



**HEWLETT
PACKARD**

**8566B
SPECTRUM ANALYZER
100 Hz – 2.5 GHz/2 – 22 GHz**

**PERFORMANCE TESTS
AND
ADJUSTMENTS**

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HP 8566B SPECTRUM ANALYZER DOCUMENTATION OUTLINE

Included with the HP Model 8566B Spectrum Analyzer are three manuals: the Operator's Handbook, the Operating and Programming Manual, and the Tests and Adjustments Manual. Not included with the instrument, but available at no charge upon return of the enclosed order card, is the two-volume Troubleshooting and Repair Manual.

OPERATOR'S HANDBOOK (HP Part Number 08566-90045)

Contents:

General Information, Installation, Quick Reference, Specifications, and Operation Verification. Available as separate publications are Specifications (HP Part Number 08566-90046), Operation Verification (HP Part Number 08566-60008), and a pocket-sized version of the Quick Reference Guide.

OPERATING AND PROGRAMMING MANUAL (HP Part Number 08566-90040)

Contents:

Manual and remote operation, including complete syntax and command description. Accompanying this manual is the separate, pocket-sized Quick Reference Guide (HP Part Number 5955-8970).

TESTS AND ADJUSTMENTS MANUAL (HP Part Number 08566-90051)

Contents:

Electrical performance testing and adjustment procedures.

TROUBLESHOOTING AND REPAIR MANUAL (HP Part Number 08566-90042)

Contents:

IF-Display Section and RF Section service information.

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MAJOR ASSEMBLY AND COMPONENT LOCATIONS

Major Assembly and Component Locations (RF Section)
Major Assembly and Component Locations (IF-Display Section)

GENERAL INFORMATION INTRODUCTION

This HP 8566B Tests and Adjustments Manual contains two sections: the Performance Tests and the Adjustments procedures.

The Performance Tests provided should be performed for the following reasons:

- If the test equipment for the Operation Verification Program is not available.
- If the instrument does not pass all of the Operation Verification tests.
- For complete verification of specifications not covered by the Operation Verification program.

A high confidence level in the instrument's operation can be achieved by running only the Operation Verification Program, since it tests most of the instrument's specifications. It is recommended that the Operation Verification Program be used for incoming inspection and after repairs, since it requires much less time and test equipment. A description of the program can be found in the Operator's Handbook.

The Adjustment procedures should be performed for the following reasons:

- If the results of a performance test are not within the specifications.
- After the replacement of a part or component that affects electrical performance.

TABLE 1. RECOMMENDED TEST EQUIPMENT (1 OF 6)

Instrument	Critical Specifications for Equipment Substitution	Recommended Model	Perf. Test	Adj.
SIGNAL SOURCES				
Synthesized Sweeper	Frequency: 10 MHz to 21 GHz Output Power: + 10 dBm maximum (leveled <13.5 GHz) + 3 dBm maximum (leveled) Aging Rate: $<1 \times 10^{-9}$ /day Spurious Signals: < -35 dBc (<7 GHz) < -25 dBc (<20 GHz) Amplitude Modulation: dc to 100 kHz Leveling: Internal, External Power Meter	HP 8340A	X	
Signal Generator	Frequency: 20 – 800 MHz SSB Phase Noise: >130 dB below carrier at 20 kHz away Stability: <10 ppm/10 min. (HP 8340A may be substituted)	HP 8640B, Opt. 002		X
Signal Generator	Frequency: 2 – 18 GHz Stability: $<5 \times 10^{-10}$ /day	HP 8672A	X	X
Signal Generator	Frequency Range: 2.3 to 6.1 GHz or greater Noise Sidebands: < -80 dBc (1 Hz) at 300 Hz offset < -85 dBc (1 Hz) at 1 kHz offset < -105 dBc (1 Hz) at 100 kHz offset	HP 8566A/B (1st LO Output)	X	
Sweep Oscillator	Mainframe for RF Plug-Ins	HP 8620C		X
RF Plug-In	Frequency: 10 kHz to 2 GHz Power: 0 dBm Leveling: Internal, External Power Meter	HP 86222A		X
RF Plug-In	Frequency: 2 – 22 GHz Power: + 3 dBm Leveling: Internal, External Power Meter	HP 86290B-H08		X
Synchronizer	Internal Oscillator Frequency: 21.4 MHz Error Output Voltage Polarity: + or – selectable from front-panel switch	HP 8709A-H10		X

TABLE 1. RECOMMENDED TEST EQUIPMENT (2 OF 6)

Instrument	Critical Specifications for Equipment Substitution	Recommended Model	Perf. Test	Adj.
SIGNAL SOURCES (Cont'd)				
Frequency Synthesizer	Frequency: 200 Hz to 80 MHz Stability: $\pm 1 \times 10^{-8}$ /day Amplitude Range: +13 to -86 dBm with 0.01 dB resolution Attenuator Accuracy: $< \pm 0.07$ dB (+13 to -47 dBm)	HP 3335A	X	X
Pulse Generator	Pulse Width: 10 nsec to 250 nsec Rise and Fall Times: < 6 nsec Output Level: +2.5V	HP 8116A		X
Function Generator (2 required)	Output: Sine Wave and Triangle Wave, 10V p-p Range: 100 Hz to 500 kHz (Sweep Function Available)	HP 3312A	X	X
Function Generator	Output: Sine Wave, Adjustable 15 - 18V p-p Frequency: Adjustable 20 to 200 Hz	HP 3310A		X
Frequency Standard	Output: 1, 2, 5, or 10 MHz Accuracy: $< \pm 1 \times 10^{-10}$ Aging Rate: $< 1 \times 10^{-10}$ /day	HP 5061A	X	X
ANALYZERS				
Spectrum Analyzer	Frequency: 100 Hz to 2.5 GHz 2 to 22 GHz Preselected	HP 8566A/B	X	X
Spectrum Analyzer	Frequency: .04 to 325 MHz	HP 8557A/853A		X
AC Probe	Active probe compatible with probe power connector on Spectrum Analyzer	HP 1121A		X
COUNTERS				
Microwave Frequency Counter	Frequency: 10 Hz to 21 GHz Sensitivity: -33 dBm (< 12 GHz) -23 dBm (< 21 GHz)	HP 5343A		X
Frequency Counter	Frequency: .02 to 20 GHz Sensitivity: -30 dBm (HP 5343A may be substituted)	HP 5340A		X

TABLE 1. RECOMMENDED TEST EQUIPMENT (3 OF 6)

Instrument	Critical Specifications for Equipment Substitution	Recommended Model	Perf. Test	Adj.
COUNTERS (Cont'd)				
Electronic Counter	Range: >10 MHz Resolution: 2×10^{-9} /gate time Ext. Time Base: 1, 2, 5, or 10 MHz	HP 5345A	X	
Universal Counter	Frequency: dc to 100 MHz Time Interval A→B: 100 nsec to 200 sec Sensitivity: 50 mV rms Range: 30 mV to 5V p-p	HP 5316A	X	
OSCILLOSCOPE				
Oscilloscope	Frequency: 100 MHz Sensitivity: .005 V/Div Dual Channel: Third Channel Trigger View Display Storage	HP 1741A		X
Probe (2 required)	10:1 Divider, compatible with oscilloscope	HP 1004D		X
METERS				
Digital Voltmeter	Resolution: ± 0.1 mV Range: 0 to 100 Vdc Input Impedance 100V Range: 10 M Ω	HP 3456A	X	X
High Voltage Probe	1000:1 Divider Impedance: 10 M Ω	HP 34111A		X
Power Meter	Range: -20 to +10 dBm Accuracy: ± 0.02 dB HP-IB Compatible	HP 436A	X	
Power Sensor	Frequency: .01 to 18 GHz Compatible with HP 436A Power Meter	HP 8481A		X
Power Sensor	Frequency: 50 MHz to 26.5 GHz with APC (m) Connector Compatible with HP 436A Power Meter	HP 8485A	X	
Power Meter	Range: -20 to +10 dBm Accuracy: ± 0.02 dB	HP 432A		X
Thermistor Mount	Frequency: 18 to 22 GHz Compatible with HP 432A Power Meter	HP K486A		X

TABLE 1. RECOMMENDED TEST EQUIPMENT (4 OF 6)

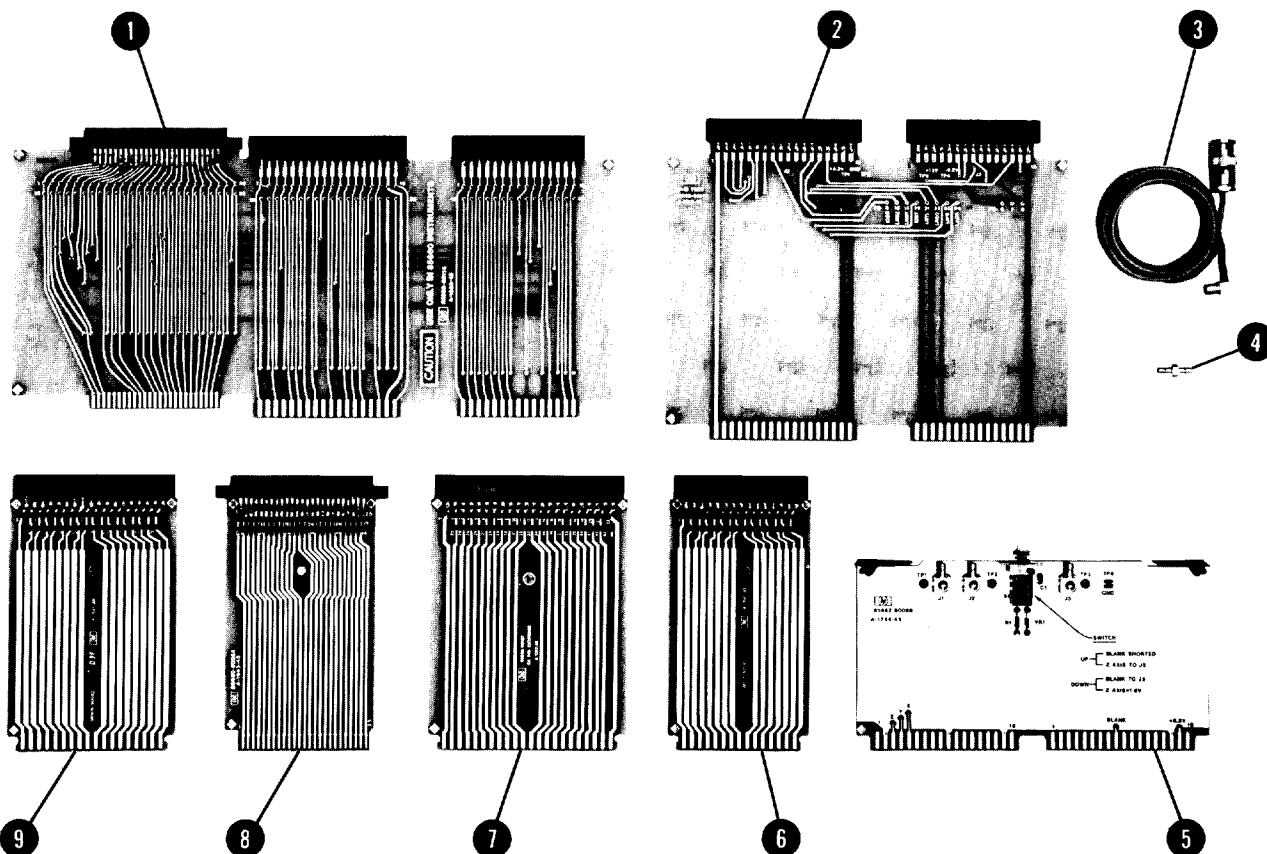
Instrument	Critical Specifications for Equipment Substitution	Recommended Model	Perf. Test	Adj.
METERS (Cont'd)				
Thermistor Mount	Frequency: 10 MHz to 18 GHz Compatible with HP 432A Power Meter	HP 8478B		X
DC SUPPLY				
Low-Voltage DC Power Supply	Output: ± 35 Vdc	HP 721A		X
ATTENUATORS				
10 dB Step Attenuator	Steps: 10 dB from 0 to 90 dB Frequency: 5 to 100 MHz Calibrated to uncertainty error of $\pm (0.02$ dB + 0.01 dB/10 dB step) at 20 MHz from 0 dB to 90 dB	HP 355D-H89		X
1 dB Step Attenuator	Steps: 1 dB from 0 to 10 dB Frequency: 20 to 100 MHz Calibrated to uncertainty error of $\pm (0.02$ dB + 0.01 dB/10 dB step) at 20 MHz from 0 dB to 10 dB	HP 355C-H25		X
20 dB Attenuator	Frequency: 200 Hz to 18 GHz Type N Connectors	HP 8491B, Option 020		X
20 dB Attenuator	Frequency: 200 Hz to 18 GHz SMA Connectors	HP 8493B, Option 020	X	
3 dB Attenuator	Frequency: 200 Hz to 18 GHz SMA Connectors	HP 8493, Option 003	X	
TERMINATIONS				
Termination	Type N Male Connector Frequency: dc to 18 GHz Impedance: 50 Ω	HP 909A, Option 012	X	
Termination	SMA Male Connector Impedance: 50 Ω	HP 1810-0118		X
FILTERS				
Low-Pass Filter	Cut-off Frequency: 250 MHz Rejection at 460 MHz: >60 dB	K&L 5L380-250-B/B	X	
Low-Pass Filter	Cut-off Frequency: 1200 MHz Rejection at 1500 MHz: >50 dB	HP 360B	X	

TABLE 1. RECOMMENDED TEST EQUIPMENT (5 OF 6)

Instrument	Critical Specifications for Equipment Substitution	Recommended Model	Perf. Test	Adj.
FILTERS (Cont'd)				
Low-Pass Filter	Cut-off Frequency: 8 GHz Rejection at 14 GHz: >80 dB	K&L 6L250-8000-NP/N	X	
MISCELLANEOUS DEVICES				
Reactive Power Divider	Range: 2 to 22 GHz Isolation: ≥ 20 dB	Omni-Spectra 2090-6202-00	X	
SPECIAL DEVICES				
Display Adjustment PC Board	Required for preliminary display adjustments	HP 85662-60088		X
Low-Noise DC Supply (Optional)	Refer to Figure 81			
Crystal Filter Bypass Network (4 required)	Refer to Figure 82			
Tuning Voltage Circuit	Refer to Figure 83			
CABLES				
Cable Assembly	Frequency Range: 200 Hz to 22 GHz SMA Male Connectors Length: 61 cm (24 inches) SWR: <1.4 at 22 GHz	HP 5061-1086	X	X
Test Cable (2 required)	BNC (m) to SMB Snap-On (f)	HP 85680-60093		X
ADAPTERS				
Adapter	Type N (f) to BNC (m)	HP 1250-0077	X	X
Adapter	Type N (f) to N (f)	HP 1250-0777	X	
Adapter	Type N (m) to N (m)	HP 1250-0778	X	
Adapter	Type N (m) to BNC (f)	HP 1250-0780	X	

TABLE 1. RECOMMENDED TEST EQUIPMENT (6 OF 6)

Instrument	Critical Specifications for Equipment Substitution	Recommended Model	Perf. Test	Adj.
ADAPTERS (Cont'd)				
Adapter	BNC Tee (m) (f) (f)	HP 1250-0781	X	
Adapter	SMA (f) to SMA (f)	HP 1250-1158	X	
Adapter	SMA (m) to SMA (m)	HP 1250-1159	X	
Adapter	BNC (f) to SMA (m)	HP 1250-1200		X
Adapter	Type N (m) to SMA (f)	HP 1250-1250	X	X
Adapter	Type N (f) to SMA (f)	HP 86290-60005	X	X
Adapter	K-Band Waveguide to SMA (f)	Maury K210C		X
Probe	SMA (m) Bulkhead Connector	HP 1250-0691		X
BOARD EXTENDERS				
Extender* (2 required)	PC Board: 36 contacts; 2 rows of 18	HP 08505-60042		X
Extender*	PC Board: 30 contacts; 2 rows of 15	HP 08505-60041		X
Extender	PC Board: 20 contacts; 2 rows of 10	HP 85680-60028		X
Extender	PC Board: 12 contacts; 2 rows of 6	HP 08505-60109		X
PC Board Extractor	PC Board extracting tool	HP 03950-4001		X
* Part of Service Accessories				



ITEM	QTY	DESCRIPTION	HP PART NUMBER	C D
1	1	Extender Board: A12 RF Section Interface	85660-60114	5
2	1	Extender Board: A13 HP-IB Interface (for 8566A only)	85660-60111	2
3	2	Cable: 4-foot long; BNC to SMB snap-on	85680-60093	3
4	1	Adapter: SMB snap-on male to SMB snap-on male	1250-0669	9
5	1	PC Board: Display Adjustment Test	85662-60088	4
6	1	Extender Board: 30 contacts; 2 rows of 15	08505-60041	7
7	2	Extender Board: 44 contacts; 2 rows of 22	08565-60107	8
8	2	Extender Board: 50 contacts; 2 rows of 25	85680-60034	2
9	2	Extender Board: 36 contacts; 2 rows of 18	08505-60042	8

FIGURE 1. SERVICE ACCESSORIES, HP PART NUMBER 08566-60001

PERFORMANCE TESTS

INTRODUCTION

The procedures in this section test the instrument's electrical performance using the Specifications in the Operator's Handbook as the performance standards. None of the tests require access to the interior of the instrument. the manual Performance Tests provided in this section should be performed only if semi-automatic test equipment (for Operation Verification) is not available and/or the Performance Test is not in the Operation Verification Program. (Refer to the Operator's Handbook for information on Operation Verification.)

VERIFICATION OF SPECIFICATIONS

When a complete verification of specifications is required, proceed as follows:

1. Run the Operation Verification Program.

2. The Operation Verification Program verifies compliance with specifications of all tests it performs. The tests not performed by the Operation Verification Program must be done manually and are as follows:

- Sweep Time Accuracy (including Fast Sweep Time Accuracy)
- Noise Sidebands
- Harmonic and Intermodulation Distortion
- Image, Multiple, and Out-of-Band Responses
- Frequency Reference Error
- Center Frequency Readout Accuracy

TABLE 1. PERFORMANCE TEST CROSS-REFERENCE

Function or Characteristic Tested	Test No.	Performance Test
Center Frequency Readout	1	Center Frequency Readout Accuracy Test
Frequency Spans	2	Frequency Span Accuracy Test
3-dB Bandwidths	3	Resolution Bandwidth Accuracy Test
Bandwidth Shape	4	Resolution Bandwidth Selectivity Test
Bandwidth Amplitudes	5	Resolution Bandwidth Switching Uncertainty Test
Log Scales	6	Log Scale Switching Uncertainty Test
IF Gains	7	IF Gain Uncertainty Test
Log and Linear Amplifier Fidelity	8	Scale Fidelity Test
CAL OUTPUT Level	9	Calibrator Amplitude Accuracy Test
Frequency Response	10	Frequency Response Test
Sweep Times	11	Sweep Time Accuracy Test
Noise Sidebands	12	Noise Sidebands Test
Line-Related Sidebands	13	Line-Related Sidebands Test
Noise Floor	14	Average Noise Level Test
Residual Responses	15	Residual Responses Test
Harmonic and Intermodulation Distortion	16	Harmonic and Intermodulation Distortion Test
Image, Multiple, and Out-of-Band Responses	17	Image, Multiple, and Out-of-Band Responses Test
Gain Compression	18	Gain Compression Test
1ST LO OUTPUT Amplitude	19	1ST LO OUTPUT Amplitude Test
SWEEP + TUNE OUT	20	SWEEP + TUNE OUT Amplitude Test
Fast Sweep Times	21	Fast Sweep Time Accuracy Test (<20 msec)
Frequency Reference	22	Frequency Reference Error Test

If the results of a performance test are marginally within specification, go to the Adjustments section of this manual and perform the related adjustments procedures. When an adjustment is directly related to a performance test, the adjustment procedure is referenced under RELATED ADJUSTMENT in the performance test.

CALIBRATION CYCLE

This instrument requires periodic verification of performance. The instrument should have a complete verification of specifications at least every six months.

EQUIPMENT REQUIRED

Equipment required for the manual performance

tests and adjustments is listed in Table 1, Recommended Test Equipment, at the beginning of this manual. Any equipment that satisfies the critical specifications given in the list may be substituted for the recommended model.

TEST RECORD

The Operation Verification Program provides a detailed test record when a printer is used with the controller. If manual performance tests are done, the results of the performance tests may be tabulated on the HP 8566B Performance Test Record at the end of this section. The HP 8566B Performance Test Record lists all of the tested specifications and the acceptable ranges for the measurement values obtained during the tests.

PERFORMANCE TESTS

NOTE

Allow ½-hour warm-up time for the 8566B before beginning the Performance Tests.

1. CENTER FREQUENCY READOUT ACCURACY TEST

RELATED ADJUSTMENTS:

10 MHz Standard Adjustment
Sweep, DAC, and Main Coil Driver Adjustments

SPECIFICATIONS:

For spans $\leq n \times 5$ MHz, $\pm$ (2% of frequency span + frequency reference error $\times$ center frequency + 10 Hz).

For spans $> n \times 5$ MHz, $\pm$ (2% of frequency span + $n \times 100$ kHz + frequency reference error $\times$ center frequency).

n*	center frequency
1	100 Hz to 5.8 GHz
2	5.8 GHz to 12.5 GHz
3	12.5 GHz to 18.6 GHz
4	>18.6 GHz

*n is the harmonic mixing number, depending on center frequency

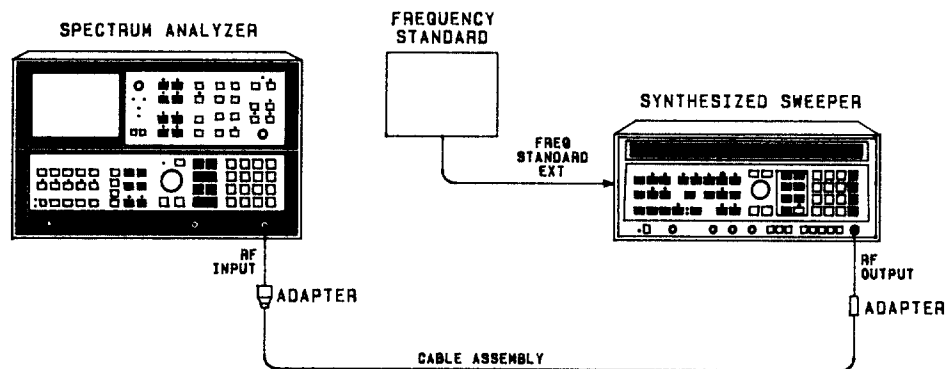


FIGURE 1. CENTER FREQUENCY TEST SETUP

PERFORMANCE TESTS

1. CENTER FREQUENCY READOUT ACCURACY TEST (Cont'd)

DESCRIPTION

A synthesized signal source that is phase-locked to a known frequency standard is used to input a signal to the analyzer. The frequency readout of the analyzer is compared to the actual input frequency for several different frequency settings over the analyzer's range. The signal source is phase-locked to a standard known to be as accurate as the analyzer's internal frequency reference to minimize the "frequency reference error X center frequency" term of the specifications.

EQUIPMENT:

Synthesized Sweeper	HP 8340A
Frequency Standard	a 10 MHz standard with accuracy within ± 1 part in 10^{10} such as HP 5061A
Adapter, Type N (m) to SMA (f)	HP 1250-1250
Adapter, SMA (f) to SMA (f)	HP 1250-1158
Cable Assembly, SMA Male Connectors	HP 5061-1086

PROCEDURE:

1. Connect CAL OUTPUT to RF INPUT.
2. Press 2-22 GHz, RECALL, 9.
3. Adjust FREQ ZERO for a maximum amplitude trace.
4. Press 2-22 GHz.
5. Set the synthesized sweeper for a 2.000000 GHz signal at a level of approximately 0 dBm.
6. Connect equipment as shown in Figure 1.
7. Set analyzer CENTER FREQUENCY and FREQUENCY SPAN and synthesized sweeper frequency according to Table 2. At each setting, press PEAK SEARCH, MR=CF to center the signal. Adjust REFERENCE LEVEL as necessary to place signal peak at a convenient level.
8. Record the CENTER FREQUENCY readout in the table for each setting. The limits for this frequency are given in the table. Refer to Figure 2.

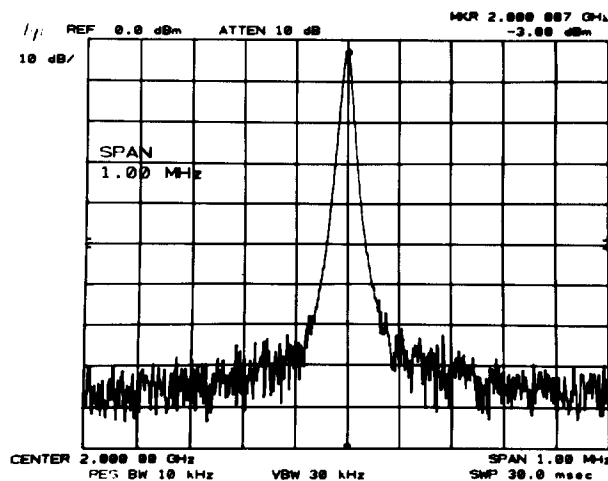


FIGURE 2. CENTER FREQUENCY ACCURACY MEASUREMENT

PERFORMANCE TESTS

1. CENTER FREQUENCY READOUT ACCURACY TEST (Cont'd)

NOTE

The spectrum analyzer CENTER FREQUENCY readout may fall outside of the specified limits if the internal frequency reference of the analyzer has not been calibrated within the past year. To eliminate the "frequency reference error X center frequency" error, the analyzer's 10 MHz Frequency Reference Output (on the rear panel) may be substituted for the frequency standard.

TABLE 2. CENTER FREQUENCY READOUT ACCURACY

SYNTHESIZED SWEEPER FREQUENCY	FREQUENCY SPAN	CENTER FREQUENCY	CENTER FREQUENCY Readout		
			Min.	Actual	Max.
2 GHz	1 MHz	2 GHz	1.999 98 GHz	_____	2.000 02 GHz
2 GHz	10 MHz	2 GHz	1.999 7 GHz	_____	2.000 3 GHz
2 GHz	100 MHz	2 GHz	1.998 GHz	_____	2.002 GHz
2 GHz	1 GHz	2 GHz	1.98 GHz	_____	2.02 GHz
3 GHz	1 MHz	3 GHz	2.999 98 GHz	_____	3.000 02 GHz
3 GHz	10 MHz	3 GHz	2.999 7 GHz	_____	3.000 3 GHz
3 GHz	100 MHz	3 GHz	2.998 GHz	_____	3.002 GHz
3 GHz	1 GHz	3 GHz	2.98 GHz	_____	3.02 GHz
6 GHz	1 MHz	6 GHz	5.999 98 GHz	_____	6.000 02 GHz
6 GHz	10 MHz	6 GHz	5.999 8 GHz	_____	6.000 2 GHz
6 GHz	100 MHz	6 GHz	5.998 GHz	_____	6.002 GHz
6 GHz	1 GHz	6 GHz	5.98 GHz	_____	6.02 GHz
9 GHz	1 MHz	9 GHz	8.999 98 GHz	_____	9.000 02 GHz
9 GHz	10 MHz	9 GHz	8.999 8 GHz	_____	9.000 2 GHz
9 GHz	100 MHz	9 GHz	8.998 GHz	_____	9.002 GHz
9 GHz	1 GHz	9 GHz	8.98 GHz	_____	9.02 GHz
9 GHz	10 GHz	9 GHz	8.8 GHz	_____	9.2 GHz
12 GHz	1 MHz	12 GHz	11.999 98 GHz	_____	12.000 02 GHz
12 GHz	10 MHz	12 GHz	11.999 8 GHz	_____	12.000 2 GHz
12 GHz	100 MHz	12 GHz	11.998 GHz	_____	12.002 GHz
12 GHz	1 GHz	12 GHz	11.98 GHz	_____	12.02 GHz
12 GHz	10 GHz	12 GHz	11.8 GHz	_____	12.2 GHz
15 GHz	1 MHz	15 GHz	14.999 98 GHz	_____	15.000 02 GHz
15 GHz	10 MHz	15 GHz	14.999 8 GHz	_____	15.000 2 GHz
15 GHz	100 MHz	15 GHz	14.998 GHz	_____	15.002 GHz
15 GHz	1 GHz	15 GHz	14.98 GHz	_____	15.02 GHz
15 GHz	10 GHz	15 GHz	14.8 GHz	_____	15.2 GHz
18 GHz	1 MHz	18 GHz	17.999 98 GHz	_____	18.000 02 GHz
18 GHz	10 MHz	18 GHz	17.999 8 GHz	_____	18.000 2 GHz
18 GHz	100 MHz	18 GHz	17.998 GHz	_____	18.002 GHz
18 GHz	1 GHz	18 GHz	17.98 GHz	_____	18.02 GHz
18 GHz	10 GHz	18 GHz	17.8 GHz	_____	18.2 GHz

2. FREQUENCY SPAN ACCURACY TEST

RELATED ADJUSTMENT:

Sweep, DAC, and Main Coil Driver Adjustments

SPECIFICATION:

For spans $\leq n \times 5$ MHz, $\pm 1\%$ of indicated frequency separation.

For spans $> n \times 5$ MHz, $\pm 3\%$ of indicated frequency separation.

n*	center frequency
1	100 Hz to 5.8 GHz
2	5.8 GHz to 12.5 GHz
3	12.5 GHz to 18.6 GHz
4	>18.6 GHz

*n is the harmonic mixing number, depending on center frequency

DESCRIPTION:

Spans less than 100 MHz are checked with a frequency synthesizer by comparing the displayed frequency span of two signals with their known span. Wider spans are tested by tuning a synthesized sweeper from one edge of the analyzer display to the other and measuring the frequency change with a frequency counter.

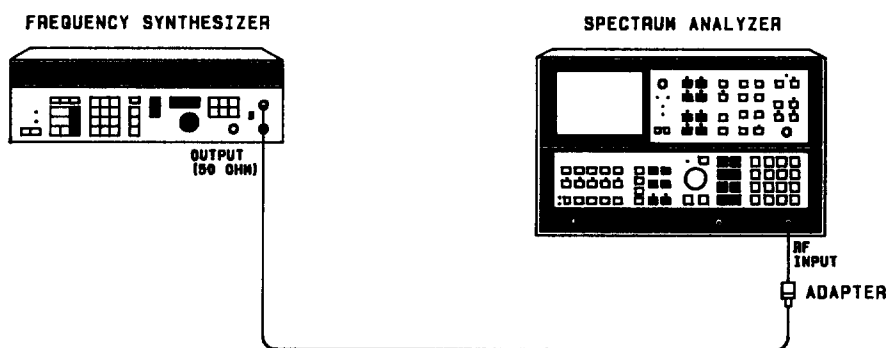


FIGURE 3. NARROW SPAN TEST SETUP

NOTE

Equipment listed is for two test setups, Figures 3 and 4.

PERFORMANCE TESTS

2. FREQUENCY SPAN ACCURACY TEST (Cont'd)

EQUIPMENT:

Frequency Synthesizer	HP 3335A
Synthesized Sweeper	HP 8340A
Adapter, Type N (m) to BNC (f)	HP 1250-0780
Adapter, Type N (m) to SMA (f)	HP 1250-1250
Adapter, SMA Female Connectors	HP 1250-1158
Cable Assembly, SMA Male Connectors	HP 5061-1086

PROCEDURE:

- Press **1-22 GHz**.
- Connect equipment as shown in Figure 3.
- Set the frequency synthesizer for an output frequency of 40 MHz and an output power level of -10 dBm.
- Key in the following analyzer settings:

CENTER FREQUENCY	.....	40 MHz
FREQUENCY SPAN	.....	20 kHz
- Set the frequency synthesizer to 39,992,000 Hz (see Table 3).
- Press **MARKER** **NORMAL** and **PEAK SEARCH**.
- Press **MARKER** **Δ** and set the frequency synthesizer to 40,008,000 Hz (see Table 3). Press **MARKER** **PEAK SEARCH**.
- Using the procedure of steps 5, 6, and 7, measure the frequency separation of the indicated signals for each setting in Table 3. The **MARKER Δ** frequency should be within the limits given in the table.

TABLE 3. NARROW SPAN ACCURACY

Spectrum Analyzer	Frequency Synthesizer		MARKER Δ Frequency		
FREQUENCY SPAN	Low (Hz)	High (Hz)	Min.	Actual	Max.
20 kHz	39,992,000	40,008,000	15.84 kHz	_____	16.16 kHz
50 kHz	39,980,000	40,020,000	39.60 kHz	_____	40.40 kHz
150 kHz	39,940,000	40,060,000	118.80 kHz	_____	121.20 kHz
200 kHz	39,920,000	40,080,000	158.4 kHz	_____	161.6 kHz
1 MHz	39,600,000	40,400,000	792.00 kHz	_____	808.00 kHz
2 MHz	39,200,000	40,800,000	1.584 MHz	_____	1.616 MHz
6 MHz	37,600,000	42,400,000	4.752 MHz	_____	4.848 MHz
10 MHz	36,000,000	44,000,000	7.76 MHz	_____	8.240 MHz
50 MHz	20,000,000	60,000,000	38.80 MHz	_____	41.2 MHz

PERFORMANCE TESTS

2. FREQUENCY SPAN ACCURACY TEST (Cont'd)

9. Disconnect the frequency synthesizer from the analyzer input. Connect equipment as shown in Figure 4.

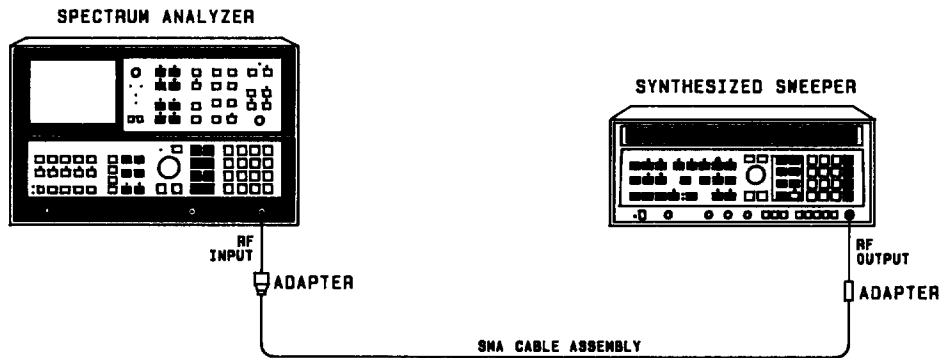


FIGURE 4. WIDE SPAN TEST SETUP

10. Press **INSTR PRESET** on 8340A Synthesized Sweeper.
11. Set the synthesized sweeper to a 4 GHz CW signal and power level of -10 dBm.
12. Press **2-22 GHz** on the analyzer.
13. Set spectrum analyzer as follows:
- | | | |
|---------------------|--|---------|
| CENTER
FREQUENCY | | 4 GHz |
| FREQUENCY
SPAN | | 500 MHz |
14. Set the synthesized sweeper to 3.8 MHz (see Table 4).
15. Press **MARKER** **NORMAL** and **PEAK SEARCH**.
16. Press **MARKER** Δ and set the synthesized sweeper to 4.2 GHz (see Table 4). Press **PEAK SEARCH**.
17. The **MARKER** Δ frequency should be between 389 MHz and 412 MHz.
18. Set spectrum analyzer **FREQUENCY SPAN** and **CENTER FREQUENCY** according to Table 4 and measure the frequency span by the procedure of steps 13 through 16. The limits for the difference between the two frequency measurements are given in the table.

PERFORMANCE TESTS

2. FREQUENCY SPAN ACCURACY TEST (Cont'd)

TABLE 4. WIDE SPAN ACCURACY

Spectrum Analyzer		Synthesized Sweeper		Measured Span (2 – 1)		
CENTER FREQUENCY	FREQUENCY SPAN	Low (GHz)	High (GHz)	Min.	Actual (2 – 1)	Max.
4 GHz	500 MHz	3.800	4.200	388 MHz	_____	412 MHz
10 GHz	500 MHz	9.800	10.200	388 MHz	_____	412 MHz
15 GHz	500 MHz	14.800	15.200	388 MHz	_____	412 MHz
20 GHz	500 MHz	19.800	20.200	388 MHz	_____	412 MHz
4 GHz	1 GHz	3.600	4.400	776 MHz	_____	824 MHz
10 GHz	1 GHz	9.600	10.400	776 MHz	_____	824 MHz
15 GHz	1 GHz	14.600	15.400	776 MHz	_____	824 MHz
20 GHz	1 GHz	19.600	20.400	776 MHz	_____	824 MHz
10 GHz	5 GHz	8.000	12.000	3.88 GHz	_____	4.12 GHz
15 GHz	5 GHz	13.000	17.000	3.88 GHz	_____	4.12 GHz
18 GHz	5 GHz	16.000	20.000	3.88 GHz	_____	4.12 GHz
10 GHz	10 GHz	6.000	14.000	7.76 GHz	_____	8.24 GHz
15 GHz	10 GHz	11.000	19.000	7.76 GHz	_____	8.24 GHz

3. RESOLUTION BANDWIDTH ACCURACY TEST

RELATED ADJUSTMENT:

3 dB Bandwidth Adjustments

SPECIFICATION:

$\pm 20\%$, 10 Hz to 1 kHz and 3 MHz bandwidths

$\pm 10\%$, 3 kHz to 1 MHz bandwidths

30 kHz and 100 kHz bandwidth accuracy figures only applicable $\leq 90\%$ Relative Humidity.

DESCRIPTION:

The 3 db bandwidth for each resolution bandwidth setting is measured with the MARKER function to determine bandwidth accuracy. The CAL OUTPUT is used for a stable signal source.

EQUIPMENT:

None required

PROCEDURE:

1. Press **2-22 GHz**.
2. Connect CAL OUTPUT to RF INPUT.
3. Key in spectrum analyzer settings as follows:

CENTER FREQUENCY	.....	100 MHz
FREQUENCY SPAN	.....	5 MHz
RES BW	.....	3 MHz
REFERENCE LEVEL	.....	-10 dBm

4. Press SCALE LIN pushbutton. Press **SHIFT**, **A** (resolution bandwidth) for units in dBm.
5. Adjust **REFERENCE LEVEL** to position peak of signal trace at (or just below) reference level (top) graticule line. Press **SWEEP SINGLE**.
6. Press **MARKER NORMAL** and place marker at peak of signal trace with DATA knob. Press **MARKER Δ** and position movable marker 3 dB down from the stationary marker on the positive-going edge of the signal trace (the **MARKER Δ** amplitude readout should be $-3.00 \text{ dB} \pm 0.05 \text{ dB}$). It may be necessary to press **SWEEP CONT** and adjust **CENTER FREQUENCY** to center trace on screen.
7. Press **MARKER Δ** and position movable marker 3 dB down from the signal peak on the negative-going edge of the trace (the **MARKER Δ** amplitude readout should be $.00 \text{ dB} \pm 0.05 \text{ dB}$). The 3 dB bandwidth is given by the **MARKER Δ** frequency readout (see Figure 5). Record this value in Table 5.

PERFORMANCE TESTS

3. RESOLUTION BANDWIDTH ACCURACY TEST (Cont'd)

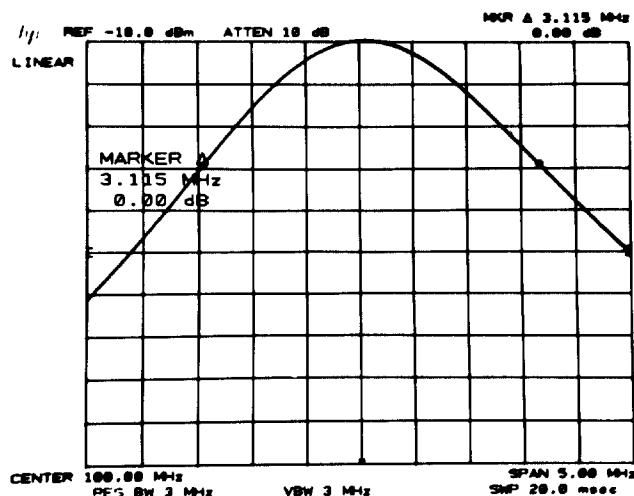


FIGURE 5. RESOLUTION BANDWIDTH MEASUREMENT

8. Vary spectrum analyzer settings according to Table 5. Press SWEEP and measure the 3 dB bandwidth for each resolution bandwidth setting by the procedure of steps 6 and 7 and record the value in Table 5. The measured bandwidth should fall between the limits shown in the table.

TABLE 5. BANDWIDTH ACCURACY

RES BW	FREQUENCY SPAN	MARKER Δ Readout of 3 dB Bandwidth		
		Min.	Actual	Max.
3 MHz	5 MHz	2.400 MHz	_____	3.600 MHz
1 MHz	2 MHz	900 kHz	_____	1.100 MHz
300 kHz	500 kHz	270.0 kHz	_____	330.0 kHz
100 kHz	200 kHz	90.0 kHz	_____	110.0 kHz
30 kHz	50 kHz	27.00 kHz	_____	33.00 kHz
10 kHz	20 kHz	9.00 kHz	_____	11.00 kHz
3 kHz	5 kHz	2.700 kHz	_____	3.300 kHz
1 kHz	2 kHz	800 Hz	_____	1.200 kHz
300 Hz	500 Hz	240 Hz	_____	360 Hz
100 Hz	200 Hz	80 Hz	_____	120 Hz
30 Hz	100 Hz	24.0 Hz	_____	36.0 Hz
10 Hz	100 Hz	8.0 Hz	_____	12.0 Hz

4. RESOLUTION BANDWIDTH SELECTIVITY TEST

RELATED ADJUSTMENTS:

3 MHz Bandwidth Filter Adjustments
 21.4 MHz Bandwidth Filter Adjustments
 Step Gain and 18.4 MHz Local Oscillator Adjustments

SPECIFICATION:

60 dB/3 dB bandwidth ratio:
 <15:1, 3 MHz to 100 kHz bandwidths
 <13:1, 30 kHz to 10 kHz bandwidths
 <11:1, 3 kHz to 30 Hz bandwidths
 60 dB points on 10 Hz bandwidths are separated by <100 Hz

DESCRIPTION:

Bandwidth selectivity is found by measuring the 60 dB bandwidth and dividing this value by the 3 dB bandwidth for each resolution bandwidth setting from 30 Hz to 3 MHz. The 60 dB points for the 10 Hz bandwidth setting are also measured. The CAL OUTPUT provides a stable signal for the measurements.

EQUIPMENT:

None required

NOTE

Performance Test 3, RESOLUTION BANDWIDTH ACCURACY TEST, must be performed before starting this test.

PROCEDURE:

1. Press **2-22 GHz**.
2. Connect CAL OUTPUT to RF INPUT.
3. Key in analyzer control settings as follows:

CENTER FREQUENCY	.....	100 MHz
FREQUENCY SPAN	.....	20 MHz
RES BW	.....	3 MHz
VIDEO BW	.....	100 Hz
SWEEP	SINGLE	

4. Press **MARKER** **NORMAL** and position marker at peak of signal trace. Press **MARKER** **Δ** and position movable marker 60 dB down from the stationary marker on the positive-going edge of the signal trace (the **MARKER Δ** amplitude readout should be $-60.00 \text{ dB} \pm 1.00 \text{ dB}$). It may be necessary to press **SWEEP** **CONT** and adjust **CENTER FREQUENCY** so that both 60 dB points are displayed (see Figure 6).

PERFORMANCE TESTS

4. RESOLUTION BANDWIDTH SELECTIVITY TEST (Cont'd)

5. Press MARKER Δ and position movable marker 60 dB down from the signal peak on the negative-going edge of the signal trace (the MARKER Δ amplitude readout should be .00 dB ± 0.50 dB).
6. Read the 60 dB bandwidth for the 3 MHz resolution bandwidth setting from the MARKER Δ frequency readout (see Figure 6) and record the value in Table 6.
7. Vary spectrum analyzer settings according to Table 6. Press SWEEP SINGLE and measure the 60 dB bandwidth for each resolution bandwidth setting by the procedure of steps 4 through 6. Record the value in Table 6.
8. Record the 3 dB bandwidths from Table 5 in Table 6.
9. Calculate the bandwidth selectivity for each setting by dividing the 60 dB bandwidth by the 3 dB bandwidth. The bandwidth ratios should be less than the maximum values shown in Table 6.
10. The 60 dB bandwidth for the 10 Hz resolution bandwidth setting should be less than 100 Hz.

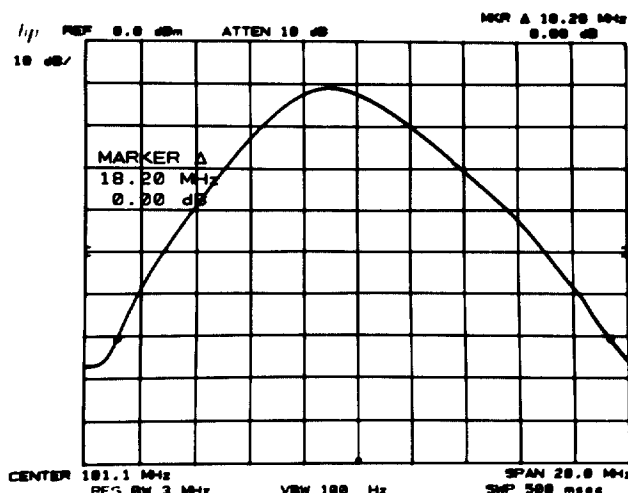


FIGURE 6. 60 dB BANDWIDTH MEASUREMENT

TABLE 6. RESOLUTION BANDWIDTH SELECTIVITY

Spectrum Analyzer			Measured 60 dB Bandwidth	Measured 3 dB Bandwidth	Bandwidth Selectivity (60 dB BW ÷ 3 dB BW)	Maximum Selectivity Ratio
RES BW	FREQUENCY SPAN	VIDEO BW				
3 MHz	20 MHz	100 Hz	_____	_____	_____	15:1
1 MHz	15 MHz	300 Hz	_____	_____	_____	15:1
300 kHz	5 MHz	AUTO	_____	_____	_____	15:1
100 kHz	2 MHz	AUTO	_____	_____	_____	15:1
30 kHz	500 kHz	AUTO	_____	_____	_____	13:1
10 kHz	200 kHz	AUTO	_____	_____	_____	13:1
3 kHz	50 kHz	AUTO	_____	_____	_____	11:1
1 kHz	10 kHz	AUTO	_____	_____	_____	11:1
300 Hz	5 kHz	AUTO	_____	_____	_____	11:1
100 Hz	2 kHz	AUTO	_____	_____	_____	11:1
30 Hz	500 Hz	AUTO	_____	_____	_____	11:1
10 Hz	100 Hz	AUTO	_____	60 dB points separated by <100 Hz		

PERFORMANCE TESTS

5. RESOLUTION BANDWIDTH SWITCHING UNCERTAINTY TEST

RELATED ADJUSTMENTS:

3 MHz Bandwidth Filter Adjustments
21.4 MHz Bandwidth Filter Adjustments
Down/Up Converter Adjustments

SPECIFICATION:

(uncorrected; referenced to 1 MHz bandwidth; 20 – 30° C

	Resolution Bandwidth
± 2.0 dB	10 Hz
± 0.8 dB	30 Hz
± 0.5 dB	100 Hz to 1 MHz
± 1.0 dB	3 MHz

DESCRIPTION:

The CAL OUTPUT signal is applied to the input of the spectrum analyzer. The deviation in peak amplitude of the signal trace is then measured as each resolution bandwidth filter is switched in.

EQUIPMENT:

None required

PROCEDURE:

1. Press **2-22 GHz**.
2. Connect CAL OUTPUT to RF INPUT.
3. Key in the following control settings:

CENTER FREQUENCY	.....	100 MHz
FREQUENCY SPAN	.....	5 MHz
REFERENCE LEVEL	.....	– 8 dBm
RES BW	.....	1 MHz

4. Press LOG **ENTER dB/DIV** and key in 1 dB. Press MARKER **PEAK SEARCH**, **Δ**.
5. Key in settings according to Table 7. Press MARKER **PEAK SEARCH** at each setting, then read the amplitude deviation from the MARKER **Δ** readout at the upper right of the display (see Figure 7). The allowable deviation for each resolution bandwidth setting is shown in the table.

PERFORMANCE TESTS

5. RESOLUTION BANDWIDTH SWITCHING UNCERTAINTY TEST (Cont'd)

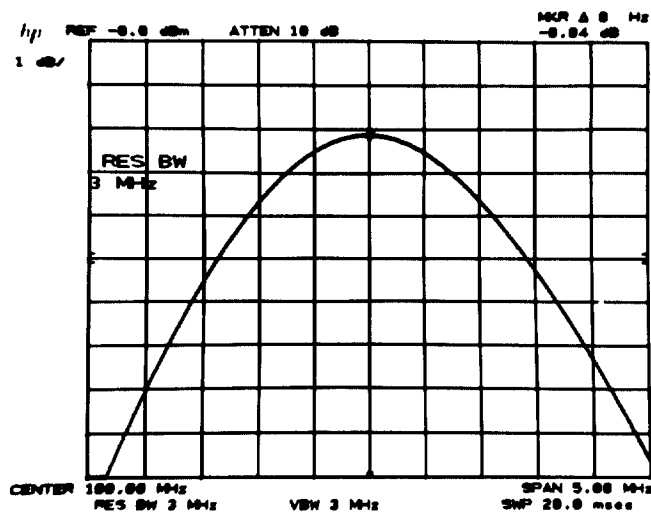


FIGURE 7. BANDWIDTH SWITCHING UNCERTAINTY MEASUREMENT

TABLE 7. BANDWIDTH SWITCHING UNCERTAINTY

RES BW	FREQUENCY SPAN	Deviation (MKR Δ Readout, dB)	Allowable Deviation (dB)
1 MHz	5 MHz	0 (ref.)	0 (ref.)
3 MHz	5 MHz	_____	± 1.00
300 kHz	5 MHz	_____	± 0.50
100 kHz	500 kHz	_____	± 0.50
30 kHz	500 kHz	_____	± 0.50
10 kHz	50 kHz	_____	± 0.50
3 kHz	50 kHz	_____	± 0.50
1 kHz	10 kHz	_____	± 0.50
300 Hz	1 kHz	_____	± 0.50
100 Hz	1 kHz	_____	± 0.50
30 Hz	200 Hz	_____	± 0.80
10 Hz	100 Hz	_____	± 2.00

6. LOG SCALE SWITCHING UNCERTAINTY TEST

RELATED ADJUSTMENT:

Video Processor Adjustments

SPECIFICATION:

± 0.5 dB (uncorrected; $20^{\circ} - 30^{\circ}\text{C}$)

DESCRIPTION:

The log scale is stepped from 1 dB/DIV to 10 dB/DIV and the variation in trace amplitude from the 1 dB/DIV setting at each step is measured.

EQUIPMENT:

None required

PROCEDURE:

1. Press .

2. Key in analyzer settings as follows:

	.....	100 MHz
	.....	100 kHz
	.....	-8 dBm
	.....	30 kHz

3. Press LOG  and key in a log scale of 1 dB per division.
4. Connect CAL OUTPUT to RF INPUT.
5. Press MARKER  and . Record the marker amplitude (upper right of display) in Table 8.
6. Step up through the log scales with . At each step, press MARKER , then record the marker amplitude in Table 8. Refer to Figure 8.
7. Subtract the marker amplitude at the 1 dB/DIV setting from the marker amplitudes recorded for the 2, 5, and 10 dB/DIV settings to obtain the amplitude deviations. The deviation should be less than ± 0.5 dB for each log scale.

PERFORMANCE TESTS

6. LOG SCALE SWITCHING UNCERTAINTY TEST (Cont'd)

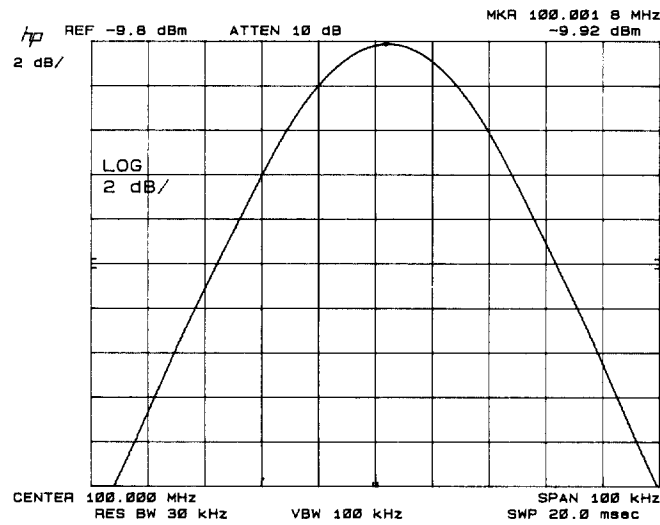


FIGURE 8. LOG SCALE SWITCHING UNCERTAINTY MEASUREMENT

TABLE 8. LOG SCALE SWITCHING UNCERTAINTY

SCALE (dB/DIV)	MKR Amplitude (dBm)	Deviation (dB)	Allowable Deviation (dB)
1	_____	0 (ref.)	0 (ref.)
2	_____	_____	± 0.5
5	_____	_____	± 0.5
10	_____	_____	± 0.5

7. IF GAIN UNCERTAINTY TEST

RELATED ADJUSTMENTS:

Step Gain and 18.4 MHz Local Oscillator Adjustments
21.4 MHz Bandwidth Filter Adjustments

SPECIFICATION:

Assuming the internal calibration signal is used to calibrate the reference level at -10 dBm and the input attenuator is fixed at 10 dB, any changes in reference level from the -10 dB setting will contribute to IF gain uncertainty as shown:

Range	Uncertainty (uncorrected; 20 – 30°C)
0 dBm to -55.9 dBm	Res BW ≥ 30 Hz, ± 0.6 dB; Res BW = 10 Hz, ± 1.6 dB
-56.0 dBm to -129.9 dBm	Res BW ≥ 30 Hz, ± 1.0 dB; Res BW = 10 Hz, ± 2.0 dB

DESCRIPTION:

The IF gain steps are tested over the entire range from 0 dBm to -129.9 dBm using an RF substitution method. The 10 dB, 2 dB, and 0.1 dB steps are compared against a calibrated signal source provided by a 3335A Frequency Synthesizer.

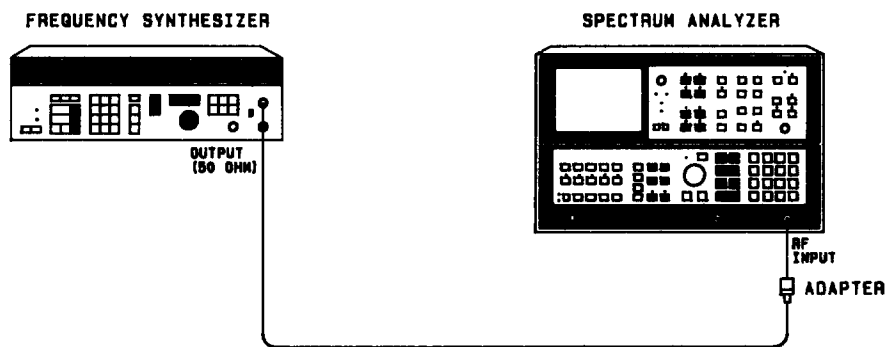


FIGURE 9. IF GAIN UNCERTAINTY TEST SETUP

EQUIPMENT:

Frequency Synthesizer	HP 3335A
Adapter, Type N (m) to BNC (f)	HP 1250-0780

7. IF GAIN UNCERTAINTY TEST (Cont'd)

PROCEDURE:

1. Press **2-22 GHz**.
2. Connect CAL OUTPUT to RF INPUT.
3. Press **RECALL** **8**. Adjust AMPTD CAL for a MARKER amplitude of $-10.00 \text{ dBm} \pm 0.02 \text{ dB}$.
4. Press **2-22 GHz**.

10 dB Gain Steps

5. Set the frequency synthesizer for an output frequency of 20.0010 MHz and an output power level of -2.0 dBm . Set the amplitude increment for 10 dB steps.
6. Connect the equipment as shown in Figure 9.
7. Key in analyzer settings as follows:

CENTER FREQUENCY	.....	20.001 MHz
FREQUENCY SPAN	.....	2 kHz

8. Press **MARKER** **PEAK SEARCH**, **MKR ← CF** or adjust **CENTER FREQUENCY** to center signal trace on display.
9. Set analyzer as follows:

VIDEO BW	.....	100 Hz
RES BW	.....	1 kHz
LOG ENTER dB/DIV	.....	1 dB

10. Press **MARKER** **PEAK SEARCH**, **Δ**.
11. Press **SHIFT**, **ATTEN** to permit extended reference level settings.
12. Set the analyzer **REFERENCE LEVEL**, **VIDEO BW**, and frequency synthesizer amplitude according to Table 9 settings. (Use the frequency synthesizer **↓** for 10 dB steps.) At each setting, note the MKR Δ amplitude displayed in the upper right corner of the analyzer display (deviation from the 0 dB reference setting) and record it in the table. See Figure 10.

NOTE

After measurement at the **REFERENCE LEVEL** = -70 dBm setting, press **SHIFT**, **q** **ENTER dB/DIV** as

PERFORMANCE TESTS

7. IF GAIN UNCERTAINTY TEST (Cont'd)

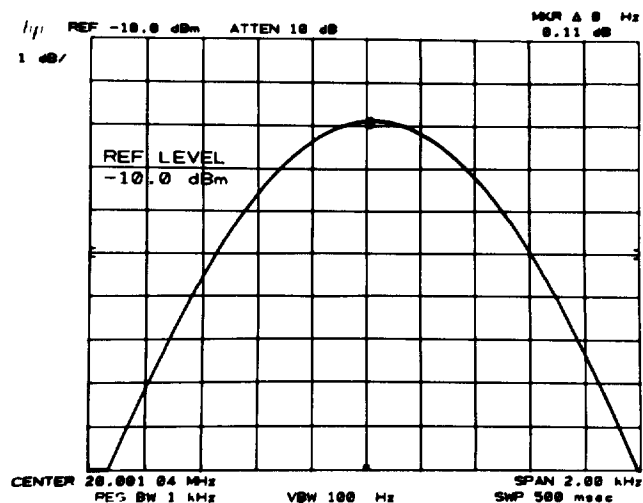


FIGURE 10. IF GAIN UNCERTAINTY MEASUREMENT

TABLE 9. IF GAIN UNCERTAINTY, 10 dB STEPS

REFERENCE LEVEL (dBm)	Frequency Synthesizer Amplitude (dBm)	VIDEO BW (Hz)	Deviation (MARKER Δ Amplitude) (dB)
0	-2	100	0 (ref.)
-10	-12	100	
-20	-22	100	
-30	-32	100	
-40	-42	100	
-50	-52	100	
-60	-62	10	
-70	-72	10	
q			
SHIFT ENTER 40/DIV			
-80	-32	100	
-90	-42	100	
-100	-52	10	
-110	-62	10	
-120	-72	10	

2 dB Gain Steps

13. Press **2-32 GHz**, **RECALL**, **7**.

14. Set **REFERENCE LEVEL** to -1.9 dBm.

PERFORMANCE TESTS

7. IF GAIN UNCERTAINTY TEST (Cont'd)

15. Press MARKER . Set to 100 Hz.
16. Set the frequency synthesizer for an output power level of -3.9 dBm. Set the amplitude increment for 2 dB steps.
17. Press MARKER , .
18. Set the analyzer and the frequency synthesizer amplitude according to Table 10. At each setting, note the MKR Δ amplitude and record it in the table.

TABLE 10. IF GAIN UNCERTAINTY, 2 dB STEPS

REFERENCE LEVEL (dBm)	Frequency Synthesizer Amplitude (dBm)	Deviation (MARKER Δ Amplitude) (dB)
-1.9	-3.9	0 (ref.)
-3.9	-5.9	_____
-5.9	-7.9	_____
-7.9	-9.9	_____
-9.9	-11.9	_____

0.1 dB Gain Steps

19. Set to 0 dB.
20. Set the frequency synthesizer for an output power level of -2.00 dBm. Set the amplitude increment for 0.1 dB steps.
21. Press MARKER , .
22. Set the analyzer and the frequency synthesizer amplitude according to Table 11. At each setting, note the MKR Δ amplitude and record it in the table.

PERFORMANCE TESTS

7. IF GAIN UNCERTAINTY TEST (Cont'd)

TABLE 11. IF GAIN UNCERTAINTY, 0.1 dB STEPS

REFERENCE LEVEL (dBm)	Frequency Synthesizer Amplitude (dBm)	Deviation (MKR Δ Amplitude (dB))
0.0	- 2.00	0 (ref.)
- 0.1	- 2.10	_____
- 0.2	- 2.20	_____
- 0.3	- 2.30	_____
- 0.4	- 2.40	_____
- 0.5	- 2.50	_____
- 0.6	- 2.60	_____
- 0.7	- 2.70	_____
- 0.8	- 2.80	_____
- 0.9	- 2.90	_____
- 1.0	- 3.00	_____
- 1.1	- 3.10	_____
- 1.2	- 3.20	_____
- 1.3	- 3.30	_____
- 1.4	- 3.40	_____
- 1.5	- 3.50	_____
- 1.6	- 3.60	_____
- 1.7	- 3.70	_____
- 1.8	- 3.80	_____
- 1.9	- 3.90	_____

23. Find the largest positive deviation and the largest negative deviation for reference level settings from 0 dBm to - 70 dBm in Table 9. Also, find the largest positive and negative deviations for the last five settings in the table.

	A	B
Reference Level Range:	0 to - 70 dBm	- 80 to - 120 dBm
Largest Positive Deviation:	_____dB	_____dB
Largest Negative Deviation:	_____dB	_____dB

24. Find the largest positive and negative deviations in Tables 10 and 11:

	C	D
	Table 10	Table 11
Largest Positive Deviation:	_____dB	_____dB
Largest Negative Deviation:	_____dB	_____dB

7. IF GAIN UNCERTAINTY TEST (Cont'd)

- 25. The sum of the positive deviations recorded in A, C, and D should not exceed 0.6 dB.
- 26. The sum of the negative deviations recorded in A, C, and D should not be less than -0.6 dB.
- 27. The sum of the positive deviations recorded in A, B, C, and D should not exceed 1.0 dB.
- 28. The sum of the negative deviations recorded in A, B, C, and D should not exceed -1.0 dB.

8. SCALE FIDELITY TEST

RELATED ADJUSTMENT:

Log Amplifier Adjustments

SPECIFICATION:

Log:

Incremental

± 0.1 dB/dB over 0 to 80 dB display

Cumulative

3 MHz to 30 Hz Resolution Bandwidth

$\leq \pm 1.0$ dB max over 0 to 80 dB display (20 – 30°C)

$\leq \pm 1.5$ dB max over 0 to 90 dB display

Linear:

$\pm 3\%$ of Reference Level for top $9\frac{1}{2}$ divisions of display

DESCRIPTION:

Scale fidelity in log and linear modes is tested by decreasing the signal level to the spectrum analyzer in 10 dB steps with a calibrated signal source and measuring the displayed amplitude change with the analyzer's MARKER Δ function.

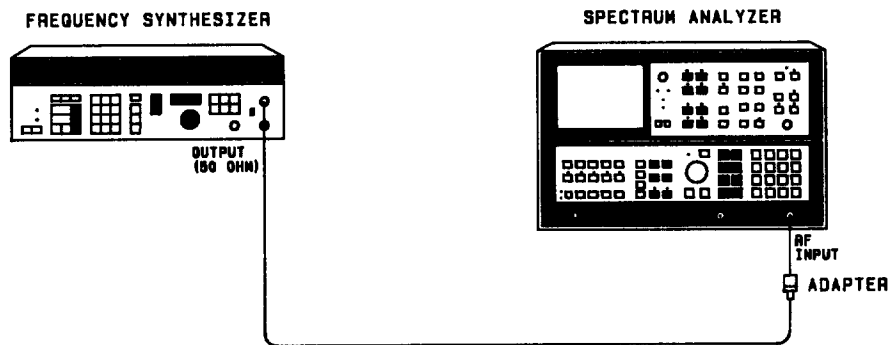


FIGURE 11. SCALE FIDELITY TEST SETUP

EQUIPMENT:

Frequency Synthesizer	HP 3335A
Adapter, Type N (m) to BNC (f)	HP 1250-0780

PERFORMANCE TESTS

8. SCALE FIDELITY TEST (Cont'd)

PROCEDURE:

Log Fidelity

- Set the frequency synthesizer for an output frequency of 20.000 MHz and an output power level of +10 dBm. Set the amplitude increment for 10 dB steps.

- Connect equipment as shown in Figure 11.

- Press **2-22 GHz** on the analyzer. Key in analyzer settings as follows:

CENTER FREQUENCY		20 MHz
FREQUENCY SPAN		50 kHz
REFERENCE LEVEL		+10 dBm

- Press **MARKER** **PEAK SEARCH** , **MR←CF** , **MR←REF LVL** to center the signal on the display.

- Key in the following analyzer settings:

FREQUENCY SPAN		0 Hz
VIDEO BW		1 Hz

- Press **MARKER** **Δ** . Step the frequency synthesizer output amplitude from +10 dBm to −80 dBm in 10 dB steps, noting the **MARKER Δ** amplitude (a negative value) at each step and recording it in column 2 of Table 12. Allow several sweeps after each step for the video filtered trace to reach its final amplitude (see Figure 12).

- Subtract the value in column 1 from the value in column 2 for each setting to find the fidelity error.

TABLE 12. LOG SCALE FIDELITY

Frequency Synthesizer Amplitude (dBm)	1 Calibrated Amplitude Step	2 MARKER Δ Amplitude (dB)	Fidelity Error (Column 2 − Column 1) (dB)
+10	0 (ref.)	0 (ref.)	0 (ref.)
0	−10	_____	_____
−10	−20	_____	_____
−20	−30	_____	_____
−30	−40	_____	_____
−40	−50	_____	_____
−50	−60	_____	_____
−60	−70	_____	_____
−70	−80	_____	_____
−80	−90	_____	_____

PERFORMANCE TESTS

8. SCALE FIDELITY TEST (Cont'd)

8. The fidelity error for amplitude steps from -10 dB to -80 dB should be $\leq \pm 1.0$ dB.
9. The fidelity error at the -90 dB setting should be $\leq \pm 1.5$ dB.

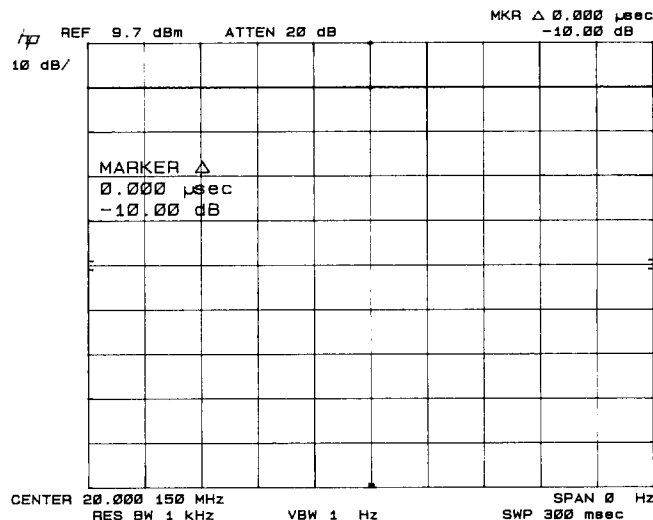


FIGURE 12. SCALE FIDELITY MEASUREMENT

Linear Fidelity

10. Key in analyzer settings as follows:

VIDEO BW	.....	300 Hz
FREQUENCY SPAN	.....	1 MHz
RES BW	.....	1 MHz

11. Set the frequency synthesizer for an output power level of $+10$ dBm.
12. Press SCALE LIN pushbutton. Press MARKER PEAK SEARCH, MR → CF to center the signal on the display.
13. Set FREQUENCY SPAN to 0 Hz and VIDEO BW to 1 Hz. Press SHIFT, A (resolution bandwidth), MARKER Δ.
14. Decrease frequency synthesizer output amplitude by 10 dB steps, noting the MARKER Δ amplitude and recording it in column 2 of Table 13.

TABLE 13. LINEAR SCALE FIDELITY

Frequency Synthesizer Amplitude (dBm)	MARKER Δ Amplitude (dB)	Allowable Range ($\pm 3\%$ of Reference Level) (dB)	
		Min.	Max.
0	_____	-10.87	-9.21
-10	_____	-23.10	-17.72

9. CALIBRATOR AMPLITUDE ACCURACY TEST

RELATED ADJUSTMENT:

CAL OUTPUT Adjustment

SPECIFICATION:

– 10 dBm $\pm$ 0.3 dB; 100 MHz

DESCRIPTION:

The output level of the calibrator signal is measured with a power meter.

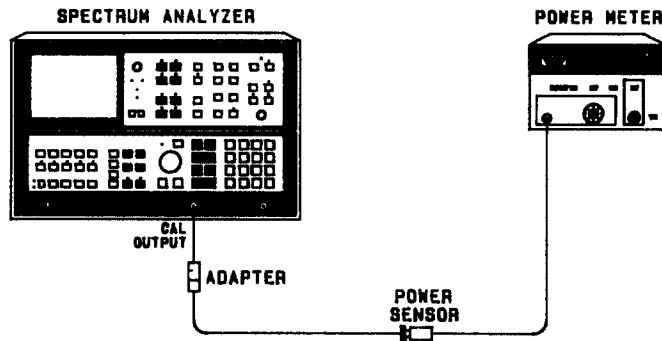


FIGURE 13. CALIBRATOR AMPLITUDE ACCURACY TEST SETUP

EQUIPMENT:

Power Meter	HP 436A
Power Sensor	HP 8485A
Adapter, Type N (f) to BNC (m)	HP 1250-0077

PROCEDURE:

1. Connect equipment as shown in Figure 13.
2. Measure output level of the CAL OUTPUT signal. The value should be – 10.0 dBm $\pm$ 0.3 dB.

_____ dBm

10. FREQUENCY RESPONSE TEST

RELATED ADJUSTMENTS:

Frequency Response Adjustments

SPECIFICATIONS:

(Includes input attenuator flatness in the 10 dB setting and mixing mode gain variations, and assumes PRESE-LECTOR PEAK in current instrument state.)

Tuned Frequency

100 Hz to 2.5 GHz non-preselected band
 2 to 12.5 GHz preselected bands
 12.5 to 18.6 GHz preselected band
 18.6 to 20 GHz preselected band
 20 to 22 GHz preselected band

Flatness (20 – 30° C)

± 0.6 dB
 ± 1.7 dB
 ± 2.2 dB
 ± 2.2 dB
 ± 3.0 dB

Cumulative

100 Hz to 20 GHz
 100 Hz to 22 GHz

± 2.2 dB
 ± 3.0 dB

DESCRIPTION:

Frequency response is checked across the full range of the spectrum analyzer. In the non-preselected range from 100 Hz to 2.5 GHz, three signal sources are used to make swept measurements: a function generator (100 Hz to 100 kHz), a frequency synthesizer (100 kHz to 60 MHz), and a synthesized sweeper. In the preselected bands from 2 GHz to 22 GHz, a synthesized sweeper is used to check the frequency response. From 100 Hz to 60 MHz, the source flatness permits a direct display of analyzer response. Above 60 MHz, the externally levelled source is first characterized with a power meter. The power sensor Cal Factor % switch is used to compensate for the frequency response of the power meter.

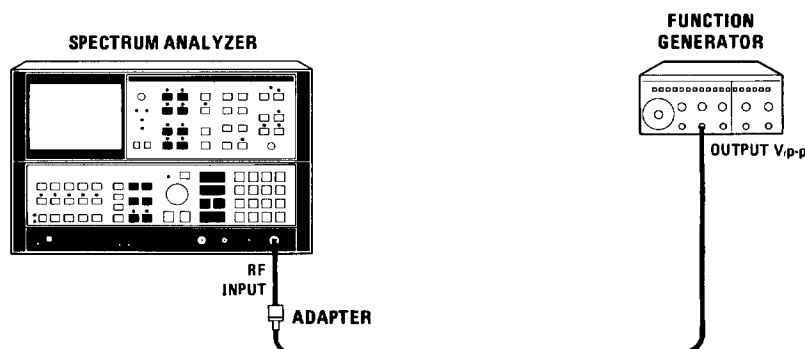


FIGURE 14. FREQUENCY RESPONSE TEST SETUP (100 Hz TO 100 kHz)

10. FREQUENCY RESPONSE TEST (Cont'd)

NOTE

Equipment listed is for three test setups, Figures 14, 16, and 18.

EQUIPMENT:

Synthesized Sweeper	HP 8340A
Frequency Synthesizer	HP 3335A
Function Generator	HP 3312A
Power Meter	HP 436A
Power Sensor	HP 8485A
Cable Assembly, SMA Male Connectors	HP 5061-1086
Adapter, Type N (m) to SMA (f)	HP 1250-1250
Adapter, Type N Male Connectors	HP 1250-0778
Adapter, Type N (m) to BNC (f)	HP 1250-0780
Adapter, SMA (f) to SMA (f)	HP 1250-1158

PROCEDURE:

1 kHz to 100 kHz

1. Connect CAL OUTPUT to the RF INPUT on the spectrum analyzer.
2. Press , , , MARKER , and adjust AMPTD CAL for a MARKER amplitude of $-10.00 \text{ dBm} \pm 0.02 \text{ dB}$.
3. Press  on the spectrum analyzer. Connect function generator to analyzer RF INPUT as shown in Figure 14.
4. Key in analyzer settings as follows:

	.....	1 kHz
	.....	100 kHz

5. Set function generator controls as follows:

RANGE Hz	10K
FUNCTION	
OFFSET	CAL
AMPLITUDE	1V
AMPLITUDE VERNIER	midrange
SYM	CAL
TRIGGER PHASE	FREE RUN
MODULATION	all out
MODULATION RANGE Hz	1
MODULATION RANGE Hz VERNIER	10 o'clock
MODULATION SYM	CAL
Percent Modulation	fully cw

6. Adjust function generator FREQUENCY to place generator signal near the center graticule on the analyzer display.

PERFORMANCE TESTS

10. FREQUENCY RESPONSE TEST (Cont'd)

7. Adjust the AMPLITUDE VERNIER on the function generator until the peak of the generator signal is at the reference level line on the analyzer display.
8. Press LOG ENTER
dB/DIV on the analyzer and key in 1 dB per division.
9. Adjust function generator AMPLITUDE VERNIER to place peak of generator signal 2 dB (2 divisions) down from the reference level. Do not readjust AMPLITUDE VERNIER during test.
10. Adjust FREQUENCY on the function generator to position the signal trace at the right edge of the analyzer display.
11. Press TRACE A MAX
HOLD . Press MODULATION SWP on the function generator. When function generator completes one sweep, press TRACE A VIEW . Trace should appear as in Figure 15.

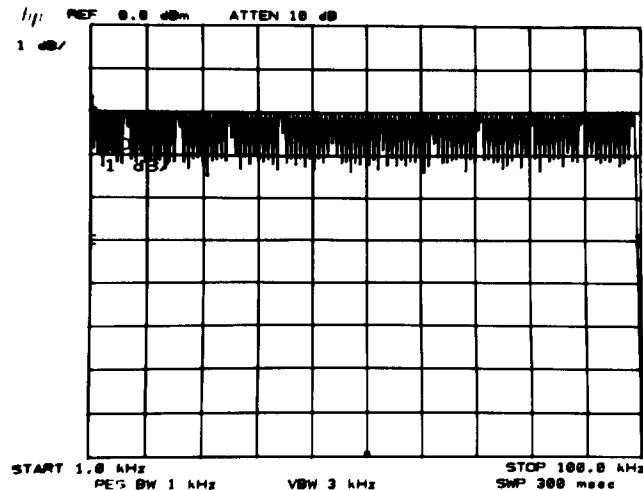


FIGURE 15. FREQUENCY RESPONSE MEASUREMENT (1 kHz TO 100 kHz)

12. The closely spaced series of signal peaks on the display defines the analyzer response over this frequency range. The maximum and minimum peak amplitudes should not differ by more than 1.2 dB. the MARKER Δ function may be used to measure this amplitude difference.
13. Press 2-22
MHz on the analyzer. Key in the following settings:

CENTER FREQUENCY	.....	100 Hz
FREQUENCY SPAN	.....	100 Hz
14. Press LOG ENTER
dB/DIV and key in 1 dB.
15. Set function generator controls as follows:

RANGE Hz	.....	100
FREQUENCY	.....	1
MODULATION	.....	all out
16. Adjust function generator FREQUENCY to center signal on analyzer display.

PERFORMANCE TESTS

10. FREQUENCY RESPONSE TEST (Cont'd)

17. Press **MARKER** **PEAK SEARCH**. The MKR amplitude should be $-2.00 \text{ dBm} \pm 0.6 \text{ dB}$.
18. Set **CF STEP SIZE** to 100 Hz. Step analyzer **CENTER FREQUENCY** from 100 Hz to 1 kHz with **↑** and set function generator **FREQUENCY** to center signal on display at each step. Press **MARKER** **PEAK SEARCH** at each frequency. The MKR amplitude should be $-2 \text{ dBm} \pm 0.6 \text{ dB}$.

0 Hz to 4 MHz

19. Connect equipment as shown in Figure 16.

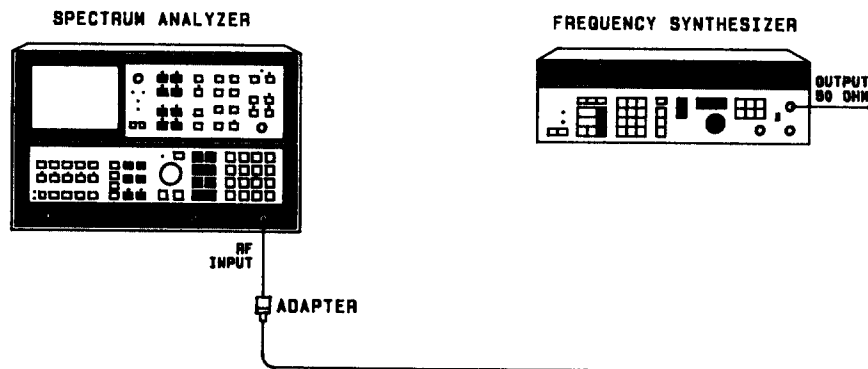


FIGURE 16. FREQUENCY RESPONSE TEST SETUP (0 Hz TO 4 MHz)

20. Press **0-25 GHz** on the analyzer. Key in the following settings:
- | | | |
|-------------------------|--|-------|
| CENTER FREQUENCY | | 4 MHz |
| FREQUENCY SPAN | | 2 MHz |
| ENTER dB/DIV | | 1 dB |
21. Set the controls of the frequency synthesizer as follows:
- | | | |
|------------------|--|-------|
| FREQUENCY | | 4 MHz |
| AMPLITUDE | | -2 dB |
22. Adjust the output amplitude of the frequency synthesizer to place the signal at the 8th graticule line.
23. Key in the analyzer settings as follows:
- | | | |
|-------------------|--|-------|
| STOP FREQ | | 4 MHz |
| START FREQ | | 0 Hz |
24. Key in the frequency synthesizer settings as follows:
- | | | |
|--------------------|--|--------------|
| FREQUENCY | | 2,000,100 Hz |
| SWEEP WIDTH | | 3,998,000 Hz |
25. Press **TRACE A** **CLEAR-WRITE** and **MAX HOLD** on the analyzer.

PERFORMANCE TESTS

10. FREQUENCY RESPONSE TEST (Cont'd)

26. Press START SINGLE 50 SEC SWEEP on the frequency synthesizer. Wait for completion of the sweep.
27. Activate MARKER ☐ NORMAL on the analyzer. Determine minimum and maximum amplitude points by using DATA knob to position the marker. Record the amplitude and frequency for each of the minimum and maximum points in Table 14.

NOTE

Disregard any response ≤ 100 kHz.

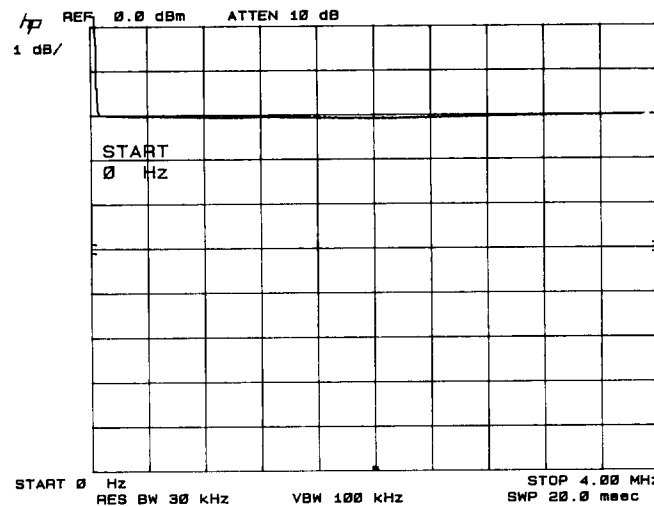


FIGURE 17. FREQUENCY RESPONSE MEASUREMENT (0 Hz TO 4 MHz)

TABLE 14. 0–2.5 GHz FREQUENCY BAND

Spectrum Analyzer		Frequency Synthesizer		Synthesized Sweeper		Trace Limits			
				Sweep Time 200 sec		Spec ± 0.6 dB			
☐ START FREQ	☐ STOP FREQ	Freq	Sweep Width	☐ START FREQ	☐ STOP FREQ	Minimum Amp	Minimum Freq	Maximum Amp	Maximum Freq
0 Hz	4 MHz	2,000,100 Hz	3,998,000 Hz	_____	_____	_____	_____	_____	_____
100 kHz	60 MHz	30050 kHz	59900 kHz	_____	_____	_____	_____	_____	_____
60 MHz	2.5 GHz	—	—	60 MHz	2.5 GHz	_____	_____	_____	_____

PERFORMANCE TESTS

10. FREQUENCY RESPONSE TEST (Cont'd)

100 kHz to 60 MHz

28. Key in the analyzer settings as follows:

CENTER FREQUENCY	.....	4 MHz
FREQUENCY SPAN	.....	4 MHz
RES BW	.....	300 kHz
ENTER dB/DIV	.....	1 dB

29. Set the frequency of the frequency synthesizer to 4 MHz.

30. Adjust the output amplitude of the frequency synthesizer to place the signal at the 8th graticule line.

31. Key in the analyzer settings as follows:

START FREQ	.....	100 kHz
STOP FREQ	.....	60 MHz

32. Key in the frequency synthesizer settings as follows:

FREQUENCY	.....	30,050,000 Hz
SWEEP WIDTH	.....	59,900,000 Hz

33. Press TRACE A **CLEAR WRITE** and **MAX HOLD** on the analyzer.

34. Press START SINGLE 50 SEC SWEEP on the frequency synthesizer. Wait for completion of the sweep.

35. Activate MARKER **NORMAL** on the analyzer. Determine minimum and maximum amplitude points by using the DATA knob to position the marker. Record the amplitude and frequency for each of the minimum and maximum points in Table 14.

NOTE

Disregard any response ≤ 4 MHz.

