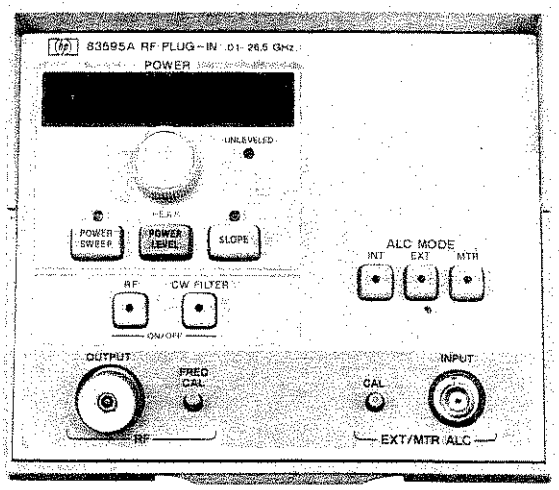
OPERATING MANUAL

83595A
RF PLUG-IN
.01 to 26.5 GHz



HEWLETT PACKARD

83595A
RF PLUG-IN
(Including Options 002 and 004)

SERIAL NUMBER

This manual applies directly to HP Model 83595A RF Plug-In having serial number prefix 2147A. With changes described in Section VII, this manual also applies to instruments with serial numbers prefixed 2143A or lower.

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

MANUAL PART NO. 83595-90003
Microfiche Part No. 83595-90004

Printed: OCTOBER 1982

HEWLETT PACKARD

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.

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 could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

CAUTION

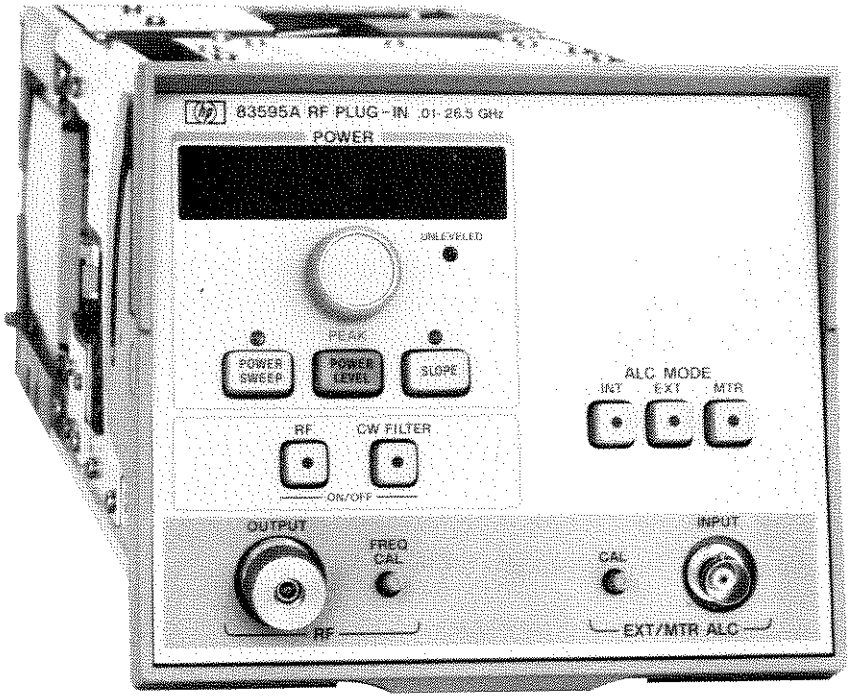
The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully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

SERVICING

WARNING

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.



ADAPTER

SMA(f) to TYPE N(f)

(1250-1404)

Figure 1-1. Model 83595A RF Plug-In and Accessory Adapter

SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION

1-2. This Operating and Service Manual contains information required to install, operate, test, adjust, and service the Hewlett-Packard Model 83595A RF Plug-In. Figure 1-1 shows the Model 83595A with accessory adapter supplied.

1-3. This manual is divided into eight major sections which provide the following information:

a. SECTION I, GENERAL INFORMATION, includes a brief description of the instrument, safety considerations, specifications, supplemental characteristics, instrument identification, options available, accessories available, and a list of recommended test equipment.

b. SECTION II, INSTALLATION, provides information for initial inspection, preparation for use, storage, and shipment.

c. SECTION III, OPERATION, explains the frequency resolution characteristics of the RF Plug-In in CW and swept frequency modes. Operating instructions include FM 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.

d. SECTION IV, PERFORMANCE TESTS, presents procedures required to verify that performance of the RF Plug-In is in accordance with published specifications.

e. SECTION V, ADJUSTMENTS, presents procedures required to properly adjust and align the Model 83595A RF Plug-In after repair.

f. SECTION VI, REPLACEABLE PARTS, provides information required to order all parts and assemblies.

g. SECTION VII, MANUAL BACKDATING CHANGES, provides backdating information required to make this manual compatible with earlier shipment configurations.

h. SECTION VIII, SERVICE, provides an overall instrument block diagram with troubleshooting and repair procedures. Each assembly within the instrument is covered on a separate Service Sheet which contains a circuit description, schematic diagram, component location diagram, and troubleshooting information to aid in the proper maintenance of the instrument.

1-4. Supplied with this manual is an Operating Information Supplement. This is simply a copy of the first three sections of the manual, which should be kept with the instrument for use by the instrument operator.

1-5. On the front cover of this manual is a Microfiche part number. This number may be used to order 10- by 15-centimeter (4- by 6-inch) microfilm transparencies of the manual. Each microfiche contains up to 60 photo duplicates of the manual pages. The microfiche package also includes the latest Manual Changes sheet as well as all pertinent Service Notes.

1-6. Refer any questions regarding this manual, the Manual Changes sheet, or the instrument to the nearest HP Sales/Service Office. Always identify the instrument by model number, complete name, and complete serial number in all correspondence. Refer to the inside rear cover of this manual for a worldwide listing of HP Sales/Service Offices.

1-7. SPECIFICATIONS

1-8. Listed in Table 1-1 are the specifications for the Model 83595A RF Plug-In. These specifications are the performance standards, or limits, against which the instrument may be tested. Table 1-2 lists the RF Plug-In supplemental performance characteristics. Supplemental performance characteristics are not specifications but are typical characteristics included as additional information for the user.

Table 1-1. Specifications for Model 83595A Installed in Model 8350A (1 of 3)

FREQUENCY[1] **Range:** 0.01 to 26.5 GHz						
Accuracy (25°C ±5°C)	**Frequency Bands (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**
CW Mode	±5 MHz[2]	±5 MHz	±10 MHz	±10 MHz	±12 MHz	_____
All Sweep Modes (Sweep time >100 ms)	±15 MHz[2]	±20 MHz	±25 MHz	±30 MHz	±35 MHz	±50 MHz[2]
Frequency Markers (Sweep time ≥100 ms)	±15 MHz[2] ±0.5% of sweep width	±20 MHz ±0.5% of sweep width	±25 MHz ±0.5% of sweep width	±30 MHz ±0.5% of sweep width	±35 MHz ±0.5% of sweep width	±50 MHz[2] ±0.5% of sweep width
Stability						
With 10% Line Voltage Change	±50 kHz	±50 kHz	±100 kHz	±150 kHz	±200 kHz	±200 kHz
With 10 dB Power Level Change	±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
Residual FM, Peak (10 Hz–10 kHz Bandwidth) (CW Mode with CW Filter)	<5 kHz	<5 kHz	<7 kHz	<9 kHz	<12 kHz	_____
POWER OUTPUT[1]						
	Frequency Bands (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 Output Power[3, 4, 5] (25°C)	+10 dBm	+10 dBm	+10 dBm	+10 dBm	+4 dBm	+4 dBm
With Option 002	+10 dBm	+8.5 dBm	+8 dBm	+7 dBm	+1 dBm	+1 dBm
Power Level Accuracy[12] (Internally Leveled)	<±1.5 dB	<±1.3 dB	<±1.3 dB	<±1.4 dB	<±1.7 dB	<±1.8 dB
With Option 002[6] (at 0 dB attenuator step)	<±1.7 dB	<±1.5 dB	<±1.5 dB	<±1.6 dB	<±1.9 dB	<±2.0 dB

Table 1-1. Specifications for Model 83595A Installed in Model 8350A (2 of 3)

POWER OUTPUT (Cont'd)

Minimum Settable Power: −5 dBm
With Option 002: −60 dBm

Attenuator Accuracy (±dB referenced from the 0 dB setting)	**Frequency Range (GHz)**	**Attenuator Setting (dB)**										
		5	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**
	0.01 to 12.4	0.4	0.6	0.7	0.7	0.9	0.9	1.8	1.8	2.0	2.0	2.2
	12.4 to 18.0	0.5	0.7	0.9	0.9	1.2	1.2	2.0	2.0	2.3	2.3	2.5
	18.0 to 26.5	0.7	1.0	2.5	2.5	3.0	3.0	4.2	4.2	4.4	4.4	4.6

Power Variation (at specified Maximum Leveled Power or below)	**Frequency Bands (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**
Internally Leveled	±0.9 dB	±0.7 dB	±0.7 dB	±0.8 dB	±0.9 dB	±1.0 dB
Externally Leveled [7] Negative Crystal Detector [8] (Sweep time >100 ms)	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB
Externally Leveled Power Meter [9]	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB
Residual AM in 100 kHz Bandwidth (in dB below carrier and at specified Maximum Leveled Power)	≥50 dB	≥50 dB	≥50 dB	≥50 dB	≥50 dB	≥50 dB
Spurious Signals (at specified Maximum Leveled Power) Harmonics or Subharmonics (in dB below carrier)	>25 dB	>25 dB	>25 dB	>25 dB	>20 dB	>20 dB
Non-Harmonics	>25 dB	>50 dB	>50 dB	>50 dB	>50 dB	>25 dB
Output SWR (Internally Leveled)	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9
With Option 002	<2.0	<2.0	<2.0	<2.0	<2.2	<2.2
Power Sweep [10] Calibrated Range [11]	>15 dB	>15 dB	>15 dB	>15 dB	>9 dB	>9 dB
With Option 002	>15 dB	>13.5 dB	>13 dB	>12 dB	>6 dB	>6 dB

Table 1-1. Specifications for Model 83595A Installed in Model 8350A (3 of 3)

MODULATION [1]

External AM

Maximum Input: 15V, 100 kHz

Internal AM

Selectable (by internal jumper in 8350A) to 1 kHz or 27.8 kHz squarewave modulation. The 27.8 kHz modulation allows operation with HP 8755A/B/C Swept Amplitude Analyzer.

On/Off Ratio: ≥30 dB below specified Maximum Leveled Power.

Symmetry: 40/60

External FM

Maximum Deviations for Modulation Frequencies:

Modulation Frequency	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

GENERAL SPECIFICATIONS [1]

Minimum Sweep Time (over full band): 30 ms

Minimum Sweep Time (over single band): 10 ms

Bandswitch Points: Internal bandswitch points at approximately 2.4 GHz, 7.0 GHz, 13.5 GHz, and 20.0 GHz.

RF Output Connector: APC-3.5 ®* Male

1. Unless otherwise noted, all specifications are at the RF OUTPUT connector and at 0° to 55°C.
2. Accuracy when calibrated with the FREQ CAL adjustment.
3. For temperatures greater than 25°C, Maximum Leveled Output Power typically degrades 0.1 dB/°C.
4. When RF output is peaked with PEAK control.
5. 0.5 dB lower for Option 004.
6. Attenuator switch points are every 5 dB starting at −5 dBm indicated power.
7. Discontinuity at 2.4 GHz bandswitch point is typically <0.25 dB.
8. Excludes coupler and detector variation. Crystal detector output should be between −10 mV and −200 mV at specified Maximum Leveled Power.
9. Use HP Model 432A/B/C Power Meter. Sweep time 100 seconds, typically ≥5 seconds/GHz but not ≤10 seconds.
10. Power Sweep and Slope compensation total must not exceed the specified Power Sweep calibrated range.
11. With Option 002, in Power Sweep or Slope functions, power can exceed the attenuator step by the amount that the Power Sweep calibrated range exceeds 5 dB (e.g. if the calibrated range is 7 dB, power can exceed the attenuator step by 2 dB).
12. Includes power level variations.

*APC-3.5® is a registered trade mark of the Bunker-Ramo Corporation.

Table 1-2. Supplemental Performance Characteristics for Model 83595A Installed in Model 8350A (1 of 2)

NOTE

Values in this table are not specifications, but are typical characteristics included for user information.

FREQUENCY CHARACTERISTICS [1]

Accuracy (25°C ±5°C) [2]	Frequency Bands (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**
CW Mode Typically	±2 MHz	±2 MHz	±3 MHz	±4 MHz	±5 MHz	±7 MHz
Manual Sweep	≤15 MHz	≤30 MHz	≤30 MHz	≤30 MHz	≤100 MHz	≤150 MHz
All Sweep Modes: (Sweep time 10 ms to 100 ms)	≤±5 MHz	≤±6 MHz	≤±8 MHz	≤±10 MHz	≤±35 MHz	≤±50 MHz
Sweep Mode Linearity [3]	≤±2 MHz	≤±2 MHz	≤±4 MHz	≤±6 MHz	≤±10 MHz	≤±15 MHz
Stability						
With Temperature	±200 kHz/°C	±200 kHz/°C	±400 kHz/°C	±600 kHz/°C	±800 kHz/°C	±800 kHz/°C
With Time (in a ten minute period after one hour warmup at the same frequency setting)	<±100 kHz	<±100 kHz	<±200 kHz	<±300 kHz	<±400 kHz	<±400 kHz

OUTPUT CHARACTERISTICS [1]

Power Output
Resolution (Displayed): 0.1 dB
Resolution (Power): Typically ±0.01 dB
Stability with Temperature (at specified Maximum Leveled Power): ±0.1 dB/°C

Power Variation (at specified Maximum Leveled Power or below)
Externally leveled with Negative Crystal Detector (sweep time 10 ms to 100 ms): [6] ±0.25 dB

Spurious Signals (in dB below carrier and at specified Maximum Leveled Power)	Frequency Bands (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**
Harmonics and Subharmonics	>35 dB	>40 dB	>35 dB	>35 dB	>35 dB	>35 dB
Non Harmonics Typically	>40 dB	>55 dB	>55 dB	>55 dB	>40 dB	>40 dB

Impedance
50 Ohms

Power Sweep [4]
Accuracy (including Linearity): Typically ±1.5 dB
Resolution (Displayed): 0.1 dB

Slope Compensation [4]
Linearity: Typically <0.2 dB
Calibrated Range: [5] Up to 5 dB/GHz; up to 15 dB for full sweep range
Resolution (Displayed): 0.01 dB/GHz

Table 1-2. Supplemental Performance Characteristics for Model 83595A Installed in Model 8350A (2 of 2)

MODULATION CHARACTERISTICS [1]

External AM

Frequency Response: Typically 100 kHz
Input Impedance: Approximately 10k Ohm
Range of Amplitude Control: Typically 15 dB
Sensitivity: Typically 1 dB/V

Pulse In

TTL compatible: Logic high = RF on, Logic low = RF off
0.01 to 26.5 GHz: Squarewave modulation up to 30 kHz
0.01 to 7.0 GHz:
Rise/Fall Time: Typically 10 ns
Minimum Pulse Width:
Leveled: Typically 1 μs
Unleveled Power Level set to +20 dBm: Typically 100 ns

External FM

Frequency Response (DC to 2 MHz): Typically ±3 dB
Sensitivity (Switch selectable)
Typically −20 MHz/V (FM Mode)
Typically −6 MHz/V (Phase-Lock Mode)
Input Impedance: 2000 Ohms nominal

GENERAL CHARACTERISTICS [1]

Frequency Reference Output: [3] 1 V/GHz ±25 mV (0.01 to 18.0 GHz) rear panel BNC output.
Auxiliary Output: Rear panel 2.3 to 7.0 GHz fundamental oscillator output, nominally 0 dBm.
Weight: Net 6.0 kg (13.2 lb.), Shipping 9.2 kg (20 lb.)

1. Unless otherwise noted, all characteristics are at the RF OUTPUT connector and at 0° to 55°C.
2. Accuracy when calibrated with the FREQ CAL adjustment.
3. With respect to the SWEEP OUT voltage.
4. Power Sweep and Slope compensation must not exceed the specified Power Sweep calibrated range.
5. With Option 002, in Power Sweep or Slope functions, power can exceed attenuator step by the amount that the Power Sweep calibrated range exceeds 10 dB (e.g. if the calibrated range is 12 dB, power can exceed the attenuator step by 2 dB).
6. Excludes coupler and detector variation. Crystal detector output should be between −10 mV and −200 mV at specified Maximum Leveled Power.

1-9. SAFETY CONSIDERATIONS

1-10. This product has been manufactured and tested in accordance with international safety standards. Before operation, this product and related documentation must be reviewed for familiarization with safety markings and instructions. A complete listing of Safety Considerations precedes Section I of this manual.

1-11. INSTRUMENTS COVERED BY MANUAL

1-12. Attached to the rear panel of the instrument is a serial number plate. A typical serial number plate is shown in 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 form the sequential suffix that is unique to each instrument. The content of this manual applies directly to instruments having the same serial number prefix as listed on the title page of this manual under SERIAL NUMBER.

1-13. An instrument manufactured after the printing of this manual may have a serial prefix that is not listed on the title page. An unlisted serial prefix indicates that the instrument is different from those documented in this manual. The manual for the instrument is then supplied with a Manual Changes supplement that contains information which documents the differences.

1-14. In addition to change information, the Manual Changes supplement may contain information for correcting errors in the manual. To keep this manual as current as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is keyed to the manual's print date and part number, both of which appear on the title page. Complimentary copies of the Manual Changes supplement are available on request from Hewlett-Packard.

1-15. For information concerning a serial number prefix that is not listed on the title page or in the Manual Changes Supplement, contact your nearest Hewlett-Packard Sales/Service Office.

1-16. DESCRIPTION

1-17. The Model 83595A is an RF Plug-In which has been designed for use with the Model 8350A Sweep Oscillator. The Model 83595A covers the frequency range of 0.01 to 26.5 GHz in five bands. A YIG Oscillator is used as the tunable RF frequency source for all bands. The lowest band (Band 0) uses a fixed 3.8 GHz oscillator which is mixed with the YIG Oscillator to generate a 0.1 to 2.4 GHz RF output. The YIG Oscillator fundamental frequency is used for Band 1 (2.3 to 7.0 GHz). A YIG Tuned Multiplier (YTM) is used to multiply the YIG Oscillator frequency for Bands 2, 3, and 4 (6.9 to 13.5 GHz, 13.4 to 20.0 GHz, and 19.9 to 26.5 GHz).

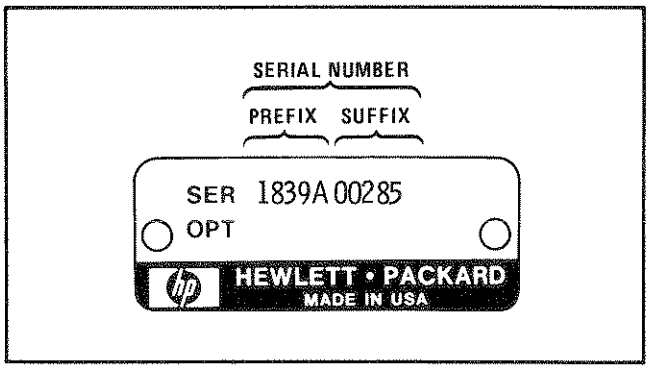


Figure 1-2. Typical Serial Number Plate

1-18. Model 83595A front panel functional controls, pushbuttons, and the Rotary Pulse Generator (RPG), are monitored by the Model 8350A via the RF Plug-In interface circuits. The Model 8350A generates a tuning voltage according to the mode of operation (CW, START/STOP, CF/ΔF). This signal is scaled and offset by the Plug-In to provide a voltage ramp (in swept modes) proportional to the YIG Oscillator and YTM frequency. The Model 83595A tuning circuits accept the tuning ramp output from the Model 8350A and convert it to a current which drives the YIG Oscillator and YTM tuning coil.

1-19. The standard Model 83595A offers a maximum leveled RF output power of +10 dBm up to 20 GHz (+4 dBm above 20 GHz). Internal (INT), External (EXT), and Power Meter (MTR) leveling are available as selected by the front panel pushbuttons. A front panel EXT/MTR ALC input connector and gain control (CAL) are provided to use with an external leveling loop. A front panel LED indicates when the RF output becomes unleveled. The RF output level is controlled by the Model 83595A RPG, the Model 8350A data entry controls (keypad and step keys), or through HP-IB control via the Model 8350A.

1-20. A power sweep function allows the RF output power to be swept at least 5 dB during CW

mode or swept frequency modes. Power sweep is selected by the front panel POWER SWEEP pushbutton. Slope compensation control is also available by selecting the SLOPE pushbutton and rotating the Model 83595A RPG or manipulating the Model 8350A data entry controls. The power sweep function and slope compensation may both be selected and modified through HP-IB control via the Model 8350A. HP-IB (Hewlett-Packard Interface Bus) is Hewlett-Packard's system of instrument-to-instrument communication. HP-IB is electrically compatible with the IEEE-488 and IEC-625 worldwide interface standards. In addition, HP-IB includes extensive hardware, software, documentation, and instrument-system support.

1-21. The RF output may be internally or externally amplitude modulated, or externally frequency modulated. The internal squarewave modulation frequency is selectable by the Model 8350A front panel or HP-IB. An internal 8350A jumper selects either 1 kHz or 27.8 kHz (for use with the Model 8755 Swept Amplitude Analyzer). Rear panel BNC connectors accept an external AM or FM signal. FM coupling (direct coupled or cross-over) and sensitivity are selected by an internal configuration switch in the Model 83595A. Refer to Section III, Operation, of this manual for detailed information on the configuration switch.

1-22. A rear panel 1V/GHz signal corresponds to the RF output frequency up to 18 GHz. This output voltage may by used as a reference for pretuning external equipment in phase-locking applications. (The Model 8410B/8411A Network Analyzer utilizes this output in such a configuration.)

1-23. The RF output may be turned off by the RF ON/OFF pushbutton. An internal switch is set to select whether the RF is on or off at turn on. RF power ON is indicated by the LED in the center of the pushbutton. Additionally, in CW mode, the CW FILTER, when selected, places a capacitor across the YIG Oscillator tuning coil to filter high frequency noise which would appear at the RF output. All front panel functions, with the exception of the FREQ CAL and EXT/MTR ALC CAL adjustments, may be set or altered via the HP-IB bus connection on the Model 8350A.

1-24. OPTIONS

1-25. Option 002, 55 dB Attenuator

1-26. Option 002 instruments contain a digitally controlled attenuator just before the RF output. Up to 55 dB of attenuation in 5 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.

1-27. Option 004, Rear Panel RF Output

1-28. Option 004 instruments have the APC-3.5 RF OUTPUT connector and the BNC EXT/MTR ALC input connector on the rear panel instead of the front panel.

1-29. SUPPLIED ACCESSORY

1-30. Figure 1-1 shows the HP 83595A RF Plug-In and the accessory adapter supplied. The adapter type and part number are as follows:

- SMA (f) to Type N (f) HP Part No. 1250-1404.

1-31. EQUIPMENT REQUIRED BUT NOT SUPPLIED

1-32. To have a complete operating Sweep Oscillator unit, the Model 83595A RF Plug-In must be installed in a Model 8350A Sweep Oscillator mainframe. Refer to Section II, Installation, in this manual for a detailed description of RF Plug-In installation.

1-33. EQUIPMENT AVAILABLE

1-34. Service Accessories

1-35. A Service Accessory Kit (HP Part Number 08350-60020) is available for servicing the Model 83595A RF Plug-In and the Model 8350A Sweep Oscillator. HP Part Numbers for the individual pieces of the kit are provided in Table 1-3. The accessory kit includes:

- Two 44-pin printed circuit board extenders. These boards have keyed slots which allow them to be used in each of the keyed PC board receptacles in the Model 83595A, and in the Model 8350A as well.

- An RF Plug-In extender cable set that provides all electrical connections when the RF Plug-In is removed from the Sweep Oscillator. The RF Plug-In Interface connector (P2) and the Power Supply Interface connector (P1) are extended by separate cables.

- One Hex Balldriver for use in Model 8350A front panel repairs.

- One 16-pin and one 20-pin I.C. Test Clip for probing integrated circuits.

1-36. A listing of service accessories available including service cables, wrenches, adapters, and extender boards is given in Table 1-3.

1-37. Model 8410B/8411A Network Analyzer

1-38. The Model 8350A Sweep Oscillator, with the Model 83595A RF Plug-In installed, is compatible with the HP Model 8410B Network Analyzer system. The combination of the Model 8410B Network Analyzer, the Model 8411A Frequency Converter, and an appropriate display Plug-In, forms a phasemeter and a ratiometer for direct phase and amplitude ratio measurement of RF voltages. These measurements can be made on CW frequencies and on swept frequencies from 110 MHz to 18 GHz. The Model 8350A/83595A combination is capable of operation over this full frequency range. The Model 8410B has an Auto-Frequency range mode which gives it the capability of automatically tracking the Model 8350A Sweep Oscillator over octave and multi-octave frequency bands. Two interconnections to the Model 8350A are necessary to ensure that the Model 8410B will phase-lock properly. The Model 8410B Source Control Cable (HP 08410-60146) connects the Model 8410B rear panel SOURCE CONTROL connector to the Model 8350A rear panel PROGRAMMING connector. Additionally, the Model 83595A RF Plug-In rear panel 1V/GHz output connects to the Model 8410B rear panel FREQ REF INPUT. The Model 8410B Source Control Cable connector pins and signals are illustrated in the Model 8350A Sweep Oscillator Operating and Service Manual.

1-39. Model 8755 Frequency Response Test Set

1-40. The Model 8350A Sweep Oscillator with the Model 83595A RF Plug-In installed is compatible with the Model 8755 Frequency Response Test Set for broadband swept scalar measurements. The Model 8350A provides internal 27.8 kHz squarewave amplitude modulation of the RF output, eliminating unnecessary cable connections to the Model 8755 or the use of an external modulator. The Model 8350A can also produce alternate sweeps through use of the ALT n function which works in conjunction with the channel switching circuits in the Model 8755C. This permits Channel 1 on the Model 8755C to respond only to the Model 8350A current state and Channel 2 to the alternate state. A single cable (HP Part Number 8120-3174) connects between the Model 8350A rear panel ALT SWP INTERFACE connector and the Model 8755C front panel ALT SWP INTERFACE connector.

1-41. Power Meters and Crystal Detectors

1-42. The RF output can be externally leveled using the HP Model 432A Power Meter or negative polarity output crystal detectors. Refer to Section III, Operation, of this manual for detailed information on leveling techniques that may be used with the Model 8350A/RF Plug-In combination.

NOTE

The Model 435A and 436A Power Meters should not be used in Model 8350A/Model 83595A external leveling systems.

1-43. RECOMMENDED TEST EQUIPMENT

1-44. Equipment required for testing and adjusting the instrument is listed in Table 1-4. Other equipment may be substituted if it meets or exceeds the critical specifications indicated in the table.

Table 1-3. Model 83595A Service Accessories Available

Name	HP Part Number	Description
44-pin printed circuit board extender	08350-60031*	Extends printed circuit boards
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)
Adjustment Tool	8830-0024	Fits miniature adjustment slot on potentiometers
Wrenches	08555-20097	5/16" slotted box/open end
	8710-0946	15/64" open end
Service Cables	8120-1578	46 cm (18") coax with SMA (m) connector on each end
	83525-60019	25 cm (10") coax with SMB snap on (f) and SMA (m)
Adapters	1250-0777	Type N (f) to BNC (m)
	1250-0082	Type N (m) to BNC (m)
	1250-1404	Type N (f) to SMA (f)
	1250-1158	SMA (f) to SMA (f)
	1250-0674	SMA (f) to SMB (m)
	1250-0675	SMA (f) to SMC (m)
	1250-0069	SMB snap on (m) to SMB snap on (m)
	1250-1743	APC-3.5 (m) to N (m)
	1250-1750	APC-3.5 (m) to N (f)
	1250-1744	APC-3.5 (f) to N (m)
	1250-1745	APC 3.5 (f) to N(f)
	1250-1746	APC-3.5 (m) to APC-7
	1250-1747	APC-3.5 (f) to APC-7
	1250-1748	APC-3.5 (m) to APC-3.5 (m)
	1250-1749	APC-3.5 (f) to APC-3.5 (f)
Hex Balldriver	8710-0523*	Removes front panel hold down plate hex screws in 8350A
IC Test Clip	1400-0734*	16-pin IC test clip
	1400-0979*	20-pin IC test clip

*These items are included in a Service Accessories Kit HP Part No. 08350-60020 (2 board extenders are included in this kit).

Table 1-4. Recommended Test Equipment (1 of 3)

Instrument	Critical Specifications	Recommended Model	Use*
Sweep Oscillator	No substitute	HP 8350A	P,A,T
Digital Voltmeter (DVM)	Range: −50V to +50V Accuracy: ±0.01% Input Impedance: ⩾10M Ohms	HP 3456A	A,T
Oscilloscope	Dual Channel Bandwidth: DC to 100 MHz Vertical Sensitivity: ⩽5 mV/DIV Horizontal Sweep Rate: ⩽0.1μS/DIV External Sweep Capability	HP 1740A	P,A,T
Oscilloscope Probe	1:1 General Purpose Probe	HP 10008B	A
Frequency Counter	Frequency Range: 0.01 to 26.5 GHz Input Impedance: 50 Ohms Resolution: ⩽1 MHz	HP 5343A	P,A
Spectrum Analyzer	Frequency Range: 0.01 to 22.0 GHz Residual FM: <100 Hz	HP 8565A or 8569A or HP 8566A	P,T

Table 1-4. Recommended Test Equipment (2 of 3)

Instrument	Critical Specifications	Recommended Model	Use*
Swept Amplitude Analyzer	Capable of Transmission Measurements Power Resolution: ⩽0.25 dB	HP 8755C	A
Display Mainframe	Compatible with 8755C Swept Amplitude Analyzer	HP 180TR, 182T	A
Detectors (2)	Compatible with Swept Amplitude Analyzer Frequency Range: 0.01 to 26.5 GHz Power Range: −20 to +10 dBm	HP 11664B	A
Frequency Meter	Frequency Accuracy: ⩽0.17% Calibration Increments: ⩽2 MHz		
	Frequency Range: 0.96 to 4.0 GHz	HP 536A	A
	4.0 to 12.4 GHz	HP 537A	A
	12.4 to 18 GHz	HP P532A	A
	18.0 to 26.5 GHz	HP K532A	A
Function Generator	Frequency Range: 0.1 Hz to 10 MHz Sinewave and squarewave output Output Level: 10Vp-p into 50 Ohms Output Level Flatness: ⩽±3% from 10 Hz to 100 kHz ⩽±10% from 100 kHz to 10 MHz	HP 3312A	P,A,T
Power Meter	Power Range: −20 to +10 dBm (No substitute when used for external power meter leveling).	HP 432A	P,A
Thermistor Sensor	Frequency Range: 0.01 to 18 GHz Maximum SWR: ⩽1.75	HP 8478B	P,A
Thermistor Sensor	Frequency Range 18 to 26.5 GHz Maximum SWR: ⩽2.0	HP K486	P,A
Adapter	Waveguide to APC 3.5 (f) (for use with HP K486)	HP K281C	A
Power Meter	Power Range: 1 μW to 100 mW	HP 436A	P,A
Power Sensor	Frequency Range 0.05 to 26.5 GHz	HP 8485A	P,A
Crystal Detector**	Frequency Response: 0.01 to 26.5 GHz Maximum Input Power: 100 mW	HP 8473C	P,A
Attenuator**	Frequency Range: 0.01 to 20.0 GHz Maximum Input Power: +20 dBm Attenuation:		
	20 dB ±1.0 dB	Weinschel Model M9-20	P
	10 dB ±0.8 dB	Weinschel Model M9-10	P,A
	6 dB ±0.6 dB	Weinschel Model M9-6	P
	3 dB ±0.5 dB	Weinschel Model M9-3	P

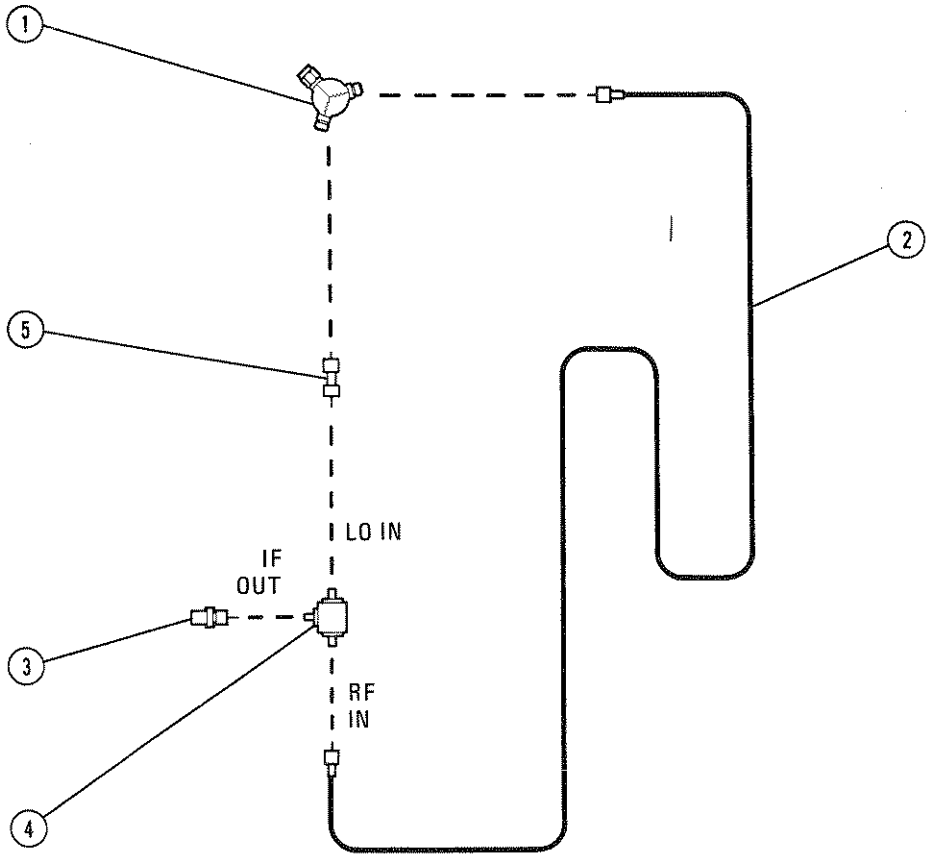
Table 1-4. Recommended Test Equipment (3 of 3)

Instrument	Critical Specifications	Recommended Model	Use*
Power Splitter**	Frequency Range: 0.01 to 26.5 GHz Maximum Input Power: ≥+20 dBm	Weinschel Model 1579A	P, A
Directional Coupler	Frequency Range: 0.1 to 2.0 GHz Nominal Coupling: ≥20 dB Maximum Coupling Variation: ≥±1 dB Minimum Directivity: ≥32 dB	HP 778D	P
Directional Coupler	Frequency Range: 2.0 to 18 GHz Nominal Coupling: ≥22 dB Maximum Coupling Variation: ±1 dB Minimum Directivity: 26 dB	HP 11691D	P
Directional Coupler	Frequency Range: 18 to 26.5 GHz Nominal Coupling: 10 dB Maximum Coupling Variation: ±0.5 dB Minimum Directivity: 40 dB	HP K752C	P
RMS Voltmeter	dB Range: −20 to −70 dBm (0 dBm = 1 mW into 600 ohms) Frequency Range: 10 Hz to 10 MHz Accuracy: ±5% of full scale	HP 3400A	P
Air Line Extension (2 required)	Impendance: 50 Ohms Frequency Range: DC to 18 GHz Reflection Coefficient: 0.018 to 0.001 (times the frequency in GHz)	HP 11567A	P
Step Attenuator	Frequency Range: DC to 18 GHz Incremental Attenuation: 0 to 70 dB in 10 dB steps Calibration Accuracy: ≤±0.1 dB at all steps	HP 8495B Option 890	P
Adjustable Short	Frequency Range: 1.1 to 18 GHz Impendance: 50 ±1.5 Ohms	Maury Microwave 1953-2	P
DC Power Supply	DC Output: 0 to 6.5 Vdc ±0.05 Vdc	HP 6213A	A
50 Ohm Termination	Type N, 50 ±0.5 Ohms	HP 909A	P
Delay Line Discriminator	Refer to Figure 1-3.		P, A
PC Board Extender	44-pin, extends printed circuit boards	HP Part No 08350-60031	A,T

* P = Performance Test; A = Adjustments; T = Troubleshooting

** For testing at frequency of ≤18 GHz, the following equipment may be substituted:

ATTENUATORS	POWER SPLITTER	CRYSTAL DETECTOR
20 dB HP 8491B Option 020	HP 11667A	HP 8470B
10 dB HP 8491B Option 010		
6 dB HP 8491B Option 006		
3 dB HP 8491B Option 003		



Item	Description	HP Part Number
1	Power Splitter: Weinschel Model 1579B	none
2	Delay Line: > 1 meter (3 feet) in length, SMA Male connectors	08503-20038
3	Adapter: BNC Female to SMA Male	1250-1200
4	Mixer: Double Balanced RHG Electronics Part No. DMS - 26 RHG Electronics Laboratories, Inc. Deer Park, NY 11729	none
5	Adapter: SMA Male to SMA Male	1250-1159

Figure 1-3. Delay Line Descriminator

SECTION II
INSTALLATION

2-1. INTRODUCTION

2-2. This section provides installation instructions for the Model 83595A RF Plug-In. This section also includes information about initial inspection, damage claims, preparation for use, packaging, storage, and shipment.

2-3. INITIAL INSPECTION

2-4. Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically. The contents of the shipment should be as shown in Figure 1-1. Procedures for checking electrical performance are given in Section IV, Performance Tests, of this Operating and Service Manual. If the instrument combination does not pass the electrical Performance Tests, refer to Section V, Adjustments, of this manual. If, after the adjustments have been made, the instrument combination still fails to meet specifications, and a circuit malfunction is suspected, refer to troubleshooting procedures in Section VIII, Service, in this manual. If the instrument does not pass the above electrical tests, if the shipment contents are incomplete, or if there is mechanical damage or defect, notify the nearest Hewlett-Packard Office. If the shipping container is damaged, or if the cushioning material shows signs of stress, notify the carrier as well as the Hewlett-Packard Office. Keep the shipping materials for the carrier's inspection. The HP Office will arrange for repair or replacement without waiting for claim settlement.

2-5. PREPARATION FOR USE

2-6. Power Requirements

2-7. When the Model 83595A RF Plug-In is properly installed, it obtains all power through the rear panel interface connector from the Model 8350A Sweep Oscillator.

2-8. RF Plug-In Configuration Switch

2-9. The Model 83595A RF Plug-In has a configuration switch (A3S1) located on the A3 Digital Interface Board. This switch must be preset prior to RF Plug-In operation in the Model 8350A. The configuration switch is an 8-section multiple switch. Each separate switch section corresponds to a separate RF Plug-In function such as FM sensitivity selection, FM input coupling selection (direct coupled or cross-over), RF power level at power on (maximum or off), and Option 002 Step Attenuator operation. Refer to Section III, Operation, in this manual for a complete description of the configuration switch and instructions on how to set the switches.

2-10. Interconnections

2-11. There are two rear panel interconnections from the Model 83595A RF Plug-In to the Model 8350A Sweep Oscillator. These are the RF Plug-In Interface connector (P2) and the Power Supply Interface connector (P1). A complete listing of pins and associated signals for these connectors is provided in Figures 2-1 and 2-2.

2-12. Mating Connectors

2-13. All of the externally mounted connectors on the Model 83595A are listed in Table 2-1. Opposite each connector is an industry identification, the HP part number of a mating connector, and the part number of an alternate source for the mating connector. For HP part numbers of the externally mounted connectors themselves, refer to Section VI, Replaceable Parts, of this manual.

2-14. Operating Environment

2-15. Temperature. The instrument may be operated in temperatures from 0°C to +55°C.

Table 2-1. Model 83595A Mating Connectors

83595A Connector		Mating Connector	
Connector Name	**Industry Identification**	**HP Part No.**	**Alternate Source**
J1 RF OUTPUT	APC-3.5 (m)	5061-1100	
J2 EXT/MTR ALC INPUT	BNC (f)	1250-0256 Straight cable	Specialty Connector 25-P118-1
J3 AUX OUTPUT	Type N (f)	1250-0882 Straight cable	Specialty Connector 25-P117-2
J4 PULSE IN	BNC (f)	1250-0256 Straight cable	Specialty Connector 25-P118-1
J5 1V/GHz	BNC (f)	1250-0256 Straight cable	Specialty Connector 25-P118-1

2-16. Humidity. The instrument may be operated in environments with humidity from 5% to 80% relative at +25°C to +40°C. However, the instrument should also be protected from temperature extremes which cause condensation within the instrument.

2-17. Altitude. The instrument may be operated at altitudes up to 4572 meters (15,000 feet).

2-18. Cooling. When the Model 83595A RF Plug-In is properly installed in the Model 8350A Sweep Oscillator, it obtains all of its cooling airflow by forced ventilation from the fan in the Model 8350A. A diagram showing the various cooling airflow paths within the Sweep Oscillator is given in Section II, Installation, of the Model 8350A Sweep Oscillator Operating and Service Manual. Ensure that all airflow passages in the Model 8350A and the Model 83595A are clear before installing the RF Plug-In in the Sweep Oscillator.

2-19. Installation Instructions

2-20. To operate as a completely functional Sweep Oscillator, the Model 83595A RF Plug-In must be installed in a Model 8350A Sweep Oscillator. To install the Model 83595A RF Plug-In in the Model 8350A Sweep Oscillator:

a. Set the Model 8350A mainframe LINE switch to OFF.

b. Remove all connectors and accessories from the front and rear panel connectors of the Model 83595A to prevent them from being damaged.

c. Position the RF Plug-In unit latching handle in the fully raised position. The latching handle should spring easily into the raised position and be held by spring tension.

d. Ensure that the Model 8350A RF Plug-In channel is clear. Align the RF Plug-In in the channel and slide it carefully into place toward the rear of the channel. It should slide easily without binding.

e. The drawer latch handle slot will engage with the locking pin just before the RF Plug-In is fully seated in position.

f. Press the latch handle downward, while still pushing in on the RF Plug-In, until the drawer latch is fully closed and the front panel of the RF Plug-In is aligned with the Sweep Oscillator front panel.

2-21. STORAGE AND SHIPMENT

2-22. Environment

2-23. The instrument may be stored or shipped in environments within the following limits:

Temperature..... −40°C to +75°C
Humidity ..... 5% to 95% relative at 0° to +40°C
Altitude ..... Up to 15240 meters (approximately 50,000 feet)

2-24. The instrument should also be protected from temperature extremes which may cause condensation in the instrument.

2-25. Packaging

2-26. Original Packaging. Containers and materials identical to those used in factory packaging are available through Hewlett-Packard offices. A complete diagram and listing of packaging materials used for the Model 83595A is shown in Figure 2-3. If the instrument is being returned to Hewlett-Packard for servicing, attach a tag indicating the type of service required, return address, model number, and full serial number (located on the rear panel serial plate). Mark the container FRAGILE to ensure careful handling. In any correspondence, refer to the instrument by model number and full serial number.

2-27. Other Packaging. The following general instructions should be used for repackaging with commercially available packaging materials:

a. Wrap the instrument in heavy paper or plastic. If shipping to a Hewlett-Packard Office or Service Center, attach a tag indicating the type of service required, return address, model number, and full serial number.

b. Use a strong shipping container.

c. Use enough shock-absorbing material around all sides of the instrument to provide a firm cushion and to prevent movement inside the container. Protect the control panel with cardboard.

d. Seal the shipping container securely.

e. Mark the shipping container FRAGILE to ensure careful handling.

f. In any correspondence, refer to the instrument by model number and full serial number.

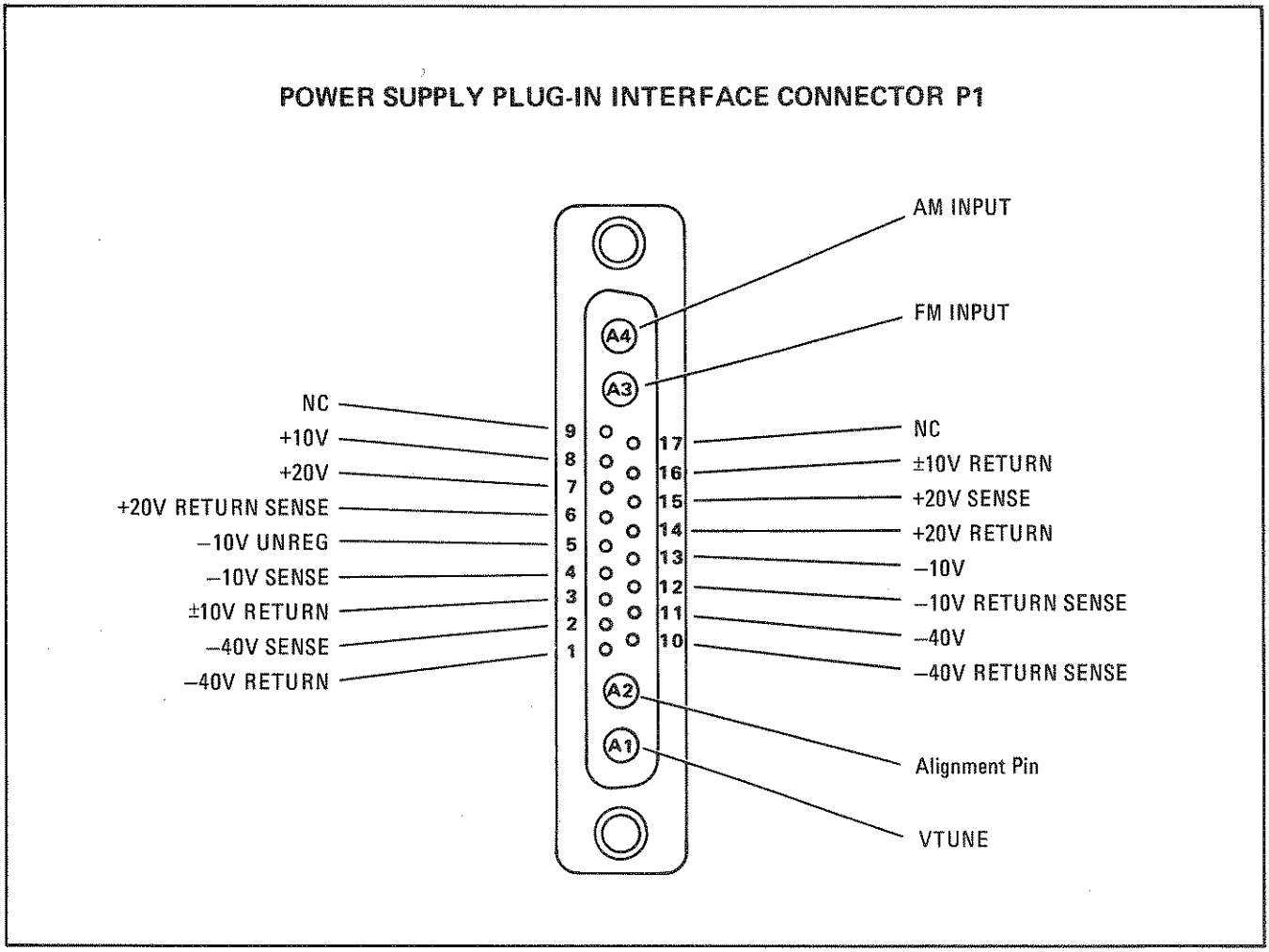


Figure 2-1. Interface Signals on Connector P1

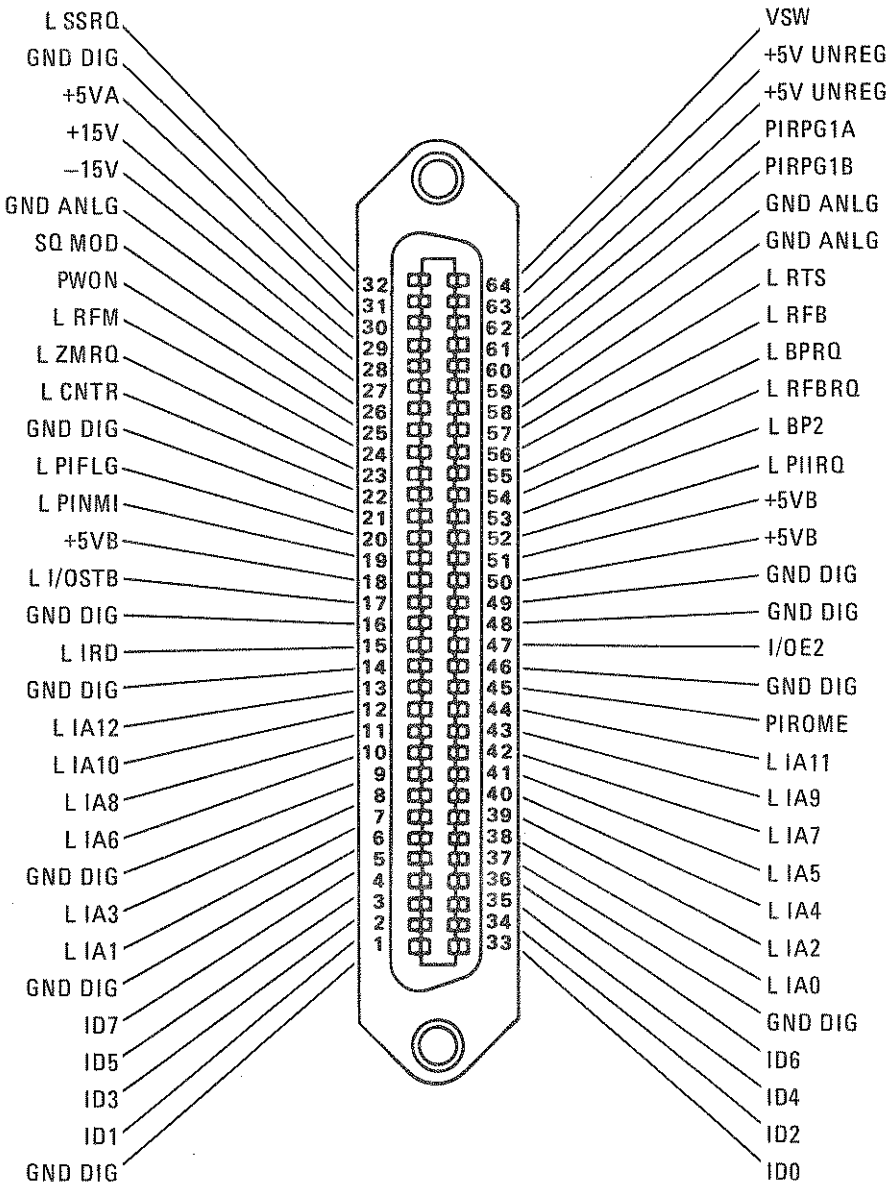
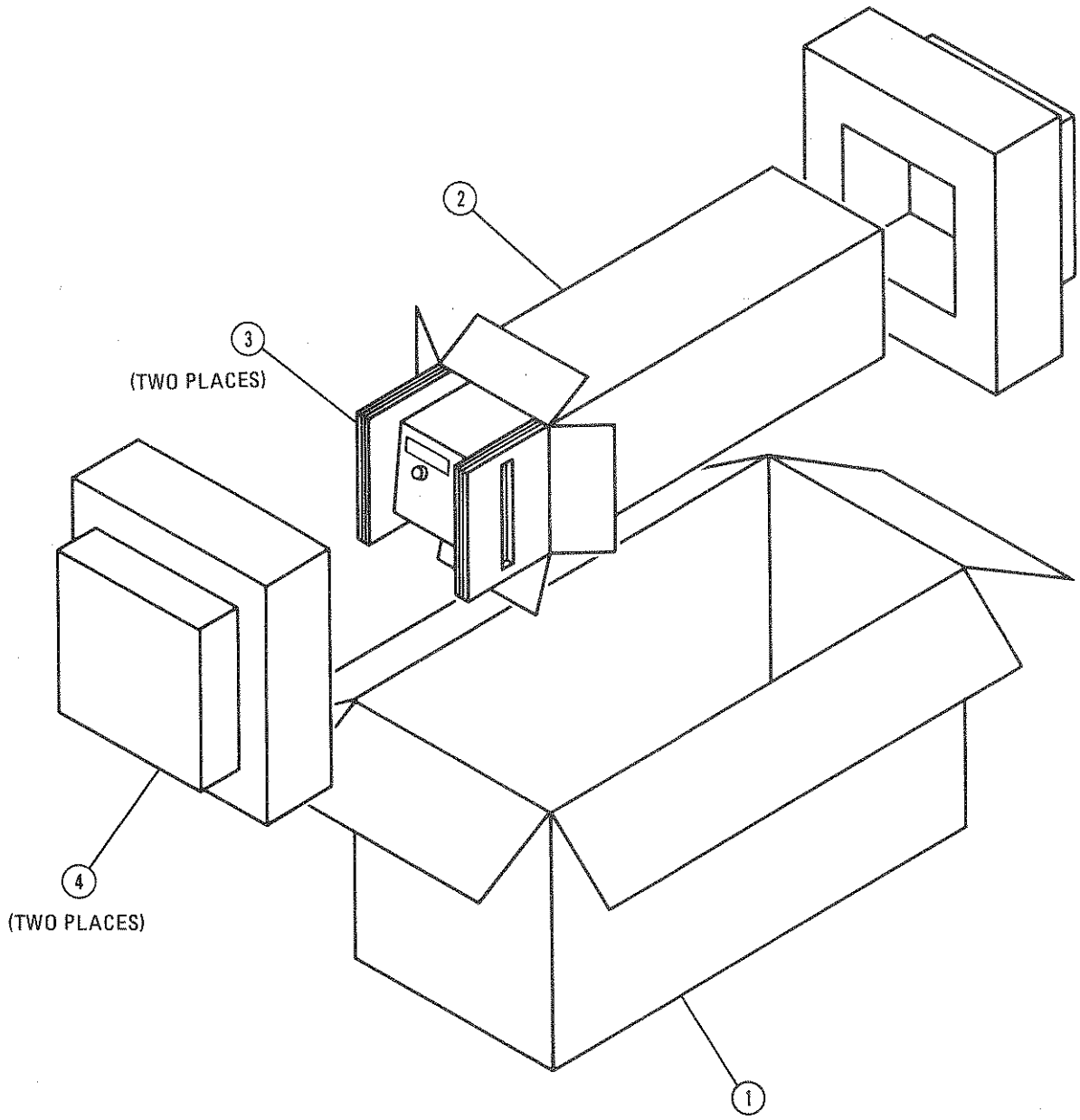


Figure 2-2. Interface Signals on Connector P2



Item	Quantity	HP Part Number	C D	Description
1	1	9211-3515	6	Outer Carton
2	1	9211-3514	5	Inner Carton
3	2	9220-3409	6	Side Pads — Corrugated Cardboard
4	2	9220-3406	3	Foam Pads
	1	9222-0352	6	Poly Bag — to cover instrument

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

SECTION III
OPERATION

3-1. INTRODUCTION

3-2. This section is divided into four major parts. Operating Characteristics explains the bandswitching and frequency resolution characteristics in CW and swept modes. Front and rear panel Panel Features are shown with illustrated descriptions. Operating Instructions provide a front panel frequency calibration procedure, configuration switch setting instructions, and crystal detector and power meter leveling instructions. Operator's Maintenance includes information on the Plug-In error codes, fuses, and service tags.

3-3. OPERATING CHARACTERISTICS

3-4. Bandswitching and Resolution

3-5. The following paragraphs describe the bandswitching and frequency resolution characteristics of the 83595A RF Plug-In.

3-6. The 83595A 10 MHz to 26.5 GHz RF output is provided in five bands. When sweeping a range of frequencies larger than a single band, the switching between these bands is done automatically. Careful selection of sweep frequencies may avoid problems associated with bandswitching such as harmonics, sweep time, stability, or switching discontinuities. Figure 3-1 illustrates the bandswitching points in the sequential and single band sweep modes.

3-7. Two areas relating to frequency resolution must be considered: these are input resolution and displayed resolution. Input resolution refers to the number of bits (8 bits = 256 points) in the digital to analog converter (DAC) used to generate the tuning voltage for a particular mode of operation. Table 3-1 cross-references input resolution with each DAC used. Displayed frequency resolution refers to the number of digits shown on the 8350A FREQUENCY displays.

3-8. Figure 3-2 is a simplified block diagram of the frequency tuning circuits. The net tuning voltage results from the summation of the three DAC outputs. With this DAC configuration the START/STOP sweep mode is computed by the microprocessor into a center frequency and a ΔF sweep width. Therefore the operation of all sweeps is set with a center frequency and sweep width. The center frequency is specified by the center frequency (CF) DAC and the Vernier DAC, and the sweep width is determined by the ΔF DAC.

3-9. The CF DAC has 12 bits, hence 4096 points across any of the Plug-In frequency bands (including overrange). The analog output ranges from zero to ten volts, which is used to coarsely specify the center frequency output of the Plug-In. These parameters give the CF DAC a resolution of 0.024% (2.5mV) over the full band (including overrange).

3-10. Resolution of Center Frequency is enhanced by a summed voltage generated by an 8-bit (256 points) Vernier DAC. Vernier range is set to $\pm$0.05% of bandwidth (including overrange). In multiband Plug-Ins, total range of the vernier will vary with each band sweep. Vernier resolution is determined by dividing $\pm$0.05% bandwidth by 256 points (128 points on either side of CF). The voltage range of the total 256 points on the Vernier DAC is equal to four points on the 12-bit CF DAC (two points on either side of CF). This increases CF resolution from 0.024% (2.5mV) to 0.00038% (.04mV), and improves the relative accuracy of the CF by a similar factor.

NOTE

When the vernier is adjusted through its zero-point, the CF DAC is incremented or decremented by the total value of the vernier (2 points on the CF DAC). At this time the accuracy of the Center Frequency is again entirely dependent on the CF DAC, 0.005% of bandwidth.

3-11. The ΔF DAC has 10 bits (1024 points). The analog output from this DAC ranges from -5 to $+5$ volts to produce an even sweep on either side of the center frequency. The ΔF resolution improves with narrower sweep widths. For broad sweeps, the resolution is 0.1% of the full band. Greater resolution is provided

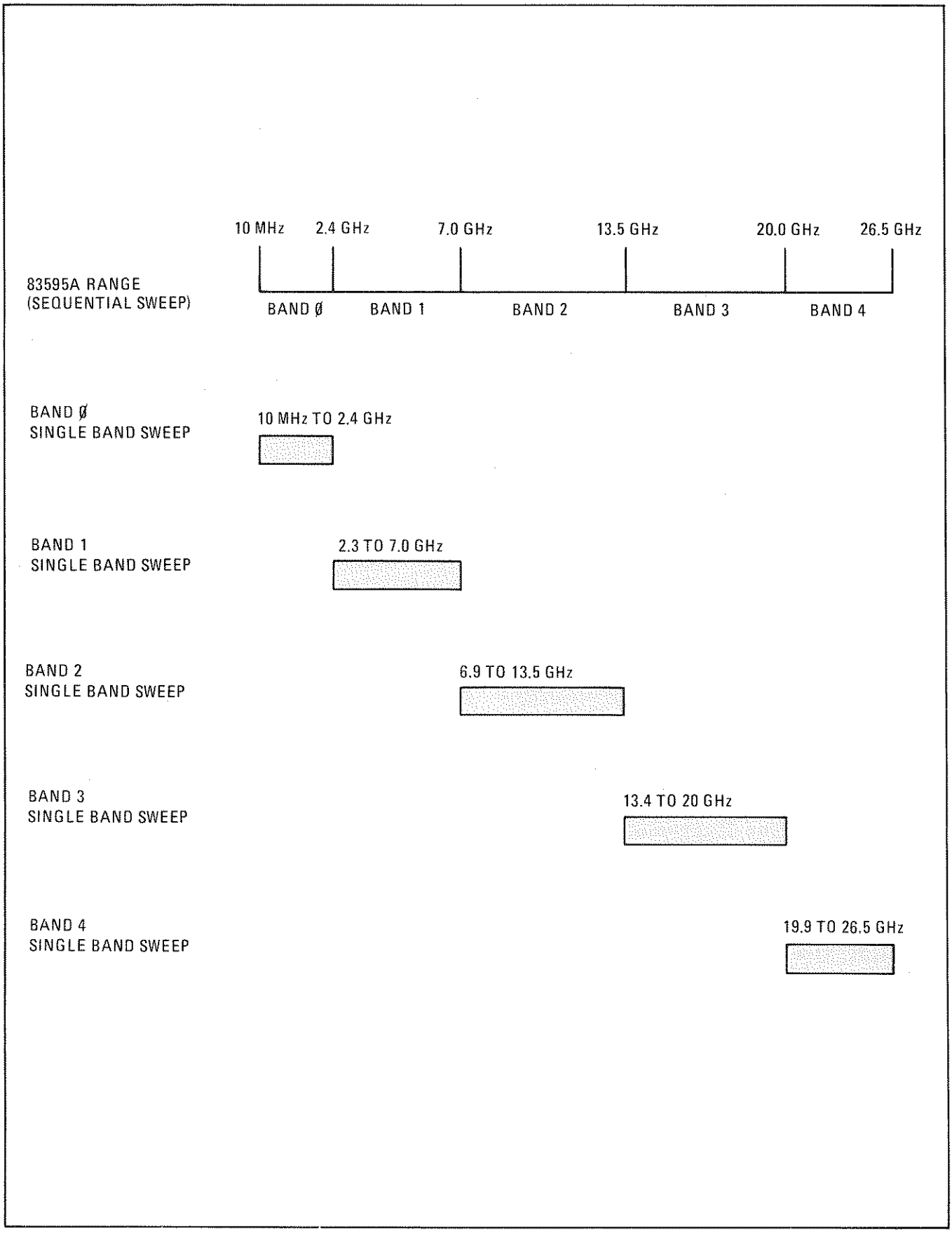


Figure 3-1. Bandswitching in Sequential and Single Band Sweep Modes

for sweep widths less than 1/8 of the full band range. At these sweep widths, the resolution is improved to 0.012% of the full band.

