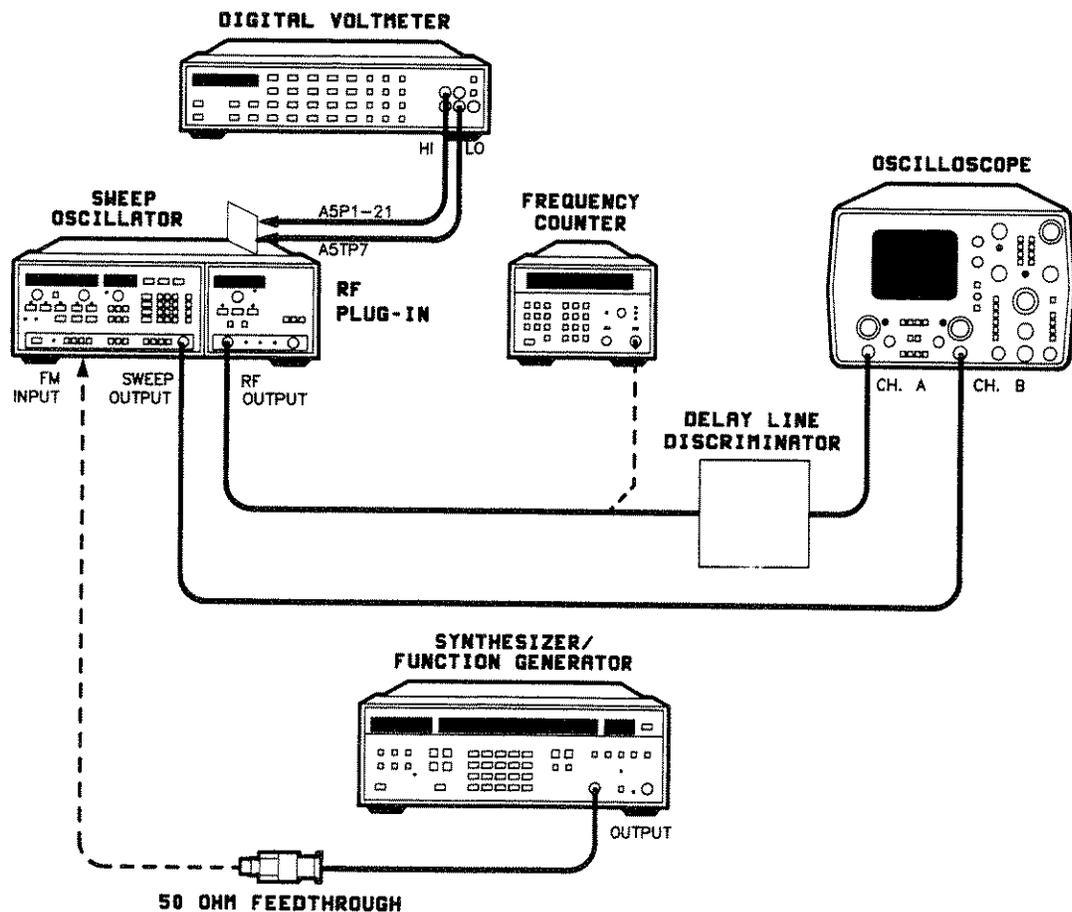


Figure 5-48. FM Adjustment Test Setup

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.

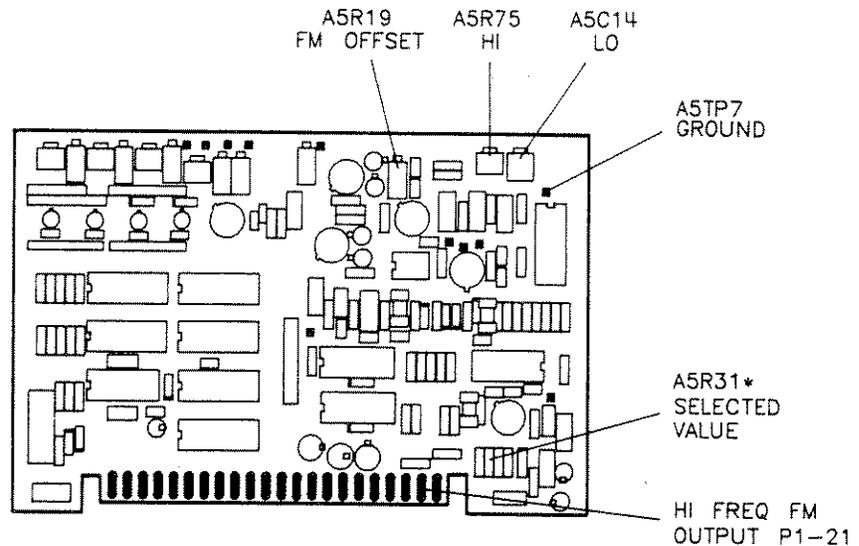


Figure 5-49. FM Driver Adjustment Location

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.

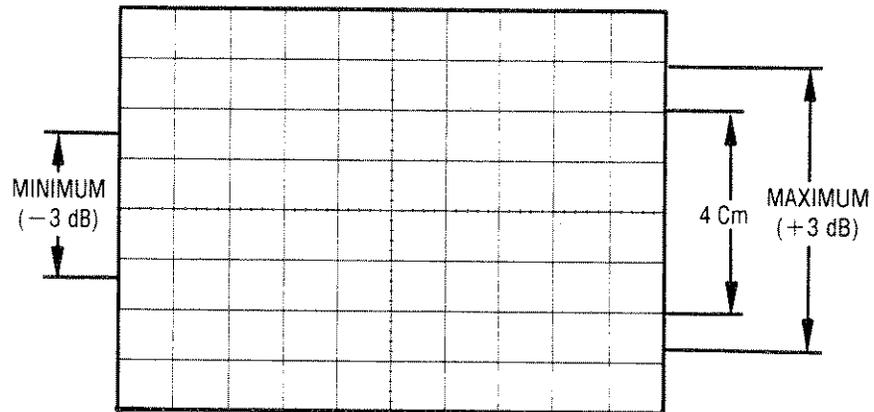
5-16. FM Driver (Cont'd)

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

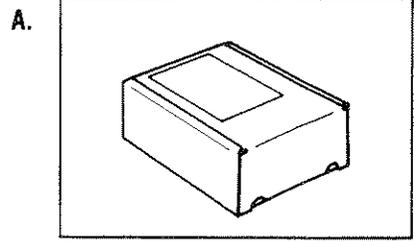
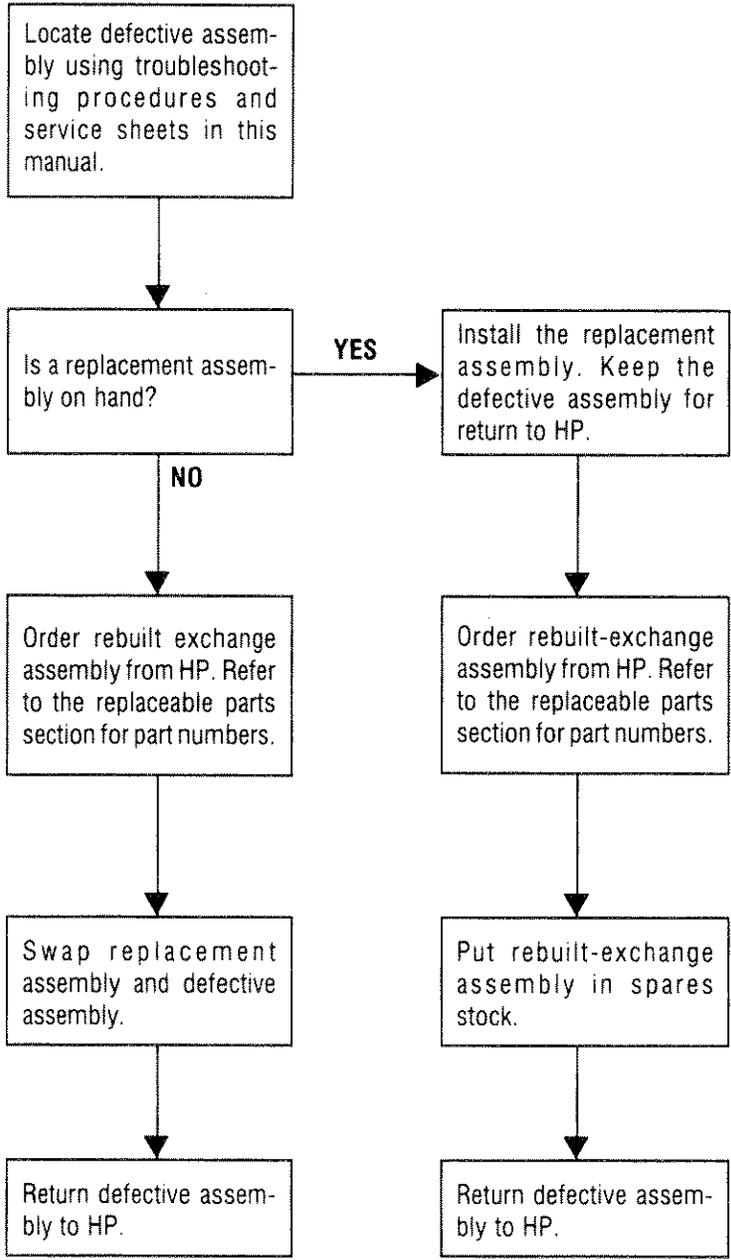
To order a part listed in the replaceable parts list, quote the HP part number with its check digit (CD), indicate the quantity, and address the order to the nearest Hewlett-Packard office. The check digit will ensure accurate processing of your order.