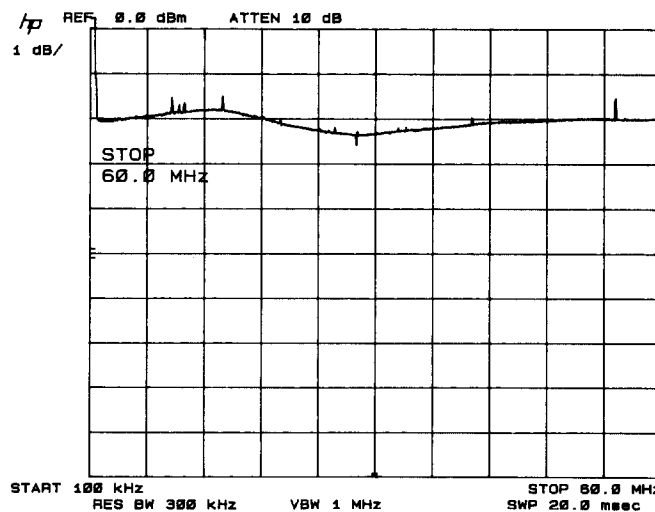


FIGURE 18. FREQUENCY RESPONSE MEASUREMENT (100 kHz TO 60 MHz)

PERFORMANCE TESTS

10. FREQUENCY RESPONSE TEST (Cont'd)

36. Press DISPLAY LINE . Using the DATA knob, place the reference line level at the right-most edge of the frequency response trace.
37. Connect equipment as shown in Figure 19. The RECORDER OUTPUT on the rear panel of the power meter is connected to the LEVELING EXT INPUT of the synthesized sweeper. One output arm of the power splitter is connected directly to the RF INPUT of the analyzer via the Type N to N adapter. The power sensor connects directly to the other splitter output.

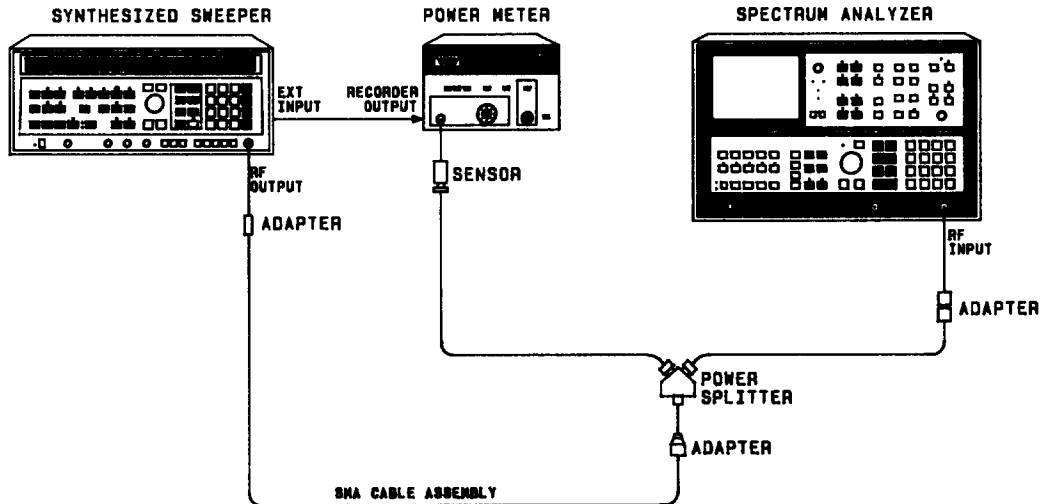


FIGURE 19. FREQUENCY RESPONSE TEST SETUP (60 MHz TO 2.5 GHz)

38. Press TRACE A on the analyzer. Key in the following settings:

CENTER FREQUENCY	.....	60 MHz
FREQUENCY SPAN	.....	10 MHz
RES BW	.....	3 MHz
ENTER dB/DIV	.....	1 dB

39. Set the controls of the power meter as follows:

MODE	.....	dBm
RANGE HOLD	.....	OFF
CAL FACTOR %	.....	100

40. Press INSTR PRESET on the synthesized sweeper. Key in the following settings:

CW FUNCTION	.....	60 MHz
SWEEP	.....	SINGLE

41. Press POWER LEVEL on the synthesized sweeper. Adjust the ENTRY knob to place the signal at the display line reference.
42. Depress RANGE HOLD on the power meter to the ON position.
43. Select METER LEVELING on the synthesized sweeper. (The signal will disappear off of the display.)

PERFORMANCE TESTS

10. FREQUENCY RESPONSE TEST (Cont'd)

44. Press **POWER LEVEL** again on the synthesized sweeper. Adjust the **ENTRY** knob to place the peak of the 60 MHz signal at the display line reference.

NOTE

Disregard any response ≤ 60 MHz.

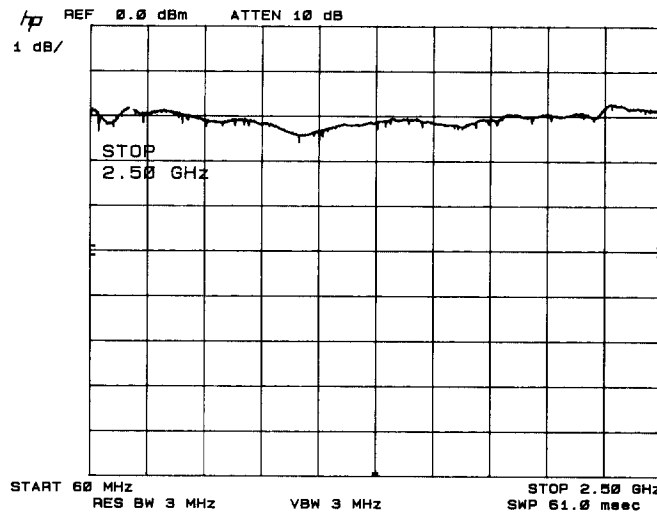


FIGURE 20. FREQUENCY RESPONSE MEASUREMENT (60 MHz TO 2.5 GHz)

45. Press **DISPLAY LINE** on the analyzer. Key in the following settings:

START FREQ		60 MHz
STOP FREQ		2.5 GHz

46. Set the controls of the synthesized sweeper as follows:

START FREQUENCY	60 MHz
STOP FREQUENCY	2.5 GHz
SWEEP TIME	200 sec

47. Press **TRACE A** on the analyzer.

48. Press **SINGLE SWEEP** on the synthesized sweeper. Wait for completion of the sweep.

49. Record the amplitude and frequency for each of the minimum and maximum points in Table 14.

2 to 22 GHz

50. Press and **SCALE** , , on the analyzer.

51. Key in the following settings for both the analyzer and the synthesized sweeper (as shown in Table 15):

START FREQ		2 GHz
STOP FREQ		3.9 GHz

PERFORMANCE TESTS

10. FREQUENCY RESPONSE TEST (Cont'd)

52. Press TRACE A  and  on the analyzer.
53. Consult the power sensor Cal Factor vs Frequency graph to set the Cal Factor % switch to the appropriate setting.
54. Press SINGLE SWEEP on the synthesized sweeper.
55. Record the amplitude and frequency for each of the minimum and maximum points in Table 15 column 4.
56. Repeat steps 51 through 55 for each Start/Stop Frequency setting in Table 15 column 2.
57. For each frequency band tested, calculate the overall flatness by subtracting the greatest maximum value from the greatest minimum value in column 4 of Table 15. Record results in Table 15 column 5.
58. Calculate the Cumulative Flatness for 100 Hz to 20 GHz and 100 Hz to 22 GHz, respectively, by subtracting the least negative value from the greatest negative value in column 4 of Table 15. Record this result at the bottom of Table 15.

PERFORMANCE TESTS

TABLE 15. FREQUENCY RESPONSE (FLATNESS)

1 Frequency Band	2 Spectrum Analyzer and Synthesized Sweeper		3 Cal Frequency	4 Trace Limits				5 Flatness
	START FREQ	STOP FREQ		Minimum		Maximum		
Specifications			Power Sensor	Amplitude	Frequency	Amplitude	Frequency	
2 – 5.8 GHz ± 1.7 dB	2 GHz	3.9 GHz	3 GHz	_____	_____	_____	_____	
	3.9 GHz	5.8 GHz	5 GHz	_____	_____	_____	_____	
5.8 – 12.5 GHz ± 1.7 dB	5.8 GHz	9.15 GHz	7 GHz	_____	_____	_____	_____	
	9.15 GHz	12.5 GHz	11 GHz	_____	_____	_____	_____	
12.5 – 18.6 GHz ± 2.2 dB	12.5 GHz	15.55 GHz	14 GHz	_____	_____	_____	_____	
	15.55 GHz	18.6 GHz	17 GHz	_____	_____	_____	_____	
18.6 – 20 GHz ± 2.2 dB	18.6 GHz	20 GHz	19 GHz	_____	_____	_____	_____	
20 – 22 GHz ± 3.0 dB	20 GHz	22 GHz	21 GHz	_____	_____	_____	_____	

Cumulative Flatness

100 Hz to 20 GHz _____ dB (Spec. ± 2.2 dB)

100 Hz to 22 GHz _____ dB (Spec. ± 3.0 dB)

11. SWEEP TIME ACCURACY TEST

RELATED ADJUSTMENT:

Sweep, DAC, and Main Coil Driver Adjustment

SPECIFICATION:

For sweep times ≤ 200 seconds, $\pm 10\%$
 For sweep times > 200 seconds, $\pm 30\%$

DESCRIPTION:

A universal counter is connected to the PENLIFT RECORDER OUTPUT (on the rear panel) of the 8566B. The counter is used in time interval mode to determine the "pen down" (sweep time) interval of the PENLIFT RECORDER OUTPUT. The penlift output voltage level corresponds directly to the sweeping of the analyzer (pen down = 0V) and not-sweeping of the analyzer (pen up = 15V). A DVM is used to set the appropriate trigger level of the counter.

This test is for sweep times ≥ 20 msec. For faster sweep times, refer to Fast Sweep Time Accuracy Test (Performance Test 21).

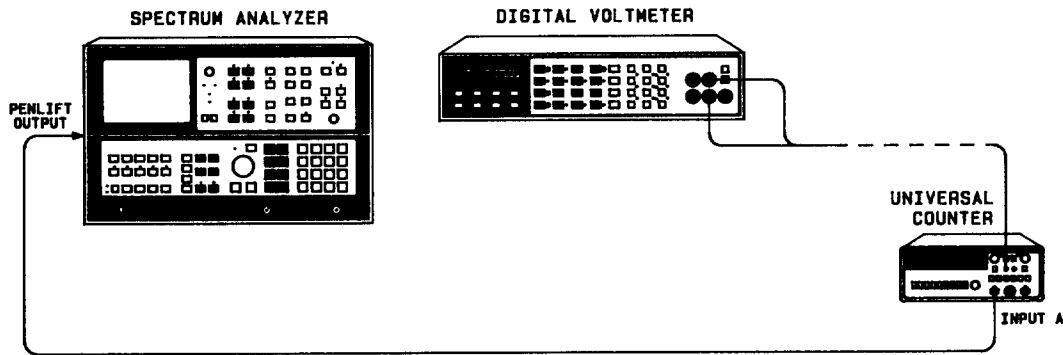


FIGURE 21. SWEEP TIME ACCURACY TEST SETUP

EQUIPMENT:

Universal Counter	HP 5316A
Digital Voltmeter	HP 3456A

PROCEDURE:

1. Connect equipment as shown in Figure 21.
2. Press **2-22 GHz** on the analyzer.
3. Key in the following settings:

CENTER FREQUENCY	500 MHz
FREQUENCY SPAN	0 Hz

PERFORMANCE TESTS

11. SWEEP TIME ACCURACY TEST (Cont'd)

4. Set up the universal counter as follows:
 - a. Set all front panel keys in "out" position.
 - b. Set POWER switch to ON.
 - c. Set GATE TIME vernier control to 9 o'clock.
 - d. Set SEP/COM A switch to COM A position.
 - e. Depress T.I. A → B switch (making sure the blue shift key is out.
 - f. Set Channel A trigger level to trigger on negative slope.
 - g. Set Channel B trigger level to trigger on positive slope.
 - h. Set both Channel A and Channel B AC/DC switches to DC.
 - i. Connect the digital voltmeter to Channel A TRIGGER LEVEL OUT. (Be sure to ground the DVM properly.)
 - j. Adjust Channel A trigger level to set a DVM voltage reading of 0.3V.
 - k. Repeat steps i and j for Channel B.
5. Set analyzer SWEEP TIME to 20 msec. Allow the universal counter enough time to settle at this sweep time.
6. Note the measured sweep time on the universal counter and record this value in Table 16. The measured sweep time should be a value between the minimum and maximum values given in Table 16.
7. Repeat steps 5 and 6 for each sweep time setting in Table 16.

TABLE 16. SWEEP TIME ACCURACY, SWEEP TIMES ≥ 20 MSEC

SWEEP TIME	MARKER Δ Time		
	Min.	Measured	Max.
20 msec	18 msec	_____	22 msec
30 msec	27 msec	_____	33 msec
50 msec	45 msec	_____	55 msec
70 msec	63 msec	_____	77 msec
90 msec	81 msec	_____	99 msec
110 msec	99 msec	_____	121 msec
170 msec	153 msec	_____	187 msec
200 msec	180 msec	_____	220 msec
2 sec	1.8 sec	_____	2.2 sec

PERFORMANCE TESTS

11. SWEEP TIME ACCURACY TEST (Cont'd)

8. Press MARKER **NORMAL**.
9. Use  to place the marker at the second vertical graticule.
10. Press **SHIFT**, ^u**SINGLE**.
11. Set analyzer **SWEEP TIME** to 20 sec. Allow the universal counter enough time to settle at this sweep time.
12. Note the measured sweep time on the universal counter and record this value in Table 17. The measured sweep time should be a value between the minimum and maximum values given in Table 17.
13. Repeat steps 11 and 12 for 200 sec sweep time.

TABLE 17. SWEEP TIME ACCURACY

SWEEP TIME	MARKER Δ Time		
	Min.	Measured	Max.
20 sec	2.8 sec	_____	5.2 sec
200 sec	28 msec	_____	52 msec

12. NOISE SIDEBANDS TEST

RELATED ADJUSTMENTS:

100 MHz Voltage-Controlled Crystal Oscillator Adjustments
 Sweep, DAC, and Main Coil Driver Adjustments
 M/N Loop Adjustments
 RF Module Phase Lock Adjustments
 YTO Loop Adjustments
 20/30 Phase Lock Adjustments

SPECIFICATION:

For Frequency Span ≤ 25 kHz (except 100 kHz offset) and Center Frequencies from 100 Hz to 5.8 GHz:

Offset from Carrier	Sideband Level (dBc/Hz)
320 Hz	- 80
1 kHz	- 85
10 kHz	- 90
100 kHz	- 105

DESCRIPTION:

A 5.7 GHz signal with low phase noise is input to the spectrum analyzer. The signal and noise sidebands are displayed on the analyzer and the trace is video-averaged. The displayed noise sideband level at various frequency offsets is measured and the measured values are corrected for log amplification and detection errors, then normalized to a 1 Hz bandwidth. A second HP 8566A/B Spectrum Analyzer is used as the signal source for this test. Therefore, if the measured values are not within specification limits, either analyzer may be at fault.

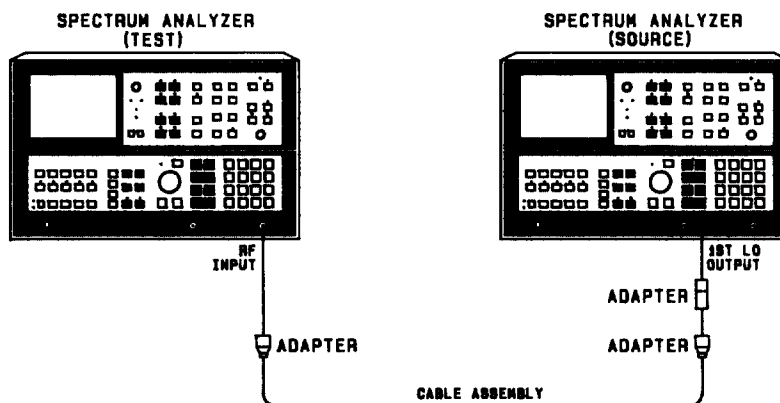


FIGURE 22. NOISE SIDEBANDS TEST SETUP

PERFORMANCE TESTS

12. NOISE SIDEBANDS TEST (Cont'd)

EQUIPMENT:

Spectrum Analyzer (1ST LO OUTPUT)	HP 8566A/B
Adapter, Type N (m) to SMA (f) (2 required)	HP 1250-1250
Adapter, Type N (f) to BNC (m)	HP 1250-0077
Cable Assembly, SMA Male Connectors	HP 5061-1086.

PROCEDURE:

1. Allow both analyzers to warm up for at least one-half hour with LINE switch in either the STANDBY or ON position.
2. On one of the analyzers, connect the CAL OUTPUT to the RF INPUT. Press 2-22 GHz then RECALL 9 and adjust FREQ ZERO control for maximum signal amplitude. Repeat this frequency calibration on the other analyzer. When completed, press 2-22 GHz again on each of the analyzers.
3. Connect 1ST LO OUTPUT of source analyzer to RF INPUT of analyzer under test as shown in Figure 22.

NOTE

Do not connect the frequency reference (on the rear panel) of the analyzers to a common frequency reference.

4. Key in the following on the source analyzer:

CENTER FREQUENCY		5.7 GHz
FREQUENCY SPAN		0 Hz
SHIFT SHIFT R MR → REF LVL F RES BW (Display diagnostics for convenience) (YTO Pretest Mode)		
SWEEP SINGLE		

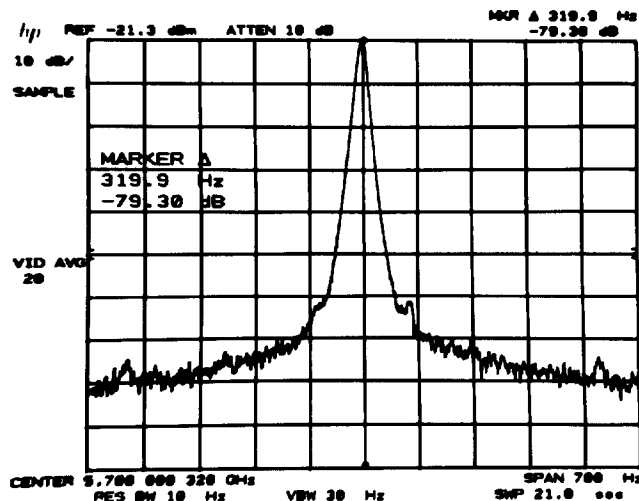


FIGURE 23. NOISE SIDEBANDS MEASUREMENT

12. NOISE SIDEBANDS TEST (Cont'd)

The first line of the diagnostic display and the CENTER readout should both now indicate 5.700 000 000 GHz. This is the 1ST LO OUTPUT frequency.

5. Key in the following on the analyzer under test:

CENTER FREQUENCY	.....	5.7 GHz
FREQUENCY SPAN	.....	5 kHz

6. Wait for completion of the sweep (the asterisk * at the upper right of the display will disappear), then press **MARKER** **PEAK SEARCH**, **MKR → CF**, **MKR → REF LVL**.
7. Change **FREQUENCY SPAN** to 700 Hz. Wait for completion of the sweep, then press **MARKER** **PEAK SEARCH**, **MKR → CF**. Wait again for the completion of the sweep.
8. Press **SHIFT** **G** **VIDEO BW** to initiate video averaging. When the VID AVG readout at the left edge of the display reaches 20, press **SHIFT**, **TRACE B** **BLANK**.
9. Press **MARKER** **PEAK SEARCH**, **Δ** and key in 320 Hz. Record the MARKER Δ amplitude: _____ dBc. See Figure 23.
10. Find the equivalent noise power bandwidth, BW_{enp} , for the 10 Hz resolution bandwidth filter by multiplying the 3 dB bandwidth recorded in Table 5 of the Resolution Bandwidth Accuracy Test by 1.13:

$$BW_{\text{enp}} = 1.13 \times \text{_____ Hz}$$

$$= \text{_____ Hz}$$

11. A correction factor of 2.5 dB must be added to the value measured in step 9 to compensate for logarithmic amplification and envelope detection. Add this correction, then subtract $10 \log (BW_{\text{enp}})$ to compute the noise sideband level in dBc referenced to a 1 Hz bandwidth:

$$\text{_____ dBc} + 2.5 \text{ dB} - 10 \log (BW_{\text{enp}}) = \text{_____ dBc/1 Hz}$$

The result should be $< -80 \text{ dBc/1 Hz}$.

12. Press **SHIFT** **H** **SWEEP TIME**.
13. Change **FREQUENCY SPAN** to 2.5 kHz.
14. Press **SHIFT** **G** **VIDEO BW**. When the VID AVG readout reaches 10, press **SHIFT**, **TRACE B** **BLANK**.
15. Press **MARKER** **PEAK SEARCH**, **Δ** and key in 1 kHz. Record the MARKER Δ amplitude: _____ dBc.
16. Compute the noise sideband level at a 1 kHz offset by the procedure of steps 10 and 11, but find BW_{enp} for the 30 Hz resolution bandwidth filter:

$$\text{_____ dBc} + 2.5 \text{ dB} - 10 \log (BW_{\text{enp}}) = \text{_____ dBc/1 Hz}$$

The result should be $< -85 \text{ dBc/1 Hz}$.

12. NOISE SIDEBANDS TEST (Cont'd)

17. Press $\boxed{\text{SHIFT}} \boxed{\text{H}} \boxed{\text{SWEEP TIME}}$.
18. Change $\boxed{\text{FREQUENCY SPAN}}$ to 25 kHz.
19. Press $\boxed{\text{SHIFT}} \boxed{\text{G}} \boxed{\text{VIDEO BW}}$. When the VID AVG readout reaches 20 or higher, press $\boxed{\text{SHIFT}}$, TRACE B $\boxed{\text{BLANK}}$.
20. Press MARKER $\boxed{\text{PEAK SEARCH}}$, $\boxed{\Delta}$ and key in 10 kHz. Record the MARKER Δ amplitude: _____ dBc.
21. Compute the noise sideband level at a 10 kHz offset by the procedure of steps 10 and 11, using the 3 dB bandwidth recorded in Table 5 for the 300 Hz resolution bandwidth filter:

$$\text{_____ dBc} + 2.5 \text{ dB} - 10 \log (\text{BW}_{\text{enp}}) = \text{_____ dBc/1 Hz}$$

The result should be $< -90 \text{ dBc/1 Hz}$.

22. Press $\boxed{\text{SHIFT}} \boxed{\text{H}} \boxed{\text{SWEEP TIME}}$.
23. Change $\boxed{\text{FREQUENCY SPAN}}$ to 250 kHz.
24. Press $\boxed{\text{SHIFT}} \boxed{\text{G}} \boxed{\text{VIDEO BW}}$. When the VID AVG readout reaches 30 or greater, press $\boxed{\text{SHIFT}}$, TRACE B $\boxed{\text{BLANK}}$.
25. Press MARKER $\boxed{\text{PEAK SEARCH}}$, $\boxed{\Delta}$ and key in 100 kHz. Record the MARKER Δ amplitude: _____ dBc.
26. Compute the noise sideband level at a 100 kHz offset by the procedure of steps 10 and 11, using BW_{enp} for the 3 kHz filter:

$$\text{_____ dBc} + 2.5 \text{ dB} - 10 \log (\text{BW}_{\text{enp}}) = \text{_____ dBc/1 Hz}.$$

The result should be $< -105 \text{ dBc/1 Hz}$.

PERFORMANCE TESTS

13. LINE-RELATED SIDEBANDS TEST

SPECIFICATION:

Offset from Carrier	Center Frequency	Sidebands
<360 Hz	100 Hz to 100 MHz 100 MHz to 5.8 GHz	- 70 dBc - 60 dBc
360 Hz to 2 kHz	100 Hz to 100 MHz	- 75 dBc

OPTION 400:

For center frequencies >100 Hz and <5.8 GHz:

Offset from Carrier	Center Frequency	Sidebands
≤ 2 kHz 2 kHz to 5.5 kHz	100 Hz to 5.8 GHz 100 Hz to 5.8 GHz	- 55 dBc - 65 dBc

DESCRIPTION:

The line-related sidebands are measured on signals of 100 MHz, 2.4 GHz, 2.6 GHz, and 5.7 GHz. A second HP 8566A/B Spectrum Analyzer is used as the signal source for this test. Therefore, if measured values are not within specified limits, either analyzer may be at fault.

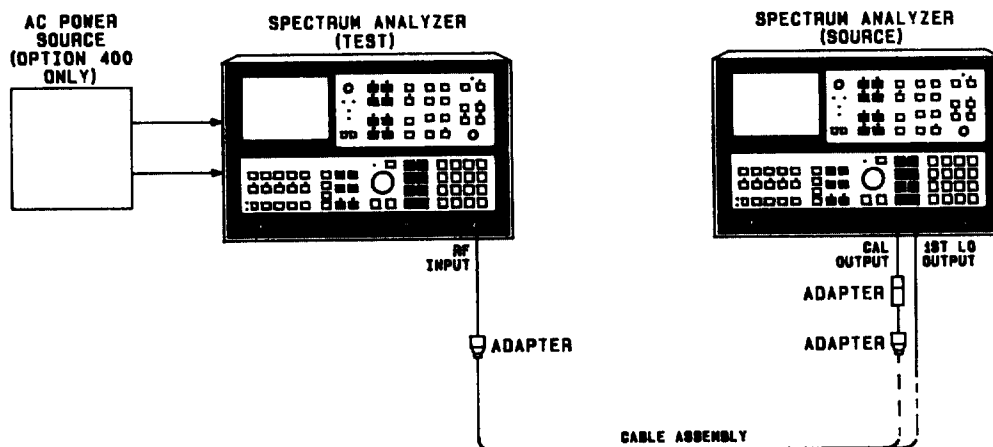


FIGURE 24. LINE-RELATED SIDEBANDS TEST SETUP

PERFORMANCE TESTS

13. LINE-RELATED SIDEBANDS TEST (Cont'd)

EQUIPMENT:

Spectrum Analyzer (1ST LO OUTPUT)	HP 8566A/B
AC Power Source (Option 400 ONLY)	California Instruments Model 153T
Adapter, Type N (m) to SMA (f) (2 required)	HP 1250-1250
Adapter, Type N (f) to BNC (m)	HP 1250-0077
Cable Assembly, SMA Male Connectors	HP 5061-1086

PROCEDURE:

- Allow both analyzers to warm up for at least one-half hour with LINE switch in either the STANDBY or ON position.
- Connect CAL OUTPUT to RF INPUT on one of the analyzers. Press 2-22 GHz then RECALL 9 and adjust FREQ ZERO control for maximum signal amplitude. Repeat this frequency calibration on the other analyzer. When complete, press 2-22 GHz on each analyzer.
- Connect CAL OUTPUT of source analyzer to RF INPUT of analyzer under test as shown in Figure 24.
- Key in the following on the analyzer under test:

CENTER FREQUENCY	100 MHz
FREQUENCY SPAN	1.2 kHz

Wait for asterisk (*) in upper-right of display to disappear.

- Press MARKER PEAK
SEARCH, MNR CF, MNR REF LVL and wait for asterisk (*) to disappear. Trace should now be centered on display.
- Press SHIFT G VIDEO
SW, SWEEP SINGLE, 1 0 Hz μV msec to initiate video averaging of 10 sweeps.
- When VID AVG = 10, press SHIFT, TRACE B BLANK, TRACE A VIEW.
- Press MARKER PEAK
SEARCH Δ and position the marker at the peaks of the line-related sidebands separated from the signal by multiples of the line frequency (e.g., 120, 180, 240, 300, 360, 420, 480, and 540 Hz for a 60 Hz line frequency). The fundamental line frequency cannot be resolved. Refer to Figure 25.

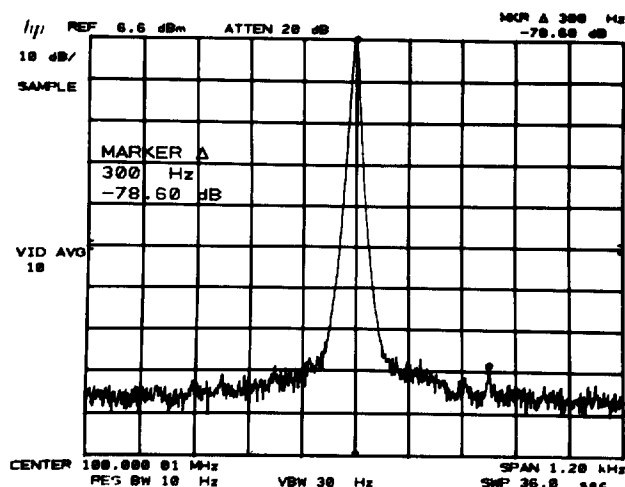


FIGURE 25. LINE-RELATED SIDEBANDS MEASUREMENT

PERFORMANCE TESTS

13. LINE-RELATED SIDEBANDS TEST (Cont'd)

9. The MARKER Δ amplitude for all line-related sidebands <360 Hz away from the signal should be < -70 dB. The MARKER Δ amplitude for all line-related sidebands from 360 Hz to 600 Hz away from the signal should be < -75 dB.

10. Press **SHIFT** **H** **SWEEP TIME** , **SWEEP** **CONT** , **TRACE A** **CLEAR-WRITE** .

11. Connect 1ST LO OUTPUT of source analyzer to RF INPUT of analyzer under test as shown in Figure 24.

12. Key in the following on the source analyzer:

CENTER FREQUENCY		2.4 GHz
FREQUENCY SPAN		0 Hz
SHIFT R MARK-REF LVL	(Display diagnostics for convenience)	
SHIFT F RES BW	(YTO Pretest Mode)	
SWEEP SINGLE		

The first line of the diagnostic display and the CENTER readout should both now indicate 2.400 000 000 GHz. This is the 1ST LO OUTPUT frequency.

13. Key in **CENTER FREQUENCY** 2.4 GHz and **REFERENCE LEVEL** +10 dBm on the analyzer under test. Wait for asterisk (*) to disappear.
14. Repeat steps 5 through 8.
15. The MARKER Δ amplitude for all line-related sidebands <360 Hz away from the signal should be < -60 dB.

Largest Level <360 Hz _____ dB at _____ Hz

16. Press **SHIFT** **H** **SWEEP TIME** , **SWEEP** **CONT** , **TRACE A** **CLEAR-WRITE** .

17. Change **CENTER FREQUENCY** of both the source and test analyzer to 2.6 GHz. Wait for asterisk (*) to disappear.

18. Press **MARKER** **OFF** , **PRESSEL PEAK** and wait for PEAKING! message to disappear from the CRT.

19. Repeat steps 5 through 8.

20. The MARKER Δ amplitude for all line-related sidebands <360 Hz away from the signal should be < -60 dB.

Largest Level <360 Hz _____ dB at _____ Hz

21. Press **SHIFT** **H** **SWEEP TIME** , **SWEEP** **CONT** , **TRACE A** **CLEAR-WRITE** .

22. Change **CENTER FREQUENCY** of both the source and test analyzer to 5.7 GHz. Wait for asterisk (*) to disappear.

PERFORMANCE TESTS

13. LINE-RELATED SIDEBANDS TEST (Cont'd)

23. Press MARKER , and wait for the PEAKING! message to disappear from the CRT.
24. Repeat steps 5 through 8.
25. The MARKER Δ amplitude for all line-related sidebands <360 Hz away from the signal should be < -60 dB.

Largest Level <360 Hz _____ dB at _____ Hz

OPTION 400

1. Set the AC power source output equal to the required line voltage and frequency. The analyzer under test should be operated at 400 Hz and the source analyzer at 50-60 Hz.
2. Allow both analyzers to warm up for at least one-half hour with LINE switch in either STANDBY or ON position.
3. Perform frequency calibration of each analyzer as specified in step 2 of standard instrument procedure.
4. Connect 1ST LO OUTPUT of source analyzer to RF INPUT of analyzer under TEST and key in settings on source analyzer as specified in step 12 of standard instrument procedure.
5. Key in 2.4 GHz, 1 MHz on analyzer under test.
6. Press MARKER and wait for PEAKING! message to disappear from display.
7. Press MARKER , , , .
8. Change to 12 kHz. Wait for signal trace to be centered.
9. Change to 30 Hz.
10. Press , , SWEEP , to initiate video averaging of 10 sweeps.
11. When the VID AVG readout reaches 10, press , TRACE B , TRACE A .
12. Press MARKER , and position the marker at the peaks of the line-related sidebands separated from the signal by multiples of the line frequency; i.e., 400 Hz, 800 Hz, 1200 Hz,...
13. The MARKER Δ amplitude for all line sidebands below 2 kHz should be < -55 dB. The Δ amplitude for sidebands from 2 kHz to 5.5 kHz should be < -65 dB.

Largest Level <2 kHz _____ dB at _____ Hz

Largest Level <2 kHz to 5.5 kHz _____ dB at _____ Hz

14. Change of source analyzer to 5.7 GHz and repeat steps 5 through 13 for 5.7 GHz.

14. AVERAGE NOISE LEVEL TEST

RELATED ADJUSTMENT:

Last Converter Adjustments

SPECIFICATION:

Displayed average noise level (0 dB input attenuation, 10 Hz resolution bandwidth):

Non-Preselected	Preselected
< -95 dBm, 100 Hz to 50 kHz	< -132 dBm, 2.0 GHz to 5.8 GHz
< -112 dBm, 50 kHz to 1 MHz	< -125 dBm, 5.8 GHz to 12.5 GHz
< -134 dBm, 1 MHz to 2.5 GHz	< -119 dBm, 12.5 GHz to 18.6 GHz
	< -114 dBm, 18.6 GHz to 22 GHz

DESCRIPTION:

The displayed average noise level is measured in a 10 Hz bandwidth at various frequencies with no signal applied to the analyzer input.

EQUIPMENT:

50 Ohm Coaxial Termination HP 909A, Option 012

PROCEDURE:

1. Press **2-22 GHz**.
2. Connect CAL OUTPUT to RF INPUT.
3. Press **RECALL** **8**. Adjust AMPTD CAL for a MARKER amplitude of $-10.00 \text{ dBm} \pm 0.02 \text{ dB}$.
4. Disconnect CAL OUTPUT. Terminate RF INPUT with a 50 ohm coaxial termination.
5. Press **0-23 GHz**. Key in settings as follows:

START FREQ	 80 Hz
STOP FREQ	 180 Hz
REFERENCE LEVEL	 -70 dBm
ATTEN	 0 dB
VIDEO BW	 3 Hz

6. Press **SHIFT** **G** **VIDEO BW**. Wait about 2 minutes for the VID AVG readout to reach 10 sweeps or more, then press **SHIFT**, **TRACE B** **BLANK**.

PERFORMANCE TESTS

14. AVERAGE NOISE LEVEL TEST (Cont'd)

7. Press MARKER NORMAL. Tune to 100 Hz, or the nearest frequency that is not on the slope of the LO feedthrough or on a line-related sideband (e.g., 120 Hz). Refer to Figure 26.

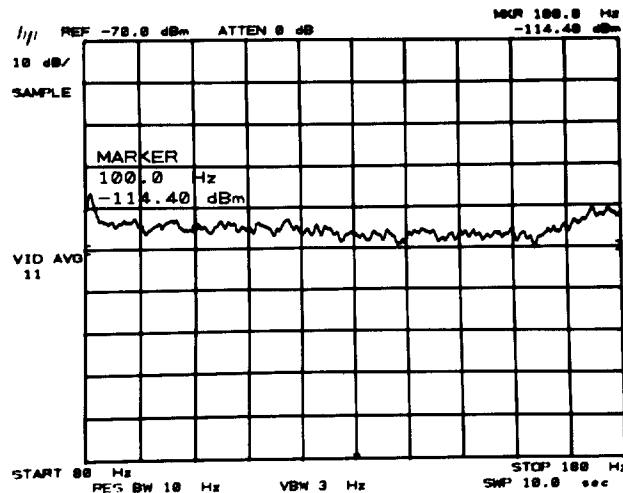


FIGURE 26. AVERAGE NOISE LEVEL MEASUREMENT

8. Read the noise level from the MARKER amplitude readout. The value should be less than -95 dBm. _____dBm
9. Key in the following settings:
- | | | |
|--|--|---------|
| CENTER
FREQUENCY | | 51 kHz |
| FREQUENCY
SPAN | | 0 Hz |
| SWEEP
TIME | | 20 msec |
10. Wait several seconds for the trace to stabilize (VID AVG >20). Read the amplitude from the MARKER readout. The value should be less than -112 dBm. _____dBm
11. Set CENTER
FREQUENCY according to Table 18. At each setting allow several seconds for the trace to stabilize before reading the amplitude from the MARKER readout. The maximum allowable level for each frequency is given in the table.

PERFORMANCE TESTS

14. AVERAGE NOISE LEVEL TEST (Cont'd)

TABLE 18. AVERAGE NOISE LEVEL

CENTER FREQUENCY	MARKER Amplitude (dBm)	Maximum Amplitude (dBm)
2 MHz	_____	- 134
1 GHz	_____	- 134
2.499 GHz	_____	- 134
2.510 GHz	_____	- 132
5.799 GHz	_____	- 132
5.810 GHz	_____	- 125
12.499 GHz	_____	- 125
12.510 GHz	_____	- 119
18.59 GHz	_____	- 119
18.61 GHz	_____	- 114
22.0 GHz	_____	- 114

15. RESIDUAL RESPONSES TEST

SPECIFICATION:

- < -100 dBm, 100 Hz to 5.8 GHz
- < -95 dBm, 5.8 GHz to 12.5 GHz
- < -85 dBm, 12.5 GHz to 18.6 GHz
- < -80 dBm, 18.6 GHz to 22 GHz

DESCRIPTION:

The spectrum analyzer is tested for residual responses across its frequency range with no signal applied and 0 dB input attenuation.

EQUIPMENT:

50 Ohm Coaxial Termination HP 909A, Option 012

PROCEDURE:

1. Press **3-22 GHz**.
2. Connect CAL OUTPUT to RF INPUT. Press **RECALL** **8**.
3. Adjust AMPTD CAL for a MARKER amplitude of $-10.00 \text{ dBm} \pm 0.02 \text{ dB}$.
4. Press **0-25 GHz**. Disconnect CAL OUTPUT and terminate RF INPUT with a 50 ohm coaxial termination.
5. Key in the following:

REFERENCE LEVEL	.....	-20 dBm
ATTEN	.....	0 dB
RES BW	.....	30 kHz
VIDEO BW	.....	1 kHz
STOP FREQ	.....	1.5 GHz

6. Press DISPLAY LINE **ENTER** and key in -100 dBm.

NOTE

There should be at least 3 dB margin between the noise trace and the display line so that any residual responses may be distinguished from the noise. It may be necessary to reduce the resolution and/or video bandwidths from the settings given in this procedure to achieve this margin. If this causes the MEAS UNCAL message to appear, it will be necessary to reduce the frequency span and use more sweeps to cover the frequency range.

7. Press TRACE A **CLEAR-WRITE**, SWEEP **SINGLE**. Wait for completion of the sweep (see Figure 27).

15. RESIDUAL RESPONSES TEST (Cont'd)

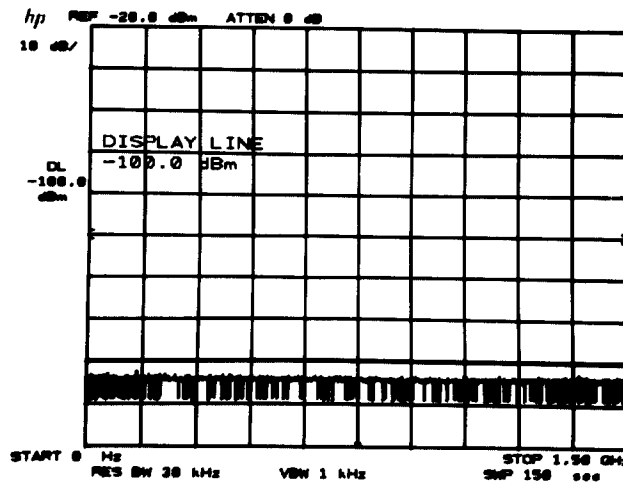


FIGURE 27. RESIDUAL RESPONSES MEASUREMENT

8. Look for any residual responses at or above the display line. If a residual is suspected, press SWEEP again and see if the response persists. A residual will persist on repeated sweeps, but a noise peak will not. Any residual responses must be below the display line.

Largest Residual Level _____ dBm at _____ Hz

9. If a response appears to be marginal, perform the following check to determine whether or not it exceeds the specification:
 - a. Press .
 - b. Press MARKER and place the marker on the peak of the response in question.
 - c. Press MARKER , then activate SWEEP .
 - d. Reduce to 1 MHz. Reduce until there is at least a 7 dB margin between the display line and the average noise level. The amplitude of the response must be less than the display line setting.
 - e. Press to resume the search for residuals.

10. Key in control settings as follows:

..... 1.4 GHz

..... 2.5 GHz

PERFORMANCE TESTS

15. RESIDUAL RESPONSES TEST (Cont'd)

11. Follow the procedure of steps 7 through 9 to determine if there are any residuals > -100 dBm in this frequency range.

Largest Residual Level _____ dBm at _____ Hz

12. Key in the following settings:

RES BW	.....	3 kHz
VIDEO BW	.....	3 kHz
START FREQ	.....	2.4 GHz
STOP FREQ	.....	5.8 GHz

13. Look for residual responses > -100 dBm by using steps 7 through 9.

Largest Residual Level _____ dBm at _____ Hz

14. Key in settings as follows:

CENTER FREQUENCY	.....	6.2 GHz
CF STEP SIZE	.....	990 MHz
FREQUENCY SPAN	.....	1 GHz
VIDEO BW	.....	1 kHz

15. Set the display line at -95 dBm. Check for residual responses > -95 dBm by using steps 7 through 9.

Largest Residual Level _____ dBm at _____ Hz

16. Step  to 11.150 GHz with  and check for residual responses > -95 dBm at each step by using steps 7 through 9.

Largest Residual Level _____ dBm and _____ Hz

17. Key in the following settings:

START FREQ	.....	11.6 GHz
STOP FREQ	.....	12.5 GHz
VIDEO BW	.....	3 kHz

18. Check for residual responses > -95 dBm by using steps 7 through 9.

Largest Residual Level _____ dBm and _____ Hz

15. RESIDUAL RESPONSES TEST (Cont'd)

19. Key in analyzer settings as follows:

START FREQ	.....	12.4 GHz
STOP FREQ	.....	18.6 GHz
RES BW	.....	100 kHz
VIDEO BW	.....	3 kHz

20. Set the display line at -85 dBm.

21. Check for residual responses > -85 dBm by using steps 7 through 9.

Largest Residual Level _____ dBm and _____ Hz

22. Key in the following:

START FREQ	.....	18.5 GHz
STOP FREQ	.....	22 GHz

23. Set the display line at -80 dBm.

24. Check for residual responses > -80 dBm by using steps 7 through 9.

Largest Residual Level _____ dBm and _____ Hz

16. HARMONIC AND INTERMODULATION DISTORTION TEST

SPECIFICATION:

Second Harmonic Distortion:

Center Frequency	Level at Mixer	Harmonic Distortion
50 MHz to 700 MHz non-preselected	≤ -40 dBm	< -80 dBc
100 Hz to 2.5 GHz non-preselected	≤ -40 dBm	< -70 dBc
2 to 22 GHz preselected	≤ -10 dBm	< -100 dBc

Third-Order Intermodulation Distortion

Third-Order Intercept (TOI):

- $> +5$ dBm, 100 Hz to 5 MHz
- $> +7$ dBm, 5 MHz to 5.8 GHz
- $> +5$ dBm, 5.8 GHz to 18.6 GHz

DESCRIPTION:

Second harmonic distortion in the non-preselected and preselected bands is checked with a signal source and low-pass filter. The low-pass filter ensures that the harmonics measured are due to the analyzer and not the source. Third-order intermodulation distortion is measured in the non-preselected and preselected bands with two signal sources. To prevent source interaction, the synthesizer outputs are padded and combined in a reactive power divider.

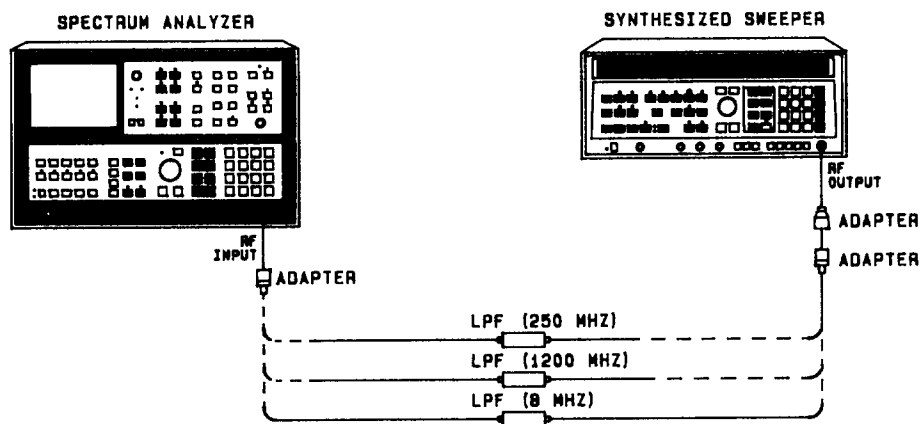


FIGURE 28. HARMONIC DISTORTION TEST SETUP

16. HARMONIC AND INTERMODULATION DISTORTION TEST (Cont'd)

NOTE

Equipment listed is for two test setups, Figures 28 and 29.

EQUIPMENT:

Synthesized Sweeper	HP 8340A
Synthesized Signal Generator	HP 8672A
Power Meter	HP 436A
Power Sensor	HP 8485A
Reactive Power Divider	Omni-Spectra 2090-6202-00
20 dB Attenuator (2 required)	HP 8493B, Option 020
3 dB Attenuator	HP 8493B, Option 003
Low-Pass Filter (250 MHz)	K&L 5L380-250-B/B
Low-Pass Filter (8 GHz)	K&L 6L250-8000-NP/N
Low-Pass Filter (1200 MHz)	HP 360B
61 cm (24 in.) Cable Assembly, SMA Male	
Connectors (2 required)	HP 5061-1086
Adapter, Type N (m) to BNC (f) (2 required)	HP 1250-0780
Adapter, Type N (m) to SMA (f)	HP 1250-1250
Adapter, Type N (f) to SMA (f)	HP 86290-60005
Adapter, SMA Female Connectors	HP 1250-1158
Adapter, SMA Male Connectors	HP 1250-1159
BNC Tee (2 required)	HP 1250-0781

PROCEDURE:

Harmonic Distortion

- Set the synthesized sweeper for an output CW frequency of 230.00 MHz and an output level of approximately -30 dBm.
- Press **2-22 GHz** on the analyzer. Key in the following settings:

CENTER FREQUENCY	230 MHz
FREQUENCY SPAN	100 kHz
REFERENCE LEVEL	-30 dBm
- Connect equipment as shown in Figure 28, using the 250 MHz low-pass filter. Adjust the synthesized sweeper output level to place peak of signal trace at the top graticule line.
- Press **DISPLAY LINE** **ENTER** and key in -110 dBm.
- Press **MARKER** **PEAK SEARCH**, **MARKER CF**, **MARKER STEP SIZE**.
- Activate **CENTER FREQUENCY** and press **HOME** to tune to the second harmonic of the input signal.
- Reduce **FREQUENCY SPAN** to 10 kHz and **VIDEO BW** to 30 Hz. Reduce **RES BW**, if necessary, for a margin of ≥ 5 dB between the displayed noise and the display line.

16. HARMONIC AND INTERMODULATION DISTORTION TEST (Cont'd)

8. The second harmonic should be below the display line (< -80 dBc).

Second harmonic level of 230 MHz _____dBc

9. Replace the 250 MHz low-pass filter with the 1200 MHz low-pass filter.
10. Set the synthesized sweeper for an output CW frequency of 800.000 MHz.
11. Press **2-22 GHz** on the analyzer. Key in:

CENTER FREQUENCY	.....	800 MHz
FREQUENCY SPAN	.....	100 kHz
REFERENCE LEVEL	.....	- 30 dBm

12. Adjust synthesized sweeper output level to place peak of signal trace at the reference level line.

NOTE

If unable to locate a harmonic distortion product, increase the output level by 10 dB. Be sure to return the output level to the original setting before making a measurement.

13. Press DISPLAY LINE **ENTER** and key in - 100 dBm.
14. Press MARKER **PEAK SEARCH**, **MKR → CF**, **MKR/Δ → STP SIZE**, **CENTER FREQUENCY** **↑**, **FREQUENCY SPAN** 10 kHz.
15. The second harmonic of the input signal should be below the display line (< -70 dBc).

Second harmonic level of 800 MHz _____dBc

16. Replace the 1200 MHz low-pass filter with the 8 GHz low-pass filter.
17. Set the synthesized sweeper for an output frequency of 7200.000 MHz and an output level of 0 dBm.
18. Press **2-22 GHz** on the analyzer. Key in the following:

CENTER FREQUENCY	.....	7.2 GHz
FREQUENCY SPAN	.....	100 kHz

19. Press MARKER **PEAK SEARCH**, **MKR → CF**.
20. Set **FREQUENCY SPAN** to 10 kHz. Press MARKER **PEAK SEARCH**, **MKR → CF**, **MKR/Δ → STP SIZE**.
21. Adjust synthesized sweeper output level to place peak of signal trace at the reference level line.
22. Press DISPLAY LINE **ENTER** and key in - 80 dBm.
23. Activate **CENTER FREQUENCY** and press **↑** to tune to the second harmonic of the input signal.

16. HARMONIC AND INTERMODULATION DISTORTION TEST (Cont'd)

24. Key in the following:

REFERENCE LEVEL	.....	- 20 dBm
FREQUENCY SPAN	.....	1 kHz

25. The second harmonic should be below the display line (< -100 dBc).

Second harmonic level of 7200 MHz _____ dBc

Intermodulation Distortion

26. Set both synthesized sources as follows:

RANGE	+ 10 dBm
METER MODE	LEVEL
RF OUTPUT	OFF
ALC	INT
AM	OFF
FM DEVIATION MHz	OFF

27. Connect equipment as shown in Figure 29 with "output" of power divider connected to power sensor. The **FREQ REFERENCE** switch on the rear panel of the analyzer should be set to INT and the **FREQ REFERENCE** switch on both synthesized source rear panels should be set to EXT.
28. Set one synthesized source for an output frequency of 2099.500 MHz, the other to 2100.500 MHz.
29. Set one synthesized source **RF OUTPUT** switch to ON and adjust the output power level for a power meter indication of -25.00 dBm ± 0.20 dB. Return the **RF OUTPUT** switch to the OFF setting.
30. Set the other synthesized source **RF OUTPUT** switch to ON and adjust the output power level for a power meter indication of -25.00 dBm ± 0.20 dB. Set both synthesized source **RF OUTPUT** switches to the ON position (power meter reading should be approximately -22 dBm).
31. Connect output of power divider to analyzer **RF INPUT** as shown in Figure 29.

NOTE

Be careful to flex the cable assemblies as little as possible, as flexing can cause a change in the measured power level. To minimize flexing, place the power sensor close to the analyzer input.

32. Press  on the spectrum analyzer.

16. HARMONIC AND INTERMODULATION DISTORTION TEST (Cont'd)

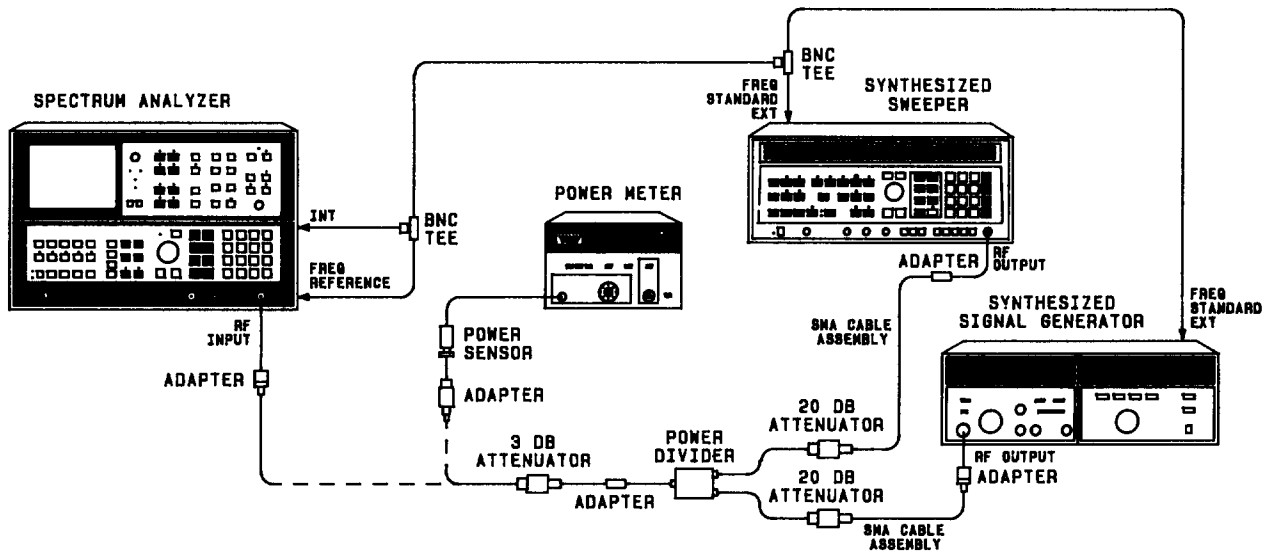


FIGURE 29. INTERMODULATION DISTORTION TEST SETUP

33. Key in analyzer settings as follows:

CENTER FREQUENCY	.....	2099.5 MHz
CF STEP SIZE	.....	1 MHz
FREQUENCY SPAN	.....	2 kHz
ATTEN	.....	0 dB

34. Wait for completion of the sweep (asterisk should not appear on display), then press MARKER PEAK SEARCH, MARK → REF LVL. Wait for completion of the sweep.

35. Press MARKER Δ. Activate CENTER FREQUENCY and press ↩ once to tune to the third order product at 2098.5 MHz.

PERFORMANCE TESTS

16. HARMONIC AND INTERMODULATION DISTORTION TEST (Cont'd)

36. Wait for completion of the sweep, then press MARKER PEAK SEARCH . Record the MKR Δ amplitude: _____dB.
37. Press ↑ three times to tune to the third order product at 2101.5 MHz. Wait for completion of the sweep, then press MARKER PEAK SEARCH . Record the MKR Δ amplitude: _____dB.
38. Choose the smallest MKR Δ amplitude in steps 36 and 37 and record its absolute value: _____dB. (For example, if one MKR Δ amplitude is -82 dB and the other is -79 dB, record $+79$ dB.) This value is S, the third order suppression.
39. Compute the third order intercept (TOI) as follows:

$$\text{TOI} = P + S/2, \text{ where } P = \text{input signal power, and } S = \text{third order suppression from step 38.}$$

$$\text{TOI} = -25 \text{ dBm} + \text{_____dB}/2$$

$$= \text{_____dBm}$$
40. The result should be $> +7$ dBm. Refer to Figure 30.

TOI for signals of 2099.5 MHz and 2100.5 MHz _____dBm

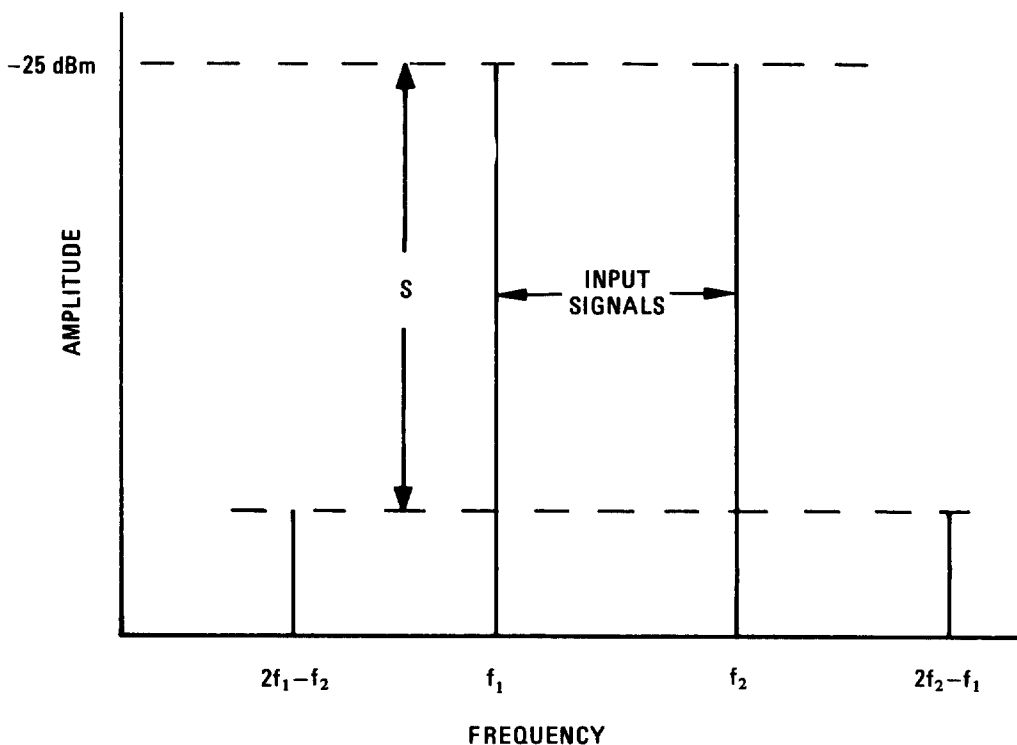


FIGURE 30. THIRD ORDER INTERMODULATION PRODUCTS

PERFORMANCE TESTS

16. HARMONIC AND INTERMODULATION DISTORTION TEST (Cont'd)

41. Set one synthesizer to 3999.500 MHz, the other to 4000.500 MHz.
42. Connect the output of the power divider to the power sensor as shown in Figure 29.
43. Set RF OUTPUT switch on both synthesizers to the OFF position. Set output levels of synthesizers according to the procedure of steps 29 and 30.
44. Connect the output of the power divider to the analyzer input as shown in Figure 29.
45. Key in the following analyzer settings:

CENTER FREQUENCY		3999.5 MHz
FREQUENCY SPAN		1 MHz
REFERENCE LEVEL		-20 dBm

46. Press MARKER OFF, PRESEL
PEAK and wait for PEAKING! message to disappear from display.
47. Set FREQUENCY
SPAN to 2 kHz and wait for completion of the sweep.
48. Press MARKER PEAK
SEARCH, MKR →
REF LVL. Wait for completion of the sweep.
49. Press MARKER Δ. Activate CENTER
FREQUENCY and press ↓ once to tune to the third order product at 3998.5 MHz. Wait for completion of the sweep.
50. Press MARKER PEAK
SEARCH and record the MKR Δ amplitude: _____dB.
51. Press ↑ three times to tune to the third order product at 4001.5 MHz. Wait for completion of the sweep, then press MARKER PEAK
SEARCH. Record the MKR Δ amplitude: _____dB.
52. Choose the smallest MKR Δ amplitude in steps 50 and 51 and record its absolute value: S = _____dB. Record S (third order suppression) in Table 19.

TABLE 19. TOI MEASUREMENT SETTINGS

Input Signal Frequencies (MHz)		Third Order Products (MHz)		Third Order Suppression (dB)	TOI (dBm)
8999.500	9000.500	8998.500	9001.500	_____	_____
13999.500	14000.499	13998.501	14001.498	_____	_____

53. Compute the TOI:

$$\begin{aligned}
 \text{TOI} &= P + S/2 \\
 &= -25 \text{ dBm} + \text{_____dB}/2 \\
 &= \text{_____dBm}
 \end{aligned}$$

PERFORMANCE TESTS

16. HARMONIC AND INTERMODULATION DISTORTION TEST (Cont'd)

Record the TOI in Table 19.

54. The result should be $> +7$ dBm.

TOI for signals of 3999.5 MHz and 4000.5 MHz _____dBm

55. Repeat steps 41 through 53 for the input signal frequencies and the third order products shown in Table 19. The TOI for each setting should be $> +5$ dBm.

17. IMAGE, MULTIPLE, AND OUT-OF-BAND RESPONSES TEST

SPECIFICATION:

Image responses (due to the mixing of signals two times the IF frequency, 2×321.4 MHz, above or below the tune frequency):

- < -70 dBc, 100 Hz to 18.6 GHz
- < -60 dBc, 18.6 to 20 GHz
- < -50 dBc, 20 GHz to 22 GHz

Multiple responses (due to the input signal mixing with more than one local oscillator harmonic):

- < -70 dBc, 100 Hz to 22 GHz

Out-of-band responses (due to the mixing of input signals outside the preselector's frequency span):

- < -60 dBc, 2 to 22 GHz

DESCRIPTION:

Image and out-of-band responses are checked by setting the analyzer center frequency to several frequencies across the analyzer range and tuning a leveled signal source to the frequencies determined by the tuning equation, $F_{\text{sig}} = nF_{\text{LO}} \pm F_{\text{IF}}$. Input signals at these frequencies will excite all possible image and out-of-band responses for a given 1st LO frequency and all positive integer values of n . In this test, only values of n corresponding to the analyzer mixing modes are used. Multiple responses are checked by applying an input signal and measuring the response at those center frequencies for which a harmonic of the 1st LO mixes with the input signal.

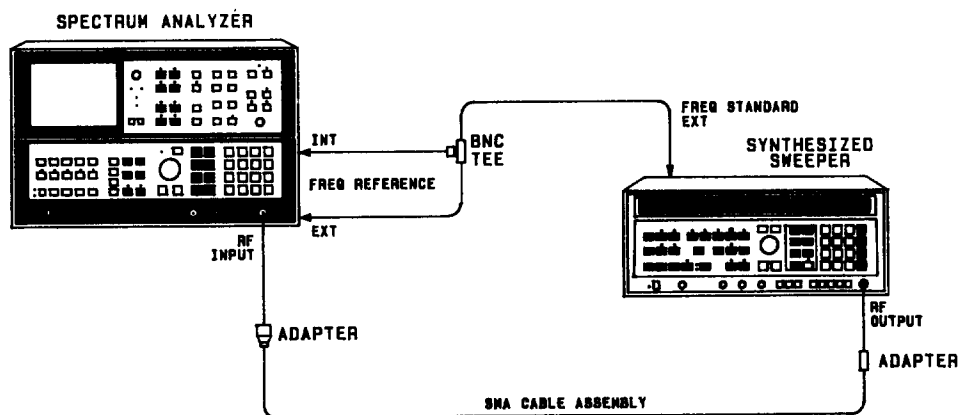


FIGURE 31. IMAGE, MULTIPLE, AND OUT-OF-BAND RESPONSES TEST SETUP

PERFORMANCE TESTS

17. IMAGE, MULTIPLE, AND OUT-OF-BAND RESPONSES TEST (Cont'd)

EQUIPMENT:

Synthesized Sweeper	HP 8340A
61 cm (24 in.) Cable Assembly, SMA Male Connectors	HP 5061-1086
Adapter, Type N (m) to SMA (f)	HP 1250-1250
Adapter, SMA Female Connectors	HP 1250-1158
BNC Tee	HP 1250-0781

PROCEDURE:

1. Connect equipment as shown in Figure 31 with the synthesized sweeper RF OUTPUT connected to the analyzer input.
2. Press INSTR PRESET on the synthesized sweeper. Key in the following sweeper settings:

CW FUNCTION	3000.000 MHz
POWER LEVEL	0.0 dBm

3. Press **3-22 GHz** on the analyzer. Key in the following analyzer settings:

CENTER FREQUENCY	3 GHz
FREQUENCY SPAN	100 kHz

4. Press DISPLAY LINE **ENTER** and key in -70 dBm.
5. Press MARKER **PRESEL PEAK** and wait for PEAKING! message to disappear from the display. Press MARKER **NORMAL**.
6. Adjust the power level of the synthesized sweeper to place the peak of the signal trace at the top CRT graticule line.

NOTE

If the maximum output power level of the synthesized sweeper is not enough to place the signal peak at the top CRT graticule line, then adjust the spectrum analyzer REFERENCE LEVEL as required to place the signal peak at the top CRT graticule line.

7. Press MARKER **A**. Using the DATA knob, determine the amplitude of the spurious response and enter the result in Table 20.
8. Set the synthesized sweeper to the frequencies in Table 20 corresponding to an analyzer center frequency of 3 GHz. The maximum allowable amplitude of the spurious response at the analyzer center frequency for each setting is shown in the table.

PERFORMANCE TESTS

17. IMAGE, MULTIPLE, AND OUT-OF-BAND RESPONSES TEST (Cont'd)

TABLE 20. IMAGE AND OUT-OF-BAND RESPONSES

Spectrum Analyzer CENTER FREQUENCY (GHz)	Synthesized Sweeper Frequency (MHz)	Displayed Spurious Amplitude	
		Measured (dBc)	Maximum (dBc)
3	3642.800	_____	- 70
	6321.400	_____	- 60
	6964.200	_____	- 60
6	2517.900	_____	- 60
	3160.700	_____	- 60
	5357.200	_____	- 70
9	4017.900	_____	- 60
	4660.700	_____	- 60
	8357.200	_____	- 70
	12696.500	_____	- 60
	13339.300	_____	- 60
12	5517.900	_____	- 60
	6160.700	_____	- 60
	11357.200	_____	- 70
	17196.500	_____	- 60
	17839.300	_____	- 60
15	4571.500	_____	- 60
	5214.300	_____	- 60
	9464.300	_____	- 60
	10107.100	_____	- 60
	14357.200	_____	- 70
17	5238.100	_____	- 60
	5880.900	_____	- 60
	10797.700	_____	- 60
	11440.500	_____	- 60
	16357.200	_____	- 70
19	4348.300	_____	- 60
	4991.100	_____	- 60
	9017.900	_____	- 60
	9660.700	_____	- 60
	13687.600	_____	- 60
	14330.400	_____	- 60
21	18357.200	_____	- 60
	4848.300	_____	- 60
	5491.100	_____	- 60
	10017.900	_____	- 60
	10660.700	_____	- 60
	15187.600	_____	- 60
	15830.400	_____	- 60
	20357.200	_____	- 50

PERFORMANCE TESTS

17. IMAGE, MULTIPLE, AND OUT-OF-BAND RESPONSES TEST (Cont'd)

9. Repeat steps 4 through 9 for all remaining **CENTER FREQUENCY** and synthesized sweeper settings in Table 20. Steps 4 through 8 need only be done once for each **CENTER FREQUENCY** setting.
10. Set the synthesized sweeper for an output CW frequency of 5700.000 MHz.
11. Key in the following analyzer settings:

CENTER FREQUENCY		5.7 GHz
REFERENCE LEVEL		0.0 dBm
12. Press **MARKER** **PRESEL PEAK** and wait for PEAKING! message to disappear from display. Press **MARKER** **NORMAL**.
13. Change **FREQUENCY SPAN** to 5 kHz. Adjust the synthesized sweeper output power level to place peak of signal trace at the top CRT graticule line.
14. Press **MARKER** **A** and **SHIFT**, **SWEEP** **CONT**. Using the DATA knob, determine the amplitude of the spurious response and enter the result in Table 21.
15. Change **CENTER FREQUENCY** to 2.36790 GHz. The multiple response at the center frequency should be below the display line (≤ -70 dBc).

Multiple response at 2.36790 GHz _____ dBc
16. Press **SHIFT**, **Q** **MARK/STP SIZE**.
17. Set the synthesized sweeper output CW frequency and analyzer **CENTER FREQUENCY** according to Table 21. Before checking the amplitude of the multiples for a given signal frequency, set the input signal amplitude by the procedure of steps 11 through 14. All multiple responses should be below the display line (≤ -70 dBc).

TABLE 21. MULTIPLE RESPONSES

Synthesized Sweeper Frequency (MHz)	CENTER FREQUENCY (Multiple Response) (GHz)	Displayed Spurious Amplitude	
		Measured (dBc)	Maximum (dBc)
5700.000	2.68930	_____	- 70
6000.000	1.18930	_____	- 70
12000.000	8.107133	_____	- 70
	8.535667	_____	- 70
13000.000	1.06790	_____	- 70
	1.91907	_____	- 70
	0.53395	_____	- 70
15000.000	10.107133	_____	- 70
	10.535667	_____	- 70

18. GAIN COMPRESSION TEST

SPECIFICATION:

<1.0 dB, 100 Hz to 22 GHz, ≤ -5 dBm at the input mixer

DESCRIPTION:

Gain compression is measured by changing the power level at the input mixer from -10 dBm to 0 dBm (100 Hz to 2.5 GHz) or -15 dBm to -5 dBm (2 to 22 GHz). The displayed signal level will change by less than 10 dB, indicating gain compression of the input mixer. Since a 10 dB change in IF gain is used to keep the signal trace near the same point on the display when the input power is increased, the error due to this IF gain change is first measured, then subtracted from the displayed deviation to give the deviation due to compression only.

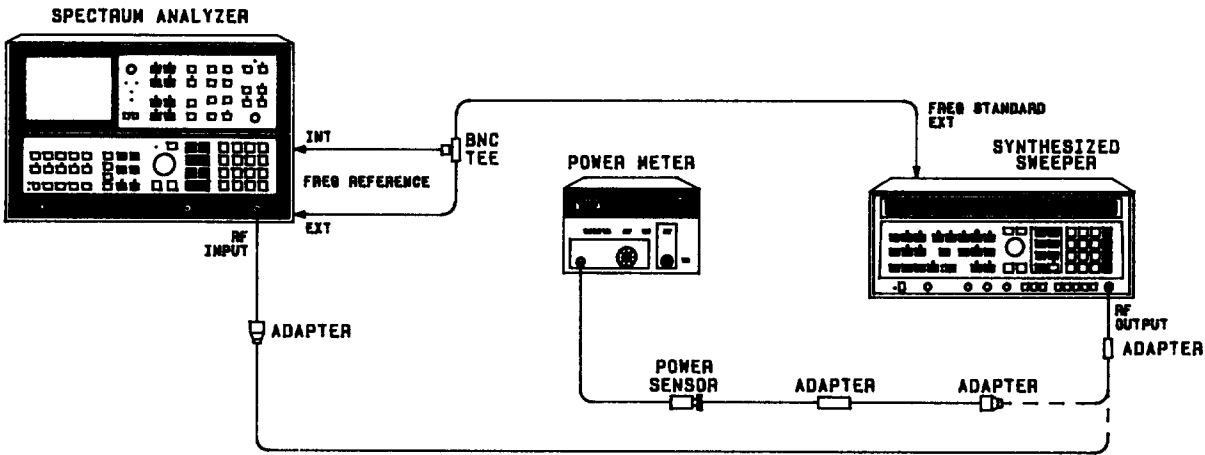


FIGURE 32. GAIN COMPRESSION TEST SETUP

EQUIPMENT:

Synthesized Signal Generator	HP 8340A
Power Meter	HP 436A
Power Sensor	HP 8485A
Adapter, Type N (m) to SMA (f) (2 required)	HP 1250-1250
Adapter, Type N Female Connectors	HP 1250-0777
Adapter, SMA (f) to SMA (f)	HP 1250-1158
Adapter, BNC Tee (m) (f) (f)	HP 1250-0781
Cable Assembly, SMA Male Connectors	HP 5061-1086

18. GAIN COMPRESSION TEST (Cont'd)

PROCEDURE:

1. Press **2-22 GHz**, **SHIFT**, **ATTEN**, **SHIFT**, **0-25 GHz** 0 dB on the analyzer. Set FREQ REFERENCE switch on rear panel of analyzer to INT and set FREQ STANDARD switch on rear panel of synthesizer to EXT.
2. Set synthesizer frequency to 2000.000 MHz. Set other synthesizer controls as follows:

ALC	INT
AM	OFF
FM DEVIATION MHz	OFF
RF OUTPUT	ON
OUTPUT LEVEL RANGE	- 20 dBm

NOTE

Care should be taken to disturb the cable assembly as little as possible, since flexing may cause a change in the measured power level. The power sensor or thermistor mount should be placed near the analyzer input to minimize flexing when the cable is moved.

3. Connect equipment as shown in Figure 32, with output of synthesizer connected to power sensor. Power is measured at the end of the cable assembly, not at the synthesizer output connector. Adjust synthesizer output level for a power meter indication of $-20.00 \text{ dBm} \pm 0.05 \text{ dB}$.
4. Disconnect cable assembly from power sensor and connect free end to analyzer RF INPUT as indicated in Figure 32. Key in analyzer settings as follows:

CENTER FREQUENCY	2 GHz
FREQUENCY SPAN	0 Hz
ATTEN	0 dB
REFERENCE LEVEL	- 10 dBm
VIDEO BW	30 Hz

5. Press the SCALE LIN pushbutton, then press **SHIFT**, **A** (resolution bandwidth) to obtain amplitude readouts in dB.
6. Press MARKER **NORMAL**, **Δ**.
7. Connect cable to power sensor and adjust synthesizer output level for a power meter reading of $-10.00 \text{ dBm} \pm 0.02 \text{ dB}$.
8. Reconnect cable to analyzer RF INPUT.
9. Change analyzer **REFERENCE LEVEL** to 0 dBm. Record the MKR Δ amplitude: _____dB. This is the IF gain error in changing the reference level from - 10 dBm to 0 dBm with 0 dB input attenuation.
10. Set **REFERENCE LEVEL** to - 10 dBm. Adjust AMPTD CAL to place the signal trace approximately 1 division down from the reference level line.

PERFORMANCE TESTS

18. GAIN COMPRESSION TEST (Cont'd)

11. Press MARKER NORMAL , Δ .
12. Connect cable to power sensor and adjust synthesizer output level for a power meter indication of 0.00 dBm $\pm$ 0.02 dB. Reconnect cable to analyzer input.
13. Change REFERENCE LEVEL to 0 dBm. Record the MKR Δ amplitude: _____dB.
14. Subtract the value obtained in step 9 from the value recorded in step 13 to find the gain compression: _____dB. The result should be > -1.0 dB (less than 1 dB compression).
15. Press 2-22 GHz on the analyzer. Press SHIFT ATTN , SHIFT 0-25 GHz 0 dB.
16. Set synthesizer to 3000.000 MHz. Connect cable to power sensor and adjust output level of synthesizer for an indication of -25.00 ± 0.05 dB on the power meter. Reconnect cable to analyzer input.

17. Key in the following settings:

CENTER FREQUENCY		3 GHz
FREQUENCY SPAN		1 MHz
ATTEN		0 dB

18. Press MARKER PRESEL PEAK and wait for PEAKING! message to disappear from the display.

19. Press SCALE LIN pushbutton, then press SHIFT AUTO (resolution bandwidth). Key in:

REFERENCE LEVEL		-15 dBm
FREQUENCY SPAN		0 Hz
VIDEO BW		30 Hz
RES BW		300 kHz

20. Press MARKER NORMAL , Δ .
21. Connect cable to power sensor and adjust synthesizer level for a power meter reading of -15.00 dBm $\pm$ 0.02 dB. Reconnect cable to analyzer.
22. Change REFERENCE LEVEL to -5 dBm. Record the MKR Δ amplitude: _____dB. This is the IF gain error in changing the reference level from -15 dBm to -5 dBm; 0 dB input attenuation.
23. Set REFERENCE LEVEL to -15 dBm. Adjust AMPTD CAL to set the trace approximately 1 division down from the reference level.
24. Press MARKER NORMAL , Δ .
25. Connect the cable to the power sensor and adjust synthesizer level for a power meter indication of -5.00 dBm $\pm$ 0.02 dB. Reconnect cable to analyzer input.
26. Change REFERENCE LEVEL to -5 dBm. Record the MKR Δ amplitude: _____dB.

18. GAIN COMPRESSION TEST (Cont'd)

27. Subtract the value recorded in step 22 from the value obtained in step 26 to find the gain compression: _____dB. The result should be > -1.0 dB (less than 1 dB compression).

28. Press **2-22 GHz** on the analyzer. Press **SHIFT** **ATTEN** , **SHIFT** **0-25 GHz** 0 dB.

29. Set synthesizer to 9000.000 MHz. Connect cable from synthesizer to power sensor and adjust synthesizer output level for a power meter reading of -15.00 ± 0.02 dB. Reconnect cable to analyzer input.

30. Key in the following analyzer settings:

CENTER FREQUENCY	.....	9 GHz
FREQUENCY SPAN	.....	1 MHz
ATTEN	.....	0 dB

31. Press **MARKER** **PRESEL PEAK** and wait for the PEAKING! message to disappear from the display.

32. Press the **SCALE LIN** pushbutton, then press **SHIFT** **AUTO** (resolution bandwidth). Key in the following:

REFERENCE LEVEL	.....	-15 dBm
FREQUENCY SPAN	.....	0 Hz
VIDEO BW	.....	30 Hz

33. Press **MARKER** **NORMAL** , **Δ** .

34. Connect cable to power sensor and adjust output level of synthesizer for a power meter indication of -5.00 ± 0.02 dB. Reconnect cable to analyzer input.

35. Change **REFERENCE LEVEL** to -5 dBm. Record the MKR Δ amplitude: _____dB.

36. Subtract the value recorded in step 22 from the value obtained in step 35 to find the gain compression: _____dB. The result should be > -1.0 dB (less than 1 dB compression).

37. Disconnect cable from analyzer RF INPUT. Connect analyzer CAL OUTPUT to RF INPUT.

38. Press **RECALL** **8** , **MARKER** **PEAK SEARCH** . Adjust AMPTD CAL for a MARKER amplitude of -10.00 dBm ± 0.02 dB.

19. 1ST LO OUTPUT AMPLITUDE TEST

SPECIFICATION:

> + 5 dBm from 2.3 GHz to 6.1 GHz

DESCRIPTION:

The power level at the 1ST LO OUTPUT connector is measured as the first LO is swept over its 2.3 GHz to 6.1 GHz range.

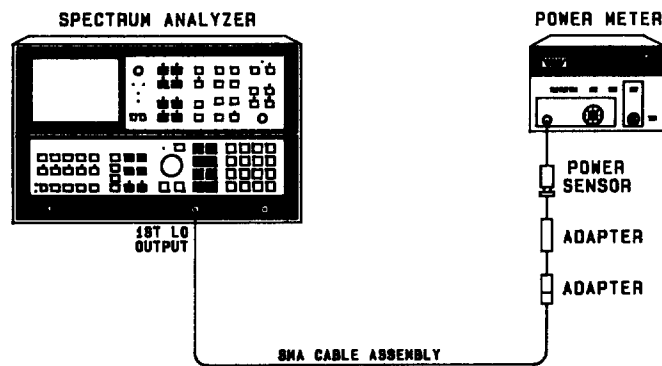


FIGURE 33. 1ST LO OUTPUT AMPLITUDE TEST SETUP

EQUIPMENT:

Power Meter	HP 436A
Power Sensor	HP 8485A
Adapter, Type N Female Connectors	HP 1250-0777
Adapter, Type N (m) to SMA (f)	HP 1250-1250
Cable Assembly, SMA Male Connectors	HP 5061-1086

PROCEDURE:

1. Press **2-22 GHz** . Key in a **STOP FREQ** of 5.8 GHz.
2. Set **SWEEP TIME** to 100 seconds.
3. Calibrate power meter and sensor. Connect equipment as shown in Figure 33.
4. Observe the meter indication as the analyzer sweeps from 2. 0 to 5.8 GHz. The indication should be > + 8 dBm across the full sweep range.

20. SWEEP + TUNE OUT ACCURACY TEST

SPECIFICATION:

– 1V/GHz X Center Frequency (GHz) $\pm$ (2% + 10 mV)

DESCRIPTION:

The spectrum analyzer is set to zero frequency span and the SWEEP + TUNE OUT auxiliary output is measured with a voltmeter as the analyzer is tuned across its frequency range.

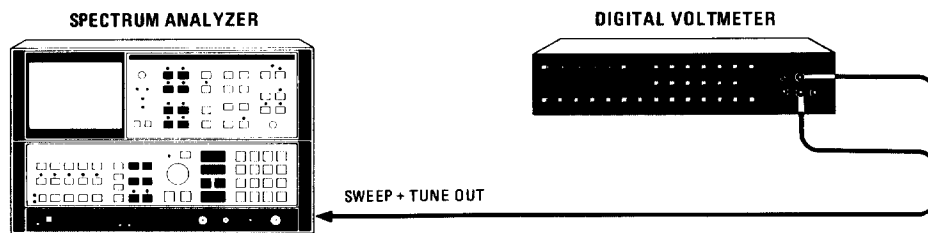


FIGURE 34. SWEEP + TUNE OUT ACCURACY TEST SETUP

EQUIPMENT:

Digital Voltmeter HP 3456A

PROCEDURE:

1. Press **2-22 GHz** on the analyzer. Set **FREQUENCY SPAN** to 0 Hz.
2. Connect digital voltmeter to the SWEEP + TUNE OUT auxiliary output on the rear panel of the analyzer as indicated in Figure 34.
3. Set **CENTER FREQUENCY** according to Table 22 and record the voltmeter readings in the table. The allowable range for each measurement is shown in the table.

PERFORMANCE TESTS

20. SWEEP + TUNE OUT ACCURACY TEST (Cont'd)

TABLE 22. SWEEP + TUNE OUT ACCURACY

CENTER FREQUENCY	Voltmeter Reading (Volts)		
	Min.	Actual	Max.
0 Hz	− 0.010	_____	+ 0.010
1 MHz	− 0.011	_____	+ 0.009
12 MHz	− 0.022	_____	− 0.002
130 MHz	− 0.143	_____	− 0.117
670 MHz	− 0.693	_____	− 0.647
1.3 GHz	− 1.336	_____	− 1.264
5.7 GHz	− 5.824	_____	− 5.576
12.5 GHz	− 12.760	_____	− 12.240
18.6 GHz	− 18.982	_____	− 18.218
22 GHz	− 22.450	_____	− 21.550

PERFORMANCE TESTS

21. FAST SWEEP TIME ACCURACY TEST (<20 MSEC)

RELATED ADJUSTMENT:

None

SPECIFICATION:

± 10% for sweep times ≤ 100 seconds

DESCRIPTION:

The triangular wave output of a function generator is used to modulate a 500 MHz signal which is applied to the spectrum analyzer RF INPUT. The signal is demodulated in the zero span mode to display the triangular waveform. Sweep time accuracy for sweep times <20 msec is tested by check the spacing of the signal peaks on the displayed waveform.