3-12. Center Frequency is always displayed with 1 MHz resolution. Likewise, Vernier values are always displayed at 10 kHz resolution. Display resolutions for ΔF values vary with sweep width. Figure 3-3 illustrates the ΔF mode displayed resolution values versus displayed ΔF frequency sweep widths.

3-13. PANEL FEATURES

3-14. Front and rear panel features are described in Figures 3-4 and 3-5, respectively. Numbered callouts on the features described match numbered descriptions below each figure.

3-15. OPERATORS CHECKS

3-16. The Operator's Checks portion (Local and Remote) of the 8350A Sweep Oscillator manual provides a quick evaluation of both 8350A and 83595A main functions. Error codes 50 to 99, displayed on the 8350A FREQUENCY display, are reserved to indicate Plug-In related problems. The 8350A Local Check covers the Sweep Oscillator and RF Plug-In. If the correct indications are not obtained, trouble may be in either of the units. If the RF Plug-In is suspected, follow the troubleshooting information in Section VIII, Service, in this manual, to isolate the problem.

3-17. OPERATING INSTRUCTIONS

3-18. Front Panel FREQ CAL

NOTE

The 83595A RF Plug-In may not meet the frequency accuracy specifications unless the front panel FREQ CAL (frequency calibration) procedure is performed.

3-19. The front panel FREQ CAL procedure, shown in Figure 3-6, should be performed after the instrument has warmed up for at least one hour. This procedure calibrates the RF output frequency for Band 0 with an external frequency counter.

3-20. Peaking RF Output Power

3-21. Front panel PEAK is a control used to adjust the YTM tracking of the YIG Oscillator to optimize output power by adjusting the tracking at frequencies of interest or to compensate for mistracking due to aging. The control may be used to correct small tracking offsets until adjustments are performed. The front panel PEAK function is accessed by pressing SHIFT POWER LEVEL . In order to monitor the effect of the Peaking function on the RF output, the 83595A must be set for an unleveled power condition. This can be accomplished by setting the ALC Mode to External (without an external detector) or increasing the Power setting until the RF output is unleveled. With the Peak function selected and an unleveled RF output, the POWER control should be adjusted to maximize the RF output power over the 2.4 to 26.5 GHz frequency range.

Table 3-1. Input Resolution

DAC Used	Voltage Resolution	Frequency Resolution					
		Band 0 0.01 to 2.4 GHz	Band 1 2.4 to 7.0 GHz	Band 2 7.0 to 13.5 GHz	Band 3 13.5 to 20 GHz	Band 4 20 to 26.5 GHz	Full Sweep 0.01 to 26.5 GHz
CF	2.44 mV	606.9 kHz	1.168 MHz	1.65 MHz	1.65 MHz	1.65 MHz	6.73 MHz
Vernier	38.8 μV	9.63 kHz	18.53 kHz	26.20 kHz	26.20 kHz	26.20 kHz	106.8 kHz
ΔF 1−1/8 of band	9.78 mV	2.43 MHz	4.67 MHz	6.61 MHz	6.61 MHz	6.61 MHz	26.93 MHz
ΔF 1/8−1/64 of band	1.22 mV	303.7 kHz	584.5 kHz	826.0 kHz	826.0 kHz	826.0 kHz	3.37 MHz
ΔF ≤1/64 of band	152.7 μV	37.9 kHz	73.1 kHz	103.2 kHz	103.2 kHz	103.2 kHz	420.8 kHz

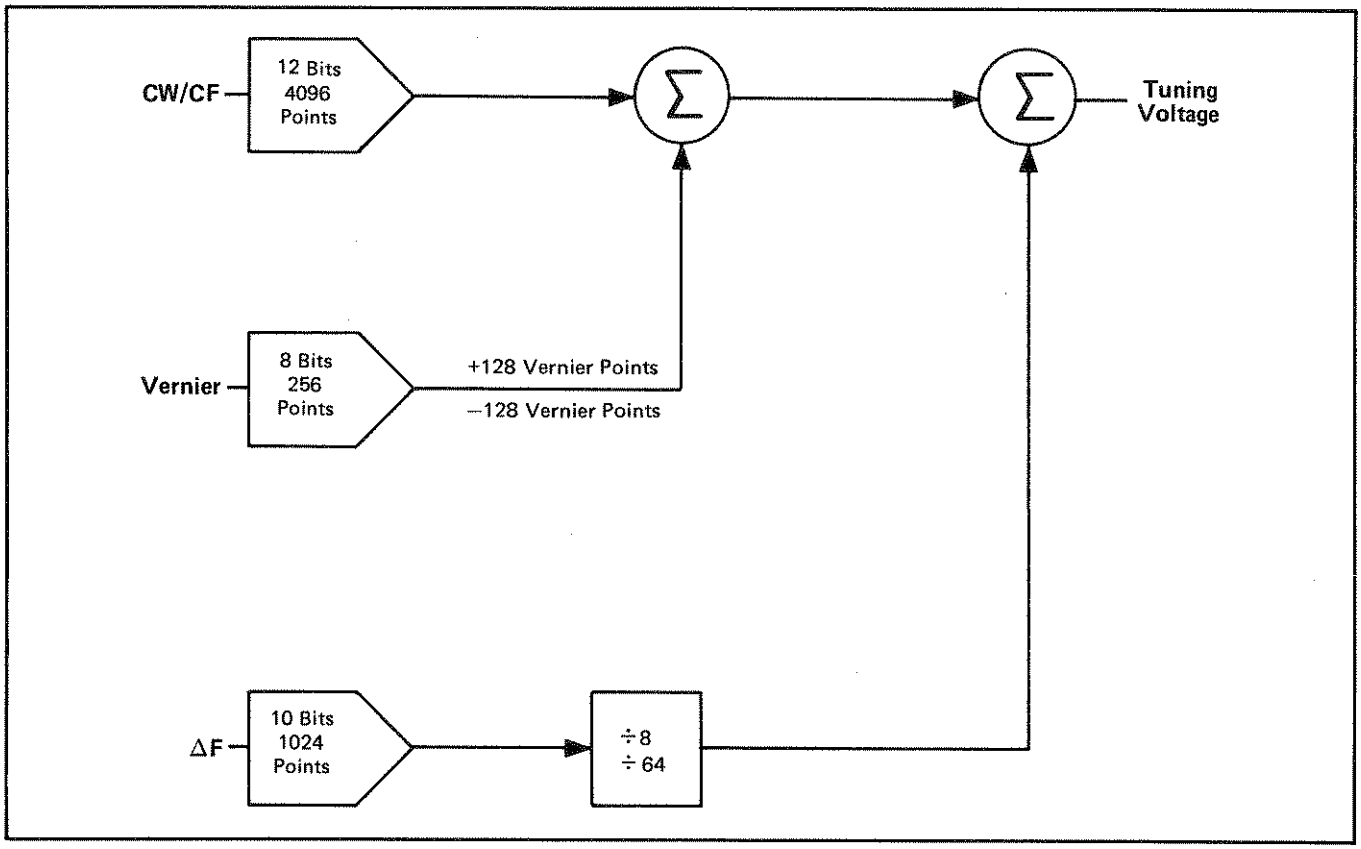


Figure 3-2. Simplified Tuning Voltage Block Diagram

ΔF Display Frequency Width

	0 MHz	124 MHz	1 GHz	4.2 GHz	26.5 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 3-3. Delta F Sweep Mode Displayed Resolution

3-22. Internal Leveling

3-23. The most convenient method of RF output leveling is internal leveling. A portion of the RF output is coupled out of an internal directional detector, producing a DC voltage proportional to the RF output signal. This detected DC voltage is applied to the automatic leveling control circuit (ALC).

3-24. External Crystal Detector Leveling

3-25. RF output power may also be leveled externally using a power splitter (or external directional coupler) and a negative output crystal detector. This leveling system uses a power splitter to sample a portion of the RF output signal with a crystal detector to produce a DC voltage proportional to the RF output power level. The detector output voltage is compared with an internal reference voltage, and the difference voltage is applied, as modulator drive, to a PIN Modulator which changes the output power level to keep a constant RF output power level. A directional coupler may be used instead of a power splitter to sample the RF signal for the leveling loop. Directional couplers are usually narrow band devices, whereas the power splitter has a flatter frequency response over a wide frequency range. The advantage of a directional coupler is that it does not have as great a coupled loss as the 6 dB loss encountered with the power splitter, therefore a higher maximum leveled output power may be obtained. Figure 3-7 illustrates a typical crystal detector leveling setup.

3-26. External Power Meter Leveling

3-27. RF output power may also be leveled with a power meter and power splitter (or directional coupler) as shown in Figure 3-8. The sweep time is limited to greater than 100 seconds when this leveling method is used. A sample of the RF output signal is routed to a power meter which produces a DC output voltage proportional to the RF input signal level. This DC voltage is applied to the 83595A ALC circuits and compared with an internal reference voltage. A difference voltage is produced and amplified by the ALC amplifier before being applied, as modulator drive, to a PIN Modulator.

3-28. External FM

3-29. The 83595A RF output signal can be frequency modulated using an external modulating signal applied to the 8350A rear panel FM INPUT connector. The external FM function provides a means of obtaining an output frequency that varies under the control of an external modulating signal. A positive-going voltage at the FM INPUT causes output frequency to decrease, while a negative-going voltage causes output frequency to increase. The sensitivity and coupling of the modulating signal may be set via configuration switch A3S1. Figure 3-10 lists the available configuration switch settings. The configuration switch settings override 8350A Sweep Oscillator nonvolatile memory settings at Instrument Preset.

3-30. External Amplitude Modulation

3-31. Pulse Modulation (PULSE IN Connector on Plug-In). The PULSE IN connector provides pulsed or squarewave modulation, where the RF output is switched on and off. This input provides an on/off power ratio of greater than 30 dB below specified maximum leveled power. The PULSE IN input is normally at a TTL HIGH (approximately +3 volts DC). When a TTL LOW signal (approximately 0 volts DC) is applied, the RF output is turned off. To get the best pulse modulation performance, the RF output power should be set at +20 dBm. With this power setting, a pulse repetition rate of up to 1 MHz is achievable in the 0.01 to 7.0 GHz frequency bands. With leveled power in this frequency range, pulse repetition rates may be up to 100 kHz. In the 7.0 to 26.5 GHz frequency bands, RF power may be squarewave modulated at repetition rates up to 30 kHz at any power output setting. The input impedance for TTL level signals is approximately 500 ohms. If the PULSE IN circuit is driven beyond TTL levels, the input impedance is reduced to approximately 200 ohms due to the diode clamping action. See the specifications and supplemental characteristics in Section I for more details on the modulation characteristics when using this input.

3-32. Amplitude Modulation (AM INPUT Connector on 8350A). The AM INPUT provides linear amplitude changes (up to approximately 15 dB) proportional to the modulating input voltage. It is limited to a frequency response of about 100 kHz. For maximum depth of modulation (i.e. maximum modulation index), the RF power level should be set to the middle of the control range (e.g. +2.5 dBm for a Plug-In with calibrated power control from −5 to +10 dBm). For Plug-Ins equipped with Option 002 (55 dB step attenuator), the middle of the attenuator range whould be selected. The center of the power control range may be selected with the front panel power control or by applying a DC bias voltage on the external modulating

signal. A positive (+) DC voltage into the AM INPUT causes a decrease in RF output power; a negative (−) DC voltage causes an increase in RF output power.

3-33. RF Power Control

3-34. The RF power set at power-up (during Instrument Preset) may be either maximum power (10 dBm) or RF power OFF as selected by the configuration switch (A3S1). Refer to Figure 3-10 for this setting. Configuration switch settings relating to the specific model Plug-In used and Option 002 Step Attenuator equipped instruments must be set prior to operation. Configuration switch number 7 is set at the factory and should not be changed.

3-35. Option 002 Step Attenuator

3-36. With Option 002 installed, the RF output power may be continuously controlled from maximum leveled output power down to −60 dBm. When the selected POWER setting goes below −5 dBm, the step attenuator increments as required in 5 dB steps to a maximum attenuation of 55 dB. Within the individual 5 dB steps of the attenuator, the ALC loop adjusts the power output to the power level programmed by the front panel POWER control. Pressing SHIFT POWER SWEEP allows control of power within the ALC range without changing attenuator settings. The display in the SHIFT POWER SWEEP mode disregards attenuator settings and only displays the ALC setting. Pressing SHIFT SLOPE allows control of attenuator steps without affecting ALC setting. In this mode the attenuator setting is displayed.

3-37. Alternate Sweep Mode

3-38. If the alternate sweep mode is used and the 83595A changes frequency bands (e.g. Band 1 to Band 4) between each sweep, the minimum sweep time recommended is 100 milliseconds. This allows enough time for the bandswitch operation and settling time for the fundamental oscillator for the next sweep.

3-39. If the Option 002 attenuator is installed, and alternate sweep mode is selected, a slow sweep default condition of 1 second/sweep may occur. This default condition only occurs when the POWER settings of the two alternate sweeps require the attenuator to switch after each sweep. The attenuator is prevented from switching faster than one step per second to prevent damage to the attenuator relay coils due to overheating.

3-40. Phase-Lock Operation

3-41. The RF output signal of the 83595A can be phase-locked to a specified CW frequency using the HP 5344S Option 043 Microwave Source Synchronizer. The 83595A signal is automatically tuned by the 5344S. Alternatively the 83595A signal can be phase-locked to an external reference oscillator. In either case, the phase-lock signal is applied to the 8350A rear panel FM INPUT connector. The phase-lock function provides a means of obtaining a very stable CW signal by transferring the frequency stability of the 5344S Source Synchronizer or the reference oscillator to the 8350A and eliminating frequency drift. The 83595A CW frequency used for phase-locking may be either the RF output or the fundamental oscillator frequency available at the rear panel AUX OUTPUT. However, use of the front panel RF output requires a broadband coupling device. Therefore it is preferable to use the rear panel AUX OUTPUT for phase-locking. Configuration Switch A3S1 switch position 8 must be set according to which 83595A output signal is used as the CW source for phase-locking (see Figure 3-10). The CW filter should be turned off in phase-lock operation. Figure 3-9 shows an example of phase-locking the 83595A front panel RF output signal using the 5344S Source Synchronizer and the 11691D 2 to 18 GHz Directional Coupler.

3-42. OPERATOR'S MAINTENANCE

3-43. Plug-In Error Codes

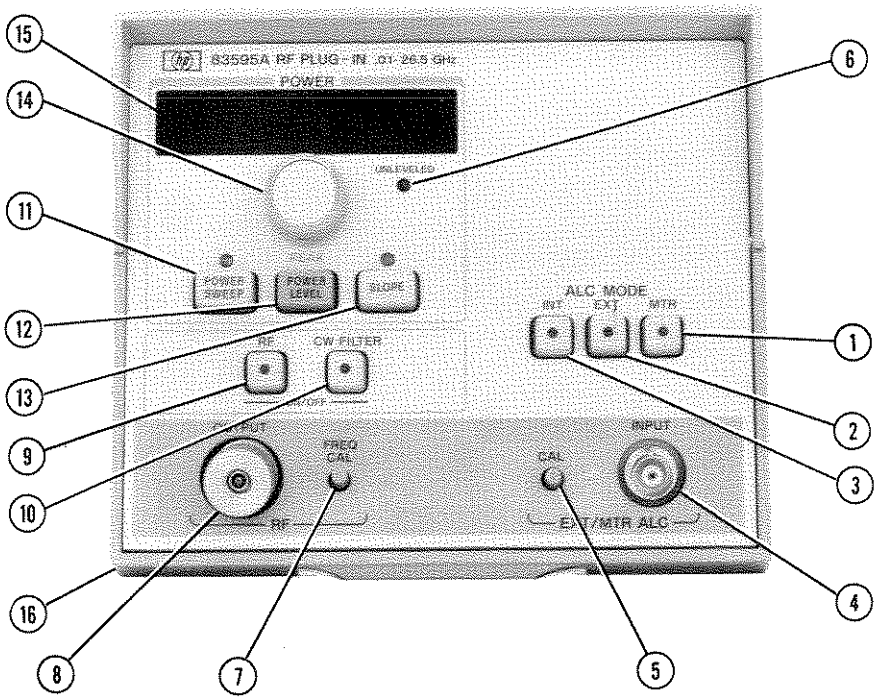
3-44. The 8350A FREQUENCY window will display RF Plug-In error codes (50 to 99) or Sweep Oscillator error codes. Information necessary to interpret Plug-In error codes may be found in Section VIII, Service, in this manual.

3-45. Fuses

3-46. Power circuits for the Model 83595A RF Plug-In are fused in the 8350A Sweep Oscillator. See the 8350A Sweep Oscillator Operating and Service Manual for fuse locations and replacement instructions.

3-47. Blue Service Tags

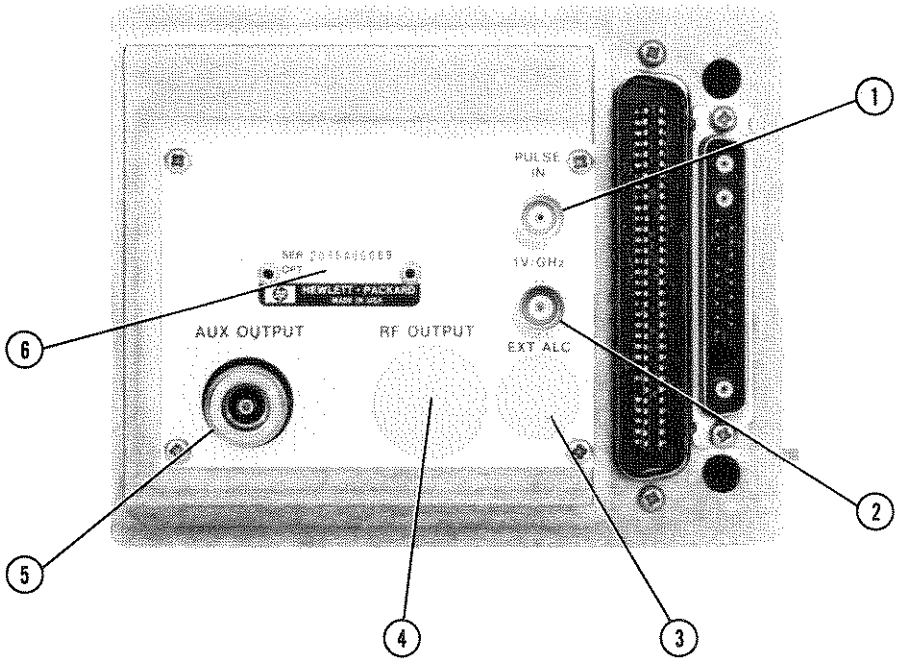
3-48. If the 83595A RF Plug-In requires service, the instrument may be sent to your local HP service organization as described in Section II, Installation, in this manual. Before sending the instrument back, fill out and attach one of the blue service tags. Record any error codes noted on the failure symptoms/special control settings portion of the tag.



FRONT PANEL FEATURES

1. Power meter automatic leveling control selection (HP 432 only).
2. External (crystal detector) automatic leveling control selection (negative crystal output).
3. Internal leveling control selection.
4. Connector (BNC) for power meter or external crystal leveling inputs (rear panel on Option 004).
5. Power level CAL adjust, for setting external (MTR or EXT) ALC.
6. UNLEVELED lamp lights if output power is unleveled.
7. Fine frequency adjust used for front panel frequency calibration.
8. APC-3.5 50-ohm RF OUTPUT connector (rear panel on Option 004.
9. RF on-off key. Used for zeroing a power meter or referencing an X-Y recorder.
10. CW FILTER enables an oscillator tune voltage filter in CW mode.
11. POWER SWEEP allows setting an increase in power per sweep (dB/SWP). SHIFT POWER SWEEP (Option 002) latches the Step Attenuator at its current setting. Power Level changes are controlled by the ALC loop.
12. POWER LEVEL allows setting of output power for all ALC modes (may be calibrated for external leveling). PEAK allows peaking of RF output power (selected when SHIFT POWER LEVEL is pressed).
13. SLOPE allows setting of the frequency slope compensation in dB/GHz (for lossy devices). SHIFT SLOPE (Option 002) latches the ALC loop at its current reference level. Power level changes are controlled by the Step Attenuator (5 dB steps).
14. Power control knob for controlling power sweep, power level, peak, or slope.
15. Plug-In display provides readout of selected power mode in dBm, dB/GHz, or dB/SWP to a tenth of a dB/dBm.
16. Plug-In latch handle is used to remove, install, and latch the RF Plug-In in the Sweep Oscillator.

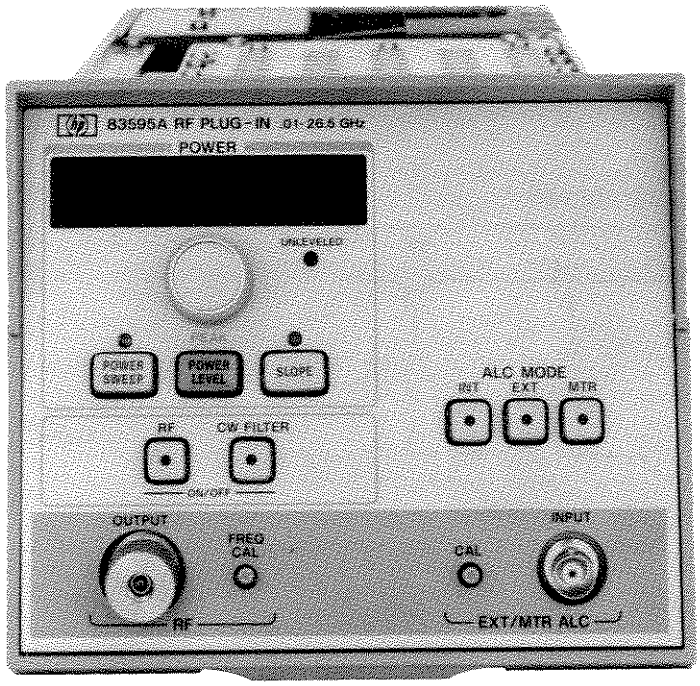
Figure 3-4. Front Panel Features



REAR PANEL FEATURES

1. PULSE IN connector is used to input external pulse or squarewave modulation.
2. 1V/GHz connector provides a frequency reference output of approximately 1 volt DC per GHz (to 18 GHz only).
3. EXT ALC connector replaces front panel EXT ALC connector on Option 004 Plug-Ins.
4. RF OUTPUT connector replaces front panel RF output connector in Option 004 Plug-Ins.
5. AUX OUTPUT connector provides 2.3 to 7.0 GHz fundamental oscillator output at approximately 0 dBm.
6. Serial Number plate has a ten digit serial number (used in any correspondence concerning Plug-In) and Option number if applicable.

Figure 3-5. Rear Panel Features



FREQ CAL PROCEDURE

1. Press 8350A INSTR PRESET CW 5 0 MHz .
2. Connect external frequency counter through a 10 dB attenuator to the RF OUTPUT connector.
3. Adjust FREQ CAL control for a frequency counter indication of 50.0 MHz.

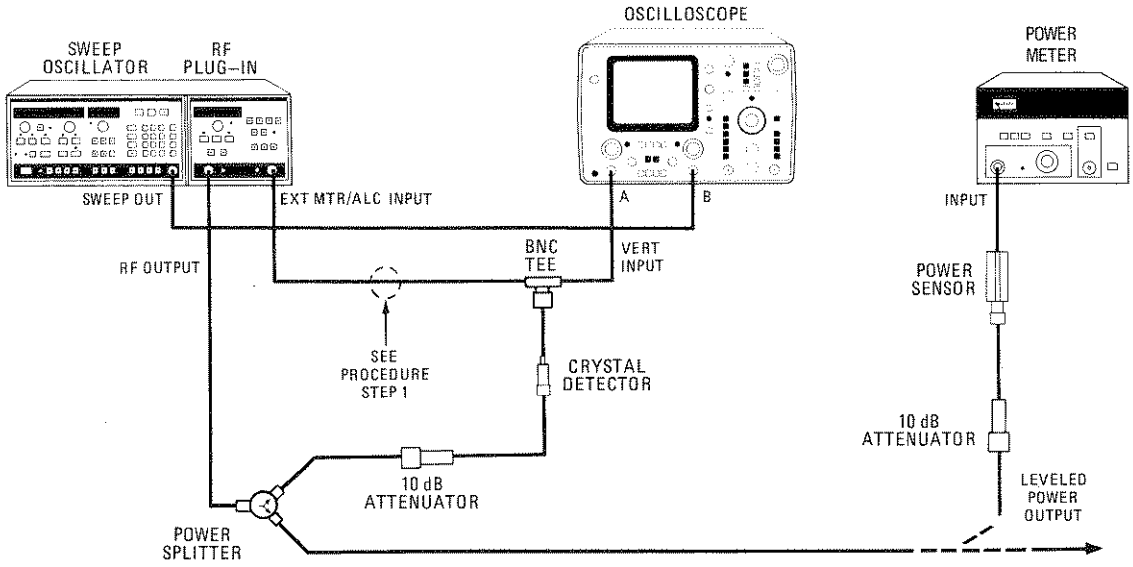
ALTERNATE FREQ CAL PROCEDURE

NOTE

This alternate FREQ CAL procedure is not as accurate as using an external counter, but normally calibrates the Band 0 frequency accuracy within specifications.

1. Press INSTR PRESET CW 0 MHz .
2. Adjust FREQ CAL control through its range and note the portion of its range that the UNLEVELED light is turned on. Set the FREQ CAL control to the center of this range.

Figure 3-6. Front Panel FREQ CAL Procedure



EXTERNAL CRYSTAL DETECTOR LEVELING

EQUIPMENT:

Sweep Oscillator	HP 8350A
RF Plug-In	HP 83595A
Oscilloscope	HP 1740A
Power Meter	HP 436A
Power Sensor	HP 8485A
Crystal Detector	HP 8473C
Power Splitter	Weinschel Model 1579
BNC Tee	HP 1250-0781

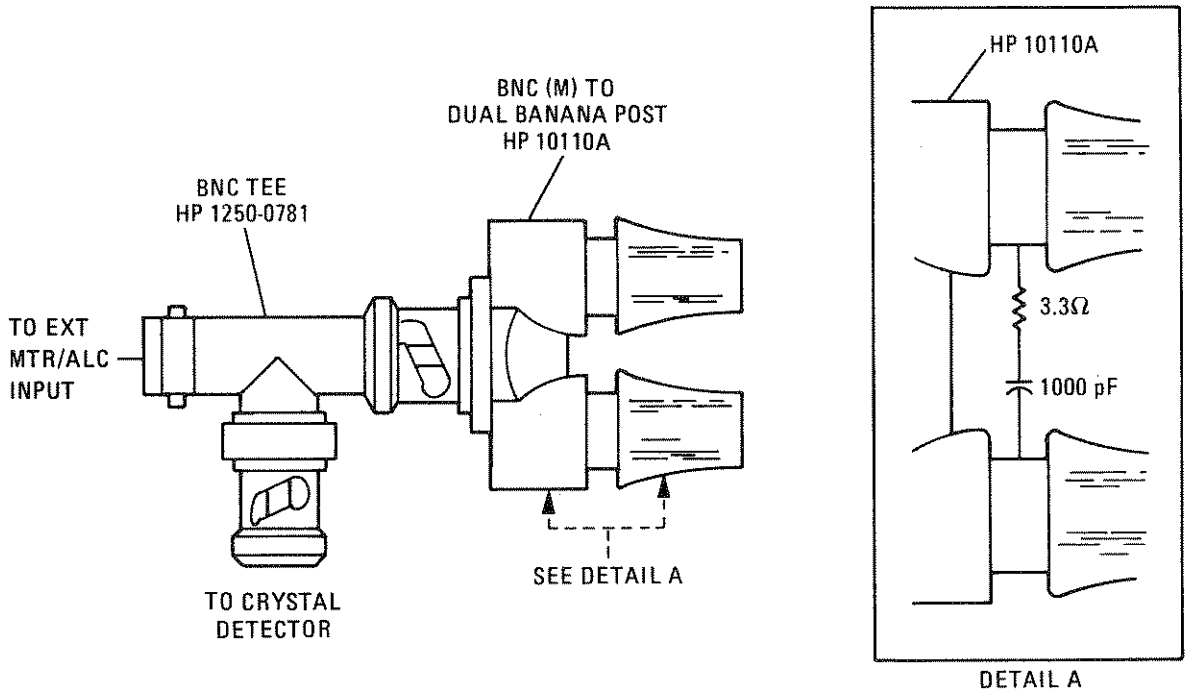
PROCEDURE:

NOTE

Crystal output signal must be between −10 mVdc and −200 mVdc.

1. Connect equipment as shown in test setup.

Figure 3-7. External Crystal Detector Leveling (1 of 2)



NOTE

Between 10 MHz and 50 MHz RF feedthrough as high as 3 dB may be observed on the envelope of the video output. During external leveling at 10 to 50 MHz, the RF feedthrough may be damped out by insertion of the circuit shown above in the test setup. The circuit may be inserted in the line to the EXT INPUT of the RF Plug-In.

2. Switch on 8350A LINE switch. Press INSTR PRESET key. The START and STOP indicators should be on.

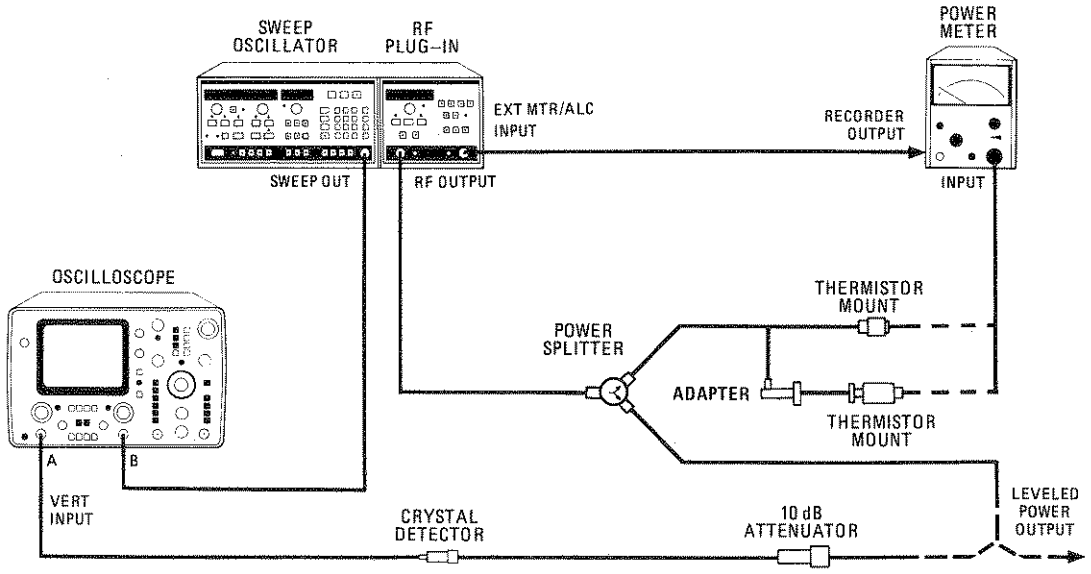
3. Set controls as follows:

   83595A:
   ALC MODE..... EXT

4. Adjust EXT/MTR ALC CAL for a power meter reading equal to the front panel output power.

5. To use leveled RF power output for testing external equipment, make connection at point marked "Leveled Power Output".

Figure 3-7. External Crystal Detector Leveling (2 of 2)



EXTERNAL POWER METER LEVELING

EQUIPMENT:

Sweep Oscillator	HP 8350A
RF Plug-In	HP 83595A
Power Meter	HP 432A
Thermistor Mount (0.01 to 18.0 GHz)	HP 8478A
Thermistor Mount (18.0 to 26.5 GHz)	HP K486A
Oscilloscope	HP 1740A
Crystal Detector	HP 8473C
10 dB Attenuator	Weinschel Model 9-10
Power Splitter	Weinschel Model 1579
Adapter	HP K281C

NOTE

For power meter leveling, sweep rate should be 100 sec/sweep to ensure proper leveling due to the slow response of the thermistor mount. The HP 435 and 436 power meters will not power meter level this Plug-In. Only an HP 432 may be used.

PROCEDURE:

1. Connect equipment as shown in test setup. Use the 8478A thermistor mount for output frequencies between 0.01 and 18.0 GHz or the K486A thermistor mount and K281C adapter for frequencies between 18.0 and 26.5 GHz.

2. Set LINE switch to turn on Sweep Oscillator. The START and STOP indicators should light, indicating the START/STOP mode is selected.

Figure 3-8. External Power Meter Leveling (1 of 2)

3. Set controls as follows:

   8350A: Press INSTR PRESET

   SWEEP TIME ..... 100 sec
   START/STOP FREQUENCY ..... As required within thermistor mount limits

   83595A: Set power to maximum specified.

   ALC MODE ..... MTR

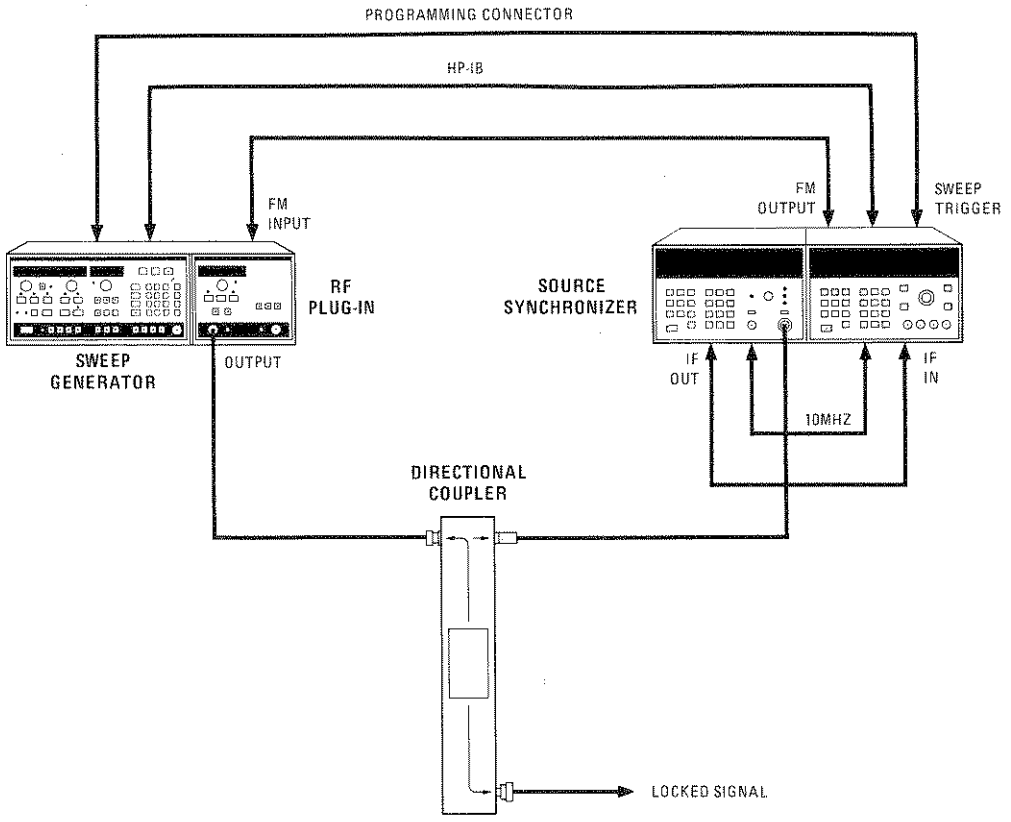
4. Select +10 dBm range on power meter.

5. Adjust 83595A EXT/MTR ALC CAL for a +7 dBm reading on the 432A power meter. Press 8350A SWEEP TRIGGER SINGLE key twice to set single sweep mode and start a sweep.

6. To use level RF power output for testing external equipment, make connection at point in test setup marked "Leveled Power Output".

Figure 3-8. External Power Meter Leveling (2 of 2)

PHASELOCKING USING THE 5344S SOURCE SYNCHRONIZER



EQUIPMENT:

Sweep Oscillator	HP 8350A
RF Plug-In	HP 83595A
Source Synchronizer	HP 5344S Opt. 043
Directional Coupler (2 to 18 GHz)	HP 11691D

DESCRIPTION:

The required CW frequency for the 83595A is automatically tuned and locked by the 5344S, with the 5344S acting as an HP-IB controller. No manual tuning is required. The 8350A Sweep Oscillator and the 5344S Source Synchronizer must be set to the same HP-IB address.

NOTE

This setup can be used for phase-locking from 2.0 to 18.0 GHz, the range of the 11691D Directional Coupler. For phase-locking without the use of a broadband coupling device, the 83595A rear-panel AUX OUTPUT fundamental oscillator frequency signal can be used.

Figure 3-9. Phase-Locking Using the 5344S Source Synchronizer (1 of 2)

PROCEDURE:

1. Set the 83595A Configuration Switch (A3S1) for an FM Sensitivity of −6 MHz/V, Cross-Over Coupled FM, and front panel RF OUTPUT Phaselock (See Figure 3-10 for specific settings of A3S1).

2. Connect the equipment as shown in the test setup. Connect the HP-IB connector of the 8350A to the HP-IB connector of the 5344A section of the 5344S.

3. Set the 5344A HP-IB address to 19 (equal to the 8350A) by setting the bottom five switches to 10011.

4. Set the 5344A to the System Controller mode by setting the top HP-IB switch to the left (SYS CONT).

5. On the 8350A press INSTR PRESET .

6. On the 83595A press CW FILTER to turn off the CW filter (pushbutton LED turned off). Set the 83595A Power Level between 0 and +5 dBm.

7. Set the 8350A HP-IB address to 19 if it is not already. Press SHIFT LCL 0 GHz s . The HP-IB address will be shown on the 8350A FREQUENCY/ TIME display.

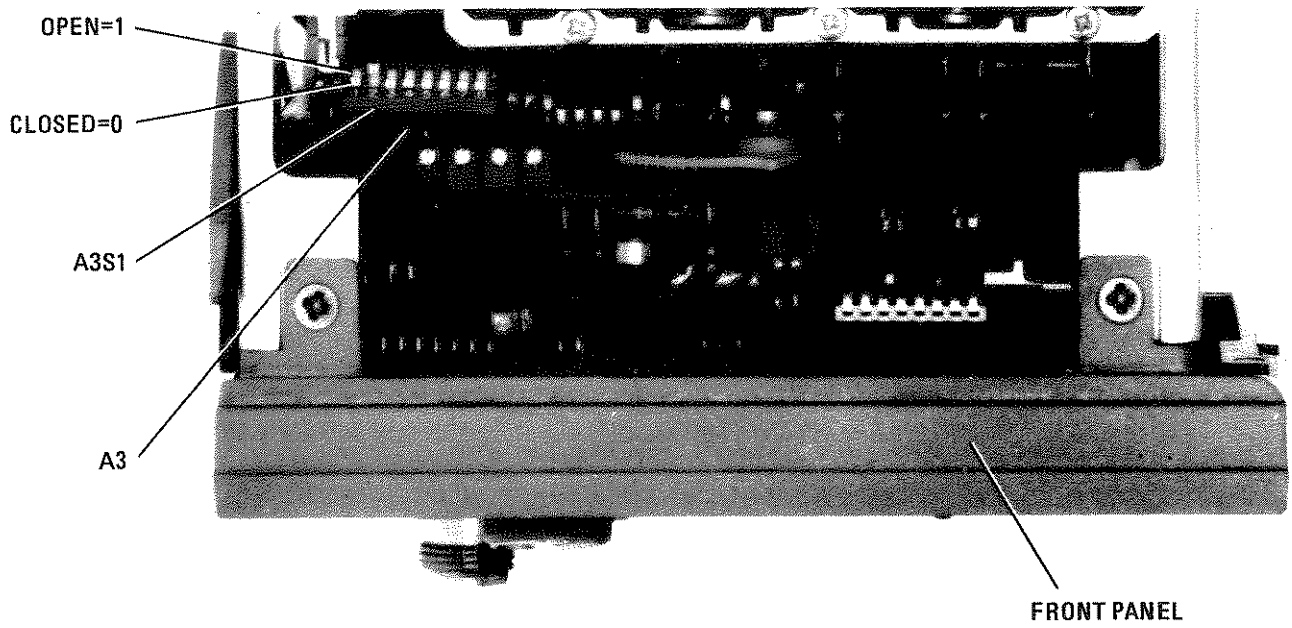
8. On the 5344A, make sure that MANUAL LOCK and AUTO LOCK are both set to off (pushbutton LEDs off). Verify that the front panel CONT lamp is on.

9. Press the 5344A MODE key until the CW annunciator lights. The MODE key will scroll through the four modes of operation. If you pass CW, continue pressing MODE until you return to CW.

10. On the 5344A, enter the frequency required for the 83595A RF output signal.

11. Press the 5344A AUTO LOCK key. The 83595A RF output signal will now be programmed and locked to the specified CW frequency.

Figure 3-9. Phase-Locking Using the 5344S Source Synchronizer (2 of 2)



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 Option 002 Installed	X	X	X	X	X	X	1	X
No Step Attenuator	X	X	X	X	X	X	0	X
AUX OUT Phase Lock	X	X	X	X	X	X	X	1
RF OUTPUT Phase Lock	X	X	X	X	X	X	X	0

NOTES

1. Switch Positions:

   1 = Switch Open = High
   0 = Switch Closed = Low (Ground)
   X = Don't Care
   * = Varies, 1 of Opt. 002, 0 if no Opt. 002.

2. Switch is set at the factory as follows:

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

Figure 3-10. Configuration Switch

SECTION IV
PERFORMANCE TESTS

4-1. INTRODUCTION

4-2. The procedures in this section test the electrical performance of the 83595A RF Plug-In/8350A Sweep Oscillator combination with the specifications of the Plug-In used as the performance standards. These specifications may be found in Section I of this manual. Due to the extended frequency range of the 83595A, the performance tests in the 8350A Operating and Service manual do not apply. None of the tests require access to the interior of the 83595A RF Plug-In.

NOTE

Allow the 83595A RF Plug-In and 8350A Sweep Oscillator to warm up for one hour prior to doing any performance tests.

4-3. EQUIPMENT REQUIRED

4-4. Equipment required for testing is listed in the Recommended Test Equipment table in Section I of this manual. Any equipment that satisfies the critical specifications given in the table may be substituted for the recommended model.

4-5. OPERATION VERIFICATION

4-6. Operation Verification consists of performing the tests listed in paragraph 4-13 steps 1 to 13 and paragraph 4-14 steps 1 to 13. Operation Verification of the HP-IB functions may be verified by executing the program listed in Section IV of the 8350A 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).

4-7 TEST RECORD

4-8. Table 4-14 provides a tabulated index of the performance tests, their acceptable limits, and a column for recording actual measurements.

4-9. TEST SEQUENCE

4-10. The performance tests should be performed in the order they occur.

4-11. CALIBRATION CYCLE

4-12. The performance tests in this section should be performed at intervals of six months or less for the 83595A.

Table 4-1 Performance Tests

Performance Test	83595A Adjustment	8350A Adjustment
4-13. Frequency Range and Accuracy		
CW Accuracy	5-14, 5-16, 5-17	5-19
Swept Frequency Accuracy	5-14 through 5-19, 5-23	
Marker Accuracy	5-14 through 5-19, 5-23	5-20
4-14. Output Amplitude		
Power Level Accuracy	5-25 through 5-28	
Power Meter Leveling	5-27	
Crystal Detector Leveling	5-29	
4-15. Frequency Stability		5-11
4-16. Residual FM		5-11
4-17. Spurious Signals		
Harmonics	5-21	
Nonharmonics	5-21	
4-18. Output SWR	—	
4-19. Residual AM	5-21, 5-28	5-11
4-20. External FM	5-30	
4-21. AM On/Off Ratio		
Squarewave Symmetry	5-28	
4-22. Step Attenuator Accuracy	—	

PERFORMANCE TESTS

4-13. FREQUENCY RANGE AND ACCURACY TEST

SPECIFICATION:

	Frequency Bands (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**
CW Mode	±5 MHz	±5 MHz	±10 MHz	±10 MHz	±12 MHz	_____
All Sweep Modes (Sweep time >100 ms)	±15 MHz	±20 MHz	±25 MHz	±30 MHz	±35 MHz	±50 MHz
Frequency Markers (Sweep time ≥100 ms)	±15 MHz ±0.5% of sweep width	±20 MHz ±0.5% of sweep width	±25 MHz ±0.5% of sweep width	±30 MHz ±0.5% of sweep width	±35 MHz ±0.5% of sweep width	±50 MHz ±0.5% of sweep width

DESCRIPTION:

A frequency counter is used to check frequency range and accuracy in the CW mode. The frequency counter is also used to check swept frequency accuracy and markers in the START/STOP mode.

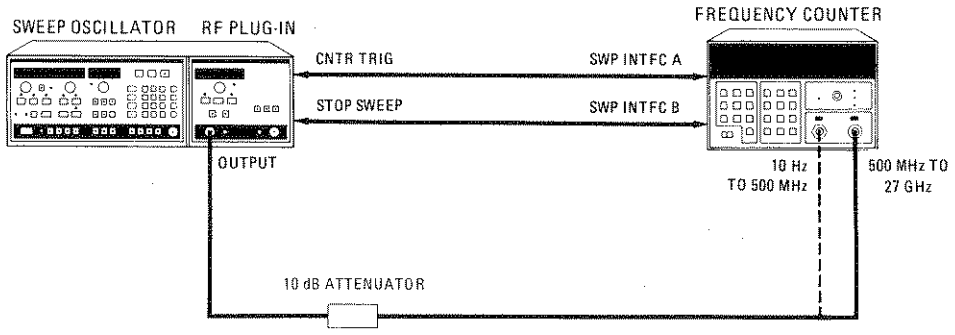


Figure 4-1. Frequency Range and CW Accuracy Test Setup

EQUIPMENT:

Sweep Oscillator ..... HP 8350A
Frequency Counter ..... HP 5343A
10-dB Attenuator ..... Weinschel Model 9-10

PROCEDURE:

1. Connect equipment as shown in Figure 4-1.

4-13. FREQUENCY RANGE AND ACCURACY TEST (Cont'd)

2. Set controls as follows:

Frequency Counter

LINE ..... ON
SAMPLE RATE ..... minimum (full CCW)
Range Connector ..... As required
Impedance Switch 50Ω
ACQ TIME (rear panel) ..... FAST

3. Press 8350A INSTR PRESET . Note that the Sweep Oscillator display indicates a start frequency of 10 MHz and a stop frequency of 26.5 GHz.

Frequency Calibration

4. Press 8350A CW and enter a CW frequency of 50 MHz.

5. Adjust the 83595A FREQ CAL adjustment for a frequency counter indication of 50.00 MHz.

Frequency Range

6. Press 8350A CW key and enter a CW frequency of 10 MHz. If the frequency observed on the frequency counter is greater than 10 MHz, rotate the 8350A CW control counter-clockwise until the frequency counter reading is at or below 10 MHz.

7. Enter a CW frequency of 26.5 GHz. If the frequency observed on the frequency counter is lower than 26.5 GHz, rotate the 8350A CW control clockwise until the frequency counter reading is at or above 26.5 GHz.

CW Frequency Accuracy

8. Check the CW frequency accuracy for each CW frequency listed in Table 4-2. Verify that the frequency counter indication at the three points on each band is within the accuracy tolerance in Table 4-2. Follow the sequence of frequencies listed for each band from top to bottom to avoid band crossover problems.

Table 4-2. CW Frequency Accuracy

Bands (Accuracy)				
Band 0 (±5 MHz)	**Band 1 (±5 MHz)**	**Band 2 (±10 MHz)**	**Band 3 (±10 MHz)**	**Band 4 (±12 MHz)**
10 MHz	4.0 GHz	10 GHz	17.0 GHz	24.0 GHz
1.0 GHz	2.5 GHz	7.1 GHz	14.0 GHz	21.0 GHz
2.4 GHz	7.0 GHz	13.5 GHz	20.0 GHz	26.5 GHz

4-13. FREQUENCY RANGE AND ACCURACY TEST (Cont'd)

Swept Frequency Accuracy

9. Press frequency counter RESET SWP M (Light on), SHIFT 1KHz . Press 8350A INSTR PRESET and set sweep time to 105 msec.

10. Enter the START and STOP frequencies on the 8350A for each band listed in Table 4-3.

11. Press 8350A START SHIFT M2 . Check the frequency counter reading for the START frequency listed in Table 4-3 and record on test record.

12. Press 8350A STOP SHIFT M2 . Check the frequency counter reading for the STOP frequency listed in Table 4-3 and record it on the test record.

13. Repeat steps 10 through 12 for each band listed.

Table 4-3. Swept Frequency Accuracy

Band	Start	Stop	Tolerance
Full Band	10 MHz	26.5 GHz	±50 MHz
Band 0	10 MHz	2.4 GHz	±15 MHz
Band 1	2.4 GHz	7.0 GHz	±20 MHz
Band 2	7.0 GHz	13.5 GHz	±25 MHz
Band 3	13.5 GHz	20.0 GHz	±30 MHz
Band 4	20.0 GHz	26.5 GHz	±35 MHz

Frequency Marker Accuracy

14. Press 8350A INSTR PRESET and set sweep time to 105 msec.

15. Set first band's START − STOP frequencies as listed in Table 4-4.

16. Set the 8350A markers to the frequencies listed and verify that the frequency counter readings are within tolerance. Enter SHIFT M2 , then the marker to be checked.

17. Set the START and STOP frequencies for each band listed and repeat the previous step with the markers set as listed.

4-13. FREQUENCY RANGE AND ACCURACY TEST (Cont'd)

Table 4-4. Frequency Marker Accuracy

Band	Sweep Range		Marker Frequencies					
	Start	Stop	M1	M2	M3	M4	M5	Tolerance
Full Band	0.01–26.5 GHz		1 GHz	4 GHz	12 GHz	18 GHz	24 GHz	±182.45 MHz
Band 0	0.01–2.4 GHz		1 GHz	2 GHz	–	–	–	±26.95 MHz
Band 1	2.4–7.0 GHz		3 GHz	6 GHz	–	–	–	±43 MHz
Band 2	7.0–13.5 GHz		8 GHz	12 GHz	–	–	–	±57.5 MHz
Band 3	13.5–20 GHz		15 GHz	18 GHz	–	–	–	±62.5 MHz
Band 4	20–26.5 GHz		21 GHz	25 GHz	–	–	–	±82.5 MHz

4-14. OUTPUT AMPLITUDE TEST

SPECIFICATION:

Minimum Settable Power: −5 dBm
with Option 002: −60 dBm

	Frequency Bands (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 Output Power	+10 dBm	+10 dBm	+10 dBm	+10 dBm	+4 dBm	+4 dBm
With Option 002	+10 dBm	+8.5 dBm	+8 dBm	+7 dBm	+1 dBm	+1 dBm
Power Level Accuracy (Internally Leveled)	<±1.5 dB	<±1.3 dB	<±1.3 dB	<±1.4 dB	<±1.7 dB	<±1.8 dB
With Option 002 (at 0 dB attenuator step)	<±1.7 dB	<±1.5 dB	<±1.5 dB	<±1.6 dB	<±1.9 dB	<±2.0 dB
Power Variation (at specified Maximum Leveled Power or below) **Internally Leveled**	±0.9 dB	±0.7 dB	±0.7 dB	±0.8 dB	±0.9 dB	±1.0 dB
Externally Leveled Negative Crystal Detector (Sweep time >100 ms)	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB
Externally Leveled Power Meter	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB	±0.2 dB

DESCRIPTION:

A power meter is used to check power level accuracy, maximum leveled output power, and power variations.

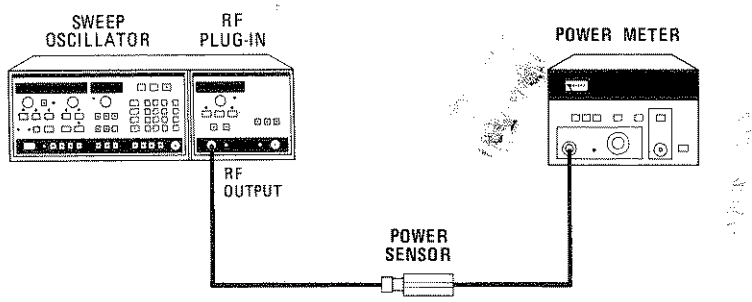


Figure 4-2. Output Amplitude Test Setup (Using HP 436A Power Meter)

4-14. OUTPUT AMPLITUDE TEST (Cont'd)

EQUIPMENT:

Sweep Oscillator	HP 8350A
Power Meter	HP 436A
Power Sensor	HP 8485A
Power Meter	HP 432A
Thermistor Sensor	HP 8478B
Thermistor Sensor	HP K486A
Crystal Detector	HP 8473C
10 dB Attenuator	Weinschel Model 9-10
Power Splitter	Weinschel Model 1579A
Oscilloscope	HP 1740A
Adapter, Waveguide to APC-3.5 female	HP K281C
BNC TEE	1250-0781

PROCEDURE:

1. Connect equipment as shown in Figure 4-2.

2. Press 8350A INSTR PRESET, and set SWEEP to MAN.

Maximum Leveled Power and Power Variations

3. Set START and STOP frequencies and POWER LEVEL for the first frequency range listed in Table 4-5 (0.05 to 2.40 GHz at +10 dBm).

4. Slowly tune the 8350A FREQUENCY/TIME control and note the minimum power level in the band. Leave the frequency at this low power point.

5. Adjust the 83595A POWER control for a power meter reading equal to the specified maximum leveled output power.

6. Slowly tune the 8350A FREQUENCY/TIME control through the frequency band. Note and record maximum power deviation on the test record.

7. Repeat steps 3 through 6 for the other frequency band settings as listed in Table 4-5.

Table 4-5. Frequency and Power Settings

Frequency Range	Maximum Leveled Power		Power Sweep Range	
	(Standard)	(Option 002)	(Standard)	(Option 002)
0.05 to 2.4 GHz	+10 dBm	+10 dBm	15 dB/SWP	15 dB/SWP
2.4 to 7.0 GHz	+10 dBm	+8.5 dBm	15 dB/SWP	13.5 dB/SWP
7.0 to 13.5 GHz	+10 dBm	+8 dBm	15 dB/SWP	13 dB/SWP
13.5 to 20 GHz	+10 dBm	+7 dBm	15 dB/SWP	12 dB/SWP
20.0 to 26.5 GHz	+4 dBm	+1 dBm	9 dB/SWP	6 dB/SWP
0.05 to 26.5 GHz	+4 dBm	+1 dBm	9 dB/SWP	6 dB/SWP

4-14. OUTPUT AMPLITUDE TEST (Cont'd)

Power Level Accuracy, Range and Power Sweep

8. Set START and STOP frequencies and POWER LEVEL for the first frequency band in Table 4-5 (0.05 to 2.40 GHz at +10 dBm). Engage the 83595A POWER SWEEP and set the dB/SWP level to 16 dB/SWP. Disengage POWER SWEEP key.

9. Slowly tune the 8350A FREQUENCY/TIME control through the frequency band and note the maximum power level variations above and below the displayed power level setting. Record these on the test record.

10. Press the 83595A POWER LEVEL key. Use the 8350A ▼ key to step the power down 1 dB.

11. Repeat steps 9 and 10 to check power level accuracy over the full calibrated range (down to −5 dBm).

12. Adjust the FREQUENCY/TIME control for the highest frequency and note the power meter level. Engage POWER SWEEP and set it for maximum leveled power (UNLEVELED light off). Record the power meter level change on the test record.

13. Repeat steps 8 through 12 for the frequencies and power levels listed in Table 4-5.

Power Meter Leveling

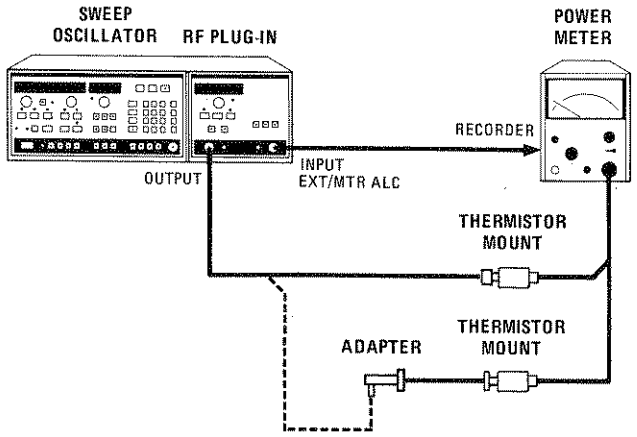


Figure 4-3. Power Meter Leveling Test Setup (Using HP 432A Power Meter)

14. Connect equipment as shown in Figure 4-3 using HP 8478B Thermistor Sensor.

15. Press 8350A INSTR PRESET and set STOP frequency to 18 GHz. Set SWEEP TIME to 100 seconds and SWEEP TRIGGER to SINGLE .

16. Adjust ALC EXT/MTR CAL control and power meter range switch for a power meter indication corresponding to the 83595A POWER display.

17. Press SWEEP TRIGGER SINGLE key and note power meter variations.

4-14. OUTPUT AMPLITUDE TEST (Cont'd)

18. When the SWP light goes out, press 8350A CW and set a CW frequency of 18 GHz. Note the power meter indication.

19. Change to the K486A Thermistor Sensor and adjust the ALC EXT/MTR CAL control for the same power meter indication noted in step 18.

20. Set the Sweep Oscillator for a START/STOP frequency of 18 to 26.5 GHz and a SWEEP TIME of 50 seconds.

21. Press SWEEP TRIGGER SINGLE key and note power variations. The combined variations from steps 17 and 21 should be $\leq \pm 0.2$ dB.

External Crystal Detector Leveling

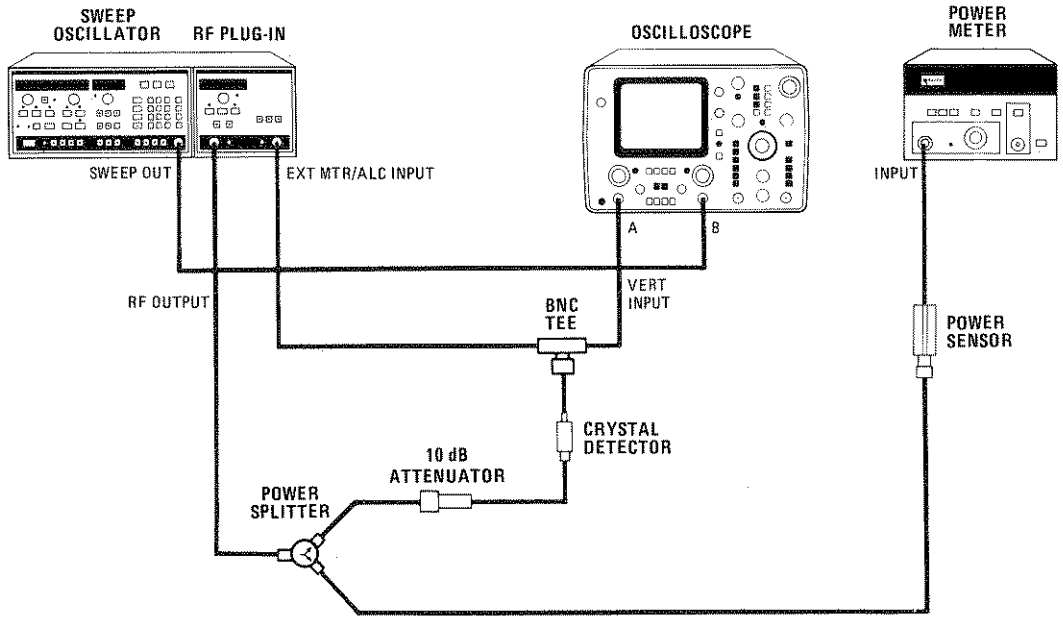


Figure 4-4. Crystal Detector Leveling Test Setup (Using HP 436A Power Meter)

22. Connect equipment as shown in Figure 4-4. Press 8350A INSTR PRESET and set SWEEP TIME to 100 milliseconds. Set the oscilloscope for external sweep mode (A vs B).

23. Press 8350A CW . Adjust the oscilloscope to the center graticule. Adjust the 83595A POWER LEVEL to decrease the power meter indication by 0.4 dB. Note the new trace position on the oscilloscope: the area between the trace and the center graticule represents the leveling tolerance of ± 0.2 dB.

24. Press 8350A START .

25. Adjust the oscilloscope trace position so that the lowest point of the trace is on the center graticule. The highest point of the trace should be within the leveled variation limits established in step 23.

4-15. FREQUENCY STABILITY TEST

SPECIFICATION:

Stability	Frequency Bands (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
With 10% Line Voltage Change	±50 kHz	±50 kHz	±100 kHz	±150 kHz	±200 kHz	±200 kHz
With 10 dB Power Level Change	±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

DESCRIPTION:

A frequency counter is used to check frequency change due to line voltage changes, output power level changes, and load impedance changes.

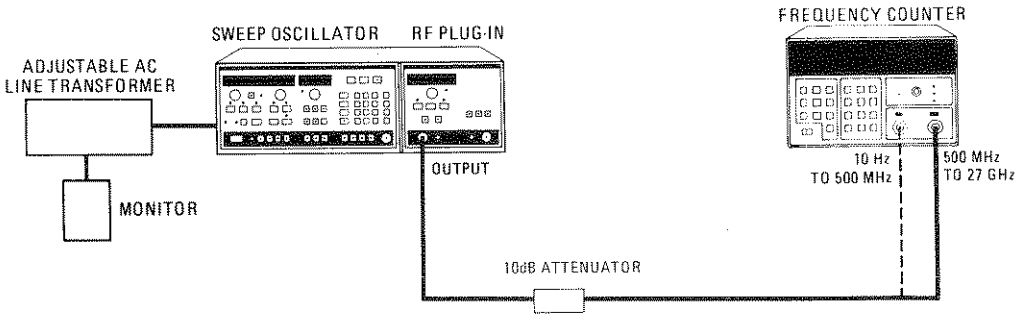


Figure 4-5. Frequency Change with Line Voltage Change

EQUIPMENT:

NOTE

More than one model number is listed for some test equipment. Use only the equipment needed to cover the line voltage used.