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.

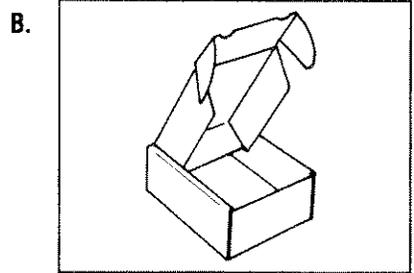
Table 6-1. Two Year Warranty and Restored Exchange Parts

| 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 |

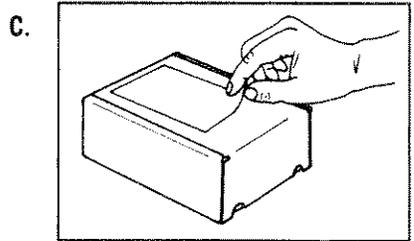
Use this fast, efficient, economical method to keep your Hewlett-Packard instrument in service.



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



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.



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 (2 of 3)

| | | | | | |
|----------|--|-----------|--|----------|--|
| H | | MCD | Millacandela | PL-MTG | Plate Mounting |
| H | Henry, Hermaphrodite, High, Hole Diameter, Hot, Hub Inside Diameter, Hydrogen | MICPROC | Microprocessor | PLSTC | Plastic |
| HD | Hand, Hard, Head, Heavy Duty | MIN | Miniature, Minimum, Minor, Minute | PN | Part Number |
| HEX | Hexadecimal, Hexagon, Hexagonal | MLD | Mold, Molded | PNP | Positive Negative Positive (Transistor) |
| HGT | Height | MM | Magnetized Material (Restricted Articles Code), Millimeter | POLYC | Polycarbonate |
| I | | MO | Metal Oxide, Milliounce, Molybdenum | POLYE | Polyester |
| IC | Collector Current, Integrated Circuit | MOD | Model, Modified Modular, Modulated, Modulator | POLYI | Polyimide |
| ID | Identification, Inside Diameter | MOM | Momentary, Motherboard | POS | Position, Positive |
| IF | Forward Current, Intermediate Frequency | MTG | Mounting | POZI | Pozidrive Recess |
| IMPD | Impedance | MTLC | Metallic | PRCN | Precision |
| IN | Inch, Indium | MTR | Meter | PRIM | Primary |
| INP | Input | MULTIPLXR | Multiplexer | PRL | Parallel |
| INS | Insert, Inside, Insulation, Insulator | MULTR | Multiplier | PRP | Purple, Purpose |
| INT | Integral, Intensity, Internal | MUW | Music Wire | P/S | Power Supply |
| INTL | Internal, International | MW | Milliwatt | PT | Part, Pint, Platinum, Point, Pulse Time |
| INV | Invert, Inverter | N | | PVC | Polyvinyl Chloride |
| J | | N-CHAN | N-Channel Metal Oxide Semiconductor | PW | Power Wirewound, Pulse Width |
| JFET | Effect Transistor | NB | Niobium | Q | |
| K | | NCH | Notched | QUAD | Set of Four |
| K | Kelvin, Key, Kilo, Potassium | NEG | Negative | R | |
| KB | Knob | NH | Nanohenry | RBN | Ribbon |
| L | | NM | Nanometer, Nonmetallic | RCVR | Receiver |
| LED | Light Emitting Diode | NO | Normally Open, Number | RECT | Rectangle, Rectangular, Rectifier |
| LG | Length, Long | NPN | Negative Positive Negative (Transistor) | RES | Research, Resistance, Resistor, Resolution |
| LIN | Linear, Linear Taper, Linearity | NS | Nanosecond, Non-Shorting, Nose | RET | Retaining |
| LK | Link, Lock | NYL | Nylon (Polyamide) | RF | Radio Frequency |
| LKG | Leakage, Locking | O | | RFI | Radio Frequency Interference |
| LKWR | Lockwasher | OCTL | Octal | RFLTR | Regulator |
| LS | Loudspeaker, Low Power Schottky, Series Inductance | OD | Olive Drab, Outside Diameter | RKR | Rocker |
| LUM | Luminous | OP | Operational | RND | Round |
| M | | OPT | Optical, Option, Optional | RPG | Rotary Pulse Generator |
| M | Male, Maximum, Mega, Mil, Milli, Mode, Momentary, Mounting Hole Centers, Mounting Hole Diameter | OXD | Oxide | RR | Rear |
| MA | Milliampere | P | | RVT | Rivet, Riveted |
| MACH | Machined | PAN-HD | Pan Head | S | |
| MAX | Maximum | PC | Picocoulomb, Piece, Printed Circuit | SCR | Screw, Scrub, Silicon Controlled Rectifier |
| | | P.C. | Printed Circuit | SEC | Secondary |
| | | PCB | Printed Circuit Board | SER | Serial, Series |
| | | PD | Pad, Palladium, Pitch Diameter, Power Dissipation | SGL | Single |
| | | PF | Picofarad; Pipe, Female Connection; Power Factor | SHFT | Shaft |
| | | PKG | Package | SHLDR | Shoulder |
| | | PL | Phase Lock, Plain, Plate, Plug | 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 |
|----------|-------------------------------------|----------|----------------------------------|
| S0545 | 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 | 8 | CAPACITOR-FXD .1UF ±20% 50VDC CER | 28480 | 0160-4084 |
| A1C4 | 0160-4084 | 8 | 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 | 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 | | | | NOT ASSIGNED | | |
| A1DS14 | 1990-0670 | 0 | 0 | LED-LAMP LUM-INT = 1MCD IF = 20MA-MAX BVR = 5V | 28480 | 1990-0670 |
| A1DS15 | 1990-0670 | 0 | 0 | LED-LAMP LUM-INT = 1MCD IF = 20MA-MAX BVR = 5V | 28480 | 1990-0670 |
| A1DS16 | 1990-0670 | 0 | 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 | 3 | LED-LIGHT BAR MODULE LUM-INT = 7MCD | 28480 | 1990-0699 |
| A1DS19 | 19090-0699 | 3 | 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 | 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 | 0 | RESISTOR-VAR CONTROL CP 10K 10% LIN | 28480 | 2100-4022 |
| A1R5 | 2100-4022 | 0 | 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 | 4 | RESISTOR 75 1% .125W F TC = 0 ± 100 | 24546 | C4-1/8-TO-75R0-F |
| A1R9 | 0757-0398 | 4 | 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 | 7 | PUSHBUTTON SWITCH P.C. MOUNT | 28480 | 5060-9436 |
| A1S3 | 5060-9436 | 7 | 7 | PUSHBUTTON SWITCH P.C. MOUNT | 28480 | 5060-9436 |
| A1S4 | 5060-9436 | 7 | 7 | PUSHBUTTON SWITCH P.C. MOUNT | 28480 | 5060-9436 |
| A1S5 | 5060-9436 | 7 | 7 | PUSHBUTTON SWITCH P.C. MOUNT | 28480 | 5060-9436 |
| A1S6 | | | | NOT ASSIGNED | | |
| A1S11 | | | | NOT ASSIGNED | | |
| A1S12 | 5060-9436 | 7 | 7 | PUSHBUTTON SWITCH P.C. MOUNT | 28480 | 5060-9436 |
| A1S13 | 5060-9436 | 7 | 7 | PUSHBUTTON SWITCH P.C. MOUNT | 28480 | 5069-9436 |
| A1S14 | 5060-9436 | 7 | 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 | 7 | SOCKET-STRP 8-CONT SIP DIP-SLDR | 28480 | 1200-0901 |
| A1XU11 | 1200-0901 | 7 | 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 | 8 | CAPACITOR-FXD .1UF ±20% 50VDC CER | 28480 | 0160-4084 |
| A2C3 | 0160-4084 | 8 | 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 | 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 $\pm 5\%$ 200VDC CER 0 ± 30 | 28480 | 0160-3875 |
| A2C9 | 0160-4808 | 4 | 1 | CAPACITOR-FXD 470PF $\pm 5\%$ 100VDC CER 0 ± 3 | 04222 | SA101A471JAAH |
| A2CR1 | 1901-0333 | 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 | NE556A |
| 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.

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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-IMPD 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-IMPD 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 | 0160-3878 | 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 | 1 | 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.

*Indicates factory selected value.

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.

*Indicates factory selected value.