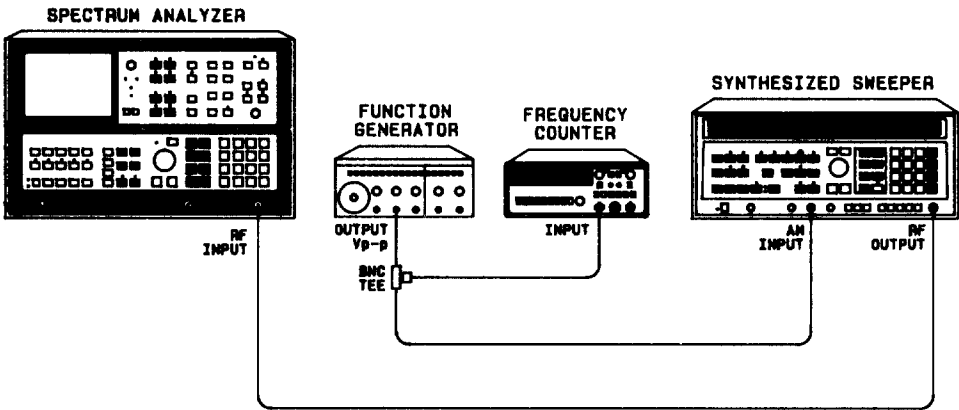


FIGURE 35. FAST SWEEP TIME ACCURACY (<20 MSEC) TEST SETUP

EQUIPMENT:

Function Generator	HP 3312A
Universal Counter	HP 5316A
Signal Generator	HP 8340A

PROCEDURE:

1. Connect equipment as shown in Figure 35.
2. Press 2-22 GHz on spectrum analyzer.
3. Key in analyzer settings as follows:

CENTER FREQUENCY	500 MHz
FREQUENCY SPAN	100 kHz

PERFORMANCE TESTS

21. FAST SWEEP TIME ACCURACY TEST (<20 MSEC) (Cont'd)

4. Set synthesized sweeper for an output frequency of 500 MHz and an output power level of -10 dBm.
5. Press MARKER PEAK SEARCH , MKR-CE , OFF .
6. Set FREQUENCY SPAN to 0 Hz, RES BW to 3 MHz, VIDEO BW to 3 MHz, and press TRIGGER VIDEO .
7. Set synthesized sweeper for an amplitude-modulated output.
8. Set function generator controls as follows:

FUNCTION	triangular wave
AMPLITUDE	approximately 1 Vp-p
OFFSET	CAL position (in)
SYM	CAL position (in)
TRIGGER PHASE	FREE RUN
MODULATION	all out

9. Key in SWEEP TIME 5 msec and set function generator for a reading of 2.00 ± 0.02 kHz.
10. Adjust spectrum analyzer TRIGGER LEVEL to place a peak of the triangular waveform on the first graticule from the left edge of the CRT display as a reference. (Adjust function generator amplitude, if necessary, to provide a signal large enough to produce a stable display.) The fifth peak from the reference should be within ± 0.5 division of the sixth graticule from the left edge of the display (see Figure 36).
11. Using sweep times and function generator frequencies in Table 23, check sweep time accuracy for sweep times <20 msec by the procedure of step 10.

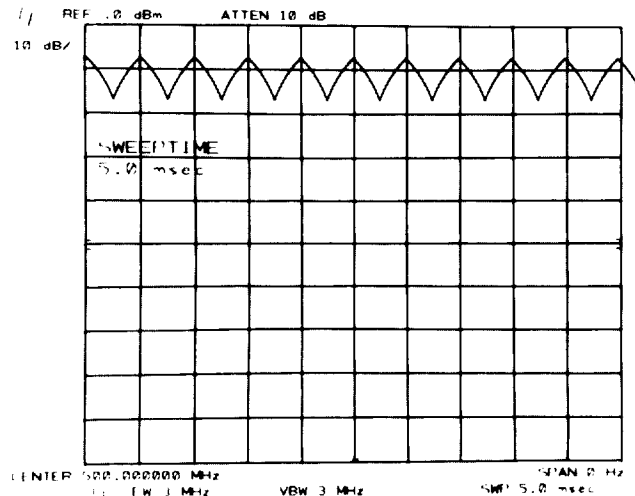


FIGURE 36. FAST SWEEP TIME MEASUREMENT (<20 MSEC)

PERFORMANCE TESTS

21. FAST SWEEP TIME ACCURACY TEST (<20 MSEC) (Cont'd)

TABLE 23. FAST SWEEP TIME ACCURACY (<20 MSEC)

SWEEP TIME	Function Generator Frequency (kHz)	Sweep Time Error (divisions)
5 msec	2.00 ± 0.02	_____
2 msec	5.00 ± 0.05	_____
1 msec	10.0 ± 0.1	_____
200 μ sec	50.0 ± 0.5	_____
100 μ sec	100 ± 1	_____

22. FREQUENCY REFERENCE ERROR TEST

RELATED ADJUSTMENT:

10 MHz Standard Adjustment

SPECIFICATION:

Aging Rate: $<1 \times 10^{-9}$ /day and $<2.5 \times 10^{-7}$ year; attained after 30 days warm-up from cold start at 25°C.

Temperature Stability: $<7 \times 10^{-9}$ 0° to 55°C

Frequency is within 1×10^{-8} of final stabilized frequency within 30 minutes.

DESCRIPTION:

The frequency of the spectrum analyzer time base oscillator is measured directly using a frequency counter locked to a frequency reference which has an aging rate less than one-tenth that of the time base specification. After a 30-day warm-up period, a frequency measurement is made. The analyzer is left undisturbed for a 24-hour period and a second reading is taken. The frequency change over this 24-hour period must be less than one part in 10^9 .

NOTE

This test requires that the spectrum analyzer be turned on (not in STANDBY) for a period of 30 days to ensure that the frequency reference attains its specified aging rate. However, after the aging rate is attained, the frequency reference typically attains its aging rate again in 72 hours of operation after being off for a period not exceeding 24 hours.

Because the frequency reference is sensitive to shock and vibration, care must be taken not to disturb the spectrum analyzer during the 24-hour period in which the frequency measurement is made.

The frequency reference should remain within its attained aging rate if: the instrument is left on; the instrument orientation with respect to the earth's magnetic field is maintained; and the instrument does not sustain any mechanical shock. Frequency changes due to orientation with respect to the earth's magnetic field and altitude changes will usually be nullified when the instrument is returned to its original position. Frequency changes due to mechanical shock will usually appear as a fixed frequency error.

The frequency reference is also sensitive to temperature changes; for this reason, the ambient temperature near the instrument at the first measurement time and the ambient temperature at the second measurement time should not differ by more than 1°C.

Placing the spectrum analyzer in STANDBY turns the instrument off while continuing to provide power for the frequency reference oven, which minimizes warm-up time. However, the spectrum analyzer must be ON to allow the frequency reference to attain its specified aging rate.

PERFORMANCE TESTS

22. FREQUENCY REFERENCE ERROR TEST (Cont'd)

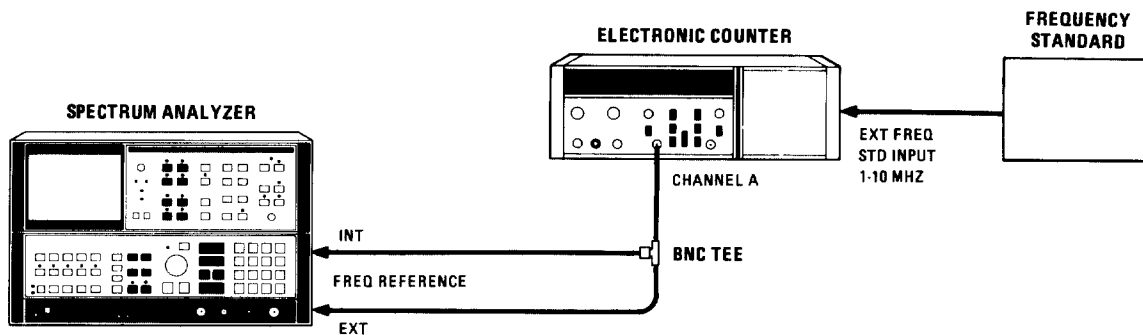


FIGURE 37. FREQUENCY REFERENCE TEST SETUP

EQUIPMENT:

Electronic Counter	HP 5345A
1, 2, 5, or 10 MHz Frequency Reference with aging rate $<1 \times 10^{-10}$ /day	HP 5061A
BNC Tee	HP 1250-0781

PROCEDURE:

1. Allow analyzer to warm up at 25°C ambient temperature for a period of 30 days.
2. Set controls of electronic counter as follows:

FUNCTION	FREQ A
DISPLAY POSITION	AUTO
GATE TIME	100 S
CHANNEL A Input Impedance	50
CHANNEL A ATTEN	x1
CHANNEL A Coupling	AC
CHANNEL A LEVEL	midrange

3. Connect equipment as shown in Figure 37.
4. Record the frequency of the analyzer time base as measured by the counter:

Frequency: 10. _____ MHz
Date: _____ Time: _____
Ambient Temperature: _____

5. Allow the analyzer to remain undisturbed for 24 hours, then note the time base frequency again:

Frequency: 10. _____ MHz
Date: _____ Time: _____
Ambient Temperature: _____

PERFORMANCE TESTS

22. FREQUENCY REFERENCE ERROR TEST (Cont'd)

NOTE

If the ambient temperatures recorded in steps 4 and 5 differ by more than 1°C, the frequency measurements may be invalid.

6. The difference in frequency between the two measurements should be <1 part in 10^9 (<0.01 Hz at 10 MHz).

_____ Hz

REFERENCES:

¹Hewlett-Packard staff, "Timekeeping and Frequency Calibration," Application Note 52-2 (Hewlett-Packard, Palo Alto, CA 94304, November 1975).

²Hewlett-Packard staff, "Measuring Warmup Characteristics and Aging Rates of Crystal Oscillators," Application Note 174-11 (Hewlett-Packard, Palo Alto, CA 94304, November 1974).

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (1 OF 13)

Hewlett-Packard Company Model 8566B Spectrum Analyzer				Tested By _____ Date _____		
Serial Numbers IF-Display Section: _____ RF Section: _____						
Test No.	Test Description			Results		
				Min.	Measured	Max.
1	Center Frequency Readout Accuracy Test 8. CENTER readout					
	Synthesized Sweeper Frequency	FREQUENCY SPAN	CENTER FREQUENCY			
	2 GHz	1 MHz	2 GHz	1.999 98 GHz	_____	2.000 02 GHz
	2 GHz	10 MHz	2 GHz	1.999 7 GHz	_____	2.000 3 GHz
	2 GHz	100 MHz	2 GHz	1.998 GHz	_____	2.002 GHz
	2 GHz	1 GHz	2 GHz	1.98 GHz	_____	2.02 GHz
	3 GHz	1 MHz	3 GHz	2.999 98 GHz	_____	3.000 02 GHz
	3 GHz	10 MHz	3 GHz	2.999 7 GHz	_____	3.000 3 GHz
	3 GHz	100 MHz	3 GHz	2.998 GHz	_____	3.002 GHz
	3 GHz	1 GHz	3 GHz	2.98 GHz	_____	3.02 GHz
	6 GHz	1 MHz	6 GHz	5.999 98 GHz	_____	6.000 02 GHz
	6 GHz	10 MHz	6 GHz	5.999 8 GHz	_____	6.000 2 GHz
	6 GHz	100 MHz	6 GHz	5.998 GHz	_____	6.002 GHz
	6 GHz	1 GHz	6 GHz	5.98 GHz	_____	6.02 GHz
	9 GHz	1 MHz	9 GHz	8.999 98 GHz	_____	9.000 02 GHz
	9 GHz	10 MHz	9 GHz	8.999 8 GHz	_____	9.000 2 GHz
	9 GHz	100 MHz	9 GHz	8.998 GHz	_____	9.002 GHz
	9 GHz	1 GHz	9 GHz	8.98 GHz	_____	9.02 GHz
	9 GHz	10 GHz	9 GHz	8.8 GHz	_____	9.2 GHz
	12 GHz	1 MHz	12 GHz	11.999 98 GHz	_____	12.000 02 GHz
	12 GHz	10 MHz	12 GHz	11.999 8 GHz	_____	12.000 2 GHz
	12 GHz	100 MHz	12 GHz	11.998 GHz	_____	12.002 GHz
	12 GHz	1 GHz	12 GHz	11.98 GHz	_____	12.02 GHz
	12 GHz	10 GHz	12 GHz	11.8 GHz	_____	12.2 GHz
	15 GHz	1 MHz	15 GHz	14.999 98 GHz	_____	15.000 02 GHz
	15 GHz	10 MHz	15 GHz	14.999 8 GHz	_____	15.000 2 GHz
	15 GHz	100 MHz	15 GHz	14.998 GHz	_____	15.002 GHz
	15 GHz	1 GHz	15 GHz	14.98 GHz	_____	15.02 GHz
	15 GHz	10 GHz	15 GHz	14.8 GHz	_____	15.2 GHz
	18 GHz	1 MHz	18 GHz	17.999 98 GHz	_____	18.000 02 GHz
	18 GHz	10 MHz	18 GHz	17.999 8 GHz	_____	18.000 2 GHz

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (2 OF 13)

Test No.	Test Description			Results			
				Min.	Measured	Max.	
1	Center Frequency Readout Accuracy Test (Cont'd)						
	18 GHz 18 GHz 18 GHz	100 MHz 1 GHz 10 GHz	18 GHz 18 GHz 18 GHz	17.998 GHz 17.98 GHz 17.8 GHz		18.002 GHz 18.02 GHz 18.2 GHz	
2	Frequency Span Accuracy Test 7. Narrow Span Accuracy						
	FREQUENCY SPAN	Frequency Synthesizer Low (Hz)	Frequency Synthesizer High (Hz)				
	20 kHz 50 kHz 150 kHz 200 kHz 1 MHz 2 MHz 6 MHz 10 MHz 50 MHz	39,992,000 39,980,000 39,940,000 39,920,000 39,600,000 39,200,000 37,600,000 36,000,000 20,000,000	40,008,000 40,020,000 40,060,000 40,080,000 40,400,000 40,800,000 42,400,000 44,000,000 60,000,000	15.84 kHz 39.60 kHz 118.80 kHz 158.4 kHz 792.00 kHz 1.584 MHz 4.752 MHz 7.76 MHz 38.80 MHz		16.16 kHz 40.40 kHz 121.20 kHz 161.6 kHz 808.00 kHz 1.616 MHz 4.848 MHz 8.240 MHz 41.2 MHz	
	17. Wide Span Accuracy						
	CENTER FREQUENCY	FREQUENCY SPAN	Synthesized Sweeper Low (GHz)	Synthesized Sweeper High (GHz)			
	4 GHz 10 GHz 15 GHz 20 GHz	500 MHz 500 MHz 500 MHz 500 MHz	3.800 9.800 14.800 19.800	4.200 10.200 15.200 20.200	388 MHz 388 MHz 388 MHz 388 MHz		412 MHz 412 MHz 412 MHz 412 MHz
	4 GHz 10 GHz 15 GHz 20 GHz	1 GHz 1 GHz 1 GHz 1 GHz	3.600 9.600 14.600 19.600	4.400 10.400 15.400 20.400	776 MHz 776 MHz 776 MHz 776 MHz		824 MHz 824 MHz 824 MHz 824 MHz
	10 GHz 15 GHz 18 GHz	5 GHz 5 GHz 5 GHz	8.000 13.000 16.000	12.000 17.000 20.000	3.88 GHz 3.88 GHz 3.88 GHz		4.12 GHz 4.12 GHz 4.12 GHz
	10 GHz 15 GHz	10 GHz 10 GHz	6.000 11.000	14.000 19.000	7.76 GHz 7.76 GHz		8.24 GHz 8.24 GHz

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (3 OF 13)

Test No.	Test Description		Results		
			Min.	Measured	Max.
3	Resolution Bandwidth Accuracy Test 8. Bandwidth Accuracy				
	RES BW	FREQUENCY SPAN			
	3 MHz	5 MHz	2.400 MHz	_____	3.600 MHz
	1 MHz	2 MHz	900 kHz	_____	1.100 MHz
	300 kHz	500 kHz	270.0 kHz	_____	330.0 kHz
	100 kHz	200 kHz	90.0 kHz	_____	110.0 kHz
	30 kHz	50 kHz	27.00 kHz	_____	33.00 kHz
	10 kHz	20 kHz	9.00 kHz	_____	11.00 kHz
	3 kHz	5 kHz	2.700 kHz	_____	3.300 kHz
	1 kHz	2 kHz	800 Hz	_____	1.200 kHz
	300 Hz	500 Hz	240 Hz	_____	360 Hz
	100 Hz	200 Hz	80 Hz	_____	120 Hz
	30 Hz	100 Hz	24.0 Hz	_____	36.0 Hz
	10 Hz	100 Hz	8.0 Hz	_____	12.0 Hz
4	Resolution Bandwidth Selectivity Test 9. Bandwidth Selectivity Ratio (60 dB BW/3 dB BW)				
	RES BW	FREQUENCY SPAN			
	3 MHz	20 MHz			15:1
	1 MHz	15 MHz			15:1
	300 kHz	5 MHz			15:1
	100 kHz	2 MHz			15:1
	30 kHz	500 kHz			13:1
	10 kHz	200 kHz			13:1
	3 kHz	50 kHz			11:1
	1 kHz	10 kHz			11:1
	300 Hz	5 kHz			11:1
	100 Hz	2 kHz			11:1
	30 Hz	500 Hz			11:1
	10 Hz	100 Hz			100 Hz
5	Resolution Bandwidth Switching Uncertainty Test 6. Bandwidth Switching Uncertainty (Deviation in dB)				
	RES BW	FREQUENCY SPAN			
	1 MHz 3 MHz	5 MHz 5 MHz		0 (ref.)	0 (ref.) ± 1.00

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (4 OF 13)

Test No.	Test Description		Results		
			Min.	Measured	Max.
5	Resolution Bandwidth Switching Uncertainty Test (Cont'd)				
	300 kHz	5 MHz		_____	± 0.50
	100 kHz	500 kHz		_____	± 0.50
	30 kHz	500 kHz		_____	± 0.50
	10 kHz	50 kHz		_____	± 0.50
	3 kHz	50 kHz		_____	± 0.50
	1 kHz	10 kHz		_____	± 0.50
	300 Hz	1 kHz		_____	± 0.50
	100 Hz	1 kHz		_____	± 0.50
	30 Hz	200 Hz		_____	± 0.80
	10 Hz	100 Hz		_____	± 2.00
6	Log Scale Switching Uncertainty Test 7. Log Scale Switching Uncertainty (Deviation in dB)				
	SCALE (dB/DIV)				
	1			0 (ref.)	0 (ref.)
	2			_____	± 0.5
7	IF Gain Uncertainty Test 12. 10 dB Gain Steps (Deviation in dB)				
	REFERENCE LEVEL (dBm)	Frequency Synthesizer Amplitude (dBm)	VIDEO BW (Hz)	Last Column from Table 9	
	0	-2	100		
	-10	-12	100	0 (ref.)	
	-20	-22	100		
	-30	-32	100		
	-40	-42	100		
	-50	-52	100		
	-60	-62	10		
	-70	-72	10		
	q				
	SHIFT ENTER HW/DIV				
	-80	-32	100	_____	
	-90	-42	100	_____	
	-100	-52	10	_____	
	-110	-62	10	_____	
	-120	-72	10	_____	

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (5 OF 13)

Test No.	Test Description		Results		
			Min.	Measured	Max.
7	IF Gain Uncertainty Test (Cont'd)				
	18. 2 dB Gain Steps (Deviation in dB)				
	REFERENCE LEVEL (dBm)	Frequency Synthesizer Amplitude (dBm)		Last Column from Table 10	
	-1.9	-3.9		0 (ref.)	
	-3.9	-5.9		_____	
	-5.9	-7.9		_____	
	-7.9	-9.9		_____	
	-9.9	-11.9		_____	
	22. 0.1 dB Gain Steps (Deviation in dB)				
	REFERENCE LEVEL (dBm)	Frequency Synthesizer Amplitude (dBm)		Last Column from Table 11	
	0.0	-2.00		0.00 (ref.)	
	-0.1	-2.10		_____	
	-0.2	-2.20		_____	
	-0.3	-2.30		_____	
	-0.4	-2.40		_____	
	-0.5	-2.50		_____	
	-0.6	-2.60		_____	
	-0.7	-2.70		_____	
	-0.8	-2.80		_____	
	-0.9	-2.90		_____	
	-1.0	-3.00		_____	
	-1.1	-3.10		_____	
	-1.2	-3.20		_____	
	-1.3	-3.30		_____	
	-1.4	-3.40		_____	
	-1.5	-3.50		_____	
	-1.6	-3.60		_____	
	-1.7	-3.70		_____	
	-1.8	-3.80		_____	
	-1.9	-3.90		_____	
	23. Recorded deviations from step 12. Largest Positive 0 to -70 dBm Largest Negative 0 to -70 dBm Largest Positive -80 to -120 dBm Largest Negative -80 to -120 dBm			_____	

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (6 OF 13)

Test No.	Test Description	Results		
		Min.	Measured	Max.
7	IF Gain Uncertainty Test (Cont'd) 24. Recorded deviation from steps 18 and 22. Largest Positive step 18 Largest Negative step 18 Largest Positive step 22 Largest Negative step 22		_____	

	25. Sum of Positive Deviations of steps 23 and 24.		_____	0.6 dB
	26. Sum of Negative Deviations of steps 23 and 24.	– 0.6 dB	_____	
	27. Sum of Positive Deviations of steps 23 and 24.		_____	1.0 dB
	28. Sum of Negative Deviations of steps 23 and 24.	– 1.0 dB	_____	
8	Scale Fidelity Test 7. Log Scale Fidelity Error			
	Frequency Synthesizer Amplitude (dBm)		Last Column from Table 12	
	+ 10		0 (ref.)	± 0.1 dB
	0		_____	± 0.1 dB
	– 10		_____	± 0.1 dB
	– 20		_____	± 1.0 dB
	– 30		_____	± 1.0 dB
	– 40		_____	± 1.0 dB
	– 50		_____	± 1.0 dB
	– 60		_____	± 1.0 dB
	– 70		_____	± 1.0 dB
	– 80		_____	± 1.5 dB
	14. Linear Scale Fidelity Error			
	Frequency Synthesizer Amplitude (dBm)			
	0	– 10.87 dB	_____	– 9.21 dB
	– 10	– 23.10 dB	_____	– 17.72 dB
9	Calibrator Amplitude Accuracy Test 2. CAL OUTPUT level	– 10.30 dB	_____	– 9.70 dB

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (7 OF 13)

Test No.	Test Description	Results					
		Min.		Measured		Max.	
10	Frequency Response Test						
	12. Deviation 1 to 100 kHz					1.2 dB	
	18. Signal level at:						
	100 Hz	- 1.4 dB				- 2.6 dB	
	200 Hz	- 1.4 dB				- 2.6 dB	
	300 Hz	- 1.4 dB				- 2.6 dB	
	400 Hz	- 1.4 dB				- 2.6 dB	
	500 Hz	- 1.4 dB				- 2.6 dB	
	600 Hz	- 1.4 dB				- 2.6 dB	
	700 Hz	- 1.4 dB				- 2.6 dB	
	800 Hz	- 1.4 dB				- 2.6 dB	
	900 Hz	- 1.4 dB				- 2.6 dB	
	1 kHz	- 1.4 dB				- 2.6 dB	
	27. Deviation 0 Hz to 4 MHz						
	Amplitude:						
	Frequency:						
	35. Deviation 100 kHz to 60 MHz						
	Amplitude:						
	Frequency:						
	49. Deviation 60 MHz to 2.5 GHz						
	Amplitude:						
	Frequency:						
	Frequency Band	START FREQ	STOP FREQ	Ampl.	Freq	Flatness	Ampl. Freq.
	2 – 5.8 GHz	2 GHz	3.9 GHz				
		3.9 GHz	5.8 GHz				
	5.8 – 12.5 GHz	5.8 GHz	9.15 GHz				
		9.15 GHz	12.5 GHz				
	12.5 – 18.6 GHz	12.5 GHz	15.55 GHz				
		15.55 GHz	18.6 GHz				
	18.6 – 20 GHz	18.6 GHz	20 GHz				
	20 – 22 GHz	20 GHz	22 GHz				
	Cumulative Flatness (dB)						
	100 Hz to 20 GHz						
	100 Hz to 22 GHz						

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (8 OF 13)

Test No.	Test Description	Results		
		Min.	Measured	Max.
11	Sweep Time Accuracy Test 7. Sweep Times ≥ 20 msec			
				
	20 msec	18 msec	_____	22 msec
	30 msec	27 msec	_____	33 msec
	50 msec	45 msec	_____	55 msec
	70 msec	63 msec	_____	77 msec
	90 msec	81 msec	_____	99 msec
	110 msec	99 msec	_____	121 msec
	170 msec	153 msec	_____	187 msec
	200 msec	180 msec	_____	220 msec
12	2 sec	1.8 sec	_____	2.2 sec
	12. Sweep Time Accuracy			
				
	20 sec	2.8 sec	_____	5.2 sec
	200 sec	28 msec	_____	52 msec
	Noise Sidebands Test			
	11. Noise Sideband Level 320 Hz offset		_____	– 80 dBc
	16. Noise Sideband Level 1 kHz offset		_____	– 85 dBc
	21. Noise Sideband Level 10 kHz offset		_____	– 90 dBc
	26. Noise Sideband Level 100 kHz offset		_____	– 105 dBc
13	Line-Related Sidebands Test			
	11. Line-Related Sideband Levels for 100 MHz signal			
	Largest level <360 Hz away from signal		_____dB at _____Hz	– 70 dB
	Largest level 360 Hz to 600 Hz away from signal		_____dB at _____Hz	– 75 dBm
	15. Line-Related Sideband Levels for 2.4 GHz signal			
	Largest level <360 Hz away from signal		_____dB at _____Hz	– 60 dBm

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (9 OF 13)

Test No.	Test Description	Results		
		Min.	Measured	Max.
13	Line-Related Sidebands Test (Cont'd)			
	20. Line-Related Sideband Levels for 2.6 GHz signal			
	Largest level <360 Hz away from signal		_____dB at _____Hz	– 60 dB
	25. Line-Related Sideband Levels for 5.7 GHz signal			
	Largest level <360 Hz away from signal		_____dB at _____Hz	– 60 dB
14	Option 400			
	11. Line-Related Sideband Levels for Option 400 Levels for Option 400 for 5.7 GHz signal			
	Largest level <2 kHz away from signal		_____dB at _____Hz	– 55 dB
	Largest level 2 kHz to 5.5 kHz away from signal		_____dB at _____Hz	– 65 dB
14	Average Noise Level Test			
	11. Average Noise Level			
	100 Hz		_____	– 95 dBm
	51 kHz		_____	– 112 dBm
	CENTER FREQUENCY			
	2 MHz		_____	– 134 dBm
	1 GHz		_____	– 134 dBm
	2.499 GHz		_____	– 134 dBm
	2.510 GHz		_____	– 132 dBm
	5.799 GHz		_____	– 132 dBm
	5.810 GHz		_____	– 125 dBm
	12.499 GHz		_____	– 125 dBm
	12.510 GHz		_____	– 119 dBm
15	Residual Responses Test			
	8. Residual Responses 0 Hz to 1.5 GHz			
	Largest Residual Level		_____dBm at _____GHz	– 100 dBm
	11. Residual Responses 1.4 to 2.5 GHz			
	Largest Residual Level		_____dBm at _____GHz	– 100 dBm
15	13. Residual Responses 2.4 to 5.8 GHz			
	Largest Residual Level		_____dBm at _____GHz	– 100 dBm

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (10 OF 13)

Test No.	Test Description		Results		
			Min.	Measured	Max.
15	Residual Responses Test (Cont'd)				
	15. Residual Responses 5.7 to 6.7 GHz Largest Residual Level			_____dBm at _____GHz	– 95 dBm
	16. Residual Responses 6.690 to 11.650 GHz Largest Residual Level			_____dBm at _____GHz	– 95 dBm
	18. Residual Responses 11.6 to 12.5 GHz Largest Residual Level			_____dBm at _____GHz	– 95 dBm
	21. Residual Responses 12.4 to 18.6 GHz Largest Residual Level			_____dBm at _____GHz	– 85 dBm
16	24. Residual Responses 18.5 to 22 GHz Largest Residual Level			_____dBm at _____GHz	– 80 dBm
	Harmonic and Intermodulation Distortion Test				
	8. Second Harmonic Level of 230 MHz			_____	– 80 dBc
	15. Second Harmonic Level of 800 MHz			_____	– 70 dBc
	25. Second Harmonic Level of 7200 MHz			_____	– 100 dBc
	40. TOI for signals of 2099.5 and 2100.5 MHz	+ 7 dBm		_____	
	54. TOI for signals of 3999.5 and 4000.5 MHz	+ 7 dBm		_____	
	55. TOI for signals of 8999.5 and 9000.5 MHz	+ 5 dBm		_____	
17	TOI for signals of 13999.500 and 14000.499 MHz		+ 5 dBm	_____	
	Image, Multiple, and Out-of-Band Responses Test				
	9/10. Spurious Responses				
	CENTER FREQUENCY (GHz)	Synthesized Sweeper Frequency (MHz)			
	3	3642.800 6321.400 6964.200		_____ _____ _____	– 70 dBc – 60 dBc – 60 dBc
	6	2517.900 3160.700 5357.200		_____ _____ _____	– 60 dBc – 60 dBc – 70 dBc

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (11 OF 13)

Test No.	Test Description		Results		
			Min.	Measured	Max.
17	Image, Multiple, and Out-of-Band Responses Test (Cont'd)				
	CENTER FREQUENCY (GHz)	Synthesized Sweeper Frequency (MHz)			
	9	4017.900		_____	- 60 dBc
		4660.700		_____	- 60 dBc
		8357.200		_____	- 70 dBc
		12696.500		_____	- 60 dBc
		13339.300		_____	- 60 dBc
	12	5517.900		_____	- 60 dBc
		6160.700		_____	- 60 dBc
		11357.200		_____	- 70 dBc
		17196.500		_____	- 60 dBc
		17839.300		_____	- 60 dBc
	15	4571.500		_____	- 60 dBc
		5214.300		_____	- 60 dBc
		9464.300		_____	- 60 dBc
		10107.100		_____	- 60 dBc
		14357.200		_____	- 70 dBc
	17	5238.100		_____	- 60 dBc
		5880.900		_____	- 60 dBc
		10797.700		_____	- 60 dBc
		11440.500		_____	- 60 dBc
		16357.200		_____	- 70 dBc
	19	4348.300		_____	- 60 dBc
		4991.100		_____	- 60 dBc
		9017.900		_____	- 60 dBc
		9660.700		_____	- 60 dBc
		13687.600		_____	- 60 dBc
		14330.400		_____	- 60 dBc
		18357.200		_____	- 60 dBc
	21	4848.300		_____	- 60 dBc
		5491.100		_____	- 60 dBc
		10017.900		_____	- 60 dBc
		10660.700		_____	- 60 dBc
		15187.600		_____	- 60 dBc
		15830.400		_____	- 60 dBc
		20357.200		_____	- 50 dBc

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (12 OF 13)

Test No.	Test Description	Results		
		Min.	Measured	Max.
17	Image, Multiple, and Out-of-Band Responses Test (Cont'd) 16. Multiple Responses			
	CENTER FREQUENCY (Multiple Response) (GHz) Synthesized Sweeper Frequency (MHz)			
	2.68930 5700.000			– 70 dBc
	1.18930 6000.000			– 70 dBc
	8.107133 12000.000			– 70 dBc
	8.535667			– 70 dBc
	1.06790 13000.000			– 70 dBc
	1.91907			– 70 dBc
	0.53395			– 70 dBc
	10.107133 15000.000			– 70 dBc
	10.535667			– 70 dBc
18	Gain Compression Test 14. Gain Compression for input – 10 to 0 dBm at 2 GHz	– 1.0 dB		
	27. Gain Compression for input – 15 to – 5 dBm at 3 GHz	– 1.0 dB		
	36. Gain Compression for input – 15 to – 5 dBm at 9 GHz	– 1.0 dB		
19	1st LO OUTPUT Amplitude Test 4. 1st LO OUTPUT Level	+ 5 dBm		
20	SWEEP + TUNE OUT Accuracy Test 3. SWEEP + TUNE OUT Accuracy			
	CENTER FREQUENCY			
	0 Hz	– 0.010 Vdc		+ 0.010 Vdc
	1 MHz	– 0.011 Vdc		+ 0.009 Vdc
	12 MHz	– 0.022 Vdc		– 0.002 Vdc
	130 MHz	– 0.143 Vdc		– 0.117 Vdc
	670 MHz	– 0.693 Vdc		– 0.647 Vdc
	1.3 GHz	– 1.336 Vdc		– 1.264 Vdc
	5.7 GHz	– 5.824 Vdc		– 5.576 Vdc
	12.5 GHz	– 12.760 Vdc		– 12.240 Vdc
	18.6 GHz	– 18.982 Vdc		– 18.218 Vdc
	22 GHz	– 22.450 Vdc		– 21.550 Vdc

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (13 OF 13)

Test No.	Test Description		Results		
			Min.	Measured	Max.
21	Fast Sweep Time Accuracy Test (<20 msec)			Sweep Time Error (divisions) _____ _____ _____ _____ _____	
		Function Generator Frequency (kHz)			
	5 msec 2 msec 1 msec 200 μ sec 100 μ sec	2.00 $\pm$ 0.02 5.00 $\pm$ 0.05 10.00 $\pm$ 0.1 50.0 $\pm$ 0.5 100 $\pm$ 1			
22	Frequency Reference Error Test 4. Frequency (initial) 5. Frequency (after 24 hours) 6. Difference between 4 and 5			10. _____ MHz 10. _____ MHz _____ Hz	0.01 Hz

ADJUSTMENTS

INTRODUCTION

The procedures in this section are for the adjustment of the instrument's electrical performance characteristics. The procedures require access to the interior of the instrument and therefore should only be performed by qualified service personnel. The adjustment procedures should not be performed as routine maintenance, but only when corrective servicing is necessary: 1) replacement of a part or component, or 2) when Performance Tests cannot meet specifications. Before attempting any adjustment, allow the instrument to warm up for one hour. Table 1, Adjustment Cross-Reference, is a cross-reference of Function Adjusted to the related Adjustment Procedure.

Table 2, Adjustable Components, lists all adjustable components – by name, reference designator, and the function adjusted by each – in alphanumeric order.

EQUIPMENT REQUIRED

The equipment required for the adjustment procedures is listed in Table 1, Recommended Test Equipment, at the beginning of this manual. If the test equipment recommended is not available, substitutions may be used if they meet the "Critical Specifications" listed in the table. The test setup used for an adjustment procedure is referenced in each procedure.

TABLE 1. ADJUSTMENT CROSS-REFERENCE

Function Adjusted	Test No.	Adjustment Procedure
Low Voltage	1	Low Voltage Power Supply Adjustments
High Voltage	2	High Voltage Adjustment
CRT Display (Standard)	3	Preliminary Display Adjustments
	4	Final Display Adjustments
CRT Display (Digital Storage)	24	Digital Storage Display Adjustments
IF Gains	5	Log Amplifier Adjustments
	10	Step Gain and 18.4 MHz Local Oscillator Adjustments
Log Scales	6	Video Processor Adjustments
Bandwidth Amplitudes	7	3 MHz Bandwidth Filter Adjustments
	8	21.4 MHz Bandwidth Filter Adjustments
	11	Down/Up Converter Adjustments
3-dB Bandwidths	9	3-dB Bandwidth Adjustments
10 MHz Internal Time Base	12	10 MHz Standard Adjustment
CAL OUTPUT Level	19	CAL OUTPUT Adjustments
Frequency Span	13	Sweep, DAC, and Main Coil Driver Adjustments
START and STOP Frequency	13	Sweep, DAC, and Main Coil Driver Adjustments
Sweep Times	13	Sweep, DAC, and Main Coil Driver Adjustments
Frequency Tuning	13	Sweep, DAC, and Main Coil Driver Adjustments
	14	100 MHz Voltage-Controlled Crystal Oscillator Adjustments
	15	M/N Loop Adjustments
	13	Sweep, DAC, and Main Coil Driver Adjustments
Phase Lock Loops	18	RF Module Phase Lock Adjustments
	16	YTO Loop Adjustments
	17	20/30 Loop Phase Lock Adjustments
RF Signal Conversion and	20	Last Converter Adjustments
RF Gains	21	Frequency Response Adjustments
Frequency Response	21	Frequency Response Adjustments
Digital Storage Video	22	Analog-to-Digital Converter Adjustments
Processing	23	Track and Hold Adjustments

ADJUSTMENT TOOLS

For adjustments requiring a non-metallic tuning tool, use fiber tuning tool HP Part Number 8710-0033. In situations not requiring non-metallic tuning tools, an ordinary small screwdriver or other suitable tool is sufficient. However, it is recommended that you use a non-metallic adjustment tool whenever possible. Never try to force any adjustment control in the analyzer. This is especially critical when tuning variable slug-tuned inductors and variable capacitors.

FACTORY-SELECTED COMPONENTS

Factory-selected components are identified with an asterisk (*) on the schematic diagram. For most components, the range of their values and functions are listed in Table 3, Factory-Selected Components. Part numbers for selected values are located in Table 4, HP Part Numbers of Standard Value Replacement Components.

RELATED ADJUSTMENTS

Any adjustments which interact with, or are related

to, other adjustments are indicated in the adjustments procedures. It is important that adjustments so noted are performed in the order indicated to ensure that the instrument meets specifications.

LOCATION OF TEST POINTS AND ADJUSTMENTS

Illustrations showing the locations of assemblies containing adjustments and locations of those adjustments within the assemblies are contained in the adjustment procedures to which they apply. Major assembly and component location illustrations are also located at the rear of this manual.

SAFETY CONSIDERATIONS

Although this instrument has been designed in accordance with international safety standards, this manual contains information, cautions, and warnings which must be followed to ensure safe operations and to retain the instrument in a safe condition. Service and adjustments should be performed only by qualified service personnel.

WARNING

Adjustments in this section are performed with power supplied to the instrument while protective covers are removed. There are voltages at many points in the instrument which can, if contacted, cause personal injury. Be extremely careful. Adjustment should be performed only by trained service personnel.

Power is still applied to this instrument with the LINE switch in STANDBY. There is no OFF position on the LINE switch. Before removing or installing any assembly or printed circuit board, remove the power cord from the rear of both instruments and wait for the MAINS indicators (red LEDs) to go completely out.

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

Use a non-metallic adjusting tool whenever possible.

ADJUSTMENTS

TABLE 2. ADJUSTABLE COMPONENTS IN ALPHA-NUMERIC ORDER (1 OF 6)

Reference Designator	Adjustment Name	Adjustment Number	Adjustment Function
A12C10	C10	3	Adjusts rise and fall times of Z-axis amplifier pulse.
A1A2R5	INTENSITY GAIN	3	Sets adjustment range of front-panel INTENSITY control.
A1A2R22	HF GAIN	3	Adjusts rise and fall times of Z-axis amplifier pulse.
A1A2R30	FOCUS GAIN	3 & 4	Adjusts for optimum focus of CRT display.
A1A2R31	ORTHO	3	Sets orthogonality of CRT.
A1A2R32	PATTERN	3	Adjusts for optimum rectangular shape of CRT display.
A1A2R35	INTENSITY LIMIT	3	Sets adjustment range of front-panel INTENSITY control.
A1A2R36	ASTIG	3	Adjusts astigmatism of CRT.
A1A3R14	FOCUS LIMIT	3	Coarse adjusts CRT focus.
A1A4C10	C10	3	Adjusts rise and fall times of X deflection amplifier pulse.
A1A4C11	C11	3	Adjusts rise and fall times of X deflection amplifier pulse.
A1A4R7	X POSN	3 & 4	Adjusts horizontal position of trace.
A1A4R27	X GAIN	3&4	Adjusts horizontal gain of trace.
A1A4R28	HF GAIN	3	Adjusts rise and fall times of X deflection amplifier pulse.
A1A5C10	C10	3	Adjusts rise and fall times of Y deflection amplifier pulse.
A1A5C11	C11	3	Adjusts rise and fall times of Y deflection amplifier pulse.
A1A5R7	Y POSN	3&4	Adjusts vertical position of trace.
A1A5R27	Y GAIN	3 & 4	Adjusts vertical gain of trace.
A1A5R28	HF GAIN	3	Adjusts rise and fall times of Y deflection amplifier pulse.
A1A6R9	+ 15V ADJ	1	Adjusts + 15 Vdc supply voltage.
A1A6R32	HV ADJUST	2	Adjusts CRT high voltage.
A3A1R34	SWEEP OFFSET	24	Adjusts digital sweep to begin at left edge of graticule.
A3A2R12	LL THRESH	24	Adjusts point at which graticule lines switch from short to long lines.
A3A2R50	X S&H	24	Adjusts horizontal sample and hold pulse.
A3A2R51	Y S&H	24	Adjusts vertical sample and hold pulse.
A3A3R1	X EXP	24	Adjusts horizontal position of annotation.
A3A3R2	Y EXP	24	Adjusts vertical position of annotation.
A3A3R4	X GAIN	24	Adjusts horizontal gain of graticule lines.
A3A3R5	Y GAIN	24	Adjusts vertical gain of graticule lines.
A3A3R6	XLL	24	Adjusts horizontal long lines on graticule information.
A3A3R7	XSL	24	Adjusts horizontal short lines on graticule information.
A3A3R8	YSL	24	Adjusts vertical short lines on graticule information.
A3A3R9	YLL	24	Adjusts vertical long lines on graticule information.
A3A3R43	YOS	24	Adjusts bottom line of graticule to align with fast sweep signal.
A3A8R9	FS	22	Adjusts high-end of digitized sweep.

ADJUSTMENTS

TABLE 2. ADJUSTABLE COMPONENTS IN ALPHA-NUMERIC ORDER (2 OF 6)

Reference Designator	Adjustment Name	Adjustment Number	Adjustment Function
A3A8R14	ZERO	22	Adjusts low end of digitized sweep.
A3A9R19	GS	23	Adjusts gain for sample mode.
A3A9R36	OSN	23	Adjusts offset of negative peak detect mode.
A3A9R39	GP	23	Adjusts gain for positive peak detect mode.
A3A9R44	OSP	23	Adjusts offset of positive peak detect mode.
A3A9R52	GN	23	Adjusts gain for negative peak detect mode.
A3A9R57	G	23	Adjusts overall gain of track and hold.
A3A9R59	OS	23	Adjusts overall offset of track and hold.
A4A1R2	LG OS	6	Adjusts linear gain offsets.
A4A1R14	OS	6	Adjusts Video Processor offset.
A4A1R32	ZERO	6	Adjusts low end of Video Processor sweep.
A4A2R14	LG20	5	Adjusts 20-dB linear gain step.
A4A2R61	- 12 VTV	5	Adjusts Log Amplifier tuning voltage.
A4A2R79	ZERO	5	Adjusts Log Amplifier offset.
A4A3C55	CTR	5	Adjusts Log Amplifier center to IF.
A4A3R67	AMPTD	5	Adjusts amplitude of Log Amplifier Bandpass Filter.
A4A3R83	LG10	5	Adjusts 10-dB linear gain step.
A4A4C9	SYM	8	Centers A4A4 Bandwidth Filter crystal pole #1 symmetry.
A4A4C19	LC CTR	8	Centers A4A4 Bandwidth Filter LC pole #1.
A4A4C20	CTR	8	Centers A4A4 Bandwidth Filter crystal pole #1.
A4A4C39	SYM	8	Adjusts A4A4 Bandwidth Filter crystal pole #2 symmetry.
A4A4C41	LC DIP	8	Dips A4A4 Bandwidth Filter LC pole #1.
A4A4C43	LC DIP	8	Dips A4A4 Bandwidth Filter LC pole #2.
A4A4C65	SYM	8	Adjusts A4A4 Bandwidth Filter crystal pole #3 symmetry.
A4A4C67	LC CTR	8	Centers A4A4 Bandwidth Filter LC pole #2.
A4A4C73	CTR	8	Centers A4A4 Bandwidth Filter crystal pole #3.
A4A4C74	CTR	8	Centers A4A4 Bandwidth Filter crystal pole #2.
A4A4R43	LC	8	Adjusts LC filter amplitudes.
A4A4R49	XTAL	8	Adjusts crystal filter amplitudes.
A4A5C10	FREQ ZERO COARSE	10	Coarse adjusts 18.4 MHz Local Oscillator to set adjustment range of front-panel FREQ ZERO control.
A5A5R2	+ 10V ADJ	10	Adjusts + 10V Temperature Compensation Supply.
A4A5R32	SG10	10	Adjusts 10-dB step gain.
A4A5R33	CAL	10	Adjusts IF gain.
A4A5R44	SG20-1	10	Adjusts first 20-dB step gain.
A4A5R51	VR	10	Adjusts variable step gain.
A4A5R54	SG20-2	10	Adjusts second 20-dB step gain.

ADJUSTMENTS

TABLE 2. ADJUSTABLE COMPONENTS IN ALPHA-NUMERIC ORDER (3 OF 6)

Reference Designator	Adjustment Name	Adjustment Number	Adjustment Function
A4A6A1C31	18.4 MHz NULL	10	Nulls 18.4 MHz Local Oscillator signal.
A4A6A1R29	WIDE GAIN	11	Adjusts gain of down/up converter.
A4A7C6	SYM	7	Adjusts 3 MHz Bandwidth Filter pole #1 symmetry.
A4A7C7	CTR	7	Centers 3 MHz Bandwidth Filter pole #1.
A4A7C13	PK	7	Peaks 3 MHz Bandwidth Filter pole #2.
A4A7C14	SYM	7	Adjusts 3 MHz Bandwidth Filter pole #2 symmetry.
A4A7C15	CTR	7	Centers 3 MHz Bandwidth Filter pole #2.
A4A7C22	PK	7	Peaks 3 MHz Bandwidth Filter pole #3.
A4A7C23	SYM	7	Adjusts 3 MHz Bandwidth Filter pole #3 symmetry.
A4A7C24	CTR	7	Centers 3 MHz Bandwidth Filter pole #3.
A4A7C31	PK	7	Peaks 3 MHz Bandwidth Filter pole #4.
A4A7C32	SYM	7	Adjusts 3 MHz Bandwidth Filter pole #4 symmetry.
A4A7C33	CTR	7	Centers 3 MHz Bandwidth Filter pole #4.
A4A7C40	PK	7	Peaks 3 MHz Bandwidth Filter pole #5.
A4A7C41	SYM	7	Adjusts 3 MHz Bandwidth Filter pole #5 symmetry.
A4A7C42	CTR	7	Centers 3 MHz Bandwidth Filter pole #5.
A4A7R30/ A4A7R41	10 Hz AMPTD	7	Adjusts 3 MHz Bandwidth Filter 10-Hz bandwidth amplitude.
A4A8C13	SYM	8	Adjusts A4A8 Bandwidth Filter crystal pole #1 symmetry.
A4A8C29	CTR	8	Centers A4A8 Bandwidth Filter crystal pole #1.
A4A8C32	LC CTR	8	Centers A4A8 Bandwidth Filter LC pole #1.
A4A8C42	SYM	8	Adjusts A4A8 Bandwidth Filter crystal pole #2 symmetry.
A4A8C44	CTR	8	Centers A4A8 Bandwidth Filter crystal pole #2.
A4A8C46	LC CTR	8	Centers A4A8 Bandwidth Filter LC pole #2.
A4A8C66	LC DIP	8	Dips A4A8 Bandwidth Filter LC pole #1.
A4A8C67	LC DIP	8	Dips A4A8 Bandwidth Filter LC pole #2.
A4A8R6	A20 dB	8	Adjusts attenuation of 21.4 MHz Bandwidth Filter 20-dB step.
A4A8R7	A10 dB	8	Adjusts attenuation of 21.4 MHz Bandwidth Filter 10-dB step.
A4A8R35	LC	8	Adjusts LC filter amplitudes.
A4A8R40	XTAL	8	Adjusts crystal filter amplitudes.
A4A9R60	3 MHz	9	Adjusts 3 MHz bandwidth.
A4A9R61	1 MHz	9	Adjusts 1 MHz bandwidth.
A4A9R62	300 kHz	9	Adjusts 300 kHz bandwidth.
A4A9R65	10 kHz	9	Adjusts 10 kHz bandwidth.
A4A9R66	3 kHz	9	Adjusts 3 kHz bandwidth.

ADJUSTMENTS

TABLE 2. ADJUSTABLE COMPONENTS IN ALPHA-NUMERIC ORDER (4 OF 6)

Reference Designator	Adjustment Name	Adjustment Number	Adjustment Function
A6A3A1C8	C8	20	Adjusts 321.4 MHz Bandpass Filter.
A6A3A1C9	C9	20	Adjusts 321.4 MHz Bandpass Filter.
A6A3A1C10	C10	20	Adjusts 321.4 MHz Bandpass Filter.
A6A3A1C11	C11	20	Adjusts 321.4 MHz Bandpass Filter.
A6A3A1C12	C12	20	Adjusts 321.4 MHz Bandpass Filter.
A6A3A1C23	10.7 MHz NOTCH	20	Adjusts 10.7 MHz Notch Filter.
A6A9A1C29	TRIPLER MATCH	18	Adjusts for maximum 300 MHz output.
A6A9A1R11	CAL OUTPUT	19	Adjusts output level of CAL OUTPUT.
A6A9A1R38	BALANCE	21	Adjusts Phase Lock tune voltage level.
A6A10R1	IO	21	Adjusts 3.3 GHz oscillator drive current.
A6A10R9	VE	21	Adjusts mixer bias 18.6 – 22 GHz.
A6A10R12	VD	21	Adjusts mixer bias 12.5 – 18.6 GHz.
A6A10R15	VC	21	Adjusts mixer bias 5.8 – 12.5 GHz.
A6A10R18	VB	21	Adjusts mixer bias 2 – 5.8 GHz.
A6A10R21	GA	21	Adjusts IF gain .01 – 2.5 GHz.
A6A10R23	GB	21	Adjusts IF gain 2 – 5.8 GHz.
A6A10R25	GC	21	Adjusts IF gain 5.8 – 12.5 GHz.
A6A10R27	GD	21	Adjusts IF gain 12.5 – 18.6 GHz.
A6A10R29	GE	21	Adjusts IF gain 18.6 – 22 GHz.
A6A10R31	LR1	21	Adjusts linearity 5.8 – 12.5 GHz (high-end).
A6A10R34	LR2	21	Adjusts linearity 12.5 – 18.6 GHz (low-end).
A6A10R37	LR3	21	Adjusts linearity 12.5 – 18.6 GHz (high-end).
A6A10R40	LB1	21	Adjusts linearity 5.8 – 12.5 GHz.
A6A10R41	LB2	21	Adjusts linearity 12.5 – 18.6 GHz (low-end).
A6A10R42	LB3	21	Adjusts linearity 12.5 – 18.6 GHz (high-end).
A6A10R70	LB4	21	Adjusts linearity 18.6 – 22 GHz.
A6A10R76	LR4	21	Adjusts linearity 18.6 – 22 GHz (high-end).
A6A10R81	GF	21	Adjusts IF gain in External Mixer Band.
A6A11R48	A1	21	Adjusts flatness of .01 – 2.5 GHz (low-end).
A6A11R51	B1	21	Adjusts flatness 2 – 5.8 GHz (low-end).
A6A11R54	C1	21	Adjusts flatness 5.8 – 12.5 GHz (low-end).
A6A11R57	D1	21	Adjusts flatness 12.5 – 18.6 GHz (low-end).
A6A11R60	E1	21	Adjusts flatness 18.6 – 22 GHz (low-end).
A6A11R66	A2	21	Adjusts flatness .01 – 2.5 GHz (high-end).
A6A11R69	B2	21	Adjusts flatness 2 – 5.8 GHz (high-end).
A6A11R72	C2	21	Adjusts flatness 5.8 – 12.5 GHz (high-end).
A6A11R75	D2	21	Adjusts flatness 12.5 – 18.6 GHz (high-end).

ADJUSTMENTS

TABLE 3. FACTORY-SELECTED COMPONENTS IN ALPHA-NUMERIC ORDER (1 OF 4)

Reference Designator	Adjustment Procedure	Range of Values (Ω or PF)	Function of Component
A1A2R9	3	2.87K – 6.19K	Sets intensity level.
A3A2R21		10.0K – 26.1K	Sets intensity level.
A3A3C27		OPEN or 1.0 – 10.0	Compensates for feedthrough of INTG signal to U1.
A3A3C32	5	OPEN or 1.0 – 10.0	Compensates for feedthrough of INTG signal to U11.
A3A9C15		620 – 910	Sets settling time of track and hold buffer.
A4A2R18		68.1 – 178	Sets adjustment range of LG20.
A4A2R36	5	90.0 – 237	Adjusts overall linear gain.
A4A2R62		17.8K – 46.4K	Sets adjustment range of ATTEN.
A4A2R86		0 – OPEN	Temperature Compensation
A4A2R88	5	0 – OPEN	Temperature Compensation
A4A2R89		0 – OPEN	Temperature Compensation
A4A2R96		0 – OPEN	Temperature Compensation
A4A2R97	5	0 – OPEN	Temperature Compensation
A4A2R99		0 – OPEN	Temperature Compensation
A4A3R15		10.0 – 82.5	Log Fidelity
A4A3R25	5	19.6 – 82.5	Log Fidelity
A4A3R35		10.0 – 61.9	Log Fidelity
A4A3R47		2.15K – 13.3K	Log Fidelity
A4A3R54	5	51.1 – 133	Sets adjustment range of LG10.
A4A3R66		46.4K – 121K	Sets adjustment range of AMPTD.
A4A3R74		2.15K – 13.3K	Log Fidelity
A4A3R79	5	21.6K – 68.1K	Bandpass Filter Temperature Compensation
A4A3R80		1.0K – 2.87K	Bandpass Filter Temperature Compensation
A4A3R81		0 – OPEN	Bandpass Filter Temperature Compensation
A4A3C51	5	390 – 680	Adjusts BPF shape in wide bandwidths (>100 kHz).
A4A3C52		OPEN or 5.6 – 15.0	Sets adjustment range of CTR.
A4A3C53		91 – 130	Sets adjustment range of CTR.
A4A4R3	8	0 – 9.09	Sets XTAL bandwidth amplitudes with respect to LC amplitudes.
A4A4R16		3.16K – 8.25K	Sets adjustment range of LC DIP.
A4A4R20		3.83K – 9.09K	Adjusts crystal filter bandwidth.
A4A4R35	8	196 – 348	Sets XTAL bandwidth amplitudes with respect to LC amplitudes.
A4A4R40		3.83K – 9.09K	Adjusts crystal filter bandwidth.
A4A4R42		1K – OPEN	Sets level of +10V Temperature Compensation Supply Voltage.
A4A4R44	8	1K – OPEN	Sets level of +10V Temperature Compensation Supply Voltage.

ADJUSTMENTS

TABLE 3. FACTORY-SELECTED COMPONENTS IN ALPHA-NUMERIC ORDER (2 OF 4)

Reference Designator	Adjustment Procedure	Range of Values (Ω or PF)	Function of Component
A4A4R45	8	0 – 100	Adjusts bandwidth shape in 10 kHz BW.
A4A4R60		3.16K – 8.25K	Sets adjustment range of LC DIP.
A4A4R64		8.83K – 9.09K	Adjusts crystal filter bandwidth.
A4A4R65		909 – 2.73K	Adjusts positive feedback.
A4A4C10	8	1.0 – 8.2	Sets adjustment range of SYM.
A4A4C17	8	91 – 103	Sets adjustment range of LC CTR.
A4A4C38	8	1.0 – 8.2	Sets adjustment range of SYM.
A4A4C66	8	1.0 – 8.2	Sets adjustment range of SYM.
A4A4C70	8	91 – 130	Sets adjustment range of LC CTR.
A4A5R10	11	806 – 1.21K	Sets 18.4 MHz Local Oscillator power.
A4A5R62	10	1.33K – 3.48K	Adjusts A8dB step.
A4A5R70	10	619 – 1.62K	Adjust A4dB step.
A4A5R86	10	215 – OPEN	Adjusts A2dB step.
A4A5C9	10	0 – 16	Sets adjustment range of FREQ ZERO COARSE.
A4A6A2R33		42.2 – 75.0	Adjusts level of 3 MHz output.
A4A7C5		56 – 82	Centers First Pole.
A4A7C12	7	56 – 82	Sets adjustment range of Second Pole PK.
A4A7C21	7	56 – 82	Sets adjustment range of Third Pole PK.
A4A7C30	7	56 – 82	Sets adjustment range of Fourth Pole PK.
A4A7C39	7	56 – 82	Sets adjustment range of Fifth Pole PK.
A4A7C93	7	1.5 – 12.0	Centers First Pole.
A4A7R12		10.0K – 17.8K	Adjusts crystal filter bandwidth.
A4A7R13		10.0K – 17.8K	Adjusts crystal filter bandwidth.
A4A7R23		10.0K – 17.8K	Adjusts crystal filter bandwidth.
A4A7R24		10.0K – 17.8K	Adjusts crystal filter bandwidth.
A4A7R34		10.0K – 17.8K	Adjusts crystal filter bandwidth.
A4A7R35		10.0K – 17.8K	Adjusts crystal filter bandwidth.
A4A7R45		10.0K – 17.8K	Adjusts crystal filter bandwidth.
A4A7R46		10.0K – 17.8K	Adjusts crystal filter bandwidth.
A4A7R56		7.50K – 13.3K	Adjusts crystal filter bandwidth.
A4A7R57		7.50K – 13.3K	Adjusts crystal filter bandwidth.
A4A7R60	10	38.3 – 68.1	Compensates for gain of A4A6A1.
A4A7R66		38.3 – 68.1	Adjusts crystal filter bandwidth.
A4A7R68		100 – 178	Adjusts crystal filter bandwidth.
A4A7R70		383 – 681	Adjusts crystal filter bandwidth.
A4A7R72		1.47K – 2.61K	Adjusts crystal filter bandwidth.
A4A7R74		38.3 – 68.1	Adjusts crystal filter bandwidth.

ADJUSTMENTS

TABLE 3. FACTORY-SELECTED COMPONENTS IN ALPHA-NUMERIC ORDER (3 OF 4)

Reference Designator	Adjustment Procedure	Range of Values (Ω or PF)	Function of Component
A4A7R76		100 – 178	Adjusts crystal filter bandwidth.
A4A7R78		383 – 681	Adjusts crystal filter bandwidth.
A4A7R80		1.47K – 2.61K	Adjusts crystal filter bandwidth.
A4A7R82		38.3 – 68.1	Adjusts crystal filter bandwidth.
A4A7R84		100 – 178	Adjusts crystal filter bandwidth.
A4A7R86		383 – 681	Adjusts crystal filter bandwidth.
A4A7R88		1.47K – 2.61K	Adjusts crystal filter bandwidth.
A4A7R90		3.83 – 68.1	Adjusts crystal filter bandwidth.
A4A7R92		100 – 178	Adjusts crystal filter bandwidth.
A4A7R94		383 – 681	Adjusts crystal filter bandwidth.
A4A7R96		1.47K – 2.61K	Adjusts crystal filter bandwidth.
A4A7R98		3.83 – 68.1	Adjusts crystal filter bandwidth.
A4A7R100		100 – 178	Adjusts crystal filter bandwidth.
A4A7R102		383 – 681	Adjusts crystal filter bandwidth.
A4A7R104		1.47K – 2.61K	Adjusts crystal filter bandwidth.
A4A8R24		0 – 100	Adjusts bandwidth shape in 10 kHz BW.
A4A8R26		3.83K – 9.09K	Adjusts crystal filter bandwidth.
A4A8R29		909 – 2.37K	Adjusts LC mode feedback.
A4A8R30	8	1.96K – 5.11K	Sets adjustment range of LC DIP.
A4A8R52		3.83K – 9.09K	Adjusts crystal filter bandwidth.
A4A8R55	8	3.16K – 8.25K	Sets adjustment range of LC DIP.
A4A8C14	8	1.0 – 8.2	Sets adjustment range of SYM.
A4A8C35	8	91 – 130	Sets adjustment range of LC CTR.
A4A8C43	8	1.0 – 8.2	Sets adjustment range of SYM.
A4A8C49	8	91 – 130	Sets adjustment range of LC CTR.
A4A9R69		196K – 348K	Sets 1.4 dB step size.
A4A9R70		215K – 383K	Sets 1 dB step size.
A4A9R71		147K – 261K	Sets 1.8 dB step size.
A6A9A1R19	19	750 – 909	Centers range of CAL OUTPUT adjustment.
A6A11R2		100K – 196K	Adjusts Band A breakpoint for best flatness.
A6A12C1		.1 – .22 μ F	Sets YTX delay compensation.
A6A12C2		.1 – .22 μ F	Sets YTX delay compensation.
A7A2C8	14	8.2 – 11.0	Sets tuning range of A7A2C4.
A7A2L4	14	.22 – .68 μ H	Centers the adjustment range of A7A2 around 100 MHz.
A7A2R67	14	110 – 825	Sets – 10 dBm output level of the 400 MHz signal.
A7A2R68	14	6.8 – 61.9	Sets – 10 dBm output level of the 400 MHz signal.
A7A2R69	14	110 – 825	Sets – 10 dBm output level of the 400 MHz signal.

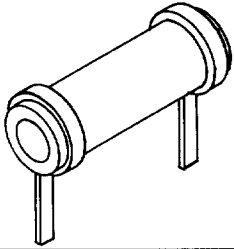
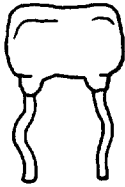
ADJUSTMENTS

TABLE 3. FACTORY-SELECTED COMPONENTS IN ALPHA-NUMERIC ORDER (4 OF 4)

Reference Designator	Adjustment Procedure	Range of Values (Ω or PF)	Function of Component
A10A3C26		0 – 15	Selected to minimize mixer distortion.
A11A4R24		348 – 562	Sets YTO Loop gain crossover to 20 ± 2 kHz.
A13C22		620 – 1300	Sets period of μ Processor clock.
A15C10		62 – 91	Sets oscillator frequency to $10 \text{ MHz} \pm .75 \text{ MHz}$.

ADJUSTMENTS

TABLE 4. HP PART NUMBERS OF STANDARD VALUE REPLACEMENT COMPONENTS (1 OF 3)

CAPACITORS					
RANGE: 1 to 24 pF TYPE: Tubular TOLERANCE: 1 to 9.1 pF = ± 0.25 pF 10 to 24 pF = $\pm 5\%$			RANGE: 27 to 680 pF TYPE: Dipped Mica TOLERANCE: $\pm 5\%$		
					
Value (pF)	HP Part Number	C D	Value (pF)	HP Part Number	C D
1.0	0160-2236	8	27	0160-2306	3
1.2	0160-2237	9	30	0160-2199	2
1.5	0150-0091	8	33	0160-2150	5
1.8	0160-2239	1	36	0160-2308	5
2.0	0160-2240	4	39	0140-0190	7
2.2	0160-2241	5	43	0160-2200	6
2.4	0160-2242	6	47	0160-2307	4
2.7	0160-2243	7	51	0160-2201	7
3.0	0160-2244	8	56	0140-0191	8
3.3	0150-0059	8	62	0140-0205	5
3.6	0160-2246	0	68	0140-0192	9
3.9	0160-2247	1	75	0160-2202	8
4.3	0160-2248	2	82	0140-0193	0
4.7	0160-2249	3	91	0160-2203	9
5.1	0160-2250	6	100	0160-2204	0
5.6	0160-2251	7	110	0140-0194	1
6.2	0160-2252	8	120	0160-2205	1
6.8	0160-2253	9	130	0140-0195	2
7.5	0160-2254	0	150	0140-0196	3
8.2	0160-2255	1	160	0160-2206	2
9.1	0160-2256	2	180	0140-0197	4
10.0	0160-2257	3	200	0140-0198	5
11.0	0160-2258	4	220	0160-0134	1
12.0	0160-2259	5	240	0140-0199	6
13.0	0160-2260	8	270	0140-0210	2
15.0	0160-2261	9	300	0160-2207	3
16.0	0160-2262	0	330	0160-2208	4
18.0	0160-2263	1	360	0160-2209	5
20.0	0160-2264	2	390	0140-0200	0
22.0	0160-2265	3	430	0160-0939	4
24.0	0160-2266	4	470	0160-3533	0
			510	0160-3534	1
			560	0160-3535	2
			620	0160-3536	3
			680	0160-3537	4

ADJUSTMENTS

TABLE 4. HP PART NUMBERS OF STANDARD VALUE REPLACEMENT COMPONENTS (2 OF 3)

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
90.9	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			

ADJUSTMENTS

TABLE 4. HP PART NUMBERS OF STANDARD VALUE REPLACEMENT COMPONENTS (3 OF 3)

RESISTORS											
RANGE: 10 to 1.47M Ohms TYPE: Fixed-Film WATTAGE: .5 at 125°C TOLERANCE: ±1%											
Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D
10.0	0757-0984	4	215	0698-3401	0	4.64K	0698-3348	4	110K	0757-0859	2
11.0	0575-0985	5	237	0698-3102	8	5.11K	0757-0833	2	121K	0757-0860	5
12.1	0757-0986	6	261	0757-1090	5	5.62K	0757-0834	3	133K	0757-0310	0
13.3	0757-0001	6	287	0757-1092	7	6.19K	0757-0196	0	147K	0698-3175	5
14.7	0698-3388	2	316	0698-3402	1	6.81K	0757-0835	4	162K	0757-0130	2
16.2	0757-0989	9	348	0698-3403	2	7.50K	0757-0836	5	178K	0757-0129	9
17.8	0698-3389	3	383	0698-3404	3	8.25K	0757-0837	6	196K	0757-0063	0
19.6	0698-3390	6	422	0698-3405	4	9.09K	0757-0838	7	215K	0757-0127	7
21.5	0698-3391	7	464	0698-0090	7	10.0K	0757-0839	8	237K	0698-3424	7
23.7	0698-3392	8	511	0757-0814	9	12.1K	0757-0841	2	261K	0757-0064	1
26.1	0757-0003	8	562	0757-0815	0	13.3K	0698-3413	4	287K	0757-0154	0
28.7	0698-3393	9	619	0757-0158	4	14.7K	0698-3414	5	316K	0698-3425	8
31.6	0698-3394	0	681	0757-0816	1	16.2K	0757-0844	5	348K	0757-0195	9
34.8	0698-3395	1	750	0757-0817	2	17.8K	0698-0025	8	383K	0757-0133	5
38.3	0698-3396	2	825	0757-0818	3	19.6K	0698-3415	6	422K	0757-0134	6
42.2	0698-3397	3	909	0757-0819	4	21.5K	0698-3416	7	464K	0698-3426	9
46.4	0698-3398	4	1.00K	0757-0159	5	23.7K	0698-3417	8	511K	0757-0135	7
51.1	0757-1000	7	1.10K	0757-0820	7	26.1K	0698-3418	9	562K	0757-0868	3
56.2	0757-1001	8	1.21K	0757-0821	8	28.7K	0698-3103	9	619K	0757-0136	8
61.9	0757-1002	9	1.33K	0698-3406	5	31.6K	0698-3419	0	681K	0757-0869	4
68.1	0757-0794	4	1.47K	0757-1078	9	34.8K	0698-3420	3	750K	0757-0137	9
75.0	0757-0795	5	1.62K	0757-0873	0	38.3K	0698-3421	4	825K	0757-0870	7
82.5	0757-0796	6	1.78K	0698-0089	4	42.2K	0698-3422	5	909K	0757-0138	0
90.0	0757-0797	7	1.96K	0698-3407	6	46.4K	0698-3423	6	1M	0757-0059	4
100	0757-0198	2	2.15K	0698-3408	7	51.1K	0757-0853	6	1.1M	0757-0139	1
110	0757-0798	8	2.37K	0698-3409	8	56.2K	0757-0854	7	1.21M	0757-0871	8
121	0757-0799	9	2.61K	0698-0024	7	61.9K	0757-0309	7	1.33M	0757-0194	8
133	0698-3399	5	2.87K	0698-3101	7	68.1K	0757-0855	8	1.47M	0698-3464	5
147	0698-3400	9	3.16K	0698-3410	1	75.0K	0757-0856	9			
162	0757-0802	5	3.48K	0698-3411	2	82.5K	0757-0857	0			
178	0698-3334	8	3.83K	0698-3412	3	90.9K	0757-0858	1			
196	0757-1060	9	4.22K	0698-3346	2	100K	0757-0367	7			

ADJUSTMENTS

1. LOW VOLTAGE POWER SUPPLY ADJUSTMENTS

REFERENCE:

A1A6 $\pm 15V$ Regulator
A1A7 +100V, +5.2V Regulator
A8 Rectifier
A17 Positive Regulator
A18 Negative Regulator

DESCRIPTION:

The +15V supply is adjusted for the IF-Display Section, and the +22V and +20V supplies are adjusted for the RF Section. All other low voltage supplies are measured to ensure that they are within tolerance.

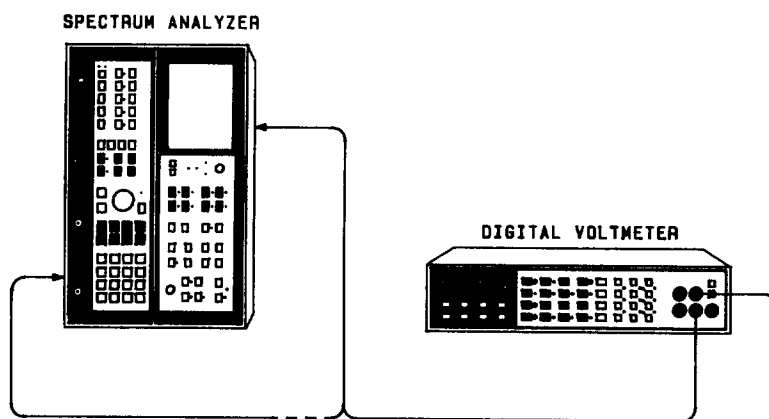


FIGURE 1. LOW VOLTAGE POWER SUPPLY ADJUSTMENTS SETUP

EQUIPMENT:

Digital Voltmeter (DVM) HP 3456A

PROCEDURE:

IF-Display Section

1. Position instrument on right side with IF-Display Section facing right, as shown in Figure 1.
2. Set LINE switch to ON and press . Mains indicator A1A8DS1 (red LED) should be lit.
3. Connect DVM to A1A6TP3. The +15V indicator A1A6DS1 (yellow LED) should be lit.
4. DVM indication should be $+15.000 \pm 0.010$ Vdc. If voltage is out of tolerance, adjust A1A6R9 +15V ADJ for specified voltage. Location of adjustment is shown in Figure 2.

ADJUSTMENTS

1. LOW VOLTAGE POWER SUPPLY ADJUSTMENTS (Cont'd)

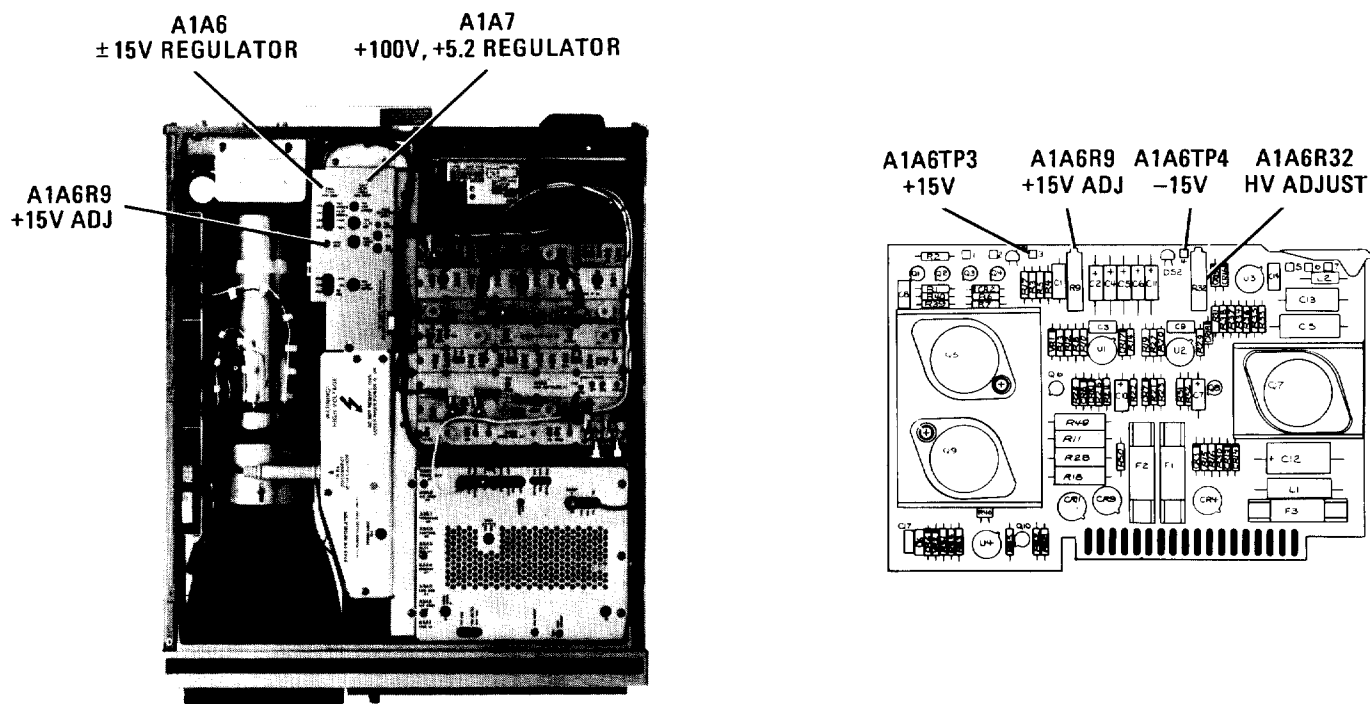


FIGURE 2. LOCATION OF IF-DISPLAY SECTION LOW VOLTAGE ADJUSTMENTS

5. Connect DVM to A1A6TP4. The -15V indicator A1A6DS2 (yellow LED) should be lit.
6. DVM indication should be $-15.000 \pm 0.050 \text{ Vdc}$. The -15V supply is referenced to the $+15\text{V}$ supply; therefore, if the -15V supply is out of tolerance, a circuit malfunction is indicated.
7. Connect DVM to A1A7TP3. The $+100\text{V}$ indicator A1A7DS2 (yellow LED) should be lit.
8. DVM indication should be $+100.0 \pm 2.0 \text{ Vdc}$. The $+100\text{V}$ supply is referenced to the $+15\text{V}$ supply; therefore, if the $+100\text{V}$ supply is out of tolerance, a circuit malfunction is indicated.
9. Connect DVM to A1A7TP2. The $+5.2\text{V}$ indicator A1A7DS1 (yellow LED) should be lit.
10. DVM indication should be $+5.200 \pm 0.050 \text{ Vdc}$. The $+5.2\text{V}$ supply is referenced to the $+15\text{V}$ supply; therefore, if the $+5.2\text{V}$ supply is out of tolerance, a circuit malfunction is indicated.

RF Section

11. Connect DVM to A8TP1; ground lead to ground. The $+22\text{V}$ indicator A8DS1 (yellow LED) should be lit.
12. Adjust A8R2 $+22\text{V ADJ}$ for DVM indication of $+22.000 \pm 0.020 \text{ Vdc}$. Location of adjustment is shown in Figure 3.

ADJUSTMENTS

1. LOW VOLTAGE POWER SUPPLY ADJUSTMENTS (Cont'd)

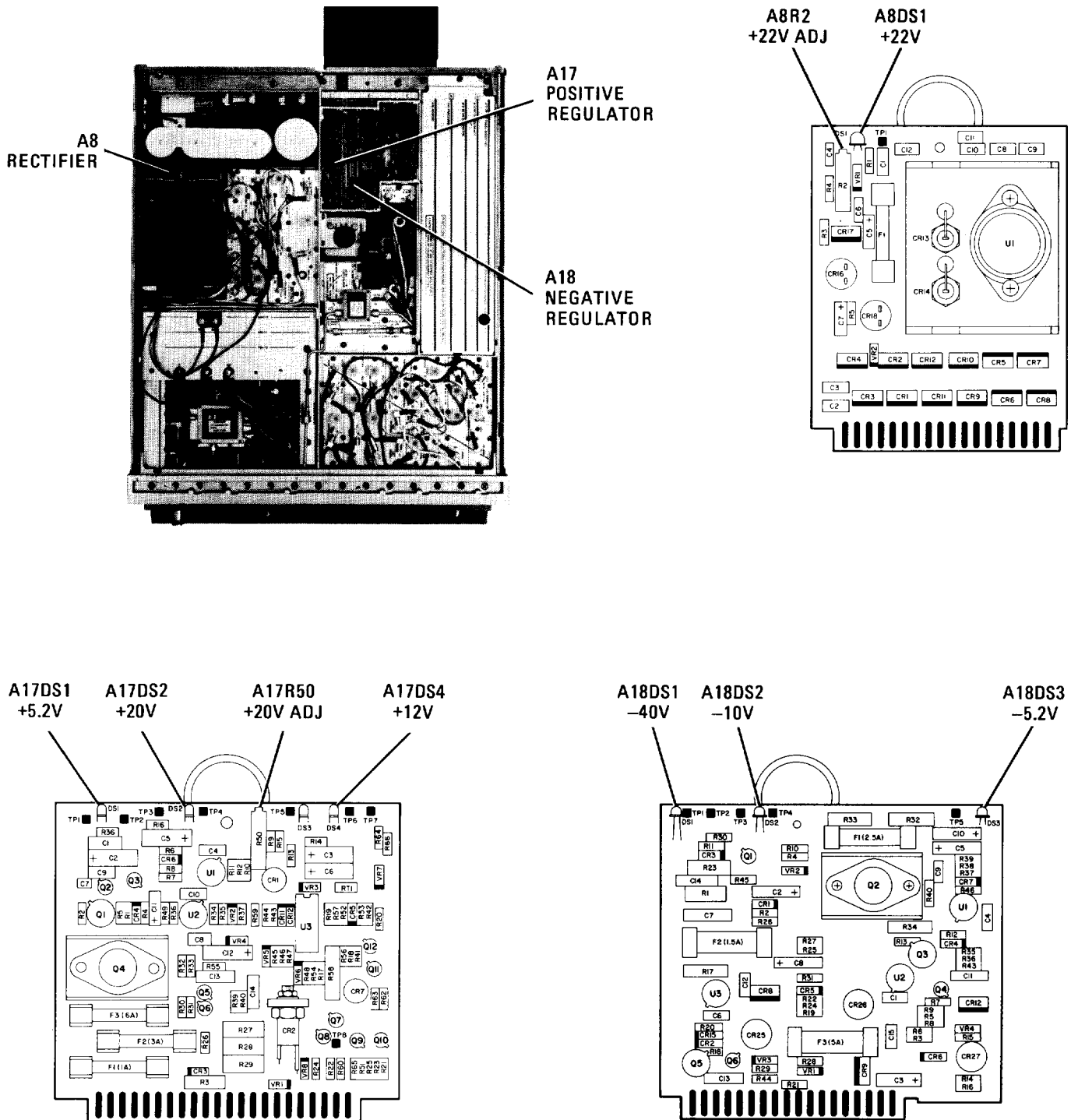


FIGURE 3. LOCATION OF RF SECTION LOW VOLTAGE ADJUSTMENTS

ADJUSTMENTS

1. LOW VOLTAGE POWER SUPPLY ADJUSTMENTS (Cont'd)

13. Connect DVM to A17TP4. The +20V indicator A17DS2 (yellow LED) should be lit.
14. Adjust A17R50 +20V ADJ for DVM indication of $+20.000 \pm 0.001$ Vdc.
15. Connect DVM to A17TP6. The +12V indicator A17DS4 (yellow LED) should be lit.
16. DVM indication should be $+12.25 \pm 0.30$ Vdc. The +12V supply voltage is set by a precision voltage regulator; therefore, if the +12V supply is out of tolerance, a circuit malfunction is indicated.
17. Connect DVM to A17TP2. The +5.2V indicator A17DS1 (yellow LED) should be lit.
18. DVM indication should be $+5.20 \pm 0.05$ Vdc. The +5.2V supply is referenced to the +20V supply; therefore, if the +5.2V supply is out of tolerance, a circuit malfunction is indicated.
19. Connect DVM to A18TP5. The -5.2V indicator A18DS3 (yellow LED) should be lit.
20. DVM indication should be -5.20 ± 0.05 Vdc. The -5.2V supply is referenced to the +20V supply; therefore, if the -5.2V supply is out of tolerance, a circuit malfunction is indicated.
21. Connect DVM to A18TP1. The -40V indicator A18DS1 (yellow LED) should be lit.
22. DVM indication should be 39.8 ± 0.4 Vdc. The -40V supply is referenced to the +20V supply; therefore, if the -40V supply is out of tolerance, a circuit malfunction is indicated.
23. Connect DVM to A18TP4. The -10V indicator A18DS2 (yellow LED) should be lit.
24. DVM indication should be -10.0 ± 0.1 Vdc. The -10V supply is referenced to the +20V supply; therefore, if the -10V supply is out of tolerance, a circuit malfunction is indicated.

ADJUSTMENTS

2. HIGH VOLTAGE ADJUSTMENT

REFERENCE:

A1A3 High Voltage Regulator
A1A6 $\pm 15\text{V}$ Regulator
A1A7 $+100\text{V}$, $+5.2\text{V}$ Regulator

DESCRIPTION:

A 1000:1 divider probe is used to measure the CRT cathode voltage. First, the accuracy of this high-voltage probe is checked by comparing measurements of the $+100\text{ Vdc}$ supply voltage with and without the probe. Any measurement error due to use of the high-voltage probe is calculated into the adjustment specification of the CRT cathode voltage, which is adjusted with the A1A6 HV ADJUST control. When the CRT cathode voltage is properly adjusted, the CRT filament voltage will be $+4.45 \pm 0.04\text{ Vrms}$ (measured at cut-off) that is required for maximum CRT life. (The filament voltage is referenced to the high voltage cathode and can only be measured directly with special equipment.)

Once the CRT cathode voltage is properly adjusted, the focus and intensity characteristics must be adjusted. Adjusting the intensity to the proper level optimizes the CRT tube life.

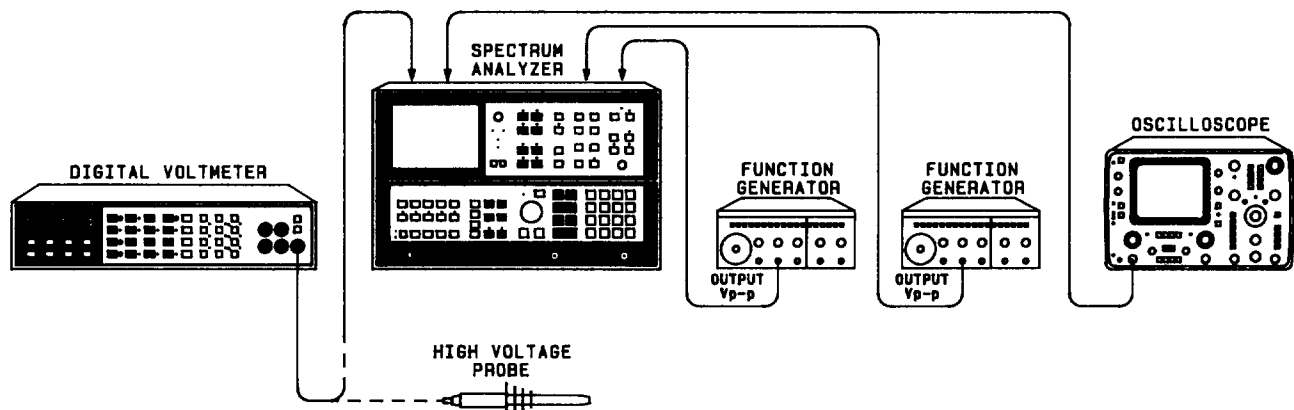


FIGURE 4. HIGH VOLTAGE ADJUSTMENT SETUP

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
DC High-Voltage Probe (1000:1 divider)	HP 34111A
Display Adjustment Board (Service Accessory)	HP 85662-60088
Oscilloscope	HP 1741A
10:1 Divider Probe	HP 10004D
Function Generator (2 required)	HP 3312A

WARNING

In the following procedural steps, it is necessary to probe voltages which, if contacted, could cause serious personal injury. Use a non-metallic alignment tool when making adjustments. Be extremely careful.