Sweep Oscillator ..... HP 8350A
Frequency Counter ..... HP 5343A
10 dB Attenuator ..... Weinschel Model 9-10
3 dB Attenuator ..... Weinschel Model 9-3

Adjustable AC Line Transformer and monitor (Select for line voltage needed)
100–120 volt ..... General Radio W5MTB
120 V Monitor ..... RCA WV 120B
220-240 volt ..... General Radio W10HM73
240V Monitor ..... RCA WV 503A
Adjustable Short ..... Maury Microwave 1959-1
Adjustable Short (18–26.5 GHz) ..... HP K920B
Adapter ..... HP K281C

4-15. FREQUENCY STABILITY TEST (Cont'd)

PROCEDURE:

Frequency Change with Line Voltage Change

1. Connect equipment as shown in Figure 4-5 and set 8350A LINE switch to ON.

2. Set adjustable line transformer using suitable monitor to the line voltage set on the 8350A power module. Press the 8350A INSTR PRESET and CW keys and enter the appropriate frequency. Rotate frequency counter SAMPLE RATE knob to HOLD, and press SET OFS MHz SHIFT , then rotate the Frequency Counter SAMPLE RATE knob counterclockwise back to the normal position.

Table 4-6. High and Low Line Voltage Selection

Nominal Line Voltage	100V	115/120V	220V	240V
Low Line Voltage	90V	108V	198V	216V
High Line Voltage	105V	126V	231V	252V

3. Set adjustable line transformer to the low line voltage using suitable monitor which corresponds to the selected nominal voltage in Table 4-6. Check and record on the test card step 3 the difference frequency displayed on counter.

4. Set adjustable line transformer using suitable monitor to the high line voltage using suitable monitor which corresponds to the selected nominal voltage. Check and record on the test record card step 4 the difference frequency displayed on counter. Repeat steps 3 and 4 for CW frequencies listed in Table 4-7.

Table 4-7. Frequency Change with Line Voltage Change

Band	CW Frequency	Frequency Change
Band 0	1.0 GHz	±50 kHz
Band 1	6.0 GHz	±50 kHz
Band 2	12.0 GHz	±100 kHz
Band 3	18 GHz	±150 kHz
Band 4	24 GHz	±200 kHz

4-15. FREQUENCY STABILITY TEST (Cont'd)

Frequency Change with 10 dB Power Level Change

5. Enter CW 1 GHz .

6. Rotate the frequency counter SAMPLE RATE knob to HOLD, press SET OFFSET SHIFT , then rotate the frequency counter SAMPLE RATE knob counterclockwise back to the normal position. Enter POWER LEVEL 0 dBm . Verify the frequency change is less than given in Table 4-8.

7. Repeat steps 5 and 6 for the other frequencies given in Table 4-8.

Table 4-8. Frequency Change with Power Level Change

Band	CW Frequency	Frequency Change
Band 0	1.0 GHz	≤±200 kHz
Band 1	6.0 GHz	≤±200 kHz
Band 2	12.0 GHz	≤±400 kHz
Band 3	18 GHz	≤±600 kHz
Band 4	24 GHz	≤±800 kHz

Frequency Change With 3:1 Load SWR

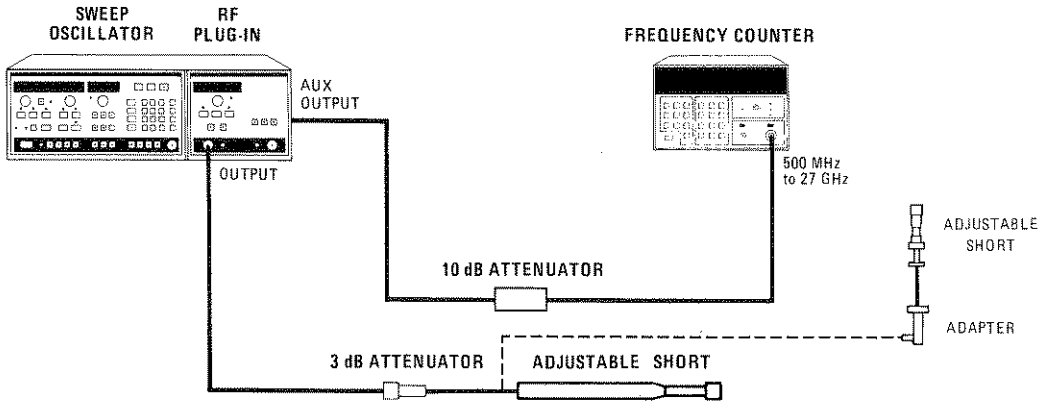


Figure 4-6. Frequency Change with 3:1 Load SWR Test Setup

4-15. FREQUENCY STABILITY TEST (Cont'd)

8. Connect equipment as shown in Figure 4-6. Press the 8350A INSTR PRESET, CW 1 GHz, then POWER LEVEL 1 0 dBm.

9. Since the frequency of the AUX OUTPUT is being counted, a multiplication factor must be entered for bands 2, 3 and 4 only to yield actual RF OUTPUT frequency errors. No factor is needed for bands 0 and 1. In band 2 press SET . (decimal point) 2 ENTER on counter. In band 3, press SET . 3 ENTER. In band 4 press SET . 4 ENTER. Note that in band 0, the counter will not read the desired output frequency. This is because the AUX OUTPUT frequency is mixed down to yield the front panel frequency.

10. On counter rotate the SAMPLE RATE knob clockwise to HOLD, and press SET OFS MHz SHIFT, then rotate the SAMPLE RATE knob counterclockwise to the normal position on the Frequency Counter.

11. Adjust the adjustable short through its range while observing the frequency counter for the greatest plus and minus frequency change. Check that the peak-to-peak frequency change is less than given in Table 4-9.

12. Enter the next CW frequency and repeat steps 10 and 11. To clear the counter multiplication factor, press SET . ENTER.

Table 4-9. Frequency Change with 3:1 Load SWR

Band	CW Frequency	Frequency Change
Band 0	1.0 GHz	±50 kHz
Band 1	6.0 GHz	±50 kHz
Band 2	12.0 GHz	±100 kHz
Band 3	18 GHz	±150 kHz
Band 4	24 GHz	±200 kHz

4-16. RESIDUAL FM TEST

SPECIFICATION:

10 Hz to 10 kHz Bandwidth, CW mode with CW Filter

0.01 to 2.4 GHz: <5 kHz (peak)
2.0 to 7.0 GHz: <5 kHz (peak)
7.0 to 13.5 GHz: <7kHz (peak)
13.5 to 20 GHz: <9 kHz (peak)
20.0 to 26.5 GHz: <12 kHz (peak)

DESCRIPTION:

The CW RF output signal is slope-detected by using the linear portion of a spectrum analyzer resolution bandwidth filter in the zero-span mode.

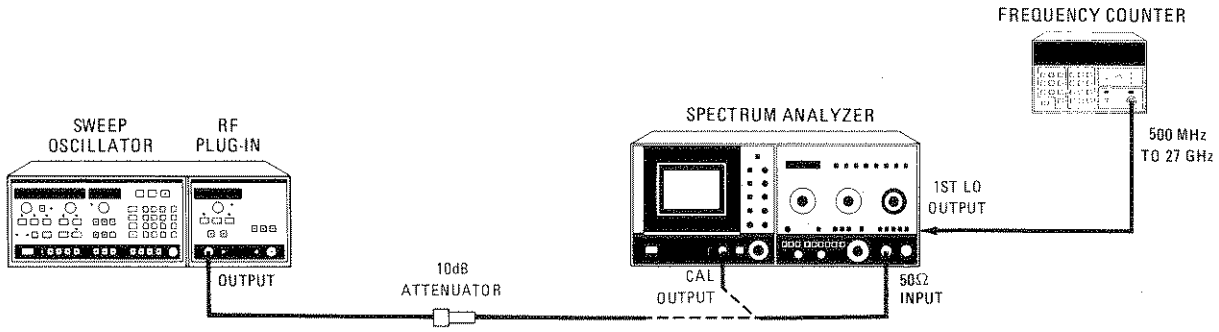


Figure 4-7. Residual FM Test Setup

EQUIPMENT:

Sweep Oscillator	HP 8350A
Spectrum Analyzer	HP 8565A
Frequency Counter	HP 5343A
10 dB Attenuator	Weinschel Model 9-10

PROCEDURE:

1. Connect equipment as shown in Figure 4-7. Connect the spectrum analyzer CAL OUTPUT to the spectrum analyzer input.

2. Press 8350A INSTR PRESET , CW . Enter a CW frequency of 6.0 GHz.

NOTE

To mimimize drift, allow five minutes warmup before continuing with test.

4-16. RESIDUAL FM TEST (Cont'd)

3. Set spectrum analyzer controls as follows:

TUNING	0.100 GHz
FREQUENCY SPAN/DIV	.5 MHz
RESOLUTION BW	300 kHz (uncoupled)
INPUT ATTEN	−30 dB
REFERENCE LEVEL	−10 dBm
AMPLITUDE SCALE	LIN
AUTO STABILIZER	ON
SWEEP TIME/DIV	10 msec/DIV
SWEEP TRIGGER	FREE RUN
BASELINE CLIPPER	fully counterclockwise (OFF)
VIDEO FILTER	.01

4. Adjust spectrum analyzer TUNING to center the 100 MHz CAL OUTPUT signal on the spectrum analyzer display.

5. Adjust spectrum analyzer REFERENCE LEVEL controls to place the peak of the signal trace at the reference level (top) graticule line.

6. Reduce RESOLUTION BW to 100 kHz and FREQUENCY SPAN/DIV to 100 kHz while keeping the signal centered with the FINE TUNING control. The spectrum analyzer display should be as shown in Figure 4-8.

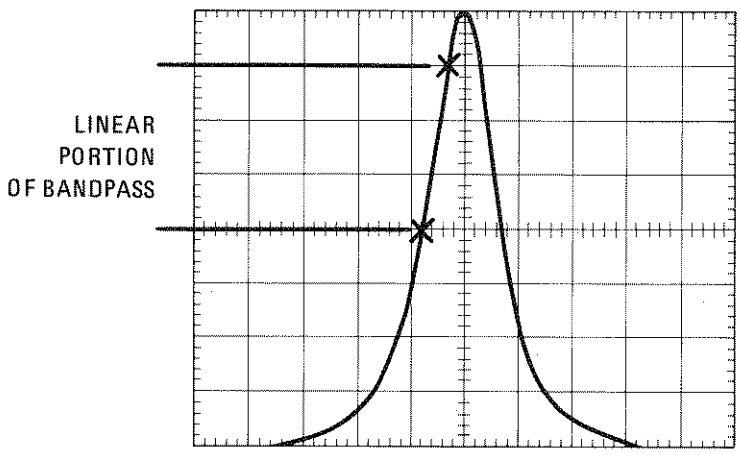


Figure 4-8. Spectrum Analyzer Display for Residual FM Test

7. Set the FREQUENCY SPAN MODE to ZERO SPAN and adjust the FINE TUNING control counterclockwise to position the CRT trace on the center horizontal graticule. Note the frequency counter indication: _____ kHz.

8. Adjust the FINE TUNING control clockwise to position the CRT trace on the seventh graticule (one division below the Reference Level). Be sure to stay tuned on the lower frequency side of the signal bandpass. Note the frequency counter indication: _____ kHz.

4-16. RESIDUAL FM TEST (Cont'd)

9. The spectrum analyzer demodulation sensitivity per division is calculated as one third of the difference frequency between the frequencies noted in steps 7 and 8. Calculate the demodulation sensitivity: _____ kHz/Div.

10. Connect the 8350A RF OUTPUT signal to the spectrum analyzer.

11. Set spectrum analyzer controls as follows:

TUNING ..... 6.00 GHz
FREQUENCY SPAN/DIV ..... .5 MHz
AMPLITUDE SCALE ..... LIN
REFERENCE LEVEL ..... +10 dBm

12. Adjust spectrum analyzer REFERENCE LEVEL controls to place the peak of the signal trace at the reference level (top) graticule line.

13. Reduce FREQUENCY SPAN/DIV to 0 while keeping the signal centered on the CRT with the FINE TUNING control.

14. Position the trace between the fifth and seventh graticules by turning the FINE TUNING control counterclockwise. STORE a single trace.

15. Note the maximum peak-to-peak deviation in divisions of the CRT trace. The peak deviation is one-half the peak-to-peak deviation. Multiply the peak deviation by the modulation sensitivity calculated in step 8.

Residual FM (kHz) = (peak-to-peak deviation/2) X (demodulation sensitivity) =_____ kHz

16. Verify that residual FM is within tolerance given in Table 4-10.

17. Repeat steps 11 through 16 with spectrum analyzer and RF Plug-In tuned to each frequency listed in Table 4-10.

Table 4-10. Residual FM

Band	CW Frequency	Residual FM
Band 0	1.0 GHz	<5 kHz
Band 1	6.0 GHz	<5 kHz
Band 2	12 GHz	<7 kHz
Band 3	18 GHz	<9 kHz
Band 4	22 GHz	<12 kHz

4-17. SPURIOUS SIGNALS TEST

SPECIFICATION:

Spurious Signals (at specified Maximum Leveled Power)	**Frequency Bands (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**
Harmonics or Subharmonics (in dB below carrier)	>25 dB	>25 dB	>25 dB	>25 dB	>20 dB	>20 dB
Non-Harmonics	>25 dB	>50 dB	>50 dB	>50 dB	>50 dB	>25 dB

DESCRIPTION:

The RF output signal from the Sweep Oscillator is displayed on a spectrum analyzer to verify that harmonic and non-harmonic spurious signals are at or below the specified level.

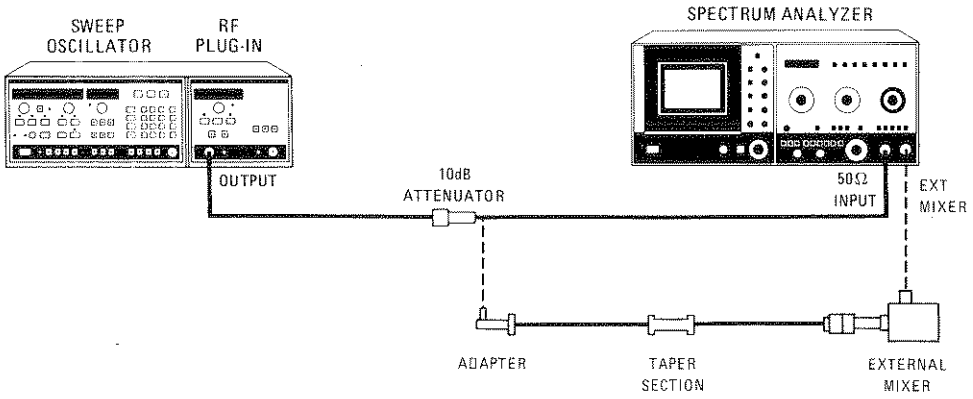


Figure 4-9. Spurious Signals Test Setup

EQUIPMENT:

Sweep Oscillator	HP 8350A
Spectrum Analyzer	HP 8565A
10 dB Attenuator	Weinschel Model 9-10
Adapter, K band waveguide to SMA female	HP K281C
External Mixer	HP 11517A
Taper Section	HP 11519A

PROCEDURE:

1. Connect equipment as shown in Figure 4-9.

4-17. SPURIOUS SIGNALS TEST (Cont'd)

2. Set controls as follows:

8565A:

Set all Normal Settings (controls marked with green)
FREQUENCY BAND GHz ..... .01 to 1.8
INPUT ATTEN. ..... 10 dB
REF LEVEL dBm ..... +10 dBm
FREQUENCY SPAN MODE. ..... FULL BAND

8350A

Press INSTR PRESET , CW 1 0 MHz .

83595A

POWER ..... Specified Maximum Leveled Power
CW FILTER ..... ON

NOTE

The spectrum analyzer originates some mixing products that may appear on the display. If a signal is in question, increase the spectrum analyzer input attenuation by 10 dB, note if the signal decreases in amplitude by 10 dB, then return the attenuator to the original position. If the signal in question comes from an external source, it will change by 10 dB. If the signal in question originates in the spectrum analyzer, the level will either change by greater or less than 10 dB or may not change at all.

The 8350A CW control when being rotated may generate some noise spikes. These signals should disappear when rotation is stopped.

If a spurious signal is found that appears to be out of specifications, check the fundamental signal amplitude to ensure it is at maximum specified power. Then check spurious signal level by substituting a known amplitude signal on the spectrum analyzer.

3. Adjust the 8350A CW control through the entire frequency range of the RF Plug-In (0.01 to 26.5 GHz) and check that any harmonic and non-harmonic spurious signals are at or below the specified levels listed at the beginning of this test.

4. Change the spectrum analyzer to each of the next higher frequency bands and repeat the previous step.

4-18. OUTPUT SWR TEST

SPECIFICATION:

Output SWR: <1.9
Option 002 (0.01 to 20 GHz): <2.0
(20 to 26.5 GHz): <2.2

DESCRIPTION:

The RF output signal is measured using a directional coupler, crystal detector, and oscilloscope. The signal at the oscilloscope contains (1) the incident signal from the oscillator, and (2) the reflected signal. The reflected signal is developed as follows: The incident signal travels down the 20 cm air lines (2 to 18 GHz), directional coupler with short (18 to 26.5 GHz), or 3 to 6 metres of coaxial cable (.01 to 2 GHz), encounters the open end, and is reflected back to the source. If the reflected signal at the RF OUTPUT connector encounters a perfect 50-ohm source match, no signal is reflected back. However, the greater the mismatch, the greater the reflected signal. This reflected signal either adds to or subtracts from the incident signal. This variation is displayed on the oscilloscope.

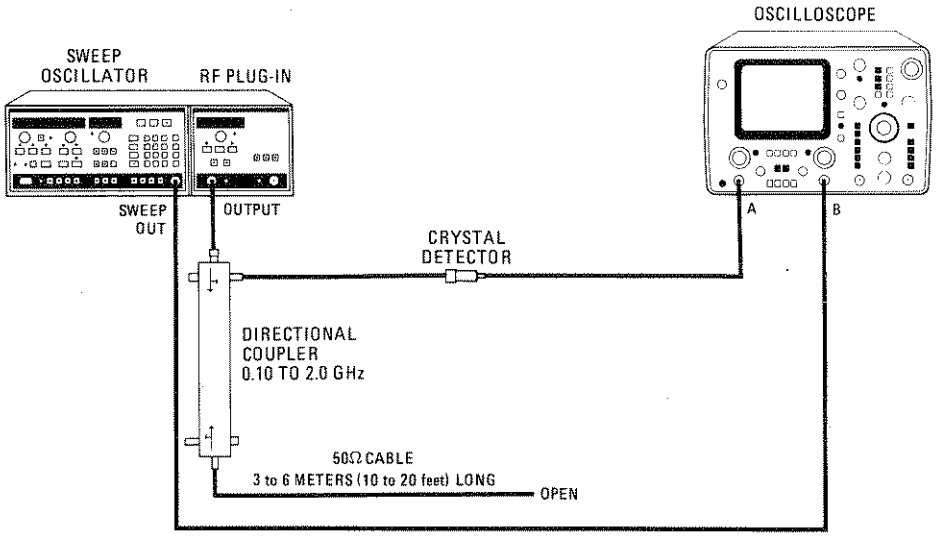


Figure 4-10. Low Frequency Output SWR Test Setup

EQUIPMENT:

Sweep Oscillator	HP 8350A
Oscilloscope	Any general purpose oscilloscope such as HP 1222A or 1740A
Crystal Detector	HP 8473C
Crystal Detector	HP K422A
Directional Couplers	
0.10 to 2 GHz	HP 778D
1.7 to 18 GHz	HP 11691D
18 to 26.5 GHz	HP K752C
Cable	
0.01 to 2 GHz	3 to 6 metres (10 to 20 feet) see Table 4-11
2 to 18 GHz	HP 11567A 20-cm Air Lines (2 required)
Adjustable Short	HP K920B
Adapter, APC-3.5 to Waveguide	HP K281C

4-18. OUTPUT SWR TEST (Cont'd)

PROCEDURE:

Low Frequency Output SWR Test

NOTE

A single 3 to 6 metre (10 to 20 foot) section of 50-ohm cable is required to avoid mismatch of connectors when performing the low frequency SWR test.

1. Connect equipment as shown in Figure 4-10.

2. Press INSTR PRESET , STOP 2 GHZ/s on the 8350A. Set DISPL BLANKING off and RF BLANKING on.

3. Adjust the POWER level control on the Plug-In for a maximum output power of −25 millivolts peak trace on Oscilloscope display in order to keep the crystal in square-law output range.

4. Select several points on the trace and calculate V MAX/V MIN (see Figure 4-11).

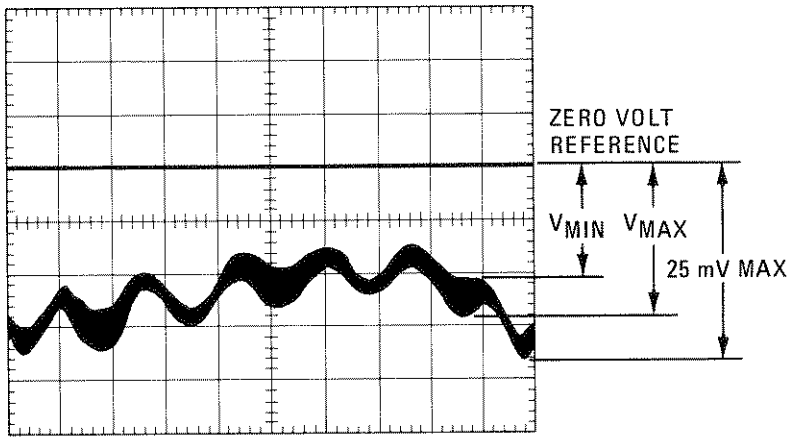


Figure 4-11. Typical Low Frequency Swept SWR Measurement

5. Determine the cable loss at selected frequency of the length of coaxial cable (between coupler end and cable open end), using manufacturer's specifications for loss/foot. (Refer to Table 4-11.)

6. Convert the V MAX/V MIN ratio noted in step 4 into source match SWR, using Figure 4-14 and the cable loss calculated in step 5. The SWR should be less than 1.9 (2.0 for Option 002).

Mid Frequency Output SWR Test

7. Connect equipment as shown in Figure 4-12.

4-18. OUTPUT SWR TEST (Cont'd)

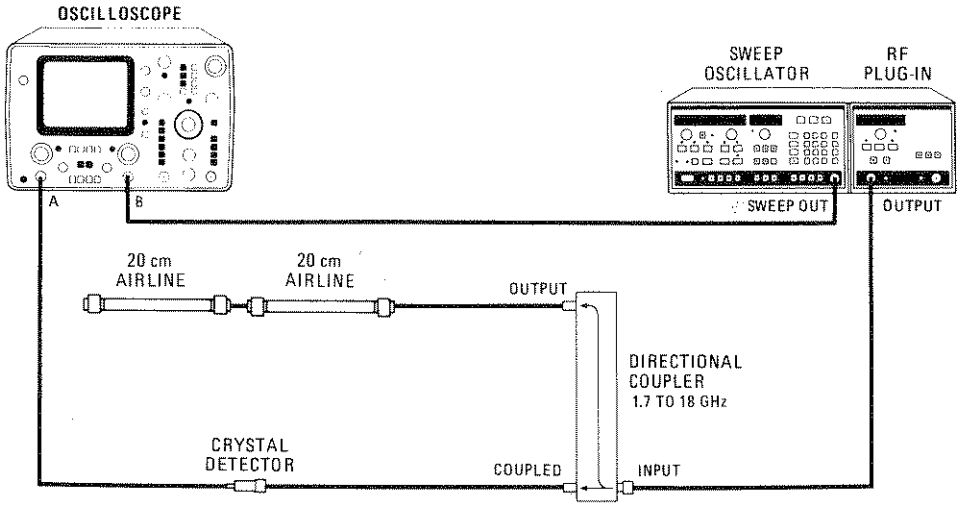


Figure 4-12. Mid Frequency Output SWR Test Setup

8. Press INSTR PRESET , START 2 GHz STOP 1 8 GHz on the 8350A. Set DISPL BLANKING off and RF BLANKING on.

9. Adjust the POWER control on the Plug-In for a maximum output power of −25 millivolts peak trace on the Oscilloscope display in order to keep the crystal in square-law output range.

10. Select points on the trace where V MAX and V MIN appear to have the greatest separation and calculate V MAX and V MIN for each point.

11. Convert the greatest V MAX and V MIN ratio noted in step 10 into source match SWR using the 0 dB LOSS line in Figure 4-14. The SWR should be less than 1.9 (2.0 for Option 002).

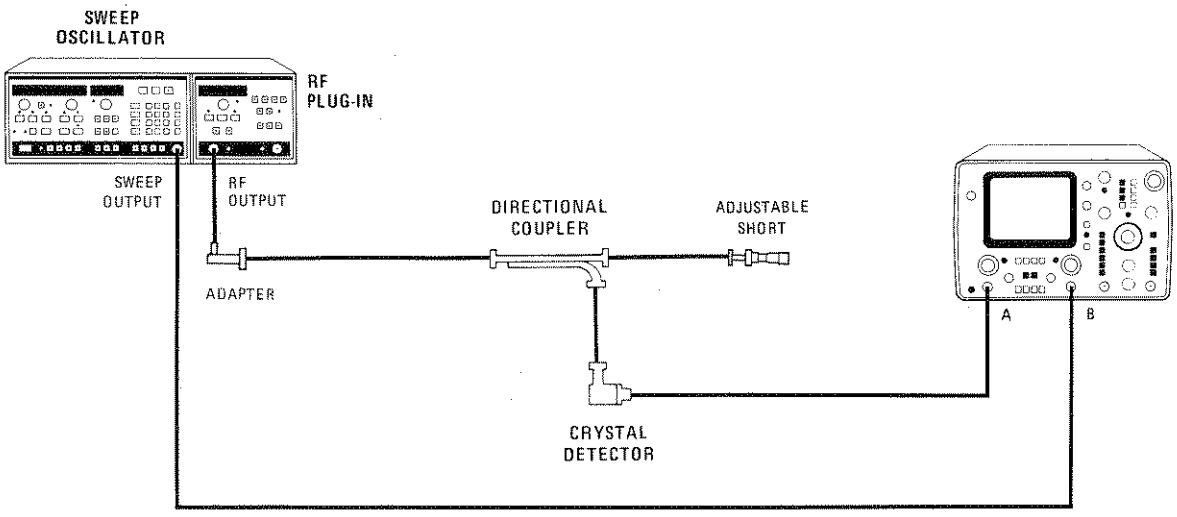


Figure 4-13. High Frequency Output SWR Test Setup

4-18. OUTPUT SWR TEST (Cont'd)

High Frequency Output SWR Test

12. Connect equipment as shown in Figure 4-13.

13. Press START 18 STOP 2 6 . 5 GHz on the 8350A. Set DISPL BLANKING off and RF BLANKING on.

14. Adjust the POWER control on the Plug-In for a maximum output power of −25 millivolts peak trace on the Oscilloscope display in order to keep the crystal in square-law output range.

15. Select points on trace where V MAX and V MIN appear to have the greatest separation and calculate V MAX and V MIN for each point.

16. Convert the greatest V MAX and V MIN ratio noted in step 15 into source match SWR using Figure 4-14 on the 0 dB loss line. Record SWR on test record step 16.

Table 4-11. Loss in Coaxial Cable

RG Cable Type	Attenuation (dB/100 ft.) at Selected Frequency					
	0.1 GHz	0.2 GHz	0.4 GHz	0.6 GHz	1 GHz	3 GHz
58/U	2.4	3.6	5.2	6.6	8.8	16.7
98/U	2.3	3.4	5.2	6.5	9.0	17.0
55A/U	4.8	7.0	10.5	13.0	17.0	32.0
58A/U	6.2	9.2	14.0	17.5	23.5	45.0
58C/U	6.2	9.2	14.0	17.5	23.5	45.0
177/U	0.95	1.5	2.4	3.2	4.5	9.5
212/U	2.4	3.6	5.2	6.6	8.8	16.7
213/U	2.1	3.1	5.0	6.5	8.8	17.5
214/U	2.3	3.4	5.2	6.5	9.0	17.0
215/U	2.1	3.1	5.0	6.5	8.8	16.7
217/U	1.5	2.3	3.5	4.4	6.0	11.7
218/U	0.95	1.5	2.4	3.2	4.5	9.5
219/U	0.95	1.5	2.4	3.2	4.5	9.5
220/U	0.69	1.12	1.85	—	3.6	7.7
221/U	0.69	1.12	1.85	—	3.6	7.7
223/U	4.8	7.0	10.5	13.0	17.0	32.0
224/U	1.5	2.3	3.5	4.4	6.0	11.7

4-18. OUTPUT SWR TEST (Cont'd)

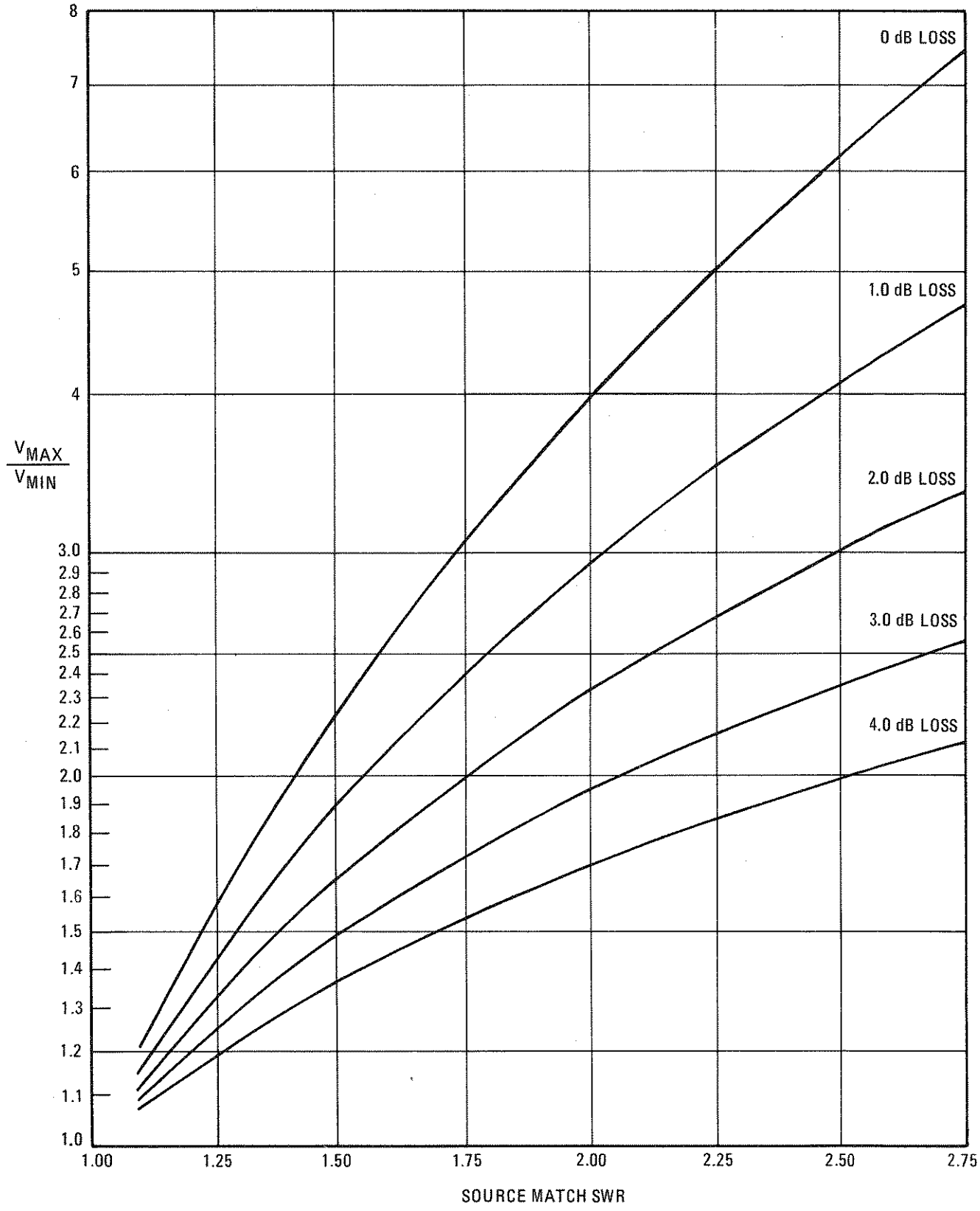


Figure 4-14. Conversion of Oscilloscope Trace to Source Match SWR

4-19. RESIDUAL AM

SPECIFICATION:

Residual AM in 100 kHz Bandwidth: ≥ 50 dB (in dB below carrier and at specified maximum leveled power).

DESCRIPTION:

The RF Output signal from the RF Plug-In is amplitude modulated with a squarewave from the 8350A. This modulated signal is used to establish a reference on the RMS voltmeter that is 9 dB below the actual carrier signal. The 9 dB reduction occurs because of voltmeter response to squarewave and square-law response of the crystal detector. Modulation is then removed and the magnitude of the Residual AM component is measured with respect to the established reference.

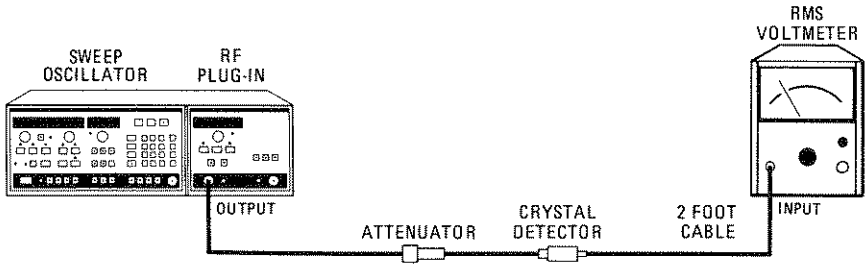


Figure 4-15. Residual AM Test Setup

EQUIPMENT:

Sweep Oscillator	HP 8350A
RMS Voltmeter	HP 3400A
Crystal Detector	HP 8473C
Attenuator	Refer to PROCEDURE
60 cm (24 in) cable (Limits bandwidth to approximately 100 kHz)	HP 11170B

PROCEDURE:

1. Connect equipment as shown in Figure 4-15 using a 20 dB attenuator.

2. Press INSTR PRESET, CW ⊓ MOD (1 kHz or 27.8 kHz), disengage DISPL BLANK.

NOTE

A 41 dB decrease in the RMS voltmeter indication corresponds to a 50 dB reduction in signal level. A correction factor of 9 dB is added because of the RMS voltmeter response to a square wave and the square-law response of the crystal detector.

4-19. RESIDUAL AM (Cont'd)

3. Set POWER LEVEL to specified Maximum Leveled Power and CW frequency to 1 GHz.

4. Vary attenuation using 3 dB, 6 dB, and 10 dB attenuators until the reading on the RMS voltmeter is −28 dB ±3 dB. Note voltmeter reading.

5. Disengage ☐ MOD . Change RMS voltmeter range switch to obtain an on-scale indication. Calculate the difference between this reading and the indication noted in step 4. Add 9 dB to compensate for square-law inequities, and verify that it meets the tolerance in Table 4-12.

6. Engage ☐ MOD . Repeat steps 3, 4 and 5 for frequencies given in Table 4-12.

Table 4-12. Residual AM

Band	CW Frequency	Residual AM (dB below carrier)
Band 0	1.0 GHz	≥ 50 dB
Band 1	6.0 GHz	≥ 50 dB
Band 2	12.0 GHz	≥ 50 dB
Band 3	18.0 GHz	≥ 50 dB
Band 4	24.0 GHz	≥ 50 dB

4-20. EXTERNAL FREQUENCY MODULATION TEST

SPECIFICATION:

Modulation Frequency	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 HMz	±1 MHz	±1 MHz

DESCRIPTION:

The RF Output is modulated with an external signal at 100 Hz, 1 MHz, 2 MHz and 10 MHz. The 100 Hz deviation is measured directly on a spectrum analyzer. The deviation at the higher frequencies is found by using a delay line discriminator to observe an increase in the modulation on an oscilloscope until distortion is observed. This frequency change is measured on a frequency counter.

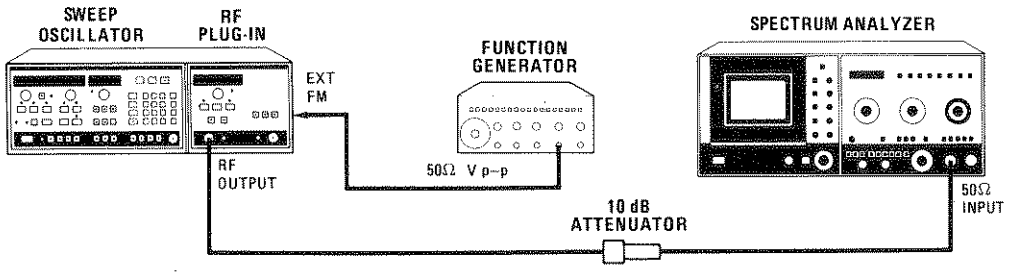


Figure 4-16. 100 Hz External Frequency Modulation Test Setup

EQUIPMENT:

Sweep Oscillator	HP 8350A
Spectrum Analyzer	HP 8565A
Frequency Counter	HP 5343A
Function Generator	HP 3312A
Oscilloscope	Any general purpose oscilloscope such as HP 1222A* or 1740A
10 dB Attenuator	HP 8491B Option 010
Power Splitter	HP 11667A
Delay Line Discriminator	(See Figure 1-3)

* Add a 50 ohm load and BNC tee to each oscilloscope input.

4-20. EXTERNAL FREQUENCY MODULATION TEST (Cont'd)

PROCEDURE:

100 Hz Modulation

1. Ensure that modulation sensitivity is set to −20 MHz/volt and modulation coupling to DC (see Figure 3-10, Configuration Switch). Connect equipment as shown in Figure 4-16.

2. Press 8350A INSTR PRESET , CW and disengage the DISPL BLANK key. Disengage RF Plug-In CW FILTER key. Center fundamental signal on spectrum analyzer CRT display. Set function generator frequency to 100 Hz sinewave and amplitude to full counterclockwise. Adjust function generator amplitude control slowly clockwise while monitoring display on spectrum analyzer. Deviation from center line should be symmetrical at first then become non-symmetrical as deviation increases.

3. Note the point at which deviation becomes non-symmetrical and verify that it is greater than ±12 MHz.

4. Turn 8350A LINE switch to off. Remove RF Plug-In and switch modulation coupling to crossover (see Figure 3-10, Configuration Switch). Install the RF Plug-In and turn the 8350A line switch to on. Then repeat steps 2 and 3. The highest symmetrical deviation frequency should be greater than ±75 MHz.

>100 Hz FM Modulation

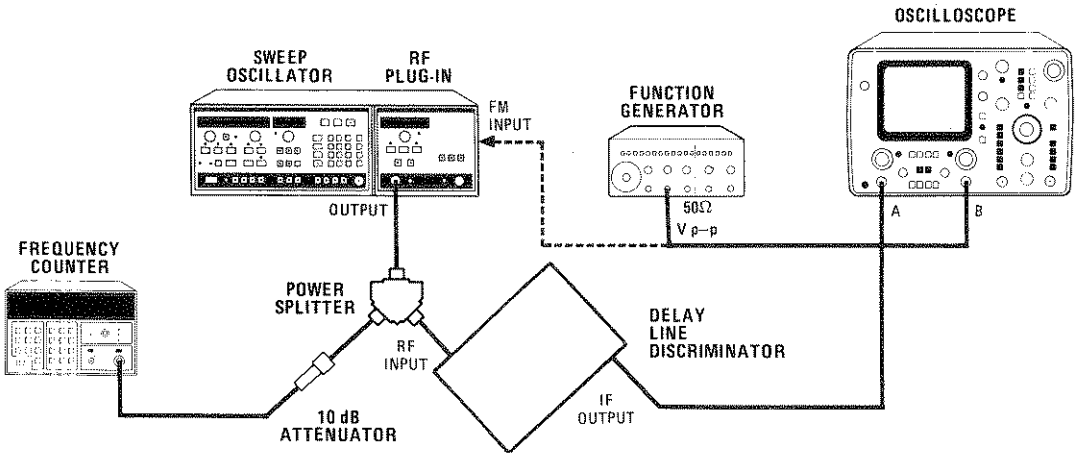


Figure 4-17. >100Hz Frequency Modulation Test Setup

5. Set function generator frequency to 1 MHz. Set both oscilloscope inputs to 50Ω.

6. Set function generator output amplitude to 0.1 volt p-p output. Connect equipment as shown in Figure 4-17 with function generator output not connected. Adjust CW and CW VERNIER for a delay line discriminator output of 0 volts as observed on Channel A of the oscilloscope. Note frequency counter reading.

4-20. EXTERNAL FREQUENCY MODULATION TEST (Cont'd)

7. Connect the function generator output to 8350A FM INPUT (rear panel) and adjust Channel A of the oscilloscope for a clear display of the function generator sinewave.

8. Increase the function generator output amplitude until the deviation displayed on Channel A becomes non-symmetrical or distorted. Use Channel B of the oscilloscope to monitor the function generator output. If the output is offset the test is invalid.

9. Mark the peak of the sinewave displayed on Channel A with a grease pencil. Remove the function generator output from FM INPUT and adjust CW/CW VERNIER to the grease pencil mark. Calculate the difference between the present frequency counter reading and the previous reading (step 6). Verify that the frequency difference is greater than the minimum given in the table below for the FM frequency range tested.

10. Set the function generator to 2 MHz and then 10 MHz, repeating steps 6 through 9 for each frequency, and verify the results according to the table below.

11. Change the mode of Plug-In modulation coupling and repeat steps 6 through 10. Verify the results according to the table below.

Modulation Frequency	Cross-Over Coupled	Direct Coupled
1 MHz	±7 MHz	±7 MHz
2 MHz	±5 MHz	±5 MHz
10 MHz	±1 MHz	±1 MHz

4-21. AM ON/OFF RATIO AND SQUARE WAVE SYMMETRY TEST

SPECIFICATION:

On/Off Ratio: ≥30 dB Symmetry: 40/60

DESCRIPTION:

The AM 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 time ratio on the frequency axis.

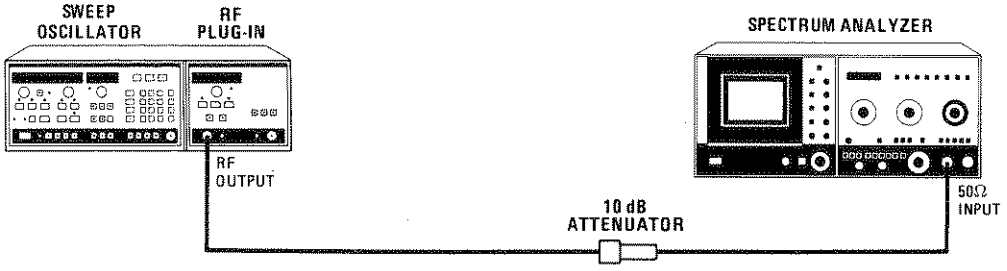


Figure 4-18. AM ON/OFF Ratio and Square Wave Symmetry Test Setup

EQUIPMENT:

Sweep Oscillator	HP 8350A
10 dB Attenuator	HP 8491B Option 010
Spectrum Analyzer	HP 8565A

PROCEDURE:

1. Connect equipment as shown in Figure 4-18. Press 8350A INSTR PRESET, CW 1 GHz and engage ⊔⊓ MOD. Set 83595A POWER LEVEL to +10 dBm.
2. Set controls as follows:

   8565A:

   Set all Normal settings (controls marked with green).

FREQUENCY BAND GHz	0.01 to 1.8 GHz
INPUT ATTENUATION	10 dB
REFERENCE LEVEL	10 dBm
FREQUENCY SPAN MODE	ZERO SPAN
SWEEP TRIGGER	VIDEO
RESOLUTION BW	3 MHz
AUTO STABILIZER	OFF
SWEEP TIME/DIV	0.1 sec for 1 kHz, 5μsec for 27.8 kHz

3. Adjust spectrum analyzer TUNING control to center 1 GHz signal on CRT. Adjust REFERENCE LEVEL to set signal on top trace. Verify that the AM ON/OFF ratio (peak-to-peak signal variation) is greater than 30 dB.
4. Verify that the squarewave symmetry of the observed signal is between 40 and 60 percent.
5. Set the CW frequency to 4 GHz and repeat steps 3 and 4.

4-22. STEP ATTENUATOR ACCURACY TEST (OPTION 002)

SPECIFICATION:

Attenuator Accuracy	Frequency Range (GHz)	Attenuator Setting (dB)										
		5	10	15	20	25	30	35	40	45	50	55
(±dB referenced from the 0 dB setting)	0.01 to 12.4	0.4	0.6	0.7	0.7	0.9	0.9	1.8	1.8	2.0	2.0	2.2
	12.4 to 18.0	0.5	0.7	0.9	0.9	1.2	1.2	2.0	2.0	2.3	2.3	2.5
	18.0 to 26.5	0.7	1.0	2.5	2.5	3.0	3.0	4.2	4.2	4.4	4.4	4.6

DESCRIPTION:

The Plug-In RF output is compared to a specially calibrated attenuator and displayed on a spectrum analyzer.

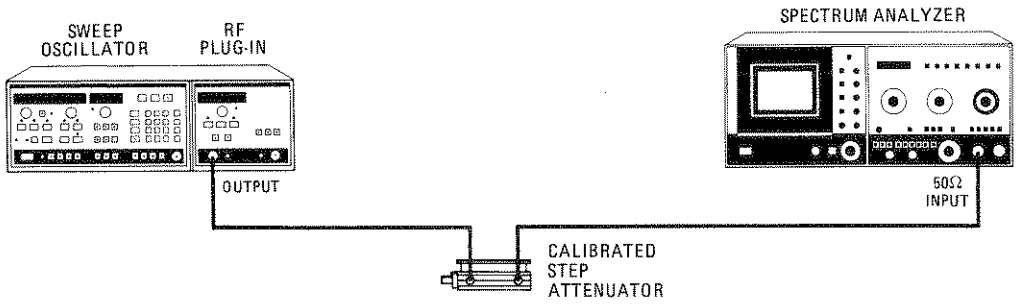


Figure 4-19. Attenuator Accuracy Test Setup

EQUIPMENT:

Sweep Oscillator	HP 8350A
Step Attenuator	HP 8495A Opt. 890
Spectrum Analyzer	HP 8565A

PROCEDURE:

1. Connect equipment as shown in Figure 4-19. Press 8350A INSTR PRESET, CW 4 GHz. Set the 83595A POWER LEVEL to −1 dBm.

2. Set controls as follows:

   Step Attenuator

   ATTENUATION ..... 50 dB

4-22. STEP ATTENUATOR ACCURACY TEST (OPTION 002) (Cont'd)

Spectrum Analyzer

Set all normal settings (controls marked with green)
INPUT ATTEN ..... 10 dB
REFERENCE LEVEL ..... −50 dBm
RESOLUTION BANDWIDTH ..... 1 MHz
FREQUENCY SPAN/DIV ..... 5 MHz
FREQUENCY SPAN MODE ..... FULL BAND
VIDEO FILTER ..... Adjust as necessary
FREQUENCY BAND ..... 3.8 to 8.5 GHz

3. Press 8350A SHIFT SLOPE . The SHIFT SLOPE mode allows the attenuator to be stepped in the smallest increments while the attenuator setting is displayed without affecting ALC circuit.

4. Note the actual attenuation values on the calibrated step attenuator's (Option 890) calibration report at the frequency and attenuation steps used. Calculate the Reference Attenuator Error for each step as shown below; record this error in the Attenuation Error column of Table 4-13 below.

   Attenuation Error = (Cal. Ref Atten. − Cal. Step Atten.) − (Ref. Setting − Step Setting)

   For example, with a Reference setting of 70 dB, the calculation for the 30 dB step setting is as follows [Note that the actual attenuation stepped in this example is 38.75 dB (69.55 dB − 30.80 dB)]:

   Example Calibration Report values:

   70 dB setting is actually 69.55 dB
   30 dB setting is actually 30.80 dB

   Attenuation Error = (69.55 dB − 30.80 dB) − (70 dB − 30 dB) = −1.25 dB

5. Adjust spectrum analyzer TUNING control to center notch on Sweep Oscillator output signal. Reduce spectrum analyzer FREQUENCY SPAN/DIV to .2 MHz and recenter TUNING control. Press FREQUENCY SPAN MODE ZERO SPAN key and adjust FINE TUNING to peak signal on spectrum analyzer display. Press spectrum analyzer 1 dB/DIV and adjust REFERENCE LEVEL VERNIER for a trace at the center graticule line.

6. Press the 8350A ▼ key twice for a display of 10 and decrease the reference attenuation by 10 dB.

7. Record the power level variation from the center graticule (reference) on the spectrum analyzer display (be sure to designate the direction of change: + is above and − is below the reference).

8. Algebraically add the Attenuation Error and Deviation from 0 reference and record the sum in the table below. Repeat steps 6 and 7 for the 20, 30, 40 and 50 dB attenuation values.

4-22. STEP ATTENUATOR ACCURACY TEST (OPTION 002) (Cont'd)

9. Step the Plug-In attenuation to 0 dB. Adjust REFERENCE LEVEL VERNIER for trace on top graticule.

10. Press the 8350A ◄ key for 5 dB Plug-In attenuation. Note the amount the trace is offset from the −5 dB line and record on deviation from 0 ref for 5 dB attenuator step. Adjust the spectrum analyzer REFERENCE LEVEL VERNIER for the same offset from the −4 dB line and repeat steps 6 and 7 for 15, 25, 35, 45, and 55 dB steps.

11. Repeat this procedure at 15 GHz and at 20 GHz.

Table 4-13. Reference Attenuator Accuracy

Ref Atten Step	Atten Step	Calibrated Change	Deviation from 0 ref	Attenuator Accuracy
50-40	10	_____	_____	_____
50-30	20	_____	_____	_____
50-20	30	_____	_____	_____
50-10	40	_____	_____	_____
50-0	50	_____	_____	_____
50-50	5	0	0	_____
50-40	15	_____	_____	_____
50-30	25	_____	_____	_____
50-20	35	_____	_____	_____
50-10	45	_____	_____	_____

Table 4-14. 83595A Performance Test Record (1 of 8)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	Lower Limit	Measured Value	Upper Limit
4-13. Frequency Range and Accuracy					
CW Mode					
	6.	Start frequency = 10 MHz		_____	10 MHz
	7.	Stop frequency = 26.5 GHz	26.5 GHz	_____	
0.01 to 2.4 GHz: ±5 MHz	8.	CW frequency = 10 MHz	5 MHz	_____	15 MHz
		CW frequency = 1 GHz	0.995 GHz	_____	1.005 GHz
		CW frequency = 2.4 GHz	2.395 GHz	_____	2.405 GHz
2.4 to 7.0 GHz: ±5 MHz		CW frequency = 4 GHz	3.995 GHz	_____	4.005 GHz
		CW frequency = 2.5 GHz	2.495 GHz	_____	2.505 GHz
		CW frequency = 7.0 GHz	6.995 GHz	_____	7.005 GHz
7.0 to 13.5 GHz: ±10 MHz		CW frequency = 10 GHz	9.99 GHz	_____	10.01 GHz
		CW frequency = 7.1 GHz	7.09 GHz	_____	7.11 GHz
		CW frequency = 13.5 GHz	13.49 GHz	_____	13.51 GHz
13.5 to 20 GHz: ±10 MHz		CW frequency = 17.0 GHz	16.99 GHz	_____	17.01 GHz
		CW frequency = 14.0 GHz	13.99 GHz	_____	14.01 GHz
		CW frequency = 20.0 GHz	19.99 GHz	_____	20.01 GHz
20 to 26.5 GHz: ±12 MHz		CW frequency = 24.0 GHz	23.988 GHz	_____	24.012 GHz
		CW frequency = 21.0 GHz	20.988 GHz	_____	21.012 GHz
		CW frequency = 26.5 GHz	26.488 GHz	_____	26.512 GHz
Swept Frequency Accuracy					
0.01 to 26.5 GHz: ±50 MHz	11.	Start frequency = 10 MHz	0 MHz	_____	60 MHz
	12.	Stop frequency = 26.5 GHz	25.45 GHz	_____	26.55 GHz
0.01 to 2.4 GHz: ±15 MHz	13.	Start frequency = 10 MHz	0 MHz	_____	25 MHz
		Stop frequency = 2.4 GHz	2.385 GHz	_____	2.415 GHz
2.4 to 7.0 GHz: ±20 MHz		Start frequency = 2.4 GHz	2.38 GHz	_____	2.42 GHz
		Stop frequency = 7.0 GHz	6.98 GHz	_____	7.02 GHz
7.0 to 13.5 GHz: ±25 MHz		Start frequency = 7.0 GHz	6.975 GHz	_____	7.025 GHz
		Stop frequency = 13.5 GHz	13.475 GHz	_____	13.525 GHz
13.5 to 20 GHz: ±30 MHz		Start frequency = 13.5 GHz	13.47 GHz	_____	13.53 GHz
		Stop frequency = 20 GHz	19.97 GHz	_____	20.03 GHz
20 to 26.5 GHz: ±35 MHz		Start frequency = 20 GHz	19.965 GHz	_____	20.035 GHz
		Stop frequency = 26.5 GHz	26.465 GHz	_____	26.535 GHz
Marker Accuracy					
0.01 to 26.5 GHz					
±50 MHz ±.5% of sweep width	16.	M1 = 1 GHz	817.55 MHz	_____	1.18245 GHz
		M2 = 4 GHz	3.81755 GHz	_____	4.18245 GHz
		M3 = 12 GHz	11.81755 GHz	_____	12.18245 GHz
		M4 = 18 GHz	17.81755 GHz	_____	18.18245 GHz
		M5 = 24 GHz	23.81755 GHz	_____	24.18245 GHz
0.01 to 2.4 GHz					
±15 MHz ±.5% of sweep width	17.	M1 = 1 GHz	973.05 MHz	_____	1.02695 GHz
		M2 = 2 GHz	1.97305 GHz	_____	2.02695 GHz
2.4 to 7 GHz					
±20 MHz ±.5% of sweep width		M1 = 3 GHz	2.957 GHz	_____	3.043 GHz
		M2 = 6 GHz	5.957 GHz	_____	6.043 GHz
7 to 13.5 GHz					
±25 MHz ±.5% of sweep width		M1 = 8 GHz	7.9425 GHz	_____	8.0575 GHz
		M2 = 12 GHz	11.9425 GHz	_____	12.0575 GHz

Table 4-14. 83595A Performance Test Record (2 of 8)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	Lower Limit	Measured Value	Upper Limit
13.5 to 20 GHz ±30 MHz ±.5% of sweep width		M1 = 15 GHz	14.9375 GHz	_____	15.0625 GHz
20 to 26.5 GHz ±35 MHz ±.5% of sweep width		M2 = 18 GHz	17.9375 GHz	_____	18.0625 GHz
		M1 = 21 GHz	20.9175 GHz	_____	21.0825 GHz
		M2 = 25 GHz	24.9175 GHz	_____	25.0825 GHz
4-14. Output Amplitude					
Power Variations at Max. Power	6.	0.05 to 2.4 GHz @ +10 dBm	+10 dBm	_____	+11.8 dBm
		2.4 to 7.0 GHz @ +10 dBm	+10 dBm	_____	+11.4 dBm
		7.0 to 13.5 GHz @ +10 dBm	+10 dBm	_____	+11.4 dBm
		13.5 to 20 GHz @ +10 dBm	+10 dBm	_____	+11.6 dBm
		20 to 26.5 GHz @ +4 dBm	+4 dBm	_____	+5.8 dBm
		0.05 to 26.5 GHz @ +4 dBm	+4 dBm	_____	+6.0 dBm
Option 002	6.	0.05 to 2.4 GHz @ +10 dBm	+10 dBm	_____	+11.8 dBm
		2.4 to 7.0 GHz @ +8.5 dBm	+8.5 dBm	_____	+9.9 dBm
		7.0 to 13.5 GHz @ +8 dBm	+8 dBm	_____	+9.4 dBm
		13.5 to 20 Ghz @ +7 dBm	+7 dBm	_____	+8.6 dBm
		20 to 26.5 GHz @ +1 dBm	+1 dBm	_____	+2.8 dBm
		0.01 to 26.5 GHz @ 1 dBm	+1 dBm	_____	+3.0 dBm
Power Level Accuracy 0.01 to 2.4 GHz		Power = +10 dBm	+8.5 dBm	_____	+11.5 dBm
		= +9 dBm	+7.5 dBm	_____	+10.5 dBm
		= +8 dBm	+6.5 dBm	_____	+9.5 dBm
		= +7 dBm	+5.5 dBm	_____	+8.5 dBm
		= +6 dBm	+4.5 dBm	_____	+7.5 dBm
		= +5 dBm	+3.5 dBm	_____	+6.5 dBm
		= +4 dBm	+2.5 dBm	_____	+5.5 dBm
		= +3 dBm	+1.5 dBm	_____	+4.5 dBm
		= +2 dBm	+0.5 dBm	_____	+3.5 dBm
		= +1 dBm	−0.5 dBm	_____	+2.5 dBm
		= 0 dBm	−1.5 dBm	_____	+1.5 dBm
		= −1 dBm	−2.5 dBm	_____	+0.5 dBm
		= −2 dBm	−3.5 dBm	_____	−0.5 dBm
		= −3 dBm	−4.5 dBm	_____	−1.5 dBm
		= −4 dBm	−5.5 dBm	_____	−2.5 dBm
		= −5 dBm	−6.5 dBm	_____	−3.5 dBm
2.4 to 7.0 GHz		Power = +10 dBm	+8.7 dBm	_____	+11.3 dBm
		= +9 dBm	+7.7 dBm	_____	+10.3 dBm
		= +8 dBm	+6.7 dBm	_____	+9.3 dBm
		= +7 dBm	+5.7 dBm	_____	+8.3 dBm
		= +6 dBm	+4.7 dBm	_____	+7.3 dBm
		= +5 dBm	+3.7 dBm	_____	+6.3 dBm
		= +4 dBm	+2.7 dBm	_____	+5.3 dBm
		= +3 dBm	+1.7 dBm	_____	+4.3 dBm
		= +2 dBm	+0.7 dBm	_____	+3.3 dBm
		= +1 dBm	−0.3 dBm	_____	+2.3 dBm
		= 0 dBm	−1.3 dBm	_____	+1.3 dBm
		= −1 dBm	−2.3 dBm	_____	+0.3 dBm
		= −2 dBm	−3.3 dBm	_____	−0.7 dBm
		= −3 dBm	−4.3 dBm	_____	−1.7 dBm

Table 4-14. 83595A Performance Test Record (3 of 8)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	Lower Limit	Measured Value	Upper Limit
		= −4 dBm	−5.3 dBm	_____	−2.7 dBm
		= −5 dBm	−6.3 dBm	_____	−3.7 dBm
7.0 to 13.5 GHz		Power = +10 dBm	+8.7 dBm	_____	+11.3 dBm
		= +9 dBm	+7.7 dBm	_____	+10.3 dBm
		= +8 dBm	+6.7 dBm	_____	+9.3 dBm
		= +7 dBm	+5.7 dBm	_____	+8.3 dBm
		= +6 dBm	+4.7 dBm	_____	+7.3 dBm
		= +5 dBm	+3.7 dBm	_____	+6.3 dBm
		= +4 dBm	+2.7 dBm	_____	+5.3 dBm
		= +3 dBm	+1.7 dBm	_____	+4.3 dBm
		= +2 dBm	+0.7 dBm	_____	+3.3 dBm
		= +1 dBm	−0.3 dBm	_____	+2.3 dBm
		= 0 dBm	−1.3 dBm	_____	+1.3 dBm
		= −1 dBm	−2.3 dBm	_____	+0.3 dBm
		= −2 dBm	−3.3 dBm	_____	−0.7 dBm
		= −3 dBm	−4.3 dBm	_____	−1.7 dBm
		= −4 dBm	−5.3 dBm	_____	−2.7 dBm
		= −5 dBm	−6.3 dBm	_____	−3.7 dBm
13.5 to 20 GHz		Power = +10 dBm	+8.6 dBm	_____	+11.4 dBm
		= +9 dBm	+7.6 dBm	_____	+10.4 dBm
		= +8 dBm	+6.6 dBm	_____	+9.4 dBm
		= +7 dBm	+5.6 dBm	_____	+8.4 dBm
		= +6 dBm	+4.6 dBm	_____	+7.4 dBm
		= +5 dBm	+3.6 dBm	_____	+6.4 dBm
		= +4 dBm	+2.6 dBm	_____	+5.4 dBm
		= +3 dBm	+1.6 dBm	_____	+4.4 dBm
		= +2 dBm	+0.6 dBm	_____	+3.4 dBm
		= +1 dBm	−0.4 dBm	_____	+2.4 dBm
		= 0 dBm	−1.4 dBm	_____	+1.4 dBm
		= −1 dBm	−2.4 dBm	_____	+0.4 dBm
		= −2 dBm	−3.4 dBm	_____	−0.6 dBm
		= −3 dBm	−4.4 dBm	_____	−1.6 dBm
		= −4 dBm	−5.4 dBm	_____	−2.6 dBm
		= −5 dBm	−6.4 dBm	_____	−3.6 dBm
20 to 26.5 GHz		Power = +4 dBm	+2.3 dBm	_____	+5.7 dBm
		= +3 dBm	+1.3 dBm	_____	+4.7 dBm
		= +2 dBm	+0.3 dBm	_____	+3.7 dBm
		= +1 dBm	−0.7 dBm	_____	+2.7 dBm
		= 0 dBm	−1.7 dBm	_____	+1.7 dBm
		= −1 dBm	−2.7 dBm	_____	+0.7 dBm
		= −2 dBm	−3.7 dBm	_____	−0.3 dBm
		= −3 dBm	−4.7 dBm	_____	−1.3 dBm
		= −4 dBm	−5.7 dBm	_____	−2.3 dBm
		= −5 dBm	−6.7 dBm	_____	−3.3 dBm
0.01 to 26.5 GHz		Power = +4 dBm	+2.2 dBm	_____	+5.8 dBm
		= +3 dBm	+1.2 dBm	_____	+4.8 dBm
		= +2 dBm	+0.2 dBm	_____	+3.8 dBm
		= +1 dBm	−0.8 dBm	_____	+2.8 dBm
		= 0 dBm	−1.8 dBm	_____	+1.8 dBm
		= −1 dBm	−2.8 dBm	_____	+0.8 dBm