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 \pm 20% 50VDC CER | 56289 | 1C20X7R104M050B |
| A7C2 | 0160-3877 | 5 | 3 | CAPACITOR-FXD 100PF \pm 20% 200VDC CER | 04222 | SR202C101MAAH |
| A7C3 | 0160-0574 | 3 | 2 | CAPACITOR-FXD .022UF \pm 20% 100VDC CER | 04222 | SR201C223MAAH |
| A7C4 | 0160-3879 | 7 | 2 | CAPACITOR-FXD .01UF \pm 20% 100VDC CER | 04222 | SR201C103MAAH |
| A7C5 | 0160-3877 | 5 | 5 | CAPACITOR-FXD 100PF \pm 20% 200VDC CER | 04222 | SR202C101MAAH |
| A7C6 | 0160-0574 | 3 | | CAPACITOR-FXD .022UF \pm 20% 100VDC CER | 04222 | SR201C223MAAH |
| A7C7 | 0180-2617 | 1 | 2 | CAPACITOR-FXD 6.8UF \pm 10% 35VDC TA | 56289 | 199D1131 |
| A7C8 | 0180-0116 | 1 | 1 | CAPACITOR-FXD 6.8UF \pm 10% 35VDC TA | 56289 | 150D685X9035B2-DYS |
| A7C9 | 0180-2815 | 1 | 1 | CAPACITOR-FXD 100UF \pm 20% 10VDC TA | | T354J107M010AS |
| A7C10 | 0180-2617 | 1 | 1 | CAPACITOR-FXD 6.8UF \pm 10% 35VDC TA | 56289 | 199D1131 |
| A7C11 | 0180-2814 | 0 | 1 | CAPACITOR-FXD 22UF \pm 20% 10VDC TA | 56289 | 199D1146 |
| A7C12 | 0160-0574 | 3 | | CAPACITOR-FXD .022UF \pm 20% 100VDC CER | 04222 | SR201C223MAAH |
| A7C13 | 0160-3879 | 7 | | CAPACITOR-FXD .01UF \pm 20% 100VDC CER | 04222 | SR201C103MAAH |
| A7C14 | 0160-3878 | 6 | 2 | CAPACITOR-FXD 1000PF \pm 20% 100VDC CER | 04222 | SR201C102MAAH |
| A7C15 | 0160-3878 | 6 | | CAPACITOR-FXD 1000PF \pm 20% 100VDC CER | 04222 | SR201C102MAAH |
| A7C16 | 0160-0575 | 4 | 1 | CAPACITOR-FXD .047UF \pm 20% 50VDC CER | 04222 | SR205C473MAAH |
| A7C17 | 0180-2731 | 0 | 1 | CAPACITOR-FXD 2.2UF \pm 10% 20VDC TA | 04222 | M5-020-225-10/9038 |
| A7C18 | 0160-3874 | 2 | 1 | CAPACITOR-FXD 10PF \pm .5PF 200VDC CER 0 \pm | | FD12C0G2D100D |
| A7C19 | 0160-4084 | 8 | | CAPACITOR-FXD .1UF \pm 20% 50VDC CER | 56289 | 1C20X7R104M050B |
| A7C20 | 0180-0228 | 6 | 1 | CAPACITOR-FXD 22UF \pm 10% 15VDC TA | 56289 | 150D226X9015B2-DYS |
| A7C21 | 0180-2794 | 5 | 1 | CAPACITOR-FXD 3.3UF \pm 20% 35VDC TA | 04222 | MD6-035-335-20/9038 |
| A7C22 | 0160-4535 | 4 | 2 | CAPACITOR-FXD 1UF \pm 10% 50VDC CER | | RPE113-130X7R105K50V |
| A7C23 | 0160-4535 | 4 | | CAPACITOR-FXD 1UF \pm 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 \pm 5% .2D-INX.45LG | 99800 | 2500-28 |
| A7L2 | 9140-0137 | 1 | | INDUCTOR RF-CH-MLD 1MH \pm 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 \pm 100 | 19701 | SFR25H |
| A7R2 | 0698-7233 | 4 | 1 | RESISTOR 750 1% .05W TF TC = 0 \pm 100 | 19701 | 5063J |
| A7R3 | 0698-7277 | 6 | 1 | RESISTOR 51.1K 1% .05W TF TC = 0 \pm 100 | 19701 | 5023R |
| A7R4 | 0757-0442 | 9 | 6 | RESISTOR 10K 1% .125W TF TC = 0 \pm 100 | 19701 | SFR25H |
| A7R5 | 0698-3449 | 6 | 1 | RESISTOR 28.7K 1% .125W TF TC = 0 \pm 100 | 19701 | SFR25H |
| A7R6 | 0698-7243 | 6 | 2 | RESISTOR 1.96K 1% .05W TF TC = 0 \pm 100 | 19701 | 5063J |
| A7R7 | 0698-7243 | 6 | | RESISTOR 1.96K 1% .05W TF TC = 0 \pm 100 | 19701 | 5063J |
| A7R8 | 0698-7260 | 7 | 2 | RESISTOR 10K 1% .05W TF TC = 0 \pm 100 | 19701 | 5063J |
| A7R9 | 0698-7260 | 7 | | RESISTOR 10K 1% .05W TF TC = 0 \pm 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 \pm 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 \pm 100 | 19701 | SFR25H |
| A7R14 | 0757-0442 | 9 | | RESISTOR 10K 1% .125W TF TC = 0 \pm 100 | 19701 | SFR25H |
| A7R15 | 0698-3260 | 9 | 1 | RESISTOR 464K 1% .125W TF TC = 0 \pm 100 | 19701 | SFR25H |
| A7R16 | 0757-0280 | 3 | 2 | RESISTOR 1K 1% .125W TF TC = 0 \pm 100 | 19701 | SFR25H |
| A7R17 | 0698-3457 | 6 | 1 | RESISTOR 316K 1% .125W TF TC = 0 \pm 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 \pm 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 \pm 0.1% .1W TF TC = 0 + 4 | 19701 | 5023Z |
| A7R26 | 0698-8960 | 6 | 2 | RESISTOR 750K 1% .125W TF TC = 0 \pm 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 \pm 100 | 19701 | SFR25H |

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 |
|-----------------------|----------------|-----|-----|---|----------|----------------------|
| 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 | 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 | 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 | 1 | 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 | 1 | 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 | 1 | 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 | 1 | RESISTOR 2.15K 1% .125W TF TC=0±100 | 19701 | SFR25H |
| A7R63 | 0757-0444 | 1 | 1 | RESISTOR 12.1K 1% .125W TF TC=0±100 | 19701 | SFR25H |
| A7R64 | 0757-0442 | 9 | 1 | RESISTOR 10K 1% .125W TF TC=0±100 | 19701 | SFR25H |
| A7R65 | 0757-0442 | 9 | 1 | 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 | 1 | RESISTOR 10K 1% .125W TF TC=0±100 | 19701 | SFR25H |
| A7R76 | 2100-0670 | 6 | 1 | 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 | 1 | RESISTOR 26.1K 1% .125W TF TC=0±100 | 19701 | SFR25H |
| A7R80 | 0698-8960 | 6 | 1 | RESISTOR 750K 1% .125W TF TC=0±100 | 19701 | SFR25H |
| A7R81 | 0757-0418 | 9 | 1 | RESISTOR 619 1% .125W TF TC=0±100 | 19701 | SFR25H |
| A7R82 | 0699-2666 | 9 | 1 | RESISTOR 37.94K ±0.1% .1W TF TC=0+4 | 19701 | 5023Z |
| A7R83 | 2100-3732 | 7 | 1 | RESISTOR-TRMR 500 10% TKF SIDE-ADJ 17-TR | 73138 | 67XR |
| A7R84 | 0699-2667 | 0 | 1 | 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 | 1 | RESISTOR 10.35K 1% .1W TF TC=0+4 | 28480 | 0698-8805 |
| A7R100 | 0698-3453 | 2 | 1 | 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 | 1 | 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 | 1 | 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 | 1 | 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 | 1 | 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 | 1 | TERMINAL-TEST POINT .330IN ABOVE | 4G819 | |
| A7TP3 | 0360-0535 | 0 | 1 | TERMINAL-TEST POINT .330IN ABOVE | 4G819 | |
| A7TP4 | 0360-0535 | 0 | 1 | TERMINAL-TEST POINT .330IN ABOVE | 4G819 | |
| A7TP5 | 0360-0535 | 0 | 1 | TERMINAL-TEST POINT .330IN ABOVE | 4G819 | |
| A7TP6 | 0360-0535 | 0 | 1 | TERMINAL-TEST POINT .330IN ABOVE | 4G819 | |
| A7TP7 | 0360-0535 | 0 | 1 | TERMINAL-TEST POINT .330IN ABOVE | 4G819 | |
| A7TP9 | 0360-0535 | 0 | 1 | TERMINAL-TEST POINT .330IN ABOVE | 4G819 | |
| A7TP10 | 0360-0535 | 0 | 1 | TERMINAL-TEST POINT .330IN ABOVE | 4G819 | |
| A7TP11 | 0360-0535 | 0 | 1 | TERMINAL-TEST POINT .330IN ABOVE | 4G819 | |
| A7TP12 | 0360-0535 | 0 | 1 | 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 \pm 10% 35VDC TA | 56289 | 150D105X9035A2-DYS |
| A9C2 | 0180-1735 | 2 | 1 | CAPACITOR-FXD .22UF \pm 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 |
| W33 | 83595-20076 | 9 | 1 | OPTION 002 AND 004 INCLUDES MOST OPTION 002 AND 004 PARTS IN ADDITION TO THE FOLLOWING: CABLE RF ATTENUATOR/REAR OUT | 28480 | 83595-20076 |

See introduction to this section for ordering information.