ADJUSTMENTS

2. HIGH VOLTAGE ADJUSTMENT (Cont'd)

PROCEDURE:

Cathode/Filament Voltage Adjustment

1. Position instrument upright as shown in Figure 4, with top cover removed.
2. Connect DVM to A1A7TP3 (+ 100V) without the high-voltage probe. (Refer to Figure 4.) Place the DVM on the 100V range.

NOTE

The accuracy of the high voltage probe is specified connected to a dc voltmeter with 10M input resistance. HP 3456A and HP 3455A, Digital Voltmeters, have a 10M input resistance on the 100V and 1000V ranges. All measurements in this procedure should be performed with the DVM manually set on the 100V range. (± 00.000 on the HP 3456A display.)

3. Set LINE switch to ON and press . Set the front panel INTENSITY control fully CCW (CRT beam at cut-off).
4. Note DVM indication at A1A7TP3.
5. Connect high-voltage probe to the DVM and connect to A1A7TP3.
6. Note DVM indication.
7. Divide the DVM indication in step 6 by the DVM indication in step 4. This gives the calibration factor needed to compensate for high-voltage probe error.

_____ Calibration Factor
8. Disconnect high-voltage probe from A1A7TP3. Set LINE switch to STANDBY. Remove ac line cord from both instrument sections.
9. The MAINS power ON indicator A1A8DS1 (red LED) should be completely OFF before proceeding with this procedure. The indicator will remain lit for several seconds after ac line cord has been removed and will go out slowly (the light becomes dimmer until it is completely out).
10. Remove protective cover from the A1A3 High Voltage Regulator. Note the voltage from the label on A1A3T1 for use in step 14. Refer to Figure 5 for location of A1A3.

_____ Vdc

WARNING

With power supplied to the instrument, A1A3TP3 is at a voltage level of approximately – 4000 Vdc. Be extremely careful.

11. Connect high-voltage probe to A1A3TP3. Refer to Figure 5 for location of test point.

ADJUSTMENTS

2. HIGH VOLTAGE ADJUSTMENT (Cont'd)

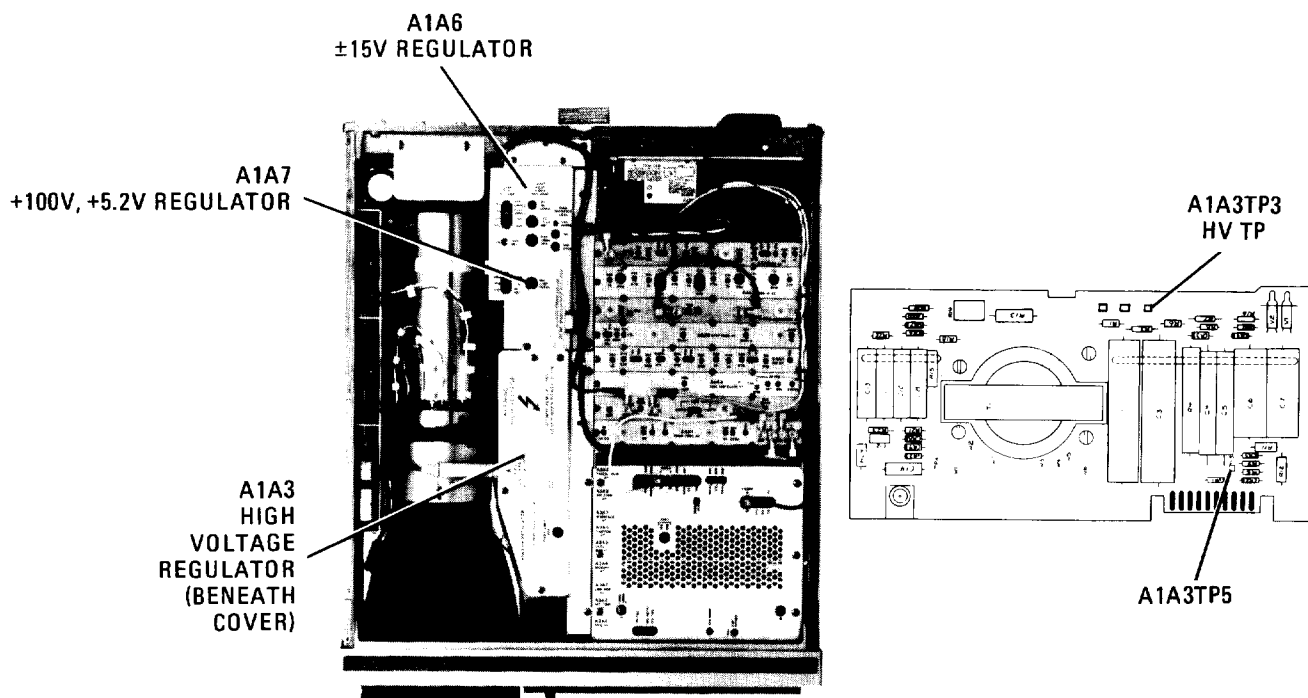


FIGURE 5. LOCATION OF HIGH AND LOW VOLTAGE REGULATOR ASSEMBLIES

12. Reconnect ac line cords to both instruments. Set LINE switch to ON.
13. Wait approximately 30 seconds for dc regulator circuits to stabilize.
14. Adjust A1A6 HV ADJ, A1A6R32, for a DVM indication equal to the calibration factor (calculated in step 7) times the voltage labeled on the top of A1A3 High Voltage Regulator. Refer to Figure 2 for location of adjustment.

EXAMPLE:

If the calibration factor calculated in step 7 was 0.00099 and A1A3T1 is labeled for -3875V , then adjust A1A6R32 HV ADJ for a DVM indication of:

$$0.00099 \times (-3875\text{V}) = -3.836 \text{ Vdc}$$

15. Set LINE switch to STANDBY. Remove ac line cord from each instrument section.
16. Wait for the MAINS power ON indicator A1A8DS1 (red LED) to go completely out before proceeding.
17. Disconnect high-voltage probe from A1A3TP3.

ADJUSTMENTS

2. HIGH VOLTAGE ADJUSTMENT (Cont'd)

Focus and Intensity Adjustments

18. Remove A3A2 Intensity Control Board from the instrument and install the Display Adjustment Board (HP 85662-60088). Set switch on the Display Adjustment Board in the "down" position.
19. Connect a calibrated 10:1 divider probe to oscilloscope Channel A input.
20. Set the oscilloscope controls as follows:

MAIN pushbutton	IN
MAIN INT/EXT	INT
MAIN TIME/DIV	0.2 msec
VOLTS/DIV (Channel A)	100
CAL (Channel A)	Fully CW
All other pushbuttons	OUT

WARNING

High voltage is present on A1A3 High Voltage Assembly (when ac line cords are connected). Be extremely careful when probing voltages.

21. Connect oscilloscope (Channel A) probe to A1A3TP5. (It may be necessary to use a long probe extension.)
22. Reconnect ac line cords to each instrument section. Set LINE switch to ON.
23. Wait approximately 30 seconds for the dc regulator circuit to stabilize.
24. Adjust the front panel INTENSITY control fully CCW. Adjust A1A2R35 Intensity Limit (clockwise) until a spot is just visible.

NOTE

Intensity Limit should have enough range to turn the spot on and off. If the spot is always on, decrease the value of A1A2R9. If the spot is always off, increase the value of A1A2R9.

25. Using a non-metallic alignment tool, center the front panel FOCUS control and adjust A1A2R36 ASTIG and A1A3R14 FOCUS LIMIT for a sharp, focused dot on the CRT display.
26. Adjust A1A2R35 INT LIMIT until the dot just disappears.
27. Measure the peak-to-peak CRT cut-off voltage, V_{co} , at A1A3TP5 on the oscilloscope. This voltage should be 45 – 75 Vp-p. Note this voltage for use in step 32.

$V_{co} = \underline{\hspace{2cm}} V_{p-p}$

ADJUSTMENTS

2. HIGH VOLTAGE ADJUSTMENT (Cont'd)

28. Connect a function generator to both inputs of the Display Adjustment Board, as shown in Figure 4. Set the function generators as follows:

X input J1: 500 kHz
Sine Wave
2V peak-to-peak

Y input J2: 1 kHz
Sine Wave
2V peak-to-peak

29. Adjust A1A2R35 INT LIMIT clockwise until the display is just visible.
30. Adjust A1A4R7 POS, A1A5R7 POS, and, if necessary, the function generator dc offsets for a full-screen illumination.
31. Set the front panel INTENSITY control fully CCW. Adjust A1A2R35 INT LIMIT until the display just disappears.
32. Slowly adjust the front panel INTENSITY control through its entire range while monitoring A1A3TP5. DO NOT allow the voltage at A1A3TP5 to drop below $(V_{co} - 50)V_{p-p}$ or 12 Vp-p, whichever is greater.

If this limit is exceeded with the INTENSITY control fully CW, then:

- a. Set INTENSITY control fully CCW.
- b. Set LINE switch to STANDBY.
- c. Increase the value of A1A2R9.
- d. Return to step 29.

NOTE

Optimum CRT tube life is obtained when the voltage at A1A3TP5 is as large as possible with the INTENSITY control fully CW. (The display must also fully disappear with the INTENSITY control fully CCW.)

33. Perform Adjustment 3 – Preliminary Display Adjustments, Part C: Focus Coarse Adjustment.

ADJUSTMENTS

3. PRELIMINARY DISPLAY ADJUSTMENTS

REFERENCE:

A1A1 Keyboard, A1A2 Z Axis Amplifier
A1A4 X Deflection Amplifier, A1A5 Y Deflection Amplifier

NOTE

Adjustments 2, High Voltage Adjustment, should be performed prior to performing Adjustments 3, Preliminary Display Adjustments.

DESCRIPTION:

All adjustments of the display section are performed to adjust the CRT display for proper horizontal and vertical characteristics. The preliminary adjustments are included for adjustment of display when major repair has been performed in the display section. For example, replacement or repair of the A1A2 Z Axis Amplifier. If adjustment is being performed as a result of minor repair (replacement of a transistor, for example), or as a routine maintenance procedure, only the final adjustments in Adjustments 4, Final Display Adjustments, need be performed.

CAUTION

Be sure not to allow a fixed spot of high intensity to remain on the spectrum analyzer CRT. A fixed spot of high intensity may permanently damage the phosphor coating of the CRT. Monitor the CRT closely during the following adjustment procedures and, if a spot occurs, move the spot offscreen by adjusting either the front-panel intensity or the horizontal or vertical deflection position controls.

A. Calibration of Pulse Generator, Oscilloscopes, and Probes

EQUIPMENT:

Oscilloscope	HP 1741A
Pulse Generator	HP 8116A
10:1 Divider Probe (2 required)	HP 10004D
Display Adjustment PC Board (service accessory)	HP 85662-60088

PROCEDURE:

1. Connect one 10:1 divider probe to the oscilloscope Channel A input and one to the Channel B input.
2. Set oscilloscope controls as follows:

MAIN pushbutton	IN
MAIN INT/EXT	INT
MAIN TIME/DIV	.01 msec
VOLTS/DIV	
Channel A	0.02
CAL	fully clockwise
Channel B	0.02
CAL	fully clockwise

ADJUSTMENTS

3. PRELIMINARY DISPLAY ADJUSTMENTS (Cont'd)

3. Connect Channel A probe to oscilloscope 1.0V p-p calibrator. Select Channel A display. Adjust probe for optimum square wave display on oscilloscope CRT. Adjust Channel A CAL for a 5-division peak-to-peak display. Disconnect probe from calibrator.
4. Connect Channel B probe to oscilloscope 1.0V p-p calibrator. Select Channel B display. Adjust probe for optimum square wave display on oscilloscope CRT. Adjust Channel B CAL for a 5-division peak-to-peak display. Disconnect probe from calibrator.

NOTE

Each probe is now compensated for the oscilloscope input to which it is connected; do not interchange probes without recalibrating.

5. Mark probe connected to Channel A input and disconnect both 10:1 probes from oscilloscope. Using two BNC cables, connect equipment as shown in Figure 6.

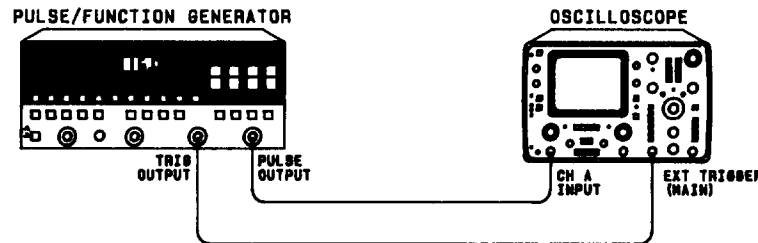


FIGURE 6. EQUIPMENT CALIBRATION SETUP

6. Set instrument controls as follows:

Pulse Generator:

Pulse Frequency (Rate)	0.2 MHz
Pulse Width	300 nsec
Pulse Amplitude	2.0V p-p
Pulse Offset	0.0 Vdc (OFF)
Pulse Polarity	Normal (+)
Pulse Rise and Fall Time	(≤ 10 nsec)

Oscilloscope:

Main pushbutton	IN
Delayed Trigger Level	fully CCW
Main TIME/DIV	1 μ sec
Vernier	CAL
Trigger Holdoff	fully CCW
Main INT/EXT	EXT
Main AC/DC	dc
Delay	.05 μ sec

ADJUSTMENTS

3. PRELIMINARY DISPLAY ADJUSTMENTS (Cont'd)

VOLTS/DIV	
Channel A	.5
Trigger	A
All other pushbuttons	OUT

7. Adjust oscilloscope Main trigger Level for a stable display. Adjust pulse generator Repetition Rate Vernier so that pulse are approximately 5 divisions ($5 \mu\text{sec}$) apart.
8. Adjust Amplitude vernier on the pulse generator for a 2V peak-to-peak signal.
9. Adjust oscilloscope control Delay for an intensified area over the center pulse as shown in Figure 7. If intensified area is not visible, decrease intensity of display.

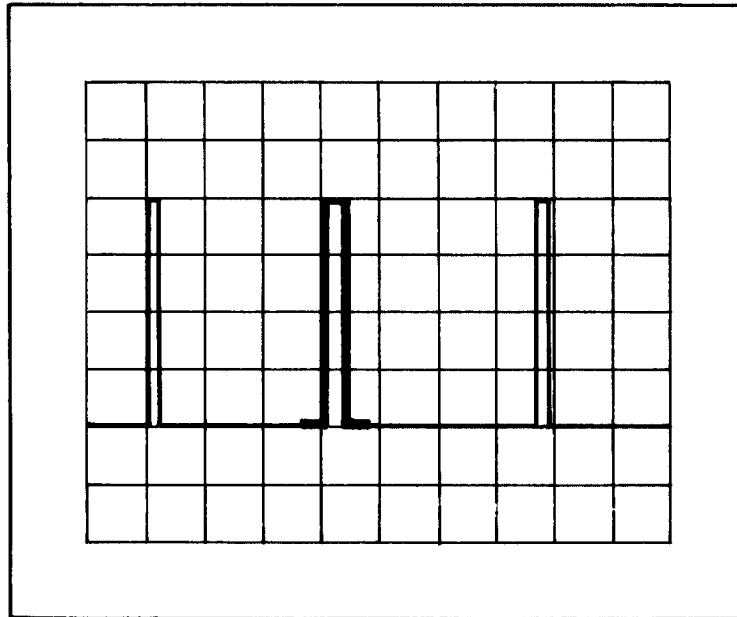


FIGURE 7. EQUIPMENT CALIBRATION WAVEFORM

10. Push oscilloscope DLY'D pushbutton IN and MAIN pushbutton OUT.
11. Adjust Delay and Horizontal Position controls to set rising edge of pulse on first vertical graticule.
12. Adjust pulse generator Pulse width Vernier for a pulse width of 5 divisions (250 nsec). Disconnect BNC cable from pulse generator Pulse Output and oscilloscope Channel A input. Reconnect calibrated 10:1 divider probes to oscilloscope Channel A and Channel B inputs (marked probe from step 5 to Channel A).

B. X and Y Deflection Amplifier Pulse Response Adjustments

1. Connect Channel A calibrated 10:1 divider probe to A1A4E1 and Channel B probe to A1A4E2, as shown in Figure 8.

ADJUSTMENTS

3. PRELIMINARY DISPLAY ADJUSTMENTS (Cont'd)

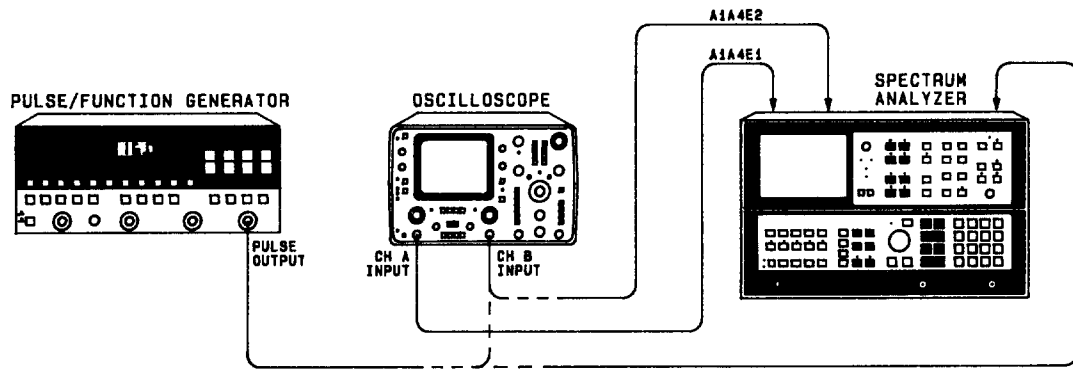


FIGURE 8. PRELIMINARY DISPLAY ADJUSTMENTS SETUP

2. Set oscilloscope controls as follows:

Display	A + B
VOLTS/DIV	
Channel A	1
Channel B	1

3. Remove cover over A3 Digital storage Section and remove A3A2 Intensity Control. Insert Display Adjustment PC Board (HP Part Number 85662-60088) in place of A3A2. Install A1A2 Z Axis Amplifier on extender board. Refer to Figure 9 for location of A3A2 assembly.
4. Connect output of pulse generator to J1 (X input) on Display Adjustment Board.
5. Push oscilloscope Channel B INVERT pushbutton IN. Set all other control settings as listed in step A-6. Set pulse generator controls as listed in step A-6.
6. Set spectrum analyzer LINE switch to ON and press 2-22
GHz. Set front-panel INTENSITY control fully counterclockwise.
7. Adjust A1A4R7 X POS and A1A4R27 X GAIN for a full eight-division display on oscilloscope as shown in Figure 10. Refer to Figure 9 for location of adjustments.
8. Measure the rise and fall times between the 10% and 90% points on the display by noting where the trace crosses the first and seventh horizontal graticule lines. Refer to Figure 10.
9. Adjust A1A4R28 HF GAIN, A1A4C10, and A1A4C11 for minimum overshoot and rise and fall times.
10. Rise and fall times should both be less than 65 nsec between 10% and 90%. Overshoot should be less than 3% (approximately 0.25 divisions).

NOTE

Always adjust A1A4C10 and A1A4C11 approximately equal amounts. Do not adjust one to its minimum value and the other to its maximum value.

ADJUSTMENTS

3. PRELIMINARY DISPLAY ADJUSTMENTS (Cont'd)

11. Connect oscilloscope Channel A probe to A1A5E1 and Channel B probe to A1A5E2. Connect output of pulse generator to J12 (Y input) on Display Adjustment PC Board.
12. The A1A5 Y Deflection Amplifier is identical to the A1A4 X Deflection Amplifier. Repeat steps 7 through 10 for the A1A5 Y Deflection Amplifier.

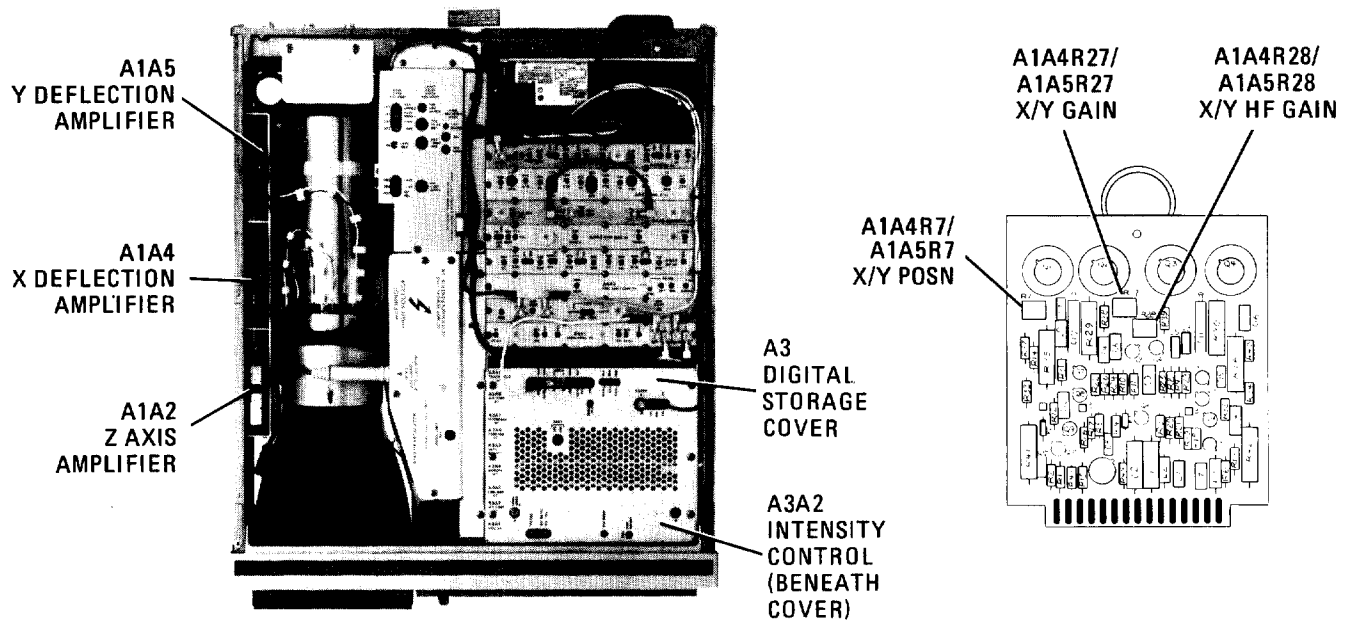


FIGURE 9. LOCATION OF X AND Y ADJUSTMENTS

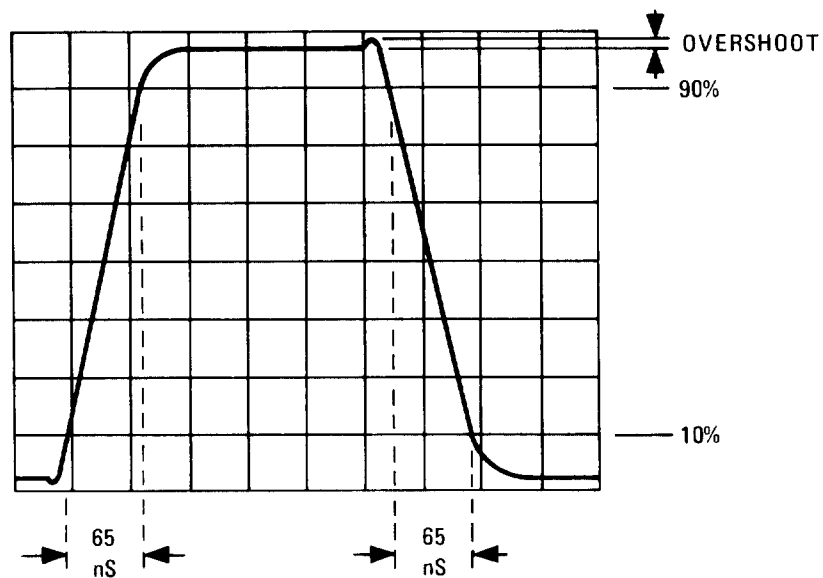


FIGURE 10. RISE AND FALL TIMES AND OVERSHOOT ADJUSTMENT WAVEFORM

3. PRELIMINARY DISPLAY ADJUSTMENTS (Cont'd)

C. Z Axis Amplifier Pulse Response Adjustments

Pulse Response of Control Gate Amplifier to **BLANK** Input

1. Connect oscilloscope Channel A probe to A1A2TP2. Connect Channel B probe to the output of the pulse generator. Connect the output of the pulse generator to J3 (Z input) on the Display Adjustment PC Board and set switch in "down" position.
2. Set oscilloscope controls as follows:

VOLTS/DIV	
Channel A	1
Channel B	1
All other pushbuttons	same as in step A-6
3. Set all pulse generator controls the same as in step A-6.
4. Select Channel B display on oscilloscope. Adjust pulse generator Amplitude Vernier for a 4V peak-to-peak output pulse as indicated on oscilloscope display.
5. Adjust A1A4R7 X POS and A1A5R7 Y POS to position CRT beam off the CRT.
6. Set the spectrum analyzer front-panel INTENSITY control fully clockwise. Select Channel A display on oscilloscope.
7. Note display on oscilloscope CRT. Pulse should be $\geq 55V$ peak-to-peak.
8. Adjust oscilloscope VOLTS/DIV vernier for a full eight-division display. Refer to Figure 10.
9. Measure the rise and fall times of the pulse between the 10% and 90% points by noting where the trace crosses the first and seventh horizontal graticule lines. Refer to Figure 10.
10. Adjust A1A2R22 HF GAIN and A1A2C10 for minimum overshoot and minimum rise and fall times. Refer to Figure 10. Refer to Figure 11 for location of adjustments.
11. Rise and fall times should be less than 30 nsec. Overshoot should be less than 5%.
12. Select Channel B display on oscilloscope. Adjust pulse generator Amplitude Vernier for a pulse of 2.5V peak-to-peak.
13. Select Channel A on oscilloscope. Note pulse display. Pulse should be greater than 55V peak-to-peak.

Pulse Response of Z Amplifier to Z Axis Input

14. Set switch on the Display Adjustment PC Board in "up" position.
15. Select Channel B display on oscilloscope. Adjust pulse generator Amplitude Vernier for a 2V peak-to-peak pulse output.

ADJUSTMENTS

3. PRELIMINARY DISPLAY ADJUSTMENTS (Cont'd)

16. Select Channel A display on oscilloscope. Note oscilloscope display. The top of the pulse should be approximately 82 Vdc and the amplitude should be greater than 55V p-p.
17. Adjust oscilloscope VOLTS/DIV vernier for a full eight-division display. Refer to Figure 10.
18. Measure the rise and fall times of the pulse between 10% and 90% by noting where the trace crosses the first and seventh horizontal graticule lines.
19. Rise and fall times should be less than 100 nsec.
20. Set oscilloscope Channel A VOLTS/DIV to 1 and Channel A vernier to CAL.
21. Set spectrum analyzer front-panel INTENSITY control fully counterclockwise. Note oscilloscope display.
22. Pulse amplitude should be less than 1V peak-to-peak. The signal level should be ≤ 45 Vdc.

Focus Coarse Adjustment

23. Disconnect oscilloscope Channel A probe from A1A2TP2 and connect to A1A2TP1.
24. Adjust spectrum analyzer front-panel FOCUS control through its full range while monitoring oscilloscope display. Pulse display should vary from greater than +80 Vdc to less than +10 Vdc. Reset front-panel FOCUS control to mid-range.
25. Connect Channel A probe to A1A2TP3. Set spectrum analyzer front-panel INTENSITY control fully clockwise. Set oscilloscope Channel A VOLTS/DIV to 0.05.
26. Adjust A1A2R30 FOCUS GAIN for a 1V peak-to-peak pulse display on oscilloscope. Refer to Figure 11 for location of A1A2R30.

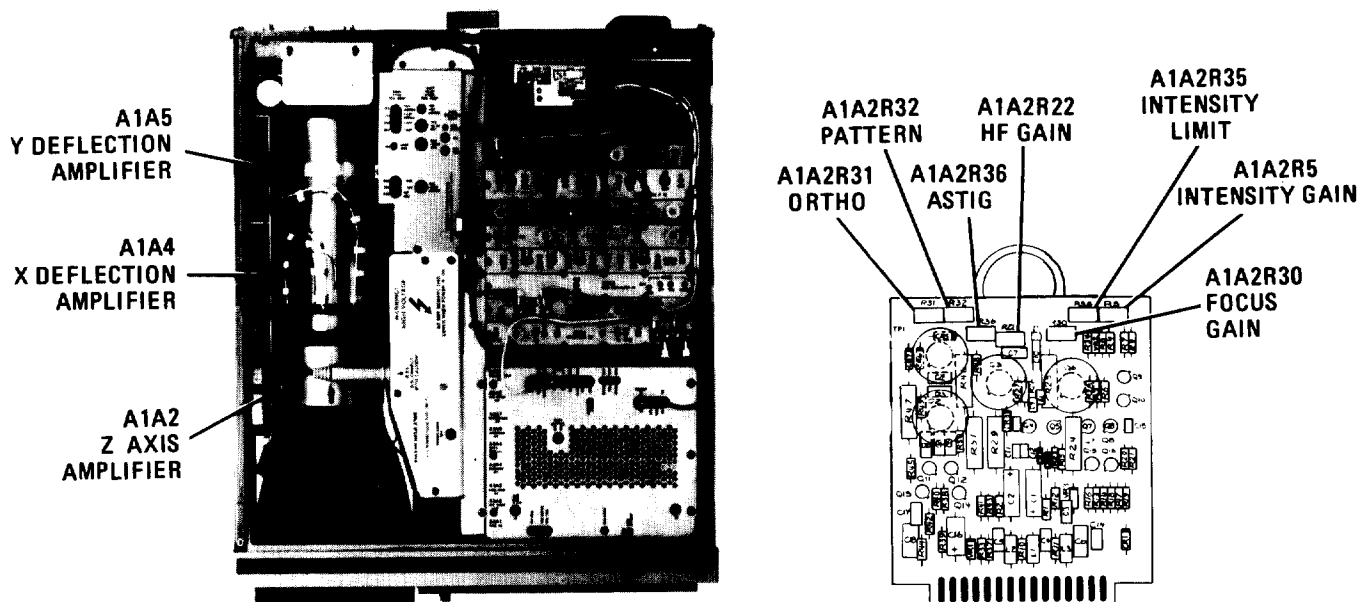


FIGURE 11. LOCATION OF Z ADJUSTMENTS

ADJUSTMENTS

3. PRELIMINARY DISPLAY ADJUSTMENTS (Cont'd)

27. Connect oscilloscope Channel A probe to A1A2TP1. Oscilloscope display should be an inverted pulse approximately 30V peak-to-peak.
28. Set spectrum analyzer front-panel INTENSITY control fully counterclockwise. Connect Channel A probe to A1A2TP1.
29. Adjust spectrum analyzer front-panel FOCUS control for +50 Vdc on the oscilloscope.

D. CRT Adjustments

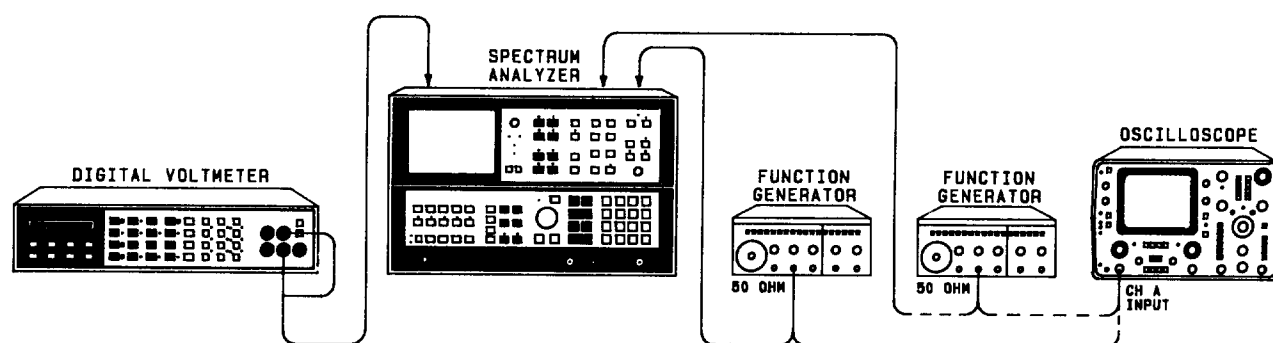


FIGURE 12. CRT ADJUSTMENTS SETUP

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
Oscilloscope	HP 1741A
Function Generator (2 required)	HP 3312A
Display Adjustment PC Board (service accessory)	HP 85662-60088

Horizontal Adjustments

1. Connect function generator output to oscilloscope input. Adjust function generator output for a 500 kHz, 2V peak-to-peak sine wave signal (add 1 Vdc offset).
2. Disconnect function generator from oscilloscope and connect to J1 (X input) on Display Adjustment PC Board.
3. Adjust front-panel INTENSITY control for convenient CRT viewing.
4. Adjust front-panel ALIGN for a horizontal trace.
5. Adjust A1A4R27 X GAIN and A1A4R7 X POS to set the horizontal trace to the approximate position shown in Figure 13. Refer to Figure 9 for location of adjustments.

3. PRELIMINARY DISPLAY ADJUSTMENTS (Cont'd)

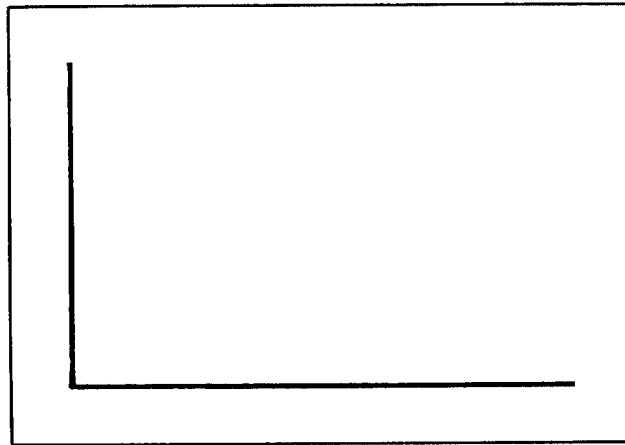


FIGURE 13. X AND Y DEFLECTION ADJUSTMENT WAVEFORM

Vertical Adjustments

6. Remove function generator from J1 on Display Adjustment PC Board and connect to J2 (Y input).
7. Adjust A1A2R31 ORTHO for a vertical trace. Refer to Figure 11 for location of adjustment.
8. Adjust A1A5R27 Y GAIN and A1A5R7 Y POS to set the vertical trace to the approximate position shown in Figure 13. Refer to Figure 9 for location of adjustments.

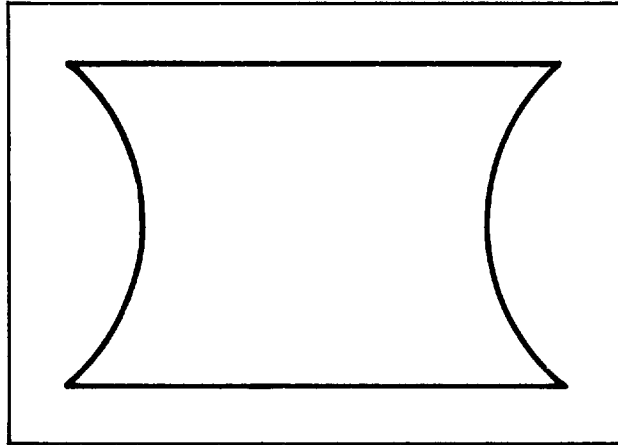
Pattern Adjustments

9. Disconnect function generator from J2 (Y input) on the Display Adjustment PC Board and reconnect to J1 (X input).
10. Connect another function generator output to oscilloscope input and adjust output for a 1 kHz, 2V peak-to-peak sine wave signal (add 1 Vdc offset). Disconnect function generator from oscilloscope and connect to J2 (Y input) on the Display Adjustment PC Board. Set switch in "down" position.
11. Adjust A1A2R32 PATT for best rectangular display. Display should not exhibit pin cushioning or barreling. Refer to Figure 14. It may be necessary to readjust A1A2R31 ORTHO and front-panel ALIGN controls to achieve optimum rectangular display. Refer to Figure 11 for location of adjustments.
12. Set LINE switch to STANDBY. Remove ac line cord from rear of each instrument section.
13. Replace A1A2 Z Axis Amplifier in instrument without extender board.
14. Disconnect function generators from Display Adjustment PC Board. Remove the Display Adjustment PC Board and replace A3A2 Intensity Control.
15. Connect ac line cord to rear of each instrument section. Set LINE switch to ON.
16. It may be necessary at this time to readjust horizontal and vertical gain and position adjustments to optimize the CRT display. When complete, display (graticule and annotation) should fill the entire screen.

ADJUSTMENTS

3. PRELIMINARY DISPLAY ADJUSTMENTS (Cont'd)

Pin Cushioning



Barreling

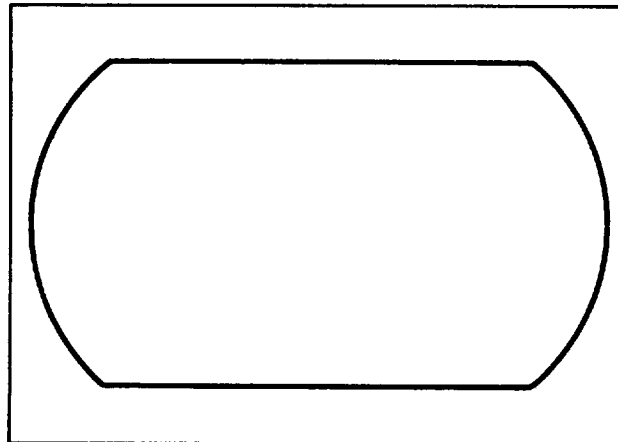


FIGURE 14. EXAMPLES OF PIN CUSHIONING AND BARRELING

ADJUSTMENTS

4. FINAL DISPLAY ADJUSTMENTS

REFERENCE:

A1A1 Keyboard, A1A2 Z Axis Amplifier
A1A4 X Deflection Amplifier, A1A5 Y Deflection Amplifier

DESCRIPTION:

This procedure is used to perform fine adjustment of the CRT display. First, the display is adjusted for best focus over the full CRT, then the graticule is adjusted for optimum rectangular display.

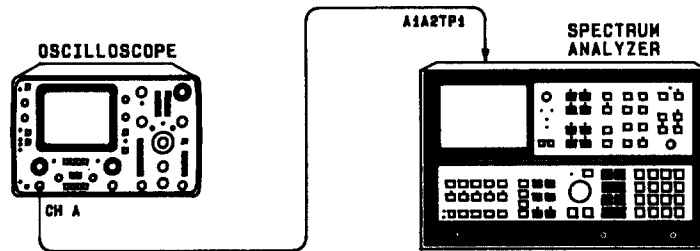


FIGURE 15. FINAL DISPLAY ADJUSTMENTS SETUP

EQUIPMENT:

Oscilloscope HP 1741A

PROCEDURE:

1. Remove top cover from instrument. Set LINE switch to ON and press **2-22 GHz**.
2. Key in **FREQUENCY SPAN** 100 Hz, **CENTER FREQUENCY** 1 GHz, TRACE A **BLANK**. Trace should be blanked and CRT annotation in the active function region should appear similar to Figure 16.

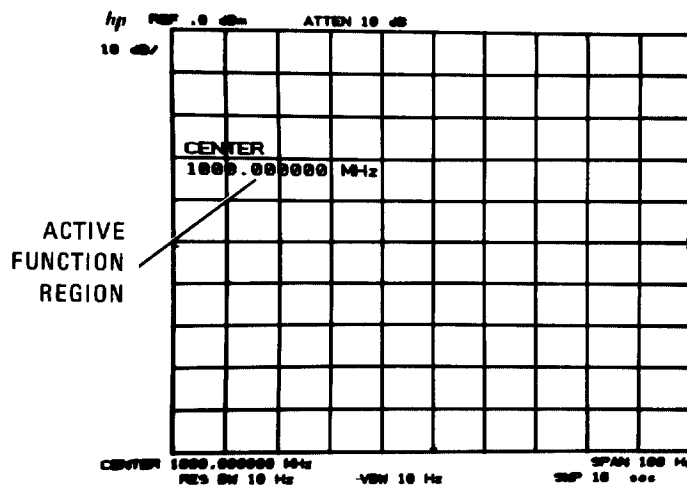


FIGURE 16. CRT DISPLAY FOR FINAL DISPLAY ADJUSTMENTS

ADJUSTMENTS

4. FINAL DISPLAY ADJUSTMENTS (Cont'd)

3. Adjust front panel FOCUS for clear, sharp characters in the active function region.
4. Note graticule lines. If graticule lines appear to be out of focus, connect oscilloscope to A1A2TP1 as shown in Figure 15.
5. Oscilloscope display should be similar to that shown in Figure 17.

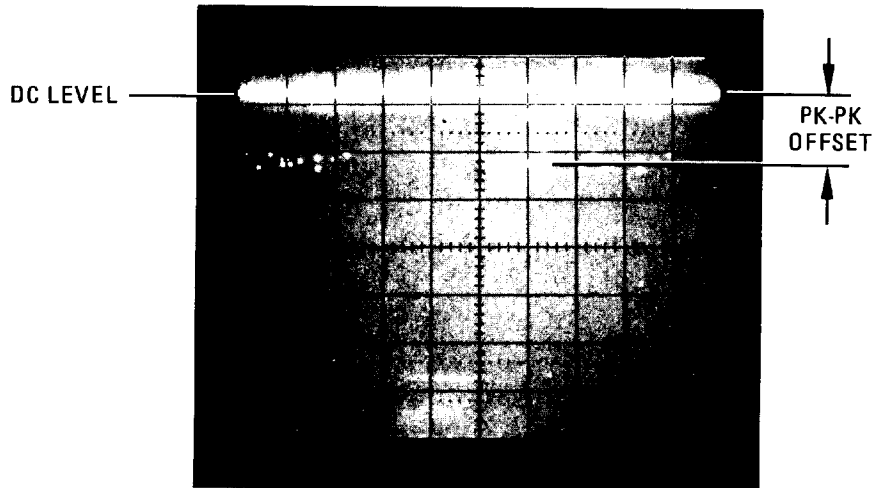


FIGURE 17. FOCUS GAIN ADJUSTMENT WAVEFORM

6. Note dc level and peak-to-peak offset of waveform.
- _____ V_{dc}
7. Adjust A1A2R30 FOCUS GAIN for a larger peak-to-peak deviation in pulse on oscilloscope display. Refer to Figure 18 for location of adjustment.
 8. Adjust front panel FOCUS control to reset dc level of oscilloscope display to the value noted in step 6.
 9. CRT annotation in active function region should be focused. If it is not, adjust front panel FOCUS control to focus characters.
 10. Note focus of graticule lines. If graticule lines appear to be more in focus than before (step 4), adjustment of A1A2R30 FOCUS GAIN in step 7 was in the proper direction. If so, repeat steps 6 through 9 until CRT annotation in active function region and graticule lines are in focus.
 11. If graticule lines appear to be less in focus than before, adjustment of A1A2R30 FOCUS GAIN was in the wrong direction. Repeat steps 6 through 9, adjusting A1A2R30 FOCUS GAIN for a smaller peak-to-peak deviation of pulse on oscilloscope display, until CRT annotation in active function region and graticule lines are both in focus.

ADJUSTMENTS

4. FINAL DISPLAY ADJUSTMENTS (Cont'd)

12. Adjust A1A4R27 X GAIN, A1A4R7 X POS, A1A5R27 Y GAIN, and A1A5R7 Y POS for optimum rectangular display of graticule on CRT. Refer to Figure 18 for location of adjustments.

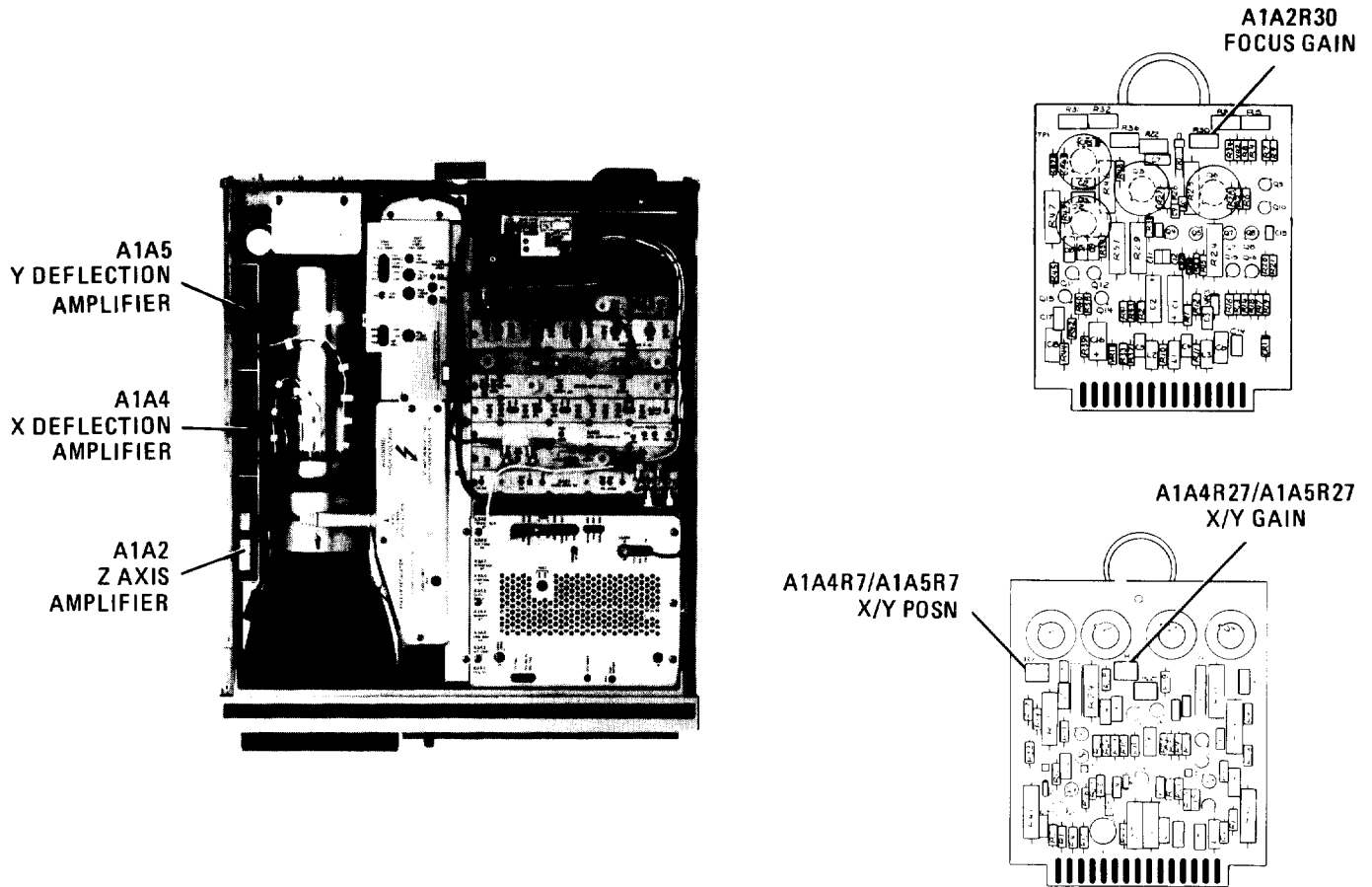


FIGURE 18. LOCATION OF FINAL DISPLAY ADJUSTMENTS

ADJUSTMENTS

5. LOG AMPLIFIER ADJUSTMENTS

REFERENCE:

A4A3 Log Amplifier-Filter
A4A2 Log Amplifier-Detector

RELATED PERFORMANCE TESTS:

Scale Fidelity Test

NOTE

The A4A3 Log Amplifier-Filter and A4A2 Log Amplifier-Detector are temperature compensated as a matched set at the factory. In the event of a circuit failure, rebuilt sets can be ordered. Contact your nearest HP Service Center.

DESCRIPTION:

First, the A4A2 Log Amplifier-Detector ZERO adjustment is adjusted for zero volts DVM indication, then the A4A3 Log Amplifier-Filter is set for center frequency by injecting a signal and adjusting the bandpass filter center adjustment for maximum DVM indication. The bandpass filter amplitude is adjusted by monitoring the output of the filter with a DVM, and adjusting the amplitude for the same DVM indication with the log amplifier filter control line shorted and not shorted to the +15V supply. Next, log fidelity (gain and offset of the log curve) is adjusted by adjusting the -12 VTV and the PIN diode attenuator. Last, the linear gain step adjustments are performed to set the proper amount of step gain in the linear mode of operation.

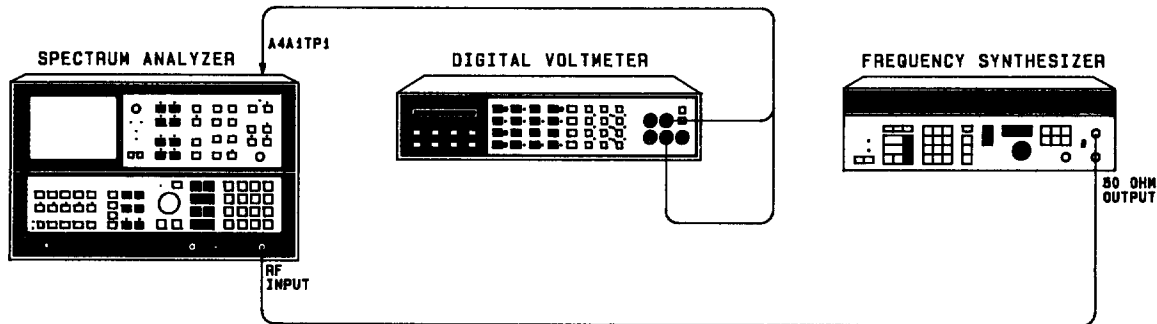


FIGURE 19. LOG AMPLIFIER ADJUSTMENTS SETUP

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
Frequency Synthesizer	HP 3335A

ADJUSTMENTS

5. LOG AMPLIFIER ADJUSTMENTS (Cont'd)

PROCEDURE:

1. Position instrument upright as shown in Figure 19, with top cover and digital storage cover removed.
2. Set LINE switch to ON and press **2-22 GHz**.
3. Key in **FREQUENCY SPAN** 0 Hz, **CENTER FREQUENCY** 7.6 MHz, **REFERENCE LEVEL** +10 dBm, **RES BW** 10 kHz, and press LIN pushbutton.
4. Connect DVM to A4A1TP1 and DVM ground to A3A9TP1. Do not connect the frequency synthesizer to the RF INPUT.

Offset Adjustment

5. Adjust A4A2R79 ZERO for 0.0000 ± 0.0005 Vdc. Refer to Figure 20 for location of adjustment.

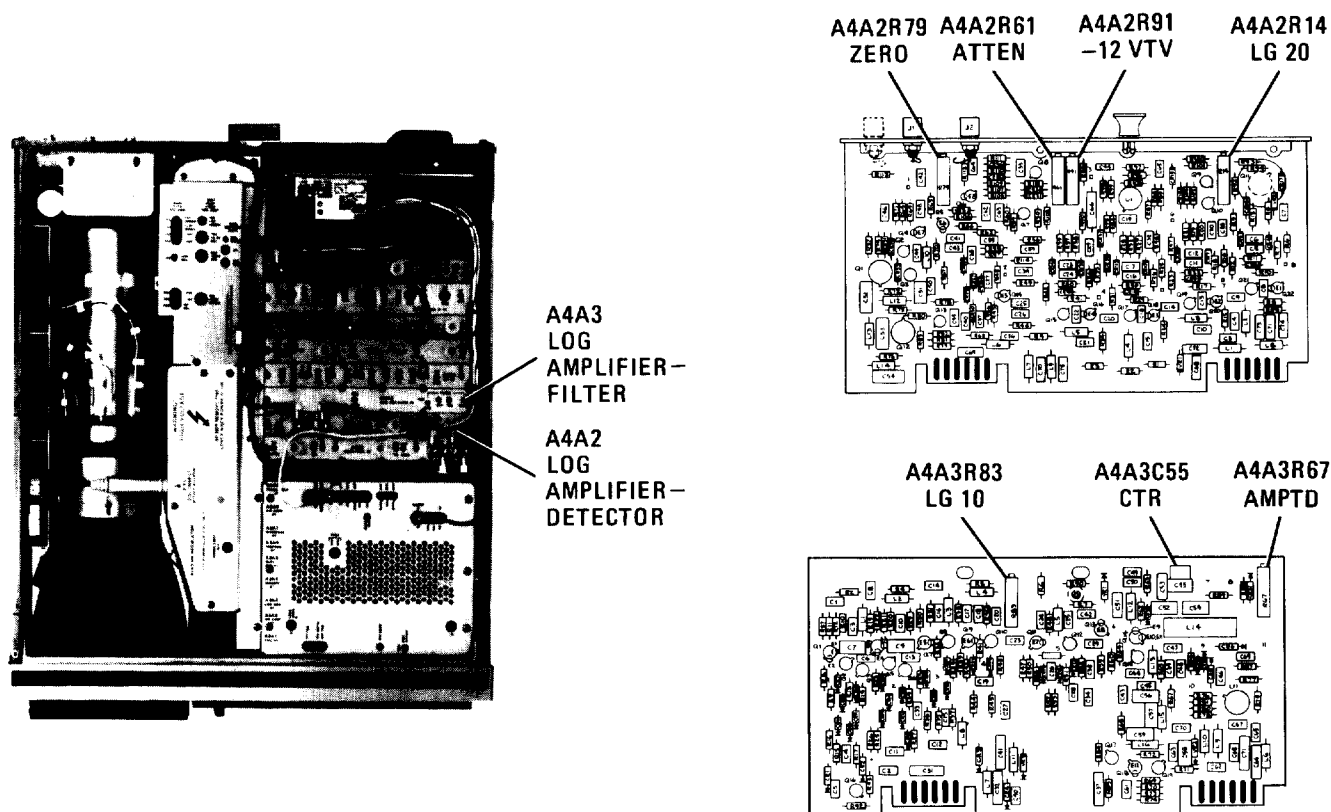


FIGURE 20. LOCATION OF LOG AMPLIFIER ADJUSTMENTS

Bandpass Filter Center Adjustment

6. Press LOG **ENTER dB/DIV**.

ADJUSTMENTS

5. LOG AMPLIFIER ADJUSTMENTS (Cont'd)

7. Set the frequency synthesizer for 7.6000 MHz at + 5.0 dBm output level and connect to RF INPUT.
8. Adjust A4A3C55 CTR for maximum DVM indication. Refer to Figure 20 for location of adjustment. If A4A3C55 is at an extreme of its adjustment range (fully meshed or unmeshed), increase or decrease value of A4A3C52 and A4A3C53. Refer to Table 3 for range of values.

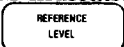
Bandpass Filter Amplitude Adjustment

9. Short A4A3TP7 to A4A3TP8 with a jumper wire. Note DVM indication. _____ Vdc
10. Remove short from between A4A3TP7 and A4A3TP8.
11. Adjust A4A3R67 AMPTD for DVM indication the same as that noted in step 9 ± 0.0005 Vdc. Refer to Figure 20 for location of adjustment. If unable to adjust A4A3R67 AMPTD for proper indication, increase or decrease value of A4A3R66. Refer to Table 3 for range of values.
12. Repeat steps 9 through 11 until DVM indication is the same ± 0.0005 Vdc with A4A3TP7 shorted to A4A3TP, and with A4A3TP7 and A4A3TP8 not shorted. Remove short.

– 12 VTV and ATTEN Adjustments

13. Press LIN pushbutton.
14. Adjust frequency synthesizer output level for DVM indication of $+ 1.000 \pm 0.002$ Vdc.
15. Press LOG .
16. Decrease the frequency synthesizer output level by 50 dB.
17. Adjust A4A2R91 – 12 VTV for DVM indication of $+ 500 \pm 1$ mVdc. Refer to Figure 20 for location of adjustment.
18. Increase the frequency synthesizer output level by 50 dB (to the level of step 14).
19. Adjust A4A2R61 ATTEN for DVM indication of $+ 1.000 \pm 0.001$ Vdc. Refer to Figure 20 for location of adjustment. If unable to adjust A4A2R61 ATTEN for proper indication, increase or decrease value of A4A2R62. Refer to Table 3 for range of values.
20. Repeat steps 13 through 19, until specifications of steps 17 and 19 are achieved without further adjustment.

Linear Gain Adjustments

21. Press LIN pushbutton. DVM indication at A4A1TP1 should be $+ 1.000 \pm 0.020$ Vdc ($+ 0.980$ to $+ 1.020$ Vdc). If indication is not within this range, repeat steps 13 through 20. If indication is within this range, key in  0 dBm and adjust the frequency synthesizer output level for DVM indication of $+ 1.000 \pm 0.001$ Vdc.

ADJUSTMENTS

5. LOG AMPLIFIER ADJUSTMENTS (Cont'd)

22. Key in   . This disables IF Step Gains.
23. Verify that attenuator is set at 10 dB. Key in  - 60 dB. Decrease the frequency synthesizer output level by 10 dB.
24. Adjust A4A3R83 LG10 for DVM indication of $+1.000 \pm 0.010$ Vdc. Refer to Figure 20 for location of adjustment. If unable to adjust LG10 for proper indication, increase or decrease value of A4A3R54. Refer to Table 3 for range of values.
25. Decrease the frequency synthesizer output level by 10 dB.
26. Key in  - 70 dB.
27. Adjust A4A2R14 LG20 for DVM indication of $+1.000 \pm 0.010$ Vdc. Refer to Figure 20 for location of adjustment. If unable to adjust LG20 for proper indication, increase or decrease value of A4A2R18. Refer to Table 3 for range of values.
28. Press  to re-enable IF Step Gains.

ADJUSTMENTS

6. VIDEO PROCESSOR ADJUSTMENTS

REFERENCE:

A4A1 Video Processor

RELATED PERFORMANCE TEST:

Log Scale Switching Uncertainty Test

DESCRIPTION:

The CAL OUTPUT signal is connected to the RF INPUT through a step attenuator. The instrument is placed in zero frequency span to produce a dc level output from the log amplifier. This dc level is adjusted by varying the input signal level and reference level. The offsets and gains on the A4A1 Video Processor are adjusted for proper levels using a DVM.

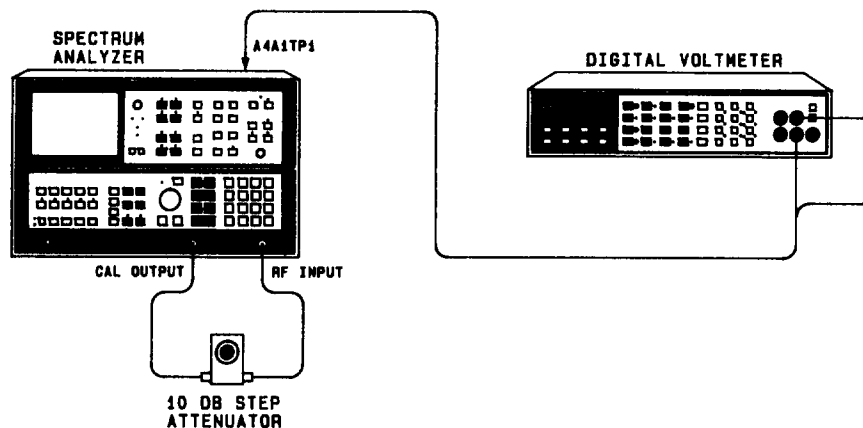


FIGURE 21. VIDEO PROCESSOR ADJUSTMENTS SETUP

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
10-dB Step Attenuator	HP 355D

NOTE

The voltage at A4A1TP3 may drift noticeably with temperature during this adjustment. Allow A4A1 (Video Processor) to warm up at least one-half hour prior to adjustment.

PROCEDURE:

1. Position instrument upright as shown in Figure 21. Remove top cover and A3 Digital Storage cover.
2. Set LINE switch to ON and press 2 - 22
GHz.
3. Connect DVM to A4A1TP1 and DVM ground to A3A9TP1.

ADJUSTMENTS

6. VIDEO PROCESSOR ADJUSTMENTS (Cont'd)

4. Connect CAL OUTPUT to RF INPUT through 10-dB step attenuator.
5. Key in 100 MHz and 0 Hz. Press LIN pushbutton.
6. Set step attenuator to 120 dB. DVM indication should be 0.000 ± 0.001 Vdc. (If DVM indication is out of tolerance, perform test 5, Log Amplifier Adjustments.)
7. Connect DVM to A4A1TP2.
8. Adjust A4A1R14 OS for DVM indication of -5.000 ± 0.003 Vdc. Refer to Figure 22 for location of adjustment.

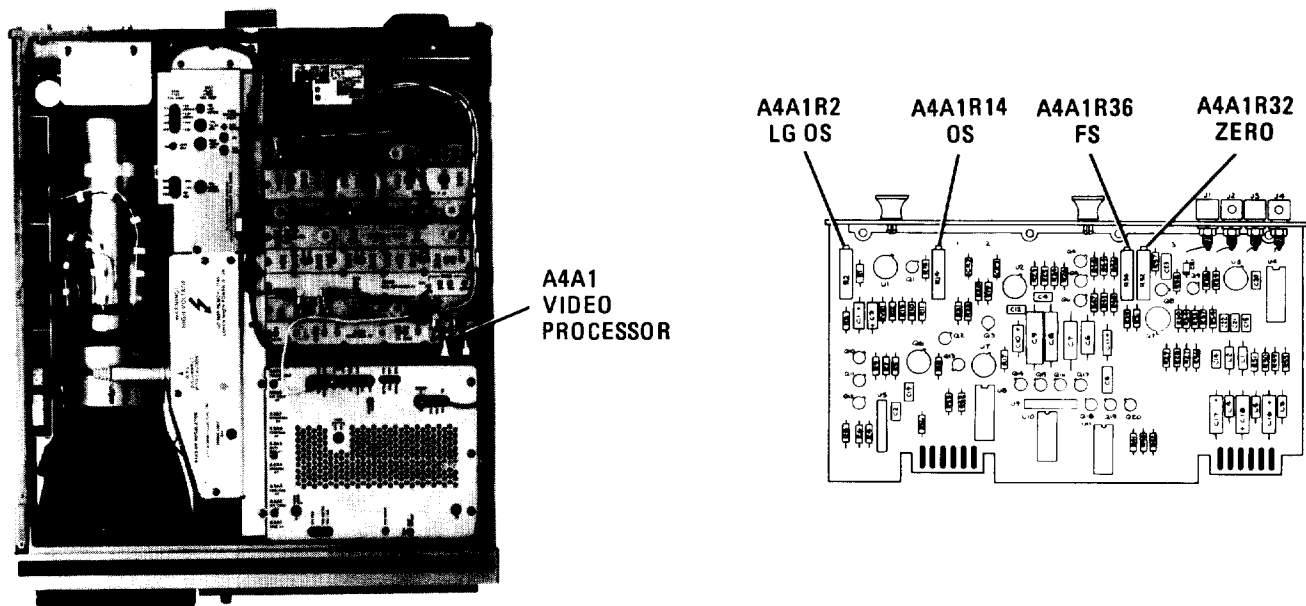


FIGURE 22. LOCATION OF VIDEO PROCESSOR ADJUSTMENTS

9. Connect DVM to A4A1TP1.
10. Set step attenuator to 0 dB.
11. Key in and adjust DATA knob for DVM indication as close to $+1000 \pm 0.001$ Vdc as possible. (It may be necessary to slightly adjust the front panel AMPTD CAL control to achieve required tolerance.)
12. Connect DVM to A4A1TP3.
13. Press LOG . Note DVM indication (approximately $+2.000 \pm 0.040$ Vdc).
14. Key in LOG 1 dB.

ADJUSTMENTS

6. VIDEO PROCESSOR ADJUSTMENTS (Cont'd)

15. Adjust A4A1R14 OS (again) for DVM indication of $+2.000 \pm 0.010$ Vdc.
16. Press LIN pushbutton.
17. Adjust A4A1R36 FS for DVM indication of $+2.000 \pm 0.001$ Vdc. Refer to Figure 22 for location of adjustment.
18. Set step attenuator to 120 dB.
19. Adjust A4A1R32 ZERO for DVM indication of 0.000 ± 0.001 Vdc. Refer to Figure 22 for location of adjustment.
20. Set step attenuator to 0 dB.
21. Repeat steps 9 through 20 until specifications of steps 15, 17, and 19 are met.

LOG Offset Adjust

22. Set step attenuator to 40 dB.
23. Key in , , LOG ,  LOG ,  - 50 dBm.
24. Connect DVM to A4A1TP1. Record DVM indication. Indication should be approximately $+0.500$ Vdc.

_____ Vdc
25. Decrease reference level to -60 dBm using the step key.
26. Adjust A4A1R2 LG OS for DVM indication of $+0.100 \pm 0.001$ Vdc greater than the DVM indication recorded in step 24. Refer to Figure 22 for location of adjustment.
27. Decrease reference level to -70 dBm using the step key.
28. DVM indication should be $+0.200 \pm 0.002$ Vdc greater than the DVM indication recorded in step 24. If not, readjust A4A1R2 LG OS.
29. Decrease reference level to -90 dBm using the step key.
30. DVM indication should be $+0.400 \pm 0.004$ Vdc greater than the indication recorded in step 24. If not, readjust A4A1R2 LG OS.
31. Repeat steps 25 through 30 until specifications of steps 26, 28, and 30 are met.

ADJUSTMENTS

7. 3 MHz BANDWIDTH FILTER ADJUSTMENTS

REFERENCE:

A4A7 3 MHz Bandwidth Filter

RELATED PERFORMANCE TEST:

Resolution Bandwidth Switching Uncertainty Test

Resolution Bandwidth Selectivity Test

DESCRIPTION:

With the CAL OUTPUT signal connected to the RF INPUT, the 18.4 MHz oscillator can be adjusted with the FREQ ZERO control (on the front panel) to peak the IF signal for maximum amplitude for the center of the 3 MHz bandpass. Each of the five stages of the 3 MHz Bandwidth Filter is adjusted for bandpass centering and symmetry. Four crystal filter bypass networks are required for alignment of the filter stages. Refer to Figure 82 for information concerning the bypass networks.

A stable 21.4 MHz signal is then applied to the IF section of the instrument from a frequency synthesizer. Each of the first four stages of the 3 MHz Bandwidth Filter is peaked in a 10 Hz bandwidth using an oscilloscope display. The final stage is peaked using the spectrum analyzer CRT display.

After all five filter stages are adjusted for centering, symmetry, and peaking, the CAL OUTPUT signal is used to match the 10 Hz and 1 kHz bandwidth amplitudes.

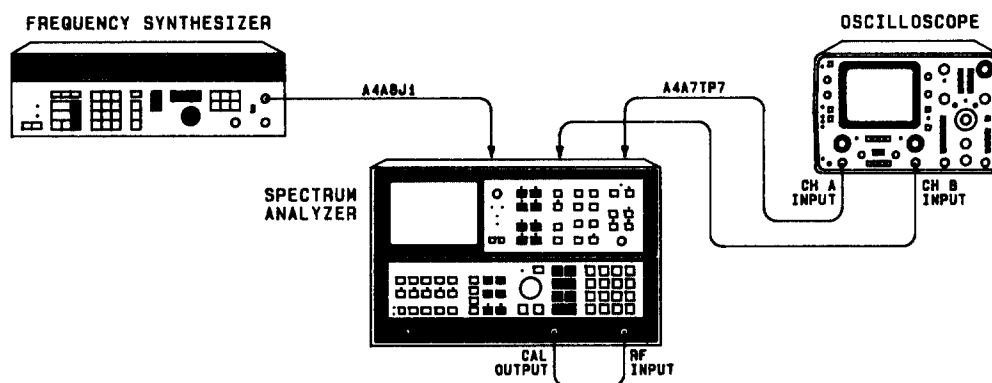


FIGURE 23. 3 MHz BANDWIDTH FILTER ADJUSTMENTS SETUP

EQUIPMENT:

Frequency Synthesizer	HP 3335A
Oscilloscope	HP 1741A
Crystal Filter Bypass Network (4 required)	Refer to Figure 82
Test Cable: BNC to SMB snap-on	HP 85680-60093

ADJUSTMENTS

7. 3 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

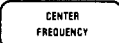
PROCEDURE:

1. Position instrument upright as shown in Figure 23 and remove top cover.
2. Set LINE switch to ON and press .

Frequency Zero Check

3. Connect CAL OUTPUT signal to RF INPUT.
4. Key in  .
5. Adjust front panel FREQ ZERO control for maximum signal amplitude on the CRT display.

Filter Center and Symmetry Adjustments

6. Key in  100 MHz,  10 kHz,  1 kHz and press LIN pushbutton. Press  and adjust reference level, using step keys to place signal peak near top CRT graticule line.
7. Connect crystal filter bypass networks between A4A7TP1 and A4A7TP2, A4A7TP3 and A4A7TP4, A4A7TP5 and A4A7TP6, and A4A7TP7 and A4A7TP8.
8. Adjust A4A7C7 CTR for minimum amplitude signal peak. Adjust A4A7C6 SYM for best symmetry of signal. Repeat adjustments to ensure that signal is nulled and adjusted for best symmetry. Refer to Figure 24 for location of adjustments.

NOTE

You may find it helpful to widen and narrow the frequency span of the instrument to adjust the bandpass symmetry and centering for each filter stage.

9. Remove crystal filter bypass network from between A4A7TP7 and A4A7TP8.
10. Adjust A4A7C15 CTR for minimum amplitude of signal peak. Adjust A4A7C14 SYM for best symmetry of signal. Repeat adjustments to ensure that signal is nulled and adjusted for best symmetry. Refer to Figure 24 for location of adjustments.
11. Remove crystal filter bypass network from between A4A7TP5 and A4A7TP6.
12. Adjust A4A7C24 CTR for minimum amplitude of signal peak. Adjust A4A7C23 SYM for best symmetry of signal. Repeat adjustments to ensure that signal is nulled and adjusted for best symmetry. Refer to Figure 24 for location of adjustments.
13. Remove crystal filter bypass network from between A4A7TP3 and A4A7TP4.
14. Adjust A4A7C33 CTR for minimum amplitude of signal peak. Adjust A4A7C32 SYM for best symmetry of signal. Repeat adjustments to ensure that signal is nulled and adjusted for best symmetry. Refer to Figure 24 for location of adjustments.

ADJUSTMENTS

7. 3 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

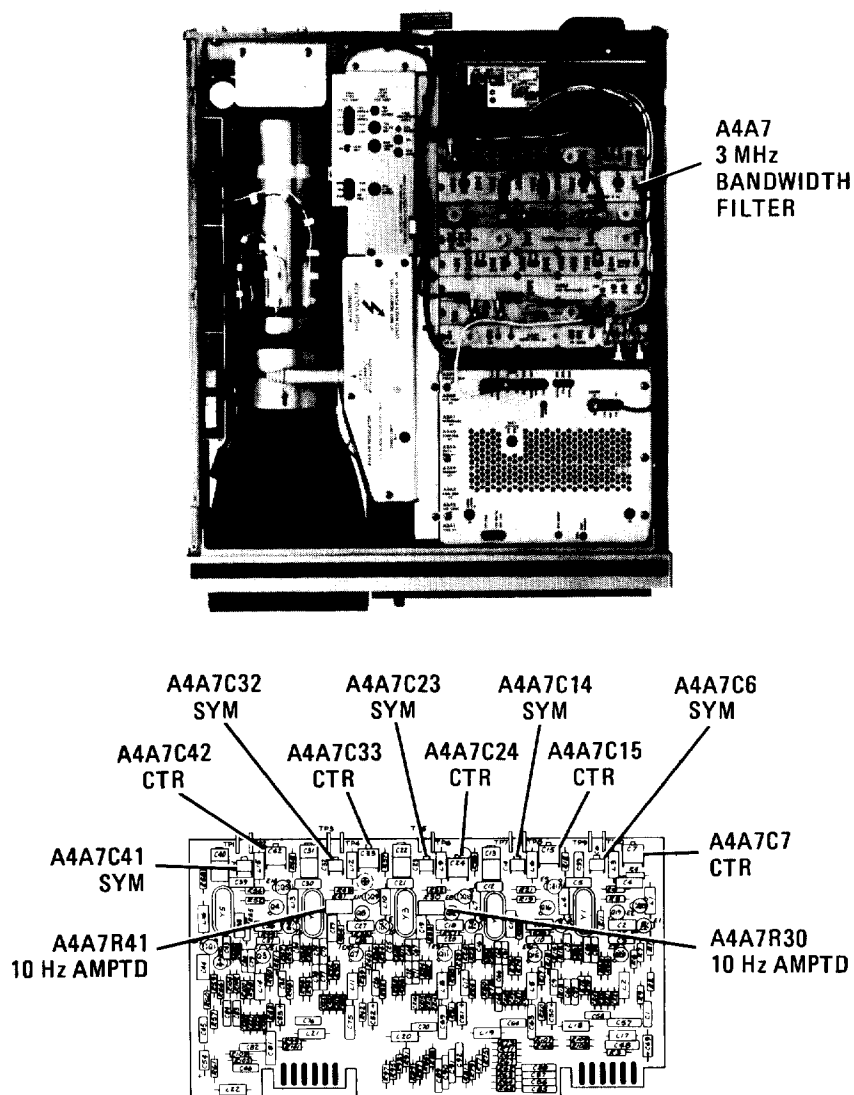


FIGURE 24. LOCATION OF CENTER, SYMMETRY, AND 10 Hz AMPLITUDE ADJUSTMENTS

15. Remove crystal filter bypass network from between A4A7TP1 and A4A7TP2.
16. Adjust A4A7C42 CTR for minimum amplitude of signal peak. Adjust A4A7C41 SYM for best symmetry of signal. Repeat adjustments to ensure that the signal is nulled and adjusted for best symmetry. Refer to Figure 24 for location of adjustments.
17. Signal should be centered on center graticule line on CRT display. If signal is not centered, go back to step 3 and repeat adjustments of each filter stage.

ADJUSTMENTS

7. 3 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

Filter Peak Adjust

18. Press **2-22 GHz**.
19. Key in **SWEEP TIME** 20 msec, **RES BW** 10 Hz, **REFERENCE LEVEL** -20 dBm.
20. Set the frequency synthesizer for 21.400 MHz at an amplitude level of -25.0 dBm.
21. Disconnect 97 (white/violet) cable from A4A8J1 and connect output of the frequency synthesizer to A4A8J1 using BNC to SMB snap-on cable.
22. Set the oscilloscope settings as follows:

Channel A	Channel B
.005 V/div	.005V/div
.2 μ sec/div	ac coupled
mag x 5 (vertical)	10:1 probe
ac coupled	
10:1 probe	
23. Connect oscilloscope Channel A probe to A4A7TP7 (left side of C14 SYM) and Channel B probe to A4A7TP5 (left side of C23 SYM).
24. Adjust frequency synthesizer output frequency to peak Channel A display.
25. Adjust A4A7C13 PK for maximum peak-to-peak signal on Channel B display. Refer to Figure 25 for location of adjustment. If unable to achieve a "peak" in signal amplitude, increase or decrease value of A4A7C12. Refer to Table 3 for range of values.

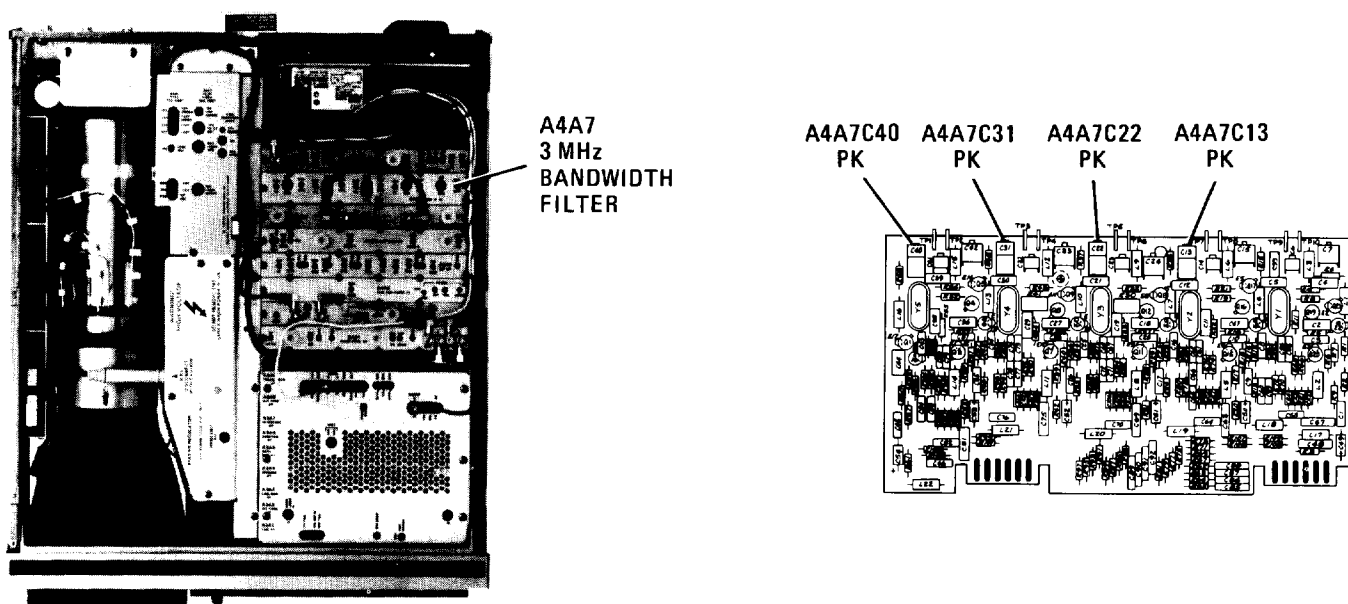
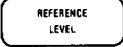


FIGURE 25. LOCATION OF 3 MHz PEAK ADJUSTMENTS

ADJUSTMENTS

7. 3 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

26. Move Channel B probe to A4A7TP3 (left side of C32 SYM).
27. Adjust frequency synthesizer output frequency to peak Channel A display.
28. Adjust A4A7C22 PK for maximum peak-to-peak signal on Channel B display. Refer to Figure 25 for location of adjustment. If unable to achieve a "peak" in signal amplitude, increase or decrease value of A4A7C21. Refer to Table 3 for range of values.
29. Move Channel B probe to A4A7TP1 (left side of C41 SYM).
30. Adjust frequency synthesizer output frequency to peak Channel A display.
31. Adjust A4A7C31 PK for maximum peak-to-peak signal on Channel B display. Refer to Figure 25 for location of adjustment. If unable to achieve a "peak" in signal amplitude, increase or decrease value of A4A7C30. Refer to Table 3 for range of values.
32. Disconnect Channel B probe from A4A7TP1.
33. Adjust frequency synthesizer output frequency to peak Channel A display.
34. Adjust  using step keys to place signal near top CRT graticule line.
35. Adjust A4A7C40 PK for maximum signal amplitude on the CRT display. Refer to Figure 25 for location of adjustment. If unable to achieve a "peak" in signal amplitude, increase or decrease value of A4A7C39. Refer to Table 3 for range of values.
36. Disconnect Channel A probe from A4A7TP7. Disconnect frequency synthesizer output from A4A8J1 and reconnect 97 cable.

10 Hz Amplitude Adjustments

37. Connect CAL OUTPUT to RF INPUT. Key in ,  9,  10 Hz.
38. Adjust the instrument front panel FREQ ZERO control for maximum signal amplitude on the CRT display.
39. Key in  1 kHz and DISPLAY . Using the DATA knob, place the display line at the signal trace.
40. Key in  10 Hz.
41. Adjust the instrument front panel FREQ ZERO control for maximum signal amplitude on the CRT display.
42. Adjust A4A7R30 10 Hz AMPTD and A4A7R41 10 Hz AMPTD equal amounts to set the signal level the same as the reference level set in step 39. See Figure 24 for location of 10 Hz AMPTD adjusts.
43. Repeat steps 37 through 42 until no further adjustment is required.

8. 21.4 MHz BANDWIDTH FILTER ADJUSTMENTS

REFERENCE:

A4A4 Bandwidth Filter

A4A8 Attenuator-Bandwidth Filter

RELATED PERFORMANCE TESTS:

IF Gain Uncertainty Test

Resolution Bandwidth Switching Uncertainty Test

Resolution Bandwidth Selectivity Test

DESCRIPTION:

First, the LC filters (100 kHz to 3 MHz bandwidths) on the A4A4 Bandwidth Filter are adjusted. The crystal filter poles (3 kHz to 30 kHz bandwidths) are then adjusted for center and symmetry by bypassing all but one pole at a time and adjusting the active pole.

Next, the LC filters and the crystal filter poles on the A4A8 Attenuator-Bandwidth Filter are adjusted in the same manner as on the A4A4 Bandwidth Filter.

Last, the 10-dB and 20-dB attenuators on the A4A8 Attenuator-Bandwidth Filter are adjusted for the proper amount of attenuation. This is done by connecting the CAL OUTPUT signal to the RF INPUT through two step attenuators, keying in the necessary reference level to activate the 10-dB and the 20-dB control lines, adjusting the step attenuators to compensate for the attenuation, and adjusting the attenuators for the proper amount of attenuation.

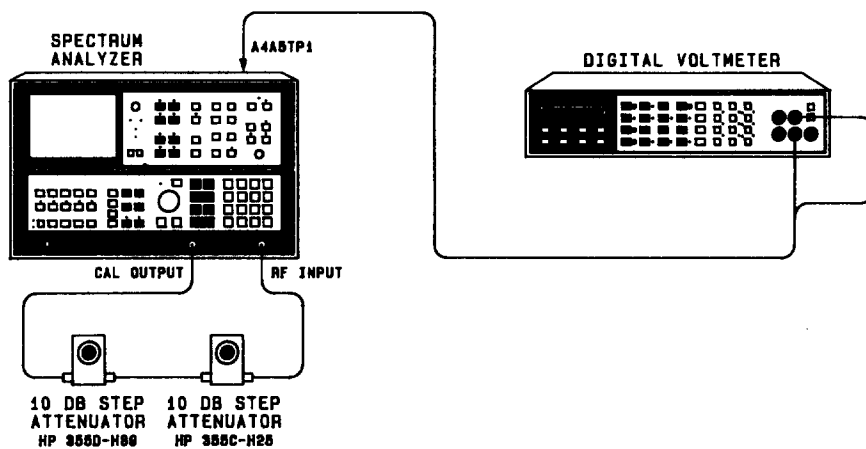


FIGURE 26. 21.4 MHz BANDWIDTH FILTER ADJUSTMENTS SETUP

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
10-dB Step Attenuator	HP 355D, Option H89
1-dB Step Attenuator	HP 355C, Option H25
Crystal Filter Bypass Network (2 required)	Refer to Figure 82

ADJUSTMENTS

8. 21.4 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

PROCEDURE:

1. Position instrument upright as shown in Figure 26 and remove top cover.
2. Set LINE switch to ON and press .

+ 10V Temperature Compensation Supply Check

3. Connect DVM to A4A5TP1 (+ 10 VF).
4. DVM indication should be between + 8.5 Vdc and + 11.0 Vdc. If voltage is within tolerance, proceed to next step. If voltage is not within tolerance, refer to Adjustment 10, Step Gain and 18.4 MHz Local Oscillator Adjustments, for adjustment procedure.