Table 4-14. 83595A Performance Test Record (4 of 8)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	Lower Limit	Measured Value	Upper Limit
0.01 to 26.5 GHz (Cont'd)		= −2 dBm	−3.8 dBm		−0.2 dBm
		= −3 dBm	−4.8 dBm		−1.2 dBm
		= −4 dBm	−5.8 dBm		−2.2 dBm
		= −5 dBm	−6.8 dBm		−3.2 dBm
Option 002					
0.01 to 2.4 GHz		Power = +10 dBm	+8.3 dBm		+11.7 dBm
		= +9 dBm	+7.3 dBm		+10.7 dBm
		= +8 dBm	+6.3 dBm		+9.7 dBm
		= +7 dBm	+5.3 dBm		+8.7 dBm
		= +6 dBm	+4.3 dBm		+7.7 dBm
		= +5 dBm	+3.3 dBm		+6.7 dBm
		= +4 dBm	+2.3 dBm		+5.7 dBm
		= +3 dBm	+1.3 dBm		+4.7 dBm
		= +2 dBm	+0.3 dBm		+3.7 dBm
		= +1 dBm	−0.7 dBm		+2.7 dBm
		= 0 dBm	−1.7 dBm		+1.7 dBm
		= −1 dBm	−2.7 dBm		+0.7 dBm
		= −2 dBm	−3.7 dBm		−0.3 dBm
		= −3 dBm	−4.7 dBm		−1.3 dBm
		= −4 dBm	−5.7 dBm		−2.3 dBm
		= −5 dBm	−6.7 dBm		−3.3 dBm
2.4 to 7.0 GHz		Power = +10 dBm	+8.5 dBm		+11.5 dBm
		= +9 dBm	+7.5 dBm		+10.5 dBm
		= +8 dBm	+6.5 dBm		+9.5 dBm
		= +7 dBm	+5.5 dBm		+8.5 dBm
		= +6 dBm	+4.5 dBm		+7.5 dBm
		= +5 dBm	+3.5 dBm		+6.5 dBm
		= +4 dBm	+2.5 dBm		+5.5 dBm
		= +3 dBm	+1.5 dBm		+4.5 dBm
		= +2 dBm	+0.5 dBm		+3.5 dBm
		= +1 dBm	−0.5 dBm		+2.5 dBm
		= 0 dBm	−1.5 dBm		+1.5 dBm
		= −1 dBm	−2.5 dBm		+0.5 dBm
		= −2 dBm	−3.5 dBm		−0.5 dBm
		= −3 dBm	−4.5 dBm		−1.5 dBm
		= −4 dBm	−5.5 dBm		−2.5 dBm
		= −5 dBm	−6.5 dBm		−3.5 dBm
7.0 to 13.5 GHz		Power = +10 dBm	+8.5 dBm		+11.5 dBm
		= +9 dBm	+7.5 dBm		+10.5 dBm
		= +8 dBm	+6.5 dBm		+9.5 dBm
		= +7 dBm	+5.5 dBm		+8.5 dBm
		= +6 dBm	+4.5 dBm		+7.5 dBm
		= +5 dBm	+3.5 dBm		+6.5 dBm
		= +4 dBm	+2.5 dBm		+5.5 dBm
		= +3 dBm	+1.5 dBm		+4.5 dBm
		= +2 dBm	+0.5 dBm		+3.5 dBm
		= +1 dBm	−0.5 dBm		+2.5 dBm
		= 0 dBm	−1.5 dBm		+1.5 dBm
		= −1 dBm	−2.5 dBm		+0.5 dBm
		= −2 dBm	−3.5 dBm		−0.5 dBm

Table 4-14. 83595A Performance Test Record (5 of 8)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	Lower Limit	Measured Value	Upper Limit
7.0 to 13.5 GHz (Cont'd)		= −3 dBm	−4.5 dBm		−1.5 dBm
		= −4 dBm	−5.5 dBm		−2.5 dBm
		= −5 dBm	−6.5 dBm		−3.5 dBm
13.5 to 20 GHz		Power = +10 dBm	+8.4 dBm		+11.6 dBm
		= +9 dBm	+7.4 dBm		+10.6 dBm
		= +8 dBm	+6.4 dBm		+9.6 dBm
		= +7 dBm	+5.4 dBm		+8.6 dBm
		= +6 dBm	+4.4 dBm		+7.6 dBm
		= +5 dBm	+3.4 dBm		+6.6 dBm
		= +4 dBm	+2.4 dBm		+5.6 dBm
		= +3 dBm	+1.4 dBm		+4.6 dBm
		= +2 dBm	+0.4 dBm		+3.6 dBm
		= +1 dBm	−0.6 dBm		+2.6 dBm
		= 0 dBm	−1.6 dBm		+1.6 dBm
		= −1 dBm	−2.6 dBm		+0.6 dBm
		= −2 dBm	−3.6 dBm		−0.4 dBm
		= −3 dBm	−4.6 dBm		−1.4 dBm
		= −4 dBm	−5.6 dBm		−2.4 dBm
		= −5 dBm	−6.6 dBm		−3.4 dBm
20 to 26.5 GHz		Power = +1 dBm	−0.1 dBm		+2.9 dBm
		= 0 dBm	−1.9 dBm		+1.9 dBm
		= −1 dBm	−2.9 dBm		+0.9 dBm
		= −2 dBm	−3.9 dBm		−0.1 dBm
		= −3 dBm	−4.9 dBm		−1.1 dBm
		= −4 dBm	−5.9 dBm		−2.1 dBm
		= −5 dBm	−6.9 dBm		−3.1 dBm
0.01 to 26.5 GHz		Power = +1 dBm	−1.0 dBm		+3.0 dBm
		= 0 dBm	−2.0 dBm		+2.0 dBm
		= −1 dBm	−3.0 dBm		+1.0 dBm
		= −2 dBm	−4.0 dBm		−0.0 dBm
		= −3 dBm	−5.0 dBm		−1.0 dBm
		= −4 dBm	−6.0 dBm		−2.0 dBm
		= −5 dBm	−7.0 dBm		−3.0 dBm
Power Sweep	12.	Power Level = −5 dBm			
0.01 to 2.4 GHz			+10 dBm		
2.4 to 7.0 GHz			+10 dBm		
7.0 to 13.5 GHz			+10 dBm		
13.5 to 20 GHz			+10 dBm		
20 to 26.5 GHz			+4 dBm		
0.01 to 26.5 GHz			+4 dBm		
Option 002	12.	Power Level = −5 dBm			
0.01 to 2.4 GHz			+10 dBm		
2.4 to 7.0 GHz			+8.5 dBm		
7.0 to 13.5 GHz			+8 dBm		
13.5 to 20 GHz			+7 dBm		
20 to 26.5 GHz			+1 dBm		
0.01 to 26.5 GHz			+5 dBm		

Table 4-14. 83595A Performance Test Record (6 of 8)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	Lower Limit	Measured Value	Upper Limit
Power Meter Leveled					
<±0.2 dB	20.			_____	<±0.2 dB
Crystal Detector Leveled					
<±0.2 dB	24.			_____	<±0.2 dB
4-15. Frequency Stability					
+5 to −10% V Line Change:					
Band 0, 1 GHz <±50 kHz	3.	Low line frequency change		_____	≤±50 kHz
	4.	High line frequency change		_____	≤±50 kHz
Band 1, 6 GHz <±50 kHz		Low line frequency change		_____	<±50 kHz
		High line frequency change		_____	<±50 kHz
Band 2, 12 GHz <±100 kHz		Low line frequency change		_____	<±100 kHz
		High line frequency change		_____	<±100 kHz
Band 3, 18 GHz <±150 kHz		Low line frequency change		_____	<±150 kHz
		High line frequency change		_____	<±150 kHz
Band 4, 24 GHz <±200 kHz		Low line frequency change		_____	≤±200 kHz
		High line frequency change		_____	≤±200 kHz
10 dB Power Change:					
Band 0, 1 GHz: ≤±200 kHz	6.	Frequency change with power		_____	≤±200 kHz
Band 1, 6 GHz: ≤±200 kHz	7.	Frequency change with power		_____	≤±200 kHz
Band 2, 12 GHz: ≤±400 kHz		Frequency change with power		_____	≤±400 kHz
Band 3, 18 GHz: ≤±600 kHz		Frequency change with power		_____	≤±600 kHz
Band 4, 24 GHz: ≤±800 kHz		Frequency change with power		_____	≤±800 kHz
3:1 Load SWR:					
Band 0, 1 GHz: ≤±100 kHz	11.	3:1 SWR		_____	≤±100 kHz
Band 1, 6 GHz: ≤±100 kHz	12.	3:1 SWR		_____	≤±100 kHz
Band 2, 12 GHz: ≤±200 kHz		3:1 SWR		_____	≤±200 kHz
Band 3, 18 GHz: ≤±300 kHz		3:1 SWR		_____	≤±300 kHz
Band 4, 24 GHz: ≤±400 kHz		3:1 SWR		_____	≤±400 kHz
4-16. Residual FM					
≤5 kHz	17.	CW frequency = 1 GHz		_____	≤5 kHz
≤5 kHz	18.	CW frequency = 6 GHz		_____	≤5 kHz
≤7 kHz		CW frequency = 12 GHz		_____	≤7 kHz
≤9 kHz		CW frequency = 18 GHz		_____	≤9 kHz
≤12 kHz		CW frequency = 22 GHz		_____	≤12 kHz
4-17. Spurious Signals					
Harmonic:					
0.01 to 2.4 GHz: >−25 dB	3.	Measure relative to carrier	>−25 dB	_____	
2.4 to 7 GHz: >−25 dB			>−25 dB	_____	

Table 4-14. 83595A Performance Test Record (7 of 8)

SPECIFICATIONS TESTED Limits	Step	TEST Conditions	Lower Limit	Measured Value	Upper Limit
7 to 13.5 GHz: >−25 dB			>−25 dB	_____	
13.5 to 20 GHz: >−25 dB			>−25 dB	_____	
20 to 26.5 GHz: >−20 dB			>−20 dB	_____	
Non-harmonic:					
0.01 to 2.4 GHz: >−25 dB			>−25 dB	_____	
2.4 to 7 GHz: >−50 dB			>−50 dB	_____	
7 to 13.5 GHz: >−50 dB			>−50 dB	_____	
13.5 to 20 GHz: >−50 dB			>−50 dB	_____	
20 to 26.5 GHz: >−50 dB			>−50 dB	_____	
4-18. Output SWR					
0.01 to 2 GHz: <1.9	6.	Range: 0.1 to 2 GHz		_____	<1.9
Option 002: <2.0				_____	<2.0
2 to 20 GHz: <1.9	11.	Range: 2 to 20 GHz		_____	<1.9
Option 002: <2.0				_____	<2.0
20 to 26.5 GHz: <1.9	16.	Range: 20 to 26.5 GHz		_____	<1.9
Option 002: <2.2				_____	<2.2
4-19. Residual AM					
1 GHz: ≥−50 dB	5.	Measure relative to carrier		_____	≥−50 dB
6 GHz: ≥−50 dB				_____	≥−50 dB
12 GHz: ≥−50 dB				_____	≥−50 dB
18 GHz: ≥−50 dB				_____	≥−50 dB
24 GHz: ≥−50 dB				_____	≥−50 dB
4-20. External FM					
Direct Coupled:	1.	A3S1: Close switch 5, open 6.			
DC to 100 Hz: ≥±12 MHz	3.		≥±12 MHz	_____	
Cross Over Coupled:	4.	A3S1: Close switch 6.			
DC to 100 Hz: ≥±75 MHz			≥±75 MHz	_____	
Direct/Cross Over Coupling					
100 Hz to 1 MHz: ≥±7 MHz	9.		≥±7 MHz	_____	
1 to 2 MHz: ≥±5 MHz	10.		≥±5 MHz	_____	
2 to 10 MHz: ≥±1 MHz			≥±1 MHz	_____	
	11.	A3S1: Change switch 6 from previous setting	≥±7 MHz	_____	
			≥±5 MHz	_____	
			≥±1 MHz	_____	
4-21. AM On/Off Ratio Square-Wave Symmetry					
On/Off Ratio:	1.	CW frequency = 1 GHz			
>30 dB below specified maximum leveled power		Power = +10 dBm			
	3.		>30 dB	_____	
Symmetry of ON/OFF time:	4.		40%	_____	60%
40/60	5.	CW frequency = 4 GHz	>30 dB	_____	
			40%	_____	60%

Table 4-14. Model 83595A Performance Test Record (8 of 8)

SPECIFICATIONS TESTED Limits		Step	TEST Conditions				Lower Limit	Measured Value	Upper Limit
4-22. Step Attenuator Accuracy (Option 002) (Referenced from 0 dB) 0.01 to 12.4 GHz		1. 2.	CW frequency = 4.0 GHz Power = − 1.0 dBm Reference Attenuation = 50 dB						
Attn. Step	**Accuracy**		**Ref. Attn. Step**	**Attn. Error**	**+**	**Deviation from 0 ref.**			
10 dB	≤±0.6 dB	4.	50 − 40		+				≤±0.6 dB
20 dB	≤±0.7 dB	7.	50 − 30		+				≤±0.7 dB
30 dB	≤±0.9 dB	8.	50 − 20		+				≤±0.9 dB
40 dB	≤±1.8 dB		50 − 10		+				≤±1.8 dB
50 dB	≤±2.0 dB		50 − 0		+				≤±2.0 dB
5 dB	≤±0.4 dB		50 − 50		+				≤±0.4 dB
15 dB	≤±0.7 dB		50 − 40		+				≤±0.7 dB
25 dB	≤±0.9 dB		50 − 30		+				≤±0.9 dB
35 dB	≤±1.8 dB		50 − 20		+				≤±1.8 dB
45 dB	≤±2.0 dB		50 − 10		+				≤±2.0 dB
55 dB	≤±2.2 dB		50 − 0		+				≤±2.2 dB
12.4 to 18 GHz		11.	CW frequency = 15 GHz Power = − 1.0 dBm Reference Attenuation = 50 dB						
Attn. Step	**Accuracy**		**Ref. Attn. Step**	**Attn. Error**	**+**	**Deviation from 0 ref.**			
10 dB	≤±0.7 dB		50 − 40		+				≤±0.7 dB
20 dB	≤±0.9 dB		50 − 30		+				≤±0.9 dB
30 dB	≤±1.2 dB		50 − 20		+				≤±1.2 dB
40 dB	≤±2.0 dB		50 − 10		+				≤±2.0 dB
50 dB	≤±2.3 dB		50 − 0		+				≤±2.3 dB
5 dB	≤±0.5 dB		50 − 50		+				≤±0.5 dB
15 dB	≤±0.9 dB		50 − 40		+				≤±0.9 dB
25 dB	≤±1.2 dB		50 − 30		+				≤±1.2 dB
35 dB	≤±2.0 dB		50 − 20		+				≤±2.0 dB
45 dB	≤±2.3 dB		50 − 10		+				≤±2.3 dB
55 dB	≤±2.5 dB		50 − 0		+				≤±2.5 dB
18 to 26.5 GHz		11.	CW frequency = 20 GHz Power = −1.0 dBm Reference Attenuation = 50 dB						
Attn. Step	**Accuracy**		**Ref. Attn. Step**	**Attn. Error**	**+**	**Deviation from 0 ref.**			
10 dB	≤±1.0 dB		50 − 40		+				≤±1.0 dB
20 dB	≤±2.5 dB		50 − 30		+				≤±2.5 dB
30 dB	≤±3.0 dB		50 − 20		+				≤±3.0 dB
40 dB	≤±4.2 dB		50 − 10		+				≤±4.2 dB
50 dB	≤±4.4 dB		50 − 0		+				≤±4.4 dB
5 dB	≤±0.7 dB		50 − 50		+				≤±0.7 dB
15 dB	≤±2.5 dB		50 − 40		+				≤±2.5 dB
25 dB	≤±3.0 dB		50 − 30		+				≤±3.0 dB
35 dB	≤±4.2 dB		50 − 20		+				≤±4.2 dB
45 dB	≤±4.4 dB		50 − 10		+				≤±4.4 dB
55 dB	≤±4.6 dB		50 − 0		+				≤±4.6 dB

SECTION V
ADJUSTMENTS

5-1. INTRODUCTION

5-2. This section provides adjustment procedures for the Model 83595A RF Plug-In. These procedures should not be performed as routine maintenance but should be used (1) after replacement of a part or component, or (2) when performance tests show that the specifications of Table 1-1 cannot be met. Table 5-1 lists all of the adjustments by reference designation, adjustment name, adjustment paragraph, and description. Each procedure includes a test setup illustration and one or more adjustment location illustrations. Table 5-2 lists the adjustments included in this section.

NOTE

Allow the 83595A RF Plug-In and the 8350A Sweep Oscillator to warm up for one hour prior to making any adjustments.

5-3. SAFETY CONSIDERATIONS

5-4. 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 involved.

WARNING

Adjustments in this section are performed with power supplied to the instrument while protective covers are removed. There are voltages at points in the instrument which can, if contacted, cause personal injury. Be extremely careful. Adjustments should be performed only by a skilled person who is aware of the hazards involved.

Capacitors inside the instrument may still be charged, even if the instrument has been disconnected from its source of supply.

NOTE

Use a non-metallic adjustment tool whenever possible.

5-5. EQUIPMENT REQUIRED

5-6. The equipment required for the adjustment procedures is listed in Section I of this Manual. If the test equipment recommended is not available, other equipment may be used if its performance meets the critical specifications listed in the table. The equipment required for each adjustment is specified in each procedure.

5-7. FACTORY-SELECTED COMPONENTS

5-8. Table 5-3 is a list of factory-selected components, and includes the reference designator, the paragraph number of the related adjustment procedure, the allowable range of values, and the basis of selection. Nominal values are given for the factory-selected components, which are designated by an asterisk (*) on the schematic diagram and in the replacement parts list. HP part numbers for standard value replacement components are given in Table 5-4.

5-9. RELATED ADJUSTMENTS

5-10. Interactive adjustments are noted in the adjustment procedures. Table 5-5 indicates by paragraph numbers the adjustments that must be performed if an assembly has been repaired or replaced or if an adjustment has been made to an assembly.

5-11. ADJUSTMENT PROCEDURES

5-12. Adjustment procedures are given in the proper sequence to allow for interrelated adjustments.

Table 5-1. Adjustable Components (1 of 3)

Reference Designation	Adjustment Name	Adjustment Paragraph	Description
A2R1	GAIN	5-24	Sets gain of frequency reference in Bands 1, 2, and 3 (1V/GHz).
A2R4	OFFSET	5-24	Sets offset of frequency reference in Bands 1, 2, and 3 (1V/GHz).
A2R6	BAND 0 OFFSET	5-24	Sets offset of frequency reference in Band 0 (1 V/GHz).
A2R23	BAND 0 GAIN	5-24	Sets gain of frequency reference in Band 0 (1 V/GHz).
A3S1	Configuration Switch	5-13	Selects plug-in code, power up power level, FM sensitivity, FM modulation coupling, step attenuator option code, normal or sequential sweep option, and phase lock operation.
A4R1	SLP	5-25	Slope Adjustment for B0.
A4R2	0 HI	5-25	Sets power calibration at the high end of the power range (+10 dBm) in Band 0.
A4R3	1 HI	5-25	Sets power calibration at the high end of the power range (+10 dBm) in Bands 1, 2, 3, and 4.
A4R4	BIAS	5-25	Sets bias on the internal detector line for 0 volts with RF power OFF.
A4R5	1 LO	5-25	Sets power calibration at the low end of the power range (−5 dBm) in Bands 1, 2, 3, and 4.
A4R6	0 LO	5-25	Sets power calibration at the low end of the power range (−5 dBm) in Bands 1, 2, 3, and 4.
A4R7	0 MD	5-25	Sets power calibration at the middle of the power range (+7 dBm) in Band 0.
A4R8	1 MD	5-25	Sets power calibration at the middle of the power range (+7 dBm) in Bands 1, 2, 3, and 4.
A4R9	PM	5-27	Sets power meter leveling calibration.
A4R11	GAIN	5-28	Sets gain of U11 Main ALC Amplifier.
A4R47	OFS 1	5-25	Adjusts for zero offset through U7-Q6 log amplifier circuit.
A4R56	OFS 2	5-25	Adjusts for zero offset through U5 log amplifier circuit.
A4R59	OFS 3	5-25	Adjusts for zero offset through U8-Q1 Sample and Hold circuit.
A4R67	OFS 4	5-25	Adjusts for zero offset through U11 Main ALC Amplifier.
A5C14	LO	5-30	Adjusts low frequency for best frequency response flatness through U10.
A5R18	FM OFFSET	5-30	Adjusts shape of U10 Video Amplifier compensation network response.
A5R19	FM	5-30	Sets DC offset of U10 Video Amplifier.
A5R34	BP 1	5-26	Breakpoint that works with SL1 (Slope 1) for ALC flatness.
A5R36	BP 2	5-26	Breakpoint that works with SL2 (Slope 2) for ALC flatness.
A5R38	BP 3	5-26	Breakpoint that works with SL3 (Slope 3) for ALC flatness.
A5R40	BP4	5-26	Breakpoint that works with SL4 (Slope 4) for ALC flatness.
A5R41	SL 1	5-26	Slope adjustment for best ALC flatness.
A5R42	SL 2	5-26	Slope adjustment for best ALC flatness.
A5R43	SL3	5-26	Slope adjustment for best ALC flatness.

Table 5-1. Adjustable Components (2 of 3)

Reference Designation	Adjustment Name	Adjustment Paragraph	Description
A5R44	SL 4	5-26	Slope adjustment for best ALC flatness.
A5R48	SLP	5-26	Sets overall slope of internal leveling ALC.
A5R50	PWSP	5-29	Sets range for power sweep.
A5R75	HI	5-30	Works in conjunction with C14 to set frequency response flatness of FM Coil.
A6R12	C	5-20, 5-21	Adjusts YTM SRD bias to peak power in all bands at low power settings.
A6R16	TV GAIN	5-15	Sets the gain of U6 Tune Voltage buffer amplifier.
A6R21	DAC CAL	5-15	Adjusts the gain of U5 Variable Gain Amplifier during all single band sweeps.
A6R24	B3	5-15, 5-23,	Adjusts the gain of U5 Variable Gain Amplifier in Bands 3 and 4 during sequential sweeps.
A6R26	B2	5-15, 5-23	Adjusts the gain of U5 Variable Gain Amplifier in Band 2 during sequential sweeps.
A6R28	B1	5-15, 5-23	Adjusts the gain of U5 Variable Gain Amplifier in Band 1 during sequential sweeps.
A6R30	B0	5-15	Adjusts the gain of U5 Variable Gain Amplifier in Band 0 during sequential sweeps.
A6R34	−10V OFFSET	5-15	Offsets the −10 volt reference voltage to U15.
A6R37	SP	5-15	Offsets input voltage to U24A forward sweep bandswitch amplifier.
A6R63	3HL	5-20, 5-21	Adjusts balance of SRD bias circuit.
A6R68	2H	5-20, 5-21	Adjusts YTM SRD bias at high power, high frequency end of Band 2.
A6R69	3H	5-20, 5-21	Adjusts TYM SRD bias at high power, high frequency end of Band 3.
A6R70	4H	5-20, 5-21	Adjusts YTM SRD bias at high power, high frequency end of Band 4.
A6R73	2L	5-20, 5-21	Adjusts YTM SRD bias at high power, low frequency end of Band 2.
A6R74	3L	5-20, 5-21	Adjusts YTM SRD bias at high power, low frequency end of Band 3.
A6R75	4L	5-20, 5-21	Adjusts YTM SRD bias at high power, low frequency end of Band 4.
A6R78	T	5-20, 5-21	Adjusts YTM SRD bias at an intermediate power level for Bands 2, 3 and 4.
A7R10	SGL HI	5-22	Adjusts offset of YTM delay compensation signal at the high end of single band sweeps.
A7R12	SGL LO	5-22	Adjusts offset of YTM delay compensation signal at the low end of single band sweeps.
A7R18	Z	5-16	Adjusts offset of U20 delay compensation amplifier to minimize the difference between CW and $\Delta F \pm 0$ with YTM delay compensation circuits.
A7R19	GAIN	5-16	Adjusts the Scaled Voltage Tune DAC input signal to U21 YTM Summing Amplifier.

Table 5-1. Adjustable Components (3 of 3)

Reference Designation	Adjustment Name	Adjustment Paragraph	Description
A7R22	ZRO	5-16	Adjusts supply correction voltage to U21 YTM Summing Amplifier.
A7R24	OFS	5-16	Adjusts Offset DAC input signal to U21 YTM Summing Amplifier.
A7R42	SEQ HI	5-22	Adjusts offset of YTM delay compensation signal at high end of sequential band sweeps.
A7R43	SEQ LO	5-22	Adjusts offset of YTM delay compensation signal at low end of sequential band sweeps.
A7R45	SEQ TC	5-22	Adjusts gain of YTM delay compensation signal in sequential band sweeps.
A7R46	SGL TC	5-22	Adjusts gain of YTM delay compensation signal in single band sweeps.
A7R51	B1 OFS	5-20, 5-24	Adjusts offset of U21 Summing Amplifier in single band sweeps.
A7R55	RTC COMP	5-22	Adjusts the pulse width of YTM retrace compensation signal.
A7S1	OFFSET	5-20	Adjusts low end of band YTM to YO tracking at slow sweep speeds.
A7S2	GAIN	5-20	Adjusts high end of band YTM to YO tracking at slow sweep speeds.
A8R10	HI	5-19	Adjusts YO delay compensation at high frequency end of band.
A8R12	LO	5-19	Adjusts YO delay compensation at low frequency end of band.
A8R18	Z	5-16, 5-19	Adjusts offset to minimize the difference between CW and $\Delta F \pm 0$ with YO delay compensation circuits.
A8R19	GAIN	5-16	Adjusts Scaled Voltage Tune DAC input signal to U20 Summing Amplifier.
A8R22	ZRO	5-16	Adjusts supply correction voltage to U20 Summing Amplifier.
A8R24	OFS	5-16	Adjusts Offset DAC input signal to U20 Summing Amplifier.
A8R44	−10V	5-14	Sets −10 volt reference voltage source.
A8R55	RTC COMP	5-18	Adjusts the pulse width of the YO retrace compensation signal.
A8S1	OFFSET	5-17	Adjusts the low end of band YO frequency accuracy.
A8S2	GAIN	5-17	Adjusts the high end of band YO frequency accuracy.
A13A1R4		none	Factory adjusted.
A14A1R11		none	Factory adjusted.
A14A1R13		none	Factory adjusted.
A14A1R14		none	Factory adjusted.
A14A1R15		none	Factory adjusted.
A14A1R16		none	Factory adjusted.
A14A1R18		none	Factory adjusted.
A16A1R4		none	Factory adjusted.
A16A1R6		none	Factory adjusted.

Table 5-2. Adjustment Procedures

Paragraph	Adjustments	Paragraph	Adjustments
5-13	Configuration Switch A3S1	5-22	YTM Delay Compensation
5-14	−10 Volt Reference On A8 YO Driver	5-23	Band Overlap Adjustment
5-15	Sweep Control Adjustments	5-24	Frequency Reference 1V/GHz Output
5-16	YO and YTM DAC Calibration	5-25	ALC Adjustments
5-17	Frequency Accuracy	5-26	ALC Internally Leveled Flatness Adjustment
5-18	YO Retrace Compensation	5-27	Power Meter Leveling Calibration
5-19	YO Delay Compensation	5-28	ALC Gain Adjustment
5-20	Slow Speed YTM to YO Tracking	5-29	Power Sweep
5-21	SRD Bias	5-30	FM Driver Adjustments

Table 5-3. Factory Selected Components

Reference Designator	Adjustment Paragraph	Allowable Range of Values	Basis of Selection
A5R31	5-30	200 to 300 Ohms	Selects scaling of current drive of YO FM coil near 100 kHz.
A7R34	none		Selected at factory to correct for frequency nonlinearity in YTM.
A7R35–39	none		
A7R66–71	none		
A8R36	none		Selected at factory to correct for frequency nonlinearity in the YO.
A8R37–39	none		
A13A1R1	none		Selected at factory to optimize YO bandwidth, power, and harmonics.
A13A1R2	none		

Table 5-4. HP Part Numbers of Standard Value Replacement Components

RESISTORS

RANGE: 10 to 464K Ohms
TYPE: Fixed-Film
WATTAGE: .125 at 125°C
TOLERANCE: ±1.0%

Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D
10.0	0757-0346	2	464	0698-0082	7	21.5K	0757-0199	3
11.0	0757-0378	0	511	0757-0416	7	23.7K	0698-3158	4
12.1	0757-0379	1	562	0757-0417	8	26.1K	0698-3159	5
13.3	0698-3427	0	619	0757-0418	9	28.7K	0698-3449	6
14.7	0698-3428	1	681	0757-0419	0	31.6K	0698-3160	8
16.2	0757-0382	6	750	0757-0420	3	34.8K	0757-0123	3
17.8	0757-0294	9	825	0757-0421	4	38.3K	0698-3161	9
19.6	0698-3429	2	909	0757-0422	5	42.2K	0698-3450	9
21.5	0698-3430	5	1.0K	0757-0280	3	46.4K	0698-3162	0
23.7	0698-3431	6	1.1K	0757-0424	7	51.1K	0757-0458	7
26.1	0698-3432	7	1.21K	0757-0274	5	56.2K	0757-0459	8
28.7	0698-3433	8	1.33K	0757-0317	7	61.9K	0757-0460	1
31.6	0757-0180	2	1.47K	0757-1094	9	68.1K	0757-0461	2
34.8	0698-3434	9	1.62K	0757-0428	1	75.0K	0757-0462	3
38.3	0698-3435	0	1.78K	0757-0278	9	82.5K	0757-0463	4
42.2	0757-0316	6	1.96K	0698-0083	8	90.9K	0757-0464	5
46.4	0698-4037	0	2.15K	0698-0084	9	100K	0757-0465	6
51.1	0757-0394	0	2.37K	0698-3150	6	110K	0757-0466	7
56.2	0757-0395	1	2.61K	0698-0085	0	121K	0757-0467	8
61.9	0757-0276	7	2.87K	0698-3151	7	133K	0698-3451	0
68.1	0757-0397	3	3.16K	0757-0279	0	147K	0698-3452	1
75.0	0757-0398	4	3.48K	0698-3152	8	162K	0757-0470	3
82.5	0757-0399	5	3.83K	0698-3153	9	178K	0698-3243	8
90.0	0757-0400	9	4.22K	0698-3154	0	196K	0698-3453	2
100	0757-0401	0	4.64K	0698-3155	1	215K	0698-3454	3
110	0757-0402	1	5.11K	0757-0438	3	237K	0698-3266	5
121	0757-0403	2	5.62K	0757-0200	7	261K	0698-3455	4
133	0698-3437	2	6.19K	0757-0290	5	287K	0698-3456	5
147	0698-3438	3	6.81K	0757-0439	4	316K	0698-3457	6
162	0757-0405	4	7.50K	0757-0440	7	348K	0698-3458	7
178	0698-3439	4	8.25K	0757-0441	8	383K	0698-3459	8
196	0698-3440	7	9.09K	0757-0288	1	422K	0698-3460	1
215	0698-3441	8	10.0K	0757-0442	9	464K	0698-3260	9
237	0698-3442	9	11.0K	0757-0443	0			
261	0698-3132	4	12.1K	0757-0444	1			
287	0698-3443	0	13.3K	0757-0289	2			
316	0698-3444	1	14.7K	0698-3156	2			
348	0698-3445	2	16.2K	0757-0447	4			
383	0698-3446	3	17.8K	0698-3136	8			
422	0698-3447	4	19.6K	0698-3157	3			

Table 5-5. Interactive Adjustments

Assembly Changed or Repaired	Related Assemblies (in order of Adjustments)	Perform the Following Paragraph Number
A1/A2 Front Panel	A2	5-24
A3 Digital Interface	A3	5-13
A4 ALC	A4, A5	5-25 thru 5-28
A5 FM	A4, A5	5-25 thru 5-30
A6 Sweep Control	A6, A8, A7	5-15 thru 5-23
A7 YTM Driver	A6, A8, A7	5-15 thru 5-23
A8 YO Driver	A6, A8, A7	5-15 thru 5-23
A11 Cavity Oscillator	A4, A5	5-25 thru 5-28
A12 Switched YIG Tuned Multiplier	A6, A8, A7, A2	5-15 thru 5-20, 5,23, 5-24
A13 2.2 – 7.0 GHz Oscillator	A6, A8, A7, A2, A5	5-15 thru 5-20, 5-23, 5-24, 5-30
A14 Power Amplifier	A4, A5	5-25 thru 5-28
A15 DC Return	A4, A5	5-25 thru 5-28
A16 Modulator/Splitter	A4, A5	5-25 thru 5-28
A17 0.01 – 2.4 GHz Amplifier	A4, A5	5-25 thru 5-28
A18 Modulator/Mixer	A4, A5	5-25 thru 5-28
AT1 Isolator	A4, A5	5-25 thru 5-28
DC1 Directional Detector	A4, A5	5-25 thru 5-28
DC2 Directional Coupler	A4, A5	5-25 thru 5-28

ADJUSTMENTS

5-13. CONFIGURATION SWITCH A3S1

REFERENCE:

Performance Test: None
Service Sheet: A3

DESCRIPTION:

Switch A3S1 is set at the factory for a combination of operating modes (refer to Table 5-6). Other operating modes are selected by setting the eight switches on A3S1.

PROCEDURE:

NOTE

All adjustment procedures assume that A3S1 is set to the factory setting (unless otherwise specified in the test). If other procedures are to be performed, set A3S1 to the factory setting until the procedures are completed, then set A3S1 to the desired operating mode before putting the instrument back in service.

1. Refer to Table 5-6 and determine if the factory-selected mode set at A3S1 is correct for your application.
2. Set configuration switch A3S1 (Figure 5-1) for the desired operating mode.
3. On the 8350A, press INSTR PRESET to set the instrument into the operating mode selected by the configuration switch.

NOTE

INSTR PRESET must be pressed after the configuration switch A3S1 positions are modified, in order to set the instrument immediately to the desired operating mode set by the configuration switch.

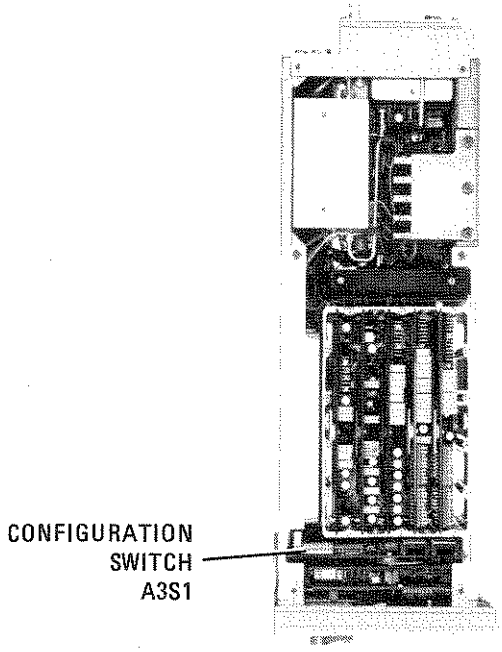


Figure 5-1. Configuration Switch A3S1 Location

Table 5-6. Configuration Switch on A3 Digital Interface Board

Description	Switch Number 1	2	3	4	5	6	7	8
Plug-In: 83595A	x	x	x	x	x	x	x	x
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 Power-Up	x	x	x	1	x	x	x	x
Maximum RF Power at Power-Up	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 Modulation (–20 MHz/V)	x	x	x	x	x	1	x	x
Cross-Over Coupled FM Modulation	x	x	x	x	x	0	x	x
Step Attenuator Option	x	x	x	x	x	x	1	x
No Step Attenuator Option	x	x	x	x	x	x	0	x
AUX OUT Phase Lock	x	x	x	x	x	x	x	1
RF OUTPUT Phase Lock	x	x	x	x	x	x	x	0

NOTE

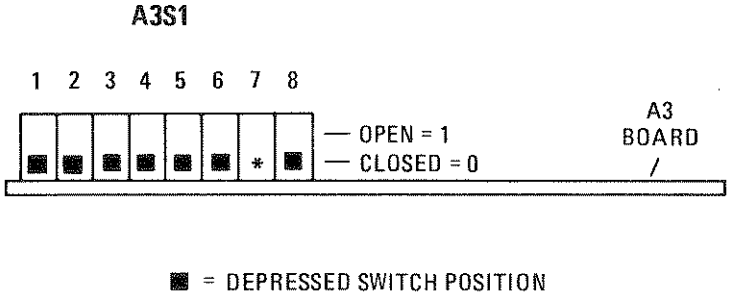
1 = Switch Open = High
0 = Switch Closed = Low (Ground)
x = Don't Care

*With the configuration switch set for an Instrument Preset condition of "RF Power OFF", bias is removed from A13 YIG Oscillator. In addition, the 8350A microprocessor issues a blanking pulse to the Plug-In: L RFB (Low = RF Blank) biases the modulator on hard, closing off the RF signal path. When RF power is manually turned on, via the front panel pushbutton, L RFB remains low for a short period to allow the RF microcircuit components to reach full capacity before releasing the ALC amplifier. This prevents the ALC loop from correcting for a large error voltage at initial power up, thus preventing overshoot.

A3S1 Factory Setting

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

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



5-14. −10 VOLT REFERENCE ON A8 YO DRIVER

REFERENCE:

Performance Test: Paragraph 4-13
Service Sheet: A8

DESCRIPTION:

The −10 volt source on the A8 YO Driver board is used as a reference voltage for the DACs on the A4 ALC, the A6 Sweep Control, the A7 YTM Driver, and the A8 YO Driver boards. The −10 volt reference output voltage is set by the potentiometer A8R44 (−10V) while monitoring A8TP12.

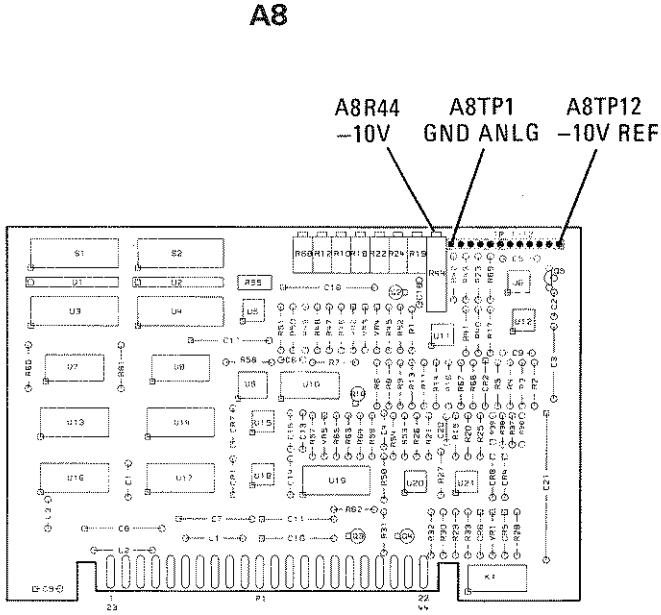


Figure 5-2. −10V Reference Adjustment Location

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
Sweep Oscillator	HP 8350A

PROCEDURE:

1. Connect the DVM to A8TP12 (−10V) with reference to A8TP1 (GND ANLG).
2. Adjust A8R44 (−10V) for a DVM reading of −10 ± 0.001 Vdc. Refer to Figure 5-2 for the locations of A8R44 and A8TP12.

5-15. SWEEP CONTROL ADJUSTMENTS

REFERENCE:

Performance Test: Paragraph 4-13
Service Sheet: A6

DESCRIPTION:

With the tuning voltage (VTUNE) set to +10V (CW frequency of 26.5 GHz), the TV Buffer is set for unity gain, and the DAC CAL adjustment is set to equalize the Bandswitch Comparator DAC and TV Buffer inputs to the Variable Gain Amplifier (the DAC CAL is set for 0V at A6TP4). The −10V OFFSET adjustment is set to offset the Variable Gain Amplifier output by −10V. The gain of the Variable Gain Amplifier is calibrated at the low end of each frequency band. The 83595A is then swept across its full frequency range and the Switch Point adjust A6R37 (SP) is adjusted to set the bandswitch points.

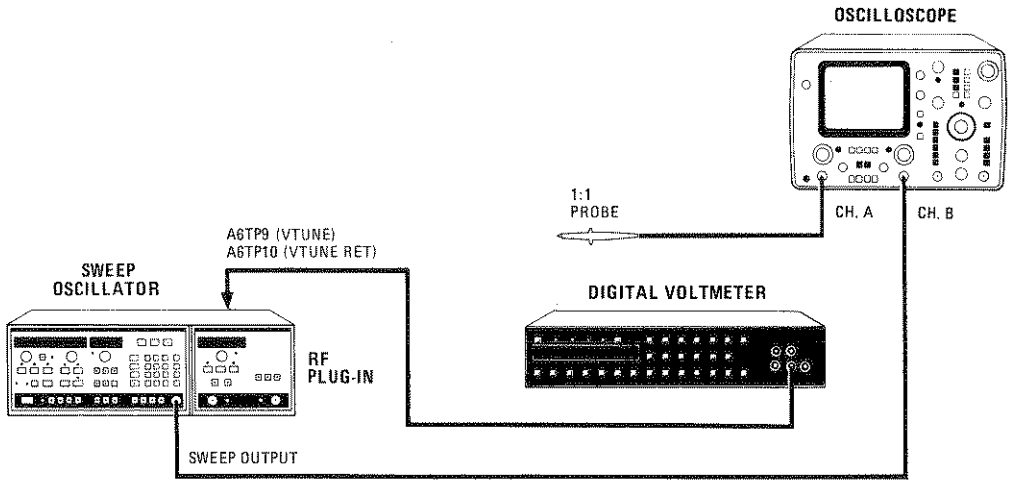


Figure 5-3. Sweep Control Adjustments Test Setup

EQUIPMENT:

Digital Voltmeter	HP 3456A
Oscilloscope	HP 1740A
1:1 Probe	HP 10008B
Sweep Oscillator	HP 8350A

5-15. SWEEP CONTROL ADJUSTMENTS (Cont'd)

PROCEDURE:

1. Ensure that the A3S1 position 1 switch is in the OPEN (up) position. Refer to paragraph 5-13 for instructions on setting A3S1.

2. Set up the equipment as shown in Figure 5-3 with the DVM connected to A6TP9 (VTUNE) and the DVM reference probe connected to A6TP10 (VTUNE RET). Do not connect the Oscilloscope probe yet. Allow the instrument to warm up for one hour.

3. On the 8350A, press INSTR PRESET CW 2 6 . 5 GHz VERNIER .

4. Adjust the 8350A FREQ VERNIER for a DVM reading of 10 ± 0.001 Vdc.

NOTE

The following voltage measurement procedures on the A6 Sweep Control board are made with the DVM reference probe connected to A8TP1 (which is electrically the same as motherboard ground).

5. Connect the DVM to A6TP5 and adjust A6R16 (TV GAIN) for a DVM reading of −10 ± 0.001 Vdc. Refer to Figure 5-4 for sweep control adjustment locations.

6. Connect the DVM to A6TP4 and adjust A6R21 (DAC CAL) for a DVM reading of 0 ± 0.001 Vdc.

7. Connect the DVM to A6TP8 (BVTUNE) and adjust A6R34 for a DVM reading of −10 ± 0.001 Vdc.

8. On the 8350A, press CW 2 0 GHz .

9. Connect the DVM to A6TP5 and adjust the 8350A FREQ VERNIER control for a DVM reading of −7.54624 ± 0.00005 Vdc.

10. Connect the DVM to A6TP8 and adjust A6R24 (B3) for a DVM reading of 0 ± 0.001 Vdc.

11. On the 8350A, press CW 1 3 . 5 GHz .

12. Connect the DVM to A6TP5 and adjust the 8350A FREQ VERNIER control for a DVM reading of −5.09249 ± 0.00005 Vdc.

13. Connect the DVM to A6TP8 and adjust A6R24 (B3) for a DVM reading of 0 ± 0.001 Vdc.

14. Repeat steps 8 through 13 until the voltage at A6TP8 is optimized at 20 GHz and at 13.5 GHz. (A6R24 is the adustment for BAND 3 and BAND 4.)

15. On the 8350A, press CW 7 GHz .

16. Connect the DVM to A6TP5 and adjust the 8350A FREQ VERNIER control for a DVM reading of −2.63873 ± 0.00005 Vdc.

17. Connect the DVM to A6TP8 and adjust A6R26 (B2) for a DVM reading of 0.001 Vdc.

5-15. SWEEP CONTROL ADJUSTMENTS (Cont'd)

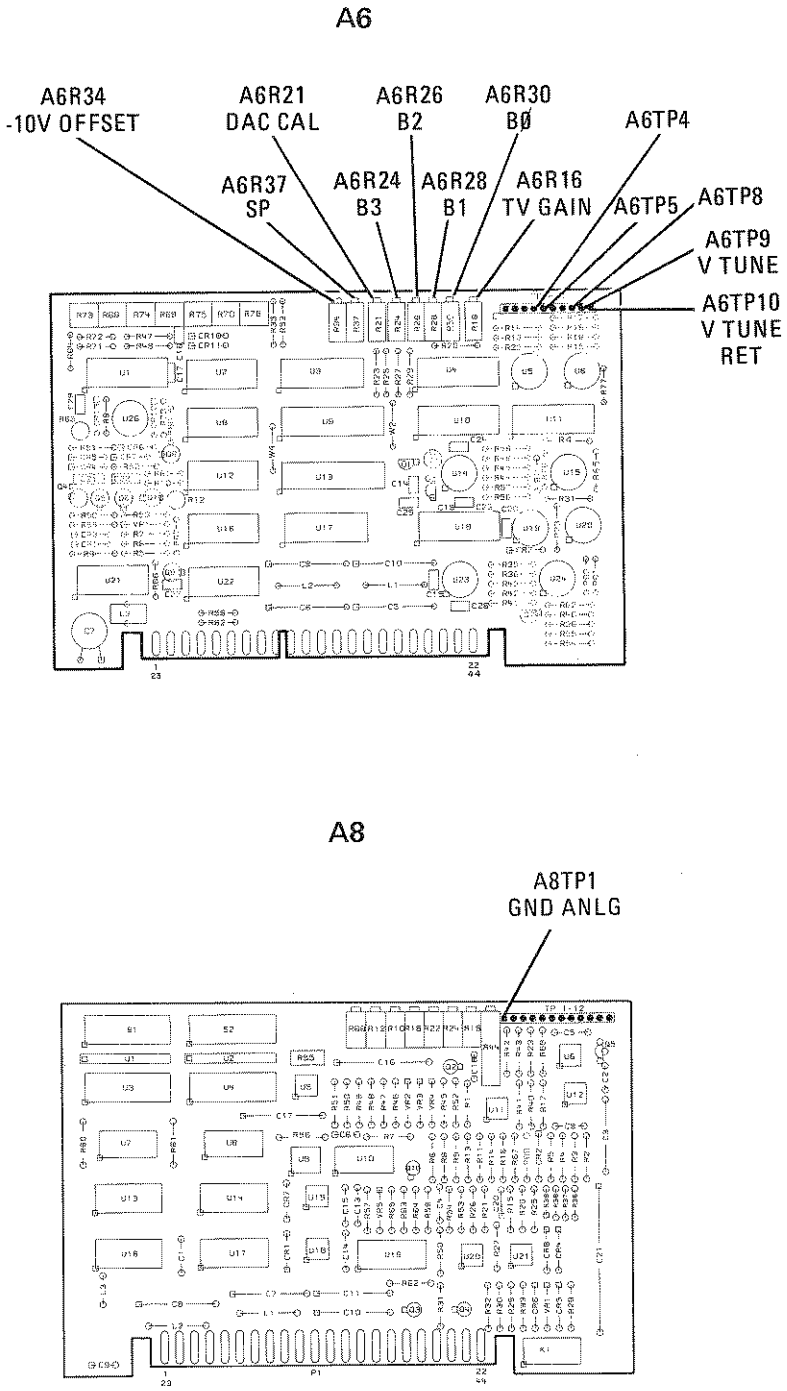


Figure 5-4. Sweep Control Adjustment Locations

5-15. SWEEP CONTROL ADJUSTMENTS (Cont'd)

18. On the 8350A, press CW 2 . 4 GHz .

19. Connect the DVM to A6TP5 and adjust the 8350A FREQ VERNIER control for a DVM reading of −0.90223 ± 0.00005 Vdc.

20. Connect the DVM to A6TP8 and adjust A6R28 (B1) for a DVM reading of 0 ± 0.001 Vdc.

21. On the 8350A, press CW 1 0 MHz .

22. Connect the DVM to A6TP5 and adjust the 8350A FREQ VERNIER control for a DVM reading of 0 ± 0.00005 Vdc.

23. Connect the DVM to A6TP8 and adjust A6R30 (B0) for a DVM reading of 0 ± 0.001 Vdc.

24. On the 8350A, press INSTR PRESET .

25. Connect the Oscilloscope probe to A6TP8. Set the Oscilloscope as follows:

Mode	A vs B
Vertical Sensitivity	0.5 V/DIV
Coupling	DC

26. Adjust the Oscilloscope vertical position control to set the top of the first full 0 to −10 volt sweep ramp on the centerline as shown in Figure 5-5.

27. Adjust A6R37 (SP) to bring the tops of the remaining 0 to −10 volt sweep ramps to the center graticule as shown in Figure 5-5.

28. Reset A3S1 to the closed (down) position before continuing with the adjustment procedures.

5-15. SWEEP CONTROL ADJUSTMENTS (Cont'd)

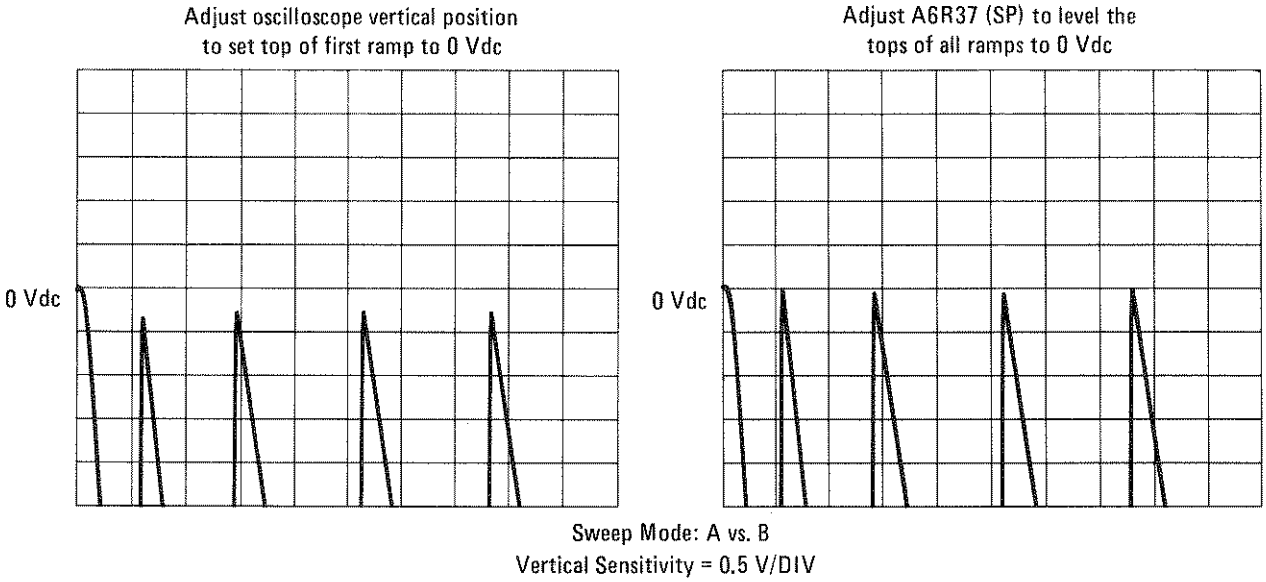


Figure 5-5. Sweep Control Adjustment Waveforms

5-16. YO AND YTM DAC CALIBRATION

REFERENCE:

Performance Test: Paragraph 4-13
Service Sheet: A7 and A8

DESCRIPTION:

The 8350A is set for a CW frequency of 26.5 GHz and then fine-tuned for a tuning voltage (VTUNE) of +10V. The Hex Data Write feature of the 8350A 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 +20V 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 Driver is adjusted the same way. The 8350A is then set into the Swept CW mode and the Delay Compensation circuits on both A7 and A8 are adjusted for a 0V output.

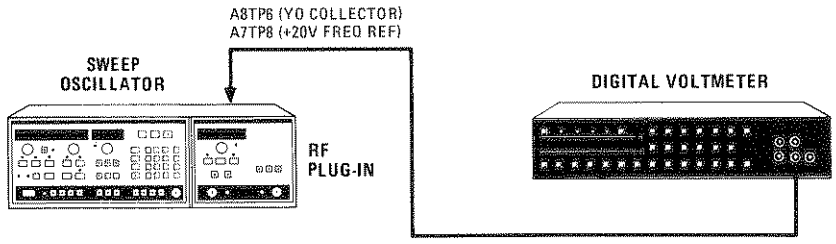


Figure 5-6. YO and YTM DAC Calibration Adjustment Locations

EQUIPMENT:

Digital Voltmeter	HP 3456A
Sweep Oscillator	HP 8350A

PROCEDURE:

1. Connect the equipment as shown in Figure 5-6. First connect the DVM to A6TP9 (VTUNE) and the reference probe to A6TP10 (VTUNE RET). Refer to Figure 5-7 for test point and adjustment locations. Allow the RF Plug-In to warm up for one hour.

2. On the 8350A, press INSTR PRESET CW 2 6 . 5 GHz .

3. Adjust the 8350A FREQ VERNIER for a DVM reading of 10 ± 0.001 Vdc.

4. Float the ground on the DVM. Connect the DVM to A8TP6 (YO COLLECTOR) with the reference probe connected to A7TP8 (+20V FREQ REF).

5-16. YO AND YTM DAC CALIBRATION (Cont'd)

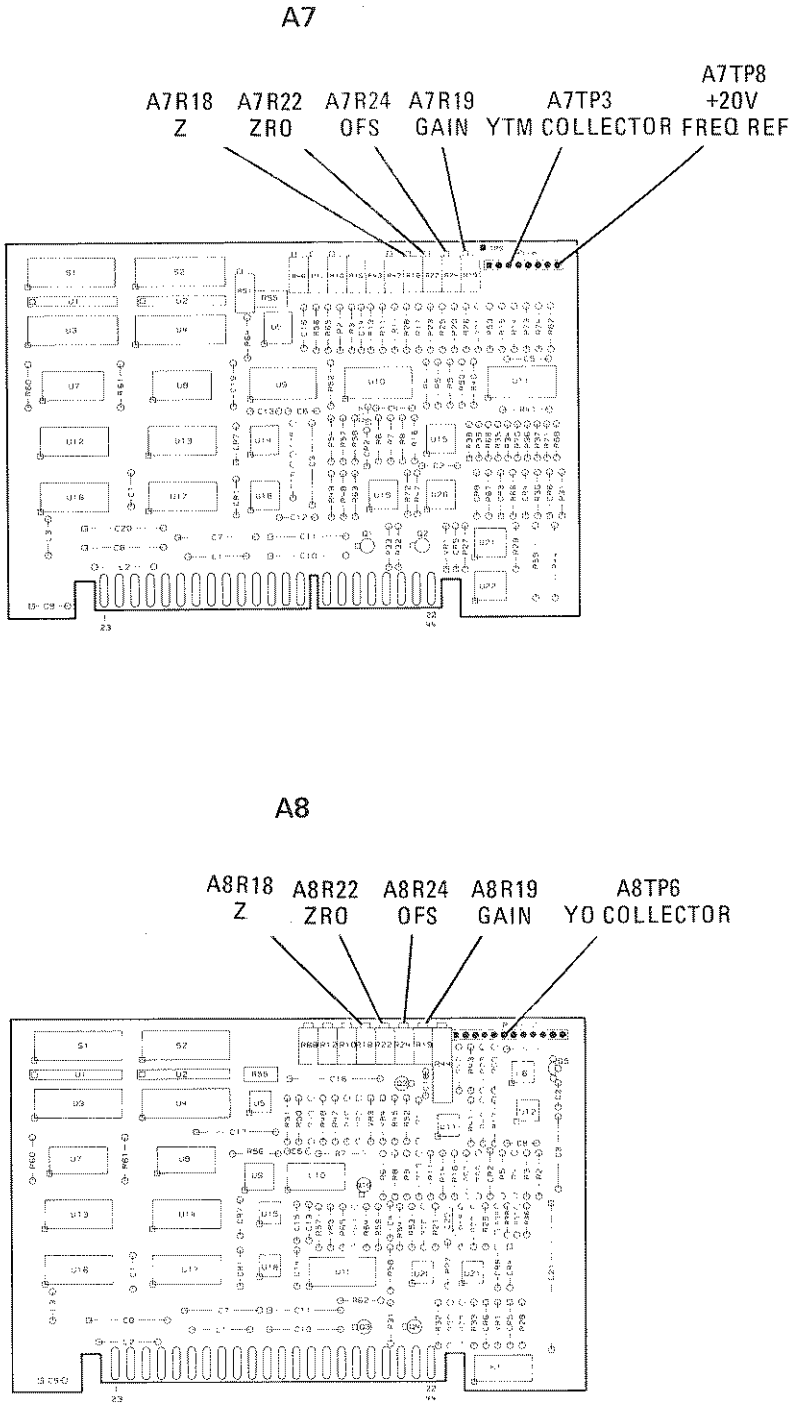


Figure 5-7. YO and YTM DAC Calibration Adjustment Locations

5-16. YO AND YTM DAC CALIBRATION (Cont'd)

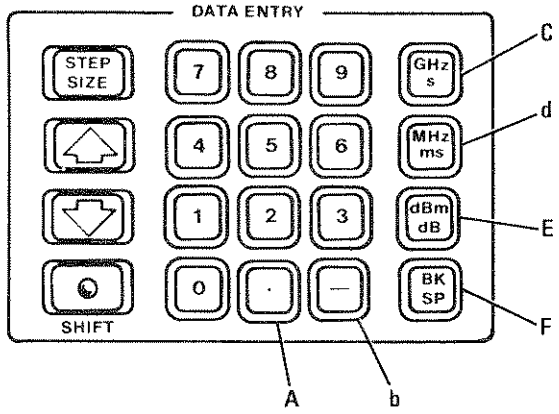


Figure 5-8. Front Panel Hexadecimal Entry Keys

5. 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

6. Adjust A8R22 (ZRO) for a DVM reading of −7.000 ± 0.001 Vdc.

7. 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

8. Adjust A8R24 (OFS) for a DVM reading of −20.000 ± 0.001 Vdc.

9. 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

10. Adjust A8R19 (GAIN) for a DVM reading of −26.500 ± 0.001 Vdc.

5-16. YO AND YTM DAC CALIBRATION (Cont'd)

11. Use the Hex Data Write feature to write all zeros to both DACs on the A7 YTM Driver as follows:

▲ ▲ ▲ ▲ ▲	Increment address to 2C88
0 0	Enter 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. Connect the DVM to A7TP3 (YTM COLLECTOR) with the reference probe still at A7TP8 (+20V FREQ REF). Adjust A7R22 (ZRO) for a DVM reading of −3.000 ± 0.001 Vdc.

13. 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 2C88
0 BKSP	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. Adjust A7R24 (OFS) for a DVM reading of −19.500 ± 0.001 Vdc.

15. 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 2C88
BKSP 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

16. Adjust A7R19 (GAIN) for a DVM reading of −9.500 ± 0.001 Vdc.

17. On the 8350A, press INSTR PRESET SHIFT CW .

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

19. Adjust A7R18 (Z) for a DVM reading of 0.000 ± 0.001 Vdc.

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

21. Adjust A8R18 (Z) for a DVM reading of 0.000 ± 0.001 Vdc.

5-17. FREQUENCY ACCURACY

REFERENCE:

Performance Test: Paragraph 4-13
Service Sheet: A8

DESCRIPTION:

The 83595A CW frequency is set first at the low end and then at the high end of Band 2. Special calibration modes are used for this procedure (SHIFT 90 for the low end of Band 2 and SHIFT 91 for the high end of Band 2). When the output frequency matches the front panel frequency display, the calibration switches on the YO Driver board A8 are set for the appropriate correction factor. A8S1 calibrates the lower portion of the band and A8S2 calibrates the high portion of the band.

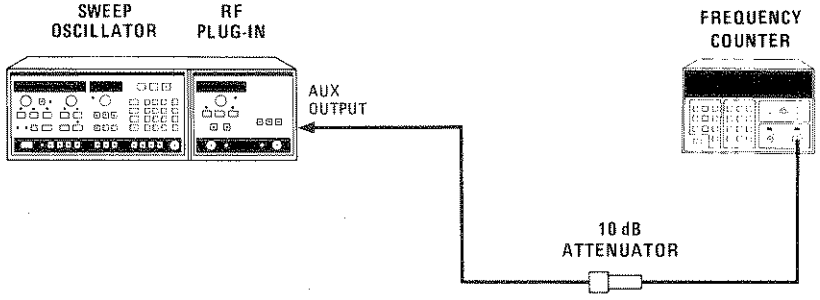


Figure 5-9. Frequency Accuracy Test Setup

EQUIPMENT:

Frequency Counter	HP 5343A
10 dB Attenuator	HP 8491B Option 010
Sweep Oscillator	HP 8350A

PROCEDURE:

1. Connect the equipment as shown in Figure 5-9 with the Frequency Counter connected to the 83595A rear-panel AUX OUTPUT connector through the 10 dB Attenuator. Allow the equipment to warm up for one hour.

2. Adjust the 83595A FREQ CAL control to the center of its mechanical range.

3. On the 8350A, press INSTR PRESET CW 6 . 9 GHz SAVE 1 .

4. On the 8350A, press CW 1 3 . 5 GHz SAVE 2 .

5. On the 5343A Frequency Counter, press SET . 2 ENTER . This sets the Frequency Counter in a mode which displays twice the input frequency. This step is necessary to compensate for the frequency of the rear-panel AUX OUTPUT (which is the YO fundamental frequency, approximately half of the 8350A displayed frequency in Band 2).