*Indicates factory selected value.



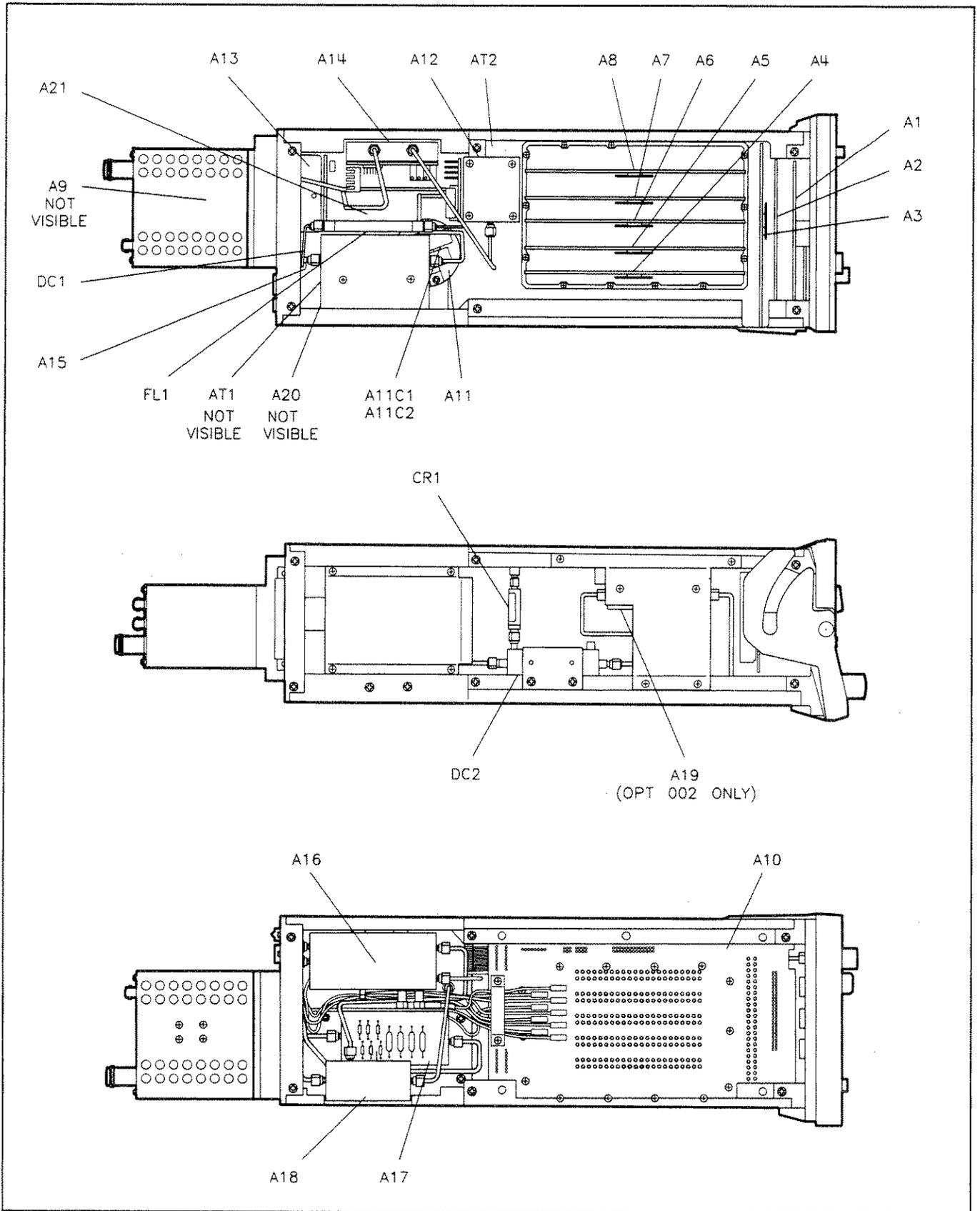


Figure 6-2. Major Assemblies (1 of 2)

| 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)

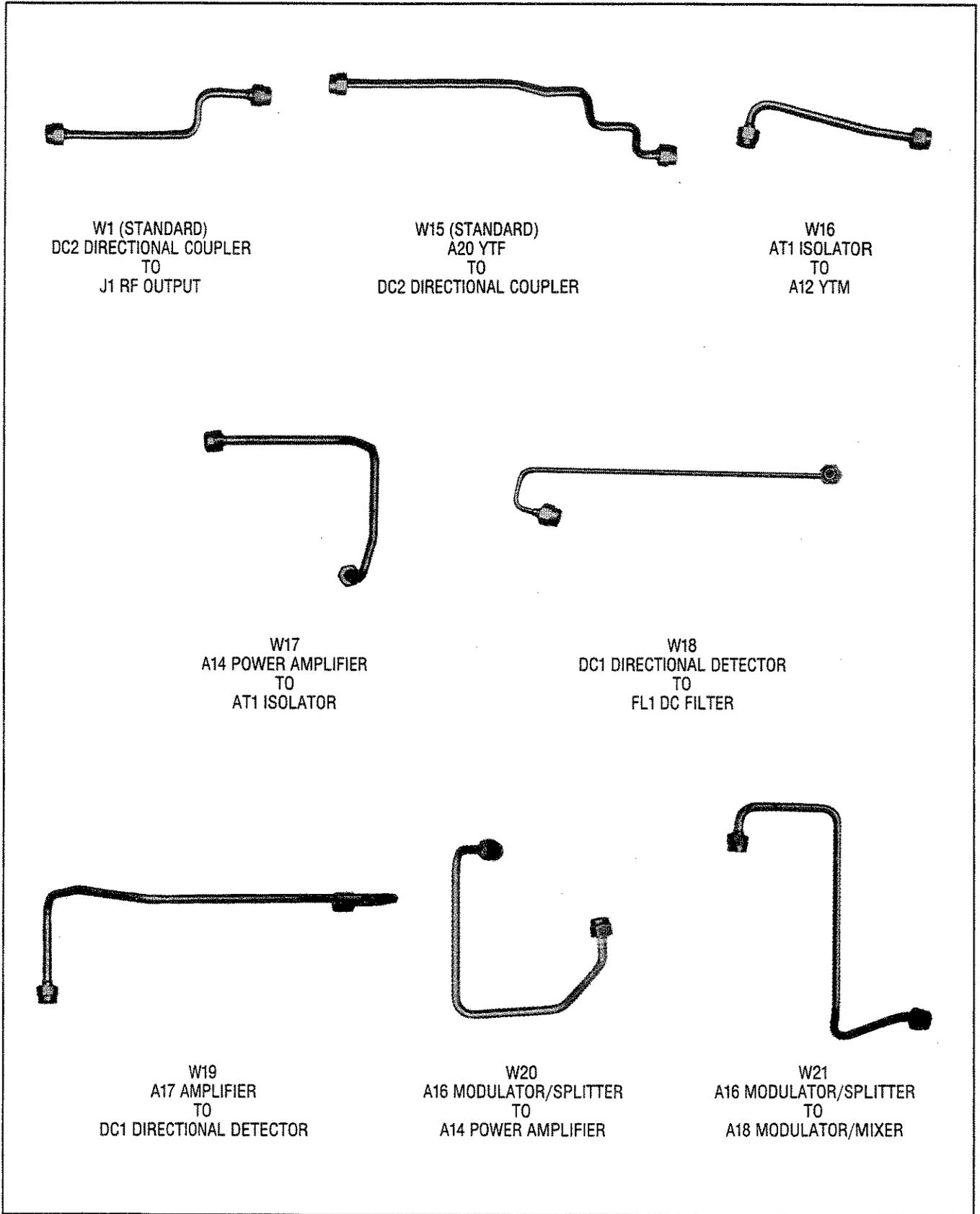


Figure 6-3. RF Cables (1 of 3)