A4A4 LC Adjustments

5. Set step attenuators to 0 dB.
6. Disconnect 97 (white/violet) cable from A4A8J1 and connect to A4A6J1.
7. Key in 1 MHz, 200 kHz, MARKER , and press LIN pushbutton.
8. Press and adjust DATA knob to set signal peak on screen near top of graticule.
9. Short A4A9TP1 to A4A9TP2.
10. Adjust A4A4C67 LC CTR and A4A4C19 LC CTR for maximum MARKER level as indicated by CRT annotation. Refer to Figure 27 for location of adjustments. If unable to adjust LC CTR adjustments for satisfactory signal amplitude, increase or decrease value of A4A4C17 and A4A4C70. Refer to Table 3 for range of values.

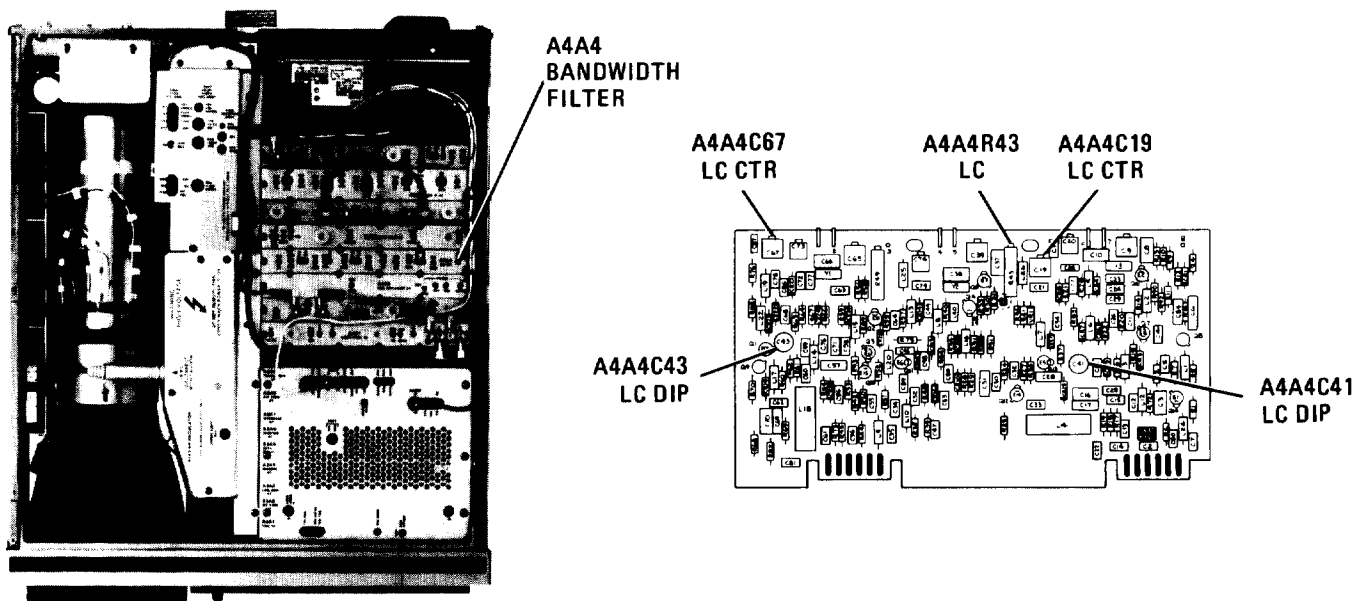


FIGURE 27. LOCATION OF A4A4 21.4 MHz LC FILTER ADJUSTMENTS

ADJUSTMENTS

8. 21.4 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

11. Remove short from between A4A9TP1 and A4A9TP2.
12. Press MARKER .
13. Reinstall short between A4A9TP1 and A4A9TP2.
14. Adjust A4A4R43 LC to align markers on display. MARKER Δ level should indicate 1.00 X. Refer to Figure 27 for location of adjustment.
15. Repeat steps 11 through 14 until no further adjustment is necessary.

A4A4 XTAL Adjustments

16. Press MARKER . Key in 30 kHz, 100 kHz, and press LIN pushbutton.
17. Press and adjust DATA knob to set signal peak on screen near top CRT graticule line.
18. Connect crystal filter bypass networks between A4A4TP1 and A4A4TP2 and between A4A4TP4 and A4A4TP5.
19. Adjust A4A4C20 CTR to center signal on center graticule line. Adjust A4A4C9 SYM for best symmetry of signal. Refer to Figure 28 for location of adjustments. If unable to adjust SYM for satisfactory signal symmetry, increase or decrease value of A4A4C10. Refer to Table 3 for range of values.

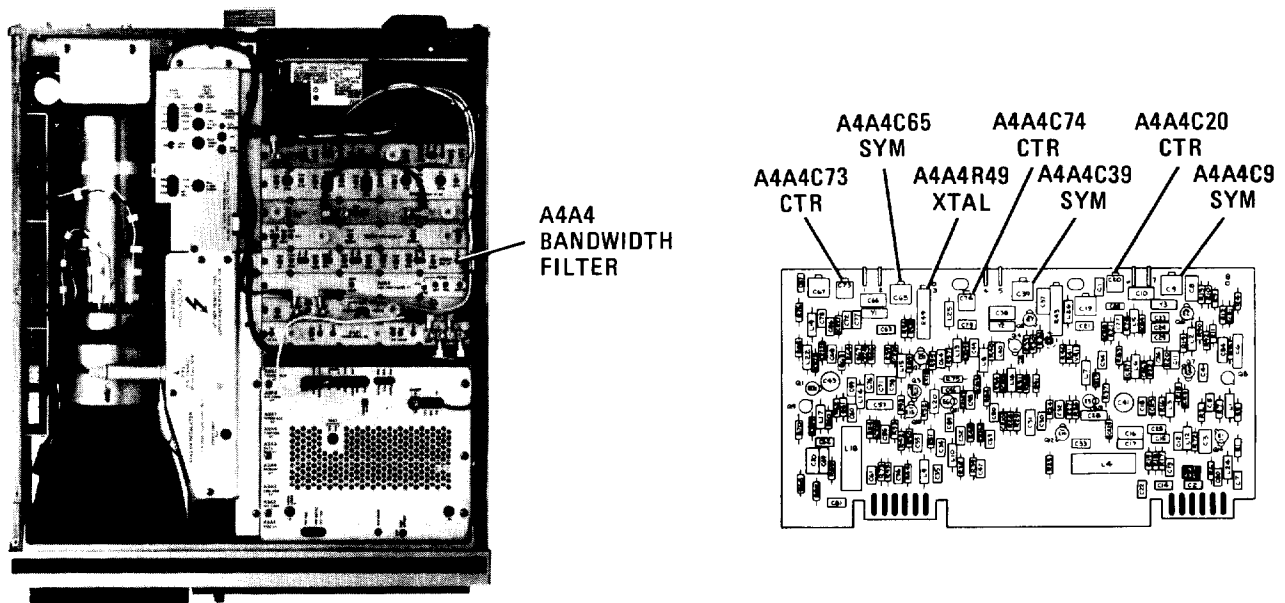


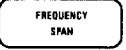
FIGURE 28. LOCATION OF A4A4 21.4 MHz CRYSTAL FILTER ADJUSTMENTS

ADJUSTMENTS

8. 21.4 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

20. Remove crystal filter bypass network from between A4A4TP4 and A4A4TP5.
21. Adjust A4A4C74 CTR to center signal on center graticule line. Adjust A4A4C39 SYM for best symmetry of signal. Refer to Figure 28 for location of adjustments. If unable to adjust A4A4C39 SYM for satisfactory signal symmetry, increase or decrease value of A4A4C38. Refer to Table 3 for range of values.
22. Remove crystal filter bypass network from between A4A4TP1 and A4A4TP2.
23. Adjust A4A4C73 CTR to center signal on center graticule line. Adjust A4A4C65 SYM for best symmetry of signal. Refer to Figure 28 for location of adjustments. If unable to adjust A4A4C65 SYM for satisfactory signal symmetry, increase or decrease value of A4A4C66. Refer to Table 3 for range of values.
24. All crystal filter bypass networks are removed. Signal should be centered and symmetrical. If not, go back to step 16 and repeat adjustments.
25. Press MARKER .
26. Key in  20 kHz,  3 kHz.
27. Adjust A4A4R49 XTAL to align markers on display. MARKER  level should indicate 1.00 X. Refer to Figure 28 for location of adjustment.

A4A8 LC Adjustments

28. Disconnect 97 (white/violet) cable from A4A6J1 and reconnect to A4A8J1. Reconnect cable to A4A6J1.
29. Press MARKER . Key in  1 MHz and  200 kHz.
30. Press  and adjust DATA knob to place signal peak near top CRT graticule line.
31. Adjust A4A8C32 LC CTR and A4A8C46 LC CTR for maximum MARKER level as indicated by CRT annotation. Refer to Figure 29 for location of adjustments. If unable to adjust A4A8C32 and A4A8C46 LC CTR adjustments for satisfactory signal amplitude, increase or decrease value of A4A8C35 and A4A8C49. Refer to Table 3 for range of values.
32. Remove short from between A4A9TP1 and A4A9TP2.
33. Press MARKER .
34. Reinstall short between A4A9TP1 and A4A9TP2.
35. Adjust A4A8R35 LC to align markers on display. MARKER  level should indicate 1.00 X. Refer to Figure 29 for location of adjustment.

ADJUSTMENTS

8. 21.4 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

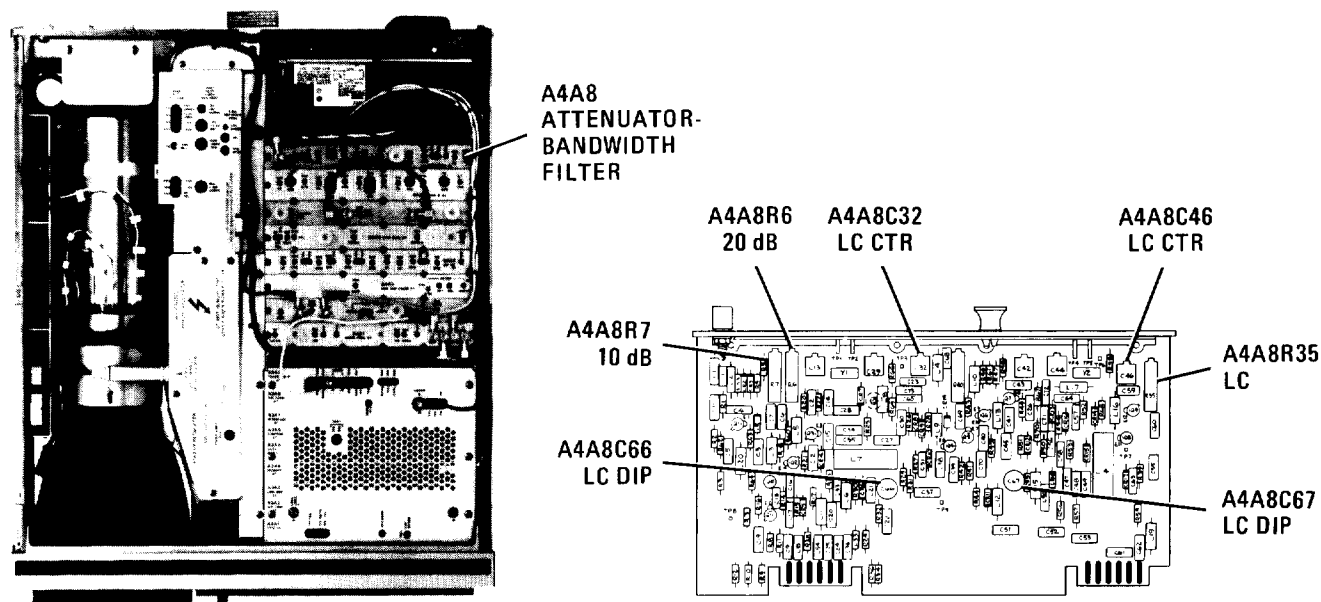


FIGURE 29. LOCATION OF A4A8 21.4 MHz LC FILTER AND ATTENUATION ADJUSTMENTS

36. Repeat steps 32 through 35 until no further adjustment is necessary.
37. Remove short from between A4A9TP1 and A4A9TP2.

A4A8 XTAL Adjustments

38. Key in 30 kHz, 100 kHz. Press MARKER .
39. Connect crystal filter bypass network between A4A8TP1 and A4A8TP2.
40. Adjust A4A8C44 CTR to center signal on center graticule line. Adjust A4A8C42 SYM for best symmetry of signal. Refer to Figure 30 for location of adjustments. If unable to adjust A4A8C42 SYM for satisfactory signal symmetry, increase or decrease value of A4A8C43. Refer to Table 3 for range of values.
41. Remove crystal filter bypass network from between A4A8TP1 and A4A8TP2 and connect between A4A8TP4 and A4A8TP5.
42. Adjust A4A8C29 CTR to center signal on center graticule line. Adjust A4A8C13 SYM for best symmetry of signal. Refer to Figure 30 for location of adjustments. If unable to adjust A4A8C13 SYM for satisfactory signal symmetry, increase or decrease value of A4A8C14. Refer to Table 3 for range of values.

ADJUSTMENTS

8. 21.4 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

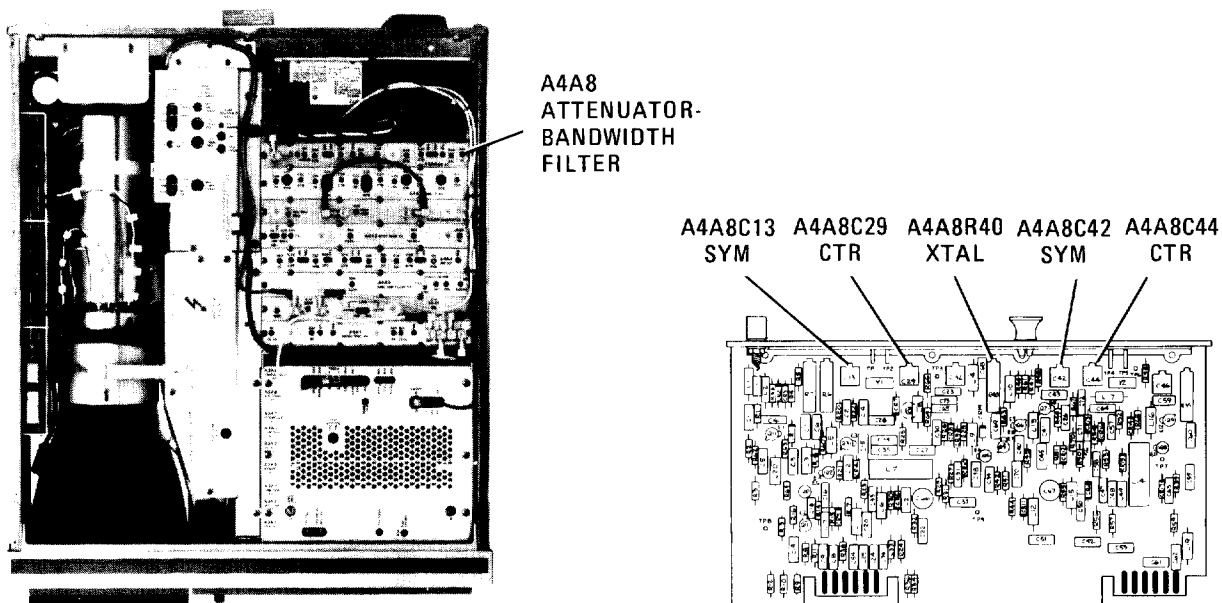


FIGURE 30. LOCATION OF A4A8 21.4 MHz CRYSTAL FILTER ADJUSTMENTS

43. Remove crystal filter bypass network connected between A4A8TP4 and A4A8TP5.
44. Key in FREQUENCY
SPAN 10 kHz.
45. Press MARKER Δ.
46. Key in RES
BW 3 kHz.
47. Adjust A4A8R40 XTAL to align markers on display. MARKER Δ level should indicate 1.00 X. Refer to Figure 30 for location of adjustment.

LC Dip Adjustments

48. Refer to Performance Test 5, Resolution Bandwidth Switching Uncertainty Test, and check all bandwidth amplitudes. If amplitude of 300 kHz bandwidth is low but amplitude of 100 kHz and 1 MHz bandwidths are within tolerance, LC DIP adjustments must be performed. If all bandwidth amplitudes are within tolerance, do not perform the following adjustments.
49. Set LINE switch to STANDBY.
50. Disconnect 97 (white/violet) cable from A4A8J1 and connect to A4A6J1.
51. Remove A4A4 Bandwidth Filter and install on extenders.
52. Set LINE switch to ON. Press 2-22
GHz.

ADJUSTMENTS

8. 21.4 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

53. Key in CENTER FREQUENCY 100 MHz, RES BW 100 kHz, FREQUENCY SPAN 1 MHz, ATTEN 0 dB, and LOG ENTER dB/DIV 2 dB.
54. Short A4A9TP1 to A4A9TP2. Short A4A4TP3 to ground.
55. Adjust A4A4C41 LC DIP for minimum amplitude of signal peak. Refer to Figure 27 for location of adjustment. If unable to achieve a “dip” in signal amplitude, increase or decrease value of A4A4R16. Refer to Table 3 for range of values.
56. Remove short from A4A4TP3 and short A4A4TP8 to ground.
57. Adjust A4A4C43 LC DIP for minimum amplitude of signal peak. Refer to Figure 27 for location of adjustment. If unable to achieve a “dip” in signal amplitude, increase or decrease value of A4A4R60. Refer to Table 3 for range of values.
58. Set LINE switch to STANDBY.
59. Reinstall A4A4 Bandwidth Filter without extenders. Short A4A4TP3 and A4A4TP8 to ground. Remove A4A8 Attenuator-Bandwidth Filter and install on extenders. Reconnect 97 cable to A4A8J1 and reconnect cable to A4A6J1.
60. Set LINE switch to ON. Press 2 - 22 GHz.
61. Key in CENTER FREQUENCY 100 MHz, RES BW 100 kHz, FREQUENCY SPAN 1 MHz, ATTEN 0 dB, and LOG ENTER dB/DIV 2 dB.
62. Short A4A8TP6 to ground.
63. Adjust A4A8C66 LC DIP for minimum amplitude of signal peak. Refer to Figure 29 for location of adjustment. If unable to achieve a “dip” in signal amplitude, increase or decrease value of A4A8R30. Refer to Table 3 for range of values.
64. Remove short from A4A8TP6 and short A4A8TP3 to ground.
65. Adjust A4A8C67 LC DIP for minimum amplitude of signal peak. Refer to Figure 29 for location of adjustment. If unable to achieve a “dip” in signal amplitude, increase or decrease value of A4A8R55. Refer to Table 3 for range of values.
66. Set LINE switch to STANDBY.
67. Reinstall A4A8 Attenuator-Bandwidth Filter without extenders. Remove short from A4A8TP3.
68. Set LINE switch to ON. Press 2 - 22 GHz.
69. Go back and repeat LC adjustments for both the A4A4 Bandwidth Filter and the A4A8 Attenuator-Bandwidth Filter.
-

ADJUSTMENTS

8. 21.4 MHz BANDWIDTH FILTER ADJUSTMENTS (Cont'd)

A10dB and A20dB Adjustments

70. Connect CAL OUTPUT to RF INPUT through 1-dB and 10-dB step attenuators. Set step attenuators to 25 dB.
71. Key in 100 MHz, 3 kHz, 1 kHz, 0 dB, and – 30 dBm.
72. Key in LOG 1 dB then press MARKER .
73. Key in – 20 dBm. Set step attenuators to 15 dB.
74. Adjust A4A8R7 A10dB to align markers on display. MARKER Δ level should indicate 0.00 dB. Refer to Figure 29 for location of adjustment.
75. Key in – 10 dBm. Set step attenuators to 5 dB.
76. Adjust A4A8R6 A20dB to align markers on display. MARKER Δ level should indicate 0.00 dB. Refer to Figure 29 for location of adjustment.

ADJUSTMENTS

9. 3-dB BANDWIDTH ADJUSTMENTS

REFERENCE:

A4A9 IF Control

RELATED PERFORMANCE TEST:

Resolution Bandwidth Accuracy Test

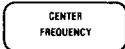
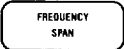
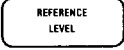
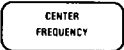
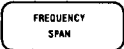
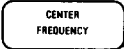
DESCRIPTION:

The CAL OUTPUT signal is connected to the RF INPUT. Each of the adjustable resolution bandwidths is selected and adjusted for the proper bandwidth at the 3-dB point.

EQUIPMENT:

No test equipment is required for this adjustment.

PROCEDURE:

1. Position instrument upright and remove top cover.
2. Set LINE switch to ON and press .
3. Connect CAL OUTPUT to RF INPUT.
4. Key in  100 MHz,  5 MHz, LIN, and  3 MHz.
5. Press  and adjust DATA knob to place signal peak near top CRT graticule line. Signal should be centered about the center line on the graticule. If not, press  and use DATA knob to center signal.
6. Press MARKER .
7. Using DATA knob, adjust marker down one side of the displayed signal to the 3-dB point; CRT MKR Δ annotation indicates .707 X.
8. Adjust A4A9R60 3 MHz for MKR Δ indication of 1.5 MHz while maintaining marker at 3-dB point (.707 X) using DATA knob. Refer to Figure 31 for location of adjustment.
9. Press MARKER . Adjust marker to 3-dB point on opposite side of signal (CRT MKR Δ annotation indicates 1.00 X). There are now two markers; one on each side of the signal at the 3-dB points.
10. CRT MKR Δ annotation now indicates the 3-dB bandwidth of the 3 MHz bandwidth. 3-dB bandwidth should be 3.00 MHz $\pm$ 0.60 MHz.
11. Key in  1 MHz and  2 MHz. If necessary, readjust  and , using DATA knob to place signal peak near top of graticule and centered on center graticule line.

ADJUSTMENTS

9. 3-dB BANDWIDTH ADJUSTMENTS (Cont'd)

12. Press MARKER , then MARKER .
13. Using DATA knob, adjust marker down one side of the displayed signal to the 3-dB point; CRT MKR Δ annotation indicates .707 X.

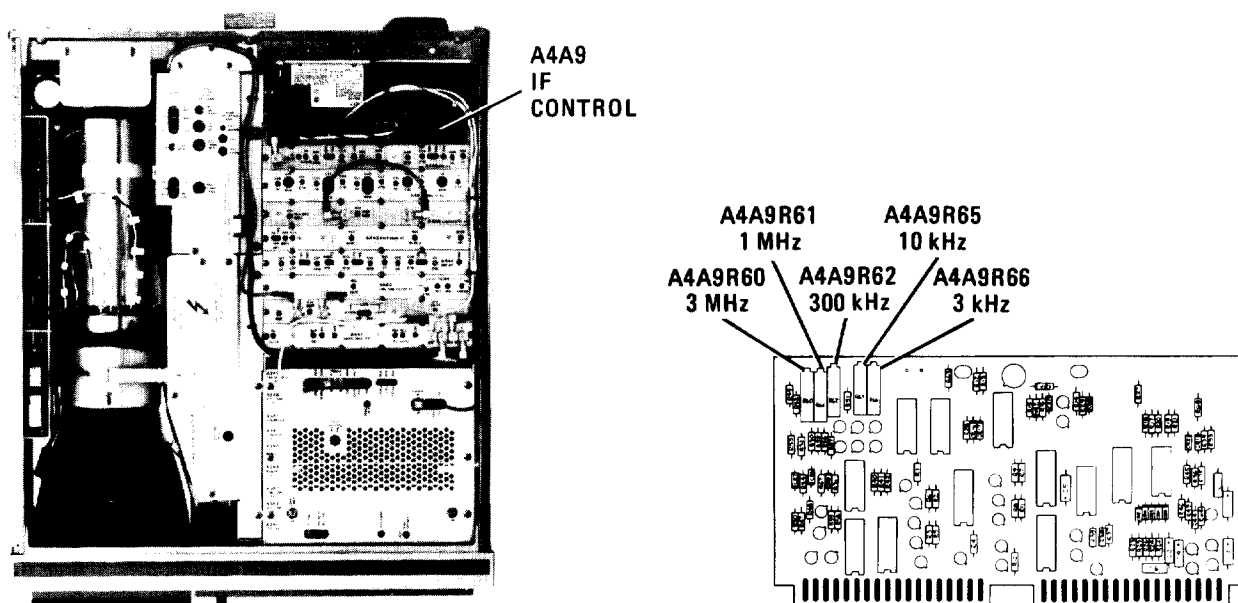


FIGURE 31. LOCATION OF 3-dB BANDWIDTHS ADJUSTMENTS

14. Adjust A4A9R61 1 MHz for MKR Δ indication of 500 kHz while maintaining marker at 3-dB point (.707 X) using DATA knob. Refer to Figure 31 for location of adjustment.
15. Press MARKER . Adjust marker to 3-dB point on opposite side of signal (CRT MKR Δ annotation indicates 1.00 X). There are now two markers; one on each side of the signal at the 3-dB point.
16. CRT MKR Δ annotation now indicates the 3-dB bandwidth of the 1 MHz bandwidth. 3-dB bandwidth should be 1.00 ± 0.10 MHz.
17. Key in 300 kHz and 500 kHz. If necessary, readjust and , using DATA knob to place signal peak near top of graticule and centered on center graticule line.
18. Press MARKER , then MARKER .
19. Using DATA knob, adjust marker down one side of the displayed signal to the 3-dB point; CRT MKR Δ annotation indicates .707 X.
20. Adjust A4A9R62 300 kHz for MKR Δ indication of 150 kHz while maintaining marker at 3-dB point (.707 X) using DATA knob. Refer to Figure 31 for location of adjustment.

ADJUSTMENTS

9. 3-dB BANDWIDTH ADJUSTMENTS (Cont'd)

21. Press MARKER . Adjust marker to 3-dB point on opposite side of signal (CRT MKR Δ annotation indicates 1.00 X).
22. CRT MKR Δ annotation now indicates the 3-dB bandwidth of the 300 kHz bandwidth. 3-dB bandwidth should be 300.0 ± 30.0 kHz.
23. Key in 10 kHz and 20 kHz. If necessary, readjust and , using DATA knob to place signal peak near top of graticule and centered on center graticule line.
24. Press MARKER , then MARKER .
25. Using DATA knob, adjust marker down one side of the displayed signal to the 3-dB point; CRT MKR Δ annotation indicates .707 X.
26. Adjust A4A9R65 10 kHz for MKR Δ indication of 5.00 kHz while maintaining marker at 3-dB point (.707 X) using DATA knob. Refer to Figure 31 for location of adjustment.
27. Press MARKER . Adjust marker to 3-dB point on opposite side of signal (CRT MKR Δ annotation indicates 1.00 X).
28. CRT MKR Δ annotation now indicates the 3-dB bandwidth of the 10 kHz bandwidth. 3-dB bandwidth should be 10.0 ± 1.0 kHz.
29. Key in 3 kHz and 5 kHz. If necessary, readjust and , using DATA knob to place signal peak near top of graticule and centered on center graticule line.
30. Press MARKER , then MARKER .
31. Using DATA knob, adjust marker down one side of the displayed signal to the 3-dB point; CRT MKR Δ annotation indicates .707 X.
32. Adjust A4A9R66 3 kHz for MKR Δ indication of 1.5 kHz while maintaining marker at 3-dB point (.707 X) using DATA knob. Refer to Figure 31 for location of adjustments.
33. Press MARKER . Adjust marker to 3-dB point on opposite side of signal (CRT MKR Δ annotation indicates 1.00 X).
34. CRT MKR Δ annotation now indicates the 3-dB bandwidth of the 3 kHz bandwidth. 3-dB bandwidth should be 3.00 ± 0.30 kHz.

ADJUSTMENTS

10. STEP GAIN AND 18.4 MHz LOCAL OSCILLATOR ADJUSTMENTS

REFERENCE:

A4A7 3 MHz Bandwidth Filter
A4A5 Step Gain

RELATED PERFORMANCE TESTS:

Resolution Bandwidth Selectivity Test
IF Gain Uncertainty Test
Center Frequency Readout Accuracy Test

DESCRIPTION:

First, the IF signal from the RF Section is measured with a power meter and adjusted for proper level. Next, the 10-dB gain steps are adjusted by connecting the CAL OUTPUT signal through two step attenuators to the RF INPUT and keying in the REFERENCE LEVEL necessary to activate each of the gain steps, while compensating for the increased gain with the step attenuators. The 1-dB gain steps are checked in the same fashion as the 10-dB gain steps, and then the variable gain is adjusted. The 18.4 MHz oscillator frequency is adjusted to provide adequate adjustment range of front-panel FREQ ZERO control; and last, the +10V temperature compensation supply used by the A4A4 Bandwidth Filter and A4A8 Attenuator-Bandwidth Filter is checked and adjusted if necessary.

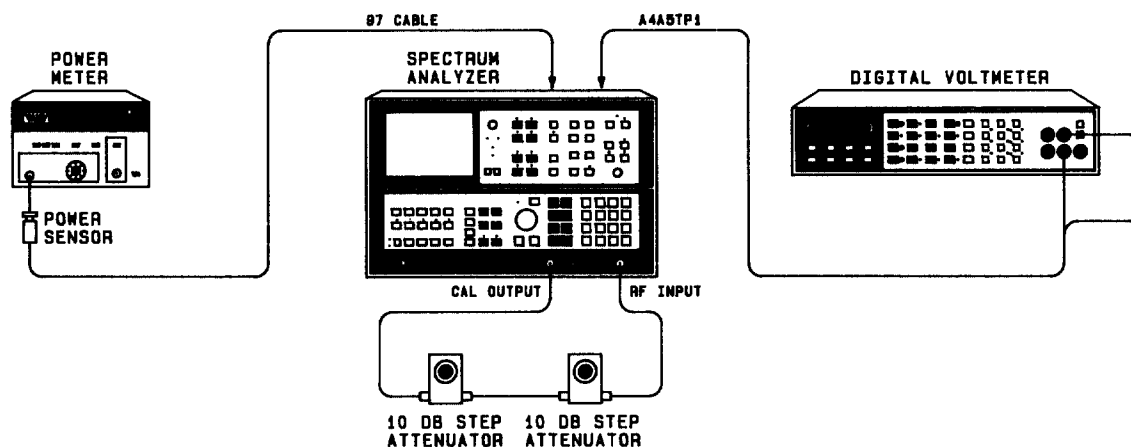


FIGURE 32. STEP GAIN AND 18.4 MHz LOCAL OSCILLATOR ADJUSTMENTS SETUP

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
Power Meter/Power Sensor	HP 436A/8481A
10-dB Step Attenuator	HP 355D, Option H89
1-dB Step Attenuator	HP 355C, Option H25

ADJUSTMENTS

10. STEP GAIN AND 18.4 MHz LOCAL OSCILLATOR ADJUSTMENTS (Cont'd)

PROCEDURE:

1. Position instrument upright as shown in Figure 32 and remove top cover.
2. The validity of the results of this adjustment procedure is based in part on the performance of the Log Amplifiers, the Video Processor, and the Track and Hold. These adjustments must be done before proceeding with the adjustment procedure of the Step Gain and 18.4 MHz Local Oscillator.
3. Set instrument LINE switch to ON and press **2.22 GHz**. Connect CAL OUTPUT to RF INPUT.
4. Key in **CENTER FREQUENCY** 100 MHz, **REFERENCE LEVEL** -10 dBm, **ATTEN** 0 dB, **FREQUENCY SPAN** 0 Hz, **RES BW** 1 kHz, **VIDEO BW** 100 Hz, and **SWEEP TIME** 20 msec.

IF Gain Adjustment

5. Disconnect 97 (white/violet) cable from A4A8J1 and connect cable to power meter/power sensor. Refer to Figure 33 for location of 97 cable and A4A8J1.
6. Adjust front-panel AMPTD CAL adjustment for a power meter indication of -5 dBm.
7. Disconnect power meter and reconnect 97 cable to A4A8J1.
8. Press LIN pushbutton and **MARKER** **NORMAL**.
9. Note **MARKER** amplitude in mV and adjust A4A5R33 CAL to 70.7 mV (top CRT graticule line). Refer to Figure 33 for location of adjustment.

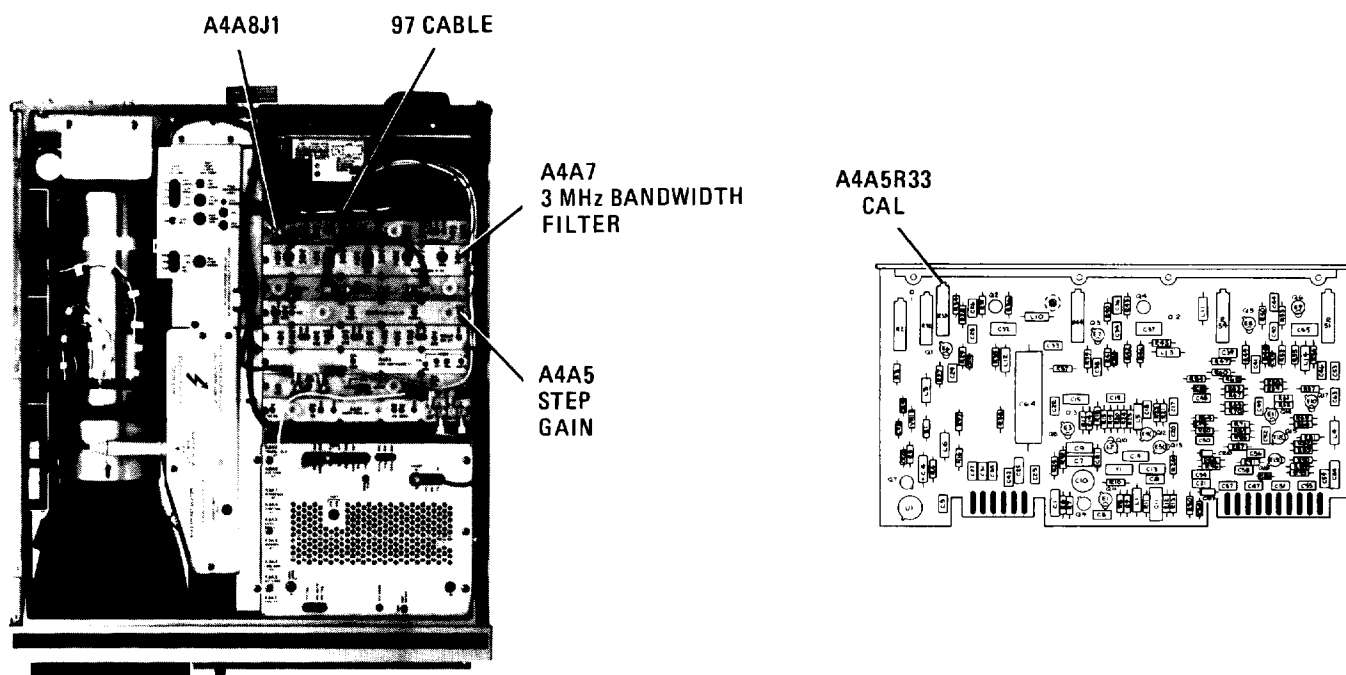


FIGURE 33. LOCATION OF IF GAIN ADJUSTMENT

ADJUSTMENTS

10. STEP GAIN AND 18.4 MHz LOCAL OSCILLATOR ADJUSTMENTS (Cont'd)

10. If A4A5R33 CAL adjustment does not have sufficient range to adjust trace to the top CRT graticule line, increase or decrease the value of A4A7R60 as necessary to achieve the proper adjustment range of A4A5 CAL adjustment. Refer to Table 3 for range of values for A4A7R60.

10-dB Gain Step Adjustment

11. Connect CAL OUTPUT to RF INPUT through 10-dB step attenuator and 1-dB step attenuator.
12. Key in LOG 1 dB and - 30 dBm.
13. Set step attenuators to 25 dB.
14. Key in MARKER . Signal trace should be at the center CRT graticule line, and MKR Δ level, as indicated by CRT annotation, should be .00 dB.
15. Key in - 40 dBm. Set step attenuators to 35 dB.
16. Adjust A4A5R32 SG10 for MKR Δ level of .00 dB (CRT MKR Δ annotation is now in upper right corner of CRT display). Refer to Figure 34 for location of adjustment.

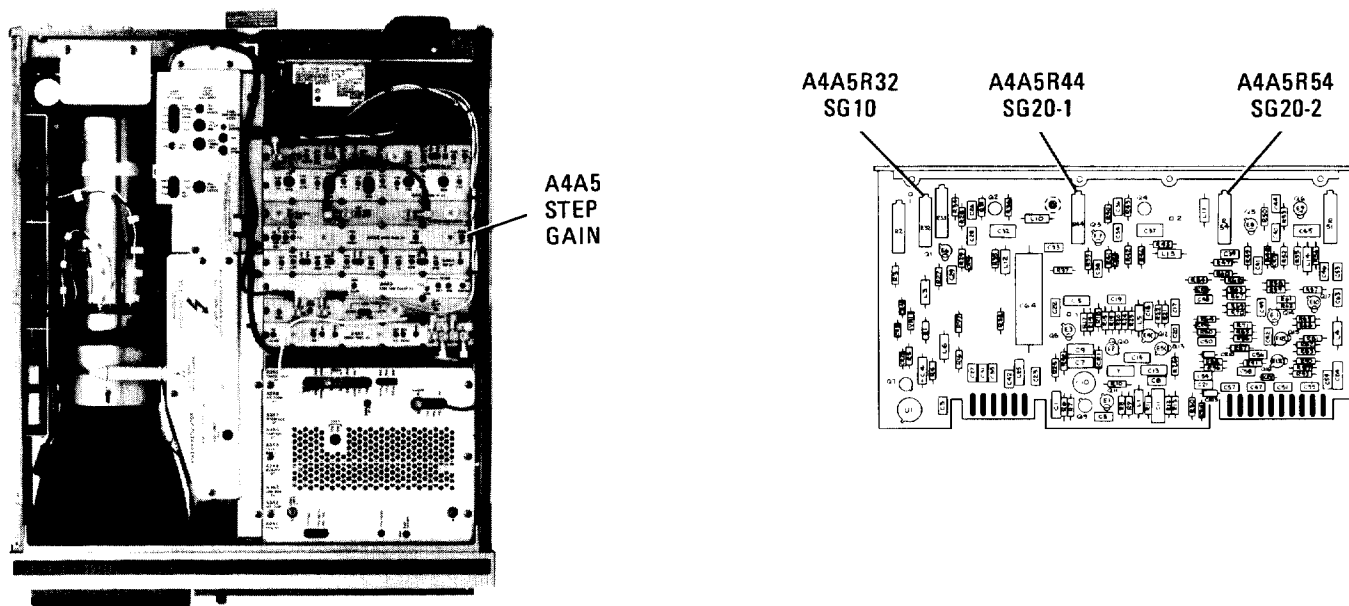


FIGURE 34. LOCATION OF 10-dB GAIN STEP ADJUSTMENTS

17. If A4A5R32 SG10 adjustment does not have sufficient range to perform adjustment in step 16, increase or decrease the value of A4A7R60 as necessary to achieve the proper adjustment range of A4A5 SG10. Refer to Table 3 for range of values for A4A7R60. Repeat steps 3 through 16 if the value of A4A7R60 is changed.

10. STEP GAIN AND 18.4 MHz LOCAL OSCILLATOR ADJUSTMENTS (Cont'd)

18. Key in REFERENCE
LEVEL – 50 dBm. Set step attenuators to 45 dB.
19. Adjust A4A5R44 SG20-1 for MKR Δ level of .00 dB. Refer to Figure 34 for location of adjustment.
20. Key in REFERENCE
LEVEL – 70 dBm. Set step attenuators to 65 dB.
21. Adjust A4A5R54 SG20-2 for MKR Δ level of .00 dB. Refer to Figure 34 for location of adjustment.

1-dB Gain Step Checks

22. Key in REFERENCE
LEVEL – 19.9 dBm. Set step attenuators to 15 dB. Press MARKER Δ twice to establish a new reference.
23. Key in REFERENCE
LEVEL – 17.9 dBm. Set step attenuators to 13 dB.
24. MKR Δ level, as indicated by CRT annotation, should be .00 $\pm$ 0.5 dB. If not, increase or decrease the value of A4A5R86. Refer to Table 3 for range of values.
25. Key in REFERENCE
LEVEL – 15.9 dBm. Set step attenuators to 11 dB.
26. MKR Δ level should be .00 $\pm$ 0.5 dB. If not, increase or decrease the value of A4A5R70. Refer to Table 3 for range of values.
27. Key in REFERENCE
LEVEL – 11.9 dBm. Set step attenuators to 7 dB.
28. MKR Δ level should be .00 $\pm$ 0.5 dB. If not, increase or decrease the value of A4A5R62. Refer to Table 3 for range of values.

.1-dB Gain Step Adjustment

29. Key in LIN, SHIFT A (resolution bandwidth), and REFERENCE
LEVEL – 19.9 dBm. Set step attenuators to 13 dB. Press MARKER Δ twice to establish a new reference.
30. Key in REFERENCE
LEVEL – 18.0 dBm. Set step attenuators to 11 dB.
31. Adjust A4A5R51 VR for MKR Δ level of –0.10 dB. Refer to Figure 35 for location of adjustment.
32. Remove all test equipment from the spectrum analyzer. Connect CAL OUTPUT to RF INPUT.

18.4 MHz Local Oscillator Adjustment

33. Press 2 - 22
GHz and RECALL 9.
34. Set front-panel FREQ ZERO control to midrange.
35. Adjust A4A5C10 FREQ ZERO to peak signal trace on CRT. Refer to Figure 35 for location of adjustment.

ADJUSTMENTS

10. STEP GAIN AND 18.4 MHz LOCAL OSCILLATOR ADJUSTMENTS (Cont'd)

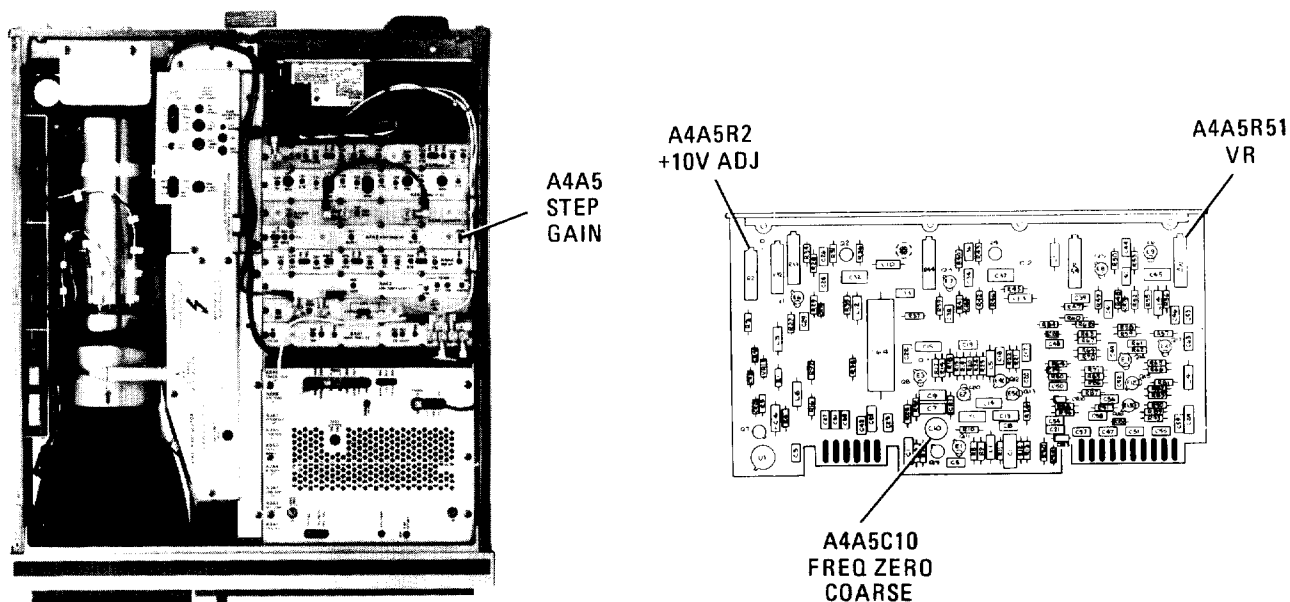


FIGURE 35. LOCATION OF .1-dB GAIN STEP, 18.4 MHz LO, AND +10V ADJUSTMENTS

36. Key in FREQUENCY
SPAN 500 Hz, RES
BW 100 Hz, and PEAK
SEARCH Δ .
37. Adjust front-panel FREQ ZERO control fully clockwise. Press PEAK
SEARCH . Signal should move at least 60 Hz away from center CRT graticule line.
38. Adjust front-panel FREQ ZERO control fully counterclockwise. Press PEAK
SEARCH . Signal should move at least 60 Hz away from center CRT graticule line.
39. If proper indications are not achieved, increase or decrease value of A4A5C9 and repeat adjustment from step 32. Refer to Table 3 for range of values.
40. Press 2 - 22
GHz and RECALL 9 .
41. Adjust front panel FREQ ZERO to peak the signal trace on the CRT.

+ 10V Temperature Compensation Supply Adjustment

42. Connect DVM to A4A5TP1 (+10VF).
43. If DVM indication is between +8.5 Vdc and +11.0 Vdc, no adjustment is required.
44. If DVM indication is not within tolerance of step 40, adjust A4A5R2 +10V ADJ for DVM indication of $+9.5 \pm 0.1$ Vdc at normal room temperature of approximately 25°C. Voltage change is approximately 30 mV/°C. Therefore, if room temperature is higher or lower than 25°C, adjustment should be made higher or lower, accordingly.

ADJUSTMENTS

11. DOWN/UP CONVERTER ADJUSTMENTS

REFERENCE:

A4A6 Down/Up Converter

RELATED PERFORMANCE TEST:

Resolution Bandwidth Switching Uncertainty Test

DESCRIPTION:

The CAL OUTPUT signal is connected to the RF INPUT connector of the instrument and controls are set to display the signal in a narrow bandwidth. A marker is placed at the peak of the signal to measure the peak amplitude. The bandwidth is changed to a wide bandwidth and the Down/Up Converter is adjusted to place the peak amplitude of the signal the same as the level of the narrow bandwidth signal.

Optionally, the input signal is removed and the IF signal is monitored at the output of the Bandwidth Filters using a spectrum analyzer with an active probe. The 18.4 MHz Local Oscillator and all harmonics are then adjusted for minimum amplitude.

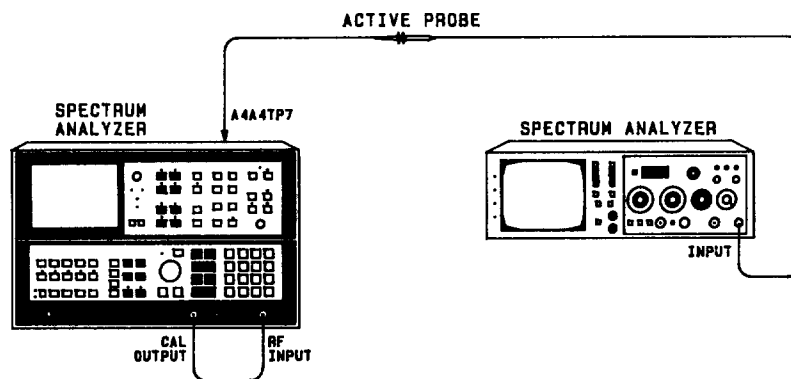


FIGURE 36. DOWN/UP CONVERTER ADJUSTMENTS SETUP

EQUIPMENT:

Spectrum Analyzer	HP 8557A/853A
Active Probe	HP 1121A

PROCEDURE:

1. Position instrument upright as shown in Figure 36 and remove top cover.
2. Set LINE switch to ON and press 2 - 22 GHz.
3. Connect CAL OUTPUT to RF INPUT.

ADJUSTMENTS

11. DOWN/UP CONVERTER ADJUSTMENTS (Cont'd)

4. Key in 100 MHz, 0 Hz, 0 dB, 1 kHz. Press LIN pushbutton, then MARKER .
5. Key in 1 MHz.
6. Adjust A4A6A1R29 WIDE GAIN to align markers on CRT display. MKR Δ level should indicate 1.00 X. Refer to Figure 37 for location of adjustment.
7. Disconnect CAL OUTPUT from RF INPUT.

Optional

8. Key in -70 dBm, 1 kHz, and MARKER .
9. Connect spectrum analyzer to A4A4TP7 using an active probe. Refer to Figure 36 for test setup.
10. Set spectrum analyzer resolution bandwidth to 100 kHz and frequency span/division to 10 MHz.
11. Adjust A4A6A1C31 18.4 MHz NULL to null the 18.4 MHz Local Oscillator signal and all displayed harmonics. Refer to Figure 37 for location of adjustment.

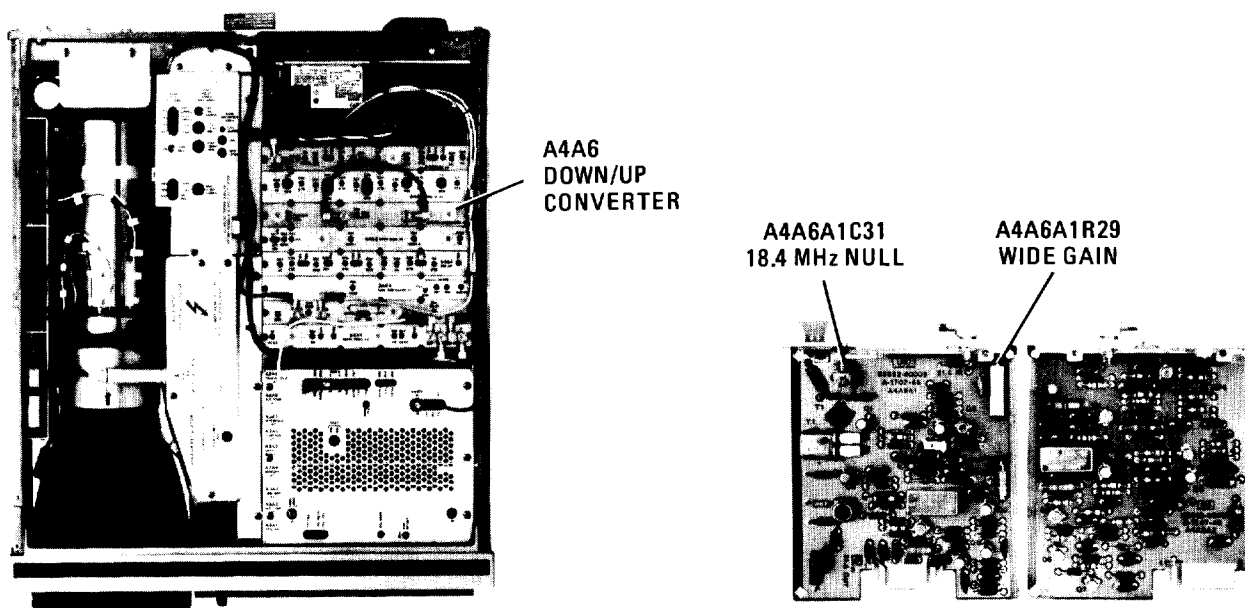


FIGURE 37. LOCATION OF DOWN/UP CONVERTER ADJUSTMENTS

12. 18.4 MHz signal and displayed harmonics should be below -10 dBm (-30 dBm on display due to 10:1 divider). If unable to adjust A4A6A1C31 18.4 MHz NULL for proper indication, increase value of A4A5R10. Refer to Table 3 for range of values.

ADJUSTMENTS

12. 10 MHz STANDARD ADJUSTMENT

REFERENCE:

A7A1 Reference Phase Detector

RELATED PERFORMANCE TEST:

Center Frequency Readout Accuracy Test

DESCRIPTION:

The internal 10 MHz time base is adjusted for frequency accuracy. This procedure does not adjust for long-term drift or aging rate. It adjusts only short-term accuracy. To properly adjust the time base, a frequency standard whose accuracy is known to be better than that of the HP 8566B Time Base is required. Refer to Frequency Reference specifications in Operators Handbook (Specifications) for complete specifications for the internal time base.

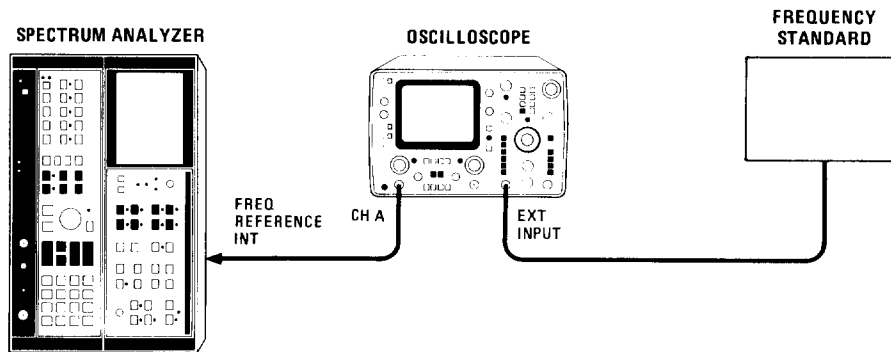


FIGURE 38. 10 MHz STANDARD ADJUSTMENT SETUP

EQUIPMENT:

Oscilloscope	.....	HP 1741A
Frequency Standard	.....	any 1, 2, 5, or 10 MHz frequency standard with accuracy of $\pm 1 \times 10^{-10}$ or better such as HP 5061A

PROCEDURE:

1. Position instrument on right side as shown in Figure 38, and remove bottom cover.
2. Set LINE switch to ON.

NOTE

Primary power must be applied to the instrument for at least 48 hours before adjusting the internal time base.

ADJUSTMENTS

12. 10 MHz STANDARD ADJUSTMENT (Cont'd)

3. Connect a frequency standard whose accuracy is known to be better than that of the internal time base, such as an HP 5061A Cesium Beam, to the EXT TRIGGER input of the oscilloscope.
4. Remove cable between FREQ REFERENCE INT and EXT connectors on HP 8566B rear panel.
5. Connect the INT FREQ REFERENCE output to the Channel A input of the oscilloscope. Set rear-panel FREQ REFERENCE switch to INT.
6. Set oscilloscope controls as follows:

TIME/DIV	.1 μ sec
CHAN A VOLTS/DIV	.1
MAG x 10 pushbutton	IN
DISPLAY A pushbutton	IN
EXT/INT trigger pushbutton	IN
SWEEP VERNIER control	CAL
TRIGGER HOLDOFF	MIN
AC/DC trigger pushbutton	OUT
POS/NEG trigger pushbutton	OUT
TRIGGER LEVEL control	Centered

7. Adjust TRIGGER LEVEL control as necessary to display sine-wave signal on oscilloscope.
8. Remove screws from A22 10 MHz Standard used to seal adjustments.

NOTE

If THERMAL SHUTDOWN indicator A17DS3 (red LED) is on, 10 MHz standard is disabled.

9. Adjust A22 COARSE frequency adjust for minimum sideways movement of the displayed signal. Adjust A22 FINE frequency adjust for minimum sideways movement of the displayed signal. No sideways movement indicates that frequency standard and internal time base frequency are the same. Refer to Figure 39 for location of A22 10 MHz Standard.
10. Note the time it takes one cycle of the sine wave to cross the oscilloscope display. When properly adjusted, it should take greater than 100 seconds for one cycle of the sine wave to cross the oscilloscope CRT display.
11. Replace screws over A22 adjustments and reconnect cable between FREQ REFERENCE INT and EXT connectors.

ADJUSTMENTS

12. 10 MHz STANDARD ADJUSTMENT (Cont'd)

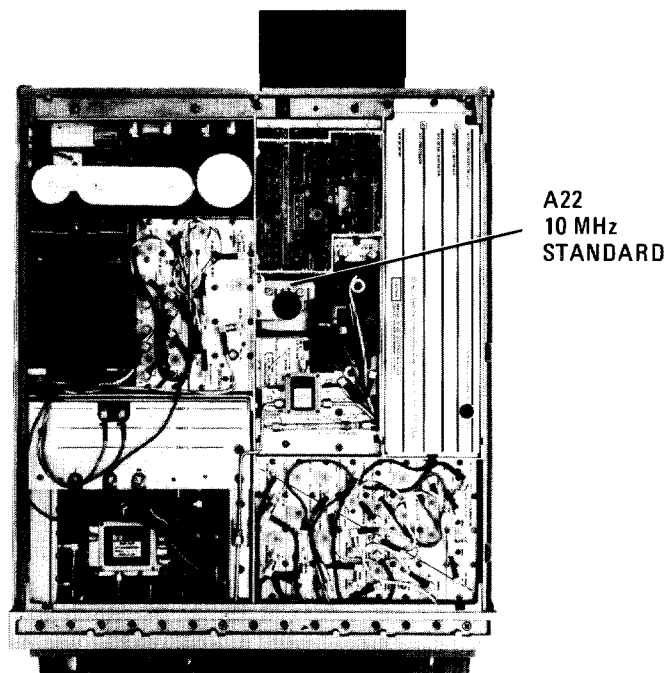


FIGURE 39. LOCATION OF 10 MHz STANDARD ADJUSTMENTS

Refer to Figure 38

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS

REFERENCE:

A16 Scan Generator
A19 Digital-to-Analog Converter (DAC)
A20 Main Coil Driver

RELATED PERFORMANCE TESTS:

Center Frequency Readout Accuracy Test
Frequency Span Accuracy Test
Sweep Time Accuracy Test

DESCRIPTION:

The Sweep Time is adjusted first by viewing the scan ramp on an oscilloscope and adjusting for proper levels. Next, the AUX OUT ramp is adjusted to produce a continuous ramp over the entire frequency range (2 – 22 GHz). Offset adjustments are performed to set quiescent state of various operational amplifiers. The YTO Main Coil Driver is adjusted to set the end-points of the oscillator range. Frequency span accuracy for YTO Spans is adjusted by adjusted Sweep Attenuator gains. And last, band overlap is adjusted at 5.8 GHz and 12.5 GHz.

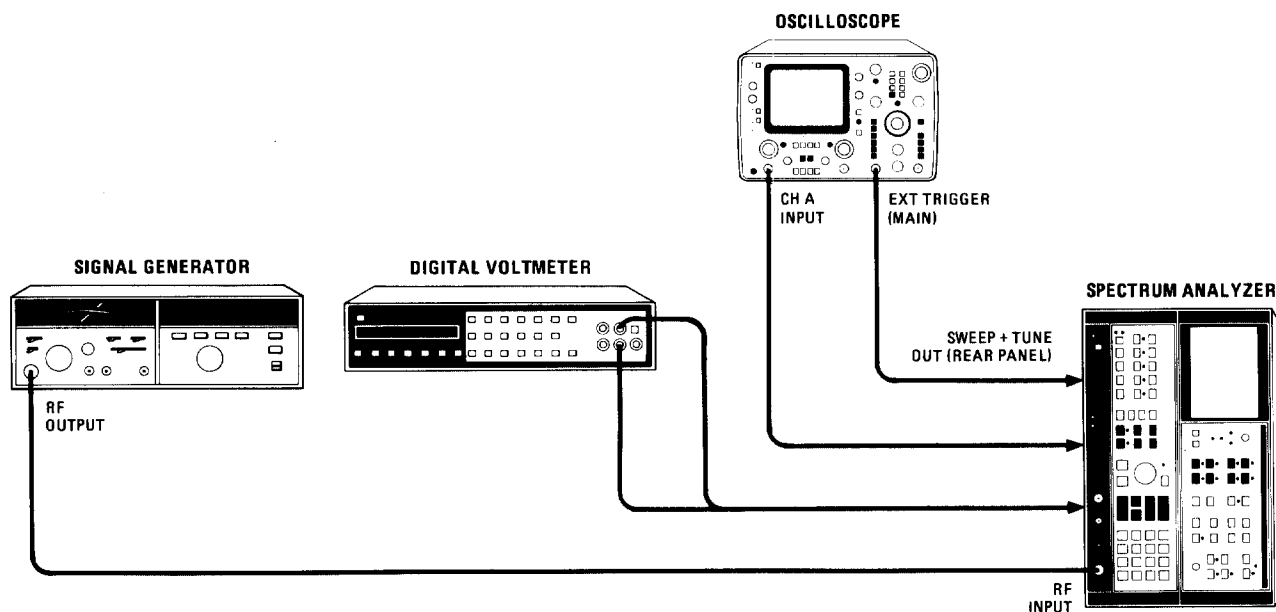


FIGURE 40. SWEEP AND DAC ADJUSTMENTS SETUP

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

NOTE

Equipment listed is for three setups: Figures 40, 45, and 46.

EQUIPMENT:

Signal Generator	HP 8672A
Oscilloscope	HP 1741A
Digital Voltmeter (DVM)	HP 3455A
Frequency Counter	HP 5340A
Adapter, BNC (f) to SMA (m)	HP 1250-1200

PROCEDURE:

1. Position instrument on right side as shown in Figure 40, with bottom cover removed. Remove cover over A12 through A16 PC Boards. Jumper A12TP2 to A12TP3 (Lock Indicator Disable).
2. Set HP 8566B LINE switch to ON.

Sweep Time Adjustment

3. Press **0 - 2.5 GHz** . Key in **SWEEP TIME** 500 msec.
4. Connect oscilloscope to A16TP3. Connect rear panel SWEEP + TUNE OUT to External Trigger on oscilloscope. Display should be a 0V to +10V ramp.
5. Set Oscilloscope Trigger Level and Persistence as necessary to display full sweep ramp, starting at a convenient point on graticule. Adjust A16R67 SWEEP TIME adjustment for a ramp of 500 msec duration. Refer to Figure 41 for a typical display.

Aux Out Adjustment

6. Press **2 - 22 GHz** .
7. Connect oscilloscope to A16TP4. Display should be a ramp similar to that shown in Figure 42.
8. Adjust A16R68 AUX adjustment to align the dc level of the rest time between each ramp with the upper dc level of each ramp. Refer to Figures 42 and 43 for typical display and illustration of proper adjustment.

Offset Adjustments

9. Key in SWEEP **SINGLE** .
10. Connect DVM to A16TP8; ground to A16TP7.
11. Adjust A16R62 Scan Reset OFFSET for DVM indication as close to 0.0000 Vdc as possible.
12. Key in **START FREQ** 2.5 GHz, **STOP FREQ** 4.9 GHz, **SHIFT** **R** **MKR-REF LVL**, SWEEP **SINGLE** , **SAVE** **1** , **STOP FREQ** 2.51 GHz, **SAVE** **2** .
13. Connect DVM to A19TP2; ground to A19 GND.
14. Press **RECALL** and alternate between **1** and **2** while monitoring DVM.

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

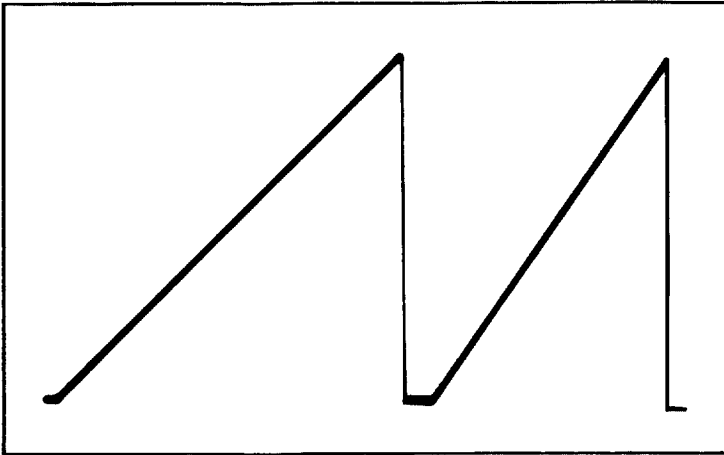


FIGURE 41. 0V TO +10V SWEEP RAMP AT A16TP3

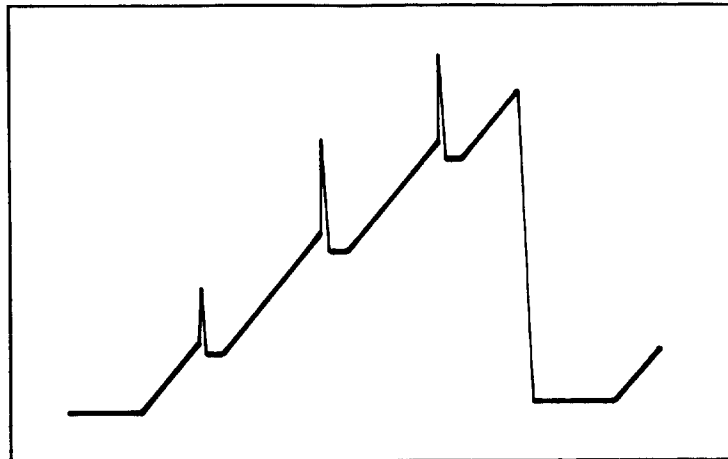


FIGURE 42. IMPROPERLY ADJUSTED DC LEVELS BETWEEN SWEEP RAMPS

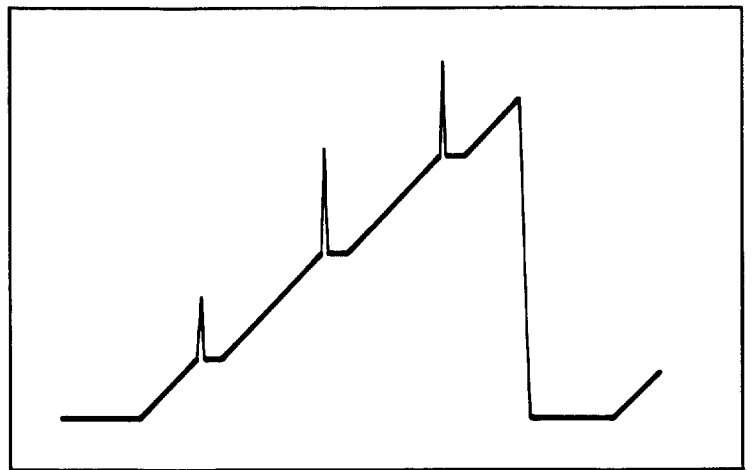


FIGURE 43. PROPERLY ADJUSTED DC LEVELS BETWEEN SWEEP RAMPS

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

15. Difference between DVM indications for and should be less than 1 mVdc. DVM indication will be approximately -8 Vdc.
16. If necessary, adjust A19R19 Summing Amplifier OFFSET while alternating between and so that difference in DVM indication is less than 1 mVdc.
17. Key in 22 GHz, .
18. Press and alternate between and while monitoring DVM.
19. Difference between DVM indications for and should be less than 3 mVdc.
20. If necessary, adjust A19R41 25 GHz SPAN OFFSET while alternating between and so that difference in DVM indication is less than 3 mVdc.

YTO DAC Adjustment

21. Press .
22. Key in 2.0125 GHz, , .
23. Key in 0 Hz (this sets the DAC to 0).
24. Clip GND lead of DVM to A19TP5.
25. Adjust A19R50 for $+10.000\text{V} \pm .001\text{V}$.
26. Connect DVM to A19TP2. Adjust A19R19 for $+10.000\text{V} \pm .001\text{V}$.
27. Key in and 4095 Hz. Adjust A19R19 for $-18.600\text{V} \pm .00\text{V}$ at TP2.
28. Press .
29. Key in 3.75 GHz, 2.5 GHz, , .
30. Adjust A19R56 for $-7.500\text{V} \pm .001\text{V}$ at TP2.
31. Select SWEEP .
32. Adjust A19R32 for $-15.000\text{V} \pm .001\text{V}$ at A19TP2.
33. Repeat steps 31 and 32 until three consecutive voltage readings are within $\pm .001\text{V}$ of one another.
34. Press , 3.75 GHz, 3.0 GHz, , .
35. Adjust A19R41 (25 GHz span offset) for $-6.750\text{V} \pm .001\text{V}$ at A19TP2.
36. Select SWEEP .
37. Adjust A19R43 for $-15.750\text{V} \pm .001\text{V}$ at A19TP2.
38. Press .

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

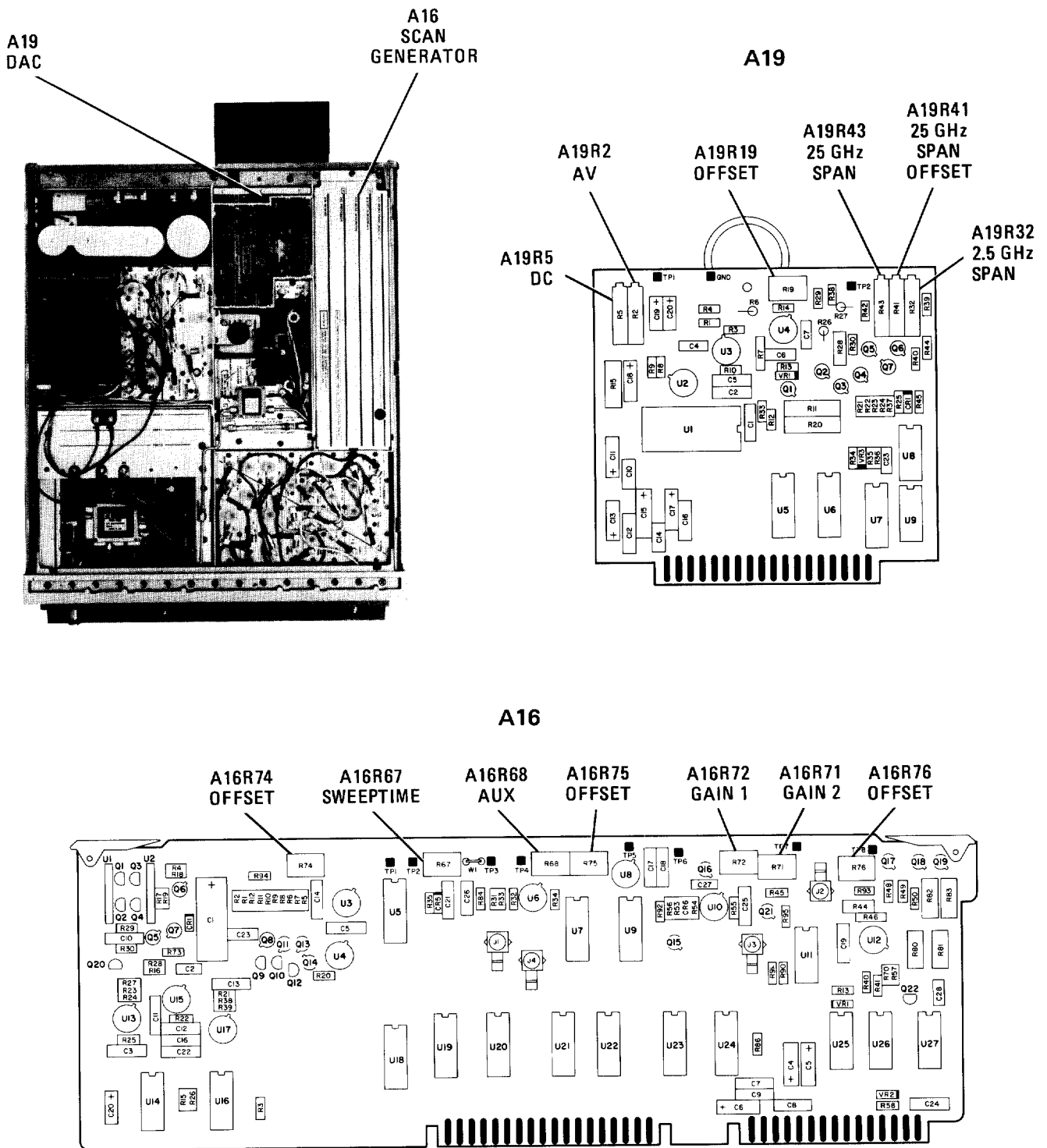


FIGURE 44. LOCATION OF SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

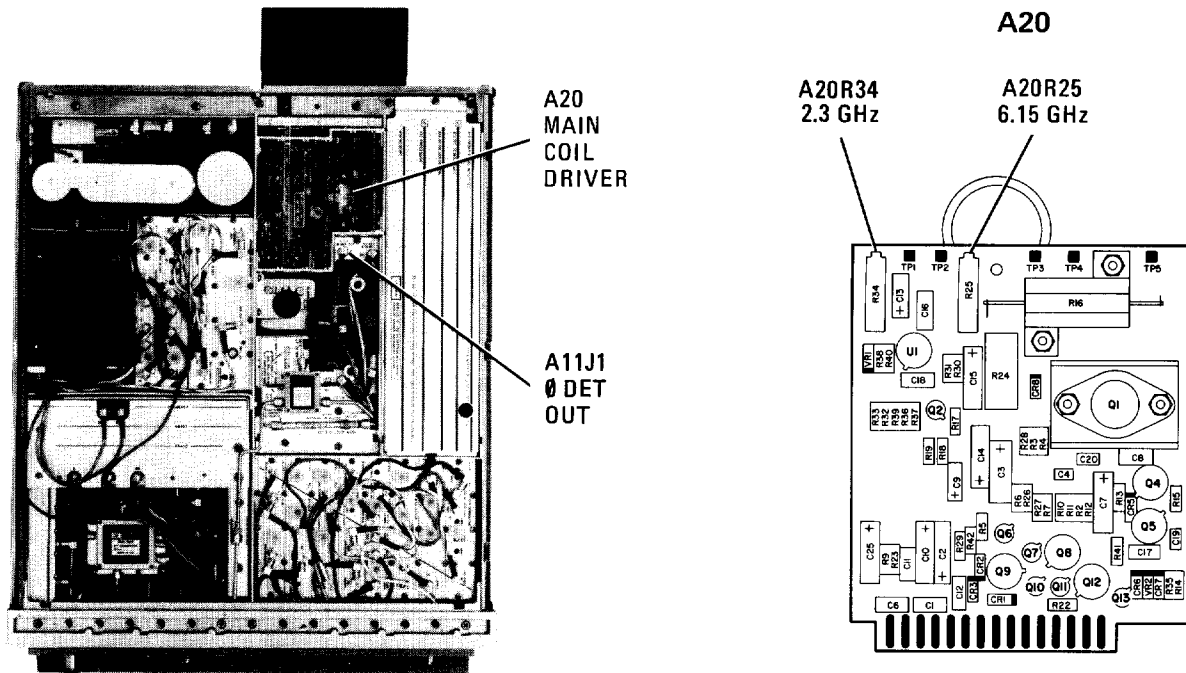


FIGURE 45. LOCATION OF SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS

YTO Main Coil Driver Adjustments

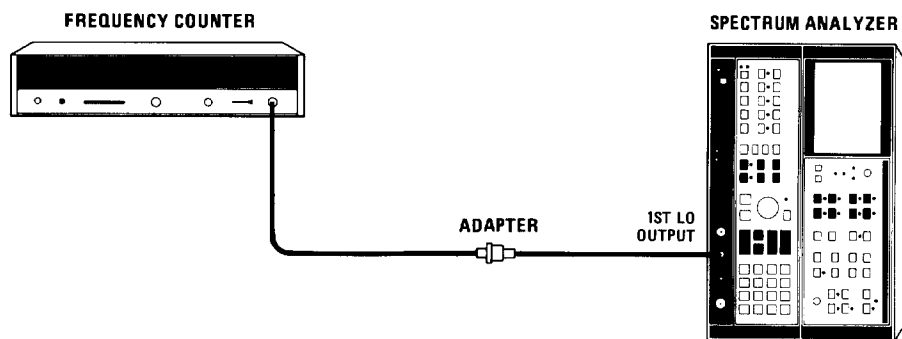


FIGURE 46. YTO MAIN COIL DRIVER ADJUSTMENT SETUP

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

39. Press **2 22 GHz**. Press **SHIFT** **F** **RES BW**. Jumper A20TP5 to A21TP2.
40. Connect frequency counter to front-panel 1st LO OUTPUT as shown in Figure 46.
41. Remove 8 (gray) cable at A11J1 Ø DET OUT.
42. Key in **FREQUENCY SPAN** 0 Hz and **CENTER FREQUENCY** 2.3 GHz.
43. Adjust A20R34 2.3 GHz adjustment for a frequency counter indication of 2300.0 ± 0.1 MHz. Refer to Figure 45 for location of adjustments. Press **SAVE** **1**.
44. Key in **CENTER FREQUENCY** 6150.000 MHz.
45. Adjust A20R25 6.15 GHz adjustment for a frequency counter indication of 6150.0 ± 0.1 MHz. Press **SAVE** **2**.
46. Alternate between **RECALL** **1** and **RECALL** **2**, making adjustments of steps 43 and 45 until requirements of both steps are met.
47. Remove jumper from between A20TP5 and A21TP2 and reconnect 8 (gray) cable to A11J1.

YTO Main Coil Driver Adjustments (Alternate Procedure)

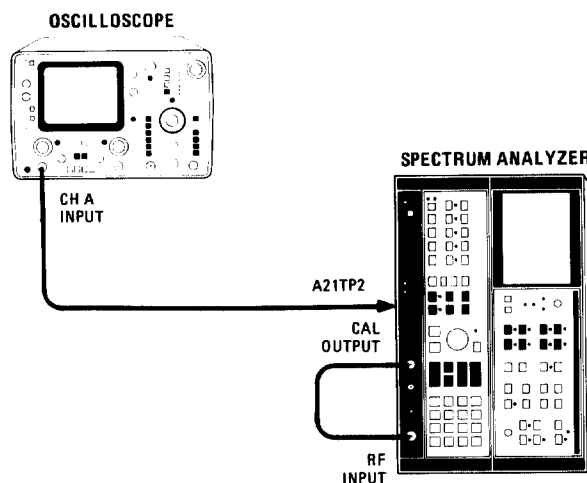


FIGURE 47. YTO MAIN COIL DRIVER ADJUSTMENTS SETUP (ALTERNATE PROCEDURE)

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

48. Disconnect 8 (gray) cable from A11J1 Ø DET OUT. Jumper A12TP2 to A12TP3 (Lock Indicator Disable).
49. Connect CAL OUTPUT to RF INPUT and press **2.22 GHz**.
50. Key in **CENTER FREQUENCY** 0 Hz. (Frequency Span readout should indicate 2 GHz.)
51. Adjust A20R25 6.15 GHz adjustment to obtain two comb teeth (100 MHz harmonics) per division on the HP 8566B CRT. These comb teeth should be evenly spaced but not necessarily aligned with graticule lines. (Counterclockwise rotation of adjustment increases spacing between comb teeth.)
52. Adjust A20R34 2.3 GHz adjustment to align the LO feedthrough signal on the center graticule line. It may be necessary to disconnect RF INPUT to locate the LO feedthrough. (Counterclockwise rotation of adjustment moves signal to the right.)
53. Repeat steps 51 and 52 until comb teeth are spaced two per division and aligned with graticule lines. (Every other comb tooth will align with a graticule line.)
54. Key in **CENTER FREQUENCY** 2 GHz, **FREQUENCY SPAN** 100 MHz. At least one comb tooth should be visible on display.
55. Adjust A20R25 6.15 GHz to place comb tooth nearest the center of the display on the center graticule line.
56. Press **SAVE** **1**.
57. Key in **CENTER FREQUENCY**, **SHIFT** **HOLD** .9 GHz.
58. Press **SAVE** **2**.
59. Adjust A20R34 2.3 GHz to place comb tooth nearest the center of the display on the center graticule line.
60. Repeat adjustments of steps 55 and 59 by alternating between **RECALL** **1** and **RECALL** **2** until requirements of both steps are met.
61. Key in **CENTER FREQUENCY** 2 GHz, **FREQUENCY SPAN** 10 MHz.
62. Press **SAVE** **3**.
63. Adjust A20R25 6.15 GHz to move nearest comb tooth to center graticule line.
64. Key in **CENTER FREQUENCY**, **SHIFT** **HOLD** .9 GHz.
65. Press **SAVE** **4**.
66. Adjust A20R34 2.3 GHz to move nearest comb to center graticule line.
67. Repeat adjustments of steps 63 and 66 by alternating between **RECALL** **3** and **RECALL** **4**.

NOTE

Steps 68 and 69 may be omitted if an oscilloscope is not available.

68. Connect oscilloscope to A21TP2. Reconnect 8 (gray) cable to A11J1 Ø DET OUT. Remove jumper from A12TP2 to A12TP3 (Lock Indicator Disable).

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

69. Alternate between and while adjusting A20R25 (6.15 GHz) and A20R34 (2.3 GHz) for dc voltage on oscilloscope $< \pm 0.2$ Vdc.

Sweep Attenuator Gain Adjustments

70. Press .
71. Key in 4 GHz, 80 MHz.
72. Connect signal generator to RF INPUT and set for output of 4.000000 GHz at -10 dBm.
73. Press .
74. Alternately press and adjust A16R72 GAIN 1 for marker frequency of 4.000 00 GHz as indicated by CRT annotation on HP 8566B display.
75. Key in 240 MHz.
76. Press .
77. Alternately press and adjust A16R71 GAIN 2 for marker frequency of 4.000 0 GHz as indicated by CRT annotation on HP 8566B display.

Band Overlap Adjustments

78. Press .
79. Change signal generator frequency to 5.820 GHz.
80. Adjust A19R43 25 GHz SPAN fully counterclockwise.
81. Press 10 GHz.
82. Adjust A19R43 clockwise until the two signals displayed on the HP 8566B almost coincide (just barely discernible as two signals).
83. Change signal generator frequency to 12.520 GHz.
84. Press 12.5 GHz.
85. HP 8566B display should be two almost-coincident signals as described in step 82. If it is not, slightly readjust A19R43 25 GHz SPAN.
86. If adjustment of A19R43 was necessary in the previous step, press 5.8 GHz. Set signal generator to 5.820 GHz and recheck for proper overlap at 5.8 GHz (just barely discernible as two signals).
87. Key in 5.8 GHz, 450 MHz.
88. Change signal generator frequency to 5.800 GHz.
89. Adjust A19R32 2.5 GHz SPAN for best-shaped single signal displayed on the HP 8566B.
90. Remove jumper between A12TP2 and A12TP3 (Lock Indicator Disable). Replace cover over A12 through A16 PC Boards.

ADJUSTMENTS

14. 100 MHz VOLTAGE-CONTROLLED CRYSTAL OSCILLATOR (VCXO) ADJUSTMENTS

REFERENCE:

A7A2 100 MHz VCXO

RELATED PERFORMANCE TESTS:

Noise Sidebands Test
Residual Responses Test

DESCRIPTION:

The open loop frequency and maximum power output of the 100 MHz VCXO is centered around 100 MHz. The 400 MHz signal is adjusted for maximum 400 MHz output with minimum spurious output. The 400 MHz output is set to -10 dBm by selecting proper resistor values for the attenuator network A7A2R67, R68, and R69.