5-17. FREQUENCY ACCURACY (Cont'd)

Low End Frequency Calibration

6. On the 8350A, press RECALL 1 . The 8350A FREQUENCY display should show 6.900 GHz.

7. On the 8350A, press SHIFT 9 0 to select the low end frequency calibration mode.

8. Adjust the 83595A POWER control if necessary to display 6.900 ± 0.003 GHz on the Frequency Counter.

9. Set switch A8S1 for the hexadecimal value displayed in the 83595A POWER display. Refer to Figure 5-10 for the location of the frequency calibration switches. Refer to Figure 5-11 for an illustration of the calibration switch configuration.

10. On the 8350A, press RECALL 1 . Verify that the Frequency Counter reads 6.900 ± 0.010 GHz.

High End Frequency Calibration

11. On the 8350A, press RECALL 2 . The 8350A FREQUENCY display should show 13.500 GHz.

12. On the 8350A, press SHIFT 9 1 to select the high end frequency calibration mode.

13. Adjust the 83595A POWER control if necessary to display 13.500 ± 0.003 GHz on the Frequency Counter.

14. Set switch A8S2 for the value displayed in the 83595A POWER display in the manner described in step 9.

15. On the 8350A, press RECALL 2 . Verify that the Frequency Counter reads 13.500 ± 0.010 GHz.

16. On the 8350A, press RECALL 1 . Manually adjust the 8350A FREQUENCY control across Band 2 (6.9 to 13.5 GHz) and check for Frequency Counter readings which correspond to the displayed 8350A FREQUENCY display reading ± 10 MHz. If necessary repeat steps 6 through 15.

17. On the 5343A Frequency Counter, press SET 4 ENTER . On the 8350A, press CW 2 6 . 5 GHz . Verify that the Frequency Counter indicates 26.5 GHz. If necessary, repeat steps 5 through 16.

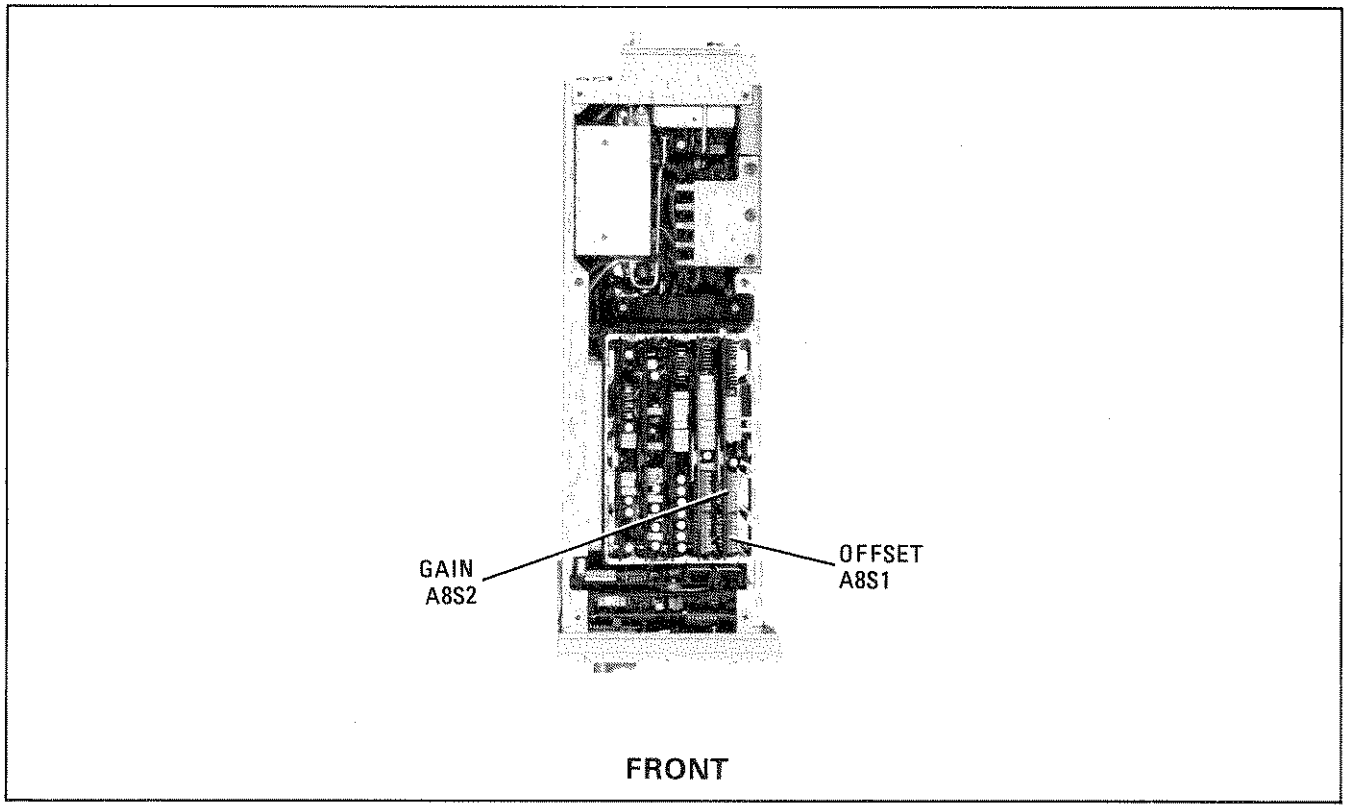


Figure 5-10. Frequency Calibration Switch Locations

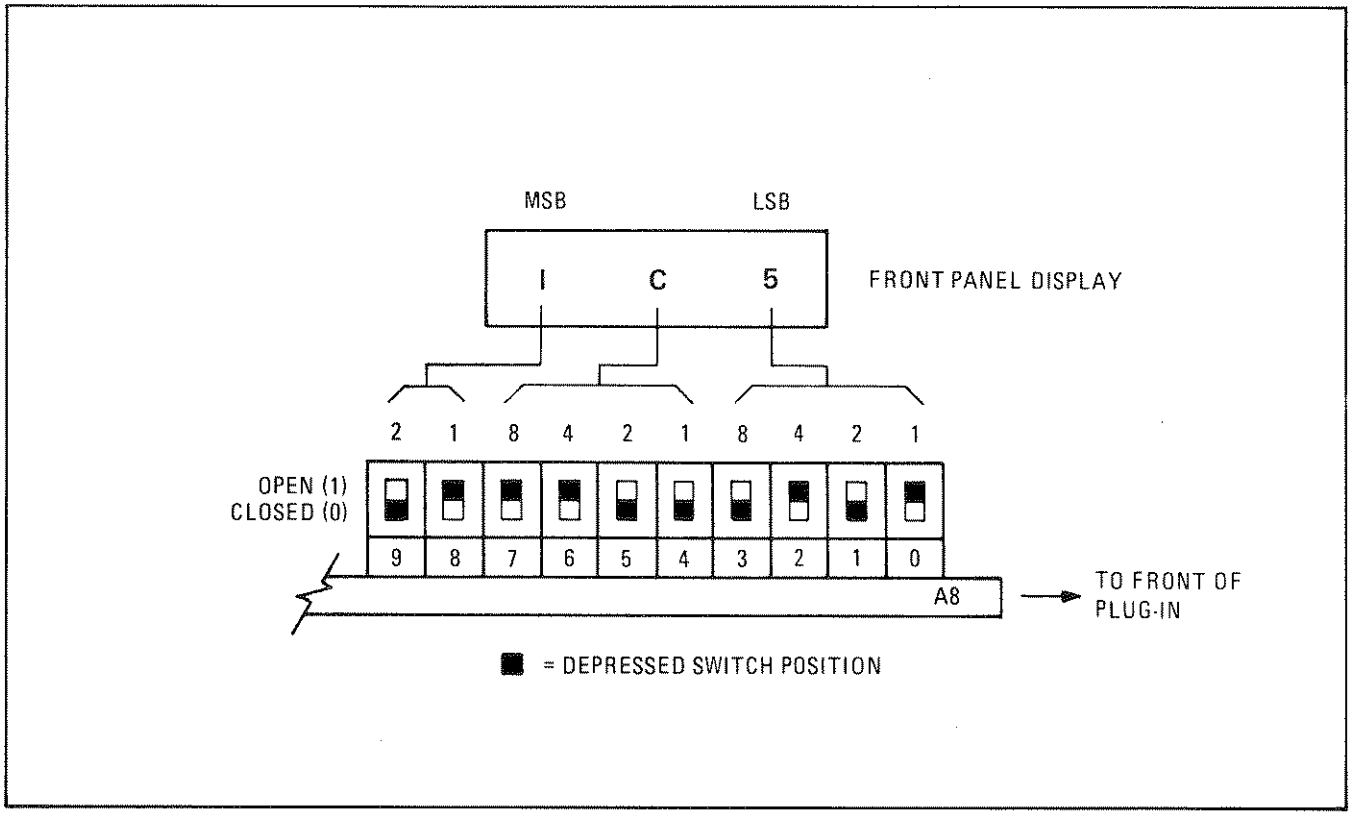


Figure 5-11. A8S1 and A8S2 Frequency Calibration Switch Configuration

5-18. YO RETRACE COMPENSATION

REFERENCE:

Performance Test: Paragraph 4-13
Service Sheet: A8

DESCRIPTION:

During sweep retrace and at each bandswitch point, the YO frequency is forced to the required beginning frequency of the next band by the retrace compensation circuit. This circuit is adjusted to maximize the YO frequency settling time before the next band is swept. An external Frequency Meter is set to the YO frequency for the start of the next band. The width of the Frequency Meter pip corresponds to the length of time the YO has settled at the correct start frequency.

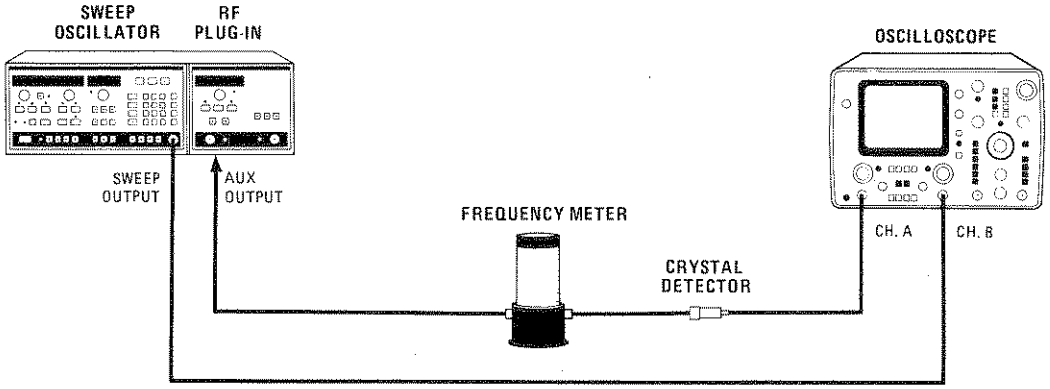


Figure 5-12. YO Retrace Compensation Test Setup

EQUIPMENT:

Oscilloscope	HP 1740A
Crystal Detector	HP 8470B
Frequency Meter (3.7 to 12.4 GHz)	HP 537A
Frequency Meter (0.96 to 4.2 GHz)	HP 536A
Sweep Oscillator	HP 8350A

5-18. YO RETRACE COMPENSATION (Cont'd)

PROCEDURE:

NOTE

This procedure requires that A3S1 is set to the factory-set position. Refer to Table 5-6.

1. Connect the equipment as shown in Figure 5-12 with the Oscilloscope connected through the Detector and the 536A Frequency Meter to the 83595A rear-panel AUX OUTPUT. On the 8350A, press INSTR PRESET , RF BLANK . Allow the equipment to warm up for one hour.

2. Set the Oscilloscope controls as follows:

Channel B	DC
Channel B Sensitivity	2 V/DIV
Horiz. Sweep	5 ms/DIV
Delayed Sweep	0.5 ms/DIV
Display	CHOP
Trigger	B
Sweep Mode	MAIN

3. Adjust the vertical sensitivity of Channel A on the Oscilloscope to bring the trace to center screen.

4. Set the 536A Frequency Meter to 3.5 GHz.

5. Use the delayed sweep vernier to set the delayed part of the trace on the bandswitch point between Band 1 and Band 2 as shown in Figure 5-13.

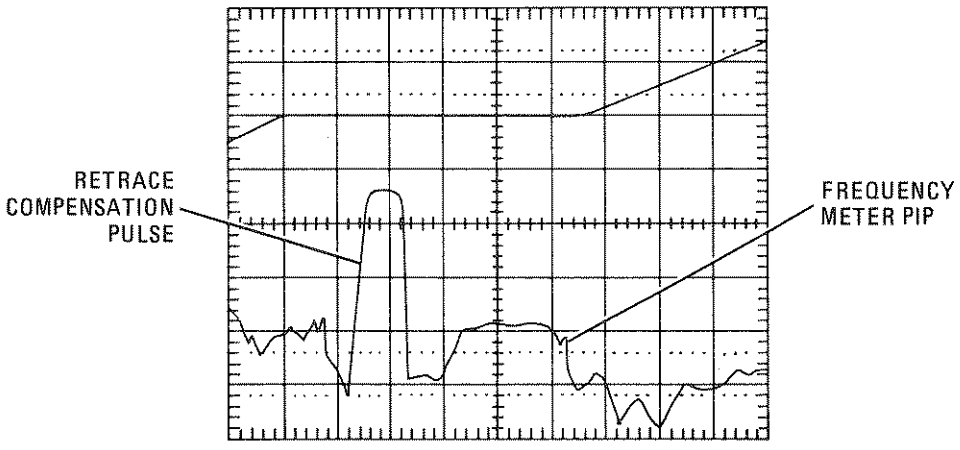


Figure 5-13. YO Retrace Compensation Pulse

5-18. YO RETRACE COMPENSATION (Cont'd)

6. On the Oscilloscope, switch to delayed sweep and fine-adjust the Frequency Meter to set the frequency pip near center screen.

7. Start with A8R55 (RTC COMP) fully clockwise, and adjust it for the widest and flattest pip while tracking the bandswitch frequency with the Frequency Meter. A well adjusted retrace compensation pulse is shown in Figure 5-13.

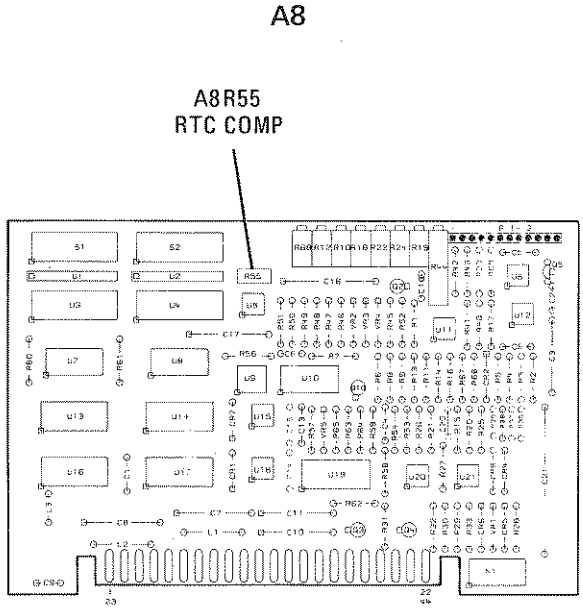


Figure 5-14. YO Retrace Compensation Adjustment Location

8. Select MAIN sweep on the Oscilloscope and adjust the delayed sweep vernier to move the delayed portion of the sweep to the bandswitch point between Band 2 and Band 3.

9. Replace the 536A Frequency Meter with the 537A and set it to 4.49 GHz.

10. On the Oscilloscope, switch to delayed sweep and fine-adjust the Frequency Meter to set the frequency pip near center screen. If the previous Band 1 to Band 2 adjustment was made properly, this bandswitch point will look the same. If it does not, repeat steps 4 through 10 for the best compromise.

5-19. YO DELAY COMPENSATION

REFERENCE:

Performance Test: Paragraph 4-13
Service Sheet: A8

DESCRIPTION:

This circuit compensates for the delay in the RF sweep output that occurs at fast sweep speeds. An external Frequency Meter is used to generate a frequency-dependent marker which is aligned with a tuning ramp-dependent marker generated from the 8350A Mainframe. Sweep time is decreased and the delay in the YO is observed as the difference between the two marker pips.

Delay compensation adjustments are made while observing the shift between the marker pips at a sweep time of 10 milliseconds (worst case for single-band sweeps). At sweep times greater than 100 milliseconds, delay should not exceed ± 15 MHz (the difference in accuracy between CW and Swept Frequency).

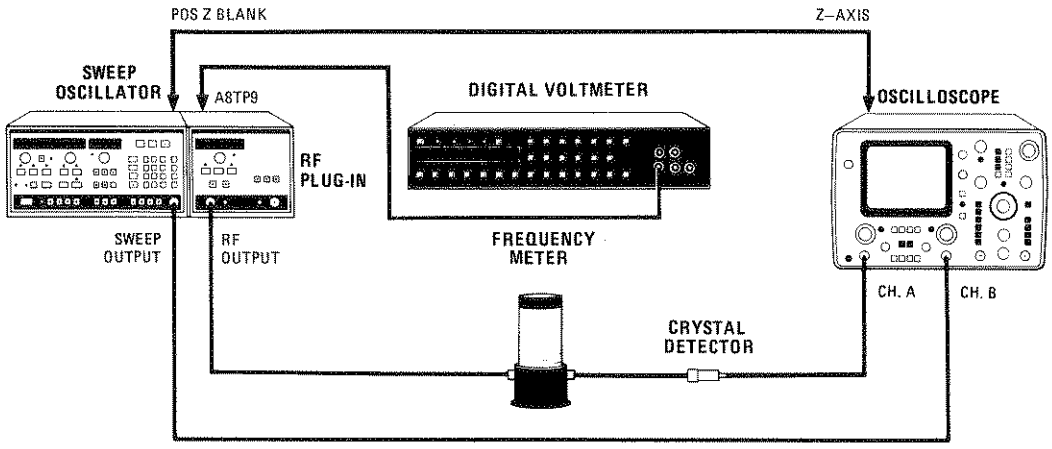


Figure 5-15. YO Delay Compensation Test Setup

EQUIPMENT:

Digital Voltmeter	HP 3456A
Oscilloscope	HP 1740A
Frequency Meter (3.7 to 12.4 GHz)	HP 537A
Frequency Meter (12.4 to 18 GHz)	HP P532A
Crystal Detector	HP 8470B
Sweep Oscillator	HP 8350A

5-19. YO DELAY COMPENSATION (Cont'd)

PROCEDURE:

NOTE

This procedure requires that A3S1 is set to the factory-set position. Refer to Table 5-6.

1. Connect the equipment as shown in Figure 5-15, using the 537A Frequency Meter. On the 8350A, press INSTR PRESET and allow the equipment to warm up for one hour.

2. Set the Oscilloscope for A vs B sweep mode to obtain a display of amplitude versus frequency.

3. On the 8350A, press CW .

4. Measure and note the voltage at A8TP9.

5. On the 8350A, press CF ΔF 0 MHz .

6. Adjust A8R18 (Z) for a DVM reading equal to the voltage noted in step 4. Remove the DVM test leads.

7. On the 8350A, enter the front panel data as follows:

   INSTR PRESET
   START 6 . 9 GHz
   STOP 1 3 . 5 GHz
   SWEEP TIME 1 0 ms
   M1 7 . 2 GHz
   AMPTD MKR
   RF BLANK
   SAVE 2

8. On the 8350A, press SWEEP TIME 2 0 0 ms SAVE 1 .

9. On the 8350A, press M2 1 3 . 2 GHz SAVE 3 .

10. On the 8350A, press SWEEP TIME 1 0 ms SAVE 4 .

11. On the 8350A, press RECALL 1 .

12. Expand the Oscilloscope trace at the marker by centering the marker on the screen and then setting the Oscilloscope for a magnified horizontal trace. Set the 537A Frequency Meter so that the peak of the pip is on the leading edge of the 7.2 GHz marker.

13. On the 8350A, press RECALL 2 .

14. Adjust A8R12 (LO) so that the peak of the 537A Frequency Meter pip is on the leading edge of the marker.

5-19. YO DELAY COMPENSATION (Cont'd)

15. Verify that the delay is accurate by manually adjusting the sweep time from 10 ms to 200 ms. Reset A8R12 (LO) as necessary for the best compromise in overall delay setting (minimum delay per change in sweep time). The position of the 537A Frequency Meter pip should typically stay within ± 15 MHz as read on the Frequency Meter across the 10 ms to 200 ms range.

16. On the 8350A, press RECALL 3 .

17. Replace the 537A Frequency Meter with the P532A and set it so that the peak of the pip is coincident with the leading edge of the 13.2 GHz marker.

18. On the 8350A, press RECALL 4 .

19. Adjust A8R10 (HI) so that the peak of the Frequency Meter pip is coincident with the leading edge of the marker.

20. Verify that the delay is accurate by manually adjusting the sweep time from 10 ms to 200 ms. Reset A8R10 (HI) as necessary for the best compromise in overall delay setting (minimum delay per change in sweep time). The position of the Frequency Meter pip should typically stay within ± 15 MHz as read on the P532A Frequency Meter across the 10 ms to 200 ms sweep speed range.

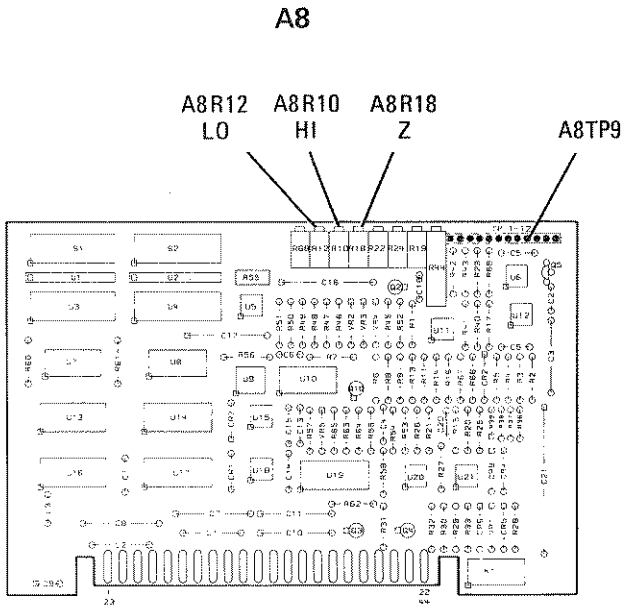


Figure 5-16. YO Delay Compensation Adjustment Location

5-20. SLOW SPEED YTM TO YO TRACKING

REFERENCE:

Performance Test: Paragraph 4-13
Service Sheet: A6 and A7

DESCRIPTION:

The 83595A is set to sweep Bands 2, 3, and 4 (7 to 26.5 GHz), and the ALC loop is opened by selecting the EXT ALC MODE. The SRD Bias for the Switched YTM is preset and requires further adjustment according to Paragraph 5-21. Special calibration modes are used for this procedure (SHIFT 92 for the beginning of Band 2 and SHIFT 93 for the rest of the frequency sweep). The output power is peaked for each calibration mode, and the appropriate correction factor is entered with the calibration switches. A7S1 calibrates the lower part of Band 2 and A7S2 calibrates the higher frequencies.

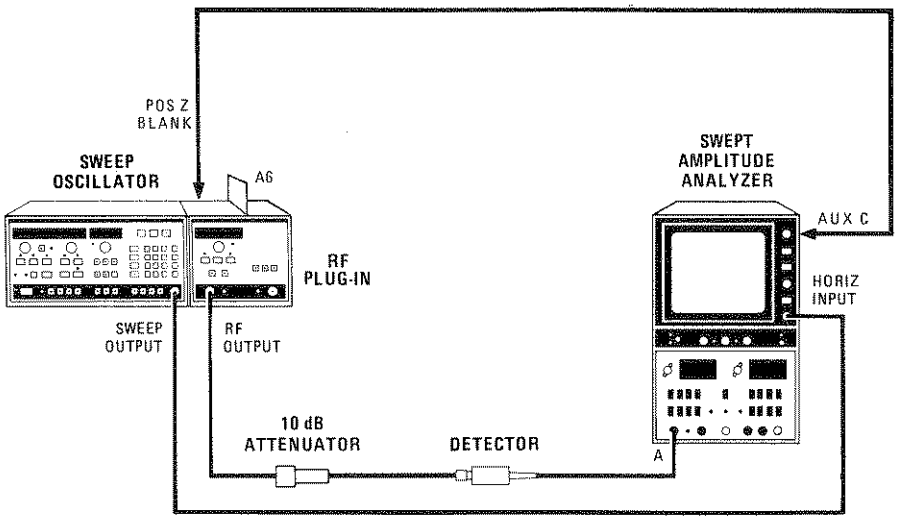


Figure 5-17. Slow Speed YTM to YO Tracking Test Setup

EQUIPMENT:

Swept Amplitude Analyzer	HP 8755C
Display Mainframe	HP 182T
Detector	HP 11664B
10 dB Attenuator	Weinschel Model M9-10
Sweep Oscillator	HP 8350A
Extender Board	HP 08350-60031

5-20. SLOW SPEED YTM TO YO TRACKING (Cont'd)

PROCEDURE:

NOTE

This procedure requires that A3S1 is set to the factory-set position. Refer to Table 5-6.

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. If squegging occurs in Band 2, adjust A6R68 and R73 to eliminate the squegging and to maximize power across the band. If squegging occurs in Band 3, adjust A6R69 and R74, and if squegging occurs in Band 4, adjust A6R70 and R75.

1. Connect the equipment as shown in Figure 5-17 with the 83595A A6 Sweep Control board on an extender. Allow the equipment to warm up for one hour.

2. On the 8350A, press INSTR PRESET START 7 GHz SWEEP TIME 2 0 0 ms ⊔⊓MOD . On the 83595A, press EXT ALC MODE . The unleveled lamp should be lit.

3. Preset A6R63 (3HL) to mid range. Refer to Figure 5-18 for adjustment locations.

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

5. Select 5 dB/DIV display resolution on the 8755C and center the display.

6. On the 8350A, press SHIFT 9 2 to enable the YTM OFFSET DAC subroutine. Using the 83595A POWER control, peak the power within the first graticule of the display.

7. Enter the number displayed on the 83595A POWER display into A7S1 as shown in Figure 5-20. Refer to Figure 5-19 for the switch location.

8. On the 8350A, press SHIFT 9 3 to enable the YTM GAIN DAC subroutine. Using the 83595A POWER control, peak the power within the last graticule of the display.

9. Enter the number displayed on the 83595A POWER display into A7S2 as shown in Figure 5-20. Refer to Figure 5-19 for the switch location.

10. On the 8350A, press INSTR PRESET so that the new calibration data will be entered from the current switch settings.

11. On the 8350A, press STOP 7 GHz ⊔⊓MOD . On the 83595A, press EXT ALC MODE .

12. Adjust A7R51 (B1 OFS) to maximize the minimum power points of the Band 1 displayed trace.

5-20. SLOW SPEED YTM TO YO TRACKING (Cont'd)

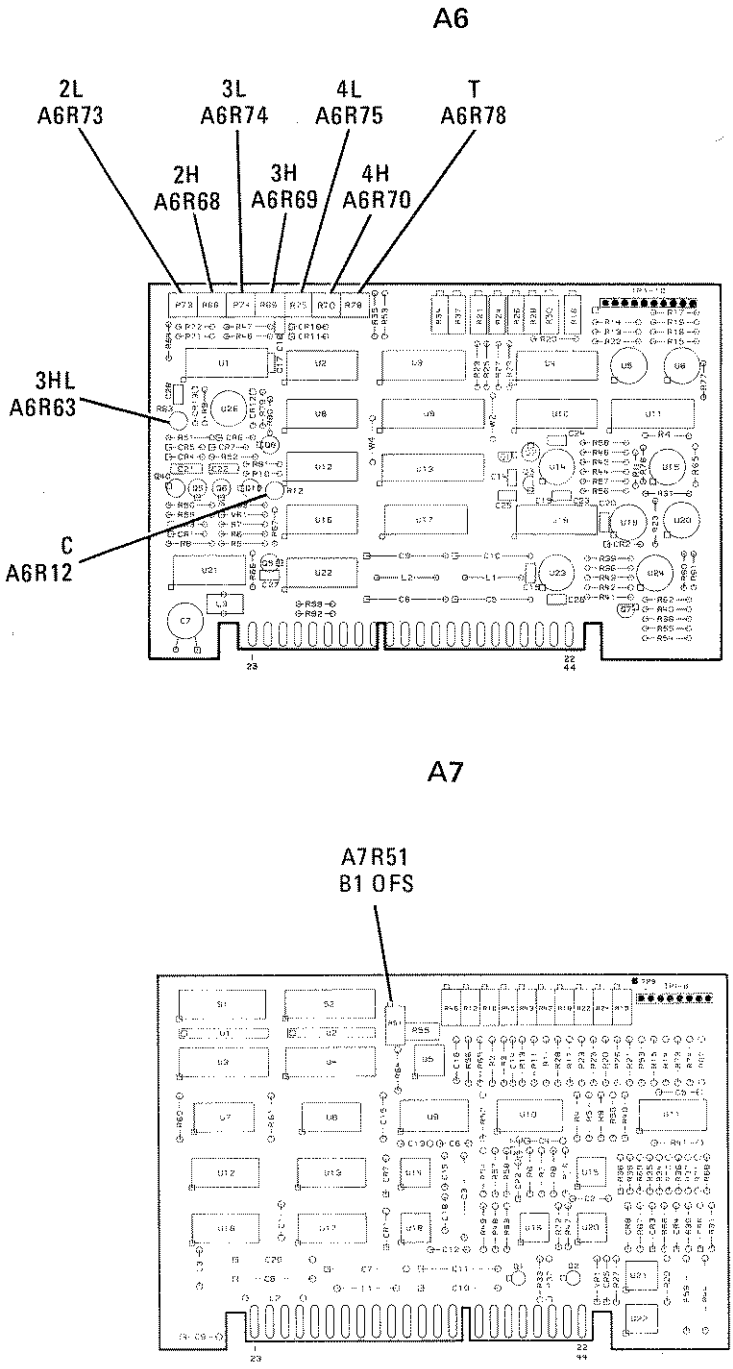


Figure 5-18. Slow Speed YTM to YO Tracking Adjustment Locations

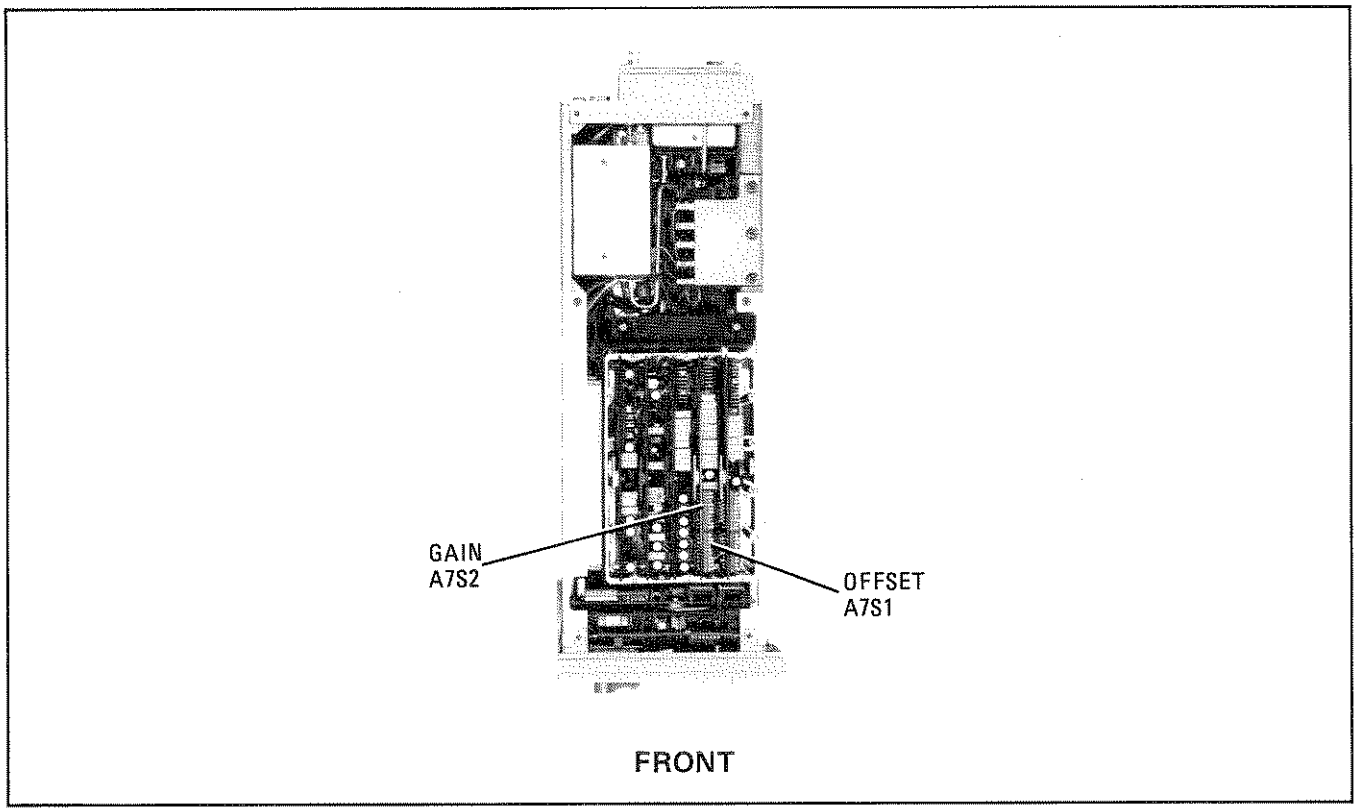


Figure 5-19. YTM to YO Tracking Calibration Switch Locations

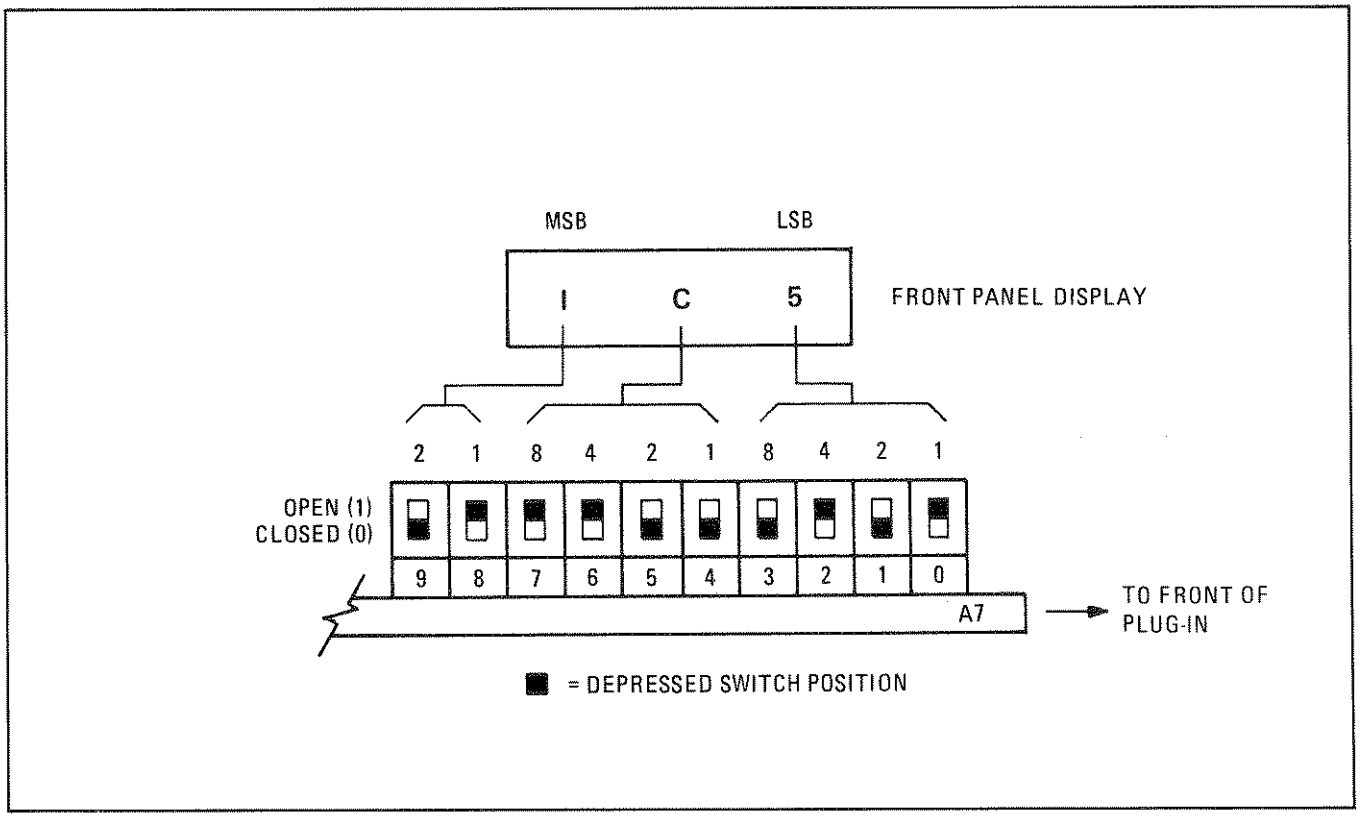


Figure 5-20. YTM to YO Tracking Calibration Switch Configuration

5-21. SRD BIAS

REFERENCE:

Performance Test: Paragraphs 4-17, 4-19
Service Sheet: A4 and A6

DESCRIPTION:

The High Power SRD Bias is set by peaking the 8755C displayed trace 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 inserting a voltage source through a 1 kOhm current-limiting resistor into the MOD 1 signal path in place of the A4 ALC board output. With the 83595A at maximum RF output power level, the voltage is increased (from a starting point of 0.6 Vdc to a maximum of 5.0 Vdc) to set the RF output to a point just above the noise level of the 8755C. At this point, A6R63 (3HL) is adjusted until minimum slope is obtained on an Oscilloscope display, and A6R12 (C) is adjusted to peak the power in Bands 2, 3, and 4. The voltage from the Power Supply is decreased until the display on the 8755C reaches a point halfway between full RF out and the previous point. A6R78 (T) is adjusted to optimize the power at this intermediate point. The Power Supply is then removed.

The YTM fundamental feedthrough is suppressed while Bands 2, 3, and 4 are swept. A ratio measurement is taken to determine system error and is subtracted from the ratio of a filtered RF path (fundamental feedthrough only) and an unfiltered RF path. A6R78 (T) is then adjusted until the harmonics specification is met.

EQUIPMENT:

Swept Amplitude Analyzer	HP 8755C
Display Mainframe	HP 182T
Detectors (2)	HP 11664B
6 dB Attenuator	Weinschel Model M9-6
10 dB Attenuator	Weinschel Model M9-10
20 dB Attenuator	Weinschel Model M9-20
Directional Coupler	HP 0955-0125
Power Supply	HP 6214A
Low Pass Filter (6.8 GHz)	HP 11684A
Storage Normalizer	HP 8750A
Oscilloscope	HP 1740A
Extender Board	HP 08350-60031
Sweep Oscillator	HP 8350A
1 kOhm Resistor	HP 0757-0280

PROCEDURE:

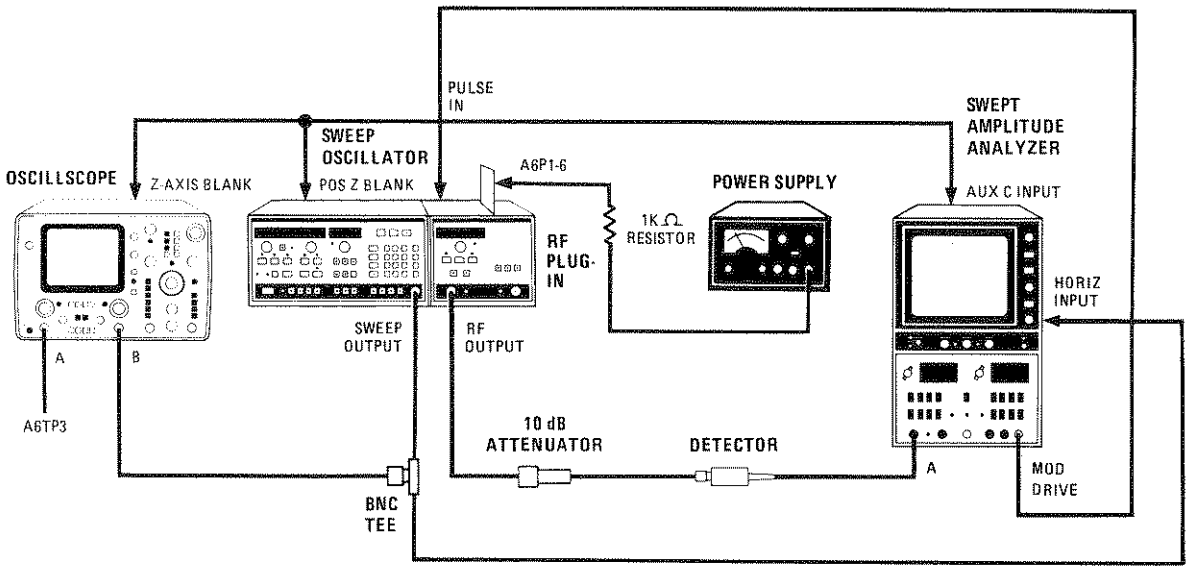
NOTE

Turn the 8350A LINE power OFF when removing or installing PC boards.

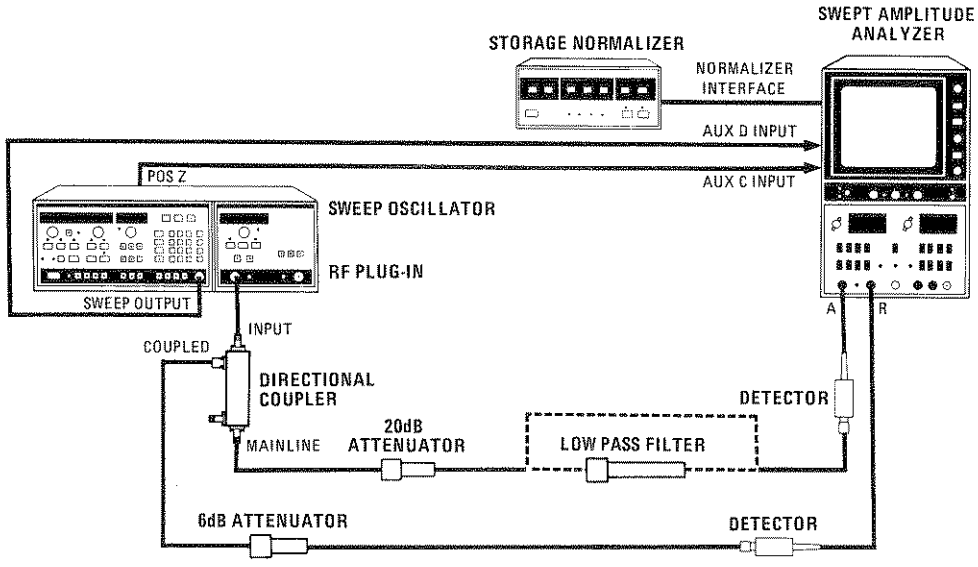
NOTE

This procedure requires that A3S1 is set to the factory-set position (refer to Table 5-6).

5-21. SRD BIAS (Cont'd)



a) Low and Mid Power Test Setup



b) YTM Fundamental Feedthrough Test Setup

Figure 5-21. SRD Bias Adjustment Test Setups

5-21. SRD BIAS (Cont'd)

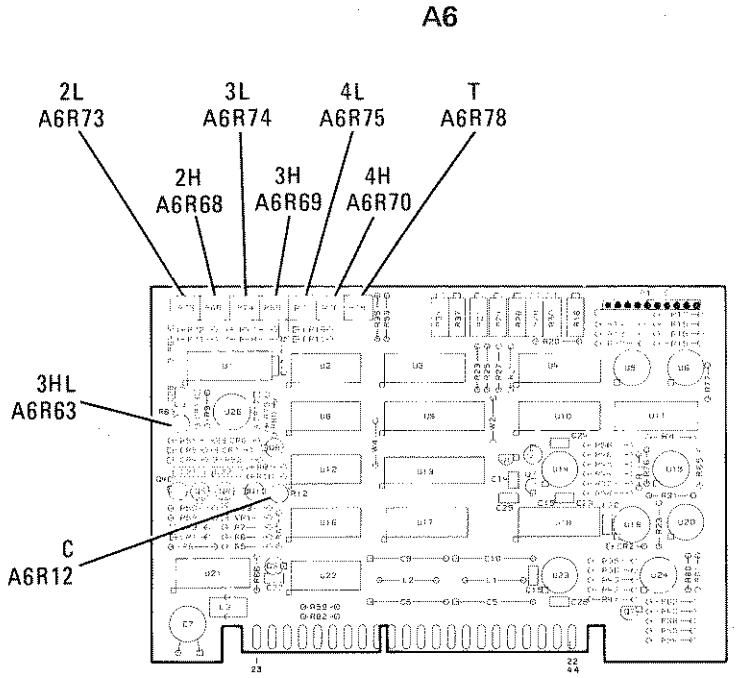


Figure 5-22. SRD Bias Adjustment Locations

High Power SRD Bias

1. Connect the equipment as shown in Figure 5-17 with the 83595A A6 Sweep Control board on an extender. With the LINE power OFF, remove the 83595A A4 ALC board. Connect the 8755C MODULATOR DRIVE output to the 83595A rear-panel PULSE IN connector.
2. Allow the equipment to warm up for one hour.
3. On the 8350A press INSTR PRESET START 7 GHz SWEEP TIME 2 0 0 ms .
4. Set the 8755C display resolution for 5 dB/DIV and center the display.
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. Refer to Figure 5-22 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.
8. Repeat steps 5 through 7 in order to obtain optimum power across the display.
9. Check the YO to YTM tracking to ensure it has not changed (refer to paragraph 5-20). If retracking is necessary, adjust A6R68, R69, R70, R73, R74, and R75 as necessary to eliminate any squegging that may have occurred.

5-21. SRD BIAS (Cont'd)

Low and Mid Power SRD Bias

10. Set up the equipment as shown in Figure 5-21a, with a 1 kOhm resistor connected to A6P1-6 (reference to ground). Remove the 83595A A4 ALC board. Connect the 8755C Swept Amplitude Analyzer MODULATOR DRIVE output to the 83595A rear-panel PULSE IN connector.

11. Allow the equipment to warm up for one hour.

12. On the 8350A, press INSTR PRESET START 7 GHz SWEEP TIME 2 0 0 ms .

13. Set the 8755C display resolution for 10 dB/DIV and adjust the display to the top graticule. On the 1740A Oscilloscope, select A vs B, set Channel 1 to .5 V/DIV, set Channel 2 to 1 V/DIV, and DC-couple Channels 1 and 2.

14. On the 8755C, select the R DISPLAY and note the position of the trace. This is the noise floor of the 8755C. Return to the A DISPLAY.

15. Set the Power Supply voltage at .6 Vdc and increase the voltage until the lowest point of the 8755C display is 10 dB above the noise floor (do not exceed 5 Vdc).

16. Monitor A6TP3 with the Oscilloscope and adjust A6R63 until minimum slope (flat display) is obtained.

17. Monitor the 8755C display and adjust A6R12 until optimum power is obtained for Bands 2, 3, and 4.

18. Reduce the Power Supply voltage until the power displayed on the 8755C rises to a level approximately halfway between maximum power output (0 volts from the Power Supply) and the previous point.

19. Adjust A6R78 to optimize the power in Bands 2, 3, and 4 at this intermediate power level.

YTM Fundamental Feedthrough

20. Set up the equipment as shown in Figure 5-21b without the Low Pass Filter, and with the 83595A A4 ALC board installed.

21. Allow the equipment to warm up for one hour.

22. On the 8350A, press INSTR PRESET START 8 GHz SWEEP TIME 2 0 0 ms ⊓ MOD .

23. On the 8755C, select A/R DISPLAY and 5 dB/DIV. Center the display.

24. On the 8750A, press SELECT CH 1 and DISPLAY STORE INPUT . The display now shows the system error between Channel A and Channel R.

5-21. SRD BIAS (Cont'd)

25. Press REFERENCE MEMORY STORE and then DISPLAY INPUT–MEM . The trace on the 8755C should be flat, showing that system errors have been removed. Note the position of the trace and the REFERENCE LEVEL. This will be used as a reference in step 28.

26. Install the Low Pass Filter at the location shown in Figure 5-21b.

27. Adjust the REFERENCE LEVEL so that the entire trace is on the display. The YTM fundamental feedthrough is now displayed on the 8755C.

28. Determine how many dB the trace is below the reference position established in step 25. If necessary, adjust A6R78 (T) until the trace is greater than 25 dB below the reference between 8 GHz and 20 GHz and greater than 20 dB below the reference between 20 GHz and 26.5 GHz.

29. Follow the performance test in paragraph 4-14 to ensure that power specifications are met. If specifications are not met, repeat the adjustments in paragraphs 5-20 and 5-21.

5-22. YTM DELAY COMPENSATION

REFERENCE:

Performance Test: Paragraph 4-14
Service Sheet: A7

DESCRIPTION:

The YTM Delay Compensation circuit is adjusted to optimize YTM to YO tracking over varying sweep rates. Adjustments are provided for sequential sweeps (multiband) and single band sweeps.

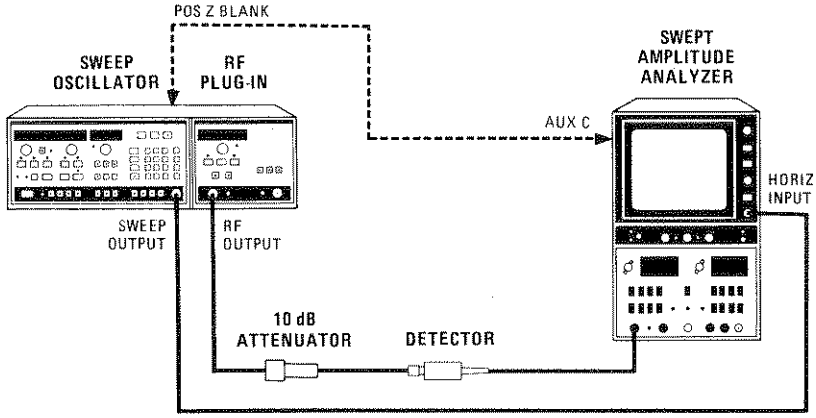


Figure 5-23. YTM Delay Compensation Adjustment Test Setup

EQUIPMENT:

Swept Amplitude Analyzer	HP 8755C
Display Mainframe	HP 182T
Detector	HP 11664B
10 dB Attenuator	Weinschel Model M9-10
Sweep Oscillator	HP 8350A

5-22. YTM DELAY COMPENSATION (Cont'd)

PROCEDURE:

NOTE

This procedure requires that A3S1 is set to the factory-set position. Refer to Table 5-6.

1. Connect the equipment as shown in Figure 5-23. Do not connect the BNC cable between the 8350A rear-panel POS Z BLANK and the 182T AUX C connector yet. Preset A7R45 (SEQ TC) fully counterclockwise. Refer to Figure 5-24 for adjustment locations. Allow the equipment to warm up for one hour.

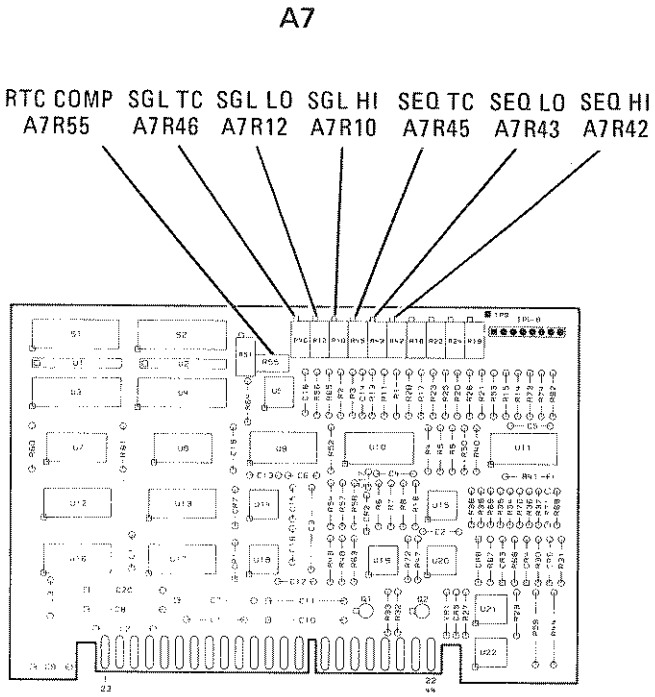


Figure 5-24. YTM Delay Compensation Adjustment Locations

2. On the 8350A and 83595A, press INSTR PRESET ⎍ MOD EXT ALC MODE SAVE 1 SWEEP TIME 0 . 5 s SAVE 2 .

3. Press RECALL 1 . Adjust A7R45 (SEQ TC) for the highest power with the best defined (brightest) bandswitch points between Band 2 and Band 3 and between Band 3 and Band 4.

5-22. YTM DELAY COMPENSATION (Cont'd)

4. Connect a BNC cable from the 8350A rear-panel POS Z BLANK connector to the 182T Display Mainframe rear-panel AUX C connector.

5. Adjust A7R43 (SEQ LO) for maximum power at the beginning of Band 2.

6. Adjust A7R42 (SEQ HI) for maximum power at the end of Band 4.

7. On the 8350A, iterate between RECALL 1 and RECALL 2 while readjusting A7R42 (SEQ HI) and A7R43 (SEQ LO) as necessary to minimize power level changes.

8. On the 8350A, press START 7 . 1 GHz SWEEP TIME 3 0 ms .

9. Adjust A7R55 (RTC COMP) for maximum power in Band 2.

10. Vary the 8350A START FREQUENCY control from 10 MHz to 20 GHz to check for power variations. Readjust A7R42 (SEQ HI), A7R43 (SEQ LO), and A7R55 (RTC COMP) as necessary to minimize any droop in power (particularly near 26.5 GHz). The worst case droop should not exceed 0.5 dB as the START frequency is varied. If this cannot be met, repeat the Slow Speed YTM to YO Tracking Adjustments (paragraph 5-20).

11. On the 8350A and 83595A, press INSTR PRESET ⌐ MOD EXT ALC MODE .

12. Repeatedly press SINGLE SWEEP TRIGGER while watching the displayed power level. Readjust A7R42 (SEQ HI) and A7R43 (SEQ LO) as necessary to minimize the power level difference between a 30 ms SINGLE sweep and a 30 ms INT sweep.

13. On the 8350A and 83595A, press INSTR PRESET ⌐ MOD START 6 . 9 GHz STOP 1 3 . 5 GHz EXT ALC MODE .

14. Preset A7R46 (SGL TC) fully counterclockwise.

15. While continuously changing the SWEEP TIME control for a sweep speed from 30 ms to 100 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.

16. On the 8350A, press START 1 3 . 4 GHz STOP 2 0 GHz . Vary the sweep speed as in step 15 and note any drop in power. If the change is greater than 0.5 dB, make slight adjustments to A7R10 (SGL HI) and A7R12 (SGL LO).

17. On the 8350A, press START 1 9 . 9 GHz STOP 2 6 . 5 GHz . Vary the sweep speed as in step 15 and note any drop in power. If the change is greater than 0.5 dB, make slight adjustments to A7R10 (SGL HI) and A7R12 (SGL LO). If it is necessary to adjust A7R10 (SGL HI) and A7R12 (SGL LO), repeat steps 15 and 16 until the power variation while adjusting the sweep time is less than 0.5 dB.

5-23. BAND OVERLAP

REFERENCE:

Performance Test: Paragraph 4-13
Service Sheet: A6

DESCRIPTION:

The 83595A is set to sweep across each bandswitch point. A Frequency Meter 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.

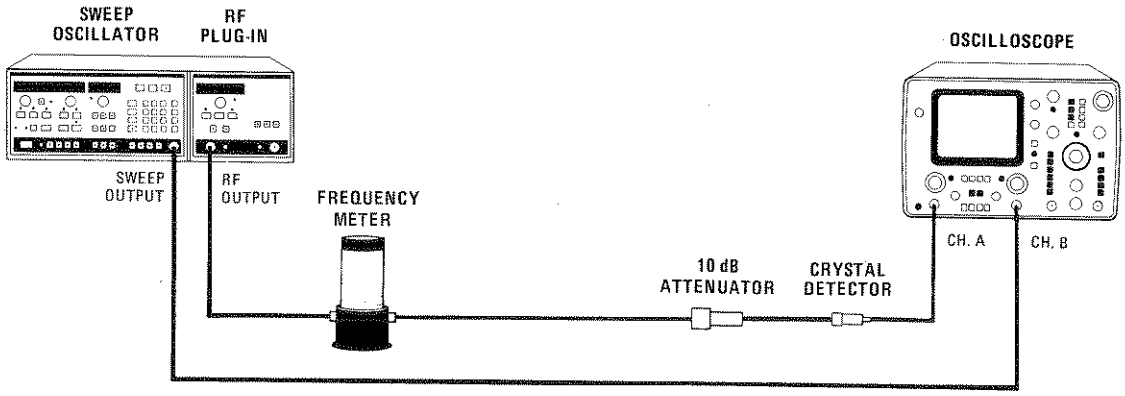


Figure 5-25. Band Overlap Adjustment Test Setup

EQUIPMENT:

Oscilloscope	HP 1740A
Frequency Meter (0.96–4.2 GHz)	HP 536A
Frequency Meter (3.7–12.4 GHz)	HP 537A
Frequency Meter (12.4–18 GHz)	HP P532A
Frequency Meter (18–26.5 GHz)	HP K532A
10 dB Attenuator	HP 8491B Option 010
Crystal Detector	HP 8470B
Sweep Oscillator	HP 8350A

PROCEDURE:

NOTE

This procedure requires that A3S1 be set to the factory-set position. Refer to Table 5-6.

1. Connect the equipment as shown in Figure 5-25 with the 536A Frequency Meter in the test setup. Allow the equipment to warm up for one hour.

2. On the 8350A, press INSTR PRESET CF 2 . 3 5 GHz ΔF 1 5 0 MHz .

5-23. BAND OVERLAP

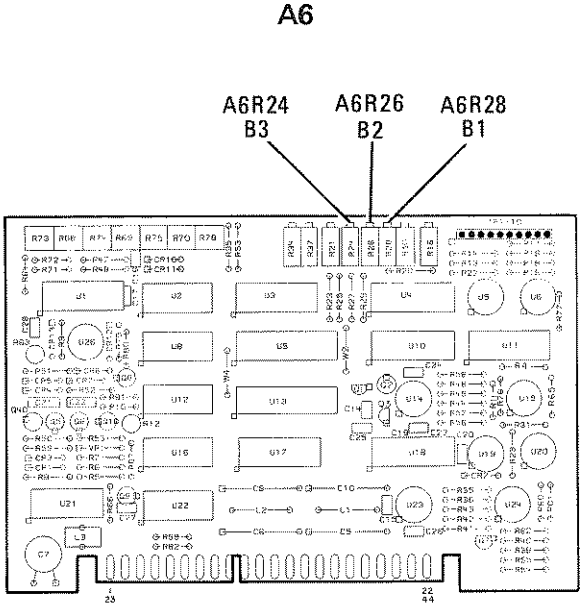


Figure 5-26. Band Overlap Adjustment Locations

3. Set the Oscilloscope for A vs B display mode to display amplitude versus frequency. Center the display on the screen.

4. Set the 536A Frequency Meter to 2.35 GHz.

5. Center the bandswitch point on the display using the 8350A FREQUENCY control.

6. Adjust the Frequency Meter to put the left half of the pip on the left side of the bandswitch point.

7. Adjust A6R28 (B1) to bring the right side pip over to the bandswitch point so that the right half of this pip mates with the left half of the other as shown in Figure 5-27. Refer to Figure 5-26 for the adjustment location. The pip should be undisturbed as it moves through the bandswitch point.

8. Replace the 536A Frequency Meter with the 537A and set it to 6.95 GHz.

9. On the 8350A, press CF 6 . 9 5 GHz .

5-23. BAND OVERLAP

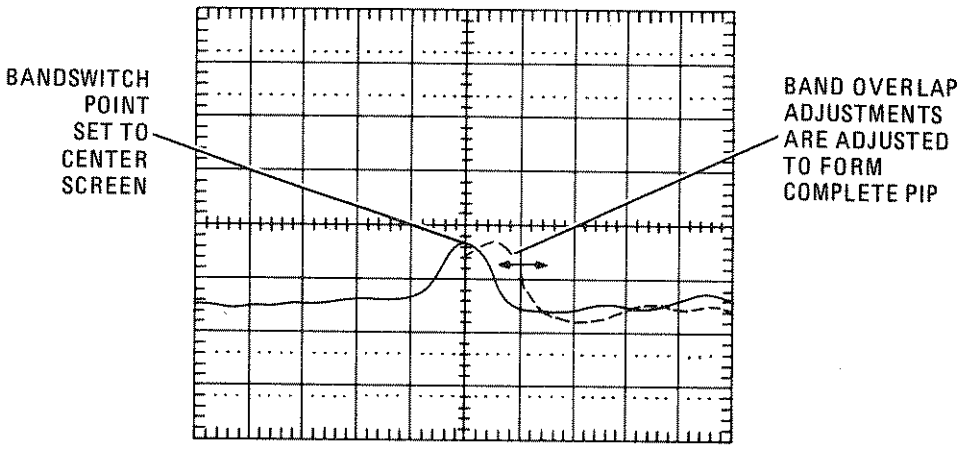


Figure 5-27. Band Overlap Adjustment Waveform

10. Repeat steps 5 through 7 but, this time, adjust A6R26 (B2) in step 7.
11. Replace the 537A Frequency Meter with the P532A and set it to 13.45 GHz.
12. On the 8350A, press CF 1 3 . 4 5 GHz .
13. Repeat steps 5 through 7 but, this time, adjust A6R24 (B3) in step 7.
14. Replace the P532A Frequency Meter with the K532A and set it to 19.95 GHz.
15. On the 8350A, press CF 1 9 . 9 5 GHz .
16. Repeat steps 5 through 7 but, this time, adjust A6R24 (B3) in step 7.
17. Repeat steps 11 through 16 to obtain a compromise between Band 3 and Band 4.