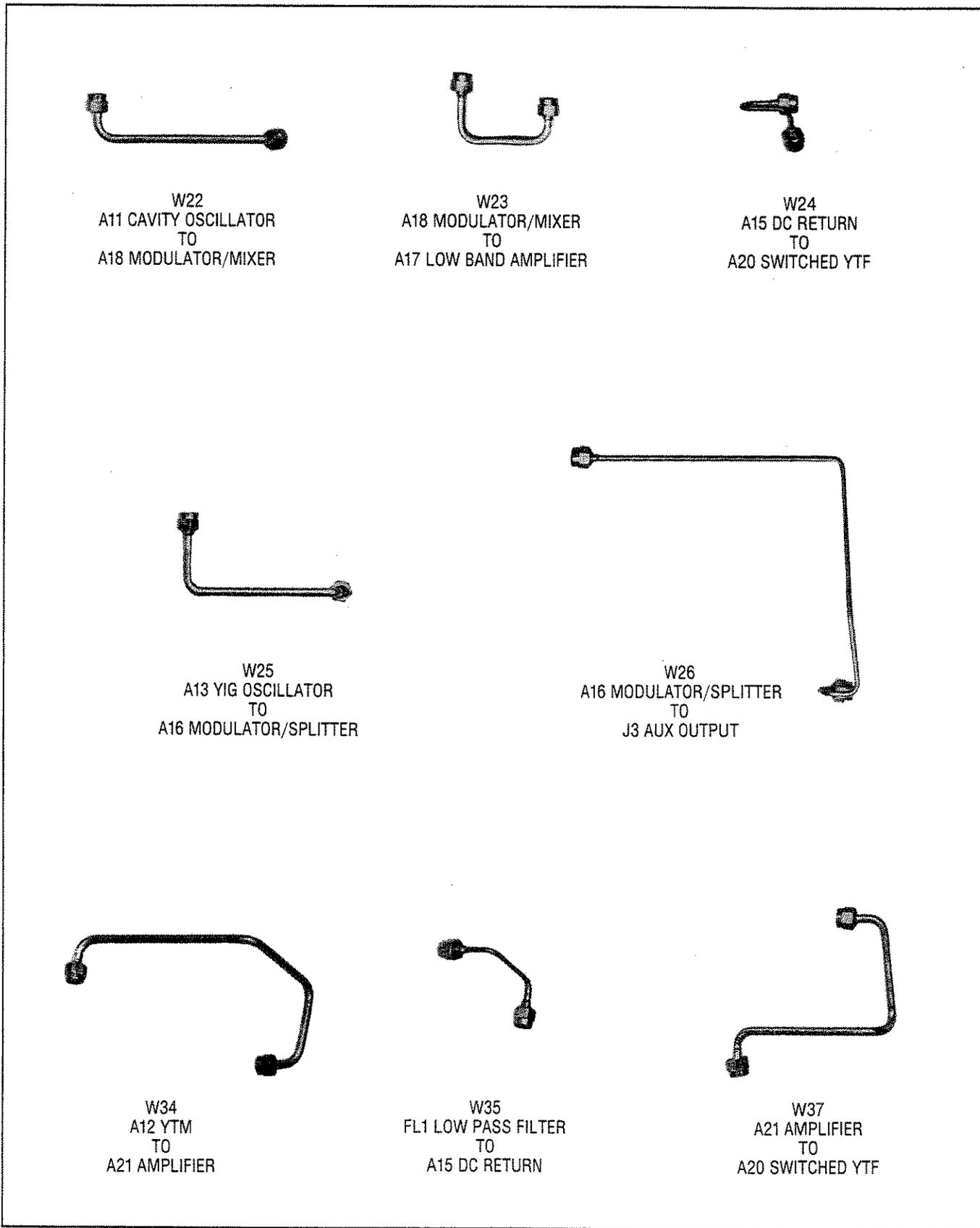
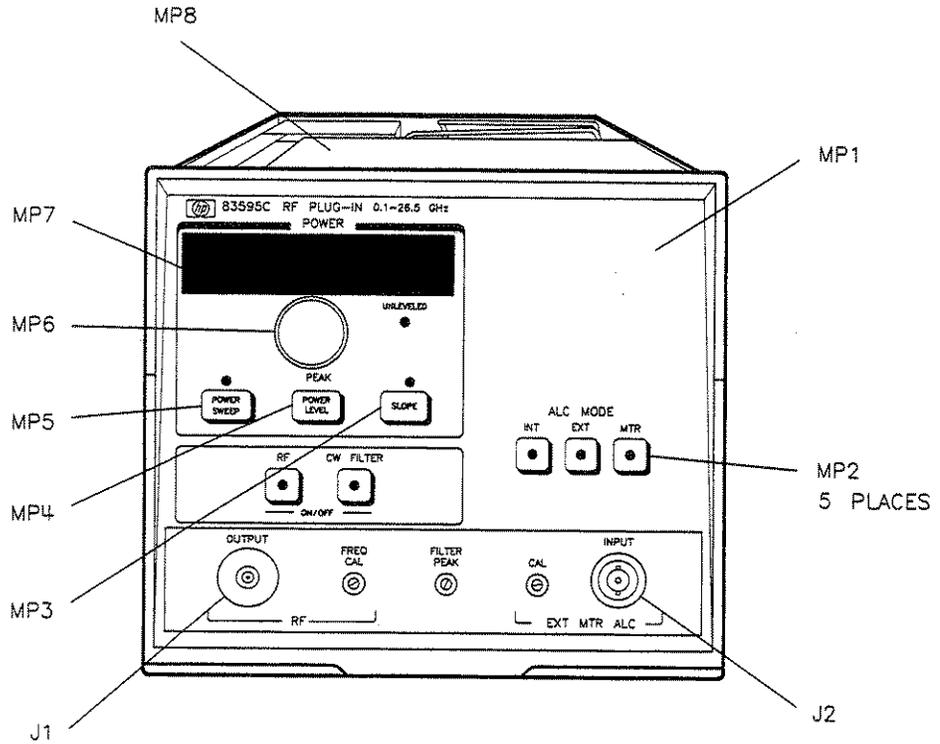


Figure 6-3. RF Cables (2 of 3)

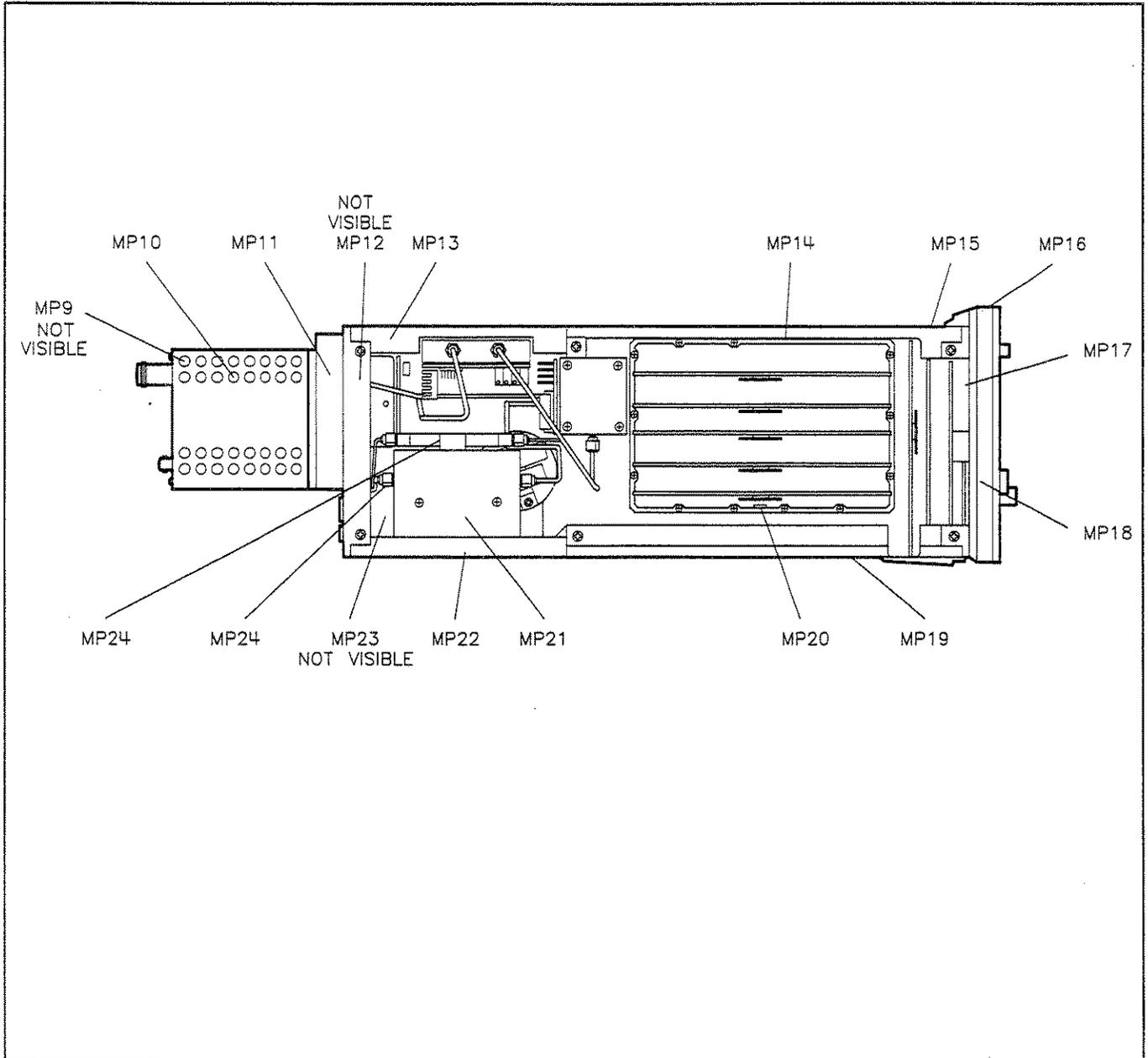
| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|-----------------------|----------------|-----|-----|--|-----------|-----------------|
| W1 | 83595-20013 | 5 | 1 | CABLES | | |
| W2 | 83592-60021 | 6 | 1 | CABLE-RF COUPLER/OUTPUT | 28480 | 83595-20013 |
| 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)