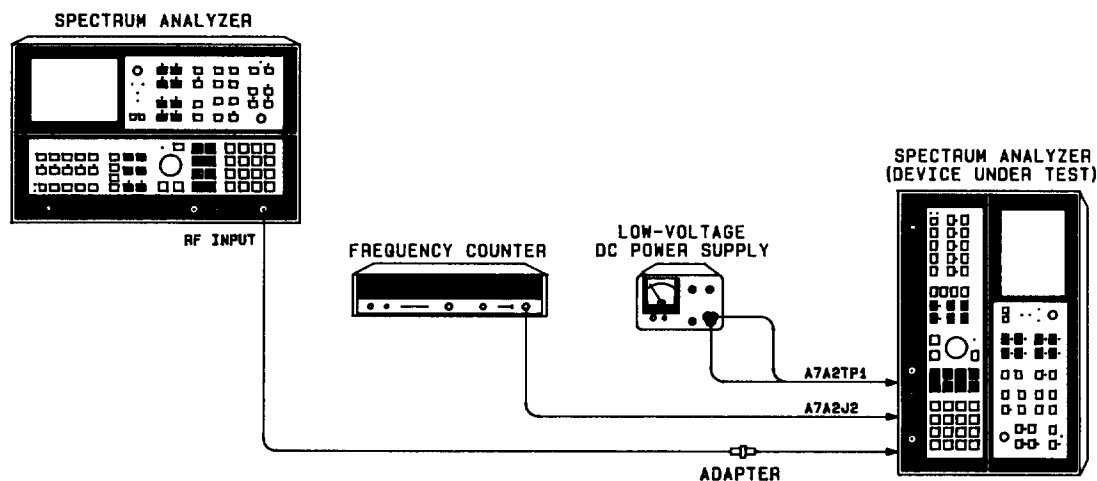


FIGURE 48. 100 MHz VCXO ADJUSTMENT SETUP

EQUIPMENT:

Frequency Counter	HP 5340A
Spectrum Analyzer	HP 8566B
Low-Voltage DC Power Supply	HP 721A
BNC to SMB Snap-On Test Cable (2 required)	Part of Service Accessories
Adapter, SMB (Snap-On) Male-to-Male	Part of Service Accessories

PROCEDURE:

1. Position instrument on right side as shown in Figure 48 with bottom cover removed.
2. Set LINE switch to ON and press $\boxed{2.22 \text{ GHz}}$.

ADJUSTMENTS

14. 100 MHz VOLTAGE-CONTROLLED CRYSTAL OSCILLATOR (VCXO) ADJUSTMENTS (Cont'd)

100 MHz Output Adjustment

3. Jumper – 10 Vdc from A18TP4 to A7A2TP1 TUNE test point. Refer to Figure 49 for location of A7A2 and adjustments.

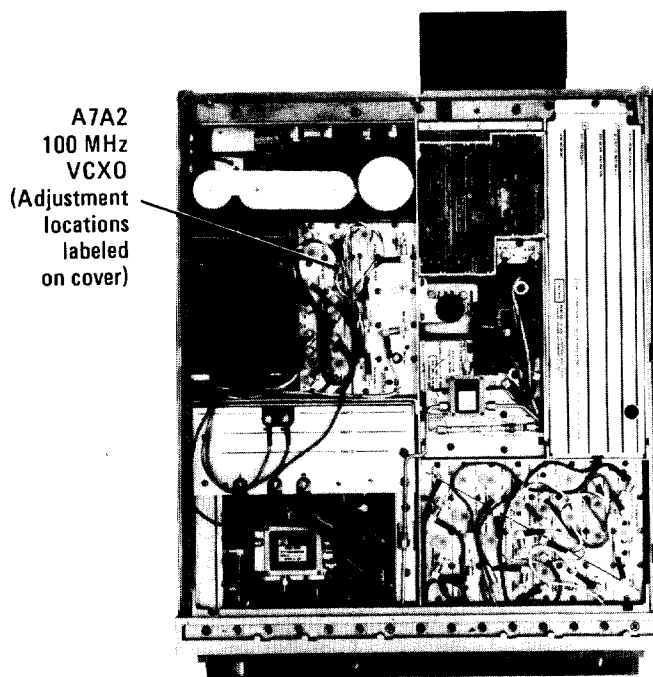


FIGURE 49. LOCATION OF 100 MHz VCXO ADJUSTMENTS

4. Disconnect 83 (gray/orange) cable from A7A2J2 100 MHz OUT. Connect frequency counter to A7A2J2.
5. Adjust A7A2C4 100 MHz through its full range while monitoring frequency counter indication. Adjustment should provide a minimum adjustment range of plus and minus 300 Hz.
6. If adjustment does not provide sufficient range, select new values for factory selected components A7A2C8 and A7A2L4. A7A2L4 is used to center the adjustment about 100 MHz, and A7A2C8 is used to adjust the range of A7A2C4. Refer to Table 3 for range of values. Refer to Table 4 for HP part numbers.
7. Adjust A7A2 100 MHz ADJ A7A2C4 for frequency counter indication of 100.0000 ± 0.0001 MHz.
8. Disconnect 96 (white/blue) cable from A7A3 400 MHz IN. Connect this cable to the spectrum analyzer RF INPUT, using a BNC to SMB snap-on test cable and SMB male-to-male adapter. Set the spectrum analyzer controls for a 400 MHz signal.
9. The 400 MHz output should be > -12 dBm.

ADJUSTMENTS

14. 100 MHz VOLTAGE-CONTROLLED CRYSTAL OSCILLATOR (VCXO) ADJUSTMENTS (Cont'd)

10. Disconnect jumper from -10 Vdc at A18TP4 and connect to ground. TUNE test point A7A2TP1 is now grounded.
11. Frequency counter indication should be less than 100 MHz. If it is not, repeat steps 3 through 10.
12. Disconnect jumper from ground and connect to output of low-voltage dc power supply. Set power supply for an output of -25 Vdc. TUNE test point A7A2TP1 is now at -25 Vdc.
13. Frequency counter indication should be greater than 100 MHz. If it is not, repeat steps 3 through 12. Disconnect power supply from A7A2TP1.

400 MHz Output Adjustment

14. Set the spectrum analyzer to 500 MHz center frequency and 1 GHz frequency span. Calibrate the HP 8566B Spectrum Analyzer (DUT) amplitude at these settings. Do not change settings after calibration.
15. Adjust A7A2C3, A7A2C2, and A7A2C1 400 MHz adjustments, in this order, to maximize the 400 MHz signal and minimize all other harmonics of 100 MHz. It may be necessary to perform the adjustment more than once. This should be done in the order stated each time.
16. The amplitude of the 400 MHz signal should be -9 dBm ± 2 dB. This amplitude is set by selecting attenuator network resistors A7A2R67, A7A2R68, and A7A2R69.

TABLE 5. SELECTION CHART FOR ATTENUATOR RESISTORS

Attenuation (dB)	Resistors		
	R67	R68	R69
0	Open	Short	Open
-1	825	6.8	825
-2	422	12.1	422
-3	261	17.8	261
-4	215	23.7	215
-5	178	31.6	178
-6	147	38.3	147
-7	133	46.4	133
-8	121	51.1	121
-9	110	61.9	110

NOTE

HP Part Numbers for resistors may be found in Table 4.

ADJUSTMENTS

14. 100 MHz VOLTAGE-CONTROLLED CRYSTAL OSCILLATOR (VCXO) ADJUSTMENTS (Cont'd)

17. If the amplitude of the 400 MHz signal is not within 2 dB of -9 dBm, note the amplitude and change the values of A7A2R67, A7A2R68, and A7A2R69 as necessary to adjust the amplitude to -9 dBm ± 2 dB. Table 5 contains a list of attenuations in 1-dB steps and the corresponding values for the attenuator network resistors to adjust the level to -10 dBm. Refer to A7A2 service section in Volume 1 for location of resistors.
18. Note the level of the 100 MHz harmonics as displayed on the spectrum analyzer.
19. The 100 MHz harmonics (which are not multiples of 400 MHz) should be greater than 40 dB down from the 400 MHz signal level except at 200 and 800 MHz. The 200 and 800 MHz harmonics should be greater than 25 dB down from the 400 MHz signal level.
20. Set the spectrum analyzer to 400 MHz center frequency and 50 MHz frequency span. Set VIDEO BW to 30 kHz.
21. Center the 400 MHz signal on the spectrum analyzer display and check for 390 MHz and 410 MHz sidebands (two divisions away on each side of center graticule line). The 390 MHz and 410 MHz sidebands should not be visible on the display. (Greater than 70 dB down from the 400 MHz signal level.)
22. Disconnect the spectrum analyzer, dc power supply, and frequency counter from the A7A2 assembly. Reconnect 83 cable (gray/orange) and 96 cable (white/blue).

ADJUSTMENTS

15. M/N LOOP ADJUSTMENTS

REFERENCE:

A7A4 M/N Output

DESCRIPTION:

The M/N VCO tuning range end points and output level are set and checked to ensure an adequate RF output level across the band of the M/N output.

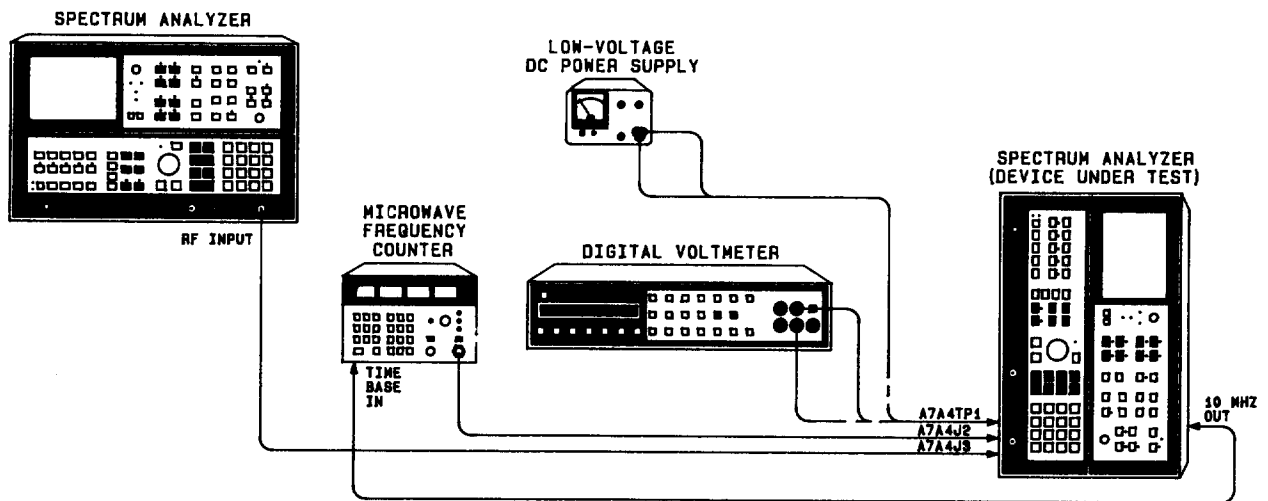


FIGURE 50. M/N LOOP ADJUSTMENT SETUP

EQUIPMENT:

Frequency Counter	HP 5343A
Spectrum Analyzer	HP 8566B
Digital Voltmeter (DVM)	HP 3455A
Low-Voltage DC Power Supply	HP 721A
BNC to SMB Snap-On Test Cable	Part of Service Accessories
Adapter, SMB (Snap-On) Male-to-Male	Part of Service Accessories

PROCEDURE:

1. Position instrument on right side as shown in Figure 50, with bottom cover removed.
2. Set LINE switch to ON and press $\boxed{2-22 \text{ GHz}}$. Press $\boxed{\text{SHIFT}}$ $\boxed{\text{F RES BW}}$. Jumper A12TP2 to A12TP3 (Lock Indicator Disable).
3. Disconnect 93 (white/orange) cable from A7A4J2 M/N OUT and connect frequency counter to this output.
4. Key in $\boxed{\text{SHIFT}}$ $\boxed{\text{F RES BW}}$, $\boxed{\text{CENTER FREQUENCY}}$ 6090.000 MHz, and $\boxed{\text{FREQUENCY SPAN}}$ 0 Hz on the HP 8566B Spectrum Analyzer (DUT).
5. The frequency counter indication should be 197.419 MHz $\pm$ 1 count.

ADJUSTMENTS

15. M/N LOOP ADJUSTMENTS (Cont'd)

6. Connect the DVM to A7A4TP1 TUNE test point. Refer to Figure 51 for location of A7A4 assembly.

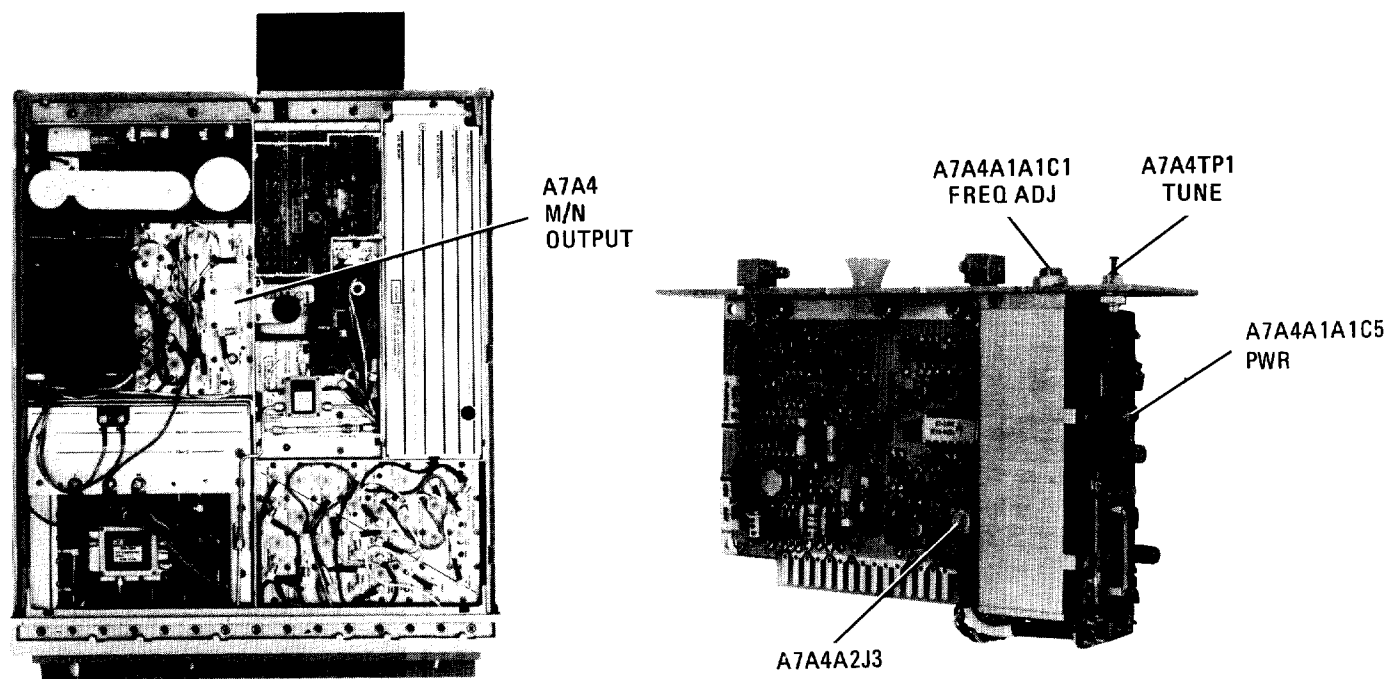


FIGURE 51. LOCATION OF M/N LOOP ADJUSTMENTS

7. Adjust A7A4A1A1C1 FREQ ADJ for DVM indication of -35.0 ± 0.5 Vdc. (Slightly loosen the hex nut to adjust the FREQ ADJ tuning slug. Tighten the hex nut after the appropriate voltage is set.)
8. Key in CENTER
FREQUENCY 2100.000 MHz on the analyzer.
9. Frequency counter indication should be 177.500 MHz and the DVM indication should be -2.3 ± 0.5 Vdc.
10. Set the HP 8566B Spectrum Analyzer (DUT) LINE switch to STANDBY.
11. Disconnect frequency counter and DVM from A7A4 assembly. Disconnect 92 (white/red) cable from A7A4, remove the A7A4 assembly from the instrument and place on extender board.
12. Disconnect 9 (white) cable from A7A4A2J3 and, using SMB male-to-male adapter, connect this cable to the input of the spectrum analyzer. Set HP 8566B Spectrum Analyzer (DUT) LINE switch to ON and press 2 - 22
GHz.
13. Set HP 8566B Spectrum Analyzer (DUT) center frequency to 375 MHz, frequency span to 100 MHz, reference level to +5 dBm, and scale to 2 dB/division. Calibrate amplitude at these settings. Do not change settings after calibration.

ADJUSTMENTS

15. M/N LOOP ADJUSTMENTS (Cont'd)

CAUTION

Do not apply a positive voltage to A7A4TP1, or damage may occur to the VCO tuning diodes.

14. Connect the low-voltage power supply to the analyzer as follows: Positive lead to ground. (Do this first.) Negative lead to A7A4TP1 TUNE test point. Set the output of the supply for -35.0 ± 0.5 Vdc.
15. Adjust A7A4A1A1C5 PWR for a VCO output level of 0 dBm ± 2 dB as indicated on the spectrum analyzer. Refer to Figure 51 for location of adjustment.
16. Slowly reduce the dc voltage output of the low-voltage power supply from -35 Vdc to -2.3 Vdc while monitoring the VCO output level on the spectrum analyzer at A7A4A2J3. The VCO output level at A7A4A2J3 should be greater than -2 dBm between 395 MHz (-35 Vdc) and 355 MHz (-2.3 Vdc).
17. Set LINE switch to STANDBY. Reconnect 9 (white) cable to A7A4A2J3.
18. Repeat steps 2 through 9.
19. Disconnect all test equipment from A7A4 assembly. Set LINE switch to STANDBY and reconnect 9 (white) and 93 (white/orange) cables.
20. Reinstall A7A4 M/N Output Assembly in instrument and remove jumper from A12TP2 to A12TP3 (Lock Indicator Disable).
21. Disconnect cable from HP 8566B Spectrum Analyzer (DUT) rear-panel 10 MHz OUT and frequency counter rear-panel time base input. Return frequency counter time base switch to internal.

ADJUSTMENTS

16. YTO LOOP ADJUSTMENTS

REFERENCE:

A11A5 Sampler
A11A2 YTO Loop Interconnect

RELATED PERFORMANCE TESTS:

Average Noise Level Test

DESCRIPTION:

The sampler is driven by a sweep oscillator and the dc output is monitored with an oscilloscope. The sampler driver circuit is adjusted for maximum amplitude and flatness over the range of M/N Loop. The sampler's IF preamplifier is adjusted for correct output level and the frequency response is checked.

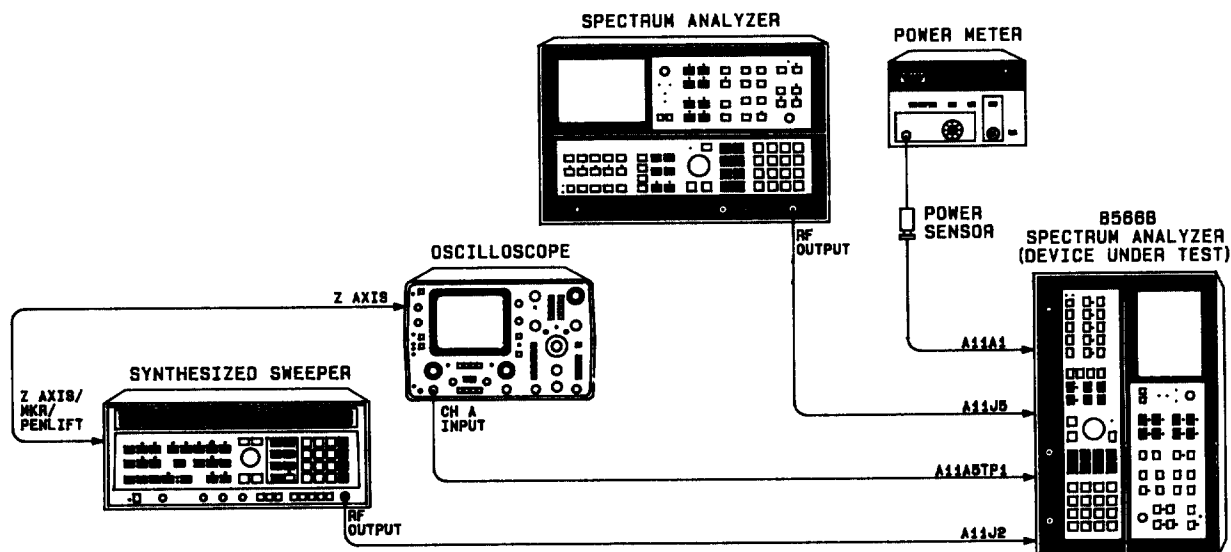


FIGURE 52. YTO LOOP ADJUSTMENTS SETUP

EQUIPMENT:

Spectrum Analyzer	HP 8566A/B
Synthesized Sweeper	HP 8340A
Oscilloscope	HP 1741A
Power Meter/Power Sensor	HP 436A/8481A
10:1 Divider Probe	HP 10004D
50-Ohm Termination (SMA Connector)	HP 1810-0118
BNC to SMB Snap-On Test Cable (2 required)	Part of Service Accessories

16. YTO LOOP ADJUSTMENTS (Cont'd)

PROCEDURE:

1. Set LINE switch to STANDBY. Position instrument on right side as shown in Figure 52, with bottom cover removed.
2. Install the A11 YTO Loop Assembly in the test position. Refer to Repair Procedures in Volume 1 (RF Service), if necessary.
3. Remove A11W1 rigid cable (refer to Figure 53 for location). Remove 50 ohm termination from 1st LO output on front panel and on the YTO OUT Port of A11A1 Coupler/Isolator. Jumper A12TP2 to A12TP3 (Lock Indicator Disable).

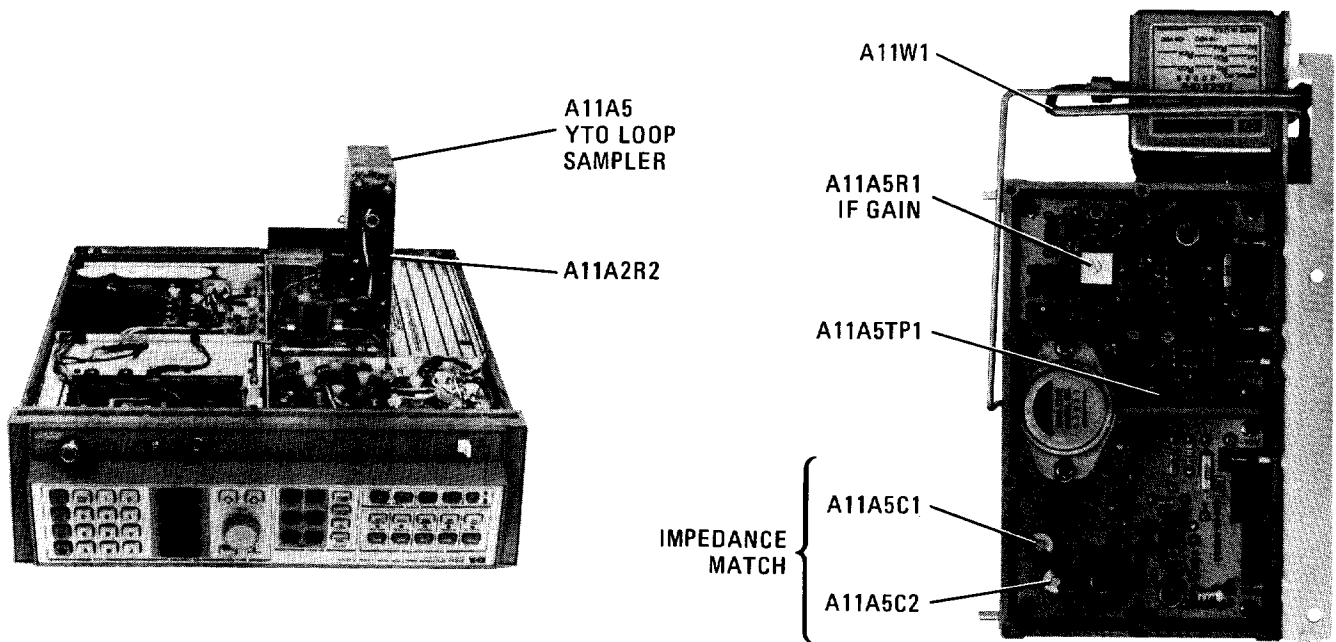


FIGURE 53. LOCATION OF YTO LOOP ADJUSTMENTS

4. Set instrument LINE switch to ON. Press 2.22 GHz.

Gate Bias Adjustment

5. Disconnect coupled output of A11A1 CIA (lift cable by removing rigid cable filter from socket) and connect power meter/power sensor to this output.
6. Key in CENTER
FREQUENCY 2 GHz, FREQUENCY
SPAN 0 Hz.
7. Adjust A11A2R2 Gate Bias Adjust for power meter indication of $-2.5 \text{ dBm} \pm 0.5 \text{ dB}$.
8. Disconnect power meter/power sensor and reconnect cable to coupled output of A11A1 CIA.

ADJUSTMENTS

16. YTO LOOP ADJUSTMENTS (Cont'd)

Sampler Adjustments

9. Remove cover from A11A5 YTO Loop Sampler Assembly.
10. Press **INSTR PRESET** on 8340A Synthesized Sweeper. Set the synthesized sweeper to a start frequency of 87.5 MHz and stop frequency of 287.5 MHz. Power level should be set to + 3.0 dBm. Set markers as follows:

M1 = 160 MHz
M2 = 187 MHz
M3 = 210 MHz

Sweep Time = 200 msec
11. Disconnect M/N IN 93 (white/orange) cable from A11J2. Connect synthesized sweeper RF output to this input connector.
12. Connect oscilloscope to A11A5TP1.
13. Adjust A11A5 IMPEDANCE MATCH adjustments A11A5C1 and A11A5C2 (using an insulated adjustment tool) for an oscilloscope display similar to that in Figure 54. Adjust C1 to put the 210 MHz marker at the most negative point. Then adjust A11A5C2 to place the 160 MHz marker at the most negative point. Now readjust A11A5C1 to make the 160 MHz and 210 MHz markers equally negative. Deviation from reference to maximum negative voltage should be at least 0.4V.

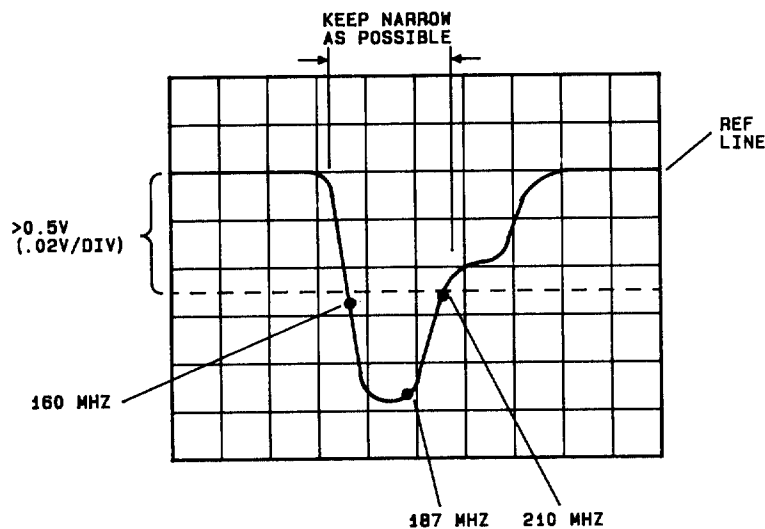
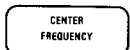
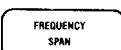


FIGURE 54. TYPICAL SWEPT FREQUENCY RESPONSE AT A11A5TP1

ADJUSTMENTS

16. YTO LOOP ADJUSTMENTS (Cont'd)

14. Disconnect oscilloscope from A11A5TP1.
15. Disconnect the 0 DET OUT 8 (gray) cable from A11J1.
16. Key in   ,  2100 MHz,  0 Hz.
17. Disconnect the IF OUT 0 (black) cable from A11J5 and connect this output connector to the spectrum analyzer input.
18. Set synthesized sweeper controls for a start frequency of 172.5 MHz and stop frequency of 182.5 MHz. Reconnect the synthesized sweeper to A11J2 M/N IN, set the sweep time to 10 seconds, and output amplitude to +3.0 dBm.
19. Set the spectrum analyzer to 50 MHz center frequency, 100 MHz frequency span, and +10 dBm reference level.
20. The IF OUT fundamental, second and third harmonics should be visible at 30, 60, and 90 MHz on the spectrum analyzer display.
21. Adjust A11A5 IF GAIN A11A5R1 for a 30 MHz signal (fundamental) level of +4 dBm.
22. Set the synthesized sweeper as follows:

Start Frequency	172.5 MHz
Stop Frequency	182.5 MHz
Sweep Time	30 sec
Power Level	+30 dBm
Sweep	SINGLE
23. On HP 8566B Spectrum Analyzer (DUT), select TRACE A  . Press Sweep SINGLE on the synthesized sweeper.
24. The displayed fundamental signal level (30 MHz) should be as follows:

From 5 MHz to 20 MHz:	greater than -3 dBm
From 20 MHz to 30 MHz:	between +2 and +6 dBm
From 30 MHz to 60 MHz:	greater than -6 dBm
From 60 MHz to 70 MHz:	greater than -10 dBm
25. Set LINE switch to STANDBY. Disconnect all equipment, reconnect all cables, remove termination, replace cover on A11A5, and reinstall A11 assembly in instrument. Remove jumper between A21TP2 and ground and between A12TP2 and A12TP3 (Lock Indicator Disable).

ADJUSTMENTS

17. 20/30 LOOP PHASE LOCK ADJUSTMENTS

REFERENCE:

A10 20/30 Synthesizer
A10A1 PLL1 VCO
A10A3 PLL1 IF
A10A4 PLL3 Up Converter
A10A5 PLL2 VCO
A10A8 PLL2 Discriminator

DESCRIPTION:

Phase Lock Loop 1 40 kHz LPF is properly adjusted using a function generator and spectrum analyzer with active probe. The response of PLL1 is adjusted for maximum rejection of signals between 160 and 166 MHz using a signal generator and spectrum analyzer.

Phase Lock Loop 2 is adjusted by selecting a very narrow span width and adjusting A10A5 and A10A8 for proper voltages at designated test points. If PLL2 will not phase lock (PL2 UNLOCK indicated), the A10A6 PLL2 Phase Detector must be disabled and a slightly different procedure used initially to set the A10A5 and A10A8 adjustments.

Phase Lock Loop 3 is adjusted for maximum multiplier output level at 160 MHz. The VCO is adjusted by setting up proper voltage levels at A10A4TP3.

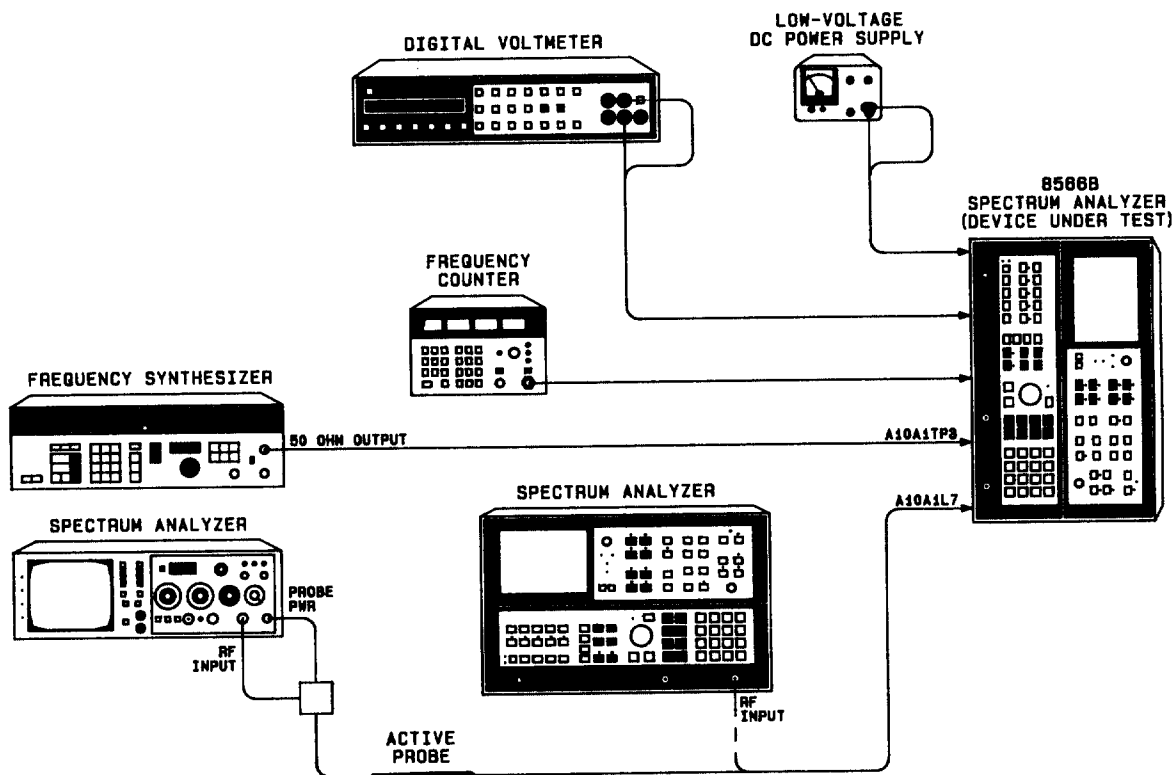


FIGURE 55. 20/30 LOOP PHASE LOCK ADJUSTMENTS SETUP

ADJUSTMENTS

17. 20/30 LOOP PHASE LOCK ADJUSTMENTS (Cont'd)

EQUIPMENT:

Spectrum Analyzer	HP 8557A/853A
Spectrum Analyzer	HP 8566A/B
Active Probe	HP 1121A
Frequency Counter	HP 5343A
Frequency Synthesizer	HP 3335A
Low-Voltage DC Power Supply	HP 721A
Digital Voltmeter	HP 3455A
BNC to SMB Snap-On Test Cable	Part of Service Accessories
Adapter, SMB Male-to-Male	Part of Service Accessories

PROCEDURE:

A. Phase Lock Loop 1

1. Set LINE switch to STANDBY. Remove A10A1 PLL1 VCO from instrument.
2. Connect frequency synthesizer 50 Ohm Output to A10A1TP3.
4. Set HP 8557A Spectrum Analyzer controls as follows:

Center Frequency (TUNING)	LO Feedthrough at left edge
Frequency Span	20 kHz
Resolution Bandwidth	3 kHz
5. Connect active probe to HP 8557A Spectrum Analyzer input and place probe on A10A1L7 terminal closest to A10A1C22.
6. Set frequency synthesizer output level to place 20 kHz signal level at 0 dBm on HP 8557A Spectrum Analyzer.
7. Set function generator to 50.000 ± 0.200 kHz.
8. Adjust A10A1L7 and A10A1L8 50 kHz NULL adjustments to null the 50 kHz signal displayed on the HP 8557A Spectrum Analyzer. Refer to Figure 56 for location of adjustments.
9. Note the level of the 50 kHz signal. This level should be at least 65 dB down from the level of the 20 kHz response. Disconnect test equipment from A10A1 assembly.
10. Place A10A1 PLL1 VCO on extender board and install in instrument. Connect all cables. Turn instrument LINE switch ON. Press .
11. Key in  0 Hz.
12. Disconnect the active probe from HP 8566B Spectrum Analyzer (DUT) and connect the HP 8566A/B Spectrum Analyzer input to A10A1J3 200-300 MHz OUT, using a BNC to SMB snap-on test cable. Set the HP 8566B Spectrum Analyzer (DUT) to a 300 MHz center frequency and a 500 MHz frequency span.
13. Set a low voltage power supply for $+16.0 \pm 0.1$ Vdc. Connect the positive lead to A10A1TP3 and the negative lead to any convenient chassis ground.

ADJUSTMENTS

17. 20/30 LOOP PHASE LOCK ADJUSTMENTS (Cont'd)

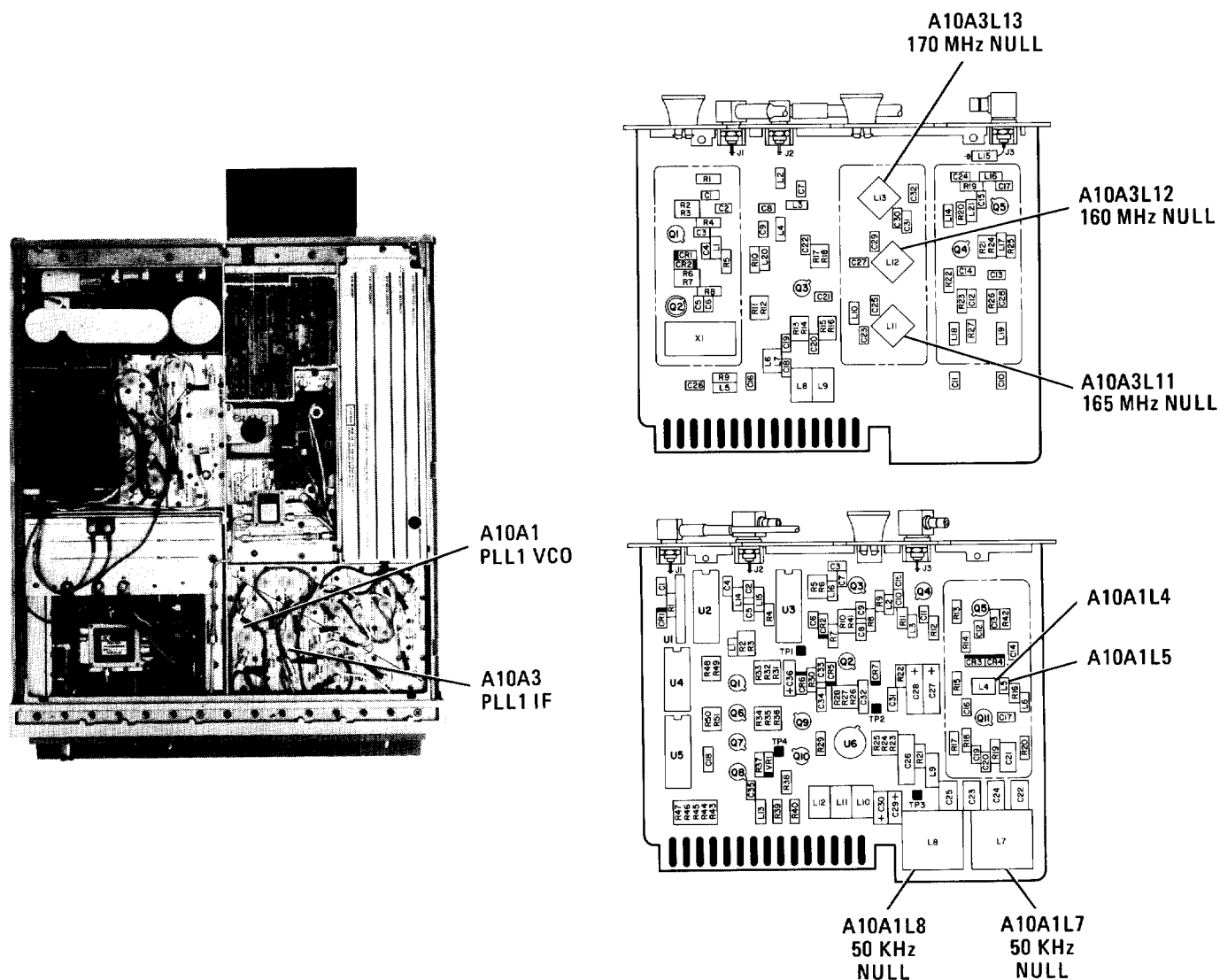


FIGURE 56. LOCATION OF PLL1 ADJUSTMENTS

14. Oscillator frequency should be 310 ± 10 MHz as indicated on the HP 8566A/B Spectrum Analyzer. If it is not, remove the metal shield from the spectrum analyzer (DUT) A10A1 assembly and increase or decrease spacing between turns of A10A1L4 and A10A1L5 to tune the oscillator properly. The frequency of the oscillator is increased by decreasing the inductance of L4 (spreading the turns apart), and decreased by increasing the inductance of L5 (enlarging the loop).
15. Change power supply voltage to $+4.0 \pm 0.1$ Vdc.
16. Oscillator frequency should drop below 200 MHz with an amplitude greater than -7 dBm.
17. Repeat steps 13 through 16 if necessary to meet requirements.
18. Set LINE switch to STANDBY. Replace metal shield on A10A1 if removed, reinstall A10A1 PLL1 VCO assembly in instrument and reconnect all cables.

ADJUSTMENTS

17. 20/30 LOOP PHASE LOCK ADJUSTMENTS (Cont'd)

B. Phase Lock Loop 2

NOTE

If PLL2 is phase-locked, proceed to step B12. If PLL2 will not phase lock (PL2 UNLOCK indicated on CRT), start with step B1.

1. Set LINE switch to STANDBY. Remove A10A6 PLL2 $\emptyset$ Detector from its connector on the motherboard. (It is not necessary to completely remove the A10A6 assembly from the instrument.)
2. Set LINE switch to ON and press $\boxed{2-22 \text{ GHz}}$.
3. Remove 7 (violet) cable from A10A5J4 SCAN ≤ 1 MHz and connect frequency counter to A10A5J4, using BNC to SMB snap-on test cable.
4. Key in $\boxed{\text{STOP FREQ}}$ 10 MHz, $\boxed{\text{START FREQ}}$ 8.600 MHz, $\boxed{\text{SHIFT}}$ $\boxed{\text{MKR REF LVL}}$ $\boxed{R}$, SWEEP $\boxed{\text{SINGLE}}$.
5. Connect DVM to A10A8TP5 VCO TUNE.
6. Adjust A10A5R2 150 MHz adjustment for a DVM indication of $+3.0 \pm 0.5\text{V}$. Refer to Figure 57 for location of adjustments.
7. Adjust A10A8R9 .3 MHz adjustment for a frequency counter indication of 0.300 ± 0.001 MHz.
8. Key in $\boxed{\text{START FREQ}}$ 8.599 MHz (CRT annotation will round off to 8.60 MHz, but HP 8566B Spectrum Analyzer (DUT) is actually set to a start frequency of 8.599 MHz). Press SWEEP $\boxed{\text{SINGLE}}$.
9. Adjust A10A5R4 100 MHz adjustment for a DVM indication of $+15.0 \pm 0.5\text{V}$.
10. Adjust A10A8R41 .2 MHz adjustment for a frequency counter indication of 0.200 ± 0.001 MHz.
11. Reinstall A10A6 PLL2 $\emptyset$ Detector and reconnect 7 (violet) cable to A10A5J4 SCAN ≤ 1 MHz.
12. Set LINE switch to ON. Press $\boxed{2-22 \text{ GHz}}$.
13. Key in $\boxed{\text{STOP FREQ}}$ 10 MHz, $\boxed{\text{START FREQ}}$ 8.600 MHz, SWEEP $\boxed{\text{SINGLE}}$.
14. Connect DVM to A10A8TP5 VCO TUNE.
15. Adjust A10A5R2 150 MHz adjustment for a DVM reading of $+3.00 \pm 0.05\text{V}$.
16. Connect DVM to A10A6TP7 $\emptyset$ DET OUT.
17. Adjust A10A8R9 .3 MHz adjustment for a DVM indication of $+3.50 \pm 0.05\text{V}$.
18. Key in $\boxed{\text{START FREQ}}$ 8.599 MHz (CRT annotation will round off to 8.60 MHz, but HP 8566B Spectrum Analyzer (DUT) is actually set to a start frequency of 8.599 MHz).
19. Connect DVM to A10A8TP5 VCO TUNE.
20. Adjust A10A5R4 100 MHz adjustment for a DVM indication of $+15.00 \pm 0.05\text{V}$.

566A SIG NOISE (NO PLZ WACK)

MEZBANE
@ .1KHZ SPAN

1.6 "

(NO PLZ MSG)

A8 VCO TUNE TP @ 4.43V (LCKD)

A6 ϕ DET. TP @ 3.50V "

(ABOVE @ 100KHZ/SPK/1KHZ/SGLSWP)

W/A6 INSERTED MAINFRAME

BY RESPONSIBILITY CODE
PROJECT RS CY LSTAL NCTAL
C AVG C
00 CD CRIS/MAINT
1 3

Line	Frequency	Power	Mode	Band	Notes
1	15.46	9	*	9	1111-1455 X0G1-709720M 5131-711-450 X0X0-09660 TRCA-RPL FUSES X011-724965 1111-11760 1115-06390 UNIT X0X1-723900
2	1.54	0	*	7	111117500 SET AT 111117500 CAL'D 115717500-OVERT 1115717500BURNIT 111117500SET AT 1111717500 111117500SET TO 111116780LSET TO
3	1.29	1	*	0	135194015
4	1.08	0	*	7	135194015
5	1.25	0	*	2	153111450 111109765
6	1.29	1	*	5	131169025 X0X3109405 X0X0-709405 X0X1-12-950 511009405 CAL S X13009405 CAL S
7	1.25	0	*	2	153111450 111109765
8	1.25	0	*	2	153111450 111109765
9	1.25	0	*	2	153111450 111109765
10	1.25	0	*	2	153111450 111109765
11	1.25	0	*	2	153111450 111109765
12	1.25	0	*	2	153111450 111109765
13	1.25	0	*	2	153111450 111109765
14	1.25	0	*	2	153111450 111109765
15	1.25	0	*	2	153111450 111109765
16	1.25	0	*	2	153111450 111109765
17	1.25	0	*	2	153111450 111109765
18	1.25	0	*	2	153111450 111109765
19	1.25	0	*	2	153111450 111109765
20	1.25	0	*	2	153111450 111109765
21	1.25	0	*	2	153111450 111109765
22	1.25	0	*	2	153111450 111109765
23	1.25	0	*	2	153111450 111109765
24	1.25	0	*	2	153111450 111109765
25	1.25	0	*	2	153111450 111109765
26	1.25	0	*	2	153111450 111109765
27	1.25	0	*	2	153111450 111109765
28	1.25	0	*	2	153111450 111109765
29	1.25	0	*	2	153111450 111109765
30	1.25	0	*	2	153111450 111109765
31	1.25	0	*	2	153111450 111109765
32	1.25	0	*	2	153111450 111109765
33	1.25	0	*	2	153111450 111109765
34	1.25	0	*	2	153111450 111109765
35	1.25	0	*	2	153111450 111109765
36	1.25	0	*	2	153111450 111109765
37	1.25	0	*	2	153111450 111109765
38	1.25	0	*	2	153111450 111109765
39	1.25	0	*	2	153111450 111109765
40	1.25	0	*	2	153111450 111109765
41	1.25	0	*	2	153111450 111109765
42	1.25	0	*	2	153111450 111109765
43	1.25	0	*	2	153111450 111109765
44	1.25	0	*	2	153111450 111109765
45	1.25	0	*	2	153111450 111109765
46	1.25	0	*	2	153111450 111109765
47	1.25	0	*	2	153111450 111109765
48	1.25	0	*	2	153111450 111109765
49	1.25	0	*	2	153111450 111109765
50	1.25	0	*	2	153111450 111109765
51	1.25	0	*	2	153111450 111109765
52	1.25	0	*	2	153111450 111109765
53	1.25	0	*	2	153111450 111109765
54	1.25	0	*	2	153111450 111109765
55	1.25	0	*	2	153111450 111

ADJUSTMENTS

17. 20/30 LOOP PHASE LOCK ADJUSTMENTS (Cont'd)

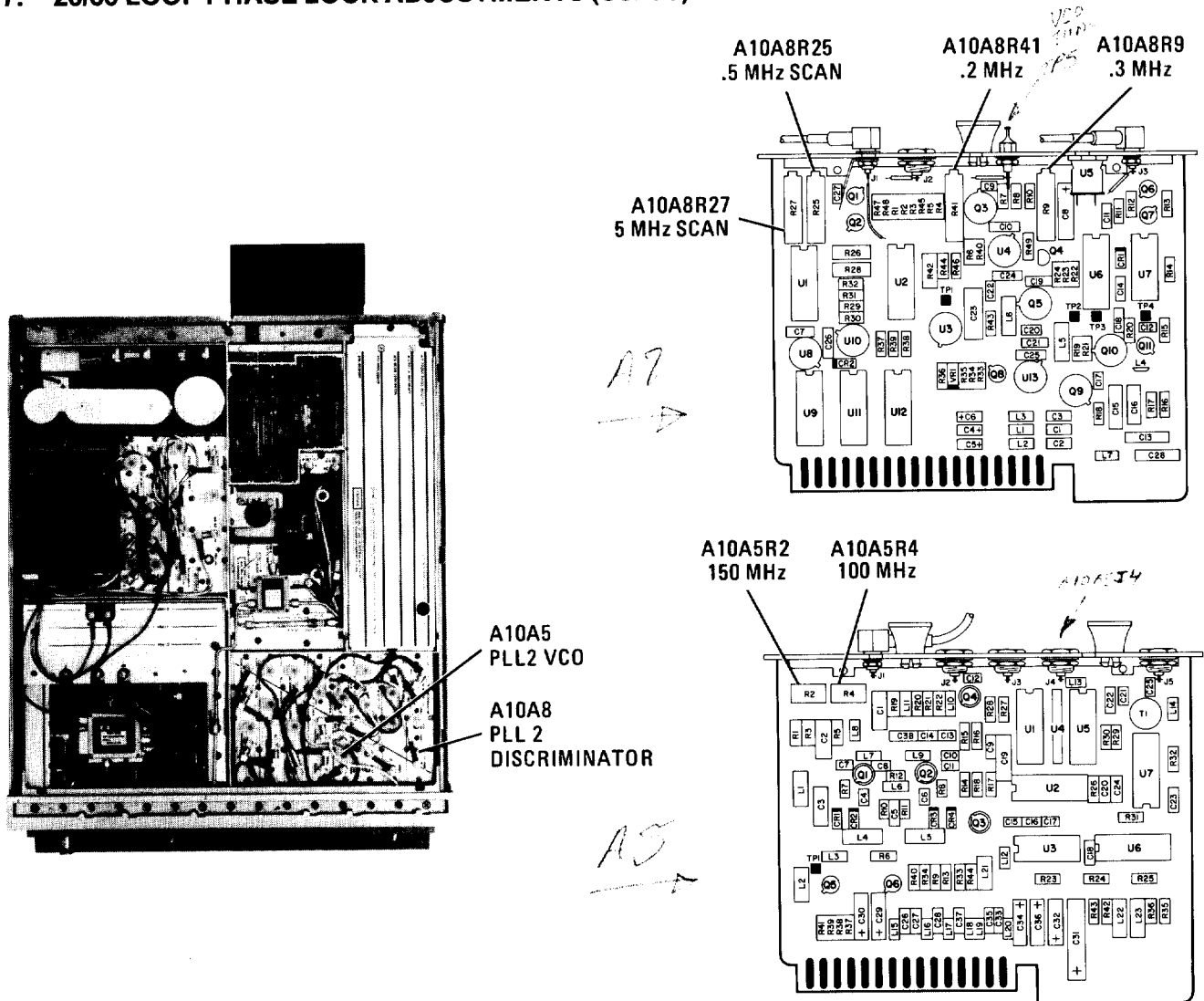


FIGURE 57. LOCATION OF PLL2 ADJUSTMENTS

21. Connect DVM to A10A6TP7 $\emptyset$ DET OUT.
22. Adjust A10A8R41 .2 MHz adjustment for a DVM indication of $3.50 \pm 0.05V$.
23. Repeat steps B-13 through B-22 until no further adjustment is required.
24. Connect front-panel CAL OUTPUT to RF INPUT.
25. Key in 100.5 MHz, 95.5 MHz, 100 msec.
26. Adjust A10A8R27 5 MHz SCAN to center 100 MHz CAL OUTPUT signal on the ninth graticule line.
27. Key in 100.05 MHz, 99.55 MHz, 500 msec.
28. Adjust A10A8R25 .5 MHz SCAN to center 100 MHz CAL OUTPUT signal on the ninth graticule line.

ADJUSTMENTS

17. 20/30 LOOP PHASE LOCK ADJUSTMENTS (Cont'd)

C. Phase Lock Loop 3

1. Set LINE switch to STANDBY. Remove A10A4 PLL3 Up Converter and install on extender board.
2. Set LINE switch to ON and press 2 - 22
GHz . Key in FREQUENCY
SPAN 0 Hz.
3. Connect HP 8566A/B Spectrum Analyzer to Test Connector A10A4J4. Set the HP 8566A/B Spectrum Analyzer settings as follows:

CENTER FREQUENCY	160 MHz
REFERENCE LEVEL	Top Graticule Line
ENTER dB/DIV	1 dB

4. Adjust A10A4L16, A10A4L17, and A10A4C50 160 MHz PEAK for maximum signal level at 160 MHz. Iteration of L16 and L17 adjustment may be necessary. Refer to Figure 58 for location of adjustments.

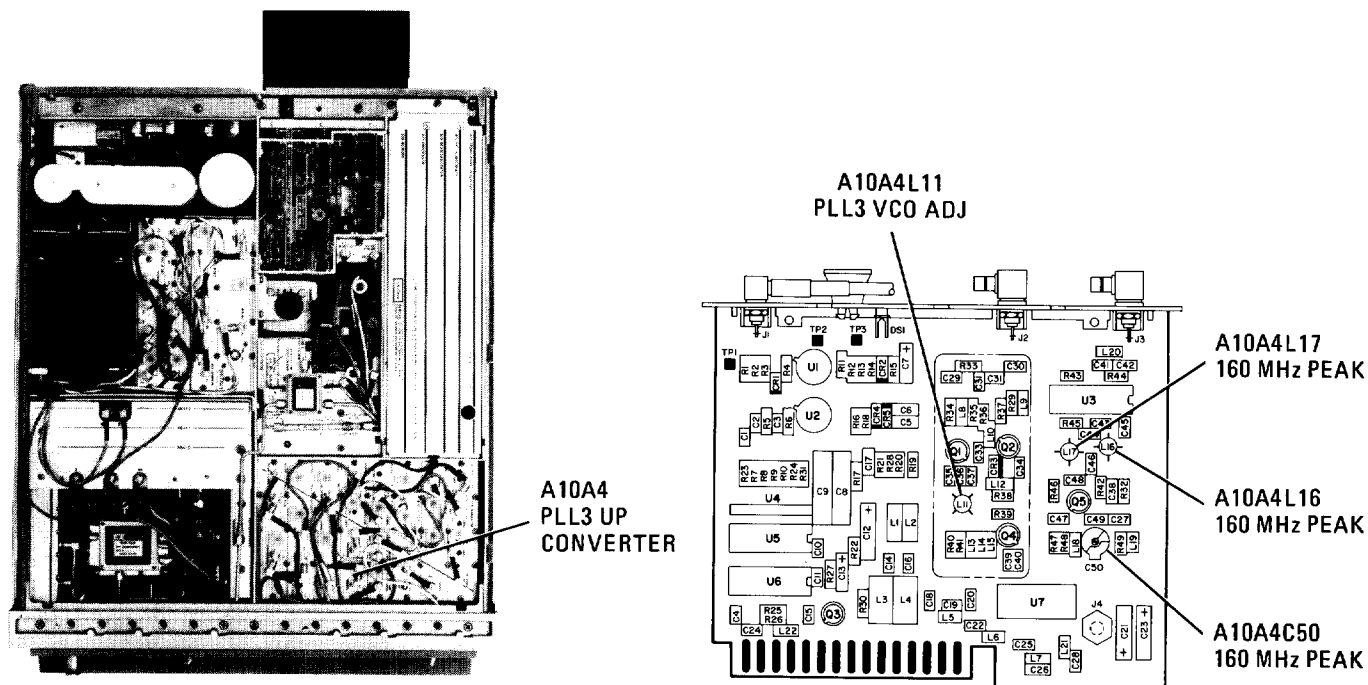


FIGURE 58. LOCATION OF PLL3 ADJUSTMENTS

ADJUSTMENTS

17. 20/30 LOOP PHASE LOCK ADJUSTMENTS (Cont'd)

5. Key in 42.450 MHz, 100 kHz, SWEEP .
6. Set HP 8566A/B Spectrum Analyzer to center frequency of 6 MHz. Press 10 dB.
7. The 6 MHz signal displayed should be at least -42 dBm. If it is not, repeat steps 1 through 6.
8. Disconnect HP 8566A/B Spectrum Analyzer. Connect DVM to A10A4TP3.
9. Adjust A10A4L11 PLL3 VCO ADJ for DVM indication of -7.0 ± 0.1 Vdc. The voltage may not change with initial adjustment but will change once the phase lock loop locks.
10. Change to 42.57 MHz and to 0 Hz. Press to initiate a sweep.
11. DVM indication should be -3.0 ± 0.5 Vdc.
12. Set LINE switch to STANDBY. Disconnect test equipment and reinstall A10A4 PLL3 Up Converter in HP 8566B Spectrum Analyzer (DUT).

ADJUSTMENTS

18. RF MODULE PHASE LOCK ADJUSTMENTS

REFERENCE:

A6A9 Phase Lock

DESCRIPTION:

The A6A9 Phase Lock Assembly sampler is adjusted and checked for proper operation. The 300 MHz signal is peaked using an HP 8566B Spectrum Analyzer to observe the signal.

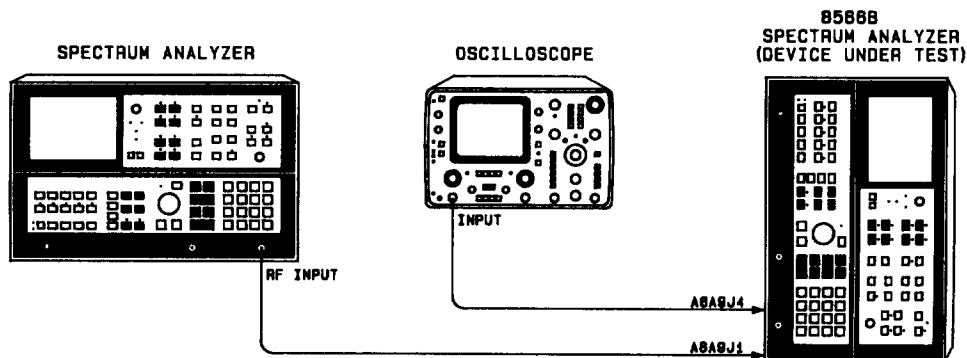


FIGURE 59. RF MODULE PHASE LOCK ADJUSTMENTS SETUP

EQUIPMENT:

Spectrum Analyzer	HP 8566A/B
Oscilloscope	HP 1741A
BNC to SMB Snap-On Test Cable	Part of Service Accessories

PROCEDURE:

1. Allow instrument to warm up for one hour.
2. With LINE switch in STANDBY, place instrument on right side as shown in Figure 59, with bottom cover removed. Disconnect 82 and 84 (gray/red and gray/yellow) cables from A6A12 and remove A6 assemblies cover.
3. Remove A6A9 Phase Lock from instrument. Disconnect all cables. Remove cover. Place on extender board in instrument. Reconnect 100 MHz input (gray/green) cable to J3 and reconnect 82 and 84 cables to A6A12 assembly.
4. Set the HP 8566B Spectrum Analyzer (DUT) LINE switch to ON and press 2-22
GHz.

ADJUSTMENTS

18. RF MODULE PHASE LOCK ADJUSTMENTS (Cont'd)

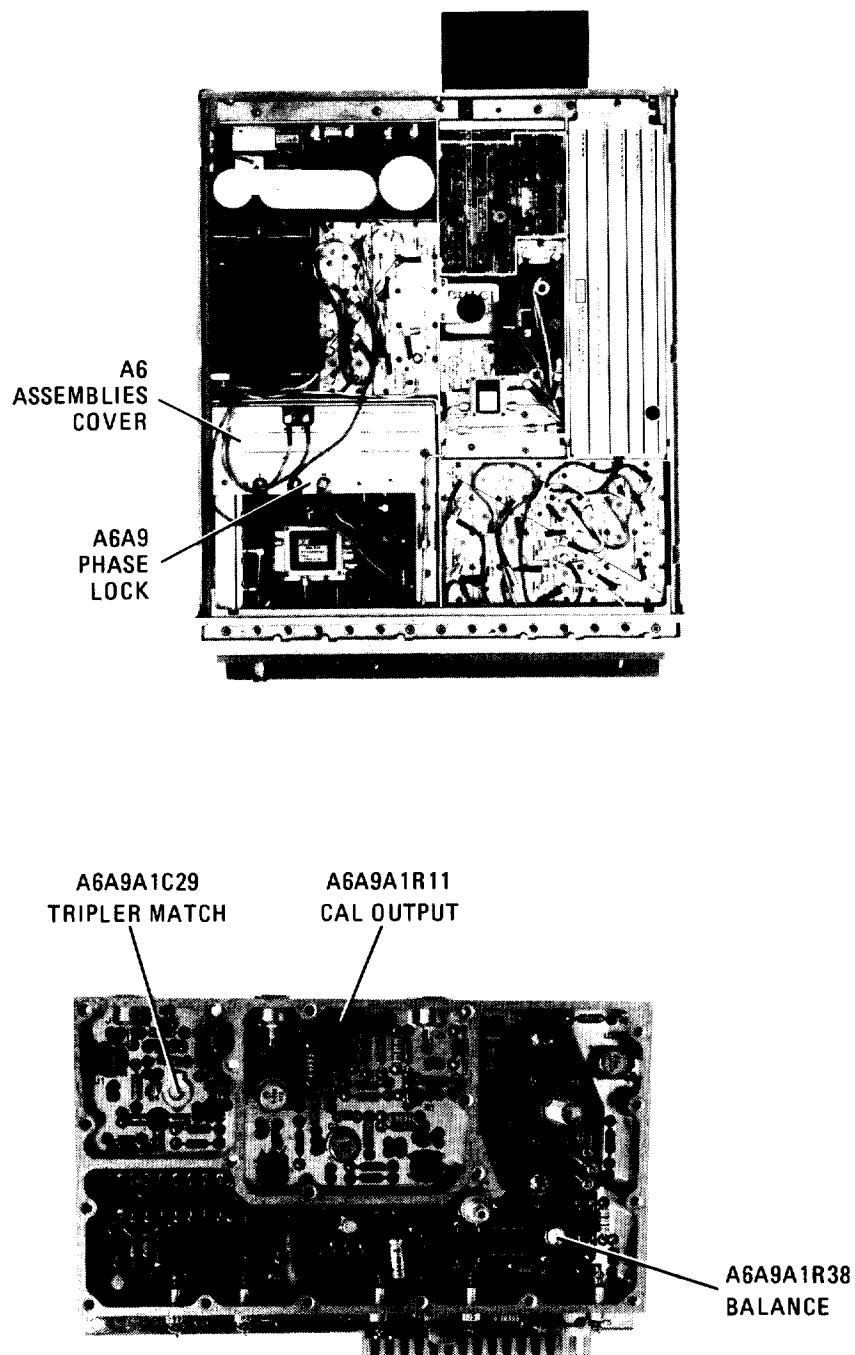


FIGURE 60. LOCATION OF RF MODULE PHASE LOCK ADJUSTMENTS

ADJUSTMENTS

18. RF MODULE PHASE LOCK ADJUSTMENTS (Cont'd)

Tripler Adjustments

5. Set spectrum analyzer controls as follows:

Full Span	2 - 22 GHz
Center Frequency	300 MHz
Freq Span	1 GHz
Input Attenuation	40 dB
Reference Level	+30 dBm

6. Connect A6A9J1 Phase Lock 300 MHz OUTPUT to the spectrum analyzer input.
7. Adjust A6A9A1C29 TRIPLER MATCH to set the 300 MHz signal level at +18.5 dB (+.5 or -1 dB).

Balance Adjustment

8. Key in 2 - 22 GHz on HP 8566B Spectrum Analyzer (DUT).

9. Set the 1741 A oscilloscope controls as follows:

Sweep Time	1 msec/div
Amplitude	10 V/div

10. Connect A6A9J4 TUNE VOLTAGE output to the 1741A oscilloscope input, using an SMB to BNC cable.
11. The oscilloscope display waveform should be similar to Figure 61.
12. Adjust A6A9R38 for a $1.5 \pm .5$ msec "dead time."

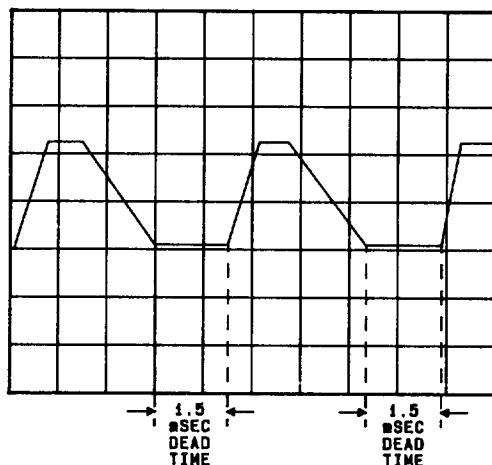


FIGURE 61. BALANCE ADJUSTMENT WAVEFORM

ADJUSTMENTS

19. CAL OUTPUT ADJUSTMENT

REFERENCE:

A6A9 Phase Lock

RELATED PERFORMANCE TEST:

Calibrator Amplitude Accuracy Test

DESCRIPTION:

A power meter is used to measure the output level of the 100 MHz CAL OUTPUT signal. This level is adjusted, if necessary, for a specified level. Harmonic level of this calibrator output is checked using a spectrum analyzer.

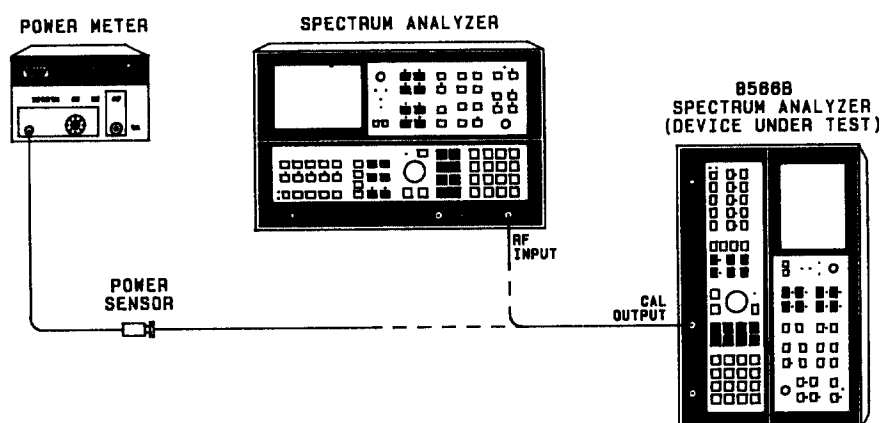


FIGURE 62. CAL OUTPUT ADJUSTMENT SETUP

EQUIPMENT:

Power Meter/Power Sensor	HP 436A/8481A
Spectrum Analyzer	HP 8566A/B

PROCEDURE:

1. Place instrument on right side as shown in Figure 62, with bottom cover removed. Remove A6 assemblies cover. Refer to Figure 63.
2. Connect power meter/power sensor to front-panel CAL OUTPUT connector.
3. Set LINE switch to ON and press 2 - 22
GHz.
4. Set A6A9A1R11 CAL OUTPUT fully clockwise and record power meter indication.
5. Set A6A9A1R11 CAL OUTPUT fully counterclockwise and record power meter indication.

19. CAL OUTPUT ADJUSTMENT (Cont'd)

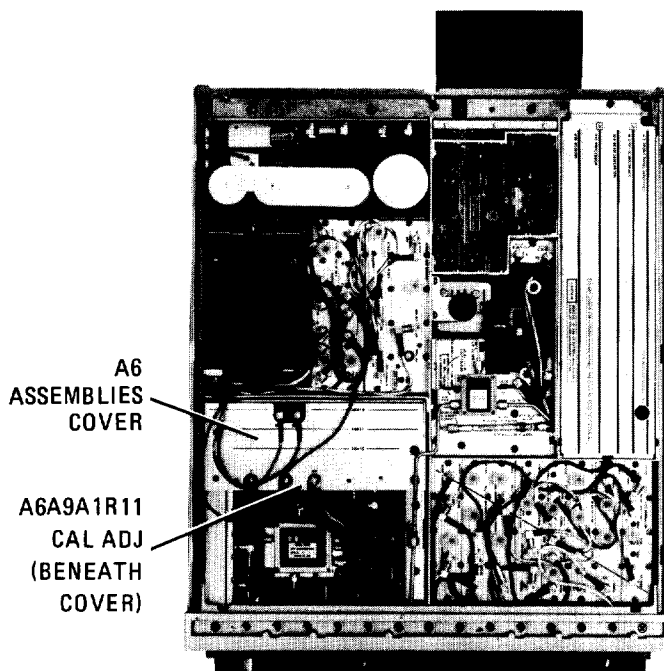


FIGURE 63. LOCATION OF CAL OUTPUT ADJUSTMENT

6. The full range of adjustment of A6A9A1R11 (steps 4 and 5) should be -11 dBm to -9 dBm. If the range is on the low side, e.g. -13 dBm to -9.5 dBm, decrease the value of A6A9A1R10. If the range is on the high side, e.g. -10.5 dBm to -7 dBm, increase the value of A6A9A1R10. (Range of values for R10 is 750 to 1.5K ohms.) Select value to place range as close as possible to -11 dBm to -9 dBm.
7. Adjust A6A9A1R11 CAL OUTPUT for power meter indication of -10.00 ± 0.01 dBm.
8. Disconnect power meter/power sensor and connect the spectrum analyzer to the front-panel CAL OUTPUT connector on the HP 8566B Spectrum Analyzer (DUT).
9. Key in $2-22$ GHz on the spectrum analyzer.
10. Adjust the spectrum analyzer to place the 100 MHz calibrator signal at the left edge of the display. Adjust reference level to place signal peak at the top graticule line.
11. Note level of displayed harmonics. All harmonics should be greater than 25 dB down from peak of -10 dBm, 100 MHz calibrator signal.
12. If harmonics are not greater than 25 dB down, A6A9A1C29 TRIPLER MATCH may be adjusted to sufficiently reduce harmonics. If this adjustment is made, however, it is necessary to recheck the A6A9J1 300 MHz OUTPUT (using the spectrum analyzer) to ensure that the output level is greater than $+17.5$ dBm. If the output is too low, repeat steps 5 through 7 of Adjustments 18, RF Module Phase Lock Adjustments, and steps 8 through 11 of this procedure.
13. Replace A6 assemblies cover.

ADJUSTMENTS

20. LAST CONVERTER ADJUSTMENTS

REFERENCE:

A6A3 Last Converter

DESCRIPTION:

A 321.4 MHz signal (IF) is applied to the Last Converter using a signal generator and the 321.4 MHz Bandpass Filter is adjusted. The 10.7 MHz frequency is nulled at the output by injecting a signal of 310.7 MHz at the input and adjusting the NOTCH ADJ to minimize the 10.7 MHz signal at the output.

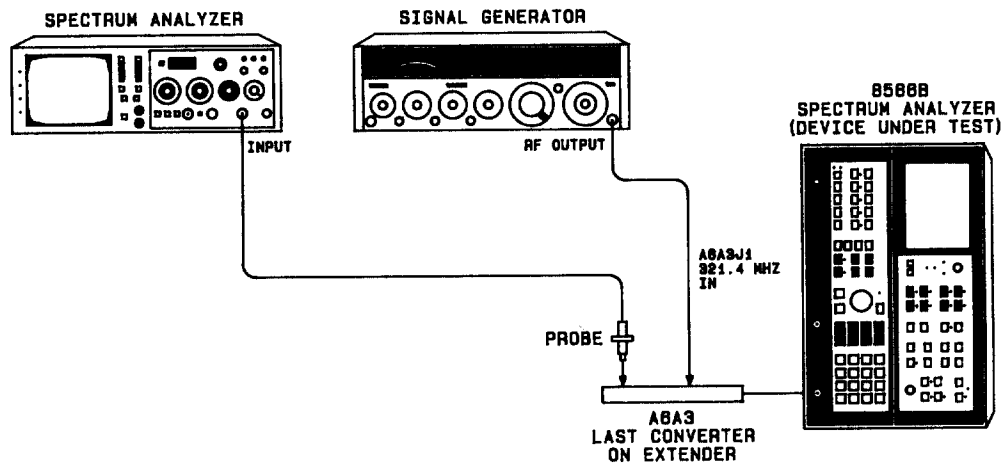


FIGURE 64. LAST CONVERTER ADJUSTMENTS SETUP

EQUIPMENT:

Signal Generator	HP 8640B
Spectrum Analyzer	HP 8557A/853A
2 x 15 Pin Extender Board	Part of Service Accessories
Probe (SMB Male Bulkhead Connector)	HP 1250-0691
BNC to SMB Snap-On Test Cable (2 required)	Part of Service Accessories

PROCEDURE:

1. Set LINE switch to STANDBY. Place instrument upside down and remove bottom cover. Remove A6 assemblies cover and remove A6A9 through A6A12 assemblies.
2. Remove RF Section right side cover and remove two screws attaching A6A3. Remove A6A3 Last Converter and place on extender board. Place instrument on right side as shown in Figure 64.
3. Disconnect 321.4 MHz IN (brown cable) and 21.4 MHz OUT (gray/brown cable) from A6A3 Last Converter. Leave 300 MHz IN (red cable) connected. Reinstall A6A9 through A6A12 assemblies.
4. Adjust A6A3 Bandpass Filter Adjustments A6A3A1C8, C9, C10, C11, and C12 to maximum capacitance position (plates fully meshed). Refer to Figure 65 for location of adjustments.

ADJUSTMENTS

20. LAST CONVERTER ADJUSTMENTS (Cont'd)

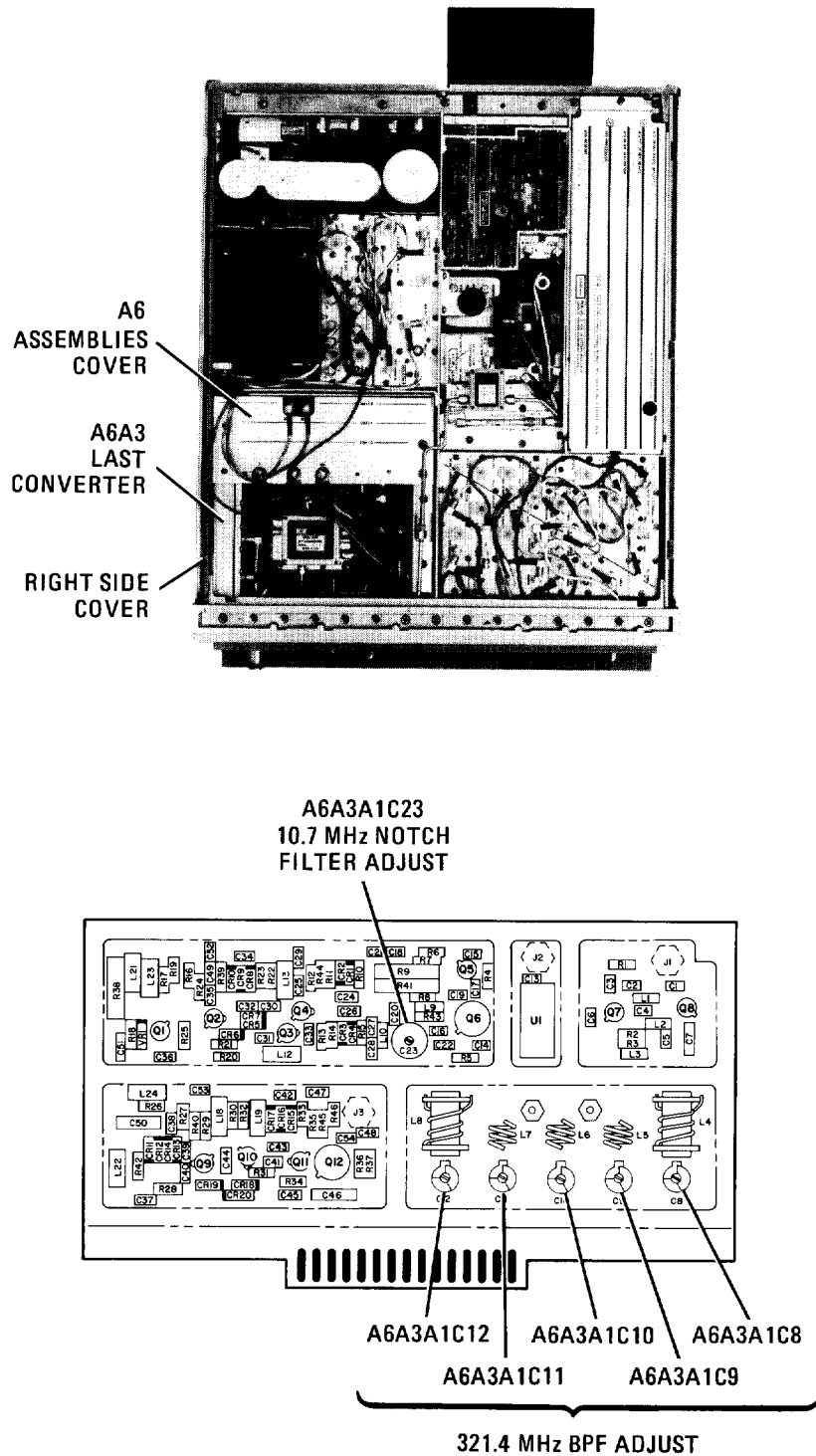


FIGURE 65. LOCATION OF LAST CONVERTER ADJUSTMENTS

ADJUSTMENTS

20. LAST CONVERTER ADJUSTMENTS (Cont'd)

5. Set HP 8566B Spectrum Analyzer (DUT) LINE switch to ON. Press 0 - 2.5 GHz , SWEEP SINGLE .
6. Connect BNC to SMB snap-on cable and probe (SMB male bulkhead connector) to input of the spectrum analyzer.
7. Set the spectrum analyzer controls as follows:

Center Frequency	321.4 MHz
Frequency Span/Division	5 MHz
Resolution Bandwidth	1 MHz
Reference Level	-30 dBm
Input Attenuation	0 dB
8. Set 8640B Signal Generator for an output of 321.40 MHz at -20 dBm and connect output to A6A3J1 321.4 MHz IN.
9. Place probe connected to the spectrum analyzer in adjustment hole above A6A3A1C9. Do not allow probe tip to touch capacitor, indicated by a sudden jump in signal level on the spectrum analyzer CRT display.
10. Using a non-metallic adjustment tool, adjust A6A3A1C8 for highest signal level (maximum) as displayed on the spectrum analyzer.
11. Move probe to adjustment hole above A6A3A1C8. Do not allow probe tip to touch capacitor.
12. Adjust A6A3A1C9 for lowest signal level (minimum) as displayed on the spectrum analyzer.
13. Adjust A6A3A1C10 for highest signal level (maximum) as displayed on the spectrum analyzer.
14. Adjust A6A3A1C11 for lowest signal level (minimum) as displayed on the spectrum analyzer.
15. Adjust A6A3A1C12 for highest signal level (maximum) as displayed on the spectrum analyzer.
16. Remove probe (SMB male bulkhead connector) from cable connected to the spectrum analyzer.
17. Set the spectrum analyzer controls as follows:

Center Frequency (TUNING)	LO Feedthrough at left edge
Frequency Span/Division	2 MHz
Resolution Bandwidth	300 kHz
Reference Level	-30 dBm
Input Attenuation	0 dB
18. Set HP 8640B Signal Generator output to 310.70 MHz at -40 dBm.
19. Connect cable from the spectrum analyzer to A6A3J3 21.4 MHz OUT.
20. Adjust A6A3A1C23 10.7 MHz Notch Filter adjustment for minimum signal level as displayed on the spectrum analyzer.
21. Set LINE switch to STANDBY. Reinstall A6A3 Last Converter and A6A9 through A6A12 assemblies. Reinstall covers and reconnect all cables.

21. FREQUENCY RESPONSE ADJUSTMENTS

REFERENCE:

A6A10 Miscellaneous Bias/Relay Driver
A6A11 Slope Generator
A6A12 YTX Driver

RELATED PERFORMANCE TEST:

Frequency Response Test

DESCRIPTION:

Frequency response (flatness) is adjusted in five parts corresponding to the five harmonic bands of the analyzer (.01 – 2.5 GHz, 2.0 – 5.8 GHz, 5.8 – 12.5 GHz, and 12.5 – 18.6 GHz, and 18.6 – 22 GHz). In each band, the analyzer is swept with a sweep oscillator over the frequency range to be adjusted. The sweep of the sweep oscillator is programmed using the SWEEP + TUNE (– 1V/GHz) output of the analyzer and a special Tuning Voltage Circuit to provide phase locking of the analyzer to the sweep oscillator. The bands are adjusted for optimum flatness and equal amplitudes.