5-24. FREQUENCY REFERENCE 1V/GHz OUTPUT

REFERENCE:

Performance Test: Paragraph 4-13
Service Sheet: A2

DESCRIPTION:

The frequency reference rear-panel output is adjusted for 1 volt per GHz. Example: 1 GHz = 1 volt; 2 GHz = 2 volts, etc.

EQUIPMENT:

Digital Voltmeter	HP 3456A
Sweep Oscillator	HP 8350A

PROCEDURE:

NOTE

Frequency Accuracy must be adjusted correctly (paragraph 5-17) before the 1V/GHz frequency reference output is adjusted.

1. Connect the equipment with the DVM connected to the rear-panel 1V/GHz frequency reference connector, J4. Allow the equipment to warm up for one hour.

Bands 1 through 3

2. Adjust A2R4 (OFFSET) to the center of its mechanical range. Refer to Figure 5-28 for the adjustment location.
3. On the 8350A, press CW 8 GHz .
4. Adjust A2R4 (OFFSET) for a DVM reading of 8.000 ± 0.005 Vdc.
5. On the 8350A, press CW 1 5 GHz .
6. Adjust A2R1 (GAIN) for a DVM reading of 15.000 ± 0.005 Vdc.
7. Repeat steps 2 through 6 until there is no change.

5-24. FREQUENCY REFERENCE 1V/GHz OUTPUT

Band 0

8. Adjust A2R6 (BAND 0 OFFSET) to the center of its mechanical range.
9. On the 8350A, press CW 1 0 MHz .
10. Adjust A2R6 (BAND 0 OFFSET) for a DVM reading of 0.010 ± 0.005 Vdc.
11. On the 8350A, press CW 2 GHz .
12. Adjust A2R23 (BAND 0 GAIN) for a DVM reading of 2.000 ± 0.005 Vdc.
13. Repeat steps 8 through 12 until there is no change.

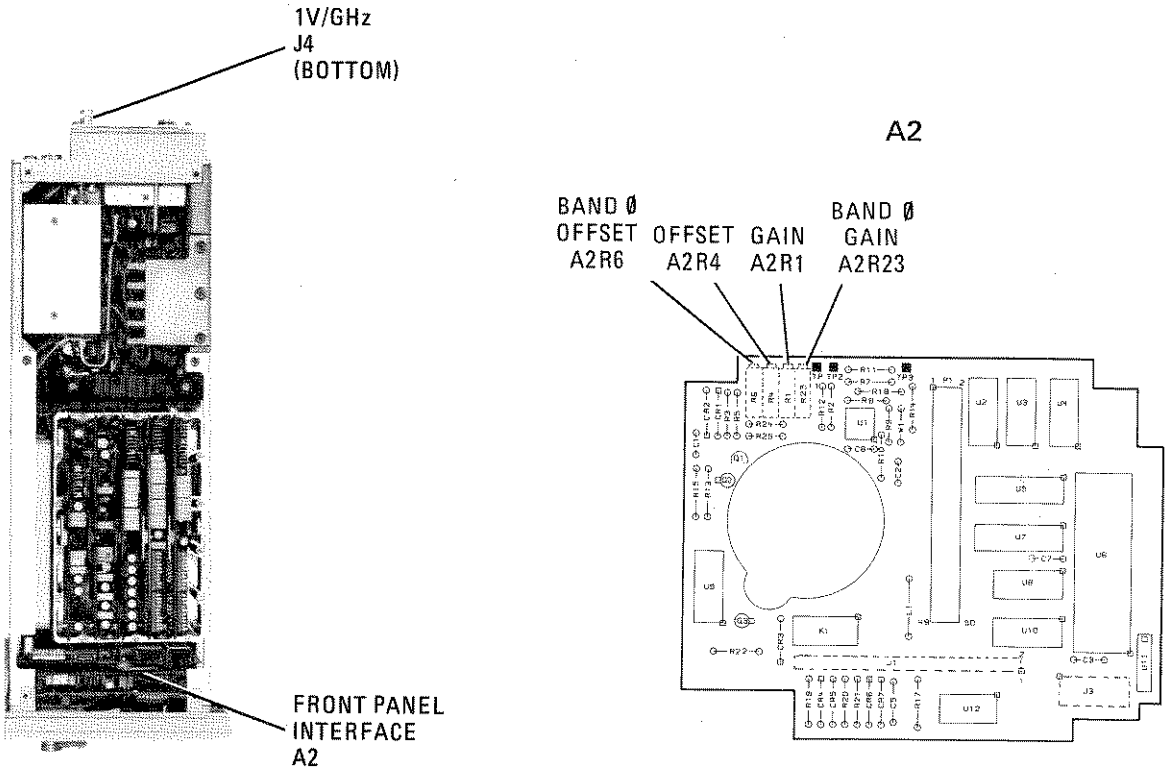


Figure 5-28. Frequency Reference Adjustment Locations

5-25. ALC ADJUSTMENT

NOTE

Complete adjustment of the ALC leveling loop requires several procedures to be performed in the order prescribed from paragraphs 5-25 through 5-28. Deviation from this routine may cause improper leveling and/or power variation problems.

REFERENCE:

Performance Test: Paragraph 4-14
Service Sheet: A4

DESCRIPTION:

Adjustments compensate for DC offsets in the detected RF path and the Main ALC Amplifier. Power is roughly calibrated and low band flatness is optimized.

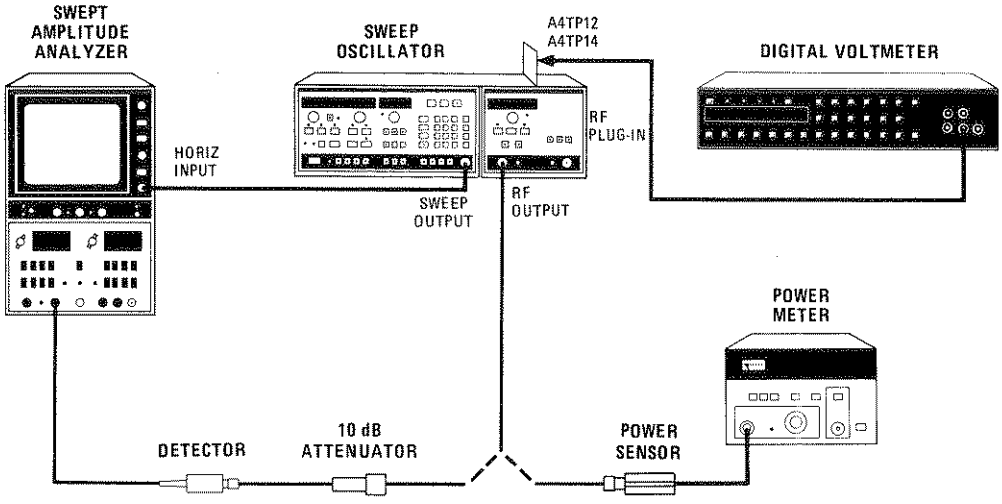


Figure 5-29. ALC Adjustment Test Setup

EQUIPMENT:

Digital Voltmeter	HP 3456A
Power Meter	HP 436A
Thermistor Mount	HP 8485A
Swept Amplitude Analyzer	HP 8755C
Display Mainframe	HP 182T
Detector	HP 11664B
Extender Board	HP 08350-60031
10 dB Attenuator	Weinschel Model M9-10
Sweep Oscillator	HP 8350A

5-25. ALC ADJUSTMENT (Cont'd)

PROCEDURE:

NOTE

Turn AC power OFF when removing or installing PC boards.

NOTE

This procedure assumes that A3S1 is set to the factory-set position (Table 5-6), and that the 8350A Sweep Oscillator 27.8 kHz squarewave modulation is selected.

1. Remove the A5 FM Driver board. Put the A4 assembly on an extender board. Sweep the full range of the Plug-In at any leveled power. Preset the following adjustments as indicated:

A4R47 (OFS 1)	Midrange
A4R56 (OFS 2)	Midrange
A4R59 (OFS 3)	Midrange
A4R67 (OFS 4)	Midrange
A4R11 (GAIN)	Midrange
A4R2 (0 HI)	Fully CW
A4R3 (1 HI)	Fully CW
A4R4 (BIAS)	Midrange
A4R1 (SLP)	Midrange

2. Float the ground on the Digital Voltmeter and measure the voltage between A4TP12 and A4TP14. Refer to Figure 5-30 for adjustment locations. Adjust A4R47 (OFS 1) for 0.000 ± 0.001 Vdc.

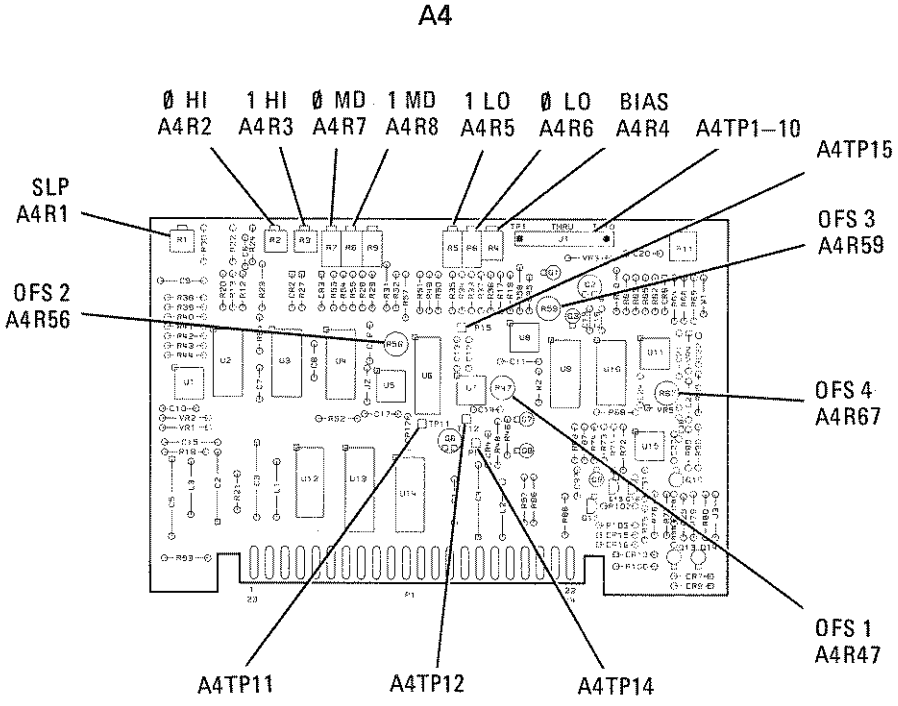


Figure 5-30. ALC Adjustment Locations

5-25. ALC ADJUSTMENT (Cont'd)

3. Attach a jumper from A4TP11 to ground. Connect the DVM to A4TP5 (reference to ground) and adjust A4R56 (OFS 2) for a DVM reading of 0.000 ± 0.001 Vdc. Remove the jumper.

4. Connect the DVM between A4TP12 and A4TP15 (floating ground). Adjust A4R59 (OFS 3) for a DVM reading of 0.000 ± 0.001 Vdc.

5. On the 8350A, press CW and ensure that the power is leveled (83595A UNLEVELED light off). Connect the DVM to A4TP7 and adjust A4R67 (OFS 4) for a DVM reading of 0.000 ± 0.001 Vdc.

6. On the 8350A, press CW 5 0 MHz . Turn OFF the 83595A RF power. Connect the DVM to A4TP10 (ground to P1 pin 42) and adjust A4R4 (BIAS) for a DVM reading of 0.000 ± 0.001 Vdc. Turn ON the 83595A RF power.

7. Set the 8350A LINE power to OFF. Remove the A4 assembly from the extender board and reinsert the A4 assembly directly into the instrument. Set the 8350A LINE power to ON and press CW 5 0 MHz . Connect the Power Meter to the 83595A RF OUTPUT.

8. Set the 83595A for a POWER reading of −3 dBm. Adjust A4R6 (0 LO) for an RF output power at the 83595A connector of −3 ± 0.1 dBm.

9. Set the 83595A for a POWER reading of +7 dBm. Adjust A4R7 (0 MD) for an RF output power at the 83595A connector of +7 ± 0.1 dBm.

10. Iterate between steps 8 and 9 until both low and midpower ranges are calibrated and no readjustment is necessary.

11. Set the 83595A for a POWER reading of +10 dBm. Adjust A4R2 (0 HI) for an RF output power at the 83595A connector of +10 ± 0.1 dBm.

12. Disconnect the Power Meter and monitor the RF output with the 8755C Swept Amplitude Analyzer. Press 8350A INSTR PRESET to sweep the full range of the Plug-In. Press 8350A ⊔⊓ MOD for compatibility with the 8755C. Set the 83595A for a POWER reading of −3 dBm. Press RF BLANK SAVE 1 .

13. Adjust A4R1 (SLP) for best overall flatness from 10 MHz to 2.4 GHz as observed on the 8755C.

14. Adjust A4R5 (1 LO) for best continuity at the bandswitch point at 2.2 GHz.

15. Set the 83595A for a POWER reading of +7 dBm. On the 8350A, press SAVE 2 . Adjust A4R8 (1 MD) for best continuity at the bandswitch point.

16. Set the 83595A for a POWER reading of +10 dBm. On the 8350A, press SAVE 3 . Adjust A4R3 (1 HI) for best trace continuity at the bandswitch point.

17. Iterate between steps 14, 15, and 16 using RECALL 1 , 2 , and 3 until trace continuity at all three power settings is achieved.

18. Reinstall the A5 FM board assembly.

5-26. ALC INTERNAL LEVELED FLATNESS

NOTE

Complete adjustment of the ALC leveling loop requires several procedures to be performed in the order prescribed from paragraphs 5-25 through 5-28. Deviation from this routine may cause improper leveling and/or power variation problems.

REFERENCE:

Performance Test: Paragraph 4-14
Service Sheet: A5

DESCRIPTION:

Four parallel circuits on the A5 assembly provide adjustments for ALC flatness. BP1 through BP4 and SL1 through SL4 determine the slope of the flatness compensation signal input to the A4 ALC assembly. Breakpoint potentiometers (BP1–4) determine the frequency at which the corresponding slope potentiometers (SL1–4) begin to affect power output leveling.

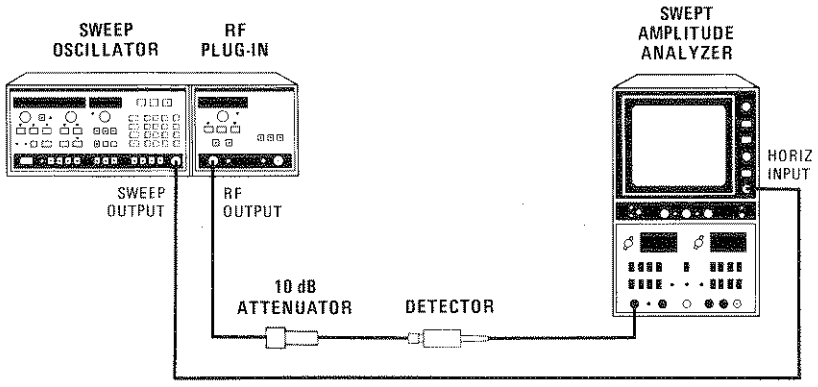


Figure 5-31. Internal Leveling Adjustment Test Setup

EQUIPMENT:

Swept Amplitude Analyzer	HP 8755C
Display Mainframe	HP 182T
Detector	HP 11664B
10 dB Attenuator	Weinschel Model M9-10
Sweep Oscillator	HP 8350A

PROCEDURE:

NOTE

This procedure requires that A3S1 is set to the factory-set position (Table 5-6), and that the 8350A Sweep Oscillator 27.8 kHz squarewave modulation is selected.

5-26. ALC INTERNAL LEVELED FLATNESS (Cont'd)

1. Connect the equipment as shown in Figure 5-31 with the 8755C Swept Amplitude Analyzer monitoring the RF OUTPUT through the 10 dB Attenuator. On the 8350A, press INSTR PRESET ⌐MOD . Allow the equipment to warm up for one hour.

NOTE

The following step negates any power variation compensation by effectively removing the ALC power variation adjustments from the leveling circuitry. This step may be omitted if the RF power variation approaches the specified limits.

2. Adjust all breakpoint potentiometers fully clockwise to effectively remove the circuit from the ALC leveling loop. These potentiometers are A5R34 (BP1), A5R36 (BP2), A5R38 (BP3), and A5R40 (BP4). Refer to Figure 5-32 for adjustment locations.

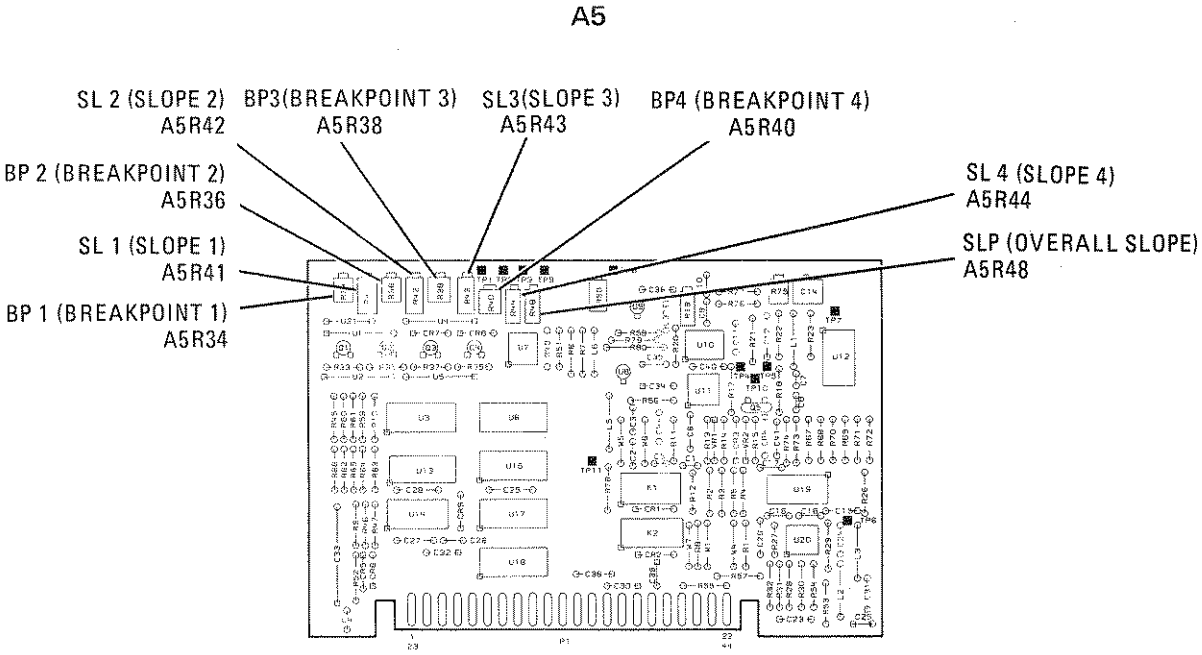


Figure 5-32. Internal Leveling Adjustment Locations

3. Adjust A5R48 (SLP) for best overall flatness.

4. Set breakpoint adjustments A5R34, A5R36, A5R38, and A5R40 (BP1−4) and slope adjustments A5R41 through A5R44 (SL1−4) for best overall flatness. (BP1 and SL1 are interdependent adjustments, as are BP2 and SL2, etc.) The breakpoint potentiometers determine the frequency points at which the slope adjustments will take effect. These are observed as pivot points on the CRT trace.

5-27. POWER METER LEVELING CALIBRATION

NOTE

Complete adjustment of the ALC leveling loop for Power Meter leveling requires several procedures to be performed in the order prescribed from paragraphs 5-25 through 5-28. Deviation from this routine may cause improper leveling and/or power variation problems.

REFERENCE:

Performance Test: Paragraph 4-14
Service Sheet: A4

DESCRIPTION:

Power Meter leveling gain potentiometer A4R9 (PM) calibrates the ALC loop gain to full-scale deflection of the leveling Meter.

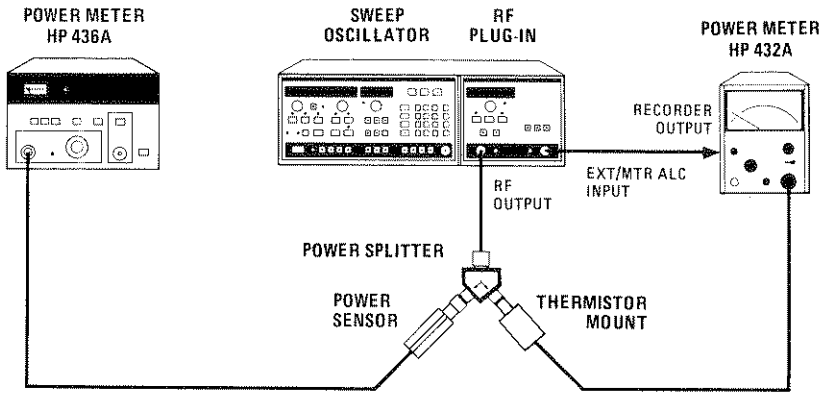


Figure 5-33. Power Meter Leveling Adjustment Setup

EQUIPMENT:

Power Meters	HP 432A and HP 436A
Thermistor Mount	HP 8478A
Power Sensor	HP 8485A
Power Splitter	HP 11667A
Sweep Oscillator	HP 8350A

5-27. POWER METER LEVELING CALIBRATION (Cont'd)

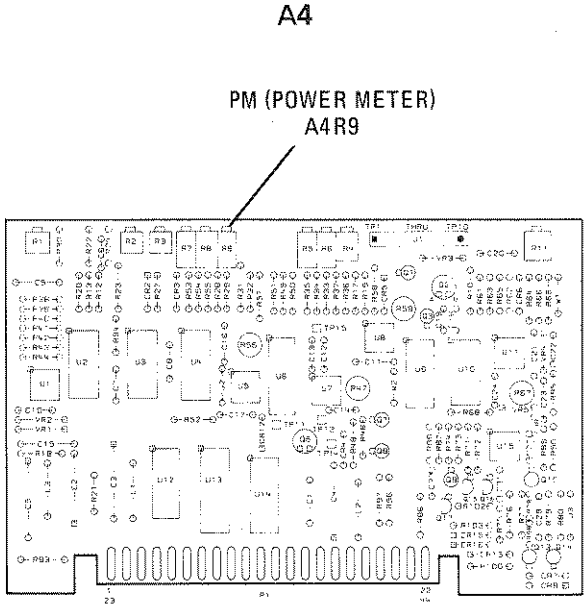


Figure 5-34. Power Meter Leveling Adjustment Location

PROCEDURE:

1. Connect the equipment as shown in Figure 5-33. On the 8350A, press INSTR PRESET CW and select a frequency at midband. Set the RF power level to −2 dBm, as indicated on the 83595A POWER display. Allow the equipment to warm up for one hour.

2. Select the 0 dB range on the HP 432A Power Meter. Both meters should read approximately −8 dBm. Note the insertion loss through the Power Splitter (typically 6 dB).

3. On the 83595A, press MTR and adjust the EXT CAL control to reset the 432A to the power level measured in step 2.

4. Increase the 83595A power level until the 432A Power Meter reaches full scale deflection (83595A RF output equals approximately +6 dBm). Adjust A4R9 (PM) until the 436A Power Meter indication is equal to the 83595A POWER display minus the Power Splitter insertion loss noted in step 2 (approximately 6 dB). Refer to Figure 5-34 for the adjustment location.

5. Alternately set the 83595A POWER to −2 dBm (and adjust the 83595A EXT CAL control) then set the 83595A POWER to +6 dBm (and adjust A4R9(PM) control) to obtain the best compromise where further adjustment of each is unnecessary.

5-28. ALC GAIN ADJUSTMENT

NOTE

Complete adjustment of the ALC leveling loop requires several procedures to be performed in the order prescribed from paragraphs 5-25 to 5-28. Deviation from this routine may cause improper leveling and/or power variation problems.

REFERENCE:

Performance Tests: Paragraphs 4-14, 4-19, and 4-21
Service Sheet: A4

DESCRIPTION:

A4R11 (GAIN) in the input leg of A4U11 adjusts the gain of the main ALC Amplifier on the A4 assembly. A4R11 (GAIN) is adjusted for maximum possible gain without oscillations.

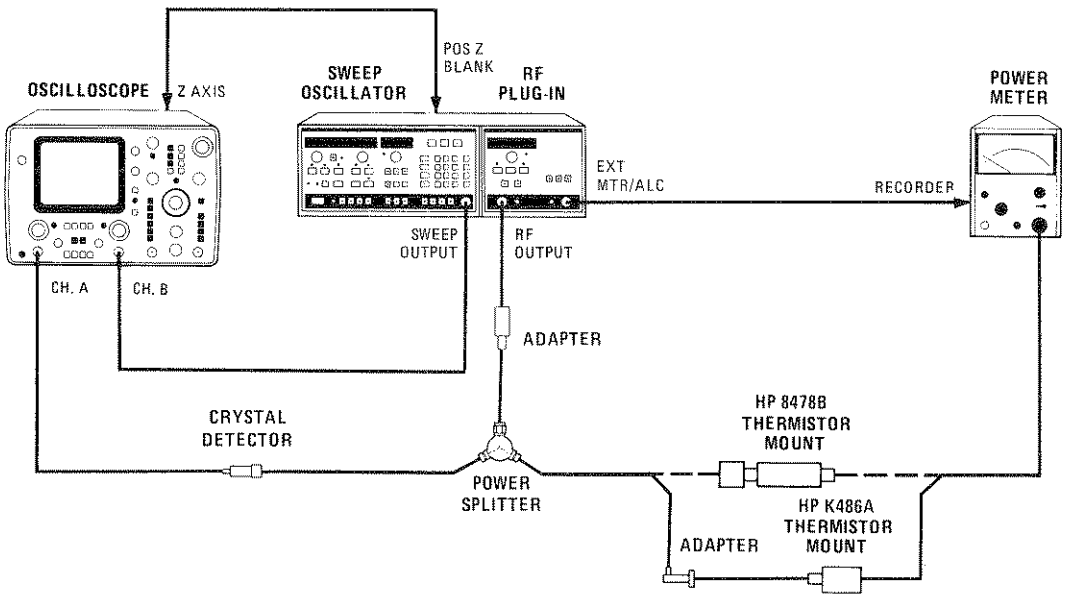


Figure 5-35. ALC Gain Adjustment Test Setup

EQUIPMENT:

Sweep Oscillator	HP 8350A
Oscilloscope	HP 1740A
Crystal Detector	HP 8473C
Power Meter	HP 432A
Thermistor Mount (0.01 to 18 GHz)	HP 8478B
Thermistor Mount (18 to 26.5 GHz)	HP K486A
Waveguide to APC 3.5(f) Adapter (18 to 26.5 GHz)	HP K281C
Power Splitter	Weinschel Model 1579A

5-28. ALC GAIN ADJUSTMENT (Cont'd)

PROCEDURE:

NOTE

This procedure requires that A3S1 is set to the factory-set position.

1. Connect the equipment as shown in Figure 5-35 with the 8478B Thermistor Mount connected to the Power Splitter. Preset A4R11 (GAIN) fully counterclockwise. Refer to Figure 5-36 for the adjustment location. Allow the equipment to warm up for one hour.

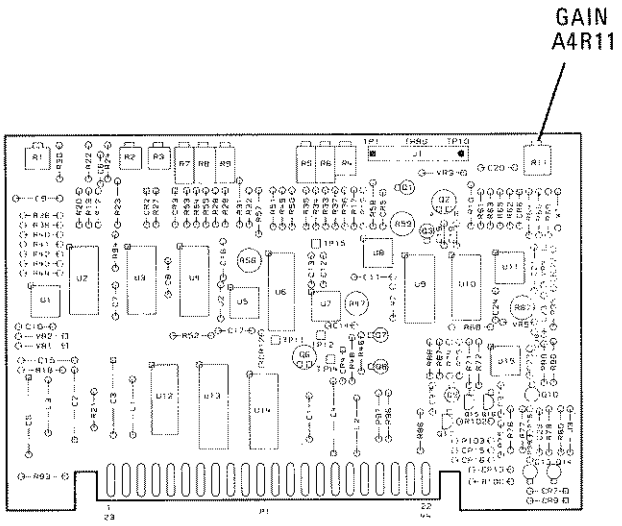


Figure 5-36. ALC Gain Adjustment Location

2. On the 8350A, press INSTR PRESET STOP 1 8 . 0 GHz SWEEP TIME 1 0 0 s .

3. On the Oscilloscope, select A vs B mode to display a plot of amplitude versus frequency. Set the Channel A vertical sensitivity for 0.01 V/DIV and AC coupling. Set the Channel B vertical sensitivity for 1 V/DIV and DC coupling. Adjust the horizontal position and vertical position controls for a stable display at mid screen.

4. On the 8350A, press CW .

5. Set the Power Meter RANGE switch to +5 dBm. Note the Power Meter needle position.

6. On the 83595A, press MTR ALC MODE.

5-28. ALC GAIN ADJUSTMENT (Cont'd)

7. If necessary, adjust the output power with the 83595A front panel EXT CAL control to position the Power Meter needle to the same reading as noted in step 5. Then decrease the Power Meter RANGE switch by three 5 dB steps to −10 dB. This attenuates the output power by 15 dB which causes the 83595A output power to be near the low end of its power range (approximately −5 dBm).

8. On the 8350A, press START .

9. Observe the trace dot as it sweeps across the CRT. Adjust A4R11 (GAIN) clockwise, increasing the gain of the ALC loop, until the trace dot begins to oscillate. Then reduce the gain slightly to eliminate the oscillations so that a sharp trace dot is obtained.

10. Set the 83595A to maximum leveled RF output power by returning the Power Meter RANGE switch to the +5 dB position. Observe the trace through the entire sweep to ensure that no oscillations occur. If oscillations do occur, reduce the gain slightly by turning A4R11 (GAIN) counterclockwise.

11. On the 8350A, press INSTR PRESET STOP 1 8 . 0 GHz to reset the 83595A to internal leveling.

12. Adjust the Oscilloscope Channel A vertical sensitivity to place the internally leveled sweep trace at center screen. If oscillations are present, further reduce the ALC loop gain by adjusting A4R11 (GAIN) counterclockwise.

13. Reduce the 83595A RF output power by rotating the 83595A POWER control until the 83595A POWER display reads −5 dBm. Observe a full sweep. If oscillations occur, reduce the gain further by adjusting A4R11 (GAIN) counterclockwise.

14. Reconnect the equipment with the K486A Thermistor Mount and the Adapter connected to the Power Splitter as shown in Figure 5-35.

15. On the 8350A, press INSTR PRESET START 1 7 . 5 GHz STOP 2 6 . 5 GHz SWEEP TIME 1 0 0 s .

16. On the Oscilloscope, adjust the horizontal position and vertical position controls for a stable display at mid screen.

17. On the 8350A, press CW .

18. Set the Power Meter RANGE switch to +5 dBm. Note the Power Meter needle position.

19. On the 83595A, press MTR ALC MODE.

20. If necessary, adjust the output power with the 83595A front panel EXT CAL control to position the Power Meter needle to the same reading as noted in step 18. Then decrease the Power Meter RANGE switch by three 5 dB steps to −10 dB. This attenuates the output power by 15 dB which causes the 83595A output power to be near the low end of its power range (approximately −5 dBm).

21. On the 8350A, press START .

22. Observe the trace dot as it sweeps across the CRT. If oscillations occur, reduce the gain by adjusting A4R11 (GAIN) counterclockwise.

5-28. ALC GAIN ADJUSTMENT (Cont'd)

23. Set the 83595A to maximum leveled RF output power by returning the Power Meter RANGE switch to the +5 dB position. Observe the trace through the entire sweep to ensure that no oscillations occur with the 83595A at maximum power. If oscillations do occur, further reduce the gain slightly by turning A4R11 (GAIN) counterclockwise.

24. On the 8350A, press INSTR PRESET START 1 7 . 5 GHz to reset the 83595A to internal leveling.

25. Adjust the Oscilloscope Channel A vertical sensitivity to place the internally leveled sweep trace at center screen. If oscillations are present, further reduce the ALC loop gain by adjusting A4R11 (GAIN) counterclockwise.

26. Reduce the 83595A RF output power by rotating the 83595A POWER control until the 83595A POWER display reads −5 dBm. Observe a full sweep. If oscillations occur, reduce the gain further by adjusting A4R11 (GAIN) counterclockwise.

5-29. POWER SWEEP

REFERENCE:

Performance Test: Paragraph 4-14
Service Sheet: A5

DESCRIPTION:

A 10 dB/sweep POWER SWEEP mode is selected and the resultant is displayed on the 8755C Swept Amplitude Analyzer. The output of the Power Sweep circuit is adjusted for the correct sweep.

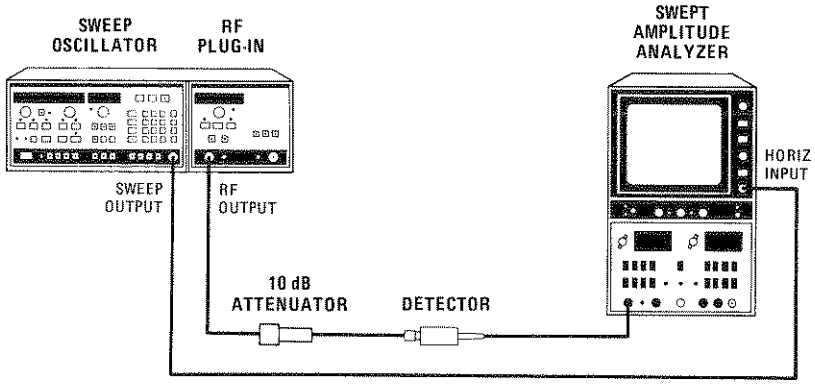


Figure 5-37. Power Sweep Test Setup

EQUIPMENT:

Swept Amplitude Analyzer	HP 8755C
Display Mainframe	HP 182T
Detector	HP 11664B
10 dB Attenuator	HP 8491B Option 010
Sweep Oscillator	HP 8350A

5-29. POWER SWEEP (Cont'd)

PROCEDURE:

NOTE

ALC gain adjustments (paragraph 5-27) must be checked before the power sweep adjustment is made.

NOTE

This procedure requires that A3S1 is set to the factory-set position (Table 5-6), and that the 8350A Sweep Oscillator 27.8 kHz squarewave modulation is selected.

1. Connect the equipment as shown in Figure 5-37. On the 8350A, press INSTR PRESET ⊓ MOD . Allow the equipment to warm up for one hour.
2. On the 8350A, press SHIFT CW .
3. On the 83595A, press POWER LEVEL . Then, on the 8350A, press 0 dBm .
4. On the 83595A, press POWER SWEEP . Then, on the 8350A, press 1 0 dB .
5. While observing the 8755C display of the RF output, adjust A5R50 (PWSP) for a power level change of 10 dB across the display (10 dB/sweep). Refer to Figure 5-38 for the adjustment location.

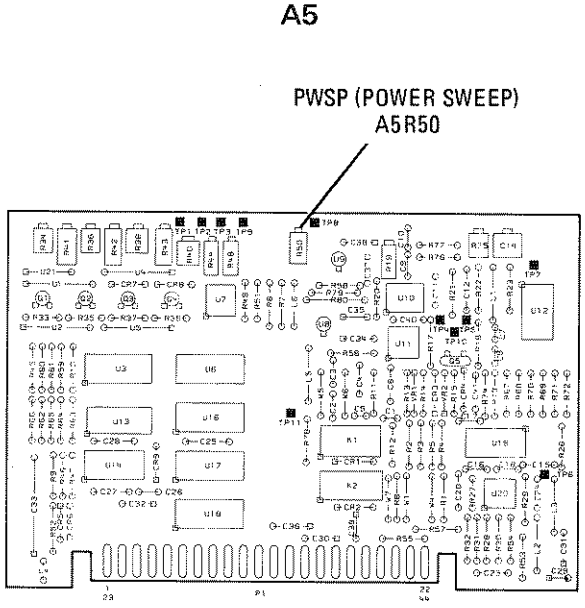


Figure 5-38. Power Sweep Adjustment Location

5-30. FM DRIVER

REFERENCE:

Performance Test: Paragraph 4-20
Service Sheet: A5

DESCRIPTION:

The FM Driver high frequency offset is adjusted for a zero volt drive with no FM modulation applied. A Delay-Line Discriminator is used to detect and display FM modulation on an Oscilloscope. Adjustments are made for best overall frequency response from DC to 10 MHz. Compliance to a supplemental characteristic of ±3 dB FM flatness is checked between DC and 2 MHz.

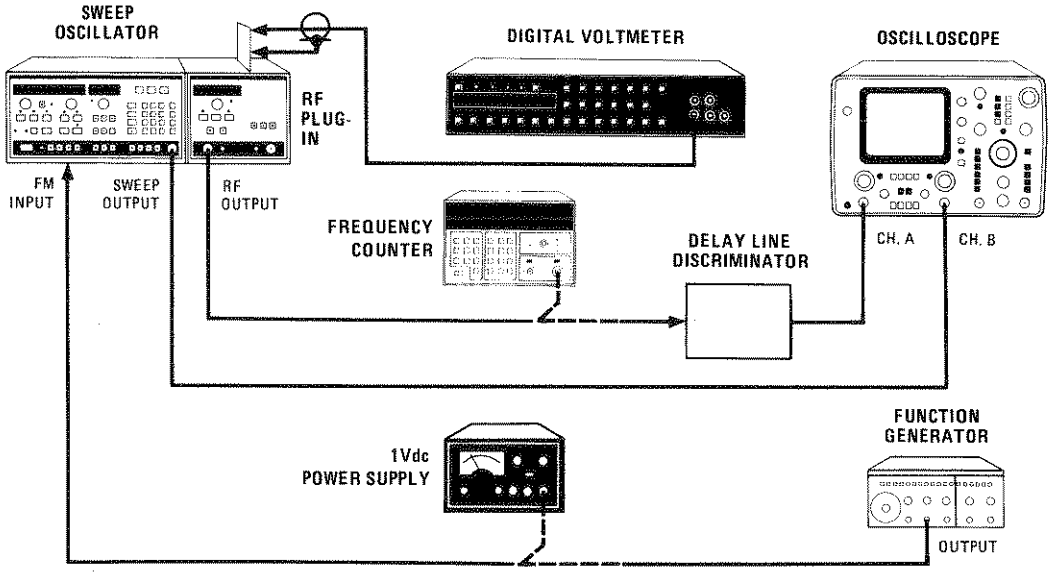


Figure 5-39. Test Setup for FM Driver Adjustments

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
Oscilloscope	HP 1740A
Function Generator	HP 3312A
Delay-Line Discriminator	See Figure 1-3
Frequency Counter	HP 5343A
DC Power Supply	HP 6214A
Sweep Oscillator	HP 8350A

5-30. FM DRIVER (Cont'd)

PROCEDURE:

NOTE

Turn AC power OFF when removing or installing PC boards.

NOTE

This procedure requires that A3S1 is set to the factory-set position (refer to Table 5-6).

FM Offset

1. Connect the equipment as shown in Figure 5-39. Connect the Frequency Counter to the 83595A RF OUTPUT connector. Do not connect the Power Supply or Function Generator to the 8350A rear-panel FM INPUT connector yet. Allow the equipment to warm up for one hour.

2. Connect the DVM between A5 pin 21 and A5TP7 (HIGH FREQ FM RET). Refer to Figure 5-40 for adjustment procedure locations. Adjust A5R19 (FM OFFSET) for a DVM reading of 0.000±0.001 Vdc.

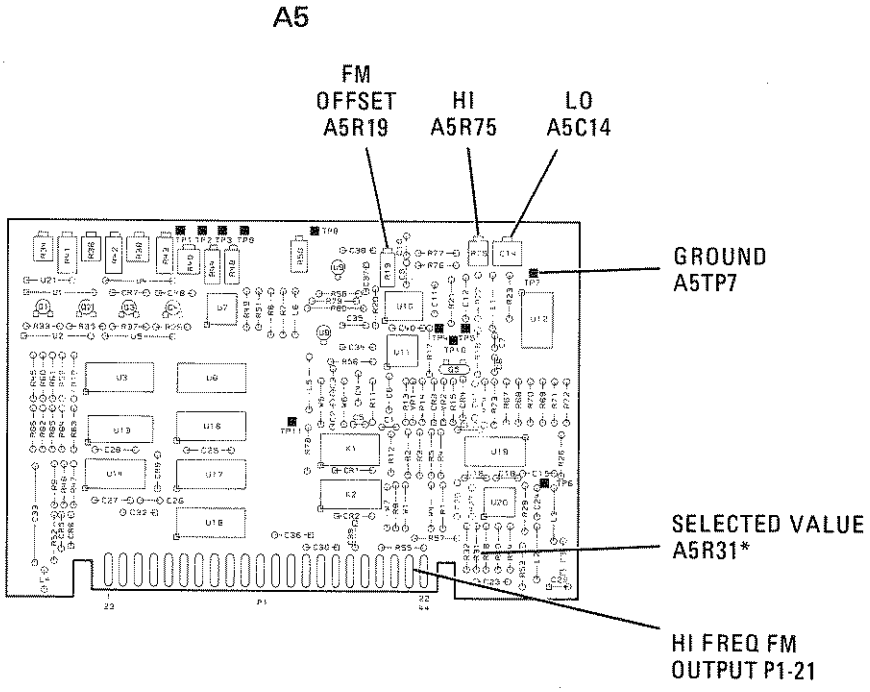


Figure 5-40. Location of A5 FM Driver Adjustments

5-30. FM DRIVER (Cont'd)

3. Disconnect the DVM and set the equipment controls as follows:

8350A SWEEP OSCILLATOR

CW FREQUENCY ..... 3 GHz
FREQUENCY Sweep Mode ..... Press SHIFT CW (swept CW)
CW VERNIER ..... ON
SWEEP TRIGGER ..... INT
RF BLANK ..... OFF

83595A RF PLUG-IN

POWER LEVEL ..... +10 dBm
CW FILTER ..... OFF
ALC MODE ..... INT

Set the configuration switch A3S1 on the Digital Interface board (Table 5-6) as follows:

Switch Number	1	2	3	4	5	6	7	8
Position	0	X	X	0	0	0	*	0

Positions: 1=Open; 0=Closed; X=Dont't care
* "0" if no Option 002; "1" if Option 002 installed.

NOTE

The A3S1 switch positions select the 83595A code, maximum RF power at power-up, −20 MHz/V FM sensitivity, cross-over coupled FM modulation (AC coupled), and Option 002 code (if installed).

3312A FUNCTION GENERATOR

RANGE ..... 1 MHz
FREQUENCY ..... 10 (10 MHz)
FUNCTION ..... Sine Wave
Amplitude ..... Set output for 100 mV p-p as displayed on Oscilloscope with 50 Ohm input

1740A OSCILLOSCOPE

MODE ..... A vs B
CHANNEL A ..... 50 Ohms
CHANNEL A V/DIV ..... 0.02 (CAL)
CHANNEL B INPUT ..... DC
CHANNEL B V/DIV 1

5-30. FM DRIVER (Cont'd)

Frequency Response

4. Connect the Frequency Counter to the 83595A RF OUTPUT. Connect +1 Vdc from the Power Supply to the 8350A rear-panel FM INPUT. A shift in frequency of approximately −20 MHz should occur on the Frequency Counter when +1 Vdc is applied. (This shows correct FM modulation sensitivity.) Connect the Delay-Line Discriminator to the 83595A RF OUTPUT and connect the Function Generator to the 8350A rear-panel FM INPUT connector.

5. Adjust the 8350A CW FREQUENCY and CW VERNIER for a waveform at the center of the Oscilloscope CRT. Adjust the Oscilloscope Channel A CAL control for a trace 4 divisions high centered on the CRT.

6. Manually sweep the Function Generator frequency from DC to 100 kHz. Select resistor A5R31 so that the amplitude of the waveforms at Function Generator frequencies of 100 Hz and 100 kHz are the same ± 0.2 divisions on the CRT. Refer to Figure 5-40 for the location of A5R31. Refer to Table 5-3 for the allowable range of values for A5R31.

7. Manually sweep the Function Generator frequency from DC to 10 MHz. Adjust A5C14 (LO) and A5R75 (HI) controls to obtain the most constant overall response from DC to 10 MHz. Repeat this step several times.

8. Check that the ±3 dB FM flatness supplemental characteristic is met between DC and 2 MHz as follows. Manually sweep the Function Generator frequency between DC and 2 MHz. On the Oscilloscope, note the maximum and minimum response points as shown in Figure 5-41. The maximum point (+3 dB) can be as high as 5.6 divisions, and the minimum point (−3 dB) can be as low as 2.8 divisions.

   and minimum point (−3 dB) can be down to 2.8 divisions.

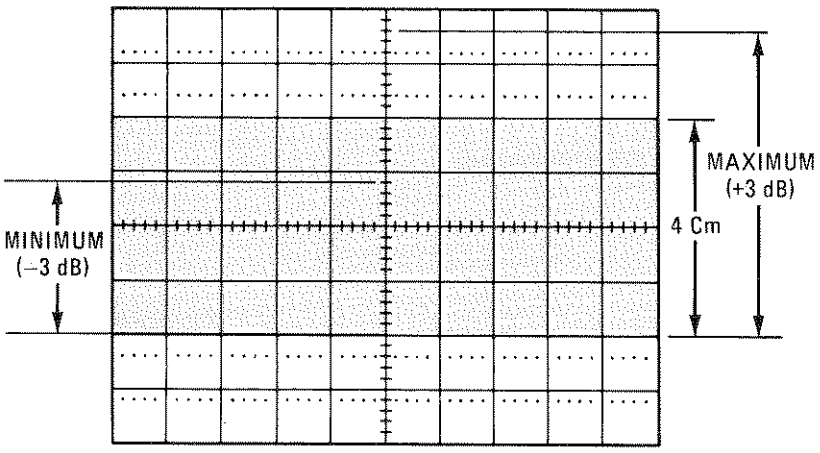


Figure 5-41. FM Flatness Tolerance, DC to 2 MHz

9. If the FM flatness supplemental characteristic in step 8 above is not met, repeat steps 6 and 7 and make compromise adjustments in the DC to 2 MHz range to meet the requirements.

10. Reset configuration switch A3S1 as indicated in Table 5-6.

SECTION VI
REPLACEABLE PARTS

6-1. INTRODUCTION

6-2. This section contains information for ordering parts. Table 6-1 lists the available exchange assemblies. Table 6-2 lists abbreviations used in the parts list and the names and addresses that correspond to the manufacturers' code numbers. Table 6-3 lists all replaceable parts in reference designator order.

6-3. EXCHANGE ASSEMBLIES

6-4. Table 6-1 lists assemblies within the instrument that may be replaced on an exchange basis, thus affording a considerable cost savings. Exchange, factory repaired and tested assemblies are available only on a trade-in basis; therefore the defective assemblies must be returned for credit. For this reason, assemblies required for spare parts stock must be ordered by the new assembly part number.

6-5. ABBREVIATIONS

6-6. Table 6-2 contains three major sections: Reference Designations expands the designators used in the parts list; Abbreviations defines all abbreviations used in the descriptions of replaceable parts; Manufacturers Code List references the name and address of a typical manufacturer with the code number provided in the parts list.

6-7. REPLACEABLE PARTS LIST

6-8. Table 6-3 is the list of replaceable parts and is organized as follows:

a. Electrical assemblies and their components in alpha-numerical order by reference designation.

b. Chassis-mounted parts in alpha-numerical order by reference designation.

c. Miscellaneous parts.

6-9. The information given for each part consists of the following:

a. The Hewlett-Packard part number.

b. Part number check digit (CD).

c. The total quantity (Qty) in the instrument.

d. The description of the part.

e. A typical manufacturer of the part in a five-digit code.

f. The manufacturer's number for the part.

6-10. The total quantity for each part is given only once — at the first appearance of the part number in the list.

NOTE

Total quantities for optional assemblies are totaled by assembly and not integrated into the standard list.

6-11. ILLUSTRATIONS

6-12. Figure 6-1, Mechanical Parts, provides the location of all replaceable mechanical parts listed in Table 6-3. These parts are denoted with reference designation prefix "MP". Figure 6-2, Attaching Hardware, references the Hewlett-Packard part number for the hardware used, with at least one location within the instrument.

6-13. ORDERING INFORMATION

6-14. To order a part listed in the Replaceable Parts List, quote the Hewlett-Packard 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 and timely processing of your order.

6-15. 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 number of parts required. Address the order to the nearest Hewlett-Packard Office.

6-16. SPARE PARTS KIT

6-17. Stocking spare parts for an instrument is often done to ensure quick return to service after a malfunction occurs. Hewlett-Packard has a Spare Parts Kit available for this purpose. The kit consists of selected replaceable assemblies and components for this instrument. A list of the contents of the kit and the Recommended Spares list for this instrument may be obtained on request, and the Spare Parts Kit may be ordered through your nearest Hewlett-Packard Office.

Table 6-1. Exchange Parts

Reference Designation	New Part Number	Rebuilt-Exchange Part Number	Description
A12	5086-7340	5086-6340	Switched YTM
A13	5086-7337	5086-6337	YO 2.3 to 7.0 GHz
A14	5086-7386	5086-6386	Power Amp. 2.3 to 7.0 GHz
A16	5086-7339	5086-6339	Modulator/Splitter
A17	5086-7217	5086-6217	Amplifier 0.01 to 2.4 GHz
A18	5086-7219	5086-6219	Modulator/Mixer
NOTE **For module exchange procedure, see Paragraph 8-30.**			

Table 6-2. Manufacturers Code List, Reference Designations, and Abbreviations 1 of 3)

MANUFACTURERS CODE LIST				
Mfr. No.	**Manufacturer Name**	**Address**		**Zip Code**
00000	ANY SATISFACTORY SUPPLIER			
0003J	NIPPON ELECTRIC CO.			
0004G	UNITRODE COMPUTER PRODUCTS CORP.	METHUEN	MA	
01121	ALLEN-BRADLEY CO.	MILWAUKEE	WI	53204
01295	TEXAS INSTR. INC. SEMICOND. COMPNT. DIV.	DALLAS	TX	75222
02111	SPECTROL ELECTRONICS CORP.	CITY OF IND	CA	91745
03888	KDI PYROFILM CORP.	WHIPPANY	NJ	07981
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX	AZ	85062
06001	GE CO. ELEK CAP & BAT PROD. DEPT.	IRMO	SC	29063
06665	PRECISION MONOLITHICS INC.	SANTA CLARA	CA	95050
07263	FAIRCHILD SEMICONDUCTOR DIV.	MOUNTAIN VIEW	CA	94042
11236	CTS. OF BERNE INC.	BERNE	IN	46711
13606	SPRAGUE ELEC. CO. SEMICONDUCTOR DIV.	CONCORD	NH	03301
17856	SILICONIX INC.	SANTA CLARA	CA	95054
18324	SIGNETICS CORP.	SUNNYVALE	CA	94086
19701	MEPCO/ELECTRA CORP.	MINERAL WELLS	TX	76067
24355	ANALOG DEVICES INC.	NORWOOD	MA	02062
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD	PA	16701
25088	SIEMENS CORP.	ISELIN	NJ	08830
27014	NATIONAL SEMICONDUCTOR CORP.	SANTA CLARA	CA	95051
28480	HEWLETT-PACKARD CO. CORPORATE HQ.	PALO ALTO	CA	94304
30983	MEPCO/ELECTRIC CORP.	SAN DIEGO	CA	92121
32977	BOURNS INC. TRIMPOT PROD. DIV.	RIVERSIDE	CA	92507
34371	HARRIS SEMICON.DIV. HARRIS-INTERTYPE	MELBOURNE	FL	32901
34649	INTEL CORP.	MOUNTAIN VIEW	CA	95051
51642	CENTRE ENGINEERING INC.	STATE COLLEGE	PA	16801
56289	SPRAGUE ELECTRIC CO.	NORTH ADAMS	MA	01247
72136	ELECTRO MOTIVE CORP.SUB IEC	WILLIMANTIC	CT	06226
73138	BECKMAN INSTRUMENTS INC. HELIPOT DIV.	FULLERTON	CA	92634

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

REFERENCE DESIGNATIONS

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

ABBREVIATIONS

A

A ..... Across Flats, Acrylic, Air (Dry Method), Ampere
ADJ ..... Adjust, Adjustment
ALC ..... Alcohol, Automatic Level Control
AMP ..... Amperage
AMPL ..... Amplifier
ANLG ..... Analog
ASSY ..... Assembly
ASTBL ..... Astable
ATTEN ..... Attenuation, Attenuator
AWG ..... American Wire Gage

B

BD ..... Board, Bundle
BE ..... Baume, Beryllium
BFR ..... Before, Buffer
BLK ..... Black, Blank, Block
BNC ..... Type of Connector
BSC ..... Basic
BVR ..... Reverse Breakdown Voltage

C

C ..... Capacitance, Capacitor, Center Tapped, Centistoke, Ceramic, Cermet, Circular Mil Foot, Closed Cup, Cold, Compression
CBL ..... Cable
CER ..... Ceramic
CH ..... Center Hole
CHAM ..... Chamfer
CHAN ..... Channel
COAX ..... Coaxial
COM ..... Commercial, Common
CONN ..... Connect, Connection, Connector
CONT ..... Contact, Continuous, Control, Controller
CONV ..... Converter
CP ..... Cadmium Plate, Candle Power, Centipoise, Conductive Plastic, Cone Point

D

D ..... Deep, Depletion, Depth, Diameter, Direct Current
D/A ..... Digital-to-Analog
DAP ..... Diallyl Phthalate
DB ..... Decibel, Double Break
DC ..... Direct Current, Double Contact
DBL ..... Double
DCDR ..... Decoder
DEG ..... Degree
DIA ..... Diameter
DIFF ..... Differential
DIP ..... Dual In-Line Package
DO ... Package Type Designation
DRVR ..... Driver

E

E ..... Enamel (Insulation, Enhancement, Extension)
E-MODE .... Enhancement Mode
EPROM ..... Eraseable Programmable Read Only Memory
EXCL ..... Excluding, Exclusive
EXT ..... Extended, Extension, External, Extinguish

F

F ..... Fahrenheit, Farad, Female, Film (Resistor), Fixed, Flange, Flint, Fluorine, Frequency
FEM ..... Female
FF ..... Flange, Female Connection; Flip Flop
FM .... Flange, Male Connection; Foam, Frequency Modulation
FT ..... Current Gain Bandwidth Product (Transition Frequency); Feet, Foot
FXD ..... Fixed

G

GEN ..... General, Generator
GL ..... Glass
GP ..... General Purpose, Group

H

H ..... Henry, Hermaphrodite, High, Hole Diameter, Hot, Hub Inside Diameter, Hydrogen
HD ..... Hand, Hard, Head, Heavy Duty
HEX ..... Hexadecimal, Hexagon, Hexagonal

I

IC ..... Collector Current, Integrated Circuit
ID ..... Identification, Inside Diameter

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

IF ..... Forward Current, Intermediate Frequency
IMPD ..... Impedance
IN ..... Inch, Indium
INP ..... Input
INT ..... Integral, Intensity, Internal
INTL ..... Internal, International
INV ..... Invert, Inverter

J

JFET ..... Effect Transistor

K

Kilo, Potassium
KB ..... Knob

L

LED ..... Light Emitting Diode
LG ..... Length, Long
LIN ..... Linear, Linear Taper, Linearity
LK ..... Link, Lock
LKG ..... Leakage, Locking
LKWR ..... Lockwasher
LS ..... Loudspeaker, Low Power Schottky, Series Inductance
LUM ..... Luminous

M

M ..... Male, Maximum, Mega, Mil, Milli, Mode, Momentary, Mounting Hole Centers, Mounting Hole Diameter
MA ..... Milliampere
MACH ..... Machined
MAX ..... Maximum
MCD ..... Millicandela
MICPROC ..... Microprocessor
MISC ..... Miscellaneous
MLD ..... Mold, Molded
MM ..... Magnetized Material (Restricted Articles Code); Millimeter
MOD ..... Model, Modified, Modular, Modulated, Modulator
MOSFET ..... Metal Oxide Semiconductor Field Effect Transistor
MTG ..... Mounting
MTR ..... Meter
MULTIPLXR ..... Multiplexer
MUW ..... Music Wire
MW ..... Milliwatt

N

N-CHAN ..... N-Channel
N-CHAN ..... N-Channel Metal Oxide Semiconductor
NO ..... Normally Open, Number
NPN ..... Negative Positive Negative (Transistor)
NS ..... Nanosecond, Non-Shorting, Nose

O

OCTL ..... Octal
OD ..... Olive Drab, Outside Diameter
OP ..... Operational
OPT ..... Optical, Option, Optional
OXD ..... Oxide

P

PC ..... Picocoulomb, Piece, Printed Circuit
PCB ..... Printed Circuit Board
PD ..... Pad, Palladium, Pitch Diameter, Power Dissipation
PKG ..... Package
PL ..... Phase Lock, Plain, Plate, Plug
PLSTC ..... Plastic
PNP ..... Positive Negative Positive (Transistor)
POLYE ..... Polyester
POS ..... Position, Positive
POZI ..... Pozidriv Recess
PRCN ..... Precision
PRP ..... Purple, Purpose
PT ..... Part, Pint, Platinum, Point, Pulse Time
PVC ..... Polyvinyl Chloride
PW ..... Power Wirewound, Pulse Width

Q

QUAD ..... Set of Four

R

RES ..... Research, Resistance, Resistor, Resolution
RET ..... Retaining
RF ..... Radio Frequency
RGLTR ..... Regulator
RKR ..... Rocker
RND ..... Round
RPG ..... Rotary Pulse Generator
RR ..... Rear
RVT ..... Rivet, Riveted

S

SCR ..... Screw, Scrub, Silicon Controlled Rectifier
SGL ..... Single
SHFT ..... Shaft
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)
SQ ..... Square
STL ..... Steel
SZ ..... Size

T

TA ..... Ambient Temperature, Tantalum
TC ..... Thermoplastic
THD ..... Thread, Threaded
THK ..... Thick
TO ..... Package Type Designation, Troy Ounce
TPL ..... Triple
TRIG ..... Trigger, Triggerable, Triggering, Trigonometry
TRMR ..... Trimmer
TRN ..... Turn, Turns
TTL ..... Tan Translucent, Transistor Transistor Logic

U

UNCT ..... Undercut
UF ..... Microfarad

V

V ..... Vanadium, Variable, Violet, Volt, Voltage
VA ..... Volt Ampere
VDC ..... Volts, Direct Current
VID ..... Video

W

W ..... Watt, Wattage, White, Wide, Width, Wire
WB ..... Wide Band
WD ..... Width, Wood

X

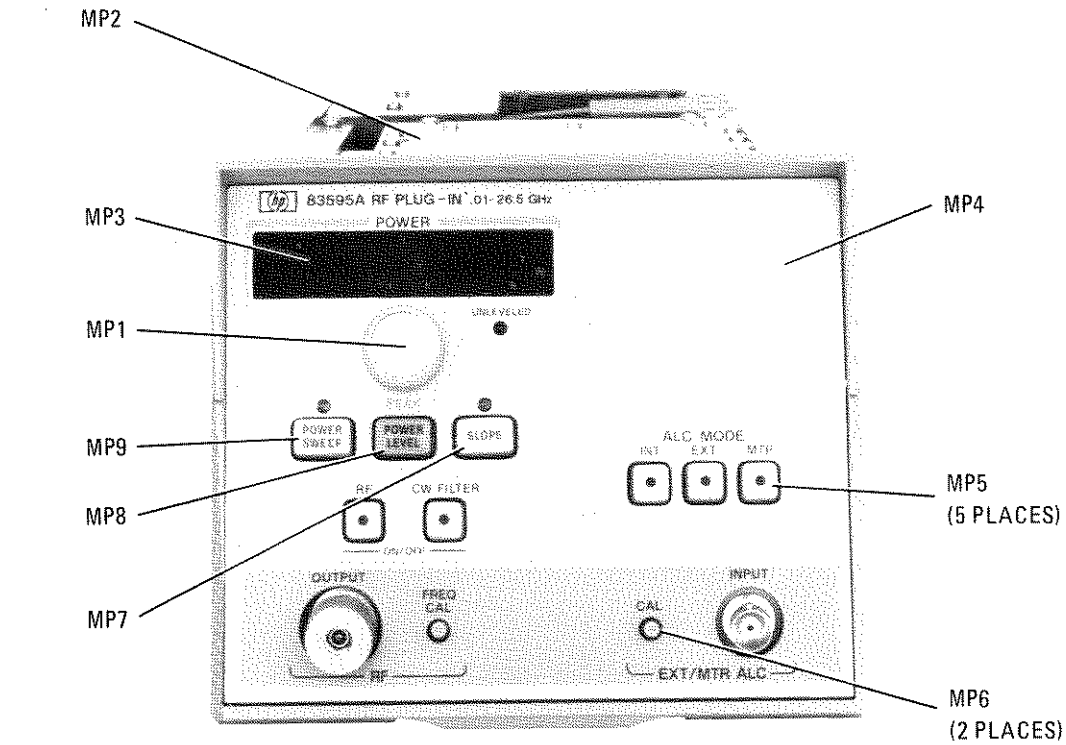
XSTR ..... Transistor

Y

YTM ..... YIG Tuned Multiplier

Z

ZNR ..... Zener



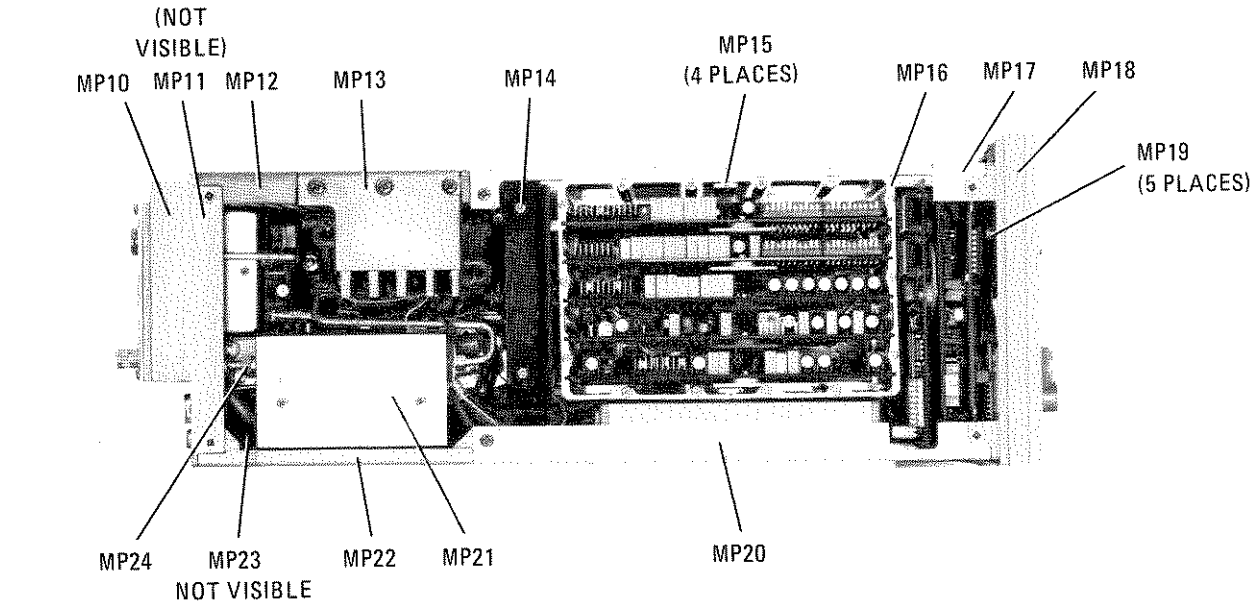


Figure 6-1. Mechanical Parts (1 of 3)