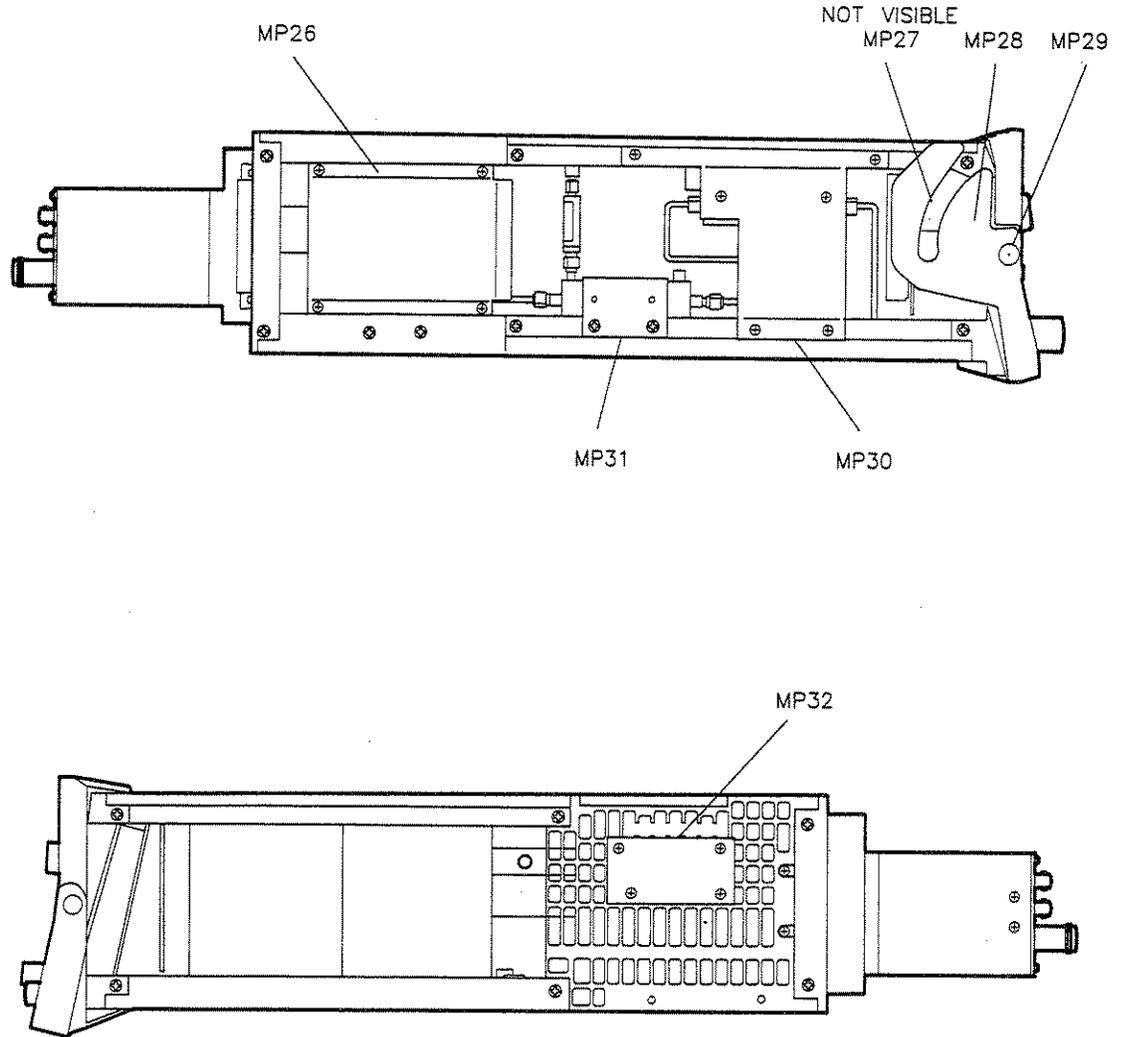
| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|-----------------------|----------------|--------|-----|--|-----------|-----------------|
| MP1 | 83595-00006 | 1 | 1 | FRONT PANEL - DRESS (STD AND OPTION 002) | 28480 | 83595-00006 |
| MP2 | 5041-0285 | 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)



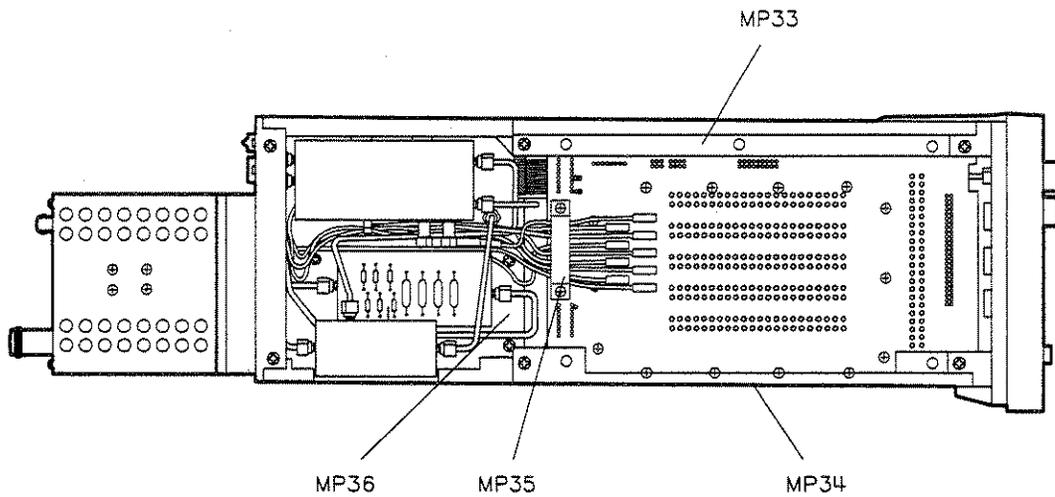
| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|-----------------------|----------------|-----|-----|---------------------------------|-----------|-----------------|
| MP9 | 83592-00026 | 5 | 1 | CONNECTOR MOUNT ASSY TYPE-N | 28480 | 83592-00026 |
| 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)



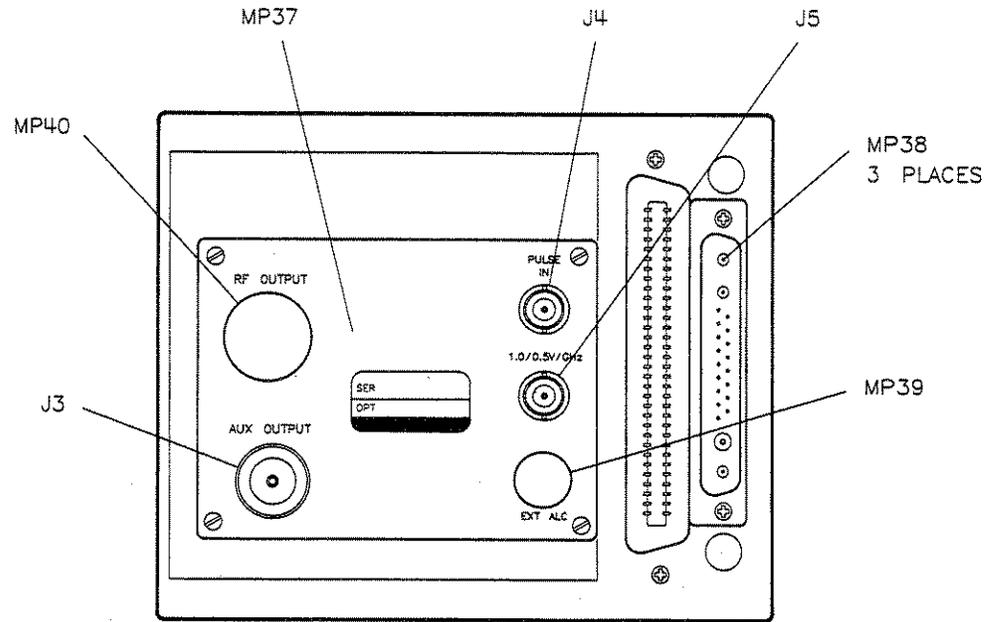
| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|-----------------------|----------------|--------|-----|---------------------------------|--------------|-----------------|
| MP26 | 83525-00010 | 6 | 1 | GUARD | 28480 | 83525-00010 |
| MP27 | 1460-1851 | 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)