EQUIPMENT:

Sweep Oscillator	HP 8620C
RF Plug-In (2 – 22 GHz)	HP 86290B, Opt. H08
RF Plug-In (.01 – 2.4 GHz)	HP 86222A
Power Meter/Thermistor Mount (18 – 22 GHz)	HP 432A/K486A
Power Meter/Power Sensor (.01 – 18 GHz)	HP 432A/8478B
Synchronizer	HP 8709A, Opt. H10
Digital Voltmeter (DVM)	HP 3455A
Function Generator	HP 3310A
Cable Assembly, SMA Male Connectors	B&W 55-S142-55-24
20 dB Attenuator	HP 8491B, Opt. 020
Adapter, K-Band Waveguide – SMA Female	Maury K210C
Adapter, Type N (m) to SMA (f)	HP 1250-1250
Adapter, Type N (f) to SMA (f)	HP 86290-60005
Adapter, Type N (f) to BNC (m)	HP 1250-0077
Tuning Voltage Circuit	Refer to Figure 83

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

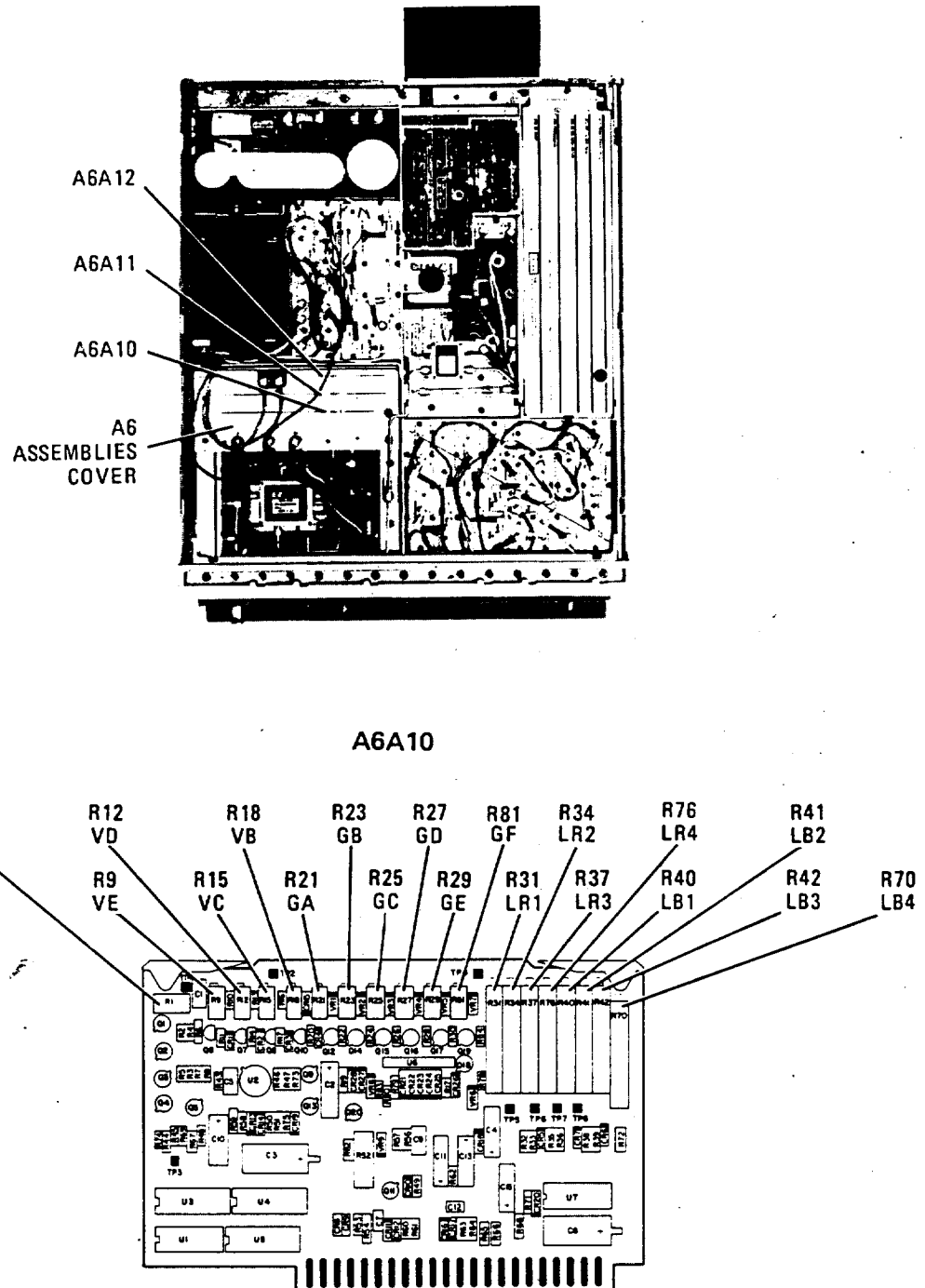


FIGURE 66. LOCATION OF FREQUENCY RESPONSE ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

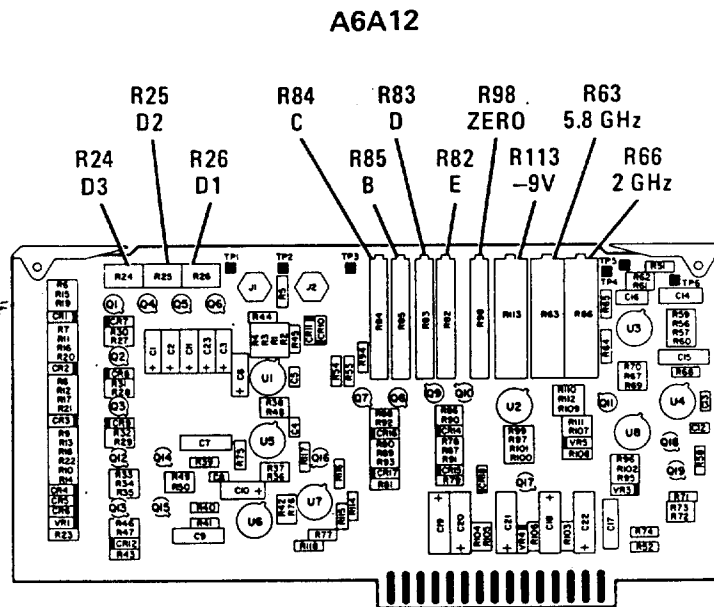
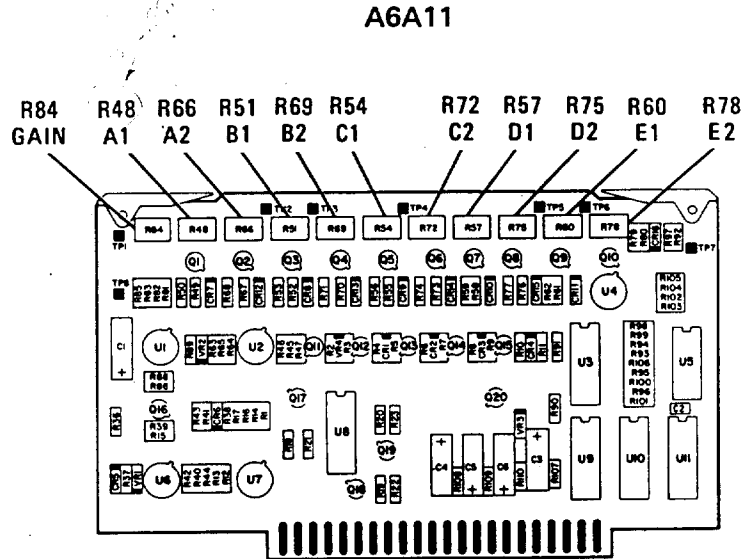


FIGURE 67. LOCATION OF FREQUENCY RESPONSE ADJUSTMENTS

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

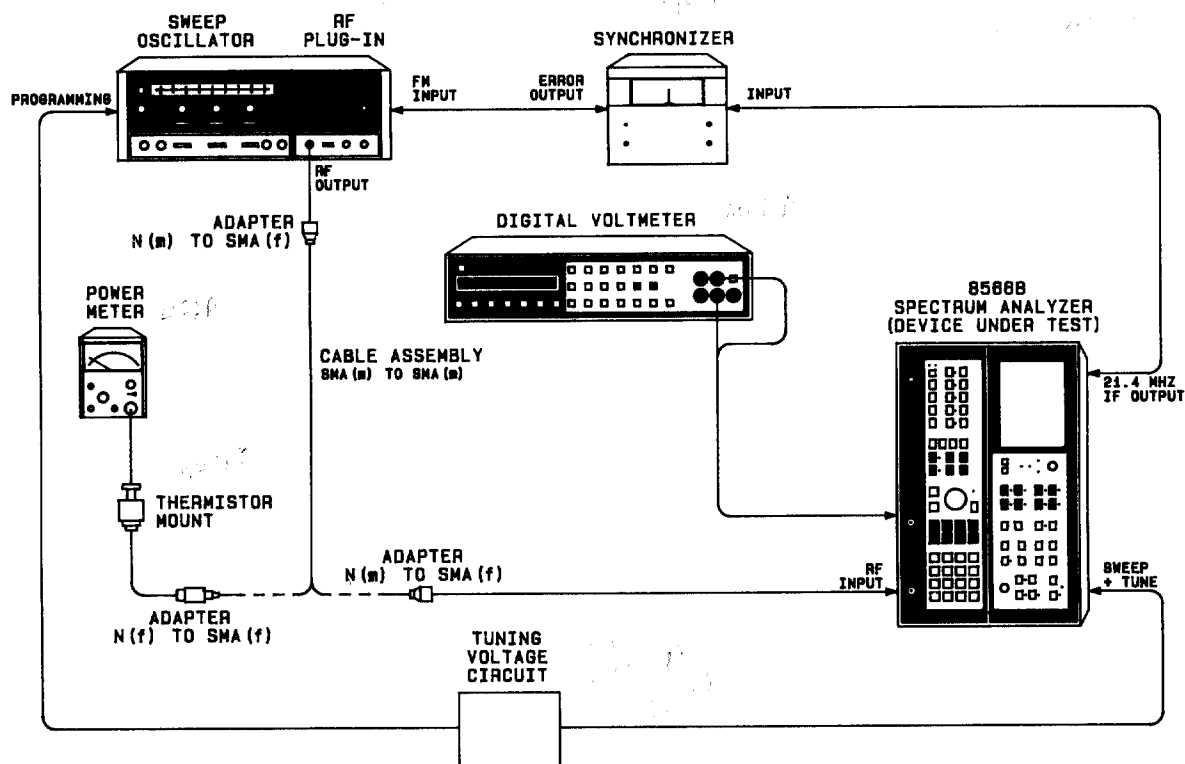


FIGURE 68. FREQUENCY RESPONSE PRELIMINARY ADJUSTMENTS SETUP

PROCEDURE:

A. Preset of Adjustments (Refer to Figures 66 and 67 for locations)

1. Position instrument on right side as shown in Figure 68, with bottom cover removed.
2. Jumper A12TP2 to A12TP3 (Lock Indicator Disable). Remove A6 assemblies cover.
3. If A6A3 Last Converter has been replaced, or if either the Slope Attenuator circuit in the Last Converter or the Slope Generator output stage in the A6A11 Slope Generator has been repaired, begin at step A-6.
4. If major repair (such as replacement of A6A10 Miscellaneous Bias/Relay Driver or A6A12 YTX Driver) has been performed, begin at step A-8.
5. If minor repair has been performed, or if this adjustment is being performed because Performance Test 10, Frequency Response Test, indicated an out-of-tolerance condition, begin at step A-12.
6. Adjust A6A11R84 GAIN fully clockwise.
7. Adjust all other potentiometers on the A6A11 Slope Generator to mid-position.
8. Adjust A6A12 YTX Driver Delay Compensation adjustments D1-A6A12R26, D2-A6A12R25, and D3-A6A12R24 to mid-position.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

9. Adjust A6A12 YTX Driver IF Offsets B-A6A12R85, C-A6A12R84, D-A6A12R83, and E-A6A12R82 fully counterclockwise.
10. Adjust A6A10 YTX Bias adjustments VB-A6A10R18, VC-A6A10R15, VD-A6A10R12, and VE-A6A10R9 fully clockwise.
11. Adjust A6A10 IF Step Gain adjustments GA-A6A10R21, GB-A6A10R23, GC-A6A10R25, GD-A6A10R27, and GE-A6A10R29 to a position eight turns from the clockwise end of the adjustment range.
12. Adjust A6A10 YTX Linearity adjustments LB1-A6A10R40, LB2-A6A10R41, LB3-A6A10R42, LB4-A6A10R70, LR1-A6A10R31, LR2-A6A10R34, LR3-A6A10R37, and LR4-A6A10R76 fully counterclockwise.
13. Adjust front-panel AMPTD CAL to mid-position.

B. Preliminary Adjustments

1. All of the following adjustments must be performed if complete realignment is necessary due to major repair of the A6 RF Module.
2. If minor realignment is necessary due to minor repair of the A6 RF Module, perform steps B-3 through B-16 of this section, then proceed to section C. Refer to step A-5 for explanation of minor repair.
3. Connect power meter/thermistor mount to front-panel CAL OUTPUT connector using a Type N Female to BNC Male adapter. Verify that the calibrator signal level is at $-10 \text{ dBm} \pm 0.1 \text{ dB}$. If not, refer to Adjustments 19, Cal Output Adjustment, for adjustment procedure.
4. Set equipment controls as follows:

HP 8620C:

SWEEP

Mode	EXT
Trigger	EXT
Time	100-10
Vernier	Fully CW

HP 86290B:

RF OFF/ON	OFF
ALC	INT
Power Level	Fully CCW
FM-NORM-PL (rear panel)	PL

HP 8709A:

Sensitivity	6 MHz/Volt
-------------------	------------

5. Disconnect power meter/thermistor mount from CAL OUTPUT and connect equipment as shown in Figure 68, with power meter/mount connected to sweep oscillator.
6. Set sweep oscillator for CW mode and CW marker pointer to 2 GHz in Band 4 (2 – 22 GHz).
7. Turn synchronizer LINE power OFF.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

8. Turn HP 86290B RF ON and adjust POWER LEVEL for -15 dBm on power meter. Disconnect power meter/mount and connect sweep oscillator to spectrum analyzer. Set sweep oscillator to Full Sweep (2 – 22 GHz).
9. Set analyzer LINE switch to ON and press . Instrument must remain in preset condition and sweep for one-half hour before performing adjustments. Key in , SWEEP .
10. Connect DVM to A6A12TP3 with ground lead to A6A12TP2.
11. Adjust A6A12R113 – 9V adjustment for DVM indication of -9.000 ± 0.001 Vdc.
12. Key in 4 GHz, 0 Hz.
13. Connect DVM to A6A12TP5, ground to A6A12TP2.
14. Adjust A6A12R85 B IF Offset adjustment for DVM indication of -2.100 ± 0.001 Vdc.
15. Key in 0 Hz.
16. Remove 82 (gray/red) cable from A6A12J2 Sweep + Tune output and connect DVM to A6A12J2.
17. Adjust A6A12R98 ZERO adjustment for DVM indication of 0.000 ± 0.001 Vdc.
18. Connect DVM to A6A10TP1 with ground lead to A6A10TP2.
19. Adjust A6A10R1 IO adjustment for DVM indication of $+0.15 \pm 0.01$ Vdc.
20. Key in 2.0 GHz, 5.8 GHz, SWEEP .
21. Set HP 8620C Sweep Oscillator for a 5.7 GHz CW signal.
22. Adjust A6A12R63 5.8 GHz adjustment to maximize the 5.7 GHz signal on the HP 8566B Spectrum Analyzer (DUT) display.
23. Set HP 8620C Sweep Oscillator for a 2.1 GHz signal.
24. Adjust A6A12R66 2 GHz adjustment to maximize the 2.1 GHz signal on the HP 8566B Spectrum Analyzer (DUT) display.
25. Set HP 8620C Sweep Oscillator to Full Sweep in Band 4 (2 – 22 GHz).
26. Turn HP 8709A Synchronizer LINE power ON and set ERROR SIGNAL switch to minus (–). Key in 2 sec on HP 8566B Spectrum Analyzer (DUT).
27. Adjust special Tuning Voltage Circuit GAIN and OFFSET to lock the HP 8709A Synchronizer as the HP 8566B Spectrum Analyzer (DUT) sweeps from 2.0 to 5.8 GHz.
28. Adjust A6A12R63 5.8 GHz adjustment for maximum signal amplitude at 5.8 GHz on the HP 8566B Spectrum Analyzer (DUT) display.
29. Adjust A6A12R66 2 GHz adjustment for maximum signal amplitude at 2 GHz on HP 8566B Spectrum Analyzer (DUT) display.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

30. Adjust A6A10R18 YTX Bias VB for maximum amplitude of overall signal level from 2 to 5.8 GHz on the HP 8566B Spectrum Analyzer (DUT) display.
 31. Key in 5.8 GHz, 7 GHz, 50 msec.
 32. Turn HP 8709A Synchronizer LINE power OFF.
 33. Set HP 8620C Sweep Oscillator for a 6 GHz CW signal.
 34. Adjust A6A12R84 C IF Offset for maximum signal amplitude at 6 GHz on HP 8566B Spectrum Analyzer (DUT) display.
 35. Turn HP 8709A Synchronizer LINE power ON and set ERROR SIGNAL switch to plus (+).
 36. Set HP 8620C Sweep Oscillator for Full Sweep in Band 4 (2 – 22 GHz sweep).
 37. Key in 12.5 GHz, 2 sec.
 38. Adjust special Tuning Voltage Circuit GAIN and OFFSET to lock HP 8709A Synchronizer as the HP 8566B Spectrum Analyzer (DUT) sweeps from 5.8 to 12.5 GHz.
 39. Adjust A6A12R84 C IF Offset for maximum signal amplitude at 5.8 GHz on the HP 8566B Spectrum Analyzer (DUT) display. Ignore flatness at upper end of band.
 40. Adjust A6A10R15 VC YTX Bias for maximum amplitude of overall signal level from 5.8 to 12.5 GHz.
 41. Key in 12.5 GHz, 15 GHz, 50 msec.
 42. Turn HP 8709A Synchronizer LINE power OFF.
 43. Set HP 8620C Sweep Oscillator for a 15 GHz CW signal.
 44. Adjust A6A12R83 D IF Offset for maximum signal amplitude at 15 GHz on the HP 8566B Spectrum Analyzer (DUT) display.
 45. Turn HP 8709A Synchronizer LINE power ON.
 46. Set HP 8620C Sweep Oscillator for Full Sweep in Band 4 (2 – 22 GHz sweep).
 47. Key in 18.6 GHz, 2 sec.
 48. Adjust special Tuning Voltage Circuit GAIN and OFFSET to lock HP 8709A Synchronizer as the HP 8566B Spectrum Analyzer (DUT) sweeps from 12.5 to 18.6 GHz.
 49. Adjust A6A12R83 D IF Offset for maximum signal amplitude at 12.5 GHz on the HP 8566B Spectrum Analyzer (DUT) display.
 50. Adjust A6A10R12 VD YTX Bias for maximum amplitude of overall signal level from 12.5 to 18.6 GHz.
 51. Key in 18.6 GHz, 22 GHz, 50 msec.
 52. Turn HP 8709A Synchronizer LINE power OFF.
-

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

53. Set HP 8620C Sweep Oscillator for a 20 GHz CW signal.
54. Adjust A6A12R82 E IF Offset for maximum signal amplitude at 20 GHz on the HP 8566B Spectrum Analyzer (DUT) display.
55. Turn HP 8709A Synchronizer LINE power ON. Key in 2 sec on HP 8566B Spectrum Analyzer (DUT).
56. Set HP 8620C Sweep Oscillator for Full Sweep in Band 4 (2 – 22 GHz).
57. Set special Tuning Voltage Circuit GAIN and OFFSET to lock HP 8709A Synchronizer as HP 8566B Spectrum Analyzer (DUT) sweeps from 18.6 to 22 GHz. Adjust HP 86290B PEAK control for best presentation on HP 8566B Spectrum Analyzer (DUT) display.
58. Adjust A6A12R82 E IF Offset for maximum signal amplitude at 18.6 GHz on the HP 8566B Spectrum Analyzer (DUT) display.
59. Adjust A6A10R9 VE YTX Bias for maximum amplitude of overall signal level from 18.6 to 22 GHz.

C. Final Flatness Calibration

1. If adjustments on A6A11 Slope Generator were preset in steps A-6 and A-7, perform the following step. If not, skip to step C-3.
2. Key in 4 GHz, 0 Hz, SCALE LOG 5 dB. Set HP 8709A Synchronizer ERROR SIGNAL switch to minus (–) and adjust special Tuning Voltage Circuit GAIN and OFFSET to lock HP 8709A Synchronizer. Press and adjust DATA knob to place signal trace on a graticule line. Adjust A6A11R84 Slope GAIN to move signal trace down one division on the HP 8566B Spectrum Analyzer (DUT) display.

10 MHz to 2.4 GHz

3. Replace HP 86290B RF Plug-In with HP 86222A RF Plug-In (.01 – 2.4 GHz) and connect equipment as shown in Figure 69, with power meter/mount connected to sweep oscillator. Connect Tuning Voltage power supply as follows: +20V to A17TP4, –10V to A18TP4, and Ground to any convenient chassis ground.
4. Set HP 8620C to CW mode and set CW Marker position to 2.0 GHz. Adjust HP 86222A RF Output Level for –15 dBm. Do not change RF Output Level during remainder of procedure.
5. Press on HP 8566B Spectrum Analyzer (DUT), then key in SCALE LOG 1 dB, and .
6. Measure power out of RF Plug-In every 200 MHz between 10 MHz and 2.5 GHz, and plot power meter indication at corresponding location on HP 8566B Spectrum Analyzer (DUT) CRT. (This location may be discerned by using the MARKER function to place a marker at the frequency being plotted.)
7. Disconnect power meter/mount and connect RF Plug-In RF Output to HP 8566B Spectrum Analyzer (DUT) RF INPUT, using the same cable used to connect power meter.
8. Set HP 8620C Sweep Oscillator for Full Sweep (.01 to 2.4 GHz sweep) and sweep time for ≥ 10 sec.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

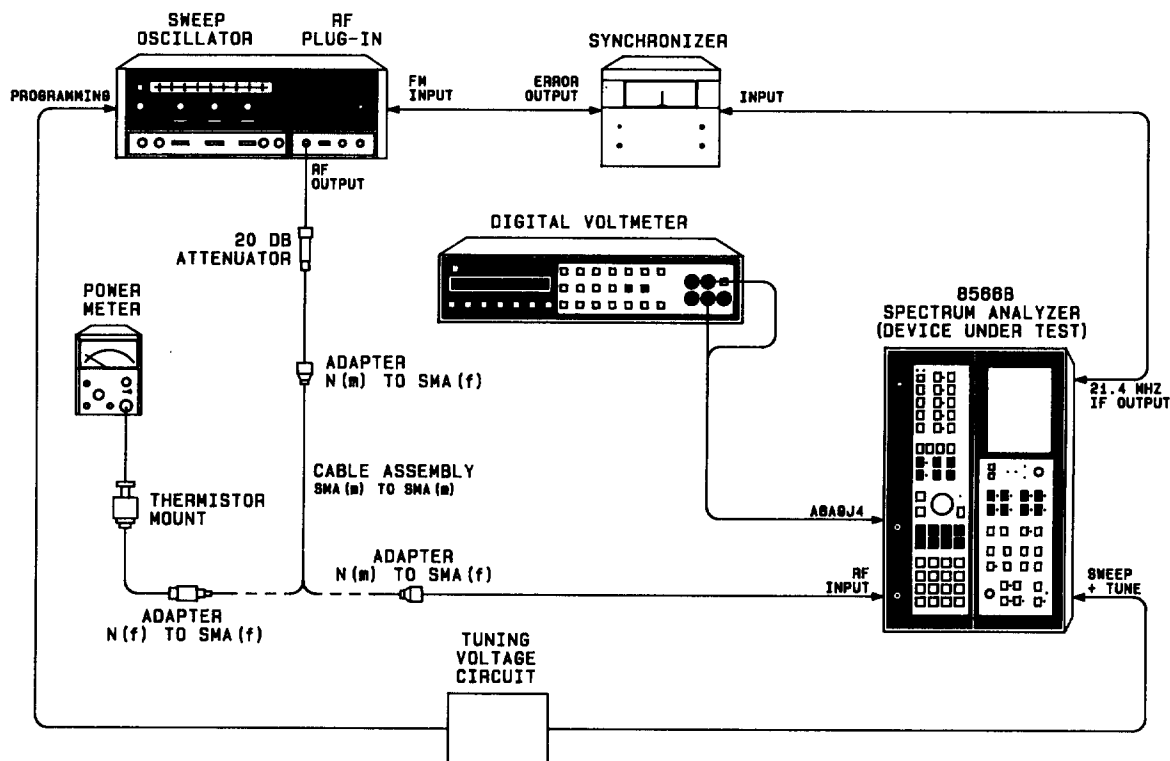


FIGURE 69. FREQUENCY RESPONSE ADJUSTMENTS SETUP (10 MHz TO 2.4 GHz)

9. Key in SWEEP TIME 2 sec.
10. Set special Tuning Voltage Circuit RANGE switch to LO position and adjust GAIN to lock the HP 8709A Synchronizer between 10 MHz and 2.5 GHz. (Make sure RF Plug-In rear-panel switch is set to PL.)
11. Adjust HP 8566B Spectrum Analyzer (DUT) REFERENCE LEVEL, if necessary, to place signal trace in upper half of display.
12. Adjust A6A11 Band A Segment adjustments A1 (A6A11R48) and A2 (A6A11R66) to align trace as closely as possible to the curve plotted in step 6. (Change REFERENCE LEVEL if necessary.) A1 controls the low-frequency end of the trace and A2 controls the high-frequency end.
13. Key in REFERENCE LEVEL -13 dBm.
14. Adjust A6A10 Band A IF Step Gain Adjustment GA (A6A10R21) to align trace as closely as possible to the curve plotted in step 6. Do not change REFERENCE LEVEL. Counterclockwise rotation of adjustment moves trace up.
15. Total deviation of signal trace from the curve plotted in step 6 must be less than 1.2 dB.
16. If necessary, repeat steps C-12 through C-15 to meet tolerance requirements. When met, remove curve plotted on HP 8566B Spectrum Analyzer (DUT) CRT.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

17. Key in REFERENCE LEVEL -9 dBm, FREQUENCY SPAN 50 MHz, CENTER FREQUENCY 100 MHz, RES BW 3 MHz, SWEEP TIME AUTO.
18. Connect CAL OUTPUT to RF INPUT.
19. Adjust A6A10 Band A IF Step Gain Adjustment GA (A6A10R21) to place calibrator signal peak at -10 dBm (one division down from top of graticule).

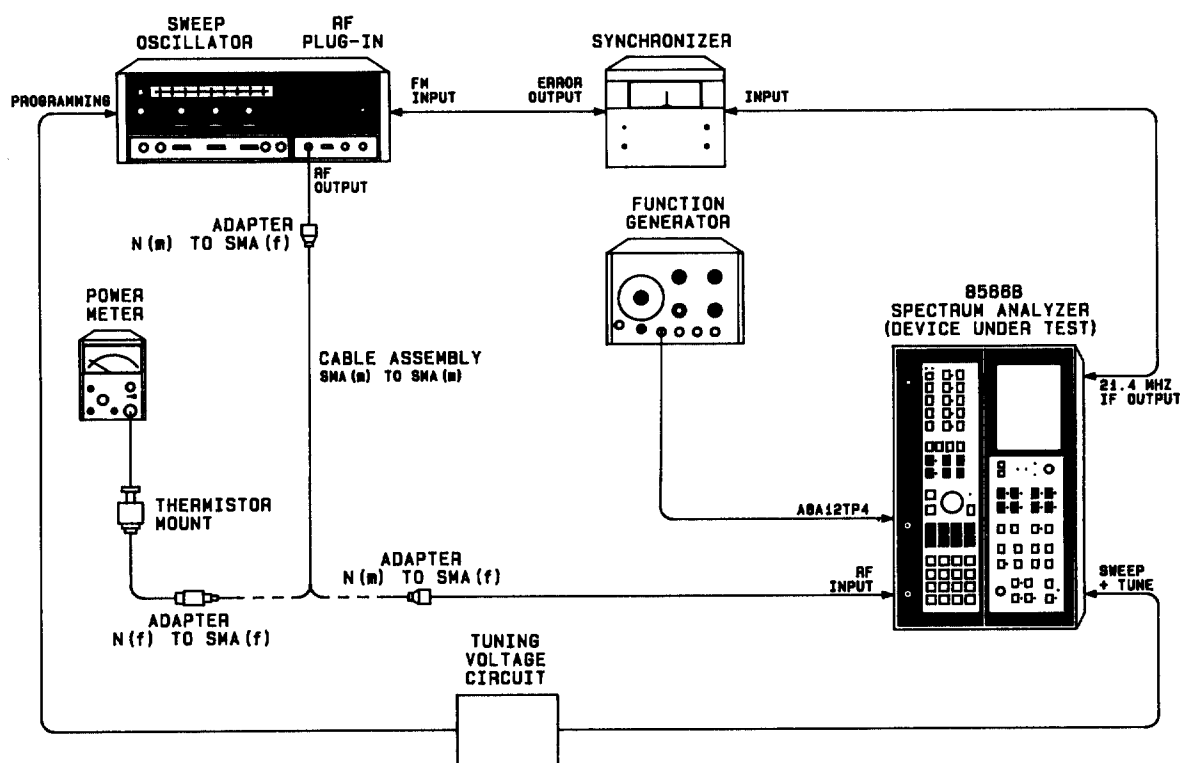


FIGURE 70. FREQUENCY RESPONSE ADJUSTMENTS SETUP (2.0 - 18.6 GHz)

2.0 to 5.8 GHz

20. Replace HP 86222A RF Plug-In with HP 86290B RF Plug-In (2 - 22 GHz) and connect equipment as shown in Figure 70, with power meter/mount connected to sweep oscillator without attenuator.
21. Press 2-22 GHz, then key in START FREQ 2.0 GHz, STOP FREQ 5.8 GHz, SCALE LOG ENTER dB/DIV 1 dB, and REFERENCE LEVEL -13 dBm.
22. Set HP 8620C Sweep Oscillator to CW Mode and set CW marker pointer to 2.0 GHz.
23. Adjust RF Plug-In Output Level for -15 dBm. Do not change RF Output level during remainder of procedure.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

24. Measure power out of RF Plug-In every 200 MHz between 2.0 GHz and 5.8 GHz, and plot power meter indication at corresponding location on HP 8566B Spectrum Analyzer (DUT) CRT. (This location may be discerned by using the MARKER function to place a marker at the frequency being plotted.)
25. Disconnect power meter/mount and connect RF Plug-In RF Output to HP 8566B Spectrum Analyzer (DUT) RF INPUT, using the same cable used to connect power meter.
26. Set sweep oscillator to Full Sweep (2 – 22 GHz).
27. Key in SCALE LOG 5 dB, 1 sec, 100 kHz on HP 8566B Spectrum Analyzer (DUT).
28. Set special Tuning Voltage Circuit RANGE switch to H1 and adjust GAIN and OFFSET to lock HP 8709A Synchronizer between 2.0 and 5.8 GHz. (Be sure HP 8709A Synchronizer ERROR signal switch is in minus (–) position.)
29. Adjust HP 8566B Spectrum Analyzer (DUT) , if necessary, to place signal trace in upper half of display.
30. Connect output of function generator to A6A12TP4.
31. Set function generator output for 15V peak-to-peak 20 Hz sine wave.
32. Adjust 5.8 GHz adjustment A6A12R63 for smallest peak-to-peak deviation of signal trace at 5.8 GHz on HP 8566B Spectrum Analyzer (DUT) display.
33. Adjust A6A12R66 2 GHz adjustment for smallest peak-to-peak deviation of signal trace at 2.0 GHz on HP 8566B Spectrum Analyzer (DUT) display.
34. Turn function generator LINE power OFF.
35. Key in SCALE LOG 2 dB. Press and adjust DATA knob to place signal trace on curve plotted in step 24.
36. Adjust A6A10R18 VB YTX Bias adjustment for maximum amplitude.
37. Adjust A6A11 Band B Segment adjustments B1 (A6A11R51) and B2 (A6A11R69) for best alignment to curve plotted in step 24. B1 controls the low-frequency end of the trace and B2 controls the high-frequency end. Adjust as necessary to keep signal trace on curve plotted.
38. Key in – 13 dBm, SCALE LOG 1 dB.
39. Adjust A6A10 Band B IF Step Gain Adjustment GB (A6A10R23) to align signal trace as closely as possible to the curve plotted in step 24. Counterclockwise rotation of GB moves trace up.
40. Turn function generator LINE power ON. Press TRACE A . Total deviation of signal trace from curve plotted in step 24 must be less than 3.0 dB.
41. If necessary, repeat steps 35 through 40 to meet tolerance requirements. When met, remove curve plotted on HP 8566B Spectrum Analyzer (DUT) CRT and press TRACE A .

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

5.8 to 12.5 GHz

42. Set HP 8620C to CW mode and set CW Marker pointer to 5.8 GHz.
43. Key in 5.8 GHz, 12.5 GHz, SWEEP TIME , SCALE LOG 1 dB, and .
44. Connect power meter/mount to sweep oscillator, using the same cable used to connect to HP 8566B Spectrum Analyzer (DUT).
45. Measure power out of RF Plug-In every 200 MHz between 5.8 GHz and 12.5 GHz, and plot power meter indication at corresponding location on HP 8566B Spectrum Analyzer (DUT) CRT. (This location may be discerned by using the MARKER function to place a marker at the frequency being plotted.)
46. Disconnect power meter/mount and connect RF Plug-In RF Output to HP 8566B Spectrum Analyzer (DUT) RF INPUT, using the same cable-used to connect power meter.
47. Set HP 8620C to Full Sweep (2 – 22 GHz).
48. Key in SCALE LOG 5 dB, 2 sec, 100 kHz.
49. Set ERROR SIGNAL switch on HP 8709A Synchronizer to plus (+).
50. Adjust special Tuning Voltage Circuit GAIN and OFFSET to lock HP 8709A Synchronizer between 5.8 and 12.5 GHz.
51. Press and adjust DATA knob to place signal trace on curve plotted in step 45.
52. Turn function generator LINE power ON.
53. Adjust A6A12R84 Band C IF Offset for minimum peak-to-peak deviation of trace at 5.8 GHz.
54. At some point above 5.8 GHz, the frequency response will begin to go bad, as indicated by a larger peak-to-peak deviation of signal trace on the HP 8566B Spectrum Analyzer (DUT) display. Refer to Figure 71.

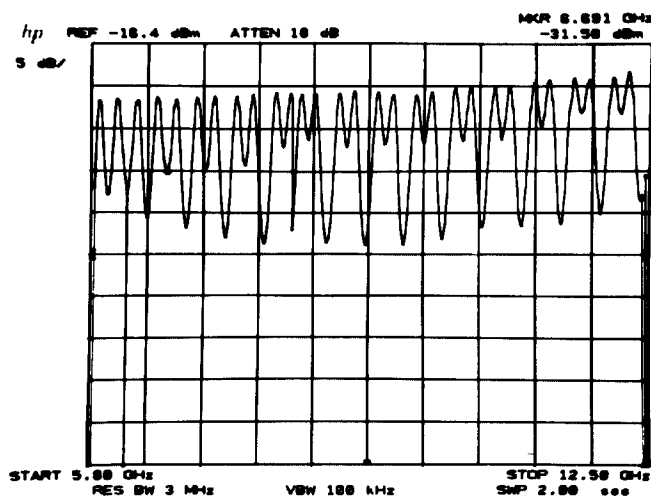


FIGURE 71. TYPICAL DISPLAY SHOWING MODULATION

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

55. Press MARKER and adjust marker to point on trace where this begins to occur. Refer to Figure 71.
56. Turn function generator LINE power OFF.
57. Adjust A6A10 YTX Linearity Correction adjustment LB1 (A6A10R40) in a clockwise direction while monitoring the HP 8566B Spectrum Analyzer (DUT) display.
58. As LB1 is adjusted clockwise, the amplitude of the signal trace will drop, beginning at the right edge of the graticule. Refer to Figure 72.

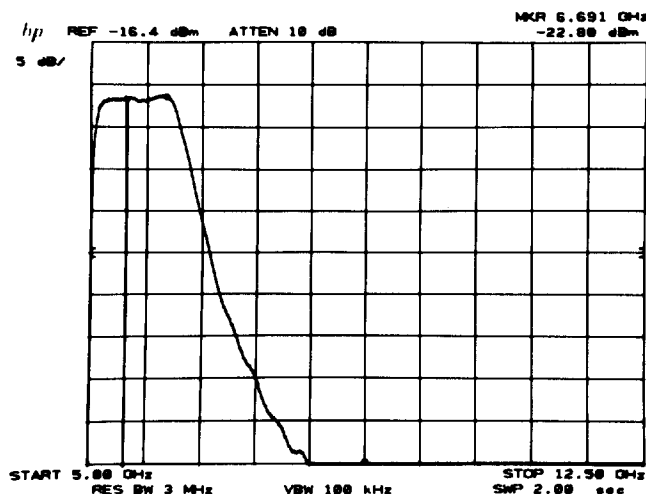


FIGURE 72. TYPICAL DISPLAY SHOWING ROLL-OFF POINT

59. Adjust LB1 to position the roll-off point at the position of the marker. Do not change the marker position.
60. Turn function generator LINE power ON.
61. Adjust A6A10 YTX Linearity Correction adjustment LR1 (A6A10R31) to minimize the peak-to-peak deviation of the signal trace between the marker position and 12.5 GHz.
62. Key in SCALE LOG 2 dB.
63. Turn function generator LINE power OFF.
64. Press and adjust, using DATA knob to keep trace on curve plotted in step 45.
65. Adjust A6A10 Band C YTX Bias adjustment VC (A6A10R15) for maximum amplitude.
66. Adjust A6A11 Band C Segment adjustments C1 (A6A11R54) and C2 (A6A11R72) for best alignment of signal trace to curve plotted in step 45. C1 controls low-frequency end of trace and C2 controls high-frequency end.
67. Key in -13 dBm, SCALE LOG 1 dB.
68. Adjust A6A10 Band C IF Step Gain Adjustment GC (A6A10R25) to align the signal trace as closely as possible to the curve plotted in step 45. Counterclockwise rotation of GC moves trace up.
69. Turn function generator LINE power ON. Press TRACE A . Total deviation of signal trace from the curve plotted in step 45 should be less than 3.0 dB. When met, remove curve plotted on HP 8566B Spectrum Analyzer (DUT) CRT and press TRACE A .

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

12.5 to 18.6 GHz

70. Set HP 8620C to CW Mode and set CW Marker pointer to 12.5 GHz.
71. Key in 12.5 GHz, 18.6 GHz, SWEEP TIME , SCALE LOG 1 dB, and – 13 dBm.
72. Connect power meter/mount to sweep oscillator output, using the same cable used to connect to the HP 8566B Spectrum Analyzer (DUT).
73. Measure power out of RF Plug-In every 200 MHz between 12.5 GHz and 18.6 GHz, and plot power meter indication at corresponding location on HP 8566B Spectrum Analyzer (DUT) CRT. (This location may be discerned by using the MARKER function to place a marker at the frequency being plotted.) Note indication at 18.6 GHz for later reference.
74. Disconnect power meter/mount and connect RF Plug-In RF Output to HP 8566B Spectrum Analyzer (DUT) RF INPUT, using the same cable used to connect power meter.
75. Set HP 8620C to Full Sweep (2 – 22 GHz).
76. Key in SCALE LOG 5 dB, 1 sec, 100 kHz.
77. Adjust special Tuning Voltage Circuit GAIN and OFFSET to lock HP 8709A Synchronizer between 12.5 and 18.6 GHz.
78. Press and adjust DATA knob to place signal trace on curve plotted in step 73.
79. Turn function generator LINE power ON and adjust for 18V peak-to-peak 20 Hz output.
80. Adjust A6A12 Band D IF Offset A6A12R83 for minimum peak-to-peak deviation of signal trace at 12.5 GHz.
81. At some point above 12.5 GHz, the frequency response will begin to go bad as indicated by a larger peak-to-peak deviation of signal trace on HP 8566B Spectrum Analyzer (DUT) CRT.
82. Press MARKER and adjust marker to point on trace where this begins to occur. Refer to Figure 71 for typical display.
83. Turn function generator LINE power OFF.
84. Adjust A6A10 YTX Linearity Correction adjustment LB2 (A6A10R41) in a clockwise direction while monitoring the HP 8566B Spectrum Analyzer (DUT) display.
85. As LB2 is adjusted clockwise, the amplitude of the trace will drop, beginning at the right edge of the graticule.
86. Adjust LB2 to position the roll-off point at the position of the marker. Do not change the marker position. Refer to Figure 72 for typical display.
87. Turn function generator LINE power ON.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

88. Adjust A6A10 YTX Linearity Correction adjustment LR2 (A6A10R34) to minimize peak-to-peak amplitude of signal trace between marker position to approximately three divisions past marker position. Ignore high-frequency end of trace, temporarily.
89. Adjust marker position to point on trace where response begins to go bad.
90. Turn function generator LINE power OFF.
91. Adjust A6A10 YTX Linearity Correction adjustment LB3 (A6A10R42) in a clockwise direction to place roll-off point at marker position.
92. Turn function generator LINE power ON.
93. Adjust A6A10 YTX Linearity Correction adjustment LR3 (A6A10R37) to minimize peak-to-peak amplitude of signal trace between marker position and 18.6 GHz.
94. Turn function generator LINE power OFF.
95. Key in SCALE LOG 2 dB. Adjust to place trace on curve plotted in step 73.
96. Adjust A6A10 YTX Bias adjustment VD (A6A10R12) for maximum amplitude.
97. Adjust A6A11 Band D Segment adjustments D1 (A6A11R57) and D2 (A6A11R75) for best alignment of signal trace to curve plotted in step 73. D1 controls the low-frequency end of the trace and D2 controls the high-frequency end.
98. Key in - 13 dBm, SCALE LOG 1 dB.
99. Adjust A6A10 Band D IF Step Gain Adjustment GD (A6A10R27) to align the signal trace as closely as possible to the curve plotted in step 73. Counterclockwise rotation of GD moves trace up.
100. Turn function generator LINE power ON. Press TRACE A . Total deviation of signal trace from the curve plotted in step 73 should be less than 4.4 dB. When met, remove curve plotted on HP 8566B Spectrum Analyzer (DUT) CRT and press TRACE A .

18.6 to 22 GHz

101. Disconnect spectrum analyzer from output of HP 86290B RF Plug-In and connect power meter/thermistor mount with K-Band waveguide adapter to output of HP 86290B RF Plug-In through the same cable assembly used in previous procedures.
102. Set HP 8620C Sweep Oscillator for an 18.6 GHz CW output.
103. Key in 18.6 GHz, 22 GHz, SCALE LOG 2 dB, - 13 dBm.
104. Note power meter indication for 18.6 GHz output frequency. Any difference between this indication and that noted in step 73 is due to the different thermistor mount and K-Band adapter, and must be compensated for.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

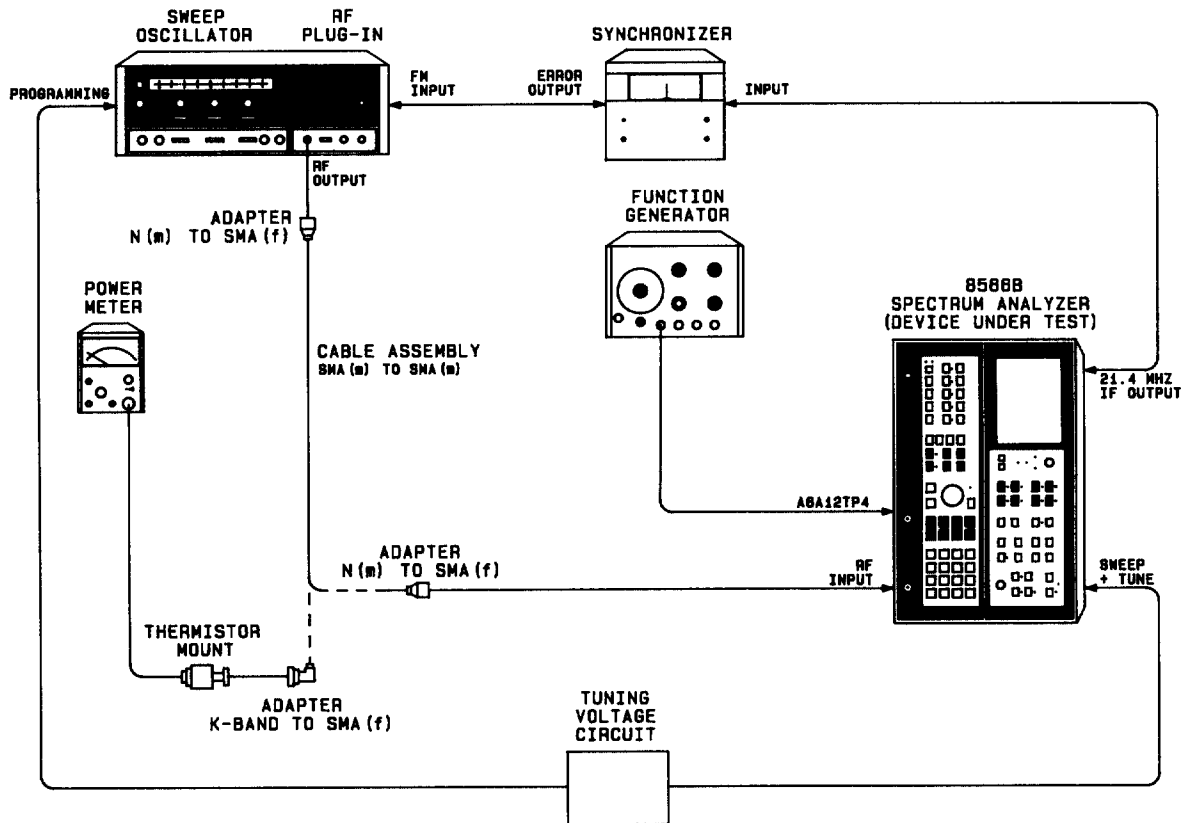


FIGURE 73. FREQUENCY RESPONSE ADJUSTMENTS SETUP (18.6 – 22 GHz)

105. Measure power out of HP 86290B RF Plug-In every 200 MHz between 18.6 and 22 GHz. Plot power meter indication, plus the difference noted in step 104, at corresponding location on HP 8566B Spectrum Analyzer (DUT) CRT. (This location may be discerned by using the MARKER NORMAL function to place a marker at the frequency being plotted.)
106. Disconnect power meter/thermistor mount and connect equipment as shown in Figure 73 with RF Plug-In connected to HP 8566B Spectrum Analyzer (DUT), using the same cable used to connect power meter.
107. Set HP 8620C Sweep Oscillator to Full Sweep (2 – 22 GHz).
108. Adjust special Tuning Voltage Circuit GAIN and OFFSET to lock HP 8709A Synchronizer between 18.6 and 22 GHz.
109. Key in SCALE LOG ENTER 80/DIV 5 dB. Press REFERENCE LEVEL and adjust to place signal trace on curve plotted in step 105.
110. Turn function generator LINE power ON and adjust for 18V peak-to-peak 20 Hz output.
111. Adjust A6A12 Band E IF Offset A6A12R82 for minimum peak-to-peak deviation of signal trace at 18.6 GHz. Adjust REFERENCE LEVEL as necessary to keep signal in upper half of display.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

112. Press MARKER and adjust marker to position where frequency response begins to go bad, as indicated by increase in peak-to-peak deviation of trace.
113. Turn function generator LINE power OFF.
114. Adjust A6A10 YTX Linearity Correction adjustment LB4 (A6A10R70) to position roll-off point at marker position.
115. Turn function generator LINE power ON.
116. Adjust A6A10 YTX Linearity Correction adjustment LR4 (A6A10R76) for minimum peak-to-peak deviation of signal trace from marker position to 22 GHz.
117. Key in SCALE LOG 2 dB. Press and adjust to keep signal trace on curve plotted in step 105.
118. Turn function generator LINE power OFF.
119. Adjust A6A10 YTX Bias adjustment VE (A6A10R9) for best amplitude.
120. Adjust A6A11 Band E Segment adjustments E1 (A6A11R60) and E2 (A6A10R78) to match trace as closely as possible to the power level curve plotted on CRT in step 105. E1 controls the low-frequency end of the trace and E2 controls the high-frequency end. Ignore absolute power level at this time. The may be adjusted as necessary to keep trace aligned with curve plotted on CRT.
121. Key in - 13 dBm. Adjust A6A10 Band E IF Step Gain adjustment GE (A6A10R29) to match trace to absolute power levels plotted on CRT in step 105.
122. Turn function generator LINE power ON. Press TRACE A . Total deviation from the power level curve plotted on the CRT should be less than 4.4 dB for 18.6 to 20 GHz, and less than 6.0 dB for 20 to 22 GHz. When met, remove curve plotted on CRT and press TRACE A .
123. Key in 12.5 GHz, 18.6 GHz, SCALE LOG 5 dB, 100 kHz, 1 sec. Press and adjust DATA knob to place signal trace in upper half of display.
124. Set function generator for 18V peak-to-peak output.
125. Adjust A6A12 Band D IF Offset A6A12R83 for minimum peak-to-peak deviation of trace between 12.5 and 18.6 GHz.
126. Change function generator output frequency to 150 Hz.
127. Change HP 8566B Spectrum Analyzer (DUT) SWEEP TIME to .
128. Adjust A6A12 Delay Compensation adjustments D2 (A6A12R25) and D3 (A6A12R24) for minimum peak-to-peak deviation of trace between 12.5 and 18.6 GHz. D2 and D3 interact. Therefore, it may be necessary to perform adjustments more than once to ensure best flatness.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

129. Key in  2 GHz,  5.8 GHz. Set HP 8709A Synchronizer ERROR SIGNAL switch to minus (–).
130. Set function generator output for 15V peak-to-peak signal at 200 Hz.
131. Adjust A6A12 Delay Compensation adjustment D1 (A6A10R26) for minimum peak-to-peak deviation of trace between 2 and 5.8 GHz.
132. Disconnect all test cables (including Tuning Voltage Circuit power supply leads) from the HP 8566B Spectrum Analyzer and replace cover over A6 RF Module. Remove jumper between A12TP2 and A12TP3 (Lock Indicator Disable).

ADJUSTMENTS

22. ANALOG-TO-DIGITAL CONVERTER ADJUSTMENTS

REFERENCE:

A3A8 Analog-to-Digital Converter

DESCRIPTION:

The Analog-to-Digital Ramp Converter is adjusted at zero and full-scale by injecting a 0 Vdc input and +10 Vdc input and adjusting the OFFS and GAIN controls until the ramp output at A3A8TP5 is at a maximum ac voltage as indicated by the digital voltmeter. This sets the horizontal end points for the CRT trace display; when the sweep ramp input is at 0 Vdc (the left graticule edge), trace position 1 is set, and when the sweep ramp input is at +10 Vdc (the right graticule edge), trace position 1000 is set.

This procedure requires a +10 Vdc source which is stable and noise-free. A simple supply circuit which can be built with common components is illustrated in Figure 81. If these components are unavailable, the alternate procedure provided below (using only the digital voltmeter) can then be used.

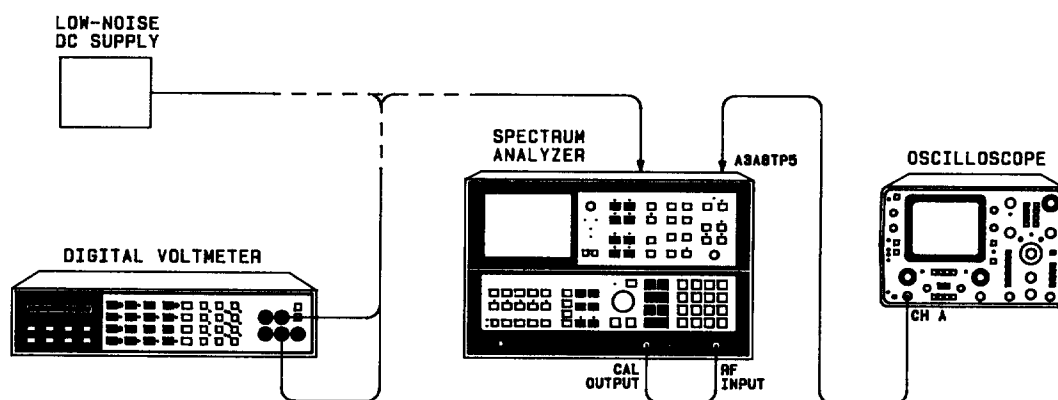


FIGURE 74. ANALOG-TO-DIGITAL CONVERTER ADJUSTMENTS SETUP

EQUIPMENT:

Oscilloscope	HP 1741A
Digital Voltmeter	HP 3456A
Low-Noise DC Supply (Optional)	Refer to Figure 81

PROCEDURE:

1. Position instrument upright as shown in Figure 74 and remove top cover. Install A3A8 Analog-to-Digital Converter Assembly on extender board.
2. Set LINE switch to ON and press 2 - 22
GHz.

ADJUSTMENTS

22. ANALOG-TO-DIGITAL CONVERTER ADJUSTMENTS (Cont'd)

3. Procedure using Low-Noise DC Supply is illustrated in Figure 81.
 - a. Key in TRACE A and SWEEP .
 - b. Disconnect 0 (black) cable from sweep ramp input A3A8J1.
 - c. Short A3A8TP4 to A3A8TP5 or connect SMB snap-on short to A3A8J1.
 - d. Connect DVM to A3A8TP11 and ground to A3A8TP4. Set DVM for Vac.
 - e. Adjust A3A8R6 OFFS until the level at A3A8TP11 is at a maximum ac voltage as indicated by the DVM (approximately 2.0 Vac). Refer to Figure 75 for location of adjustment.

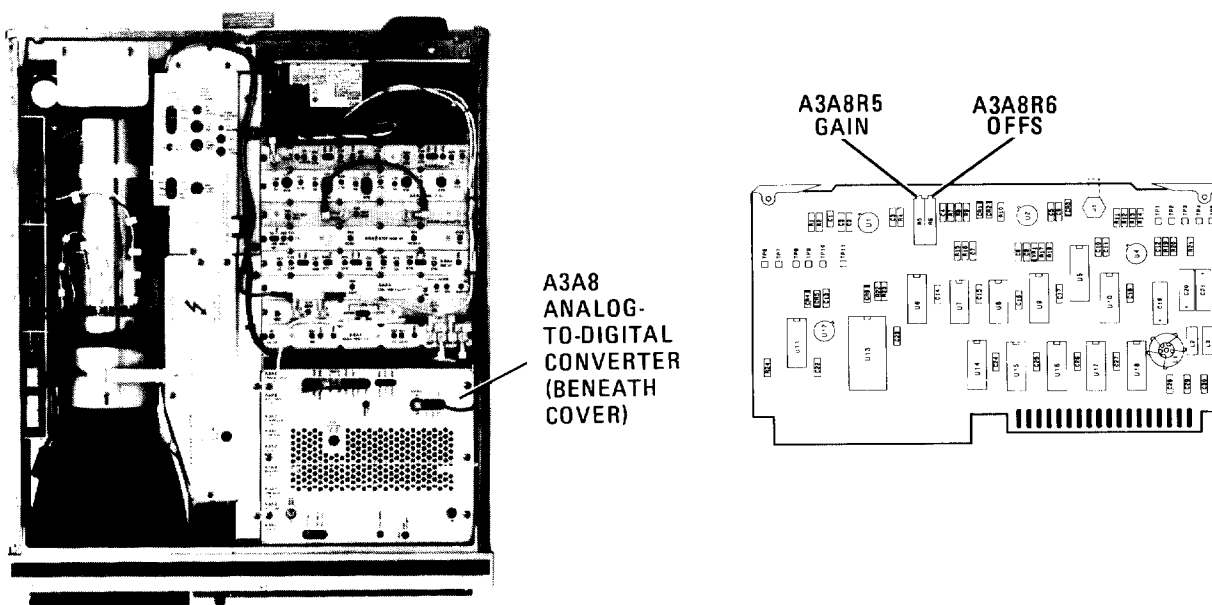


FIGURE 75. LOCATION OF ANALOG-TO-DIGITAL CONVERTER ADJUSTMENTS

- f. Remove short from A3A8TP4 and A3A8TP5. Reconnect 0 (black) cable to A3A8J1.
- g. Press .
- h. Press MARKER , 1498 .
- i. Key in .
- j. Connect output of the Low-Noise DC Supply to A3A8J1. While monitoring the output voltage with a DVM, adjust the Low-Noise DC Supply for DVM indication of +10.000 Vdc.
- k. Connect DVM to A3A8TP5 and ground to A3A8TP4. Set DVM for Vac. Voltage should be 10.000 ± 0.001 Vdc.

ADJUSTMENTS

22. ANALOG-TO-DIGITAL CONVERTER ADJUSTMENTS (Cont'd)

- l. Connect DVM to A3A8TP11 and ground to A3A8TP4.
- m. Adjust A3A8R5 GAIN until the level at A3A8TP11 is at maximum ac voltage as indicated by the DVM (approximately 2.0 Vac). Refer to Figure 75 for location of adjustment.

Alternate Procedure:

4. Procedure without using Low-Noise DC Supply:
 - a. Press .
 - b. Key in TRACE A  and SWEEP .
 - c. Disconnect 0 (black) cable from sweep ramp input A3A8J1.
 - d. Short A3A8TP4 to A3A8TP5 or connect SMB snap-on short to A3A8J1.
 - e. Connect DVM to A3A8TP11 and ground to A3A8TP4. Set DVM for Vac.
 - f. Adjust A3A8R6 OFFS until the level at A3A8TP11 is at a maximum ac voltage as indicated by the DVM (approximately 2.0 Vac). Refer to Figure 75 for location of adjustment.
 - g. Remove short from A3A8TP4 and A3A8TP5. Reconnect 0 (black) cable to A3A8J1.
 - h. Press .
 - i. Connect DVM to A3A8TP5 and ground to A3A8TP4. Set DVM for Vdc.
 - j. Press SWEEP . Note DVM reading at the end of the sweep. The voltage will begin to drift immediately after the sweep ends. Therefore, the first indication after the sweep ends is the valid indication. It may be helpful to press  several times to ensure a valid indication at the end of the sweep.
 - k. If DVM indication is $+10.020 \pm 0.005$ Vdc at the end of the sweep, no further adjustment is necessary. Otherwise, adjust A3A8R5 GAIN and repeat step i until the voltage at the end of the sweep is $+10.020 \pm 0.005$ Vdc.

23. TRACK AND HOLD ADJUSTMENTS

REFERENCE:

A3A9 Track and Hold

DESCRIPTION:

The CAL OUTPUT signal is connected to the RF INPUT. The instrument is placed in zero frequency span to produce a dc level output from the IF-Video section and this dc level is regulated by adjusting the reference level. The Offsets and Gains on the Track and Hold assembly are adjusted for proper levels using a DVM.

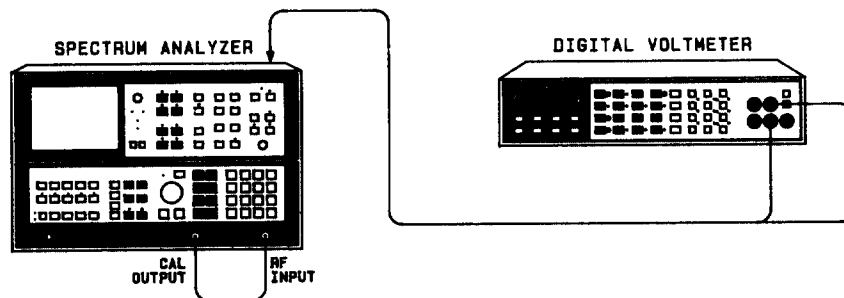


FIGURE 76. TRACK AND HOLD ADJUSTMENTS SETUP

EQUIPMENT:

Digital Voltmeter (DVM) HP 3456A

PROCEDURE:

1. Place instrument upright as shown in Figure 76 with top and A3 Digital Storage covers removed.
2. Set LINE switch to ON and press **2-22 GHz**.
3. Connect CAL OUTPUT to RF INPUT.
4. Connect DVM to A3A9TP3 and ground to A3A9TP1.
5. Key in **CENTER FREQUENCY** 100 MHz, **FREQUENCY SPAN** 0 Hz.
6. Disconnect 7 (violet) cable from A4A1J1 and terminate with a 50-ohm load.
7. Short A3A9TP1 to A3A9TP3. DVM indication should be 0.000 ± 0.001 Vdc.
8. Key in **SINGLE**, TRACE A **CLEAR-WRITE**, MARKER **NORMAL**, MARKER **Δ**, SWEEP **CONT**, **SHIFT** TRACE A **BLANK**.

ADJUSTMENTS

23. TRACK AND HOLD ADJUSTMENTS (Cont'd)

9. Adjust A3A9R59 (T/H) OFS until MARKER Δ level indication as indicated by CRT annotation flickers back and forth between .00 and .10 dB. Refer to Figure 77 for location of adjustment.

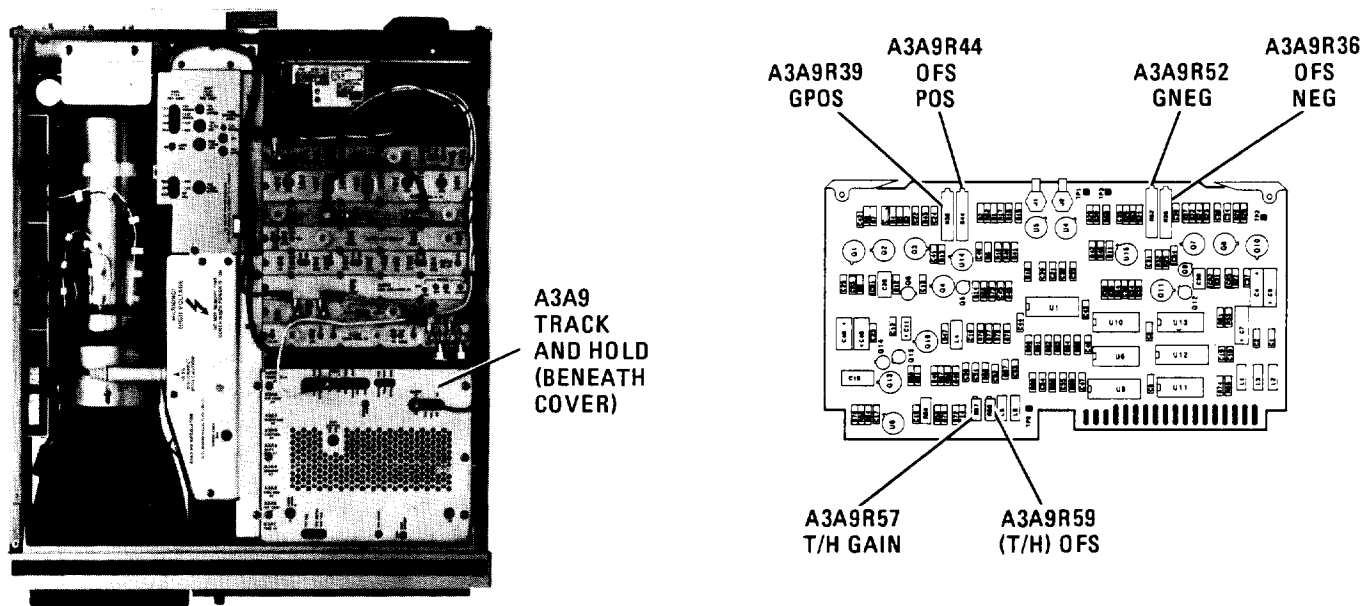


FIGURE 77. LOCATION OF TRACK AND HOLD ADJUSTMENTS

10. Key in TRACE A ^b.
11. Adjust A3A9R44 OFS POS until MARKER Δ level indication as indicated by CRT annotation flickers back and forth between .00 and .10 dB. Refer to Figure 77 for location of adjustment.
12. Key in TRACE A ^d.
13. Adjust A3A9R36 OFS NEG until MARKER Δ level indication as indicated by CRT annotation flickers back and forth between .00 and .10 dB. Refer to Figure 77 for location of adjustment.
14. Key in TRACE A ^e.
15. Remove short from between A3A9TP1 and A3A9TP3. Reconnect 7 (violet) cable to A4A1J1.
16. Press and adjust DATA knob for DVM indication of $+2.000 \pm 0.001$ Vdc at A3A9TP3.
17. Disconnect DVM from instrument.
18. Key in , TRACE A , MARKER , MARKER , SWEEP .

ADJUSTMENTS

23. TRACK AND HOLD ADJUSTMENTS (Cont'd)

19. Adjust A3A9R57 T/H GAIN for MARKER Δ level indication as indicated by CRT annotation of 100 ± 0.1 dB. Refer to Figure 77 for location of adjustment.
20. Key in TRACE A ^b.
21. Adjust A3A9R39 GPOS for MARKER Δ level indication as indicated by CRT annotation of 100 ± 0.1 dB. Refer to Figure 77 for location of adjustment.
22. Key in TRACE A ^d.
23. Adjust A3A9R52 GNEG for MARKER Δ level indication as indicated by CRT annotation of 100 ± 0.1 dB. Refer to Figure 77 for location of adjustment.
24. Repeat steps 4 through 23 until no further adjustments are required.

ADJUSTMENTS

24. DIGITAL STORAGE DISPLAY ADJUSTMENTS

REFERENCE:

A3A1 Trigger
A3A2 Intensity Control
A3A3 Line Generator

DESCRIPTION:

First, preliminary CRT graticule adjustments are performed to position the graticule on the CRT. These preliminary adjustments assume that repair has been performed on the associated circuitry. If no repair has been performed on the assemblies listed under REFERENCE, the preliminary adjustments are not necessary.

Next, the Sample and Hold Balance adjustments are performed. The horizontal and vertical Offset and Gain adjustments are performed, then the final CRT graticule adjustments are performed.

Last, the CRT annotation adjustments are performed to place the CRT annotation in proper location with respect to the CRT graticule.

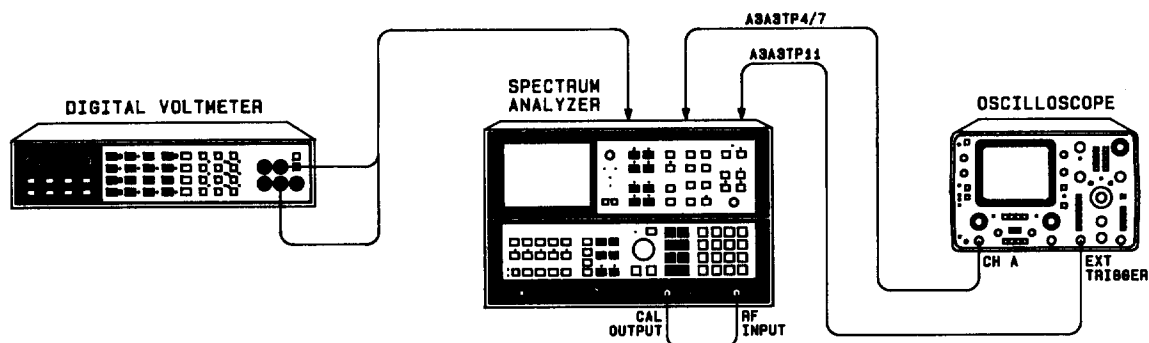


FIGURE 78. DIGITAL STORAGE DISPLAY ADJUSTMENTS SETUP

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
Oscilloscope	HP 1741A

PROCEDURE:

1. Place instrument upright as shown in Figure 78 with top and A3 Digital Storage covers removed.
2. Set LINE switch to ON and press 2 22 GHz.

ADJUSTMENTS

24. DIGITAL STORAGE DISPLAY ADJUSTMENTS (Cont'd)

Preliminary Graticule Adjustments

3. Press TRACE A .
4. Adjust A3A3R4 X GAIN and A3A3R5 Y GAIN to place graticule information completely on CRT. Refer to Figure 79 for location of adjustment.

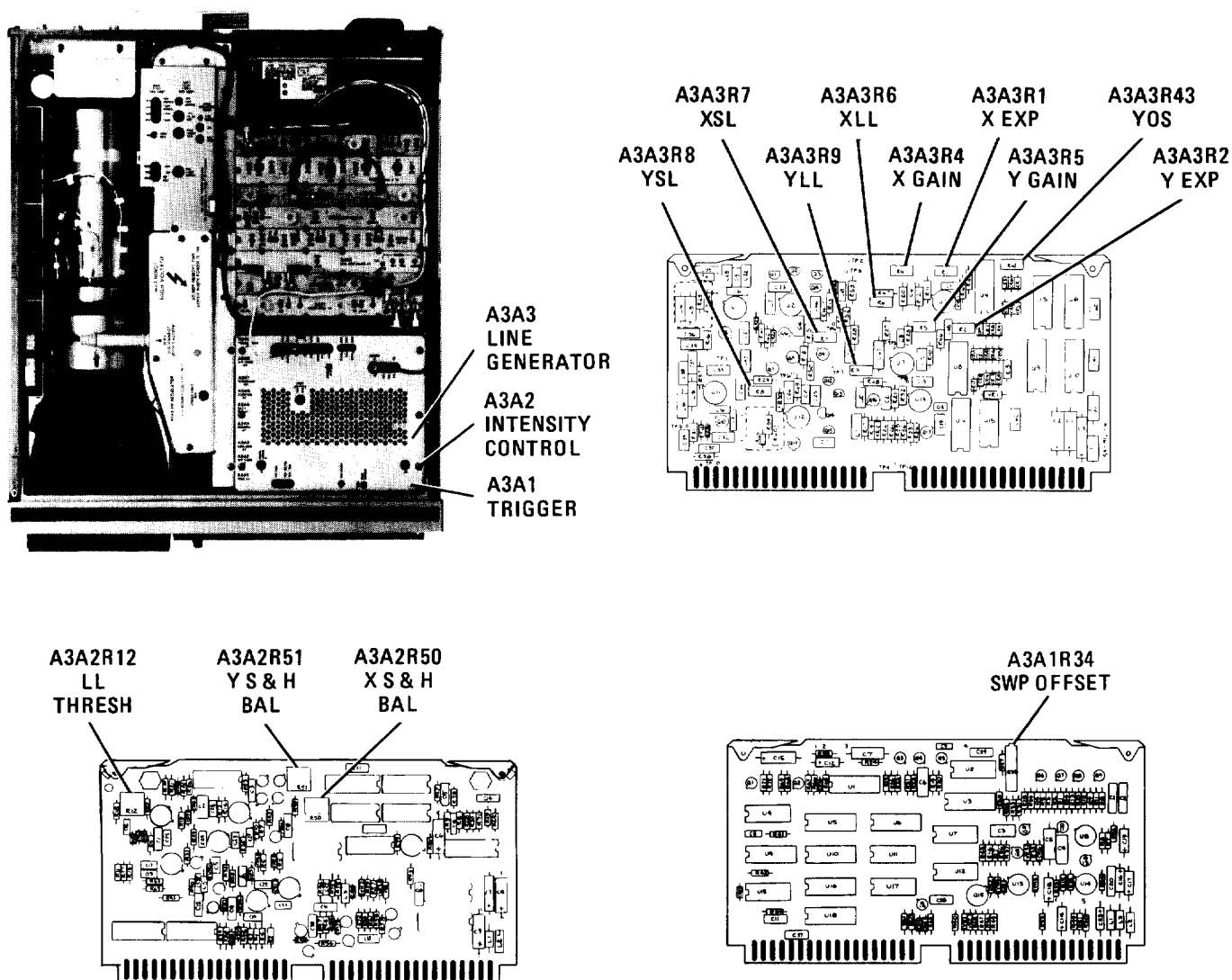


FIGURE 79. LOCATION OF DIGITAL STORAGE DISPLAY ADJUSTMENTS

5. Adjust A3A2R12 LL THRESH fully clockwise. Refer to Figure 79 for location of adjustment.
6. Adjust A3A3R6 XLL so that horizontal graticule lines just meet the vertical graticule lines at the left and right sides of the graticule. Refer to Figure 79 for location of adjustment.

ADJUSTMENTS

24. DIGITAL STORAGE DISPLAY ADJUSTMENTS (Cont'd)

7. Adjust A3A3R9 YLL so that vertical graticule lines just meet the horizontal graticule lines at the top and bottom of the graticule. Refer to Figure 79 for location of adjustment.
8. Repeat steps 6 and 7 until horizontal and vertical graticule lines are adjusted so that they meet the edges of the graticule but do not overshoot.
9. Adjust A3A2R12 LL THRESH fully counterclockwise. Refer to Figure 79 for location of adjustment.
10. Adjust A3A3R7 XSL so that horizontal graticule lines just meet the vertical graticule lines at the left and right sides of the graticule. Refer to Figure 79 for location of adjustment.
11. Adjust A3A3R8 YSL so that the vertical graticule lines just meet the horizontal graticule lines at the top and bottom of the graticule. Refer to Figure 79 for location of adjustment.
12. Repeat steps 10 and 11 until horizontal and vertical graticule lines are adjusted so that they meet at the edges of the graticule but do not overshoot.

Sample and Hold Balance Adjustments

13. Set LINE switch to STANDBY.
14. Place A3A3 Line Generator on extender boards.
15. Set LINE switch to ON. Press 7.22 GHz .
16. Key in SHIFT RECORDER LOWER LEFT 0 Hz, SHIFT RECORDER UPPER RIGHT 1028 Hz.
17. Connect oscilloscope to A3A3TP4.
18. Connect A3A3TP11 to oscilloscope External Trigger Input and adjust oscilloscope controls for display as shown in Figure 80.

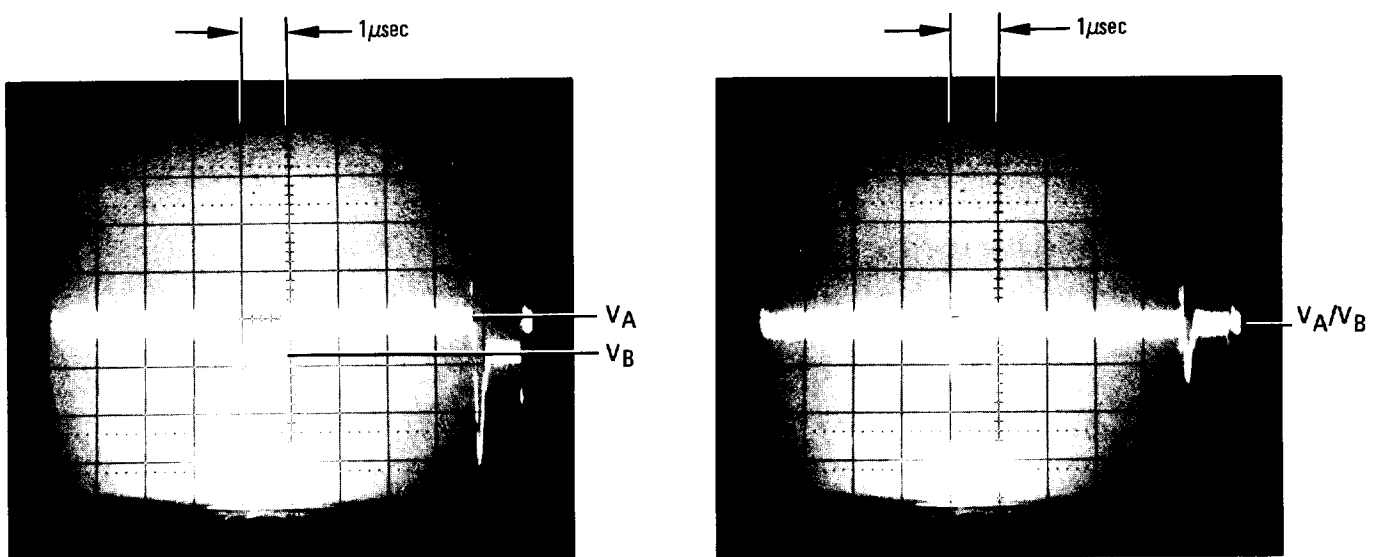


FIGURE 80. SAMPLE AND HOLD BALANCE ADJUSTMENT WAVEFORMS

ADJUSTMENTS

24. DIGITAL STORAGE DISPLAY ADJUSTMENTS (Cont'd)

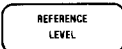
19. Adjust A3A2R50 X S&H BAL for minimum dc offset level between V_A and V_B as illustrated in Figure 80. Refer to Figure 79 for location of adjustment.
20. Connect oscilloscope to A3A3TP7.
21. Adjust A3A2R51 Y S&H BAL for minimum dc offset level between V_A and V_B as illustrated in Figure 80. Refer to Figure 79 for location of adjustment.
22. Set LINE switch to STANDBY.
23. Reinstall A3A3 Line Generator in instrument without extender boards.
24. Set LINE switch to ON.

X and Y Offset and Gain Adjustments

25. Press .
26. Key in  0 Hz,  100 μ sec.
27. Disconnect 9 (white) cable from A3A9J2 and connect to A3A2J2 LG/FS test connector on A3A2 Intensity Control; the other end of the cable remains connected to A3A2J1.
28. Select TRIGGER  and adjust front-panel LEVEL control for a stable display on instrument CRT.
29. Adjust A3A1R34 SWP OFFSET so that the signal trace begins at the left edge graticule line. Refer to Figure 79 for location of adjustment.
30. Adjust A3A3R4 X GAIN for twenty cycles displayed on the CRT graticule. This may be made easier by adjusting A3A1R34 SWP OFFSET so that the first peak is centered on the left edge graticule line, then adjusting A3A3R4 X GAIN for two cycles per division with the twentieth cycle being centered on the right edge graticule line. A3A1R34 SWP OFFSET must then be readjusted so that the trace begins at the left edge graticule line. Refer to Figure 79 for location of adjustment.
31. Remove the 9 (white) cable from A3A2J2 LG/FS test connector and reconnect to A3A9J2.
32. Make sure there is no signal input at the RF INPUT connector.
33. Connect DVM to A3A9TP3 and DVM ground to A3A9TP1.
34. Press LIN pushbutton.
35. DVM indication should be 0.000 ± 0.002 Vdc.
36. Adjust A3A3R43 YOS to align the bottom graticule line with the fast sweep signal trace. Refer to Figure 79 for location of adjustment.
37. Key in  100 MHz. Connect CAL OUTPUT to RF INPUT. Press LOG  10 dB.

ADJUSTMENTS

24. DIGITAL STORAGE DISPLAY ADJUSTMENTS (Cont'd)

38. Press  and adjust DATA knob for DVM indication of $+2.000 \pm 0.002$ Vdc.
39. Adjust A3A3R5 Y GAIN to align the top graticule line with the fast sweep signal trace. Refer to Figure 79 for location of adjustment.

Final Graticule Adjustments

40. Press , TRACE A .
41. Set A3A2R12 LL THRESH fully clockwise.
42. Adjust A3A3R6 XLL and A3A3R9 YLL to align horizontal and vertical graticule lines so that each line meets the edge line (right, left, top, or bottom) but does not overshoot.
43. Adjust A3A2R12 LL THRESH fully counterclockwise.
44. Adjust A3A3R7 XSL and A3A3R8 YSL to align horizontal and vertical graticule lines so that each line meets the edge line (right, left, top, or bottom) but does not overshoot.
45. Adjust A3A2R12 LL THRESH clockwise until all graticule lines switch over to long lines. This is indicated by a noticeable increase in graticule line intensity. (All graticule lines should increase in intensity.)

X and Y Expand Adjustments

46. Press .
47. Key in MARKER .
48. Adjust A3A3R1 X EXP to center the letter "F" in "REF" (CRT annotation in upper left corner of display) over the left edge graticule line. Refer to Figure 79 for location of adjustment.
49. Adjust A3A3R2 Y EXP to align the remainder of the CRT annotation so that the upper annotation (MARKER data) is above the top graticule line and the lower annotation (START and STOP data) is below the bottom graticule line. Adjust for equal spacing above and below the graticule pattern. Refer to Figure 79 for location of adjustment.

Resealing of Adjustments

50. If any of the following potentiometers were adjusted in the preceding steps, they must be resealed with a silicone rubber compound without acetic acid (HP Part Number 0470-0357).

X GAIN A3A3R4
Y GAIN A3A3R5
XLL A3A3R6
YLL A3A3R9
XSL A3A3R7
YSL A3A3R8

ADJUSTMENTS

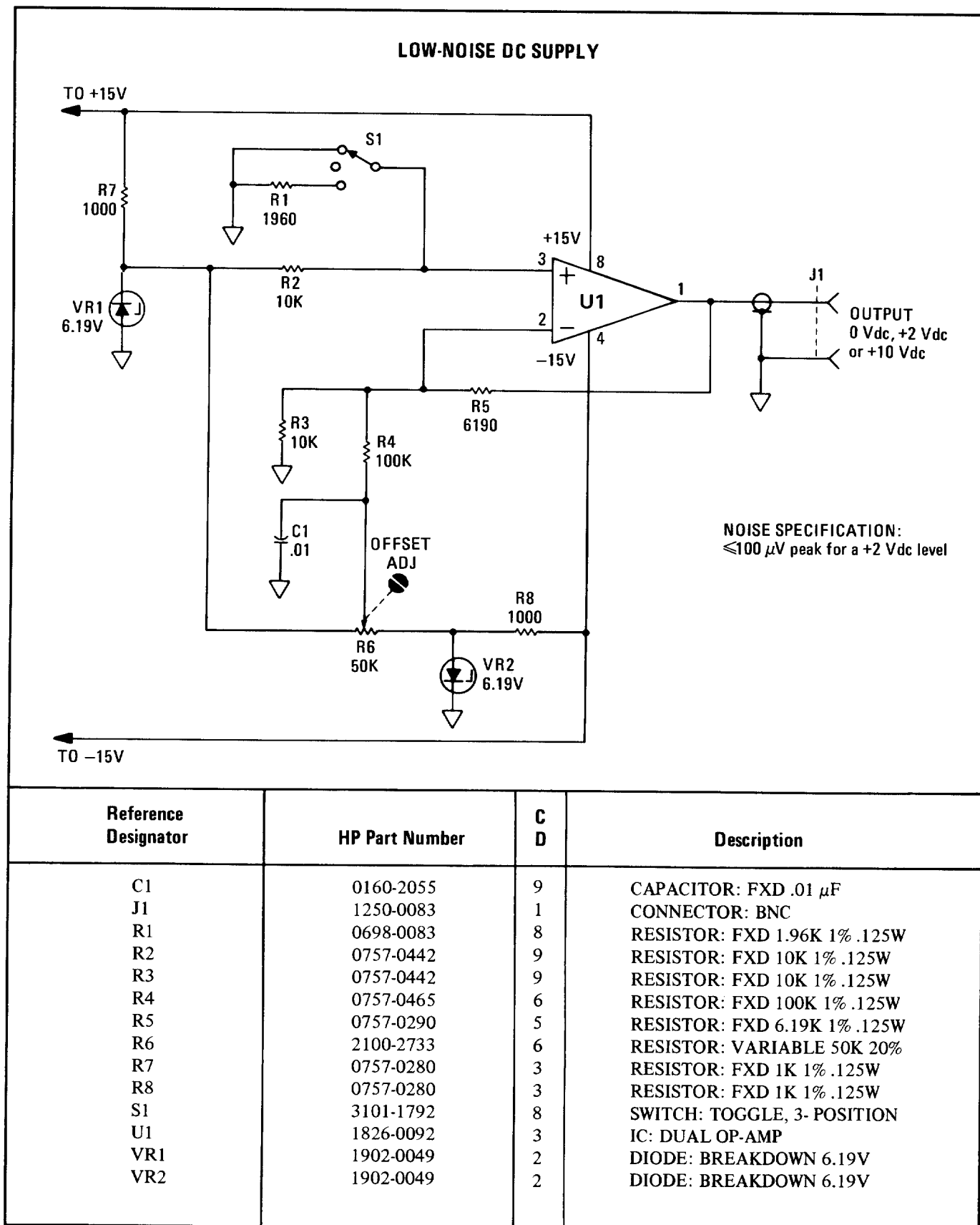
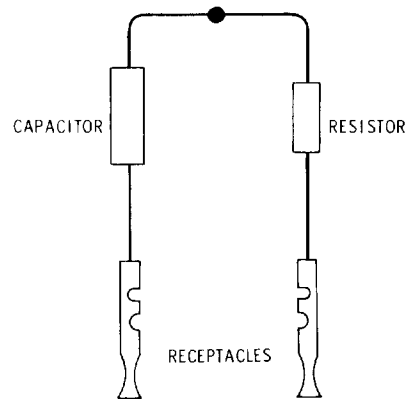


FIGURE 81. LOW-NOISE DC SUPPLY

ADJUSTMENTS

CRYSTAL FILTER BYPASS NETWORK CONFIGURATION



A4A4 Bandwidth Filter and A4A8 Attenuator–Bandwidth Filter
21.4 MHz IF Crystal Filter Bypass Networks (4 required)

Part	Value	HP Part Number	CD	Quantity
Resistor	31.6 Ω	0757-0180	2	4
Capacitor	91 pF	0160-2203	9	4
Receptacle	—	1251-3720	1	8

A4A7 3 MHz Bandwidth Filter
3 MHz IF Crystal Filter Bypass Networks (4 required)

Part	Value	HP Part Number	CD	Quantity
Resistor	2.7 Ω	0811-1671	4	4
Capacitor	.047 μ F	0170-0040	9	4
Receptacle	—	1251-3720	1	8

FIGURE 82. CRYSTAL FILTER BYPASS NETWORK CONFIGURATION

ADJUSTMENTS

TUNING VOLTAGE CIRCUIT DESCRIPTION

The special Tuning Voltage Circuit is used to externally sweep the HP 8620C Sweep Oscillator in order to phase-lock the oscillator's output to the HP 8566B tuning range using the HP 8709A Synchronizer.