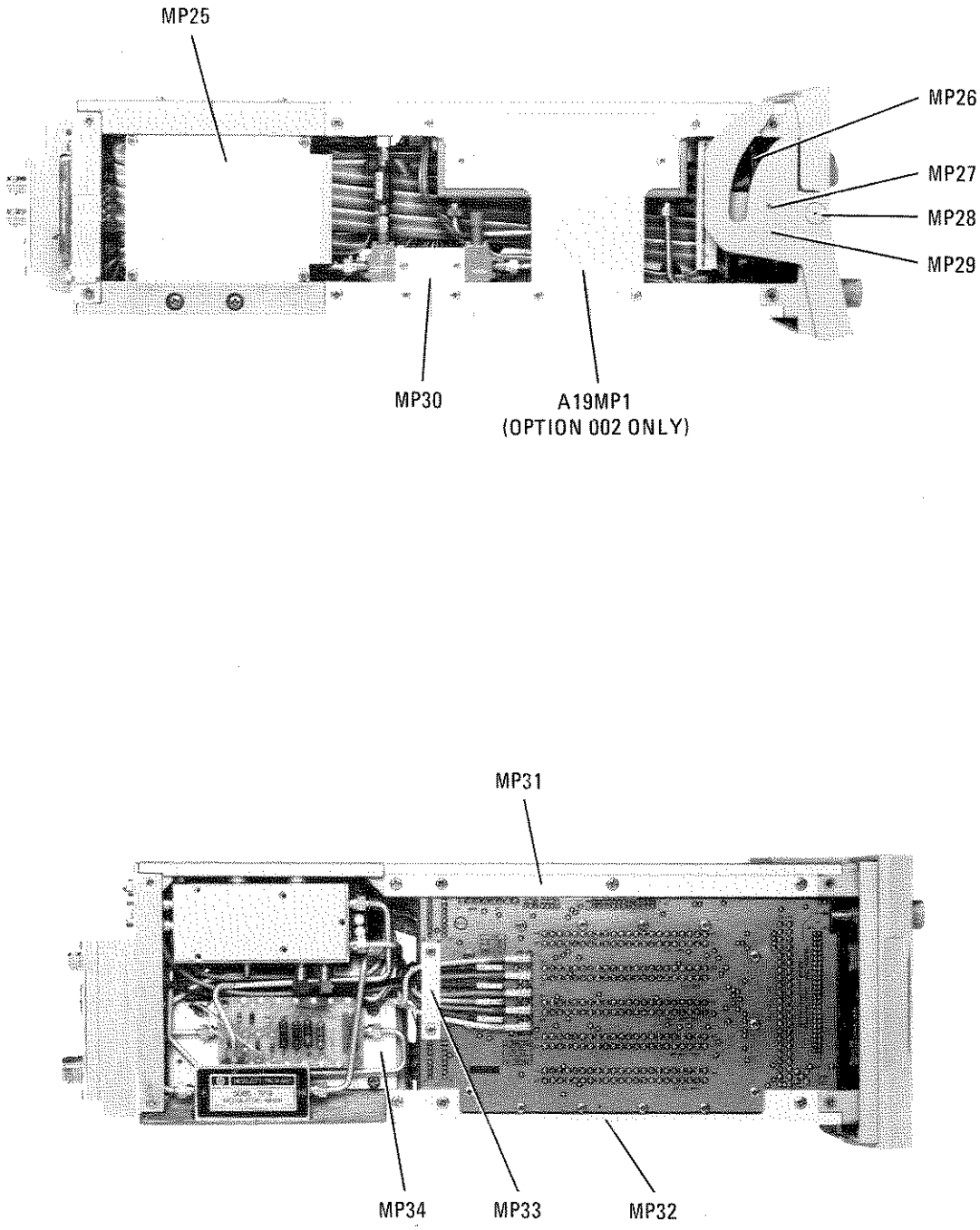


Figure 6-1. Mechanical Parts (2 of 3)

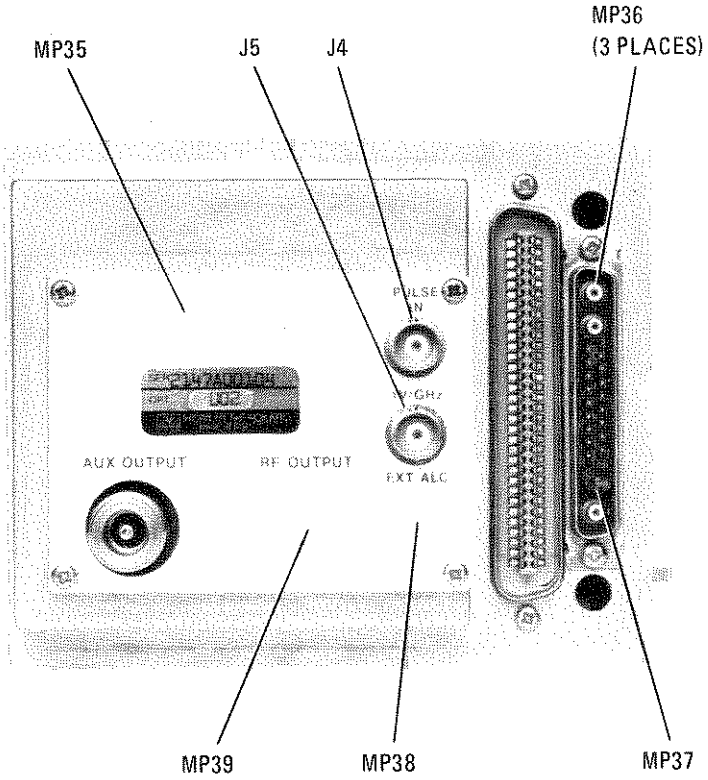


Figure 6-1. Mechanical Parts (3 of 3)

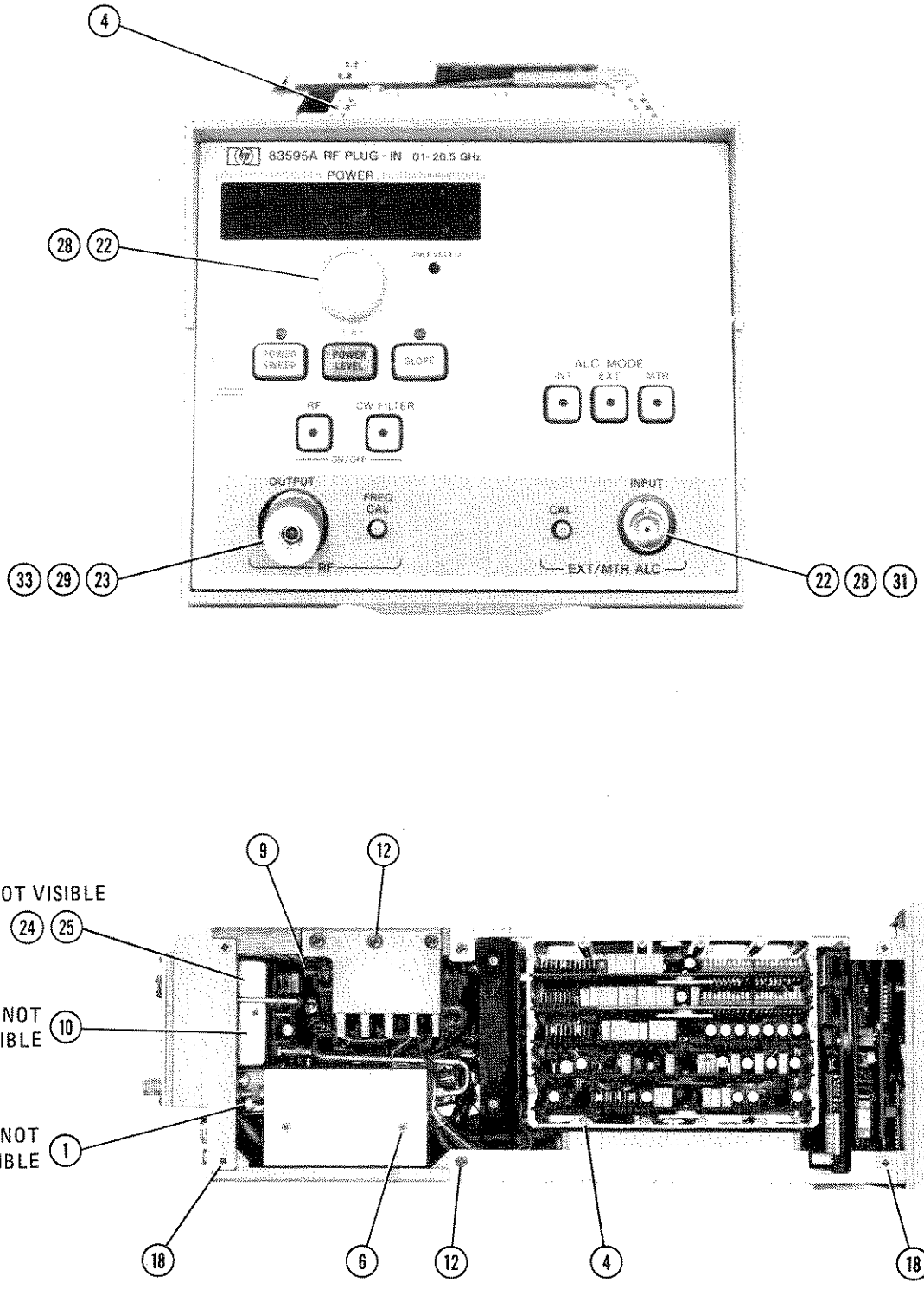


Figure 6-2. Attaching Hardware (1 of 3)

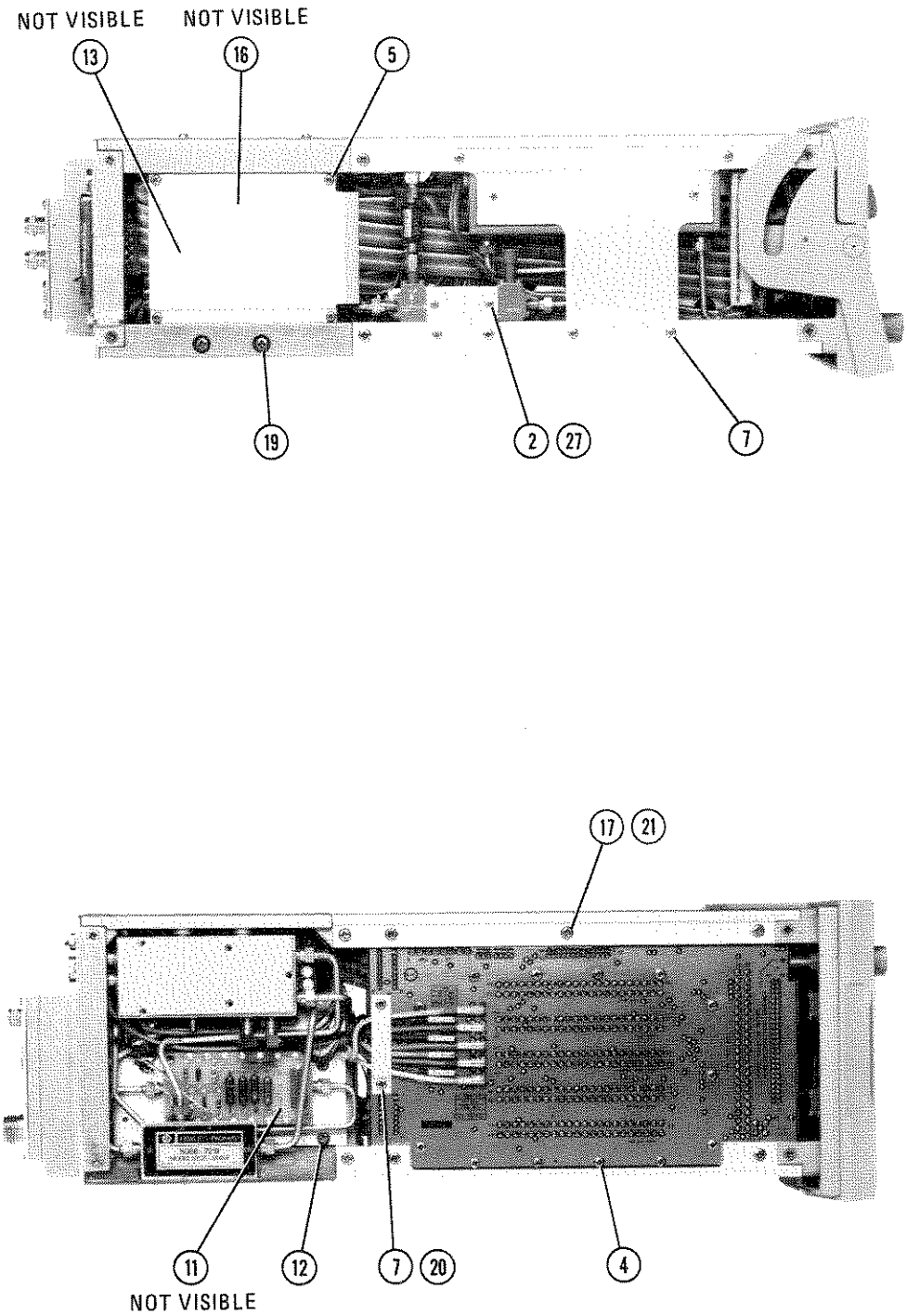


Figure 6-2. Attaching Hardware (2 of 3)

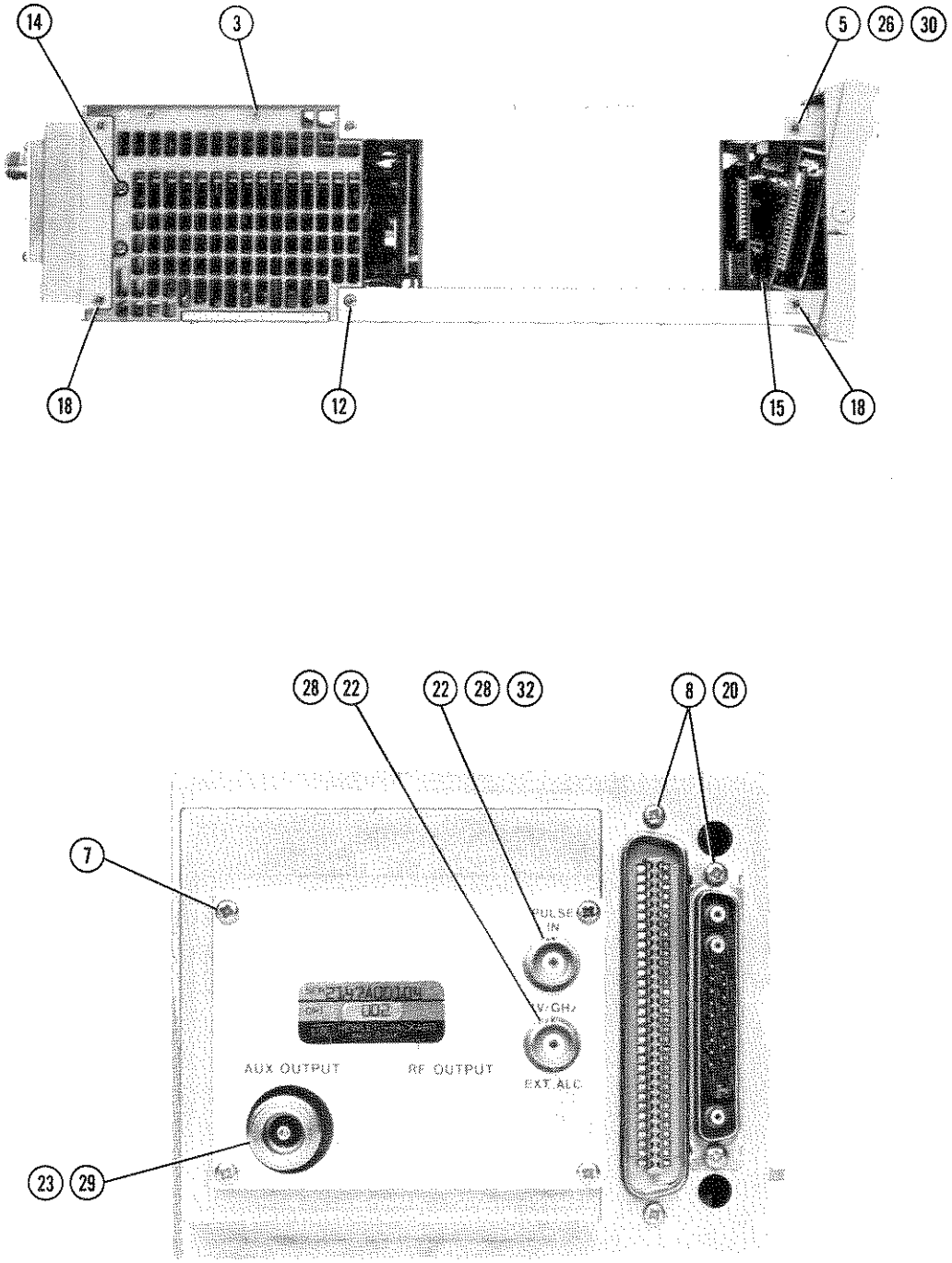


Figure 6-2. Attaching Hardware (3 of 3)

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	**83592-60008**	**9**	**1**	**BOARD ASSEMBLY-FRONT PANEL (DOES NOT INCLUDE A1RPG1 ROTARY PULSE GENERATOR)**	**28480**	**83592-60008**
A1C1	0160-4084	8	30	CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A1C2	0180-2811	7	1	CAPACITOR-FXD 10UF±20% 35VDC TA	28480	0180-2811
A1C3	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A1C4	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A1C5	0180-0552	9	1	CAPACITOR-FXD 220UF±20% 10VDC TA	28480	0180-0552
A1DS1				NOT ASSIGNED		
A1DS2	1990-0487	7	7	LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	5082-4584
A1DS3	1990-0487	7		LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	5082-4584
A1DS4	1990-0487	7		LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	5082-4584
A1DS5	1990-0487	7		LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	5082-4584
A1DS6	1990-0486	6	1	LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	5082-4684
A1DS7-A1DS13				NOT ASSIGNED		
A1DS14	1990-0487	7		LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	5082-4584
A1DS15	1990-0487	7		LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	5082-4584
A1DS16	1990-0487	7		LED-LAMP LUM-INT=1MCD IF=20MA-MAX BVR=5V	28480	5082-4584
A1DS17	1990-0699	3	3	LED-LIGHT BAR MODULE LUM-INT=7MCD	28480	1LM1-2350
A1DS18	1990-0699	3		LED-LIGHT BAR MODULE LUM-INT=7MCD	28480	1LM1-2350
A1DS19	1990-0699	3		LED-LIGHT BAR MODULE LUM-INT=7MCD	28480	1LM1-2350
A1J1	1251-4827	1	3	CONNECTOR 50-PIN M POST TYPE	28480	1251-4827
A1MP1	2190-0067	4	1	WASHER-LK INTL T 1/4 IN .256-IN-ID	28480	2190-0067
A1MP2	2950-0006	3	1	NUT-HEX-DBL-CHAM 1/4-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
A1MP3	0380-1233	9	3	SPACER-SPECIALTY .450-IN-LG; .175-IN-OD	00000	ORDER BY DESCRIPTION
A1MP4	0380-1233	9		SPACER-SPECIALTY .450-IN-LG; .175-IN-OD	00000	ORDER BY DESCRIPTION
A1MP5	0380-1233	9		SPACER-SPECIALTY .450-IN-LG; .175-IN-OD	00000	ORDER BY DESCRIPTION
A1MP6	7121-1153	1		LABEL-INFORMATION .14-IN-WD .4-IN-LG	28480	7121-1153
A1R1				NOT ASSIGNED		
A1R2	0698-3444	1	1	RESISTOR 316 1% .125W F TC=0±100	24546	C4-1/8-T0-316R-F
A1R3	2100-3766	7	2	RESISTOR-VAR CONTROL CP 10K 10% LIN	28480	2100-3766
A1R4	2100-3766	7		RESISTOR-VAR CONTROL CP 10K 10% LIN	28480	2100-3766
A1R5				NOT ASSIGNED		
A1R6	0698-8820	7	1	RESISTOR 4.64 1% .125W F TC=0±100	28480	0698-8820
A1R7	0757-0398	4	4	RESISTOR 75 1% .125W F TC=0±100	24546	C4-1/8-T0-75R0-F
A1R8	0757-0398	4		RESISTOR 75 1% .125W F TC=0±100	24546	C4-1/8-T0-75R0-F
A1R9	0757-0398	4		RESISTOR 75 1% .125W F TC=0±100	24546	C4-1/8-T0-75R0-F
A1RPG1	5060-9444	7	1	ROTARY PULSE GENERATOR	28480	5060-9444
A1S1	5060-9436	7	8	PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S2	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S3	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S4	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S5	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S6-A1S11				NOT ASSIGNED		
A1S12	5060-9436	7	3	PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S13	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1S14	5060-9436	7		PUSHBUTTON SWITCH P.C. MOUNT	28480	5060-9436
A1U1	1810-0124	9	1	NETWORK-RES 16-DIP 200.0 OHM X 8	28480	1810-0124
A1U2	1990-0738	1	1	DISPLAY-NUM-SEG 5-CHAR .152-H RED	28480	1990-0738
A1U3	1810-0403	7	1	NETWORK-RESISTOR R1-R15: 330 OHM±2%	01121	316A331
A1XDS17	1200-0901	7	3	SOCKET-STRP 8-CONT SIP DIP-SLDR	28480	1200-0901
A1XDS18	1200-0901	7		SOCKET-STRP 8-CONT SIP DIP-SLDR	28480	1200-0901
A1XDS19	1200-0901	7		SOCKET-STRP 8-CONT SIP DIP-SLDR	28480	1200-0901
A1XU2	1251-5928	5	1	CONNECTOR 15-PIN M POST TYPE	28480	1251-5928
A2	**83595-60057**	**1**		**BOARD ASSEMPLY-SUB PANEL**	**28480**	**83595-60057**
A2C1	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A2C2	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A2C3	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A2C4				NOT ASSIGNED		
A2C5	0160-0174	9	4	CAPACITOR-FXD .47UF +80-20% 25VDC CER	28480	0160-0174
A2C6	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A2C7	0160-3879	7	26	CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A2C8	0160-3875	3		CAPACITOR-FXD 22PF 5% 200VDC CER 0±30	28480	0160-3875
A2CR1	1901-0033	2	20	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	1251-4827	1		CONNECTOR 50-PIN M POST TYPE	28480	1251-4827
A2J2				NOT ASSIGNED		

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
A2J3	1200-0508	0	1	SOCKET-IC 14-CONT DIP-SLDR	28480	1200-0508
A2K1	0490-0916	6	3	RELAY-REED 1A 500MA 100VDC 5VDC-COIL	28480	0490-0916
A2L1	9100-1618	1	1	INDUCTOR RF-CH-MLD 5.6UH 10%	28480	9100-1618
A2MP1	0380-0773	0	4	SPACER-RVT-ON .5-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A2MP2	0380-0773	0		SPACER-RVT-ON .5-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A2MP3	0380-0773	0		SPACER-RVT-ON .5-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A2MP4	0380-0773	0		SPACER-RVT-ON .5-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
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	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE	17856	VN10KM
A2R1	2100-3056	8	1	RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN	02111	43P502
A2R2	0757-0199	3	1	RESISTOR 21.5K 1% .125W F TC=0±100	24546	C4-1/8-T0-2152-F
A2R3	0698-3268	7	1	RESISTOR 11.5K 1% .125W F TC=0±100	24546	C4-1/8-T0-1152-F
A2R4	2100-3109	2	1	RESISTOR-TRMR 2K 10% C SIDE-ADJ 17-TRN	32997	300P-1-202
A2R5	0757-0465	6	8	RESISTOR 100K 1% .125W F TC=0±100	24546	C4-1/8-T0-1003-F
A2R6	2100-3054	6	2	RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	02111	43P503
A2R7	0757-0440	7	3	RESISTOR 7.5K 1% .125W F TC=0±100	24546	C4-1/8-T0-7501-F
A2R8	0698-3451	0	1	RESISTOR 133K 1% .125W F TC=0±100	24546	C4-1/8-T0-1333-F
A2R9	0757-0280	3	17	RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A2R10	0757-0442	9	39	RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A2R11	0757-0123	3	2	RESISTOR 34.8K 1% .125W F TC=0±100	28480	0757-0123
A2R12	0698-3153	9	3	RESISTOR 3.83K 1% .125W F TC=0±100	24546	C4-1/8-T0-3831-F
A2R13	0698-3431	6	1	RESISTOR 23.7 1% .125W F TC=0±100	03888	PME55-1/8-T0-23R7-F
A2R14	0757-0438	3	6	RESISTOR 5.11K 1% .125W F TC=0±100	24546	C4-1/8-T0-5111-F
A2R15	0698-3156	2	4	RESISTOR 14.7K 1% .125W F TC=0±100	24546	C4-1/8-T0-1472-F
A2R16				NOT ASSIGNED		
A2R17	0757-0465	6		RESISTOR 100K 1% .125W F TC=0±100	24546	C4-1/8-T0-1003-F
A2R18	0757-0289	2	3	RESISTOR 13.3K 1% .125W F TC=0±100	19701	MF4C1/8-T0-1332-F
A2R19				NOT ASSIGNED		
A2R20	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A2R21	0757-0465	6		RESISTOR 100K 1% .125W F TC=0±100	24546	C4-1/8-T0-1003-F
A2R22	0757-0465	6		RESISTOR 100K 1% .125W F TC=0±100	24546	C4-1/8-T0-1003-F
A2R23	2100-3054	6		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	02111	43P503
A2R24	0698-7260	7	9	RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-G
A2R25	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-G
A2R26	0698-7229	5		RESISTOR 511 1% .05W F TC=0±100	24546	C3-1/8-T0-511R-G
A2TP1	0360-0535	0	19	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	3	IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A2U2	1858-0047	5	3	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	5	IC SCHMITT-TRIG TTL LS INV HEX 1-INP	01295	SN74LS14N
A2U5	1820-1730	6	4	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		IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS273N
A2U9	1826-0417	6	5	IC SWITCH ANLG QUAD 16-DIP-C PKG	27014	LF13333D
A2U10	1858-0069	1		TRANSISTOR ARRAY 16-PIN PLSTC DIP	13606	ULN-2803A
A2U11	1810-0368	3	1	NETWORK-RES 6-SIP 10.0K OHM X 5	01121	206A103
A2U12	1826-0205	0	1	IC TIMER TTL	18324	NE556A
A2W1				NOT ASSIGNED		
A2W2				NOT ASSIGNED		
A2W3	8159-0005	0	1	WIRE 22AWG W PVC 1X22 80C	28480	8159-0005
A3	**83595-60007**	**1**		**BOARD ASSEMBLY-DIGITAL INT**	**28480**	**83595-60007**
A3C1	0160-0127	2	8	CAPACITOR-FXD 1UF ±20% 25VDC CER	28480	0160-0127
A3C2	0160-0127	2		CAPACITOR-FXD 1UF ±20% 25VDC CER	28480	0160-0127
A3C3	0160-0127	2		CAPACITOR-FXD 1UF ±20% 25VDC CER	28480	0160-0127
A3C4	0160-0127	2		CAPACITOR-FXD 1UF ±20% 25VDC 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	1251-4827	1		CONNECTOR 50-PIN M POST TYPE	28480	1251-4827
A3MP1	5040-6852	3	1	EXTRACTOR, ORANGE	28480	5040-6852
A3MP2	5000-9043	6	1	EXTRACTOR-PIN .031 BOARD	28480	5000-9043
A3R1	0757-0428	1	1	RESISTOR 1.62K 1% .125W F TC=0±100	24546	C4-1/8-T0-1621-F
A3R2	0698-3153	9		RESISTOR 3.83K 1% .125W F TC=0±100	24546	C4-1/8-T0-3831-F
A3R3	0698-3153	9		RESISTOR 3.83K 1% .125W F TC=0±100	24546	C4-1/8-T0-3831-F
A3R4	0698-7212	9	4	RESISTOR 100 1% .05W F TC=0±100	24546	C3-1/8-T0-100R-G
A3S1	3101-2243	6	1	SWITCH-RKR DIP-RKR-ASSY 8-1A .05A 30VDC	28480	3101-2243
A3U1	83595-80001	7	1	IC-NMOS 32K EPROM PROGRAMMED	28480	83595-80001
A3U2	83595-80002	8	1	IC-NMOS 32K EPROM PROGRAMMED	28480	83595-80002

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
A3U3	1826-0180	0	3	IC TIMER TTL MONO/ASTBL	01295	NE555P
A3U4	1820-2081	2	1	IC NMOS	04713	MC68A21P
A3U5	1820-2005	0	1	IC TIMER NMOS	34649	D8253
A3U6	1820-1202	7	2	IC GATE TTL LS NAND TPL 3-INP	01295	SN74LS10N
A3U7	1820-1197	9	3	IC GATE TTL LS NAND QUAD 2-INP	01295	SN74LS00N
A3U8	1820-1416	5		IC SCHMITT-TRIG TTL LS INV HEX 1-INP	01295	SN74LS14N
A3U9	1820-1216	3	7	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 MISC TTL LS	01295	SN74LS245N
A3U18	1820-2075	4		IC MISC TTL LS	01295	SN74LS245N
A3U19	1810-0338	7		NETWORK-RES 16-DIP100.0 OHM X 8	11236	761-3-R100
A3XU1	1200-0565	9	2	SOCKET-IC 24-CONT DIP-SLDR	28480	1200-0565
A3XU2	1200-0565	9		SOCKET-IC 24-CONT DIP-SLDR	28480	1200-0565
A4	**83592-60061**	4		**BOARD ASSEMBLY-ALC**	**28480**	**83592-60061**
A4C1	0160-0127	2		CAPACITOR-FXD 1UF ±20% 25VDC CER	28480	0160-0127
A4C2	0180-0374	3	4	CAPACITOR-FXD 10UF±10% 20VDC TA	56289	150D106X9020B2
A4C3	0180-0374	3		CAPACITOR-FXD 10UF±10% 20VDC TA	56289	150D106X9020B2
A4C4	0180-0374	3		CAPACITOR-FXD 10UF±10% 20VDC TA	56289	150D106X9020B2
A4C5	0180-0374	3		CAPACITOR-FXD 10UF±10% 20VDC TA	56289	150D106X9020B2
A4C6	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A4C7	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A4C8	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A4C9	0160-3821	9	1	CAPACITOR-FXD .33UF ±20% 50VDC CER	28480	0160-3821
A4C10	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A4C11	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A4C12	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A4C13	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A4C14	0160-3874	2	4	CAPACITOR-FXD 10PF ±.5PF 200VDC CER	28480	0160-3874
A4C15	0160-0127	2		CAPACITOR-FXD 1UF ±20% 25VDC CER	28480	0160-0127
A4C16	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A4C17	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A4C18	0160-0572	1	3	CAPACITOR-FXD 2200PF ±20% 100VDC CER	28480	0160-0572
A4C19	0160-0572	1		CAPACITOR-FXD 2200PF ±20% 100VDC CER	28480	0160-0572
A4C20	0160-0574	3	4	CAPACITOR-FXD .022UF ±20% 100VDC CER	28480	0160-0574
A4C21	0160-0128	3	1	CAPACITOR-FXD 2.2UF ±20% 50VDC CER	28480	0160-0128
A4C22	0160-0945	2	2	CAPACITOR-FXD 910PF ±5% 100VDC MICA	28480	0160-0945
A4C23	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A4C24	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A4C25				NOT ASSIGNED		
A4C26				NOT ASSIGNED		
A4C27	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A4C28				NOT ASSIGNED		
A4C29	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A4C30-- A4C34				NOT ASSIGNED		
A4C35	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A4C36	0160-3878	6	13	CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A4C37	0160-3878	6		CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A4CR1				NOT ASSIGNED		
A4CR2	1901-1098	1	12	DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A4CR3	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A4CR4	1901-0535	9	13	DIODE-SM SIG SCHOTTKY	28480	1901-0535
A4CR5	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A4CR6	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A4CR7	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A4CR8				NOT ASSIGNED		
A4CR9	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A4CR10				NOT ASSIGNED		
A4CR11				NOT ASSIGNED		
A4CR12	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A4CR13	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A4CR14	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A4CR15	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A4CR16	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A4J1	1251-4672	4	11	CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A4L1	9140-0210	1	3	INDUCTOR RF-CH-MLD 100UH 5% .166DX.385LG	28480	9140-0210
A4L2	9140-0210	1		INDUCTOR RF-CH-MLD 100UH 5% .166DX.385LG	28480	9140-0210
A4L3	9140-0210	1		INDUCTOR RF-CH-MLD 100UH 5% .166DX.385LG	28480	9140-0210
A4MP1	5040-6848	7	1	EXTRACTOR YELLOW	28480	5040-6848

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
A4MP2	5000-9043	6	5	PIN:P.C. BOARD EXTRACTOR	28480	5000-9043
A4MP3	1251-4932	7	4	CONN SGL CONT SKT .021-IN-BSC-SZ	91506	LSG-1AG14-1
A4MP4	1251-4932	7		CONN SGL CONT SKT .021-IN-BSC-SZ	91506	LSG-1AG14-1
A4MP5	1251-4932	7		CONN SGL CONT SKT .021-IN-BSC-SZ	91506	LSG-1AG14-1
A4MP6	1251-4932	7		CONN SGL CONT SKT .021-IN-BSC-SZ	91506	LSG-1AG14-1
A4Q1	1855-0420	2	1	TRANSISTOR J-FET 2N4391 N-CHAN D-MODE	01295	2N4391
A4Q2	1854-0295	7	2	TRANSISTOR-DUAL NPN PD=400MW	28480	1854-0295
A4Q3	1855-0414	4	1	TRANSISTOR J-FET 2N4393 N-CHAN D-MODE	04713	2N4393
A4Q4				NOT ASSIGNED		
A4Q5				NOT ASSIGNED		
A4Q6	1854-0295	7		TRANSISTOR-DUAL NPN PD=400MW	28480	1854-0295
A4Q7	1855-0423	5	8	TRANSISTOR MOSFET N-CHAN E-MODE	17856	VN10KM
A4Q8	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE	17856	VN10KM
A4Q9	1853-0451	5	2	TRANSISTOR PNP 2N3799 SI TO-18 PD=360MW	01295	2N3799
A4Q10	1853-0451	5		TRANSISTOR PNP 2N3799 SI TO-18 PD=360MW	01295	2N3799
A4Q11				NOT ASSIGNED		
A4Q12				NOT ASSIGNED		
A4Q13	1854-0404	0	1	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0404
A4Q14	1853-0007	7	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	04713	2N3251
A4Q15	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE	17856	VN10KM
A4Q16	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE	17856	VN10KM
A4Q17	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE	17856	VN10KM
A4R1	2100-2633	5	3	RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN	30983	ET50X102
A4R2	2100-2516	3	3	RESISTOR-TRMR 100K 10% C SIDE-ADJ 1-TRN	32997	3329W-1-104
A4R3	2100-2515	2	1	RESISTOR-TRMR 200K 10% C SIDE-ADJ 1-TRN	30983	ET50W204
A4R4	2100-2489	9	1	RESISTOR-TRMR 5K 10% C SIDE-ADJ 1-TRN	32997	3329W-1-502
A4R5	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A4R6	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A4R7	2100-0670	6	5	RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-103
A4R8	2100-0670	6		RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-103
A4R9	2100-3749	6	4	RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN	28480	2100-3749
A4R10	0757-0416	7	5	RESISTOR 511 1% .125W F TC=0±100	24546	C4-1/8-T0-511R-F
A4R11	2100-2633	5		RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN	30983	ET50X102
A4R12	0698-7257	2	2	RESISTOR 7.5K 1% .05W F TC=0±100	24546	C3-1/8-T0-7501-G
A4R13	0698-7258	3	1	RESISTOR 8.25K 1% .05W F TC=0±100	24546	C3-1/8-T0-8251-G
A4R14				NOT ASSIGNED		
A4R15				NOT ASSIGNED		
A4R16				NOT ASSIGNED		
A4R17	0698-7253	8	2	RESISTOR 5.11K 1% .05W F TC=0±100	24546	C3-1/8-T0-5111-G
A4R18	0698-7268	5	1	RESISTOR 21.5K 1% .05W F TC=0±100	24546	C3-1/8-T0-2152-G
A4R19	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-G
A4R20	0698-7263	0	1	RESISTOR 13.3K 1% .05W F TC=0±100	24546	C3-1/8-T0-1332-G
A4R21	0698-7274	3	1	RESISTOR 38.3K 1% .05W F TC=0±100	24546	C3-1/8-T0-3832-G
A4R22	0698-7261	8	2	RESISTOR 11K 1% .05W F TC=0±100	24546	C3-1/8-T0-1102-G
A4R23	0757-0464	5	1	RESISTOR 90.9K 1% .125W F TC=0±100	24546	C4-1/8-T0-9092-F
A4R24	0698-7269	6	2	RESISTOR 23.7K 1% .05W F TC=0±100	24546	C3-1/8-T0-2372-G
A4R25				NOT ASSIGNED		
A4R26				NOT ASSIGNED		
A4R27	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-G
A4R28	0698-7227	6	1	RESISTOR 422 1% .05W F TC=0±100	24546	C3-1/8-T0-422R-G
A4R29	0698-6846	3	1	RESISTOR 5.42K .5% .125W F TC=0±50	24546	NC55-1/8-T2-5421-D
A4R30	0698-7252	7	1	RESISTOR 4.64K 1% .05W F TC=0±100	24546	C3-1/8-T0-4641-G
A4R31	0837-0119	7	1	THERMISTOR ROD 5K-OHM TC=+.7%/C-DEG	28480	0837-0119
A4R32	0698-7259	4	3	RESISTOR 9.09K 1% .05W F TC=0±100	24546	C3-1/8-T0-9091-G
A4R33	0698-7272	1		RESISTOR 31.6K 1% .05W F TC=0±100	24546	C3-1/8-T0-3162-G
A4R34	0698-7233	4	2	RESISTOR 750 1% .05W F TC=0±100	24546	C3-1/8-T0-750R-G
A4R35	0698-7243	6	4	RESISTOR 1.96K 1% .05W F TC=0±100	24546	C3-1/8-T0-1961-G
A4R36	0698-7212	9		RESISTOR 100 1% .05W F TC=0±100	24546	C3-1/8-T0-100R-G
A4R37	0698-7243	6		RESISTOR 1.96K 1% .05W F TC=0±100	24546	C3-1/8-T0-1961-G
A4R38	0698-7212	9		RESISTOR 100 1% .05W F TC=0±100	24546	C3-1/8-T0-100R-G
A4R39	0698-7243	6		RESISTOR 1.96K 1% .05W F TC=0±100	24546	C3-1/8-T0-1961-G
A4R40	0698-7243	6		RESISTOR 1.96K 1% .05W F TC=0±100	24546	C3-1/8-T0-1961-G
A4R41	0698-7283	4	1	RESISTOR 90.9K 1% .05W F TC=0±100	24546	C3-1/8-T0-9092-G
A4R42	0698-7267	4	1	RESISTOR 19.6K 1% .05W F TC=0±100	24546	C3-1/8-T0-1962-G
A4R43	0698-7272	1	1	RESISTOR 31.6K 1% .05W F TC=0±100	24546	C3-1/8-T0-3162-G
A4R44	0698-7275	4	1	RESISTOR 42.2K 1% .05W F TC=0±100	24546	C3-1/8-T0-4222-G
A4R45				NOT ASSIGNED		
A4R46	0698-7197	9	1	RESISTOR 23.7 1% .05W F TC=0±100	24546	C3-1/8-T00-23R7-G
A4R47	2100-2030	6	3	RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	73138	82PR20K
A4R48	0757-0421	4	3	RESISTOR 825 1% .125W F TC=0±100	24546	C4-1/8-T0-825R-F
A4R49*	0698-8615	8	2	RESISTOR 75K 1% .05W F TC=0±100	28480	0698-8615
A4R50	0698-7277	6		RESISTOR 51.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-5112-G
A4R51	0698-7282	3	1	RESISTOR 82.5K 1% .05W F TC=0±100	24546	C3-1/8-T0-8252-G
A4R52	0698-7249	2	1	RESISTOR 3.48K 1% .05W F TC=0±100	24546	C3-1/8-T0-3481-G
A4R53	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-G
A4R54	0698-7259	4		RESISTOR 9.09K 1% .05W F TC=0±100	24546	C3-1/8-T0-9091-G
A4R55	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-G
A4R56	2100-2030	6		RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	73138	82PR20K

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
A4R57	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A4R58	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A4R59	2100-1986	9	1	RESISTOR-TRMR 1K 10% C TOP-ADJ 1-TRN	73138	82PR1K
A4R60				NOT ASSIGNED		
A4R61	0698-7259	4		RESISTOR 9.09K 1% .05W F TC=0±100	24546	C3-1/8-T0-9091-G
A4R62	0698-7270	9	1	RESISTOR 26.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-2612-G
A4R63	0757-0447	4	3	RESISTOR 16.2K 1% .125W F TC=0±100	24546	C4-1/8-T0-1622-F
A4R64	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A4R65	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-G
A4R66	0757-0416	7		RESISTOR 511 1% .125W F TC=0±100	24546	C4-1/8-T0-511R-F
A4R67	2100-2030	6		RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	73138	82PR20K
A4R68	0698-7236	7	1	RESISTOR 1K 1% .05W F TC=0±100	24546	C3-1/8-T0-1001-G
A4R69	0698-3440	7	5	RESISTOR 196 1% .125W F TC=0±100	24546	C4-1/8-T0-196R-F
A4R70				NOT ASSIGNED		
A4R71	0698-0085	0	2	RESISTOR 2.61K 1% .125W F TC=0±100	24546	C4-1/8-T0-2611-F
A4R72	0757-0278	8	8	RESISTOR 1.78K 1% .125W F TC=0±100	24546	C4-1/8-T0-1781-F
A4R73	0698-7277	6	1	RESISTOR 51.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-5112-G
A4R74	0698-7251	6	1	RESISTOR 4.22K 1% .05W F TC=0±100	24546	C3-1/8-T0-4221-G
A4R75	0698-7247	0	1	RESISTOR 2.87K 1% .05W F TC=0±100	24546	C3-1/8-T0-2871-G
A4R76	0757-0399	5		RESISTOR 82.5 1% .125W F TC=0±100	24546	C4-1/8-T0-825R-F
A4R77	0757-0274	5	3	RESISTOR 1.21K 1% .125W F TC=0±100	24546	C4-1/8-T0-1211-F
A4R78	0698-7234	5	1	RESISTOR 825 1% .05W F TC=0±100	24546	C3-1/8-T0-825R-G
A4R79	0757-0394	0	4	RESISTOR 51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
A4R80	0698-3440	7		RESISTOR 196 1% .125W F TC=0±100	24546	C4-1/8-T0-196R-F
A4R81– A4R85				NOT ASSIGNED		
A4R86	0698-3440	7		RESISTOR 196 1% .125W F TC=0±100	24546	C4-1/8-T0-196R-F
A4R87	0698-7256	1	1	RESISTOR 6.81K 1% .05W F TC=0±100	24546	C3-1/8-T0-6811-G
A4R88	0698-7262	9	1	RESISTOR 12.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-1212-G
A4R89	0698-7244	7	2	RESISTOR 2.15K 1% .05W F TC=0±100	24546	C3-1/8-T0-2151-G
A4R90	0698-7261	8		RESISTOR 11K 1% .05W F TC=0±100	24546	C3-1/8-T0-1102-G
A4R91				NOT ASSIGNED		
A4R92				NOT ASSIGNED		
A4R93	0698-7212	9		RESISTOR 100 1% .05W F TC=0±100	24546	C3-1/8-T0-100R-G
A4R94	0698-7253	8		RESISTOR 5.11K 1% .05W F TC=0±100	24546	C3-1/8-T0-5111-G
A4R95	0698-7222	1	1	RESISTOR 261 1% .05W F TC=0±100	24546	C3-1/8-T0-261R-G
A4R96	0698-3157	3	5	RESISTOR 19.6K 1% .125W F TC=0±100	24546	C4-1/8-T0-1962-F
A4R97	0698-3157	3		RESISTOR 19.6K 1% .125W F TC=0±100	24546	C4-1/8-T0-1962-F
A4R98	0837-0085	6	1	THERMISTOR ROD 680-OHM TC=+.7%/C-DEG	28480	0837-0085
A4R99	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A4R100	0757-0419	0	1	RESISTOR 681 1% .125W F TC=0±100	24546	C4-1/8-T0-681R-F
A4TP1– A4TP10				PINS ON J1		
A4TP11	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A4TP12	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A4TP13				NOT ASSIGNED		
A4TP14	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A4TP15	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A4U1	1826-0261	8	3	IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A4U2	1826-0417	6		IC SWITCH ANLG QUAD 16-DIP-C PKG	27014	LF13333D
A4U3	1826-0616	7	1	IC OP AMP PRCN QUAD 14-DIP-C PKG	06665	OP-11EY
A4U4	1826-0610	1	2	IC MULTIPLXR 4-CHAN-ANLG DUAL 16-DIP-C	06665	MUX24FQ
A4U5	1826-0319	7	3	IC OP AMP LOW-BIAS-H-IMPD TO-99 PKG	04713	LF356G
A4U6	1826-0610	1		IC MULTIPLXR 4-CHAN-ANLG DUAL 16-DIP-C	06665	MUX24FQ
A4U7	1826-0447	2		IC OP AMP LOW-BIAS-H-IMPD TO-99 PKG	04713	LF356G
A4U8	1826-0021	8	1	IC OP AMP GP TO-99 PKG	27014	LM310H
A4U9	1826-0417	6		IC SWITCH ANLG QUAD 16-DIP-C PKG	27014	LF13333D
A4U10	1820-1197	9		IC GATE TTL LS NAND QUAD 2-INP	01295	SN74LS00N
A4U11	1826-0319	7		IC OP AMP LOW-BIAS-H-IMPD TO-99 PKG	04713	LF356G
A4U12	1820-1216	3		IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	SN74LS138N
A4U13	1820-1730	6		IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS273N
A4U14	1826-0752	2	6	IC CONV 12-B-D/A 16-DIP-C PKG	24355	AD7542BD
A4U15	1826-0026	3	3	IC COMPARATOR PRCN TO-99 PKG	01295	LM311L
A4VR1	1902-0049	2	2	DIODE-ZNR 6.19V 5% DO-35 PD=.4W	28480	1902-0049
A4VR2	1902-0049	2		DIODE-ZNR 6.19V 5% DO-35 PD=.4W	28480	1902-0049
A4VR3	1902-0041	4	1	DIODE-ZNR 5.11V 5% DO-35 PD=.4W	28480	1902-0041
A4VR4	1902-3070	5	2	DIODE-ZNR 4.22V 5% DO-35 PD=.4W	28480	1902-3070
A4VR5	1902-3070	5		DIODE-ZNR 4.22V 5% DO-35 PD=.4W	28480	1902-3070
A4W1	8159-0005	0		WIRE 22AWG W PVC 1X22 80C	28480	8159-0005
A4W2	1258-0124	7	2	SHUNT-PROGRAMMABLE 1 DBL PIN SET	28480	1258-0124
A4W3	1258-0124	7		SHUNT-PROGRAMMABLE 1 DBL PIN SET	28480	1258-0124
A5	**83592-60005**	**6**		**BOARD ASSEMBLY-FM**	**28480**	**83592-60005**
A5C1	0160-0575	4	4	CAPACITOR-FXD .047UF ±20% 50VDC CER	28480	0160-0575
A5C2	0160-0572	1		CAPACITOR-FXD 2200PF ±20% 100VDC CER	28480	0160-0572
A5C3	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A5C4	0160-0945	2		CAPACITOR-FXD 910PF ±5% 100VDC MICA	28480	0160-0945
A5C5	0160-0575	4		CAPACITOR-FXD .047UF ±20% 50VDC CER	28480	0160-0575

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
A5C6	0160-2247	1	1	CAPACITOR-FXD 3.9PF ±.25PF 500VDC CER	28480	0160-2247
A5C7	0160-3879	7		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	DM15F201J03O0WV1CR
A5C12	0160-2199	2	1	CAPACITOR-FXD 30PF ±5% 300VDC MICA	28480	0160-2199
A5C13				NOT ASSIGNED		
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
A5C19				NOT ASSIGNED		
A5C20	0160-2249	3	2	CAPACITOR-FXD 4.7PF ±.25PF 500VDC CER	28480	0160-2249
A5C21				NOT ASSIGNED		
A5C22				NOT ASSIGNED		
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		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		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A5CR2	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
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		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A5CR6	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A5CR7	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A5CR8	1901-1098	1		DIODE-SWITCHING 1N4150 50V 200MA 4NS	9N171	1N4150
A5CR9	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A5K1	0490-0916	6		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% .166DX.385LG	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	4	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	5040-6851	2	1	EXTRACTOR	28480	5040-6851
A5MP2	5000-9043	6		PIN:P.C. BOARD EXTRACTOR	28480	5000-9043
A5MP3	4330-0145	9	6	INSULATOR-BEAD GLASS	28480	4330-0145
A5MP4	4330-0145	9		INSULATOR-BEAD GLASS	28480	4330-0145
A5MP5	4330-0145	9		INSULATOR-BEAD GLASS	28480	4330-0145
A5MP6	4330-0145	9		INSULATOR-BEAD GLASS	28480	4330-0145
A5MP7	4330-0145	9		INSULATOR-BEAD GLASS	28480	4330-0145
A5MP8	4330-0145	9		INSULATOR-BEAD GLASS	28480	4330-0145
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	1854-0475	5	1	TRANSISTOR-DUAL NPN PD=750MW	28480	1854-0475
A5R1	0698-0083	8	9	RESISTOR 1.96K 1% .125W F TC=0±100	24546	C4-1/8-TO-1961-F
A5R2	0698-3154	0	5	RESISTOR 4.22K 1% .125W F TC=0±100	24546	C4-1/8-TO-4221-F
A5R3	0698-3154	0		RESISTOR 4.22K 1% .125W F TC=0±100	24546	C4-1/8-TO-4221-F
A5R4	0698-3154	0		RESISTOR 4.22K 1% .125W F TC=0±100	24546	C4-1/8-TO-4221-F
A5R5	0698-3154	0		RESISTOR 4.22K 1% .125W F TC=0±100	24546	C4-1/8-TO-4221-F
A5R6	0757-0439	4	2	RESISTOR 6.81K 1% .125W F TC=0±100	24546	C4-1/8-TO-6811-F
A5R7	0757-0439	4		RESISTOR 6.81K 1% .125W F TC=0±100	24546	C4-1/8-TO-6811-F
A5R8	0698-3158	4	2	RESISTOR 23.7K 1% .125W F TC=0±100	24546	C4-1/8-TO-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

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
A5R11	0698-3155	1	2	RESISTOR 4.64K 1% .125W F TC=0±100	24546	C4-1/8-T0-4641-F
A5R12	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	C4-1/8-T0-1961-F
A5R13	0698-3446	3	1	RESISTOR 383 1% .125W F TC=0±100	24546	C4-1/8-T0-383R-F
A5R14	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
A5R15	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
A5R16				NOT ASSIGNED		
A5R17	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A5R18	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A5R19	2100-3749	6		RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN	28480	2100-3749
A5R20	0757-0458	7	3	RESISTOR 51.1K 1% .125W F TC=0±100	24546	C4-1/8-T0-5112-F
A5R21	0698-3136	8	1	RESISTOR 17.8K 1% .125W F TC=0±100	24546	C4-1/8-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	C4-1/8-T0-2871-F
A5R24				NOT ASSIGNED		
A5R25				NOT ASSIGNED		
A5R26	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	C4-1/8-T0-1961-F
A5R27	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	C4-1/8-T0-1961-F
A5R28	0757-0382	6	2	RESISTOR 16.2 1% .125W F TC=0±100	19701	MF4C1/8-T0-16R2-F
A5R29	0757-0382	6		RESISTOR 16.2 1% .125W F TC=0±100	19701	MF4C1/8-T0-16R2-F
A5R30	0757-0398	4		RESISTOR 75 1% .125W F TC=0±100	24546	C4-1/8-T0-75R0-F
A5R31*	0757-0401	0	4	RESISTOR 100 1% .125W F TC=0±100	24546	C4-1/8-T0-101-F
A5R32	0757-0403	2	3	RESISTOR 121 1% .125W F TC=0±100	24546	C4-1/8-T0-121R-F
A5R33	0698-7280	1	5	RESISTOR 68.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-6812-G
A5R34	2100-2574	3	4	RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	30983	ET50X501
A5R35	0698-7280	1		RESISTOR 68.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-6812-G
A5R36	2100-2574	3		RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	30983	ET50X501
A5R37	0698-7280	1		RESISTOR 68.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-6812-G
A5R38	2100-2574	3		RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	30983	ET50X501
A5R39	0698-7280	1		RESISTOR 68.1K 1% .05W F TC=0±100	24546	C3-1/8-T0-6812-G
A5R40	2100-2574	3		RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	30983	ET50X501
A5R41	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A5R42	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A5R43	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A5R44	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A5R45	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A5R46	0757-0420	3	4	RESISTOR 750 1% .125W F TC=0±100	24546	C4-1/8-T0-751-F
A5R47	0757-0420	3		RESISTOR 750 1% .125W F TC=0±100	24546	C4-1/8-T0-751-F
A5R48	2100-3759	8	2	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-G
A5R50	2100-3749	6		RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN	28480	2100-3749
A5R51	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0±100	24546	C4-1/8-T0-1472-F
A5R52	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0±100	24546	C4-1/8-T0-1472-F
A5R53	0757-0346	2	6	RESISTOR 10 1% .125W F TC=0±100	24546	C4-1/8-T0-10R0-F
A5R54	0757-0346	2		RESISTOR 10 1% .125W F TC=0±100	24546	C4-1/8-T0-10R0-F
A5R55	0757-0346	2		RESISTOR 10 1% .125W F TC=0±100	24546	C4-1/8-T0-10R0-F
A5R56	0757-0346	2		RESISTOR 10 1% .125W F TC=0±100	24546	C4-1/8-T0-10R0-F
A5R57	0757-0346	2		RESISTOR 10 1% .125W F TC=0±100	24546	C4-1/8-T0-10R0-F
A5R58	0757-0346	2		RESISTOR 10 1% .125W F TC=0±100	24546	C4-1/8-T0-10R0-F
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	C4-1/8-T0-1213-F
A5R64	0698-6363	9	2	RESISTOR 40K .1% .125W F TC=0±25	28480	0698-6363
A5R65	0757-0289	2		RESISTOR 13.3K 1% .125W F TC=0±100	19701	MF4C1/8-T0-1332-F
A5R66	0698-6363	9		RESISTOR 40K .1% .125W F TC=0±25	28480	0698-6363
A5R67	0698-3447	4	7	RESISTOR 422 1% .125W F TC=0±100	24546	C4-1/8-T0-422R-F
A5R68	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	C4-1/8-T0-422R-F
A5R69	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	C4-1/8-T0-422R-F
A5R70	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	C4-1/8-T0-422R-F
A5R71	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	C4-1/8-T0-422R-F
A5R72	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	C4-1/8-T0-422R-F
A5R73	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A5R74	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A5R75	2100-2522	1	2	RESISTOR-TRMR 10K 10% C SIDE-ADJ 1-TRN	30983	ET50X103
A5R76	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A5R77	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A5R78	0698-3158	4		RESISTOR 23.7K 1% .125W F TC=0±100	24546	C4-1/8-T0-2372-F
A5R79	0757-0403	2		RESISTOR 121 1% .125W F TC=0±100	24546	C4-1/8-T0-121R-F
A5R80	0698-0082	7	1	RESISTOR 464 1% .125W F TC=0±100	24546	C4-1/8-T0-4640-F
A5TP1	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A5TP2	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A5TP3	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A5TP4	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A5TP5	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A5TP6	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A5TP7	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A5TP8	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A5TP9	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION

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
A5TP10	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A5TP11	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A5U1	1810-0206	8	1	NETWORK-RES 8-SIP 10.0K OHM X 7	01121	208A103
A5U2	1810-0208	0	1	NETWORK-RES 8-SIP 68.0K OHM X 7	01121	208A683
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	01121	208A472
A5U5	1810-0321	8	1	NETWORK-RES 8-SIP220.0K OHM X 7	01121	208A224
A5U6	1820-1196	8		IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS174N
A5U7	1826-0092	3		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	NE592K
A5U11	1826-0476	7	2	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
A5U15				NOT ASSIGNED		
A5U16	1820-1196	8		IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS174N
A5U17	1826-0699	6	1	IC CONV 8-B-D/A 16-DIP-C PKG	24355	AD7524AD
A5U18	1820-1216	3		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	HA1-6195-5
A5U20	1810-0224	0	1	NETWORK-RES 8-SIP 33.0K OHM X 4	01121	2088333
A5U21	1810-0366	1	1	NETWORK-RES 6-SIP 220.0 OHM X 5	01121	206A221
A5VR1	1902-3002	3		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	7	WIRE 22AWG W PVC 1X22 80C	28480	8159-0005
A5W2				NOT ASSIGNED		
A5W3				NOT ASSIGNED		
A5W4	8159-0005	0		WIRE 22AWG W PVC 1X22 80C	28480	8159-0005
A5W5	8159-0005	0		WIRE 22AWG W PVC 1X22 80C	28480	8159-0005
A5W6	8159-0005	0		WIRE 22AWG W PVC 1X22 80C	28480	8159-0005
A5W7	8159-0005	0		WIRE 22AWG W PVC 1X22 80C	28480	8159-0005
A6	**83595-60054**	**8**		**BOARD ASSEMBLY-SWEEP CONTROL**	**28480**	**83595-60054**
A6C1-- A6C4				NOT ASSIGNED		
A6C5	0180-0116	1	8	CAPACITOR-FXD 6.8UF±10% 35VDC TA	56289	150D685X9035B2
A6C6	0180-0116	1		CAPACITOR-FXD 6.8UF±10% 35VDC TA	56289	150D685X9035B2
A6C7	0180-2815	1	3	CAPACITOR-FXD 100UF±20% 10VDC TA	28480	0180-2815
A6C8				NOT ASSIGNED		
A6C9	0180-0228	6	5	CAPACITOR-FXD 22UF±10% 15VDC TA	56289	150D226X9015B2
A6C10	0180-0228	6		CAPACITOR-FXD 22UF±10% 15VDC TA	56289	150D226X9015B2
A6C11				NOT ASSIGNED		
A6C12				NOT ASSIGNED		
A6C13				NOT ASSIGNED		
A6C14	0160-3878	6		CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A6C15	0160-0573	2		CAPACITOR-FXD 4700PF ±20% 100VDC CER	28480	0160-0573
A6C16	0160-3878	6		CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A6C17	0160-3878	6		CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A6C18				NOT ASSIGNED		
A6C19	0160-0575	4		CAPACITOR-FXD .047UF ±20% 50VDC CER	28480	0160-0575
A6C20	0160-3878	6		CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A6C21	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A6C22	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A6C23	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A6C24	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A6C25	0160-3878	6		CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A6C26	0160-3878	6		CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A6C27	0160-0575	4		CAPACITOR-FXD .047UF ±20% 50VDC CER	28480	0160-0575
A6C28	0160-3874	2		CAPACITOR-FXD 10PF ±5% 200VDC CER	28480	0160-3874
A6CR1	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A6CR2	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A6CR3	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A6CR4	1901-0050	3	8	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A6CR5	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A6CR6	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A6CR7	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A6CR8				NOT ASSIGNED		
A6CR9				NOT ASSIGNED		
A6CR10	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A6CR11	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A6CR12	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A6CR13	1901-0033	2		DIODE-GP 180V 200MA D7	28480	1901-0033
A6L1	9140-0137	1	6	INDUCTOR RF-CH-MLD 1MH 5% .2DX.45LG Q=60	28480	9140-0137
A6L2	9140-0137	1		INDUCTOR RF-CH-MLD 1MH 5% .2DX.45LG Q=60	28480	9140-0137