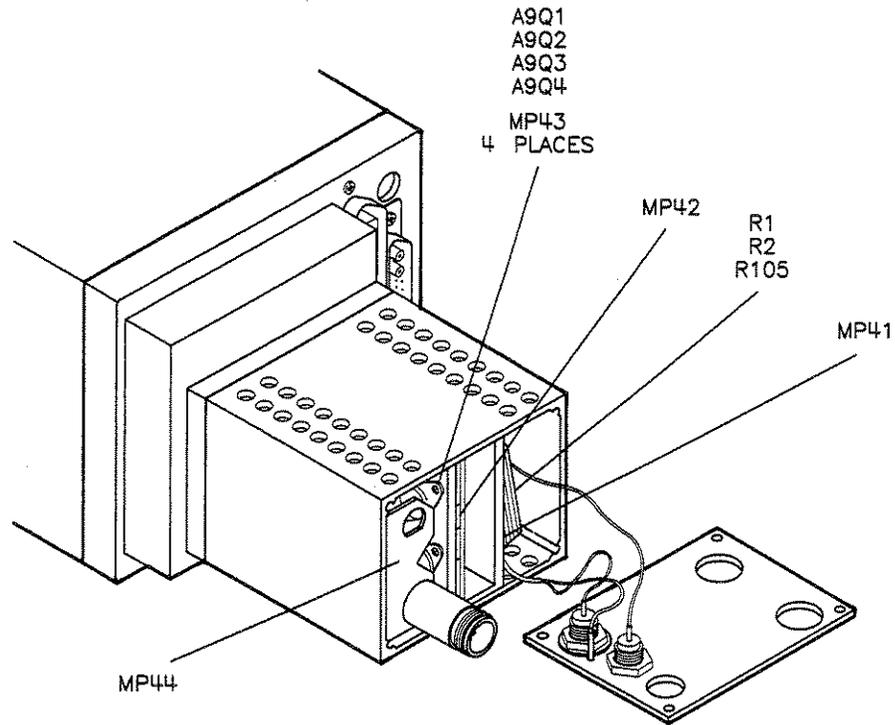
| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|-----------------------|----------------|--------|-----|------------------------|-----------|-----------------|
| MP33 | 83592-20018 | 7 | 1 | SIDERAIL - LOWER LEFT | 28480 | 83592-20018 |
| MP34 | 83592-20015 | 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)



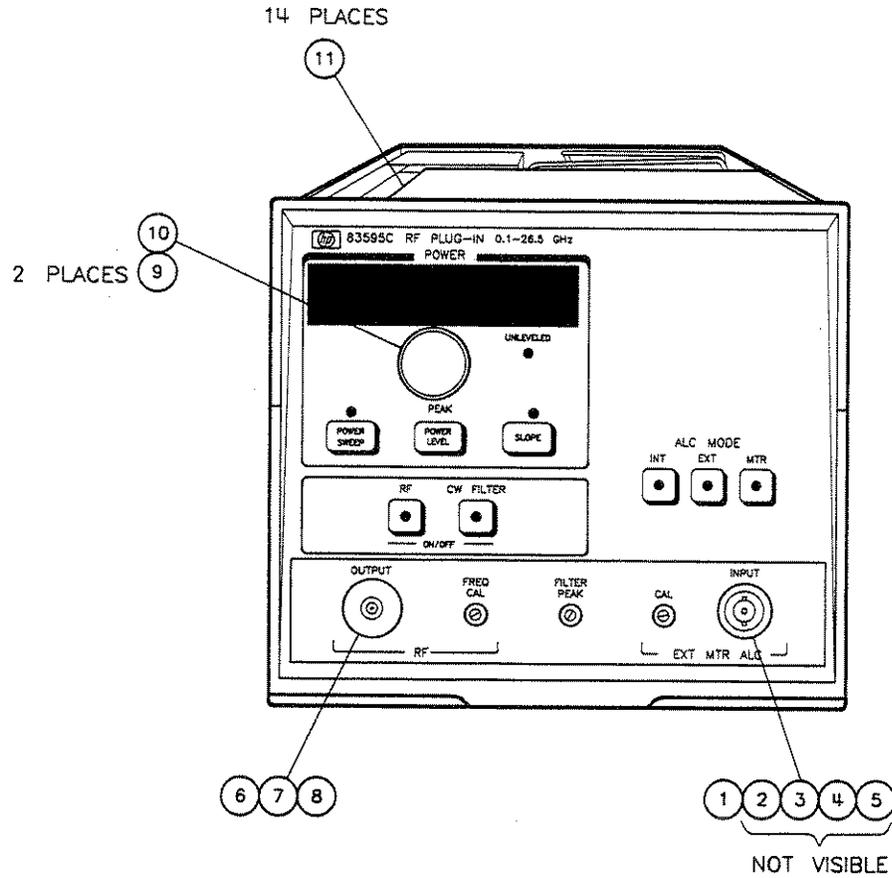
| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|-----------------------|----------------|--------|-----|------------------------------|-----------|-----------------|
| MP37 | 83592-00029 | 8 | 1 | PANEL - REAR | 28480 | 83592-00029 |
| MP38 | 5021-0906 | 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)



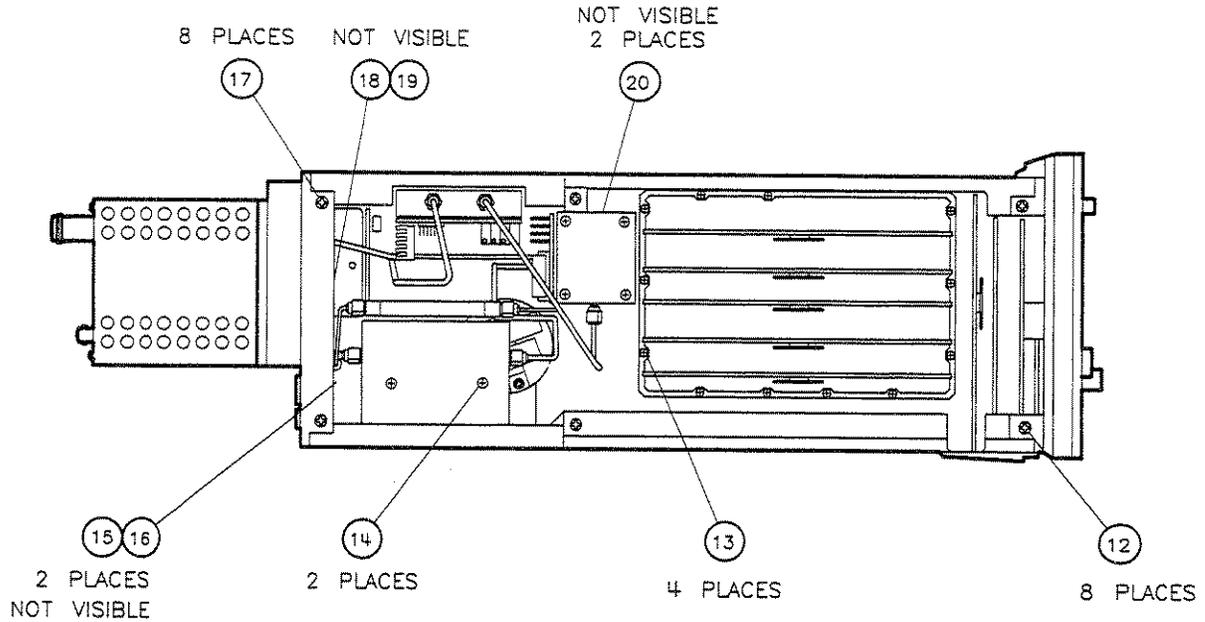
| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|-----------------------|----------------|--------|-----|----------------------------|-----------|-----------------|
| R1, 2, 105 | 0811-3827 | 7 | 1 | RESISTORS MATCHED SET | 28480 | 0811-3827 |
| MP41 | 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)



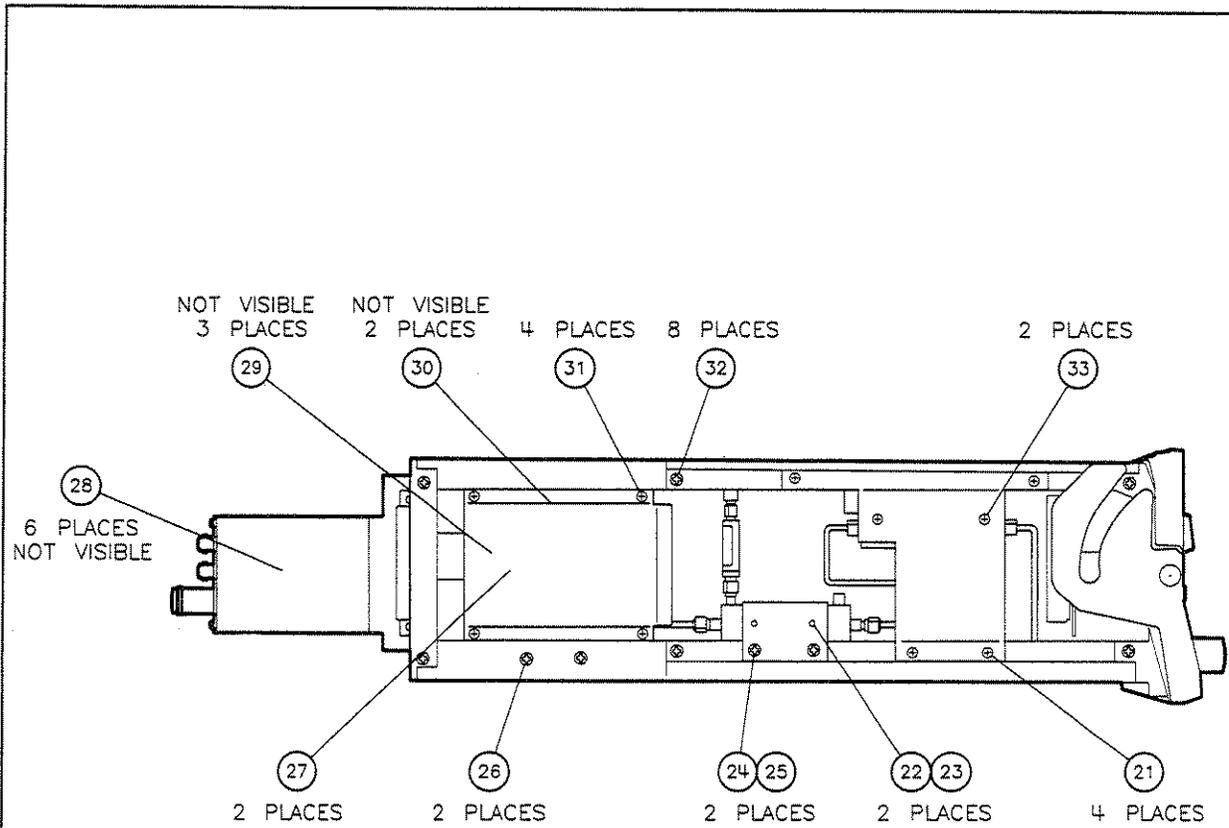
| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|-----------------------|----------------|-----|-----|--|-----------|----------------------|
| 1 | 1250-0118 | 3 | 1 | CONNECTOR-RF BNC FEM SGL-HOLE-FR 5-OHM | 03316 | 28JR128-1 |
| 2 | 5040-0345 | 7 | 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)



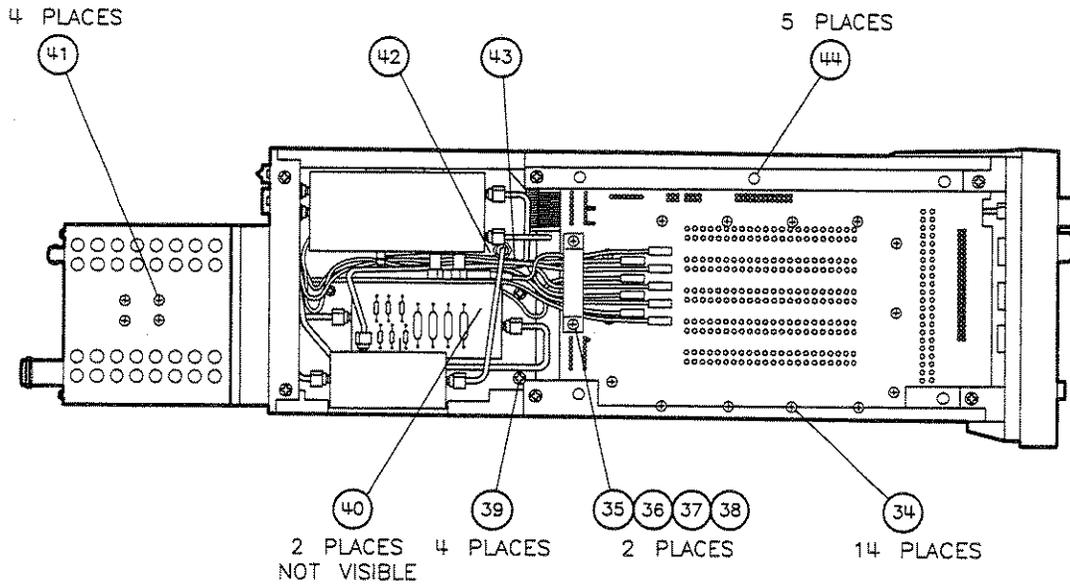
| Reference Designation | HP Part Number | C D | Qty | Description | Mfr. Code | Mfr Part Number |
|-----------------------|----------------|-----|-----|--|-----------|----------------------|
| 12 | 2360-0333 | 8 | 8 | SCREW-MACH 6-32 .25-IN-LG 100 DEG | 28480 | 2360-0333 |
| 13 | 0570-0112 | 4 | 4 | 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)

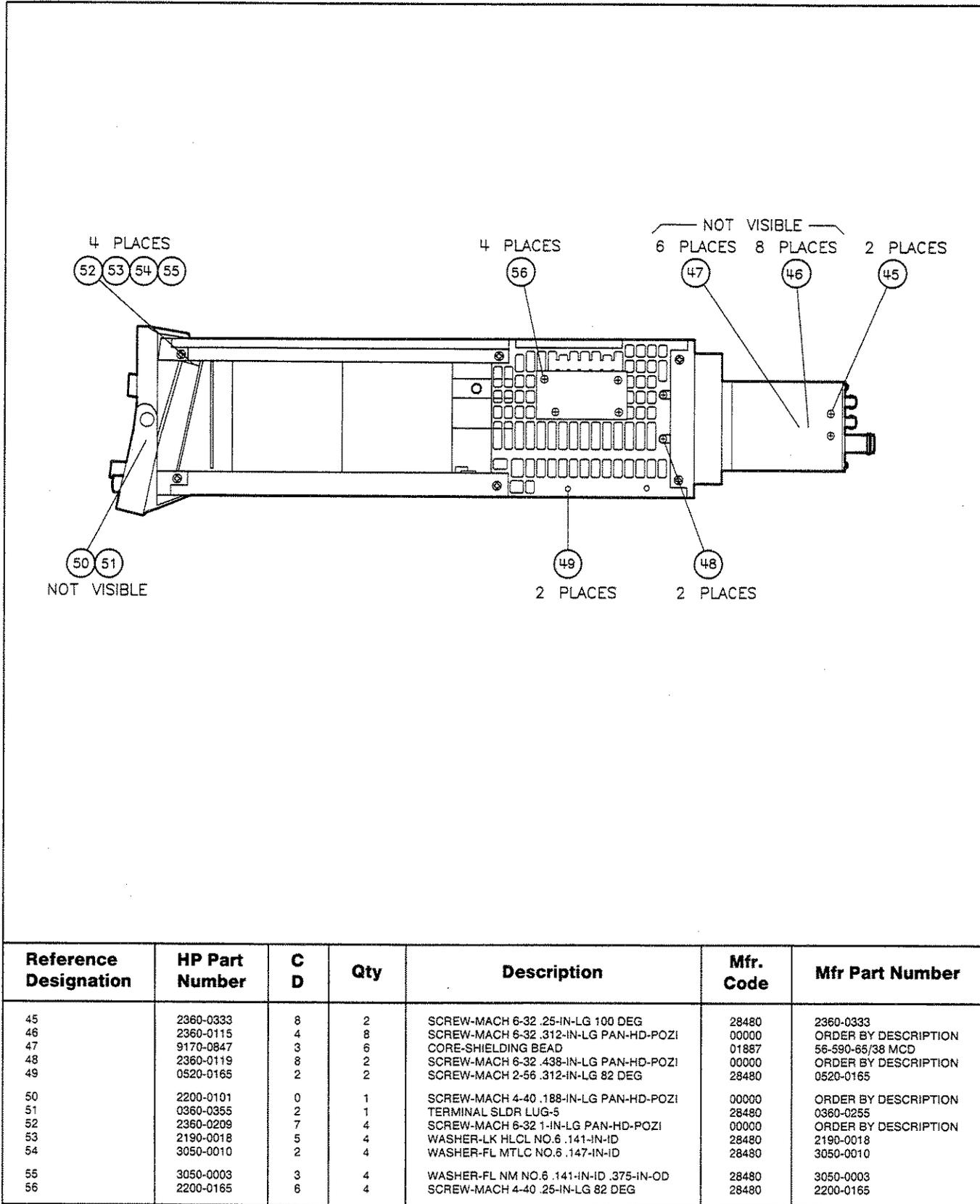
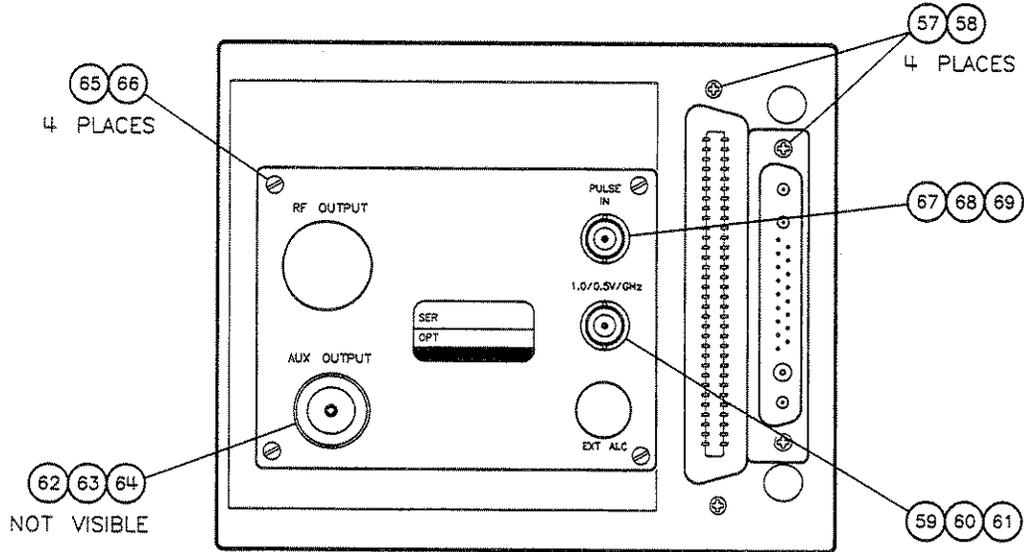


Figure 6-5. Attaching Hardware, Right Side (5 of 6)



| 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.