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
A6L3	08503-80001	9		COIL-TOROID	28480	08503-80001
A6MP1	5040-6849	8	1	EXTRACTOR, P.C. BOARD BLUE	28480	5040-6849
A6MP2	5000-9043	6		PIN:P.C. BOARD EXTRACTOR	28480	5000-9043
A6Q1	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE	17856	VN10KM
A6Q2	1854-0477	7	3	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A6Q3	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE	17856	VN10KM
A6Q4	1854-0019	3	1	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A6Q5	1853-0405	9	1	TRANSISTOR PNP SI PD=300MW FT=850 MHZ	04713	2N4209
A6Q6	1853-0405	9		TRANSISTOR PNP SI PD=300MW FT=850 MHZ	04713	2N4209
A6Q7	1855-0423	5		TRANSISTOR MOSFET N-CHAN E-MODE	17856	VN10KM
A6Q8	1854-0404	0		TRANSISTOR-NPN SI TO-18 PD=360MW	04713	SS9333
A6Q9	1854-0477	7		TRANSISTOR-NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A6Q10	1853-0281	9		TRANSISTOR-PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A6R1				NOT ASSIGNED		
A6R2				NOT ASSIGNED		
A6R3				NOT ASSIGNED		
A6R4	0757-0466	7		RESISTOR 110K 1% .125W F TC=0±100	24546	C4-1/8-T0-1103-F
A6R5	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A6R6	0757-1094	9	1	RESISTOR 1.47K 1% .125W F TC=0±100	24546	C4-1/8-T0-1471-F
A6R7	0698-3446	3	1	RESISTOR 383 1% .125W F TC=0±100	24546	C4-1/8-T0-383R-F
A6R8	0757-0401	0		RESISTOR 100 1% .125W F TC=0±100	24546	C4-1/8-T0-101-F
A6R9	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C4-1/8-T0-1002-F
A6R10	0698-7267	4		RESISTOR 19.6K 1% .05W F TC=0±100	24546	C4-1/8-T0-1962-F
A6R11	0698-7283	4		RESISTOR 90.9K 1% .05W F TC=0±100	24546	C4-1/8-T0-9092-F
A6R12	2100-1738	9		RESISTOR-TRMR 10K 10% C TOP-ADJ 1-TRN	32997	3329H-1-103
A6R13	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A6R14	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-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		RESISTOR 6.99K .1% .1W F TC=0+4	28480	0698-8469
A6R18	0698-8469	0		RESISTOR 6.99K .1% .1W F TC=0+4	28480	0698-8469
A6R19	0698-8469	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	3	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	2	RESISTOR 40.423K .1% .1W F TC=0±5	28480	0699-0935
A6R24	2100-3732	7	3	RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	28480	2100-3732
A6R25	0699-0935	1		RESISTOR 40.423K .1% .1W F TC=0±5	28480	0699-0935
A6R26	2100-3732	7		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	2	RESISTOR-TRMR 1K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-102
A6R29	0699-0937	3	1	RESISTOR 109.74K .1% .1W F TC=0±5	28480	0699-0937
A6R30	2100-3759	8		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	5	RESISTOR 1M 1% .125W F TC=0±100	28480	0698-8827
A6R37	2100-3750	9	2	RESISTOR-TRMR 20K 10% C SIDE-ADJ 17-TRN	28480	2100-3750
A6R38	0698-8827	4		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	0698-6867	8	1	RESISTOR 7.35K .25% .125W F TC=0±50	28480	0698-6867
A6R41	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A6R42	0698-3260	9	4	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	C4-1/8-T0-2371-F
A6R44	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-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	C4-1/8-T0-2371-F
A6R47	0757-0421	4		RESISTOR 825 1% .125W F TC=0±100	24546	C4-1/8-T0-825R-F
A6R48	0757-0421	4		RESISTOR 825 1% .125W F TC=0±100	24546	C4-1/8-T0-825R-F
A6R49	0698-3447	4		RESISTOR 422 1% .125W F TC=0±100	24546	C4-1/8-T0-422R-F
A6R50	0698-3440	7		RESISTOR 196 1% .125W F TC=0±100	24546	C4-1/8-T0-196R-F
A6R51	0757-0401	0		RESISTOR 100 1% .125W F TC=0±100	24546	C4-1/8-T0-101-F
A6R52	0698-0084	9		RESISTOR 2.15K 1% .125W F TC=0±100	24546	C4-1/8-T0-2151-F
A6R53	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
A6R54	0698-3453	2	3	RESISTOR 196K 1% .125W F TC=0±100	24546	C4-1/8-T0-1963-F
A6R55	0698-8827	4		RESISTOR 1M 1% .125W F TC=0±100	28480	0698-8827
A6R56	0698-3159	5	3	RESISTOR 26.1K 1% .125W F TC=0±100	24546	C4-1/8-T0-2612-F
A6R57	0698-3266	5	1	RESISTOR 237K 1% .125W F TC=0±100	24546	C4-1/8-T0-2373-F
A6R58	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A6R59	0698-7236	7		RESISTOR 1K 1% .05W F TC=0±100	24546	C4-1/8-T0-1001-F
A6R60	0698-7277	7		RESISTOR 51.1K 1% .05W F TC=0±100	24546	C4-1/8-T0-5112-F
A6R61	0698-7277	7		RESISTOR 51.1K 1% .05W F TC=0±100	24546	C4-1/8-T0-5112-F
A6R62	0757-0458	7		RESISTOR 51.1K 1% .125W F TC=0±100	24546	C4-1/8-T0-5112-G
A6R63	2100-2030	6		RESISTOR-TRMR 20K 10% C TOP-ADJ 1-TRN	32997	3329H-1-203
A6R64	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-T0-1002-F
A6R65	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0±100	24546	C4-1/8-T0-7501-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
A6R66	0698-7272	1		RESISTOR 31.6K 1% .05W F TC=0±100	24546	C3-1/8-TO-3162-G
A6R67	0698-7253	8		RESISTOR 5.11K 1% .05W F TC=0±100	24546	C3-1/8-TO-5110-G
A6R68	2100-2516	3		RESISTOR-TRMR 100K 10% C SIDE-ADJ 1-TRN	32997	3329W-104
A6R69	2100-2516	3		RESISTOR-TRMR 100K 10% C SIDE-ADJ 1-TRN	32997	3329W-104
A6R70	2100-2516	3		RESISTOR-TRMR 100K 10% C SIDE-ADJ 1-TRN	32997	3329W-104
A6R71	0698-7237	8		RESISTOR 1.1K 1% .05W F TC=0±100	24546	C3-1/8-TO-1101-G
A6R72	0698-7242	5		RESISTOR 1.78K 1% .05W F TC=0±100	24546	C3-1/8-1780-G
A6R73	2100-2521	0		RESISTOR-TRMR 2K 10% C SIDE-ADJ 1-TRN	32997	3329W-1-202
A6R74	2100-2521	0		RESISTOR-TRMR 2K 10% C SIDE-ADJ 1-TRN	32997	3329W-1-202
A6R75	2100-2521	0		RESISTOR-TRMR 2K 10% C SIDE-ADJ 1-TRN	32997	3329W-1-202
A6R76	0698-7283	4		RESISTOR 90.9K 1% .125W F TC=±100	24546	C3-1/8-TO-9092-G
A6R77	0698-7285	6		RESISTOR 110K 1% .05W F TC=0±100	24546	C3-1/8-TO-1103-G
A6R78	2100-2692	6		RESISTOR-TRMR 1M 20% C SIDE-ADJ 1-TRN	32997	3329W-1-105
A6R79	0683-7243	6		RESISTOR 1.96K 1% .05W F TC=0±100	24546	C3-1/8-TO-1961-G
A6R80*	0698-7249	2		RESISTOR 3.48K 1% .05W F TC=0±100	24546	C3-1/8-TO-3481-G
A6R81	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-TO-1961-G
A6R82	0698-7243	6		RESISTOR 1.96K 1% .05W F TC=0±100	24546	C3-1/8-TO-1961-G
A6TP1– A6TP10	1251-4672	4	1	CONNECTOR 10-PIN M POST TYPE	28480	1251-4672
A6U1	1826-0720	4	5	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	SN74LS86N
A6U3	1820-1196	8		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	1826-0471	2	16	IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A6U6	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A6U7				NOT ASSIGNED		
A6U8	1820-1112	8	2	IC FF TTL LS D-TYPE POS-EDGE-TRIG	01295	SN74LS74AN
A6U9	1820-1730	6		IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS273N
A6U10	1826-0417	6		IC SWITCH ANLG QUAD 16-DIP-C PKG	27014	LF13333D
A6U11	1826-0417	6		IC SWITCH ANLG QUAD 16-DIP-C PKG	27014	LF13333D
A6U12	1820-1112	8		IC FF TTL LS D-TYPE POS-EDGE-TRIG	01295	SN74LS74AN
A6U13	1820-2024	3	5	IC DRVR TTL LS LINE DRVR OCTL	01295	SN74LS244N
A6U14	1826-0026	3		IC COMPARATOR PRCN TO-99 PKG	01295	LM311L
A6U15	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A6U16	1820-1246	1	1	IC GATE TTL LS AND QUAD 2-INP	01295	SN74LS09N
A6U17	1820-1216	3		IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	SN74LS138N
A6U18	1826-0752	2		IC CONV 12-B-D/A 16-DIP-C PKG	24355	AD7542BD
A6U19	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A6U20	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A6U21	1820-1202	7		IC GATE TTL LS NAND TPL 3-INP	01295	SN74LS10N
A6U22	1820-1197	9		IC GATE TTL LS NAND QUAD 2-INP	01295	SN74LS00N
A6U23	1826-0026	3		IC COMPARATOR PRCN TO-99 PKG	01295	LM311L
A6U24	1826-0092	3		IC OP AMP GP DUAL TO-99 PKG	28480	1826-0092
A6U25				NOT ASSIGNED		
A6R26	1826-0185	5		IC OP AMP SPCL TO-99	3L585	CA3080
A6VR1	1902-3002	3		DIODE-ZNR 2.37V 5% DO-7 PD=.4W TC=–.074%	28480	1902-3002
A6W1				NOT ASSIGNED		
A6W2	8159-0005	0		WIRE 22AWG W PVC 1X22 80C	28480	8159-0005
A6W3				NOT ASSIGNED		
A6W4	8159-0005	0		WIRE 22AWG W PVC 1X22 80C	28480	8159-0005
A7	**83595-60056**	**0**		**8G ASSY-YTM DRIVER (DOES NOT INCLUDE 20-** PIN HEADER P2 OR FACTORY SELECT RESISTORS R34* THRU R39* AND R66* THRU R71*)	**28480**	**83595-60056**
A7C1	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A7C2	0160-3877	5	2	CAPACITOR-FXD 100PF ±20% 200VDC CER	28480	0160-3877
A7C3	0160-0162	5	1	CAPACITOR-FXD .022UF ±10% 200VDC POLYE	28480	0160-0162
A7C4	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A7C5	0160-3877	5		CAPACITOR-FXD 100PF ±20% 200VDC CER	28480	0160-3877
A7C6	0160-0574	3		CAPACITOR-FXD .022UF ±20% 100VDC CER	28480	0160-0574
A7C7	0180-0116	1		CAPACITOR-FXD 6.8UF±10% 35VDC TA	56289	150D685X9035B2
A7C8	0180-0116	1		CAPACITOR-FXD 6.8UF±10% 35VDC TA	56289	150D685X9035B2
A7C9	0180-2815	1		CAPACITOR-FXD 100UF±20% 10VDC TA	28480	0180-2815
A7C10	0180-0116	1		CAPACITOR-FXD 6.8UF±10% 35VDC TA	56289	150D685X9035B2
A7C11	0180-0228	6		CAPACITOR-FXD 22UF±10% 15VDC TA	56289	150D226X9015B2
A7C12	0160-0574	3		CAPACITOR-FXD .022UF ±20% 100VDC CER	28480	0160-0574
A7C13	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A7C14	0160-3878	6		CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A7C15	0160-3878	6		CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A7C16	0160-0575	4		CAPACITOR-FXD .047UF ±20% 50VDC CER	28480	0160-0575
A7C17	0180-2731	0	2	CAPACITOR-FXD 2.2UF±10% 20VDC TA	28480	0180-2731
A7C18	0160-3874	2		CAPACITOR-FXD 10PF ±.5PF 200VDC CER	28480	0160-3874
A7C19	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A7C20	0180-0228	6		CAPACITOR-FXD 22UF±10% 15VDC TA	56289	150D226X9015B2

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
A7C21	0180-2794	5	1	CAPACITOR-FXD 3.3UF ±20% 35VDC TA	28480	0180-2794
A7CR1	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A7CR2	1901-0539	3	2	DIODE-SM SIG SCHOTTKY	28480	1901-0539
A7CR3	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR4	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR5	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR6	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR7	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A7CR8	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A7CR9	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A7J1	1200-0626	3	1	SOCKET-IC 20-CONT DIP DIP-SLDR	28480	1200-0626
A7L1	9140-0137	1		INDUCTOR RF-CH-MLD 1MH 5% .2DX.45LG Q=60	28480	9140-0137
A7L2	9140-0137	1		INDUCTOR RF-CH-MLD 1MH 5% .2DX.45LG Q=60	28480	9140-0137
A7L3	08503-80001	9		COIL TOROID	28480	08503-80001
A7MP1	5040-6844	3	1	EXTRACTOR-BOARD	28480	5040-6844
A7MP2	5000-9043	6		PIN:P.C. BOARD EXTRACTOR	28480	5000-9043
A7P1				NOT ASSIGNED		
A7P2	1251-7204	4	1	HEADER 20-PIN	28480	1251-7204
A7Q1	1853-0044	2	4	TRANSISTOR PNP SI TO-39 PD=1W FT=200MHZ	28480	1853-0044
A7Q2	1853-0044	2		TRANSISTOR PNP SI TO-39 PD=1W FT=200MHZ	28480	1853-0044
A7R1	0757-0443	0		RESISTOR 11K 1% .125W F TC=0±100	24546	C4-1/8-T0-1102-F
A7R2	0757-0420	3		RESISTOR 750 1% .125W F TC=0±100	24546	C4-1/8-T0-751-F
A7R3	0757-0458	7		RESISTOR 51.1K 1% .125W F TC=0±100	24546	C4-1/8-T0-5112-F
A7R4	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R5	0698-3449	6		RESISTOR 28.7K 1% .125W F TC=0±100	24546	C4-1/8-T0-2872-F
A7R6	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	C4-1/8-T0-1961-F
A7R7	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	C4-1/8-T0-1961-F
A7R8	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R9	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R10	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A7R11	0757-0200	7	1	RESISTOR 5.62K 1% .125W F TC=0±100	24546	C4-1/8-T0-5621-F
A7R12	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A7R13	0757-0447	4		RESISTOR 16.2K 1% .125W F TC=0±100	24546	C4-1/8-T0-1622-F
A7R14	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R15	0698-3260	9	1	RESISTOR 464K 1% 125W F TC=0±100	28480	0698-3260
A7R16	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A7R17	0698-3457	6		RESISTOR 316K 1% .125W F TC=0±100	28480	0698-3457
A7R18	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A7R19	2100-3732	7		RESISTOR-TRMR 500 10% C SIDE-ADJ 17-TRN	28480	2100-3732
A7R20	0699-0796	2	1	RESISTOR 22.95K .1% .1W F TC=0+4	28480	0699-0796
A7R21	0698-6406	1	4	RESISTOR 8.54K .1% .1W F TC=0+4	28480	0698-6406
A7R22	2100-3749	6		RESISTOR-TRMR 5K 10% C SIDE-ADJ 17-TRN	28480	2100-3749
A7R23	0699-0800	9	1	RESISTOR 48.5K .1% .1W F TC=0+4	28480	0699-0800
A7R24	2100-3757	6		RESISTOR-TRMR 100 10% C SIDE-ADJ 17-TRN	28480	2100-3757
A7R25	0699-0801	0	1	RESISTOR 9.041K .1% .1W F TC=0+4	28480	0699-0801
A7R26	0698-8960	6	1	RESISTOR 750K 1% .125W F TC=0±100	28480	0698-8960
A7R27	0698-8489	4	4	RESISTOR 15K .1% .1W F TC=0+4	28480	0698-8489
A7R28	0757-0444	1	2	RESISTOR 12.1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1212-F
A7R29	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R30	0757-0470	3	3	RESISTOR 162K 1% .125W F TC=0±100	24546	C4-1/8-T0-1623-F
A7R31	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R32	0757-0274	5		RESISTOR 1.21K 1% .125W F TC=0±100	24546	C4-1/8-T0-1211-F
A7R33	0698-3453	2		RESISTOR 196K 1% .125W F TC=0±100	24546	C4-1/8-T0-1963-F
A7R34*				FACTORY SELECTED		
A7R35*				FACTORY SELECTED		
A7R36*				FACTORY SELECTED		
A7R37*				FACTORY SELECTED		
A7R38*				FACTORY SELECTED		
A7R39*				FACTORY SELECTED		
A7R40	0698-8489	4		RESISTOR 15K .1% .1W F TC=0+4	28480	0698-8489
A7R41	0698-6406	1		RESISTOR 8.54K .1% .1W F TC=0+4	28480	0698-6406
A7R42	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A7R43	2100-3750	9		RESISTOR-TRMR 20K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-203
A7R44	0811-1037	6	2	RESISTOR 315 1% 3W PW TC=0±20	28480	0811-1037
A7R45	2100-3753	2	1	RESISTOR-TRMR 200K 10% C SIDE-ADJ 17-TRN	28480	2100-3753
A7R46	2100-3611	1		RESISTOR-TRMR 50K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-503
A7R47	0757-0289	2		RESISTOR 13.3K 1% .125W F TC=0±100	19701	MF4C1/8-T0-1332-F
A7R48	0757-0440	7		RESISTOR 7.5K 1% .125W F TC=0±100	24546	C4-1/8-T0-7501-F
A7R49	0698-6721	3	1	RESISTOR 19K 1% .125W F TC=0±25	28480	0698-6721
A7R50	0698-8827	4		RESISTOR 1M 1% .125W F TC=0±100	28480	0698-8827
A7R51	2100-0670	6		RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-103
A7R52	0698-8827	4		RESISTOR 1M 1% .125W F TC=0±100	28480	0698-8827
A7R53	0698-3159	5		RESISTOR 26.1K 1% .125W F TC=0±100	24546	C4-1/8-T0-2612-F
A7R54	0698-8958	2	2	RESISTOR 511K 1% .125W F TC=0±100	28480	0698-8958
A7R55	2100-2517	4	2	RESISTOR-TRMR 50K 10% C SIDE-ADJ 1-TRN	30983	ET50X503

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A7R56	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A7R57	0757-0290	5	2	RESISTOR 6.19K 1% .125W F TC=0±100	19701	MF4C1/8-T0-6191-F
A7R58	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R59	0811-1037	6		RESISTOR 315 1% 3W PW TC=0±20	28480	0811-1037
A7R60	0698-0084	9		RESISTOR 2.15K 1% .125W F TC=0±100	24546	C4-1/8-T0-2151-F
A7R61	0698-0084	9		RESISTOR 2.15K 1% .125W F TC=0±100	24546	C4-1/8-T0-2151-F
A7R62	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R63	0757-0444	1		RESISTOR 12.1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1212-F
A7R64	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R65	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R66*				FACTORY SELECT		
A7R67*				FACTORY SELECT		
A7R68*				FACTORY SELECT		
A7R69*				FACTORY SELECT		
A7R70*				FACTORY SELECT		
A7R71*				FACTORY SELECT		
A7R72	0698-8959	3	1	RESISTOR 619K 1% .125W F TC=0±100	28480	0698-8959
A7R73	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A7R74	0757-0418	9	1	RESISTOR 619 1% .125W F TC=0±100	24546	C4-1/8-T0-619R-F
A7S1	3101-0471	8	4	SWITCH-RKR DIP-RKR-ASSY 10-1A .05A 30VDC	28480	3101-0471
A7S2	3101-0471	8		SWITCH-RKR DIP-RKR-ASSY 10-1A .05A 30VDC	28480	3101-0471
A7TP1–						
A7TP8	1251-5618	0	2	CONNECTOR 8-PIN M POST TYPE	28480	1251-5618
A7TP9	0360-0535	0		TERMINAL TEST POINT PCB	00000	ORDER BY DESCRIPTION
A7TP10–						
A7TP13	1251-5618	0		CONNECTOR 8-PIN M POST TYPE	28480	1251-5618
A7U1	1810-0277	3	4	NETWORK-RES 10-SIP 2.2K OHM X 9	01121	210A222
A7U2	1810-0277	3		NETWORK-RES 10-SIP 2.2K OHM X 9	01121	210A222
A7U3	1820-2024	3		IC DRVR TTL LS LINE DRVR OCTL	01295	SN74LS244N
A7U4	1820-2024	3		IC DRVR TTL LS LINE DRVR OCTL	01295	SN74LS244N
A7U5	1826-0180	0		IC TIMER TTL MONO/ASTBL	01295	NE555P
A7U6				NOT ASSIGNED		
A7U7	1820-1568	8	2	IC BFR TTL LS BUS QUAD	01295	SN74LS125AN
A7U8	1820-1144	6	2	IC GATE TTL LS NOR QUAD 2-INP	01295	SN74LS02N
A7U9	1826-0720	4		IC SWITCH ANLG QUAD 16-DIP-C PKG	06665	SW-02FQ
A7U10	1826-0720	4		IC SWITCH ANLG QUAD 16-DIP-C PKG	06665	SW-02FQ
A7U11	1826-0753	3	2	IC OP AMP LOW-BIAS-H-IMPD QUAD 14-DIP-C	04713	MC34004BL
A7U12	1820-1196	8		IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS174N
A7U13	1826-0752	2		IC CONV 12-B-D/A 16-DIP-C PKG	24355	AD7542BD
A7U14	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A7U15	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A7U16	1820-1216	3		IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	SN74LS138N
A7U17	1826-0752	2		IC CONV 12-B-D/A 16-DIP-C PKG	24355	AD7542BD
A7U18	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A7U19	1826-0261	8		IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A7U20	1826-0758	8	2	IC MULTIPLIER ANLG TO-100 PKG	28480	1826-0758
A7U21	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A7U22	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A7VR1	1902-0197	1	3	DIODE-ZNR 82.5V 5% DO-15 PD=1W TC=+.082%	28480	1902-0197
A8	**83592-60002**	**3**		**BOARD ASSEMBLY-YO DRIVER**	**28480**	**83592-60002**
A8C1	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
A8C2	0160-4389	6	2	CAPACITOR-FXD 100PF ±5PF 200VDC CER	51642	200-200-NP0-101J
A8C3	0160-0161	4	1	CAPACITOR-FXD .01UF ±10% 200VDC POLYE	28480	0160-0161
A8C4	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A8C5	0160-4389	6		CAPACITOR-FXD 100PF ±5PF 200VDC CER	51642	200-200-NP0-101J
A8C6	0160-0575	4		CAPACITOR-FXD .047UF ±20% 50VDC CER	28480	0160-0575
A8C7	0180-0116	1		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		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		CAPACITOR-FXD 22UF±10% 15VDC TA	56289	150D226X9015B2
A8C12	0160-0574	3		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		CAPACITOR-FXD 10PF ±.5PF 200VDC CER	28480	0160-3874
A8C15	0160-3878	6		CAPACITOR-FXD 1000PF ±20% 100VDC CER	28480	0160-3878
A8C16	0180-3020	2	1	CAPACITOR-FXD 120UF±10% 50VDC TA	28480	0180-3020
A8C17	0180-2206	4	1	CAPACITOR-FXD 60UF±10% 6VDC TA	56289	150D606X9006B2
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		CAPACITOR-FXD 2.2UF±10% 20VDC TA	28480	0180-2731
A8C21	0180-2186	9	1	CAPACITOR-FXD 300UF±20% 30VDC TA	06001	69F455G7
A8CR1	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A8CR2	1901-0539	3		DIODE-SM SIG SCHOTTKY	28480	1901-0539
A8CR3				NOT ASSIGNED		
A8CR4	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A8CR5	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033

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
A8CR6	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A8CR7	1901-0535	9		DIODE-SM SIG SCHOTTKY	28480	1901-0535
A8CR8	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A8J1	1200-0455	6	1	SOCKET-IC 8-CONT DIP-SLDR	28480	1200-0455
A8K1	0490-0916	6		RELAY-REED 1A 500MA 100VDC 5VDC-COIL	28480	0490-0916
A8L1	9140-0137	1		INDUCTOR RF-CH-MLD 1MH 5% .2DX.45LG Q=60	28480	9140-0137
A8L2	9140-0137	1		INDUCTOR RF-CH-MLD 1MH 5% .2DX.45LG Q=60	28480	9140-0137
A8L3	08503-80001	9		COIL TOROID	28480	08503-80001
A8MP1	5040-6846	5	1	P.C. BOARD EXTRACTOR	28480	5040-6846
A8MP2	5000-9043	6		PIN:P.C. BOARD EXTRACTOR	28480	5000-9043
A8MP5	1200-0173	5	4	INSULATOR-XSTR DAP-GL	28480	1200-0173
A8MP6	1200-0173	5		INSULATOR-XSTR DAP-GL	28480	1200-0173
A8P2	1251-7203	3	1	HEADER 8-PIN	28480	1251-7203
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		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		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A8R2	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	C4-1/8-T0-1961-F
A8R3	0757-0458	7		RESISTOR 51.1K 1% .125W F TC=0±100	24546	C4-1/8-T0-5112-F
A8R4	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A8R5	0757-0462	3	1	RESISTOR 75K 1% .125W F TC=0±100	24546	C4-1/8-T0-7502-F
A8R6	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	C4-1/8-T0-1961-F
A8R7	0698-0083	8		RESISTOR 1.96K 1% .125W F TC=0±100	24546	C4-1/8-T0-1961-F
A8R8	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A8R9	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A8R10	2100-0670	6		RESISTOR-TRMR 10K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-103
A8R11	0698-3155	1		RESISTOR 4.64K 1% .125W F TC=0±100	24546	C4-1/8-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	C4-1/8-T0-6192-F
A8R14	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A8R15	0698-3452	1	1	RESISTOR 147K 1% .125W F TC=0±100	24546	C4-1/8-T0-1473-F
A8R16	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A8R17	0698-3456	5		RESISTOR 287K 1% .125W F TC=0±100	28480	0698-3456
A8R18	2100-3750	9		RESISTOR-TRMR 20K 10% C SIDE-ADJ 17-TRN	28480	2100-3750
A8R19	2100-3757	6		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
A8R21	0698-6406	1		RESISTOR 8.54K .1% .1W F TC=0+4	28480	0698-6406
A8R22	2100-0545	4		RESISTOR-TRMR 1K 10% C SIDE-ADJ 17-TRN	32997	3292X-1-102
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		RESISTOR 162K 1% .125W F TC=0±100	24546	C4-1/8-T0-1623-F
A8R27	0698-8489	4		RESISTOR 15K .1% .1W F TC=0+4	28480	0698-8489
A8R28	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A8R29	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A8R30	0757-0470	3		RESISTOR 162K 1% .125W F TC=0±100	24546	C4-1/8-T0-1623-F
A8R31	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A8R32	0757-0274	5		RESISTOR 1.21K 1% .125W F TC=0±100	24546	C4-1/8-T0-1211-F
A8R33	0698-3453	2		RESISTOR 196K 1% .125W F TC=0±100	24546	C4-1/8-T0-1963-F
A8R34				NOT ASSIGNED		
A8R35				NOT ASSIGNED		
A8R36*				FACTORY SELECTED		
A8R37*				FACTORY SELECTED		
A8R38*				FACTORY SELECTED		
A8R39*				FACTORY SELECTED		
A8R40	0698-8489	4		RESISTOR 15K .1% .1W F TC=0+4	28480	0698-8489
A8R41	0698-6406	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	02111	43P203
A8R45	0699-0518	6	1	RESISTOR 11.489K .1% .1W F TC=0+4	28480	0699-0518
A8R46	0757-0416	7		RESISTOR 511 1% .125W F TC=0±100	24546	C4-1/8-T0-511R-F
A8R47	0757-0416	7		RESISTOR 511 1% .125W F TC=0±100	24546	C4-1/8-T0-511R-F
A8R48	0757-0416	7		RESISTOR 511 1% .125W F TC=0±100	24546	C4-1/8-T0-511R-F
A8R49	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0±100	24546	C4-1/8-T0-5111-F
A8R50	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0±100	24546	C4-1/8-T0-5111-F
A8R51	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0±100	24546	C4-1/8-T0-5111-F
A8R52	0757-0180	2	1	RESISTOR 31.6 1% .125W F TC=0±100	28480	0757-0180
A8R53	0698-3159	5		RESISTOR 26.1K 1% .125W F TC=0±100	24546	C4-1/8-T0-2612-F
A8R54	0698-8958	2		RESISTOR 511K 1% .125W F TC=0±100	28480	0698-8958
A8R55	2100-2517	4		RESISTOR-TRMR 50K 10% C SIDE-ADJ 1-TRN	30983	ET50X503
A8R56	0757-0438	3		RESISTOR 5.11K 1% .125W F TC=0±100	24546	C4-1/8-T0-5111-F
A8R57	0757-0465	6		RESISTOR 100K 1% .125W F TC=0±100	24546	C4-1/8-T0-1003-F
A8R58	0698-3457	6	1	RESISTOR 316K 1% .125W F TC=0±100	28480	0698-3457
A8R59	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-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
A8R60	0698-0084	9		RESISTOR 2.15K 1% .125W F TC=0±100	24546	C4-1/8-T0-2151-F
A8R61	0698-0084	9		RESISTOR 2.15K 1% .125W F TC=0±100	24546	C4-1/8-T0-2151-F
A8R62	0698-3455	4	1	RESISTOR 261K 1% .125W F TC=0±100	24546	C4-1/8-T0-2613-F
A8R63	0698-3152	8	1	RESISTOR 3.48K 1% .125W F TC=0±100	24546	C4-1/8-T0-3481-F
A8R64	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A8R65	0698-3156	2		RESISTOR 14.7K 1% .125W F TC=0±100	24546	C4-1/8-T0-1472-F
A8R66	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A8R67	0757-0290	5		RESISTOR 6.19K 1% .125W F TC=0±100	19701	MF4C1/8-T0-6191-F
A8R68*				FACTORY SELECTED		
A8R69*				FACTORY SELECTED		
A8S1	3101-0471	8		SWITCH-RKR DIP-RKR-ASSY 10-1A .05A 30VDC	28480	3101-0471
A8S2	3101-0471	8		SWITCH-RKR DIP-RKR-ASSY 10-1A .05A 30VDC	28480	3101-0471
A8TP1– A8TP12	1251-5925	2		CONNECTOR 12-PIN M POST TYPE	28480	1251-5925
A8U1	1810-0277	3		NETWORK-RES 10-SIP 2.2K OHM X 9	01121	210A222
A8U2	1810-0277	3		NETWORK-RES 10-SIP 2.2K OHM X 9	01121	210A222
A8U3	1820-2024	3		IC DRVR TTL LS LINE DRVR OCTL	01295	SN74LS244N
A8U4	1820-2024	3		IC DRVR TTL LS LINE DRVR OCTL	01295	SN74LS244N
A8U5	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A8U6	1826-0476	7		IC SWITCH ANLG 8-DIP-P PKG	01295	TL601CP
A8U7	1820-1568	8		IC BFR TTL LS BUS QUAD	01295	SN74LS125AN
A8U8	1820-1144	6		IC GATE TTL LS NOR QUAD 2-INP	01295	SN74LS02N
A8U9	1826-0180	0		IC TIMER TTL MONO/ASTBL	01295	NE555P
A8U10	1826-0753	3		IC OP AMP LOW-BIAS-H-IMPD QUAD 14-DIP-C	04713	MC34004BL
A8U11	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A8U12	1826-0758	8		IC MULTIPLIER ANLG TO-100 PKG	28480	1826-0758
A8U13	1820-1196	8		IC FF TTL LS D-TYPE POS-EDGE-TRIG COM	01295	SN74LS174N
A8U14	1826-0752	2		IC CONV 12-B-D/A 16-DIP-C PKG	24355	AD7542BD
A8U15	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A8U16	1820-1216	3		IC DCDR TTL LS 3-TO-8-LINE 3-INP	01295	SN74LS138N
A8U17	1826-0752	2		IC CONV 12-B-D/A 16-DIP-C PKG	24355	AD7542BD
A8U18	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A8U19	1826-0720	4		IC SWITCH ANLG QUAD 16-DIP-C PKG	06665	SW-02FQ
A8U20	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A8U21	1826-0471	2		IC OP AMP LOW-DRIFT TO-99 PKG	28480	1826-0471
A8VR1	1902-0197	1		DIODE-ZNR 82.5V 5% DO-15 PD=1W TC=+.082%	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
A9	**83525-60010**	**2**		**BOARD ASSEMBLY-TRANSISTOR HEAT SINK** INCLUDES PC BOARD, C1, AND C2 ONLY	**28480**	**83525-60010**
A9C1	0180-0291	3	3	CAPACITOR-FXD 1UF±10% 35VDC TA	56289	150D105X9035A2
A9C2	0180-1735	2	1	CAPACITOR-FXD .22UF±10% 35VDC TA	56289	150D224X9035A2
A9E1	1200-0043	8	3	INSULATOR-XSTR ALUMINUM	28480	1200-0043
A9E2	1200-0043	8		INSULATOR-XSTR ALUMINUM	28480	1200-0043
A9E3	1200-0043	8		INSULATOR-XSTR ALUMINUM	28480	1200-0043
A9E4	83525-20034	6	1	BACKING PAD	28480	83525-20034
A9MP1	83525-20036	8	1	HEAT SINK	28480	83525-20036
A9MP2	2360-0115	4	6	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A9MP3	2360-0115	4		SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A9MP4	2360-0115	4		SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A9MP5	2360-0115	4		SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A9MP6	2360-0115	4		SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A9MP7	2360-0115	4		SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
A9Q1	1854-0080	8	2	TRANSISTOR NPN SI TO-3 PD=100W FT=3MHZ	28480	1854-0080
A9Q2	1854-0080	8		TRANSISTOR NPN SI TO-3 PD=100W FT=3MHZ	28480	1854-0080
A9Q3	1820-0430	1	1	IC 309 V RGLTR TO-3	07263	LM309K
A10	**83595-60055**	**9**		**BOARD ASSEMBLY-MOTHER**	**28480**	**83595-60055**
A10C1	0160-3879	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	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A10C6	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A10C7	0160-3879	7		CAPACITOR-FXD .01UF ±20% 100VDC CER	28480	0160-3879
A10J1	1251-5926	3	1	CONNECTOR 50-PIN M POST TYPE	28480	1251-5926
A10J2	1251-6952	7	1	CONNECTOR 26-PIN M POST TYPE	28480	1251-6952
A10J3	1251-3196	5	1	CONNECTOR 8-PIN M POST TYPE	28480	1251-3196
A10J4	1200-0507	9	6	SOCKET-IC 16-CONT DIP-SLDR	28480	1200-0507
A10J5	1200-0507	9		SOCKET-IC 16-CONT DIP-SLDR	28480	1200-0507
A10J6	1250-0257	1	2	CONNECTOR-RF SMB M PC 50-OHM	28480	1250-0257

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
A10MP1	1251-1115	4	5	POLARIZING KEY-PC EDGE CONN	28480	1251-1115
A10MP2	1251-1115	4		POLARIZING KEY-PC EDGE CONN	28480	1251-1115
A10MP3	1251-1115	4		POLARIZING KEY-PC EDGE CONN	28480	1251-1115
A10MP4	1251-1115	4		POLARIZING KEY-PC EDGE CONN	28480	1251-1115
A10MP5	1251-1115	4		POLARIZING KEY-PC EDGE CONN	28480	1251-1115
A10R1	0698-8812	7	1	RESISTOR 1' 1% .125W F TC=0±100	28480	0698-8812
A10XA1				NOT ASSIGNED		
A10XA2				NOT ASSIGNED		
A10XA3	1251-1365	6	6	CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A10XA4	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A10XA5	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A10XA6	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A10XA7	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A10XA8	1251-1365	6		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	28480	1251-1365
A10XA9	1251-0472	4	1	CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS	28480	1251-0472
A11	**86222-60007**	**7**	**1**	**CAVITY OSCILLATOR**	**28480**	**86222-60007**
A11C1	0180-2216	6	1	CAPACITOR-FXD 350UF+75-10% 16VDC AL	56289	30D357G016DH2
A11C2	0180-2144	9	1	CAPACITOR-FXD 200UF+75-10% 25VDC AL	56289	30D207G025DH9
A12	**5086-7340**	**2**	**1**	**SWITCHED YIG TUNED MULTIPLIER**	**28480**	**5086-7340**
A12	5086-6340	0		EXCHANGE 5086-7340 YTM	28480	5086-6340
A12A1				BD ASSY-SWITCHED YTM HEATER P/O A12 AND NOT SEPARATELY REPLACEABLE		
A12A1C1	0160-2055	9	2	CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A12A1C2	0160-2055	9		CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
A12A1C3	0180-0049	9	1	CAPACITOR-FXD 20UF+75-10% 50VDC AL	56289	30D206G050CC2
A12A1CR1	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A12A1E1	1251-3172	7	21	CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A12A1E2	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A12A1E3	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A12A1E4	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A12A1J1	1200-0507	9		SOCKET-IC 16-CONT DIP-SLDR	28480	1200-0507
A12A1MP1	1205-0011	0	1	HEAT SINK TO-5/TO-39-CS	28480	1205-0011
A12A1MP2	1200-0173	5		INSULATOR-XSTR DAP-GL	28480	1200-0173
A12A1Q1	1853-0038	4	1	TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0038
A12A1R1	0757-0465	6		RESISTOR 100K 1% .125W F TC=0±100	24546	C4-1/8-T0-1003-F
A12A1R2	0757-0465	6		RESISTOR 100K 1% .125W F TC=0±100	24546	C4-1/8-T0-1003-F
A12A1R3	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A12A1R4	0698-3162	0	1	RESISTOR 46.4K 1% .125W F TC=0±100	24546	C4-1/8-T0-4642-F
A12A1R5	0683-1555	0	1	RESISTOR 1.5M 5% .25W FC TC=-900/+1100	01121	CB1555
A12A1R6	0757-0447	4		RESISTOR 16.2K 1% .125W F TC=0±100	24546	C4-1/8-T0-1622-F
A12A1R7	0698-3154	0		RESISTOR 4.22K 1% .125W F TC=0±100	24546	C4-1/8-T0-4221-F
A12A1TP1	1251-0600	0	10	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A12A1TP2	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A12A1TP3	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A12A1TP4	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A12A1U1	1826-0261	8		IC OP AMP LOW-NOISE TO-99 PKG	28480	1826-0261
A12A1VR1	1902-0176	6	1	DIODE-ZNR 47.5V 5% DO-15 PD=1W TC=+.081%	28480	1902-0176
A13	**5086-7337**	**7**	**1**	**OSCILLATOR 2.3 - 7.0 GHZ**	**28480**	**5086-7337**
A13E1	5001-1559	5	1	INSULATOR	28480	5001-1559
A13	5086-6337	5		EXCHANGE 5086-7337 OSCILLATOR	28480	5086-6337
A13A1				BD ASSY-OSCILLATOR BIAS P/O A13 AND NOT SEPARATELY REPLACEABLE		
A13A1C1	0160-0127	2		CAPACITOR-FXD 1UF ±20% 25VDC CER	28480	0160-0127
A13A1C2	0160-0127	2		CAPACITOR-FXD 1UF ±20% 25VDC CER	28480	0160-0127
A13A1CR1	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A13A1E1	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A13A1E2	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A13A1E3	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A13A1E4	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A13A1E5	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A13A1E6	1251-0600	0		CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	28480	1251-0600
A13A1J1	1200-0507	9		SOCKET-IC 16-CONT DIP-SLDR	28480	1200-0507
A13A1J2	1250-0257	1		CONNECTOR-RF SMB M PC 50-OHM	28480	1250-0257
A13A1MP1	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172

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
A13A1R1*				FACTORY SELECTED		
A13A1R2*				FACTORY SELECTED		
A13A1R3	0757-0279	0		RESISTOR 3.16K 1% .125W F TC=0±100	24546	C4-1/8-T0-3161-F
A13A1R4	2100-2633	5		RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN	30983	ET50X102
A13A1VR1	1902-0579	3	2	DIODE-ZNR 5.11V 5% DO-15 PD=1W TC=-.009%	28480	1902-0579
A13A1VR2	1902-0579	3		DIODE-ZNR 5.11V 5% DO-15 PD=1W TC=-.009%	28480	1902-0579
A13A1VR3	1902-0197	1		DIODE-ZNR 82.5V 5% DO-15 PD=1W TC=+.082%	28480	1902-0197
A14	**5086-7386**	**6**	**1**	**POWER AMPLIFIER (2.3-26.5 GHZ)**	**28480**	**5086-7386**
A14	5086-6386	2		EXCHANGE 5086-7386 AMPLIFIER	28480	5086-6386
A14A1			1	BD ASSY-AMP BIAS PART OF A14 AND NOT SEPARATELY REPLACEABLE		
A14A1C1	0160-0174	9		CAPACITOR-FXD .47UF +80-20% 25VDC CER	28480	0160-0174
A14A1C2	0180-1704	5	4	CAPACITOR-FXD 47UF±10% 6VDC TA	56289	150D476X9006B2
A14A1C3	0180-1704	5		CAPACITOR-FXD 47UF±10% 6VDC TA	56289	150D476X9006B2
A14A1C4	0180-0291	3		CAPACITOR-FXD 1UF±10% 35VDC TA	56289	150D105X9035A2
A14A1C5	0180-0291	3		CAPACITOR-FXD 1UF±10% 35VDC TA	56289	150D105X9035A2
A14A1C6	0180-1704	5		CAPACITOR-FXD 47UF±10% 6VDC TA	56289	150D476X9006B2
A14A1C7	0180-1704	5		CAPACITOR-FXD 47UF±10% 6VDC TA	56289	150D476X9006B2
A14A1C8	0160-0174	9		CAPACITOR-FXD .47UF +80-20% 25VDC CER	28480	0160-0174
A14A1E1	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E2	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E3	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E4	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E5	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E6	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E7	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E8	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E9	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E10	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E11	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1E12	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A14A1J1	1200-0507	9		SOCKET-IC 16-CONT DIP-SLDR	28480	1200-0507
A14A1MP1	1200-0173	5		INSULATOR-XSTR DAP-GL	28480	1200-0173
A14A1MP2	0380-0322	5	8	SPACER-RVT-ON .062-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A14A1MP3	0380-0322	5		SPACER-RVT-ON .062-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A14A1MP4	0380-0322	5		SPACER-RVT-ON .062-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A14A1MP5	0380-0322	5		SPACER-RVT-ON .062-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A14A1MP6	0380-0322	5		SPACER-RVT-ON .062-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A14A1MP7	0380-0322	5		SPACER-RVT-ON .062-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A14A1MP8	0380-0322	5		SPACER-RVT-ON .062-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A14A1MP9	0380-0322	5		SPACER-RVT-ON .062-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A14A1Q1	1854-0477	7		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A14A1Q2	1853-0213	7	1	TRANSISTOR PNP 2N4236 SI TO-5 PD=1W	04713	2N4236
A14A1R1	0698-3443	0	1	RESISTOR 287 1% .125W F TC=0±100	24546	C4-1/8-T0-287R-F
A14A1R2	0757-0420	3		RESISTOR 750 1% .125W F TC=0±100	24546	C4-1/8-T0-751-F
A14A1R3	0698-3441	8	3	RESISTOR 215 1% .125W F TC=0±100	24546	C4-1/8-T0-215R-F
A14A1R4	0698-3441	8		RESISTOR 215 1% .125W F TC=0±100	24546	C4-1/8-T0-215R-F
A14A1R5	0757-0280	3		RESISTOR 1K 1% .125W F TC=0±100	24546	C4-1/8-T0-1001-F
A14A1R6	0757-0198	2	1	RESISTOR 100 1% .5W F TC=0±100	28480	0757-0198
A14A1R7	0757-0417	8	2	RESISTOR 562 1% .125W F TC=0±100	24546	C4-1/8-T0-562R-F
A14A1R8	0757-0400	9	2	RESISTOR 90.9 1% .125W F TC=0±100	24546	C4-1/8-T0-90R9-F
A14A1R9	0757-0400	9		RESISTOR 90.9 1% .125W F TC=0±100	24546	C4-1/8-T0-90R9-F
A14A1R10	0698-3441	8		RESISTOR 215 1% .125W F TC=0±100	24546	C4-1/8-T0-215R-F
A14A1R11				FACTORY ADJUSTED; NOT REPLACEABLE		
A14A1R12				NOT ASSIGNED		
A14A1R13				FACTORY ADJUSTED; NOT REPLACEABLE		
A14A1R14				FACTORY ADJUSTED; NOT REPLACEABLE		
A14A1R15				FACTORY ADJUSTED; NOT REPLACEABLE		
A14A1R16				FACTORY ADJUSTED; NOT REPLACEABLE		
A14A1R17				NOT ASSIGNED		
A14A1R18				FACTORY ADJUSTED; NOT REPLACEABLE		
A14A1R19	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A14A1R20				NOT ASSIGNED		
A14A1R21	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A14A1R22	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A14A1R23	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A14A1R24	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A14A1R25				NOT ASSIGNED		
A14A1R26	0757-0442	9		RESISTOR 10K 1% .125W F TC=0±100	24546	C4-1/8-T0-1002-F
A14A1R27	0757-0417	8		RESISTOR 562 1% .125W F TC=0±100	24546	C4-1/8-T0-562R-F
A14A1R28	0757-0403	2		RESISTOR 121 1% .125W F TC=0±100	24546	C4-1/8-T0-121R-F
A14A1R29				NOT ASSIGNED		
A14A1R30	0698-0084	9		RESISTOR 2.15K 1% .125W F TC=0±100	24546	C4-1/8-T0-2151-F
A14A1R31	0698-0084	9		RESISTOR 2.15K 1% .125W F TC=0±100	24546	C4-1/8-T0-2151-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
A14A1VR1	1902-0551	1	2	DIODE-ZNR 6.19V 5% DO-15 PD=1W TC=+.022%	28480	1902-0551
A14A1VR2	1902-0029	8	1	DIODE-ZNR 12.1V 5% DO-15 PD=1W TC=+.064%	28480	1902-0029
A15	**5086-7238**	7	**1**	**DC RETURN**	**28480**	**5086-7238**
A16	**5086-7339**	9	**1**	**MODULATOR/SPLITTER**	**28480**	**5086-7339**
A16	5086-6339	7		EXCHANGE 5086-7339 MOD/SPLITTER	28480	5086-6339
A16A1				BOARD ASSEMBLY-MOD/SPLITTER PART OF A16 AND NOT SEPARATELY REPLACEABLE		
A16A1C1	0160-0174	9		CAPACITOR-FXD .47UF +80 -20% 25VDC CER	28480	0160-0174
A16A1C2	0180-2602	4	2	CAPACITOR-FXD 47UF±20% 8VDC TA	28480	0180-2602
A16A1C3	0180-2602	4		CAPACITOR-FXD 47UF±20% 8VDC TA	28480	0180-2602
A16A1E1	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A16A1E2	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A16A1E3	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A16A1E4	1251-3172	7		CONNECTOR-SGL CONT SKT .03-IN-BSC-SZ RND	28480	1251-3172
A16A1J1	1200-0507	9		SOCKET-IC 16-CONT DIP-SLDR	28480	1200-0507
A16A1J2	1251-4572	3	1	CONNECTOR 10-PIN M POST TYPE	28480	1251-4572
A16A1MP1	0380-0321	4	4	SPACER-RVT-ON .125-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A16A1MP2	0380-0321	4		SPACER-RVT-ON .125-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A16A1MP3	0380-0321	4		SPACER-RVT-ON .125-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A16A1MP4	0380-0321	4		SPACER-RVT-ON .125-IN-LG .152-IN-ID	00000	ORDER BY DESCRIPTION
A16A1MP5	0570-0034	9	1	SCREW-MACH 4-40 .25-IN-LG RD-HD-SLT	00000	ORDER BY DESCRIPTION
A16A1MP6	0510-0160	6	1	NUT-HEX-DBL-CHAM 4-40-THD .122-IN-THK	00000	ORDER BY DESCRIPTION
A16A1Q1	1854-0456	2	1	TRANSISTOR NPN SI PD=65W FT=3MHZ	01295	TIP41A
A16A1Q2	1854-0477	7		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A16A1R1	0698-7231	2	1	RESISTOR 619 1% .05W F TC=0±100	24546	C3-1/8-TO-619R-G
A16A1R2	0698-7220	9	1	RESISTOR 215 1% .05W F TC=0±100	24546	C3-1/8-TO-215R-G
A16A1R3	0698-7223	2	1	RESISTOR 287 1% .05W F TC=0±100	24546	C3-1/8-TO-287R-G
A16A1R4				FACTORY ADJUSTED; NOT REPLACEABLE		
A16A1R5	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-TO-1002-G
A16A1R6				FACTORY ADJUSTED; NOT REPLACEABLE		
A16A1R7	0698-7260	7		RESISTOR 10K 1% .05W F TC=0±100	24546	C3-1/8-TO-1002-G
A16A1R8	0698-7244	7		RESISTOR 2.15K 1% .05W F TC=0±100	24546	C3-1/8-TO-2151-G
A16A1R9	0698-7273	2	1	RESISTOR 34.8K 1% .05W F TC=0±100	24546	C3-1/8-TO-3482-G
A16A1R10	0698-7257	2		RESISTOR 7.5K 1% .05W F TC=0±100	24546	C3-1/8-TO-7501-G
A16A1R11	0698-7233	4		RESISTOR 750 1% .05W F TC=0±100	24546	C3-1/8-TO-750R-G
A16A1VR1	1902-0551	1		DIODE-ZNR 6.19V 5% DO-15 PD=1W TC=+.022%	28480	1902-0551
A16A1VR2	1902-3171	7	1	DIODE-ZNR 11V 5% DO-35 PD=.4W TC=+.062%	28480	1902-3171
A17	**5086-7217**	**2**	**1**	**AMPLIFIER .01-2.4 GHZ**	**28480**	**5086-7217**
A17	5086-6217	0		EXCHANGE 5086-7217 AMPLIFIER	28480	5086-6217
A18	**5086-7219**	**4**	**1**	**MODULATOR-MIXER**	**28480**	**5086-7219**
A18	5086-6219	2		EXCHANGE 5086-7219 MOD-MIXER	28480	5086-6219
AT1	0960-0638	6	1	ISOLATOR-2.0-7.0 GHZ	28480	0960-0638
CR1	83595-60045	7	1	LBHCD DETECTOR-0.01-26.5 GHZ	28480	83595-60045
CR2	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
CR3	1901-0033	2		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
DC1	5086-7220	7	1	DIRECTIONAL DETECTOR	28480	5086-7220
DC2	0955-0125	5	1	DIRECTIONAL COUPLER .01-26.5 GHZ	28480	0955-0125
E1	5040-0345	7	2	INSULATOR:CONNECTOR	28480	5040-0345
E2	5040-0345	7		INSULATOR:CONNECTOR	28480	5040-0345
J1	5061-1100	8	1	CONNECTOR ASSEMBLY, APC-3.5M	28480	5061-1100
J2	1250-0118	3	3	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0118
J3	86290-60005	7		CONNECTOR ASSEMBLY TYPE-N	28480	86290-60005
J4	1250-0118	3		CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0118
J5	1250-0118	3		CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0118
MP1	0370-3023	8	1	KNOB-3/4 JACK .25-IN-ID	28480	0370-3023
MP2	83525-00005	9	1	COVER-PC	28480	83525-00005
MP3	4040-1695	1	1	WINDOW-DISPLAY	28480	4040-1695
MP4	83595-00001	9	1	FRONT PANEL-DRESS	28480	83595-00001
MP5	5041-0285	6	5	KEY CAP-LITE	28480	5041-0285
MP6	5040-8823	2	2	KEY CAP-JADE GRAY	28480	5040-8823
MP7	5041-1926	4	1	KEY CAP-SLOPE	28480	5041-1926
MP8	5041-1924	2	1	KEY CAP-POWER LEVEL	28480	5041-1924
MP9	5041-1925	3	1	KEY CAP-POWER SWEEP	28480	5041-1925
MP10	0050-2032	9	1	CASTING-AL FRAME (RR)	28480	0050-2032
MP11	0050-2067	0	1	CASTING-AL OSCILLATOR BRACKET	28480	0050-2067
MP12	0050-2069	2	1	CASTING-AL HEAT SINK RF	28480	0050-2069
MP13	0050-2068	1	1	CASTING-AL HEAT SINK	28480	0050-2068
MP14	83525-20038	0	1	SHIELD-REAR	28480	83525-20038

See introduction to this section for ordering information
*Indicates factory selected value

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	CD	Qty	Description	Mfr Code	Mfr Part Number
MP15	1400-1095	6	4	CLIP-FASTENER .400 X .300 X .090 HI; BE	28480	1400-1095
MP16	83525-20037	9	1	SHIELD-FRONT	28480	83525-20037
MP17	83592-20016	5	1	SIDERAIL UPPER RIGHT	28480	83592-20016
MP18	83525-20039	1	1	CASTING-FRONT	28480	83525-20039
MP19	0510-1148	2	5	RETAINER-PUSH ON KB-TO-SHFT EXT	28480	0510-1148
MP20	83592-20017	6	1	SIDERAIL UPPER LEFT	28480	83592-20017
MP21	83592-00008	3	1	SHIELD-ISOLATOR	28480	83592-00008
MP22	0050-2066	9	1	CASTING-AL HEAT SINK, RF	28480	0050-2066
MP23	83592-00006	1	1	BRACKET-ISOLATOR	28480	83592-00006
MP24	83592-00013	0	1	BRACKET-DET/DC RET	28480	83592-00013
MP25	83525-00010	6	1	GUARD	28480	83525-00010
MP26	1460-1851	8	1	WIREFORM MUW BLK OXD	28480	1460-1851
MP27	1480-0337	5	1	PIN-ROLL .094-IN-DIA .188-IN-LG STL	28480	1480-0337
MP28	83525-20033	5	1	LATCH-SCREW	28480	83525-20033
	3030-0007	5	2	SCREW-SET 4-40 .125-IN-LG SMALL CUP-PT	00000	ORDER BY DESCRIPTION
MP29	83525-20040	4	1	LATCH	28480	83525-20040
MP30	83592-00009	4	1	BRACKET-COUPLER	28480	83592-00009
MP31	83592-20018	7	1	SIDERAIL-LOWER LEFT	28480	83592-20018
MP32	83592-20015	4	1	SIDERAIL-LOWER RIGHT	28480	83592-20015
MP33	83592-00012	9	1	WIRE HOLDER	28480	83592-00012
MP34	83592-00004	9	1	BRACKET-AMPLIFIER	28480	83592-00004
MP35	83592-00003	8	1	PANEL-REAR	28480	83592-00003
MP36	5021-0906	6	3	BUSHING-PLASTIC	28480	5021-0906
MP37	11869-20020	4	1	ALIGNMENT PIN	28480	11869-20020
MP38	6960-0002	4	1	PLUG-HOLE DOME-HD FOR .5-D-HOLE STL	28480	6960-0002
MP39	6960-0003	5	1	PLUG-HOLE DOME-HD FOR .75-D-HOLE STL	28480	6960-0003
R1	0811-3573	9	2	RESISTOR-MATCHED SET WIREWOUND CHASSIS	28480	0811-3573
R2	0811-3573	9		RESISTOR-MATCHED SET WIREWOUND CHASSIS	28480	0811-3573
W1	83595-20013	5	1	CBL-RF COUPLER/OUTPUT	28480	83595-20013
W2	83592-60021	6	1	CABLE COAX EXT/MTR ALC	28480	83592-60021
W3	83592-60025	0	1	CABLE ASSY RIBBON FRONT PANEL	28480	83592-60025
W4	83592-60018	1	1	CABLE ASSY RIBBON RF SECTION	28480	83592-60018
W5	83592-60017	0	1	CABLE COAX PULSE IN	28480	83592-60017
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 GRAY 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	83592-60014	7	1	CABLE COAX, YELLOW, MOD 1	28480	83592-60014
W14	83592-60019	2	1	CABLE COAX RIBBON, RF SECTION	28480	83592-60019
W15	83592-20047	2	1	CABLE-RF DC2/YTM	28480	83592-20047
W16	83592-20039	2	1	CABLE-RF AT1/YTM	28480	83592-20039
W17	83592-20038	1	1	CABLE-RF PWR AMPL/AT1	28480	83592-20038
W18	83592-20034	7	1	CABLE-RF DC1/DC RETURN	28480	83592-20034
W19	83592-20044	9	1	CABLE-RF A17/DC1 RETURN	28480	83592-20044
W20	83592-20042	7	1	CABLE-RF A16/A14	28480	83592-20042
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/A12	28480	83592-20035
W25	83592-20036	9	1	CABLE-RF A13/A16	28480	83592-20036
W26	83592-20043	8	1	CABLE-RF A16/J3 AUX OUTPUT	28480	83592-20043
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 CONN	28480	83525-60056
				OPTION 002		
A19	83595-60019	5	1	ATTENUATOR-55 DB (OPT. 002 ONLY)	28480	83595-60019
A19MP1	83592-00010	7	1	BRACKET-ATTENUATOR	28480	83592-00010
MP1	6960-0106	9		PLUG-HOLE .625D HOLE (DELETE MP38)	28480	6960-0106
MP2	6960-0107	0		PLUG-HOLE FOR .75D HOLE (DELETE MP39)	28480	6960-0107
W8	83592-60023	8	1	CABLE-COAX DETECTOR, GRAY (DELETE STD MP4)	28480	83592-60023
W15	83592-20048	3	1	CABLE-RF DC2/YTM (DELETE STD W15)	28480	83592-20048
W30	83595-20014	6	1	CABLE-RF A19/RF OUTPUT	28480	83595-20014
W31	83592-20029	0	1	CABLE-RF DC2/A19	28480	83592-20029
				OPTION 004		
MP4	83592-00002	7	1	PANEL-DRESS (OPT. 004 ONLY)(DELETE STD MP4)	28480	83592-00002
W2	83592-60024	9	1	CABLE-COAX EXT/MTR ALC(OPT. 004)(DELETE STD W2)	28480	83592-60024
W8	83592-60023	8	1	CABLE-COAX DETECTOR, GRAY (DELETE STD W8)	28480	83592-60023
W15	83592-20048	3	1	CABLE-RF DC2/YTM (DELETE STD W15)	28480	83592-20048
W32	83592-20052	9	1	CABLE-RF DC2/REAR PANEL RF OUTPUT	28480	83592-20052

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
				OPTION 002 AND 004		
A19	83595-60019	5		ATTENUATOR-55DB	28480	83595-60019
A19MP1	83592-00010			BRACKET-ATTENUATOR	28480	83592-00010
MP1	6960-0106	9		PLUG-HOLE .625D HOLE (DELETE MP38)	28480	6960-0106
MP2	6960-0107	0		PLUG-HOLE FOR .750 HOLE (DELETE MP39)	28480	6960-0107
W8	83592-60023	8		CABLE-COAX DETECTOR, GRAY (DELETE STD W8)	28480	83592-60023
W15	83592-20048	3	1	CABLE-RF DC2/YTM (DELETE STD W15)	28480	83592-20048
W30	83592-20050	7	1	CABLE-RF A19/RF OUTPUT	28480	83592-20050
W31	83592-20029	0		CABLE-RF DC2/A19	28480	83592-20029
W32	83592-20052	9		CABLE-RF DC2/REAR PANEL RF OUTPUT	28480	83592-20052
W33	83592-20051	8	1	CABLE-RF A19/REAR PANEL RF OUTPUT	28480	83592-20051
				ACCESSORIES		
	1250-1404	2	1	ADAPTER TYPE-N(F) TO SMA (F)	28480	1250-1404
				ATTACHING HARDWARE NOTE SEE FIGURE 6-3 FOR ATTACHING HARDWARE LOCATIONS		
1	0520-0126	5	6	SCREW-MACH 2-56 .125-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
2	0520-0127	6	6	SCREW-MACH 2-56 .188-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
3	0520-0166	3	2	SCREW-MACH 2-56 .375-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
4	0624-0281	3	28	SCREW-TPG 4-20 .5-IN-LG PAN-HD-POZI STL	28480	0624-0281
5	2200-0101	0	5	SCREW-MACH 4-40 .188-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
6	2200-0103	2	10	SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
7	2200-0105	4	6	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
8	2200-0107	6	6	SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
9	2200-0113	4	8	SCREW-MACH 4-40 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
10	2200-0164	5	2	SCREW-MACH 4-40 .188-IN-LG UNCT 82 DEG	00000	ORDER BY DESCRIPTION
11	2200-0166	7	2	SCREW-MACH 4-40 .312-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
12	2360-0115	4	23	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
13	2360-0117	6	3	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
14	2360-0119	8	2	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
15	2360-0129	0	4	SCREW-MACH 6-32 1-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
16	2360-0182	5	3	SCREW-MACH 6-32 .312-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
17	2360-0197	2	5	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
18	2360-0323	8	16	SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	2360-0323
19	2510-0051	6	2	SCREW-MACH 8-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
20	2360-0009	3	6	NUT-HEX-W LKWR 4-40-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
21	2420-0001	5	5	NUT-HEX-W LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
22	2950-0001	8	4	NUT-HEX-DBL-CHAM 3 8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
23	2950-0132	6	2	NUT-HEX-DBL-CHAM 7 16-28-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
24	2950-0177	9	1	NUT-HEX-DBL-CHAM 1 4-36-THD .05-IN-THK	28480	2950-0177
25	1250-1142	5	1	WASHER-LK INTL T 1 2 IN .26-IN-ID	28480	1250-1142
26	2190-0004	9	2	WASHER-LK INTL T NO 4 .115-IN-ID	28480	2190-0004
27	2190-0014	1	6	WASHER-LK INTL T NO 2 .089-IN-ID	28480	2190-0014
28	2190-0016	3	2	WASHER-LK INTL T 3 8 IN .377-IN-ID	28480	2190-0016
29	2190-0104	0	2	WASHER-LK INTL T 7 16 IN .439-IN-ID	28480	2190-0104
30	0360-0355	2	1	TERMINAL-SLDR LUG PL-MTG FOR-#5-SCR	28480	0360-0355
31	0360-1190	5	1	TERMINAL-SLDR LUG PL-MTG FOR-#8-SCR	28480	0360-1190
32	0360-1632	0	2	TERMINAL-SLDR LUG LK-MTG FOR #3/8-SCR	28480	0360-1632
33	83595-20004	4	1	SPACER, RF OUTPUT CONNECTOR	28480	83595-20004

See introduction to this section for ordering information
*Indicates factory selected value