The SWEEP + TUNE OUT voltage (-1V/GHz) of the analyzer is used by the Tuning Voltage Circuit to generate the necessary tuning voltage to sweep the sweep oscillator.

Range and RF Plug-In selection is provided so that the Tuning Voltage Circuit will operate for Low-Band (100 Hz to 2.5 GHz) or High-Band (2 to 22 GHz) and also for Standard (2 to 18.6 GHz) RF Plug-Ins or Option H08 (2 to 22 GHz) RF Plug-Ins.

Certain sweep oscillator control settings are required for proper operation of the Tuning Voltage Circuit. These settings are as follows:

8620C:

BAND	4
SWEEP MODE	EXT
MARKERS	OFF

86222/82690:

FM/NORM/PL (rear panel)	PL
-------------------------------	----

PARTS LIST

Reference Designator	HP Part Number	C D	Description
C1	0180-2208	6	CAPACITOR-FXD 220UF $\pm 10\%$ 10VDC TANTALUM
C2	0160-0127	2	CAPACITOR-FXD 1UF $\pm 20\%$ 25VDC CERAMIC
C3	0160-0127	2	CAPACITOR-FXD 1UF $\pm 20\%$ 25VDC CERAMIC
C4	0160-0163	6	CAPACITOR-FXD .033UF $\pm 10\%$ 200VDC POLYETHYLENE
J1	1250-0083	1	CONNECTOR-RF BNC FEMALE 50-OHM
J2	1251-0101	6	CONNECTOR-50-PIN MICRORIBBON FEMALE
P1	1251-0086	6	CONNECTOR-50-PIN MICRORIBBON MALE
P2	1251-0086	6	CONNECTOR-50-PIN MICRORIBBON MALE
R1	2100-2730	3	RESISTOR-VARIABLE CONTROL 1-TRN 5K 20%
R2	2100-2730	3	RESISTOR-VARIABLE CONTROL 1-TRN 5K 20%
R3	0757-0278	9	RESISTOR-1.78K 1% .125W F TC=0 $\pm$ 100
R4	0757-0460	1	RESISTOR-61.9K 1% .125W F TC=0 $\pm$ 100
R5	0698-3136	8	RESISTOR-17.8K 1% .125W F TC=0 $\pm$ 100
R6	0757-0401	0	RESISTOR-100 1% .125W F TC=0 $\pm$ 100
R7	0757-0401	0	RESISTOR-100 1% .125W F TC=0 $\pm$ 100
R8	0698-3156	2	RESISTOR-14.7K 1% .125W F TC=0 $\pm$ 100
R9	0757-0442	9	RESISTOR-10K 1% .125W F TC=0 $\pm$ 100
R10	0698-3266	5	RESISTOR-237K 1% .125W F TC=0 $\pm$ 100
R11	0757-0462	3	RESISTOR-75K 1% .125W F TC=0 $\pm$ 100
S1	3101-0957	5	SWITCH-TOGGLE SUBMINIATURE DPDT 5A 115VAC
S2	3101-0957	5	SWITCH-TOGGLE SUBMINIATURE DPDT 5A 115VAC
U1	1826-0371	1	IC OP AMP TO-99 LF256H
VR1	1902-0049	2	DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.22%

FIGURE 83. TUNING VOLTAGE CIRCUIT (1 OF 2)

TUNING VOLTAGE CIRCUIT

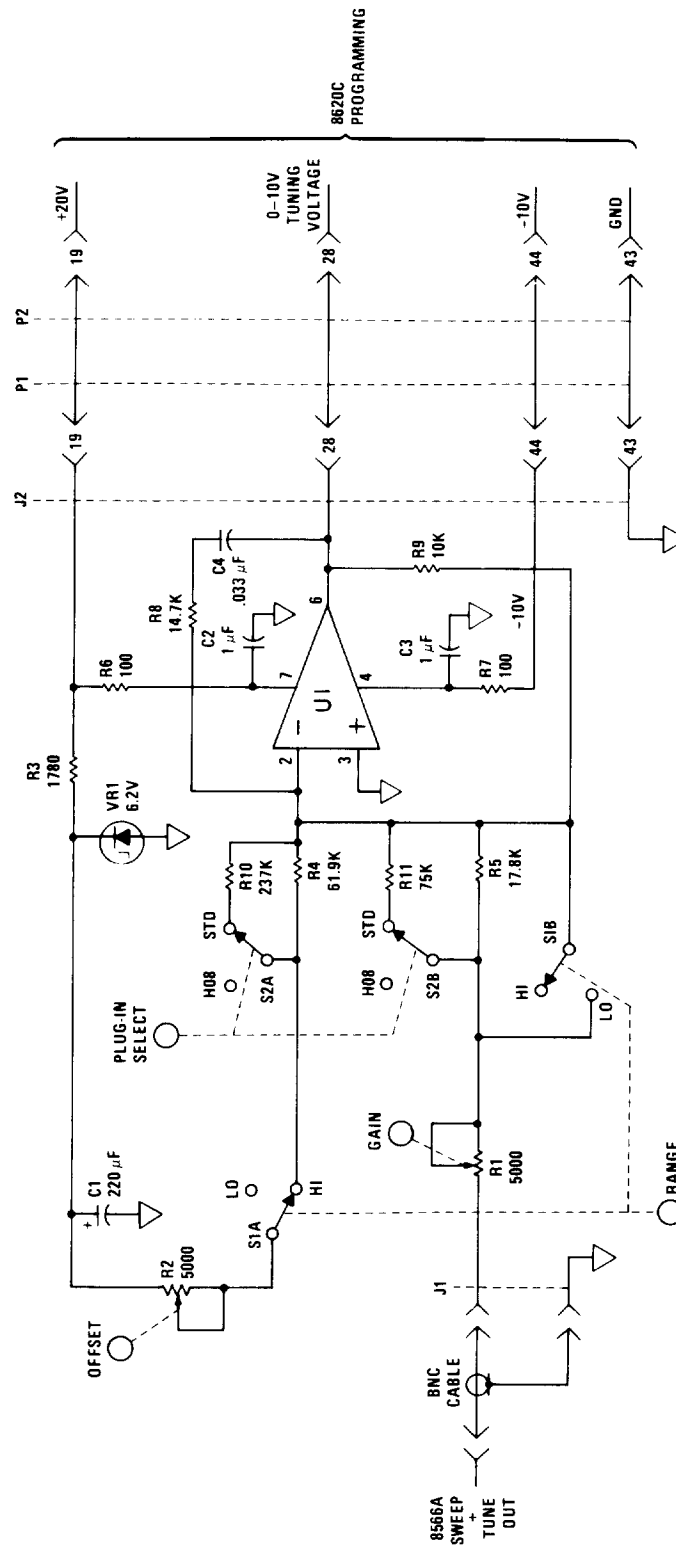
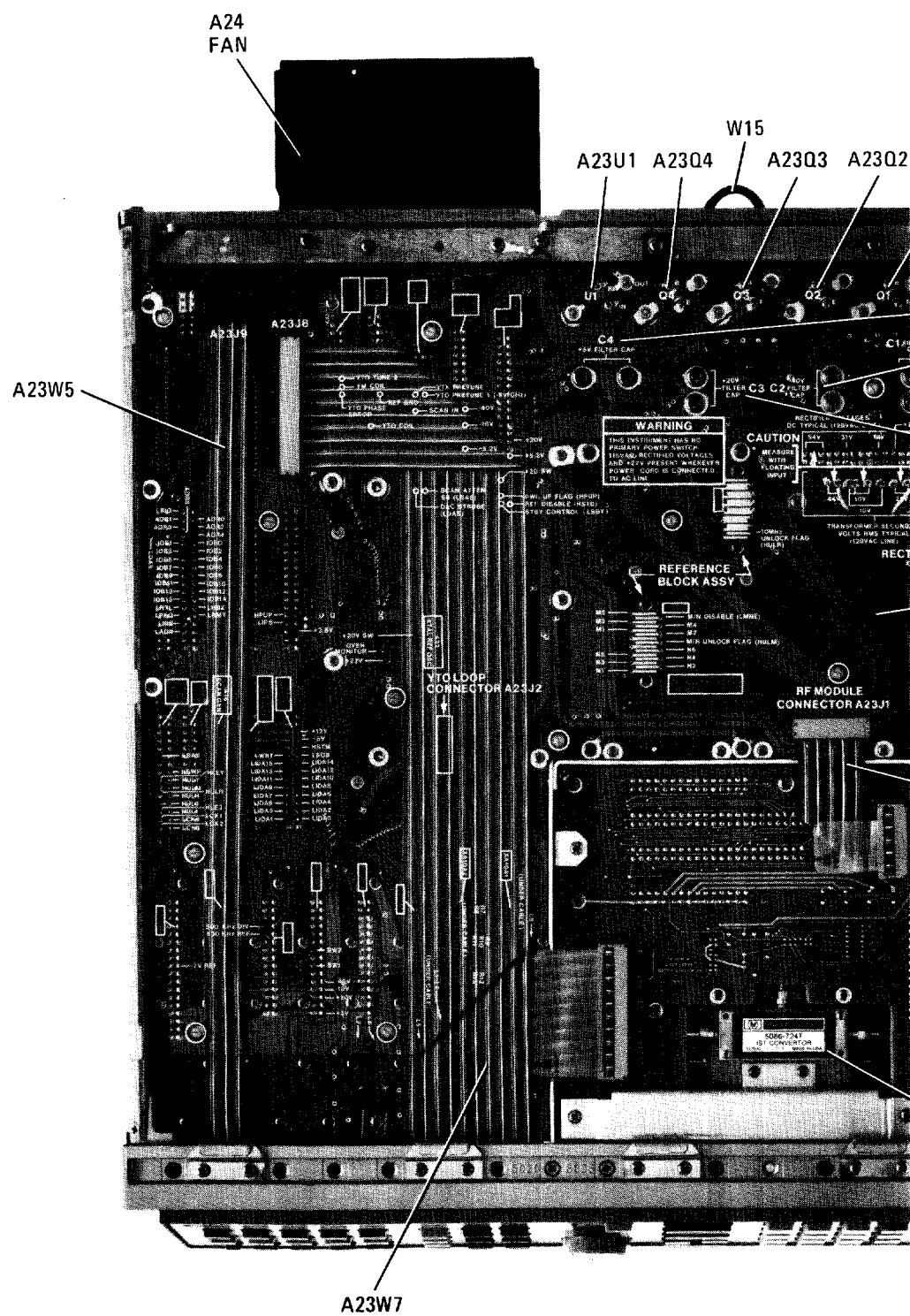
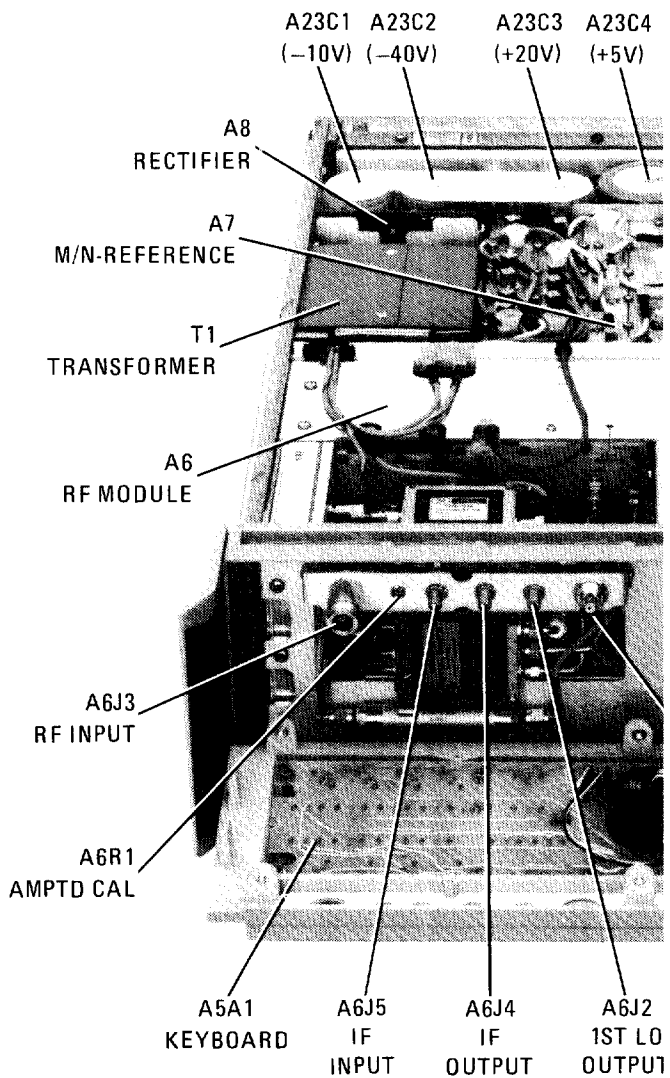
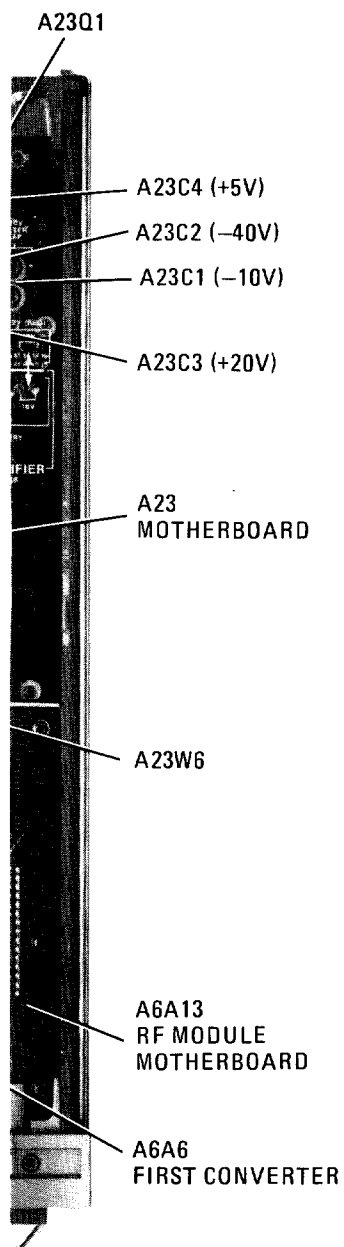
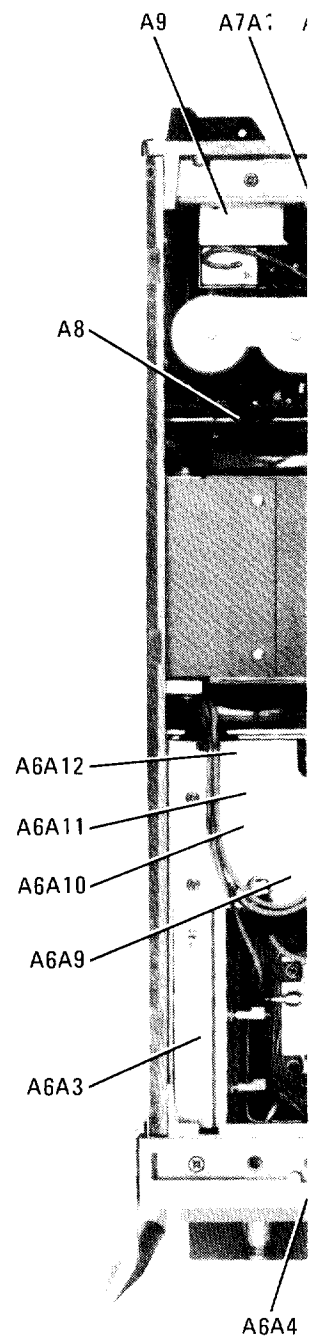
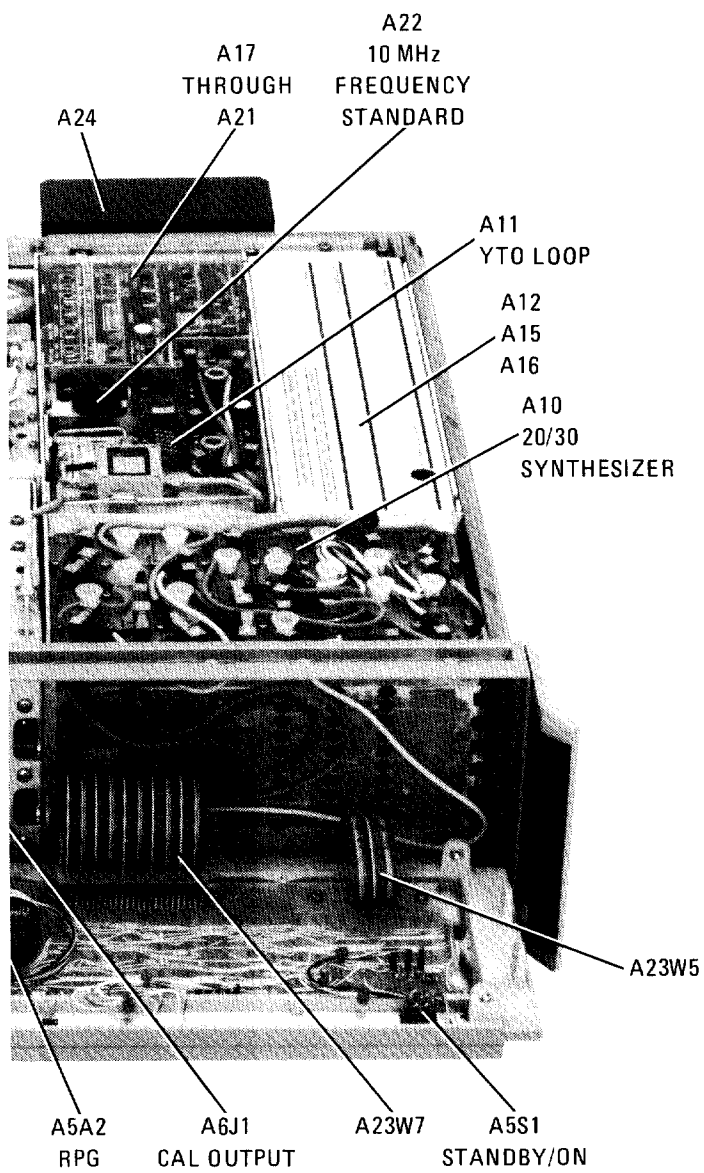


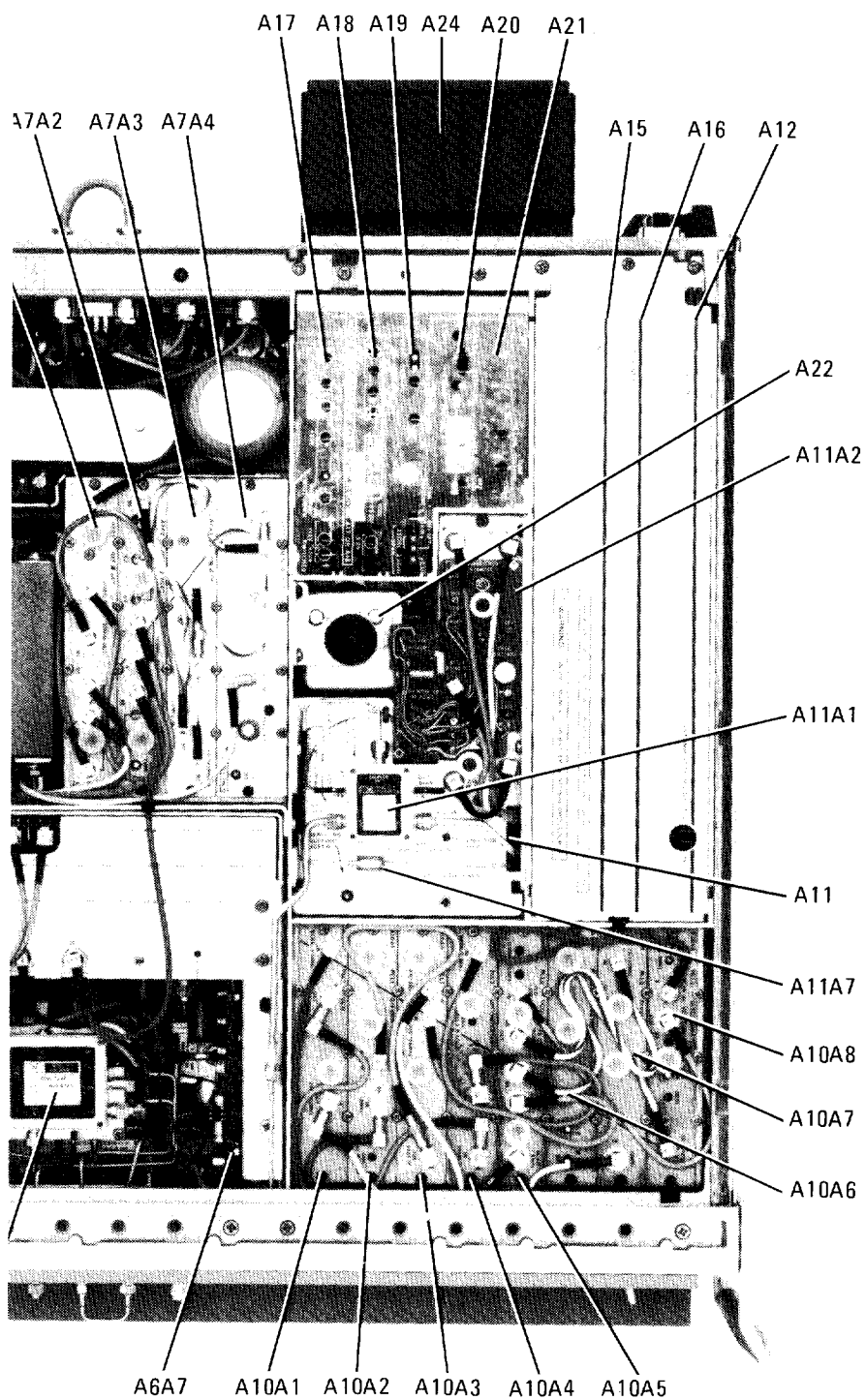
FIGURE 83. TUNING VOLTAGE CIRCUIT (2 OF 2)

ACLU	A6A5
Controller	A15
Coupler/Isolator/Amplifier	A11A1
Digital-Analog Converter	A19
FM Coil Driver	A21
Fan	A24
First Converter	A6A6
Front Panel	A5
Front Panel Interface	A12
Interconnect	A11A2
Keyboard	A5A1
Last Converter	A6A3
Line Module	A9
M/N Output	A7A4
M/N Phase Detector	A7A3
M/N Reference	A7
M/N Reference Motherboard	A7A5
Main Coil Driver	A20
Miscellaneous Bias/Relay Driver	A6A10
Motherboard	A23
Negative Regulator	A18
Phase Lock	A6A9
Phase-Lock Loop 1 Divider	A10A2
Phase-Lock Loop 1 IF	A10A3
Phase-Lock Loop 1 VCO	A10A1
Phase-Lock Loop 2 Discriminator	A10A8
Phase-Lock Loop 2 Divider	A10A7
Phase-Lock Loop 2 Phase Detector	A10A6
Phase-Lock Loop 2 VCO	A10A5
Phase-Lock Loop 3 Up Converter	A10A4
Positive Regulator	A17
RF Module	A6
RF Module Motherboard	A6A13
RPG	A5A2
Rectifier	A8
Reference Phase Detector	A7A1
Sampler	A11A5
Scan Generator	A16
Second Converter	A6A4
Slope Generator	A6A11
STANDBY/ON Switch	A5S1
YTO Loop	A11
YTO Phase Detector	A11A4
YTX	A6A8
YTX Current Driver	A6A7
YTX Driver	A6A12
6.2 GHz Low-Pass Filter	A11A7
10 MHz Frequency Standard	A22
20/30 Synthesizer	A10
100 MHz VCXO	A7A2









MAJOR ASSEMBLY AND COMPONENT LOCATIONS (RF SECTION)

Analog-Digital Converter	A3A8
Attenuator-Bandwidth Filter	A4A8
Bandwidth Filter	A4A4
Bus Transition	A1A9
CRT	A1V1
Data Manipulator	A3A5
Digital Storage Motherboard	A3A10
Display Motherboard	A1A10
Down/Up Converter	A4A6
High Voltage Multiplier	A1A11
High Voltage Regulator	A1A3
IF Control	A4A9
IF-Video Motherboard	A4A10
Intensity Control	A3A2
Interface	A3A7
Keyboard	A1A1
Line Generator	A3A3
Log Amplifier-Detector	A4A2
Log Amplifier-Filter	A4A3
Main Control	A3A6
Memory	A3A4
Rectifier	A1A8
Step Gain	A4A5
Track and Hold	A3A9
Trigger	A3A1
Video Processor	A4A1
X Deflection Amplifier	A1A4
Y Deflection Amplifier	A1A5
Z Axis Amplifier	A1A2
3 MHz Bandwidth Filter	A4A7

A4A10

W8

A3A10

W8

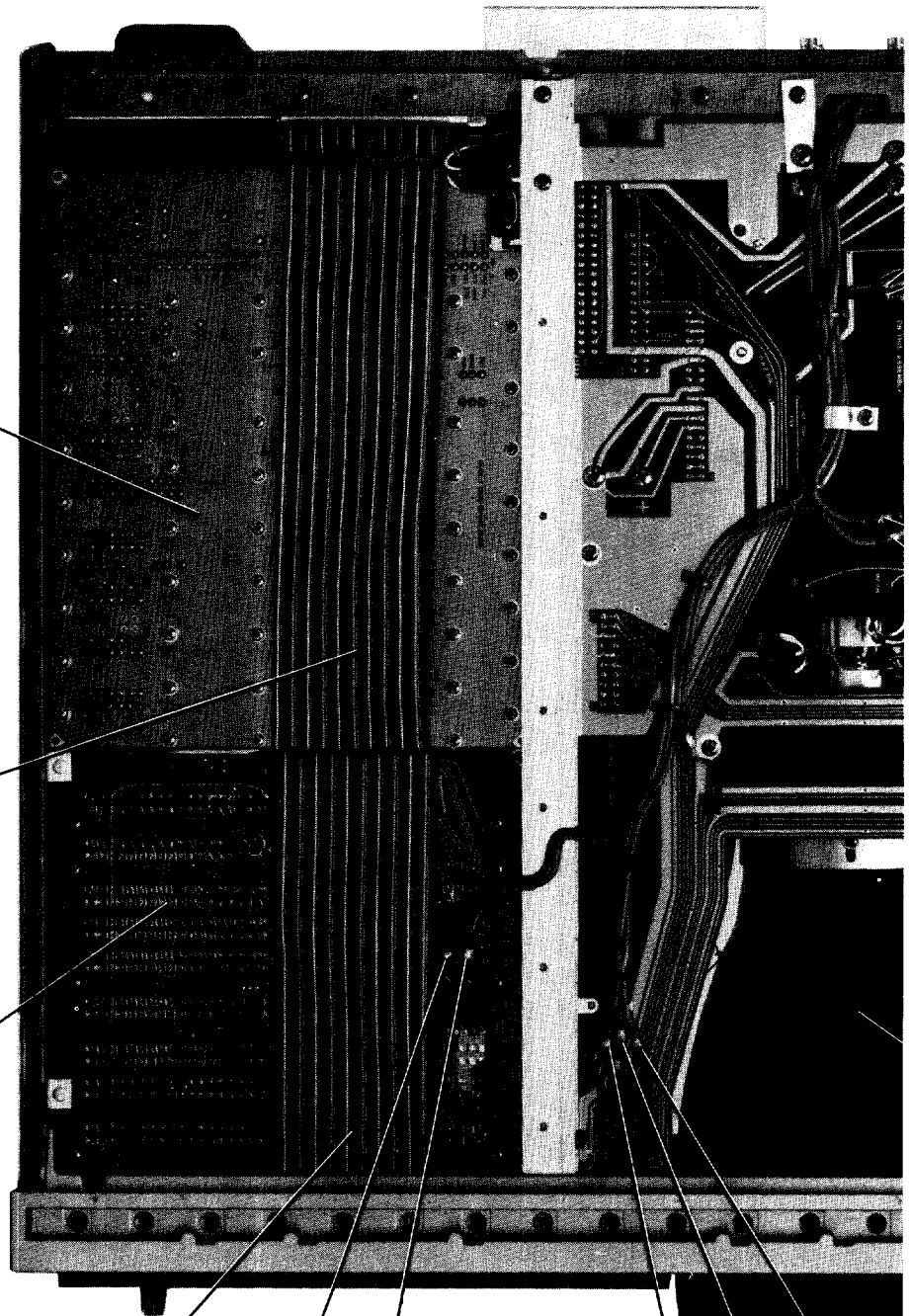
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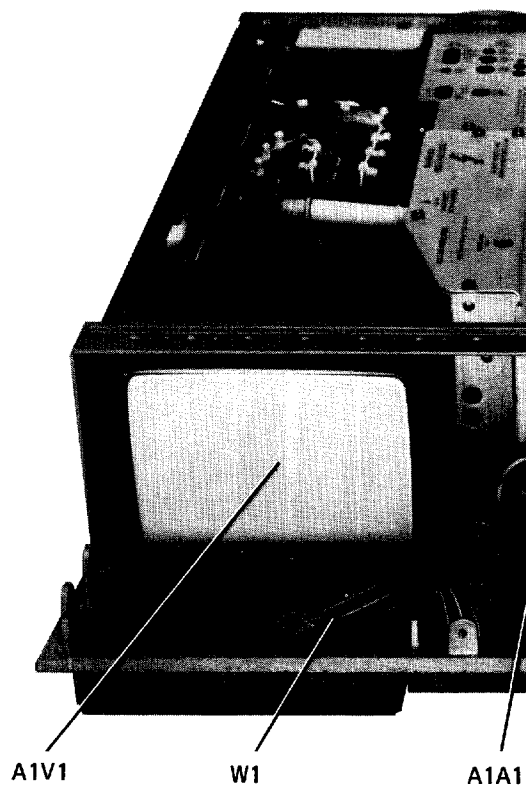
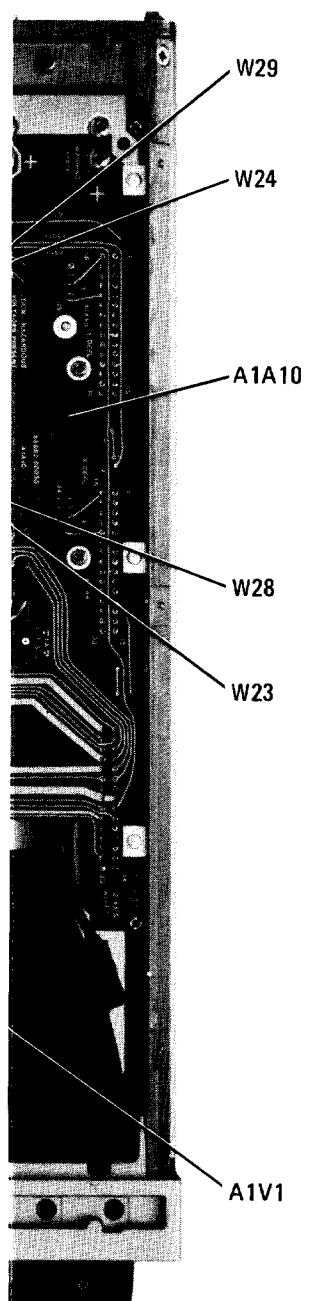
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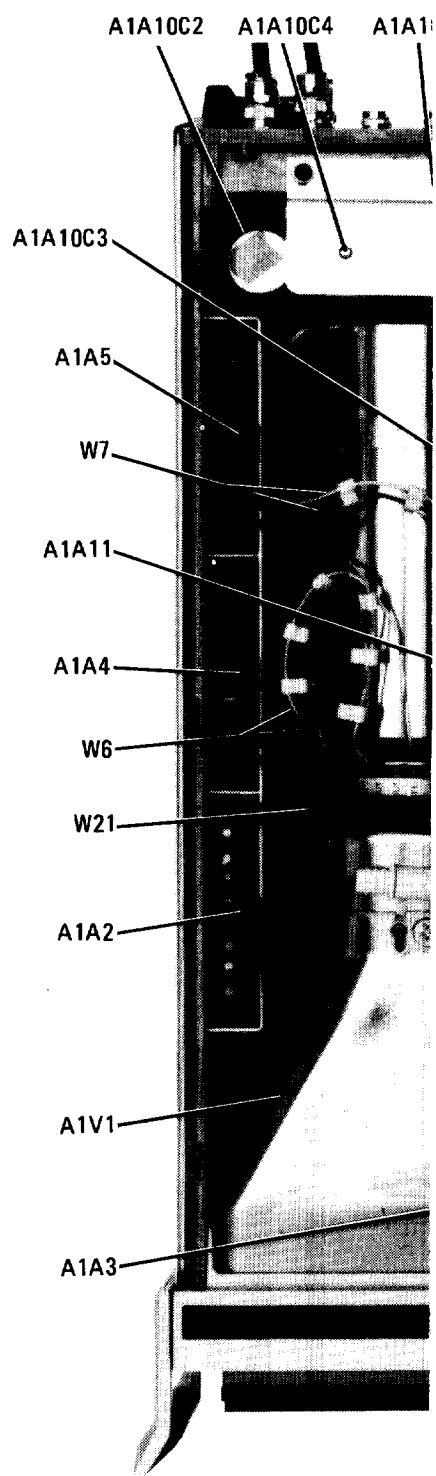
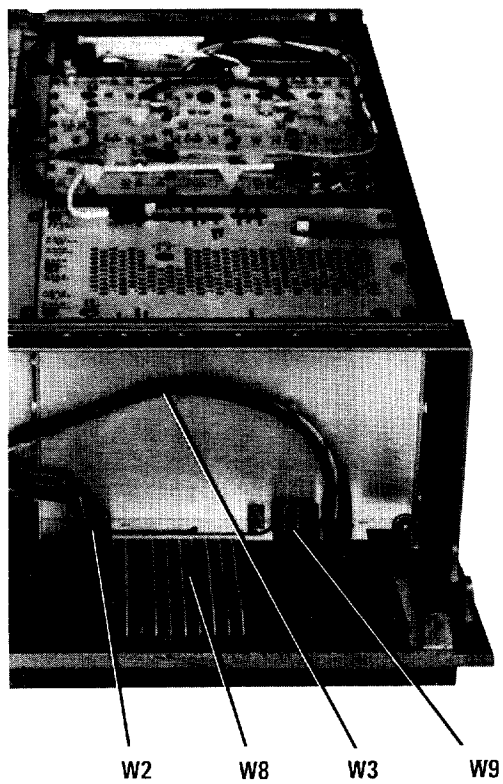
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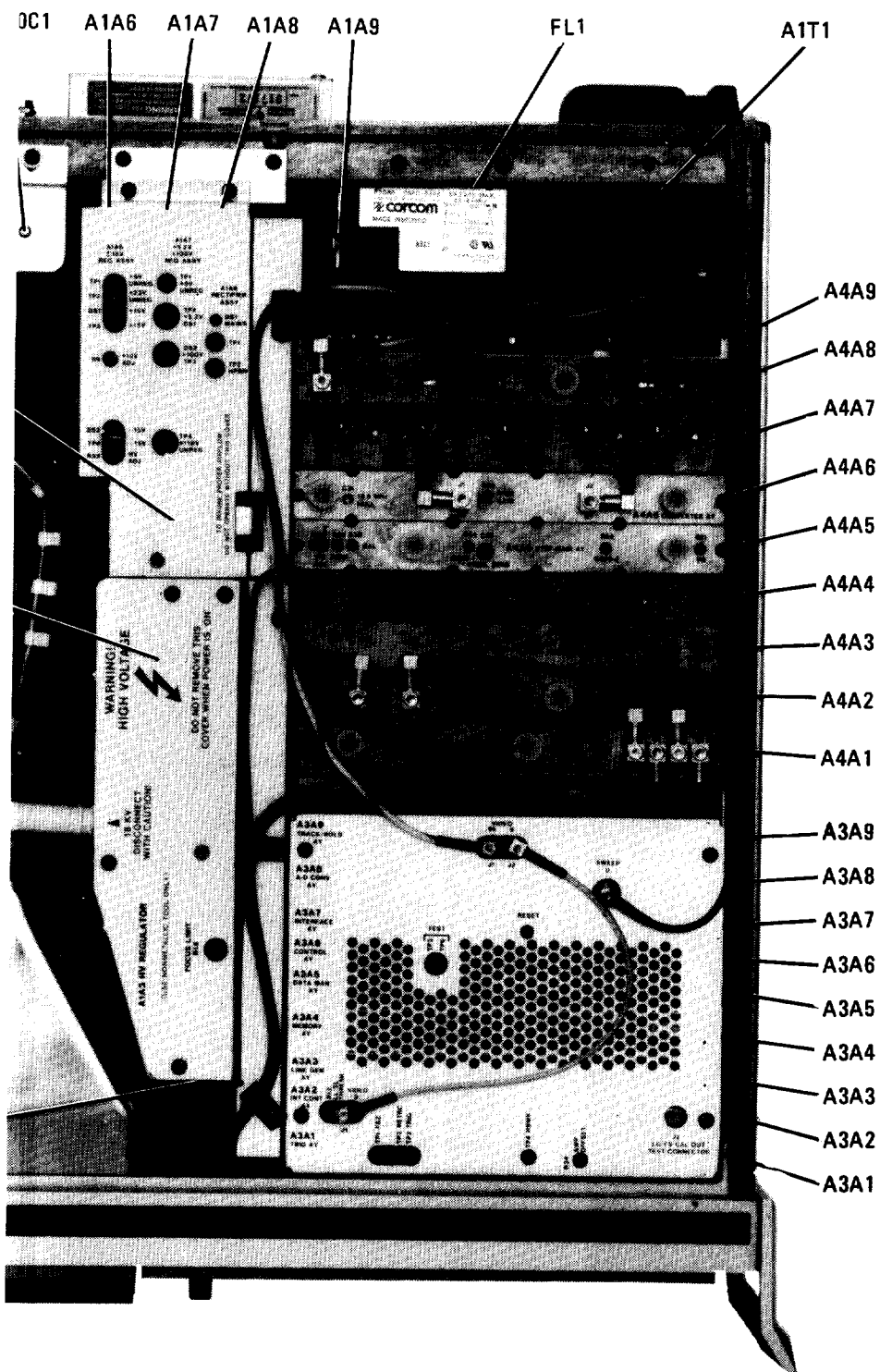
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W27









MAJOR ASSEMBLY AND COMPONENT LOCATIONS (IF-DISPLAY SECTION)

MANUAL UPDATING SUPPLEMENT

<pre>***** MANUAL UPDATING COVERAGE ***** * * This supplement adapts your manual * to instruments with all serial * number prefixes. * *****</pre>	<pre>***** MANUAL IDENTIFICATION ***** * * Instrument Model Number: 8566B * Manual Part Number: 08566-90051 * Manual Print Date: September 1984 * *****</pre>
--	---

ABOUT THIS SUPPLEMENT

The information in this supplement is provided to correct manual errors and to adapt the manual to instruments containing changes made after the manual print date.

Change and correction information in this supplement is grouped according to the tabs in the manual. "All Serials" indicates information that corrects manual errors or modifies all instruments. All other information documents changes to the design of the instrument and is prefaced by a serial number or serial prefix. Supplemental or replacement pages referred to in the change information can be located at the end of this supplement.

Manual updating supplements are revised as often as necessary to keep manuals as accurate as possible. Hewlett-Packard recommends that you periodically request the latest edition of this supplement. Free copies are available from all HP offices. When requesting copies quote the model number, print date, and part number listed at the top of this page.

HOW TO USE THIS SUPPLEMENT

Insert this title page in front of the title page in your manual.

Insert each tab of correction information behind each appropriate tab divider in the manual.

Make all errata changes.

Make all appropriate serial-number-related changes.

When inserting replacement pages, the original pages may be discarded or the original manual may be left intact to document all instrument configurations.

If your manual has been updated according to the last edition of this supplement, you need only record the latest changes.

► indicates new information.

ADJUSTMENTS

► PAGE 6:

All Serials

Table 2. Adjustable Components in Alpha-Numeric Order (4 of 6)
Change Adjustment Number of A6A9A1R38 to 18.

► PAGES 38 THROUGH 41:

All Serials

5. Log Amplifier Adjustments

In step 23, delete the sentence "Verify that attenuator is set at 10 dB."

► PAGES 42 THROUGH 44:

All Serials

6. Video Processor Adjustments

In step 11, change "...as close to +1000..." to "...as close to 1,000..."

PAGES 71 THROUGH 79:

All Serials

13. Sweep, DAC, and Main Coil Driver Adjustments

Replace pages 73 and 74 with the new pages 73 and 74 included in this Manual Updating supplement.
Replace pages 77 and 78 with the new pages 77 and 78 included in this Manual Updating supplement.

► PAGES 98 THROUGH 100:

All Serials

18. RF Module Phase Lock Adjustments

Change step 8 to read "Key in [0—2.5 GHz] on HP 8566B Spectrum Analyzer (DUT)."

► PAGES 106 THROUGH 123:

All Serials

21. Frequency Response Adjustments

In step 19, change DVM indication to -0.15 ± 0.01 Vdc.

► PAGES 124 THROUGH 126:

All Serials

22. Analog-to-Digital Converter Adjustments

In Figure 74, change A3A8TP5 to A3A8TP11.

In step 3, make the following changes:

In part d, first sentence, change "DVM" to "Oscilloscope" in the first sentence.

In part d, delete the second sentence.

In part e, replace the first sentence with the following text:

"Adjust A3A8R6 OFFS until the level at A3A8TP11 toggles. Center A3A8R6 in the range in which the output at A3A8TP11 toggles."

In step 4, make the following changes:

In part e, first sentence, change "DVM" to "Oscilloscope".

In part e, delete the second sentence.

In part f, replace the first sentence with the following text:

"Adjust A3A8R6 OFFS until the level at A3A8TP11 toggles. Center A3A8R6 in the range in which the output at A3A8TP11 toggles."

In part h, change "Press [2—22 GHz]." to "Press [0—2.5 GHz]."

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

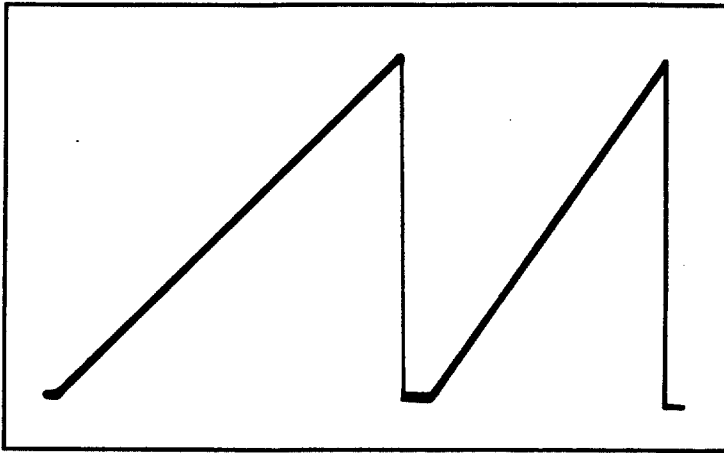


FIGURE 41. 0V TO +10V SWEEP RAMP AT A16TP3

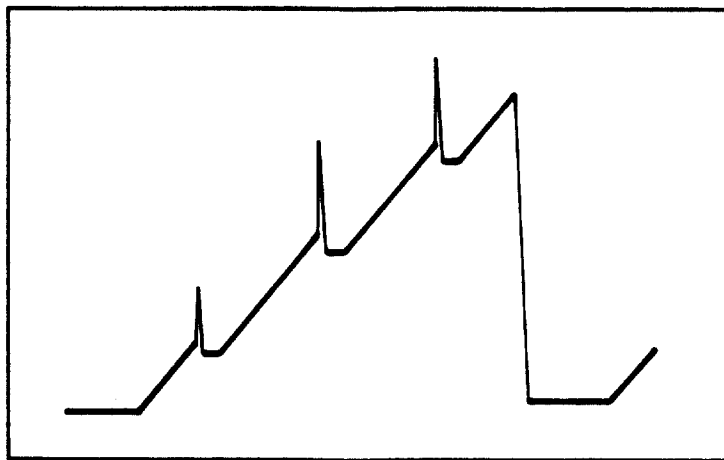


FIGURE 42. IMPROPERLY ADJUSTED DC LEVELS BETWEEN SWEEP RAMPS

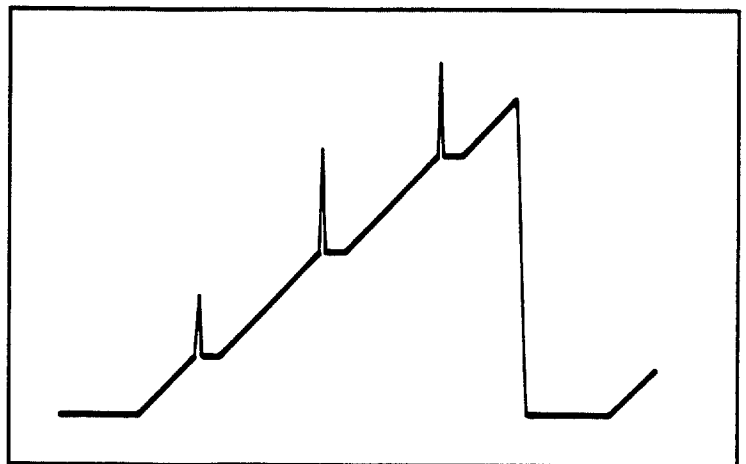


FIGURE 43. PROPERLY ADJUSTED DC LEVELS BETWEEN SWEEP RAMPS

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

15. Difference between DVM indications for RECALL 1 and RECALL 2 should be less than 1 mVdc. DVM indication will be approximately -8 Vdc.
16. If necessary, adjust A19R19 Summing Amplifier OFFSET while alternating between RECALL 1 and RECALL 2 so that difference in DVM indication is less than 1 mVdc.
17. Key in STOP PRESET 22 GHz, SAVE 3.
18. Press RECALL and alternate between 1 and 3 while monitoring DVM.
19. Difference between DVM indications for RECALL 1 and RECALL 3 should be less than 3 mVdc.
20. If necessary, adjust A19R41 25 GHz SPAN OFFSET while alternating between RECALL 1 and RECALL 3 so that difference in DVM indication is less than 3 mVdc.

YTO DAC Adjustment

21. Press 1-22 GHz.
22. Key in STOP PRESET 3 GHz, SHIFT SWEEP CONT, CENTER FREQUENCY 2.0125 GHz, SHIFT R REF-REF LVL, SWEEP SINGLE.
23. Key in SHIFT CF STOP SIZE 0 Hz (this sets the DAC to 0).
24. Connect DVM to A19TP5. Clip GND lead of DVM to A19TP3.
25. Adjust A19R50 for $+10.000\text{V} \pm .001\text{V}$.
26. Connect DVM to A19TP2. Adjust A19R19 for $-6.000\text{V} \pm .001\text{V}$.
27. Key in SHIFT CF STOP SIZE and 4095 Hz. Adjust A19R9 for $-18.600\text{V} \pm .001\text{V}$ at TP2.
28. Press 1-22 GHz.
29. Key in CENTER FREQUENCY 3.4286 GHz, FREQUENCY SPAN 2.5 GHz, SHIFT R REF-REF LVL, SWEEP SINGLE, SAVE 1.
30. Adjust A19R56 for $-7.500\text{V} \pm .001\text{V}$ at TP2.
31. Press 1-22 GHz, RECALL 1.
32. Press SWEEP SINGLE.
33. Adjust A19R32 for $-15.000\text{V} \pm .001\text{V}$ at A19TP2.
34. Repeat steps 32 and 33 until three consecutive voltage readings are within $\pm .001\text{V}$ of one another.
35. Press 1-22 GHz, STOP PRESET 5 GHz, SHIFT SWEEP CONT, CENTER FREQUENCY 3.4286 GHz, FREQUENCY SPAN 3.0 GHz, SHIFT R REF-REF LVL, SWEEP SINGLE, SAVE 2.
36. Adjust A19R41 (25 GHz span offset) for $-6.750\text{V} \pm .001\text{V}$ at A19TP2.
37. Press 1-22 GHz, RECALL 2.
38. Adjust A19R43 for $-15.750\text{V} \pm .001\text{V}$ at A19TP2.

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

YTO Main Coil Driver Adjustment

39. Press **1-22**, **SHIFT**, **F**. Jumper A20TP5 to A21TP2.
40. Connect frequency counter to front-panel 1st LO OUTPUT as shown in Figure 46.
41. Remove 8 (gray) cable at A11J1 $\emptyset$ DET OUT.
42. Key in **FREQUENCY SPIN** 0 Hz and **CENTER FREQUENCY** 2.3 GHz.
43. Adjust A20R34 2.3 GHz adjustment for a frequency counter indication of 2300.0 ± 0.1 MHz. Refer to Figure 45 for location of adjustments. Press **SAVE** **1**.
44. Key in **CENTER FREQUENCY** 6150.000 MHz.
45. Adjust A20R25 6.15 GHz adjustment for a frequency counter indication of 6150.0 ± 0.1 MHz. Press **SAVE** **2**.
46. Alternate between **RECALL** **1** and **RECALL** **2**, making adjustments of steps 43 and 45 until requirements of both steps are met.
47. Remove jumper from between A20TP5 and A21TP2 and reconnect 8 (gray) cable to A11J1.

YTO Main Coil Driver Adjustment (Alternate Procedure)

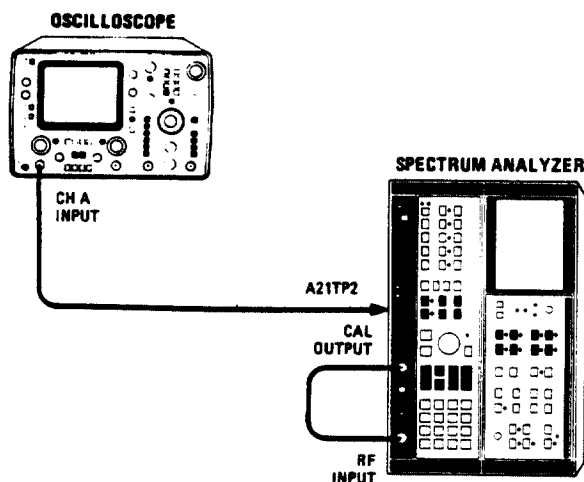


FIGURE 47. YTO MAIN COIL DRIVER ADJUSTMENTS SETUP (ALTERNATE PROCEDURE)

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

48. Disconnect 8 (gray) cable from A11J1 Ø DET OUT. Jumper A12TP2 to A12TP3 (Lock Indicator Disable).
49. Connect CAL OUTPUT to RF INPUT and press **2.72 GHz**.
50. Key in **CENTER FREQUENCY** 0 Hz. (Frequency Span readout should indicate 2 GHz.)
51. Adjust A20R25 6.15 GHz adjustment to obtain two comb teeth (100 MHz harmonics) per division on the HP 8566B CRT. These comb teeth should be evenly spaced but not necessarily aligned with graticule lines. (Counterclockwise rotation of adjustment increases spacing between comb teeth.)
52. Adjust A20R34 2.3 GHz adjustment to align the LO feedthrough signal on the center graticule line. It may be necessary to disconnect RF INPUT to locate the LO feedthrough. (Counterclockwise rotation of adjustment moves signal to the right.)
53. Repeat steps 51 and 52 until comb teeth are spaced two per division and aligned with graticule lines. (Every other comb tooth will align with a graticule line.)
54. Key in **CENTER FREQUENCY** 2 GHz, **FREQUENCY SPAN** 100 MHz. At least one comb tooth should be visible on display.
55. Adjust A20R25 6.15 GHz to place comb tooth nearest the center of the display on the center graticule line.
56. Press **SAVE** **1**.
57. Key in **CENTER FREQUENCY**, **SHIFT** **HOLD** .9 GHz.
58. Press **SAVE** **2**.
59. Adjust A20R34 2.3 GHz to place comb tooth nearest the center of the display on the center graticule line.
60. Repeat adjustments of steps 55 and 59 by alternating between **RECALL** **1** and **RECALL** **2** until requirements of both steps are met.
61. Key in **CENTER FREQUENCY** 2 GHz, **FREQUENCY SPAN** 10 MHz.
62. Press **SAVE** **3**.
63. Adjust A20R25 6.15 GHz to move nearest comb tooth to center graticule line.
64. Key in **CENTER FREQUENCY**, **SHIFT** **HOLD** .9 GHz.
65. Press **SAVE** **4**.
66. Adjust A20R34 2.3 GHz to move nearest comb to center graticule line.
67. Repeat adjustments of steps 63 and 66 by alternating between **RECALL** **3** and **RECALL** **4**.

NOTE

Steps 68 and 69 may be omitted if an oscilloscope is not available.

68. Connect oscilloscope to A21TP2. Reconnect 8 (gray) cable to A11J1 Ø DET OUT. Remove jumper from A12TP2 to A12TP3 (Lock Indicator Disable).



Manual Updating Supplement

Supplement HP Part Number: 08566-90142
Supplement Print Date: 1 February 1990

This supplement updates the following document:

HP 8566B

Performance Tests and Adjustments Manual

Manual HP Part Number: 08566-90051
Manual Print Date: September 1984

What Are Manual Updating Supplements?

A Manual Updating Supplement keeps your manual up-to-date. The supplement, which consists of a cover page and various replacement and/or additional pages for your manual, is shipped with the manual that it updates.

How to Use the Manual Updating Supplement

SELECTING THE PAGES TO BE ADDED

The following information helps you select the applicable pages to add supplement information to your manual.

Serial Prefix or Firmware Version

Check the serial prefix or firmware version information on the pages. If there are several versions of a page, select the version that applies to your instrument. For example, your instrument has a serial prefix of 2825A, and the supplement has two versions of one page: *Serial Prefix 2731A and Above*, and *Serial Prefix 2829A and Above*. In this example *Serial Prefix 2731A and Above* applies to your instrument.

Supplement Revision Date

If there are two copies of a page with the same page number and serial prefix, but different revision dates (for example, Rev. 12JUL87 and Rev. 28AUG87), select the page with the latest revision date.

If there is an All Serials version of a particular piece of information on a page *and* a version identified by a serial prefix that applies to your instrument, select the version with the latest revision date on the bottom of the page. If there are two such pages with different changes, use both (incorporate one with the other).

If the page already in your manual has a revision date that is *later* than the applicable page in the supplement, keep the page currently in your manual; the manual already may have been updated.

COVER PAGE

The cover page of each Manual Updating Supplement gives the supplement part number and its print date. The supplement print date corresponds to the revision date of the supplement (for example, Rev. 12JUL87) found at the bottom of the cover page.

The revision date of the supplement and its part number are updated each time the supplement changes, but the supplement part number stays the same. For each manual part number there is only one Manual Updating Supplement part number. For example, the manual with HP Part Number 70700-90001 always will have a Manual Updating Supplement with HP Part Number 70700-90047; however, there will be different revision dates of that supplement.

REPLACEMENT OR ADDITIONAL PAGES

A replacement page has the same page number as the page being replaced. Additional pages have page numbers with a decimal number. For example, if one additional page is added between pages 6-5 and 6-6, it will be numbered 6-5.1.

The revision date appearing on each page is the date that the new page was *originally* added to the supplement.

Replacement or additional pages may contain several different types of information:

- new information that was not supplied in the original document
- change information that documents changes to the product that have occurred since the original printing of the manual
- error information (errata) that corrects errors that were present in the manual

Location of a new or changed information is marked with a vertical bar on the outside margin of each replacement.

New and change information is usually tied to a serial prefix or firmware version change; however, information that applies to *all* serials or *all* firmware versions may also be included in the supplement.

The applicable serial prefix or firmware version is printed on each page. If the information applies to all serial numbers of the instrument, the page will contain the notation *All Serials*. Similarly, if a replacement page contains error-correction information, it will contain the notation *Errata*.

INSERTING THE REPLACEMENT AND ADDITIONAL PAGES

After you have selected applicable pages, discard each old page for which you have a new version. Insert the new version of the page. Each replacement page will have the exact page number as the old version.

Additional pages have page numbers with a decimal number. These pages are added to the manual without removing any old pages. For example, if there is one additional page numbered 6-5.1, it should be added between pages 6-5 and 6-6.

PERFORMANCE TESTS

11. SWEEP TIME ACCURACY TEST (Cont'd)

4. Set up the universal counter as follows:
 - a. Set all front panel keys in "out" position.
 - b. Set POWER switch to ON.
 - c. Set GATE TIME vernier control to 9 o'clock.
 - d. Set SEP/COM A switch to COM A position.
 - e. Depress T.I. A → B switch (making sure the blue shift key is out).
 - f. Set Channel A trigger level to trigger on negative slope.
 - g. Set Channel B trigger level to trigger on positive slope.
 - h. Set both Channel A and Channel B AC/DC switches to DC.
 - i. Connect the digital voltmeter to Channel A TRIGGER LEVEL OUT. (Be sure to ground the DVM properly.)
 - j. Adjust Channel A trigger level to set a DVM voltage reading of 0.3V.
 - k. Repeat steps i and j for Channel B.
5. Set analyzer SWEEP TIME to 20 msec. Allow the universal counter enough time to settle at this sweep time.
6. Note the measured sweep time on the universal counter and record this value in Table 16. The measured sweep time should be a value between the minimum and maximum values given in Table 16.
7. Repeat steps 5 and 6 for each sweep time setting in Table 16.

TABLE 16 SWEEP TIME ACCURACY, SWEEP TIMES ≥ 20 MSEC

SWEEP TIME	MARKER Δ Time		
	Min.	Measured	Max.
20 msec	18 msec	_____	22 msec
30 msec	27 msec	_____	33 msec
50 msec	45 msec	_____	55 msec
70 msec	63 msec	_____	77 msec
90 msec	81 msec	_____	99 msec
110 msec	99 msec	_____	121 msec
170 msec	153 msec	_____	187 msec
200 msec	180 msec	_____	220 msec
2 sec	1.8 sec	_____	2.2 sec

11. SWEEP TIME ACCURACY TEST (Cont'd)

8. Press MARKER .
9. Use  to place the marker at the second vertical graticule.
10. Press , ^u.
11. Set the analyzer to 20 sec. Allow the universal counter enough time to settle at this sweep time.
12. Note the measured sweep time on the universal counter and record this value in Table 17. Measured sweep time should be a value between the minimum and maximum values given in Table 17.
13. Repeat steps 11 and 12 for 200 sec sweep time.

TABLE 17. SWEEP TIME ACCURACY

	MARKER Δ Time		
	Minimum	Measured	Maximum
20 sec	2.8 sec	_____	5.2 sec
200 sec	28 sec	_____	52 sec

13. LINE-RELATED SIDEBANDS TEST (Cont'd)

9. The MARKER Δ amplitude for all line-related sidebands <360 Hz away from the signal should be <-70 dB. The MARKER Δ amplitude for all line-related sidebands from 360 Hz to 600 Hz away from the signal should be <-75 dB.

Largest Level <360 Hz _____ dB at _____ Hz

Largest Level 360-600 Hz _____ dB at _____ Hz

10. Press **SHIFT** **H** **SWEEP TIME**, SWEEP **CONT**, TRACE A **CLEAR WHITE**.

11. Connect 1ST LO OUTPUT of source analyzer to RF INPUT of analyzer under test as shown in Figure 24.

12. Key in the following on the source analyzer:

CENTER FREQUENCY 2.4 GHz

FREQUENCY SPAN 0 Hz

SHIFT **R** **DIS-REF LVL** (Display diagnostics for convenience)

SHIFT **F** **RES BA** (YTO Pretest Mode)

SWEEP **SMALL**

The first line of the diagnostic display and the CENTER readout both should now indicate 2.400 000 000 GHz. This is the 1ST LO OUTPUT frequency.

13. Key in **CENTER FREQUENCY** 2.4 GHz and **REFERENCE LEVEL** +10 dBm on the analyzer under test. Wait for asterisk (*) to disappear.

14. Repeat steps 5 through 8.

15. The MARKER Δ amplitude for all line-related sidebands <360 Hz away from the signal should be <-60 dB.

Largest Level <360 Hz _____ dB at _____ Hz

16. Press **SHIFT** **H** **SWEEP TIME**, SWEEP **CONT**, TRACE A **CLEAR WHITE**.

17. Change **CENTER FREQUENCY** of both the source analyzer and the test analyzer to 2.6 GHz. Wait for the asterisk (*) to disappear.

18. Press MARKER **OFF**, **PRESEL PEAK** and wait for PEAKING! message to disappear from the CRT.

19. Repeat steps 5 through 8.

20. The MARKER Δ amplitude for all line-related sidebands <360 Hz away from the signal should be <-60 dB.

Largest Level <360 Hz _____ dB at _____ Hz

21. Press **SHIFT** **H** **SWEEP TIME**, SWEEP **CONT**, TRACE A **CLEAR WHITE**.

22. Change **CENTER FREQUENCY** of both the source analyzer and the test analyzer to 5.7 GHz. Wait for the asterisk (*) to disappear.

PERFORMANCE TESTS

13. LINE-RELATED SIDEBANDS TEST (Cont'd)

23. Press MARKER , and wait for the PEAKING! message to disappear from the CRT.
24. Repeat steps 5 through 8.
25. The MARKER Δ amplitude for all line-related sidebands <360 Hz away from the signal should be < -60 dB.

Largest Level <360 Hz _____ dB at _____ Hz

OPTION 400

1. Set the AC power source output equal to the required line voltage and frequency. The analyzer under test should be operated at 400 Hz and the source analyzer at 50-60 Hz.
2. Allow both analyzers to warm up for at least one-half hour with LINE switch in either STANDBY or ON position.
3. Perform frequency calibration of each analyzer as specified in step 2 of standard instrument procedure.
4. Connect 1ST LO OUTPUT of source analyzer to RF INPUT of analyzer under TEST and key in settings on source analyzer as specified in step 12 of standard instrument procedure.
5. Key in 2.4 GHz, 1 MHz on analyzer under test.
6. Press MARKER and wait for PEAKING! message to disappear from display.
7. Press MARKER , , , .
8. Change to 12 kHz. Wait for signal trace to be centered.
9. Change to 30 Hz.
10. Press , , SWEEP , to initiate video averaging of 10 sweeps.
11. When the VID AVG readout reaches 10, press , TRACE B , TRACE A .
12. Press MARKER , and position the marker at the peaks of the line-related sidebands separated from the signal by multiples of the line frequency; i.e., 400 Hz, 800 Hz, 1200 Hz,...
13. The MARKER Δ amplitude for all line sidebands below 2 kHz should be < -55 dB. The Δ amplitude for sidebands from 2 kHz to 5.5 kHz should be < -65 dB.

Largest Level <2 kHz _____ dB at _____ Hz

Largest Level <2 kHz to 5.5 kHz _____ dB at _____ Hz

14. Change of source analyzer to 5.7 GHz and repeat steps 5 through 13 for 5.7 GHz.

PERFORMANCE TESTS

15. RESIDUAL RESPONSES TEST (Cont'd)

19. Key in analyzer settings as follows:

START FREQ	.....	12.4 GHz
STOP FREQ	.....	18.6 GHz
RES BW	.....	100 kHz
VIDEO BW	.....	3 kHz

20. Set the display line at -85 dBm.

21. Check for residual responses > -85 dBm by using steps 7 through 9.

Largest Residual Level _____ dBm and _____ Hz

22. Key in the following:

START FREQ	.....	18.5 GHz
STOP FREQ	.....	22 GHz

23. Set the display line at -80 dBm.

24. Check for residual responses > -80 dBm by using steps 7 through 9.

Largest Residual Level _____ dBm and _____ Hz

16. HARMONIC AND INTERMODULATION DISTORTION TEST

SPECIFICATION:

Second Harmonic Distortion:

Center Frequency	Level at Mixer	Harmonic Distortion
50 MHz to 700 MHz non-preselected	≤ -40 dBm	< -80 dBc
100 Hz to 2.5 GHz non-preselected	≤ -40 dBm	< -70 dBc
2 to 22 GHz preselected	≤ -10 dBm	< -100 dBc

Third-Order Intermodulation Distortion

Third-Order Intercept (TOI):

- $> +5$ dBm, 100 Hz to 5 MHz
- $> +7$ dBm, 5 MHz to 5.8 GHz
- $> +5$ dBm, 5.8 GHz to 18.6 GHz

DESCRIPTION:

Second harmonic distortion in the non-preselected and preselected bands is checked with a signal source and low-pass filter. The low-pass filter ensures that the harmonics measured are due to the analyzer and not the source. Third-order intermodulation distortion is measured in the non-preselected and preselected bands with two signal sources. To prevent source interaction, the synthesizer outputs are padded and combined in a reactive power divider.

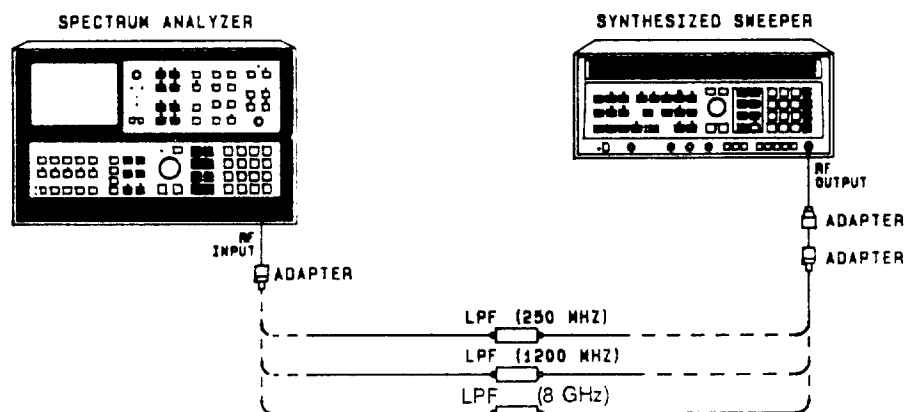


FIGURE 28. HARMONIC DISTORTION TEST SETUP

17. IMAGE, MULTIPLE, AND OUT-OF-BAND RESPONSES TEST (Cont'd)

9. Repeat steps 4 through 9 for all remaining **CENTER FREQUENCY** and synthesized sweeper settings in Table 20. Steps 4 through 8 need only be done once for each **CENTER FREQUENCY** setting.
10. Set the synthesized sweeper for an output CW frequency of 5700.000 MHz.
11. Key in the following analyzer settings:
- CENTER FREQUENCY** 5.7 GHz
- REFERENCE LEVEL** 0.0 dBm
12. Press **MARKER** **PRESEL PEAK** and wait for PEAKING! message to disappear from display. Press **MARKER** **NORM**.
13. Change **FREQUENCY SPAN** to 5 kHz. Adjust the synthesized sweeper output power level to place peak of signal trace at the top CRT graticule line.
14. Press **MARKER** **A** and **SHIFT**, **SWEEP** **CONT**. Using the DATA knob, determine the amplitude of the spurious response and enter the result in Table 21.
15. Change **CENTER FREQUENCY** to 2.36790 GHz. The multiple response at the center frequency should be below the display line (≤ -70 dBc).
- Multiple response at 2.36790 GHz _____ dBc
16. Press **SHIFT**, **Q** **MANUAL STEP SIZE**.
17. Set the synthesized sweeper output CW frequency and analyzer **CENTER FREQUENCY** according to Table 21. Before checking the amplitude of the multiples for a given signal frequency, set the input signal amplitude by the procedure of steps 11 through 14. All multiple responses should be below the display line (≤ -70 dBc).

TABLE 21. MULTIPLE RESPONSES

Synthesized Sweeper Frequency (MHz)	CENTER FREQUENCY (Multiple Response) (GHz)	Displayed Spurious Amplitude	
		Measured (dBc)	Maximum (dBc)
5700.000	2.68930	_____	-70
6000.000	1.18930	_____	-50
12000.000	8107133	_____	-70
	8.535667	_____	-70
13000.000	1.06790	_____	-45
	1.9107	_____	-45
	0.53395	_____	-45
15000.000	10.107133	_____	-60
	10.535667	_____	-60

PERFORMANCE TESTS

18. GAIN COMPRESSION TEST

SPECIFICATION:

<1.0 dB, 100 Hz to 22 GHz, ≤ -5 dBm at the input mixer

DESCRIPTION:

Gain compression is measured by changing the power level at the input mixer from -10 dBm to 0 dBm (100 Hz to 2.5 GHz) or -15 dBm to -5 dBm (2 to 22 GHz). The displayed signal level will change by less than 10 dB, indicating gain compression of the input mixer. Since a 10 dB change in IF gain is used to keep the signal trace near the same point on the display when the input power is increased, the error due to this IF gain change is first measured, then subtracted from the displayed deviation to give the deviation due to compression only.

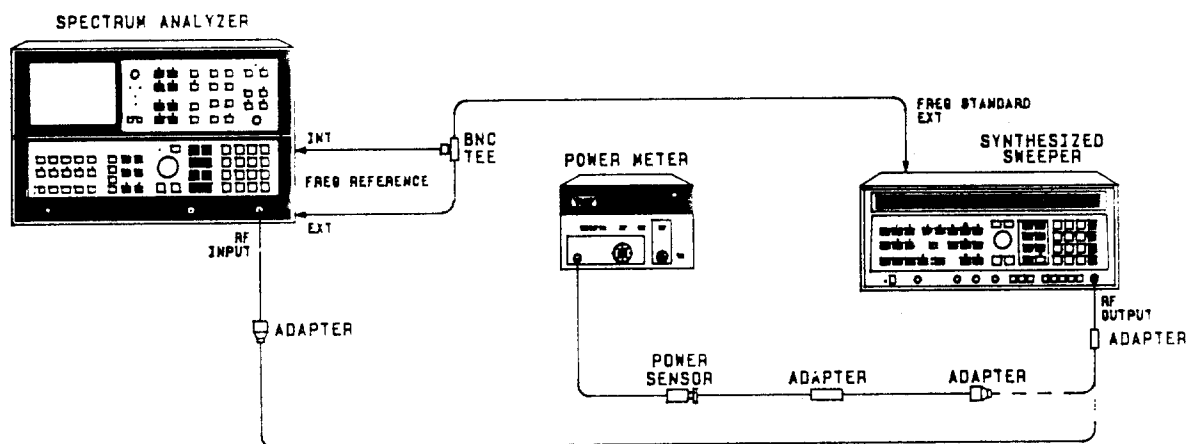


FIGURE 32 GAIN COMPRESSION TEST SETUP

EQUIPMENT:

Synthesized Signal Generator	HP 8340A
Power Meter	HP 436A
Power Sensor	HP 8485A
Adapter, Type N (m) to SMA (f) (2 required)	HP 1250-1250
Adapter, Type N Female Connectors	HP 1250-0777
Adapter, SMA (f) to SMA (f)	HP 1250-1158
Adapter, BNC Tee (m) (f) (f)	HP 1250-0781
Cable Assembly, SMA Male Connectors	HP 5061-1086

PERFORMANCE TESTS

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (5 OF 13)

Test No.	Test Description		Results		
			Min.	Measured	Max.
7	IF Gain Uncertainty Test (Cont'd)				
	18. 2 dB Gain Steps (Deviation in dB)				
	REFERENCE LEVEL (dBm)	Frequency Synthesizer Amplitude (dBm)		Last Column from Table 10	
	- 1.9	- 3.9		0 (ref.)	
	- 3.9	- 5.9			
	- 5.9	- 7.9			
	- 7.9	- 9.9			
	- 9.9	- 11.9			
	22. 0.1 dB Gain Steps (Deviation in dB)				
	REFERENCE LEVEL (dBm)	Frequency Synthesizer Amplitude (dBm)		Last Column from Table 11	
	0.0	- 2.00		0.00 (ref.)	
	- 0.1	- 2.10			
	- 0.2	- 2.20			
	- 0.3	- 2.30			
	- 0.4	- 2.40			
	- 0.5	- 2.50			
	- 0.6	- 2.60			
	- 0.7	- 2.70			
	- 0.8	- 2.80			
	- 0.9	- 2.90			
	- 1.0	- 3.00			
	- 1.1	- 3.10			
	- 1.2	- 3.20			
	- 1.3	- 3.30			
	- 1.4	- 3.40			
	- 1.5	- 3.50			
	- 1.6	- 3.60			
	- 1.7	- 3.70			
	- 1.8	- 3.80			
	- 1.9	- 3.90			
	23. Recorded deviations from step 12.				
	Largest Positive 0 to - 70 dBm				
	Largest Negative 0 to - 70 dBm				
	Largest Positive - 80 to - 120 dBm				
	Largest Negative - 80 to - 120 dBm				

TABLE 24. HP 8566B PERFORMANCE TEST RECORD (6 OF 13)

Test No.	Test Description	Results		
		Min.	Measured	Max.
7	IF Gain Uncertainty Test (Cont'd)			
	24. Recorded deviation from steps 18 and 22.			
	Largest Positive step 18		_____	
	Largest Negative step 18		_____	
	Largest Positive step 22		_____	
	Largest Negative step 22		_____	
	25. Sum of Positive Deviations of steps 23 and 24.		_____	0.6 dB
	26. Sum of Negative Deviations of steps 23 and 24.	- 0.6 dB	_____	
8	27. Sum of Positive Deviations of steps 23 and 24.		_____	1.0 dB
	28. Sum of Negative Deviations of steps 23 and 24.	- 1.0 dB	_____	
	Scale Fidelity Test			
	7. Log Scale Fidelity Error			
	Frequency Synthesizer Amplitude (dBm)		Last Column from Table 12	
	+ 10		0 (ref.)	
	0		_____	± 1.0 dB
	- 10		_____	± 1.0 dB
	- 20		_____	± 1.0 dB
	- 30		_____	± 1.0 dB
	- 40		_____	± 1.0 dB
	- 50		_____	± 1.0 dB
	- 60		_____	± 1.0 dB
	- 70		_____	± 1.0 dB
	- 80		_____	± 1.5 dB
	14. Linear Scale Fidelity Error			
	Frequency Synthesizer Amplitude (dBm)			
	0	- 10.87 dB	_____	- 9.21 dB
	- 10	- 23.10 dB	_____	- 17.72 dB
9	Calibrator Amplitude Accuracy Test			
	2. CAL OUTPUT level	- 10.30 dB	_____	- 9.70 dB

Table 1-2. Adjustable Components in Alpha-numeric Order (1 of 6)

Reference Designator	Adjustment Name	Adjustment Number	Adjustment Function
A1A2C104	C104	3	Adjusts rise and fall times of Y deflection amplifier pulse.
A1A2C109	C109	3	Adjusts rise and fall times of Y deflection amplifier pulse.
A1A2C204	C204	3	Adjusts rise and fall times of X deflection amplifier pulse.
A1A2C209	C209	3	Adjusts rise and fall times of X deflection amplifier pulse.
A1A2C307	C307	3	Adjusts rise and fall times of Z axis amplifier pulse.
A1A2R117	YHF GAIN	3	Adjusts rise and fall times of Y deflection amplifier pulse.
A1A2R120	Y GAIN	3	Adjusts vertical position of trace.
A1A2R127	Y POSN	3	Adjusts vertical position of trace.
A1A2R217	XHF GAIN	3	Adjusts rise and fall times of X deflection amplifier pulse.
A1A2R220	X GAIN	3	Adjusts horizontal position of trace.
A1A2R227	X POSN	3	Adjusts horizontal gain of trace.
A1A2R308	ZHF GAIN	3	Adjusts rise and fall times of Z axis amplifier pulse.
A1A2R319	INT GAIN	3&4	Sets adjustment range of front-panel INTENSITY control.
A1A2R409	FOCUS COMP	4	
A1A2R426	T/B FOC	4	Sets focus at the CRT's top and bottom edges.
A1A2R427	T/B CTR	4	Centers CRT's top and bottom edges.
A1A2R437	R/L FOC	4	Sets focus at the CRT's right and left edges.
A1A2R440	R/L CTR	4	Centers CRT's right and left edges.
A1A2R512	ORTHO	3	Sets orthogonality of CRT.
A1A2R513	3D	4	
A1A2R516	INT LIM	4	Sets adjustment range of front-panel INTENSITY control.
A1A2R517	ASTIG	4	Adjusts astigmatism of CRT.
A1A3R14	FOCUS LIMIT	4	Coarse adjusts CRT focus.
A1A6R9	+15V ADJ	1	Adjusts +15 Vdc supply voltage.
A1A6R103	HV ADJ	2	Adjusts CRT high voltage.
A3A1R34	SWEEP OFFSET	24	Adjusts digital sweep to begin at left edge of graticule.
A3A2R12	LL THRESH	24	Adjusts point at which graticule lines switch from short to long lines.
A3A2R50	XS	24	Adjusts horizontal sample and hold pulse.
A3A2R51	YS	24	Adjusts vertical sample and hold pulse.
A3A3R1	X EXP	24	Adjusts horizontal position of annotation.
A3A3R2	Y EXP	24	Adjusts vertical position of annotation.
A3A3R4	X GAIN	24	Adjusts horizontal gain of graticule lines.
A3A3R5	Y GAIN	24	Adjusts vertical gain of graticule lines.
A3A3R6	XLL	24	Adjusts horizontal long lines on graticule information.
A3A3R7	XSL	24	Adjusts horizontal short lines on graticule information.
A3A3R8	YSL	24	Adjusts vertical short lines on graticule information.
A3A3R9	YLL	24	Adjusts vertical long lines on graticule information.
A3A3R43	YOS	24	Aligns graticule's bottom line with fast sweep signal.
A3A8R9	FS	22	Adjusts high-end of digitized sweep.

ADJUSTMENTS

TABLE 2. ADJUSTABLE COMPONENTS IN ALPHA-NUMERIC ORDER (2 OF 6)

Reference Designator	Adjustment Name	Adjustment Number	Adjustment Function
A3A8R14	ZERO	22	Adjusts low end of digitized sweep.
A3A9R19	GS	23	Adjusts gain for sample mode.
A3A9R36	OSN	23	Adjusts offset of negative peak detect mode.
A3A9R39	GP	23	Adjusts gain for positive peak detect mode.
A3A9R44	OSP	23	Adjusts offset of positive peak detect mode.
A3A9R52	GN	23	Adjusts gain for negative peak detect mode.
A3A9R57	G	23	Adjusts overall gain of track and hold.
A3A9R59	OS	23	Adjusts overall offset of track and hold.
A4A1R2	LG OS	6	Adjusts linear gain offsets.
A4A1R14	OS	6	Adjusts Video Processor offset.
A4A1R32	ZERO	6	Adjusts low end of Video Processor sweep.
A4A2R14	LG20	5	Adjusts 20-dB linear gain step.
A4A2R61	- 12 VTV	5	Adjusts Log Amplifier tuning voltage.
A4A2R79	ZERO	5	Adjusts Log Amplifier offset.
A4A3C55	CTR	5	Adjusts Log Amplifier center to IF.
A4A3R67	AMPTD	5	Adjusts amplitude of Log Amplifier Bandpass Filter.
A4A3R83	LG10	5	Adjusts 10-dB linear gain step.
A4A4C9	SYM	8	Centers A4A4 Bandwidth Filter crystal pole #1 symmetry.
A4A4C19	LC CTR	8	Centers A4A4 Bandwidth Filter LC pole #1.
A4A4C20	CTR	8	Centers A4A4 Bandwidth Filter crystal pole #1.
A4A4C39	SYM	8	Adjusts A4A4 Bandwidth Filter crystal pole #2 symmetry.
A4A4C41	LC DIP	8	Dips A4A4 Bandwidth Filter LC pole #1.
A4A4C43	LC DIP	8	Dips A4A4 Bandwidth Filter LC pole #2.
A4A4C65	SYM	8	Adjusts A4A4 Bandwidth Filter crystal pole #3 symmetry.
A4A4C67	LC CTR	8	Centers A4A4 Bandwidth Filter LC pole #2.
A4A4C73	CTR	8	Centers A4A4 Bandwidth Filter crystal pole #3.
A4A4C74	CTR	8	Centers A4A4 Bandwidth Filter crystal pole #2.
A4A4R43	LC	8	Adjusts LC filter amplitudes.
A4A4R49	XTAL	8	Adjusts crystal filter amplitudes.
A4A5C10	FREQ ZERO COARSE	10	Coarse adjusts 18.4 MHz Local Oscillator to set adjustment range of front-panel FREQ ZERO control.
A5A5R2	+ 10V ADJ	10	Adjusts + 10V Temperature Compensation Supply.
A4A5R32	SG10	10	Adjusts 10-dB step gain.
A4A5R33	CAL	10	Adjusts IF gain.
A4A5R44	SG20-1	10	Adjusts first 20-dB step gain.
A4A5R51	VR	10	Adjusts variable step gain.
A4A5R54	SG20-2	10	Adjusts second 20-dB step gain.

ADJUSTMENTS

TABLE 4. HP PART NUMBERS OF STANDARD VALUE REPLACEMENT COMPONENTS (3 OF 3)

RESISTORS

RANGE: 10 to 1.47M Ohms

TYPE: Fixed-Film

WATTAGE: .5 at 125°C

TOLERANCE: $\pm 1\%$



Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D	Value (Ω)	HP Part Number	C D
10.0	0757-0984	4	215	0698-3401	0	4.64K	0698-3348	4	110K	0757-0859	2
11.0	0575-0985	5	237	0698-3102	8	5.11K	0757-0833	2	121K	0757-0860	5
12.1	0757-0986	6	261	0757-1090	5	5.62K	0757-0834	3	133K	0757-0310	0
13.3	0757-0001	6	287	0757-1092	7	6.19K	0757-0196	0	147K	0698-3175	5
14.7	0698-3388	2	316	0698-3402	1	6.81K	0757-0835	4	162K	0757-0130	2
16.2	0757-0989	9	348	0698-3403	2	7.50K	0757-0836	5	178K	0757-0129	9
17.8	0698-3389	3	383	0698-3404	3	8.25K	0757-0837	6	196K	0757-0063	0
19.6	0698-3390	6	422	0698-3405	4	9.09K	0757-0838	7	215K	0757-0127	7
21.5	0698-3391	7	464	0698-0090	7	10.0K	0757-0839	8	237K	0698-3424	7
23.7	0698-3392	8	511	0757-0814	9	12.1K	0757-0841	2	261K	0757-0064	1
26.1	0757-0003	8	562	0757-0815	0	13.3K	0698-3413	4	287K	0757-0154	0
28.7	0698-3393	9	619	0757-0158	4	14.7K	0698-3414	5	316K	0698-3425	8
31.6	0698-3394	0	681	0757-0816	1	16.2K	0757-0844	5	348K	0757-0195	9
34.8	0698-3395	1	750	0757-0817	2	17.8K	0698-0025	8	383K	0757-0133	5
38.3	0698-3396	2	825	0757-0818	3	19.6K	0698-3415	6	422K	0757-0134	6
42.2	0698-3397	3	909	0757-0819	4	21.5K	0698-3416	7	464K	0698-3426	9
46.4	0698-3398	4	1.00K	0757-0159	5	23.7K	0698-3417	8	511K	0757-0135	7
51.1	0757-1000	7	1.10K	0757-0820	7	26.1K	0698-3418	9	562K	0757-0868	3
56.2	0757-1001	8	1.21K	0757-0821	8	28.7K	0698-3103	9	619K	0757-0136	8
61.9	0757-1002	9	1.33K	0698-3406	5	31.6K	0698-3419	0	681K	0757-0869	4
68.1	0757-0794	4	1.47K	0757-1078	9	34.8K	0698-3420	3	750K	0757-0137	9
75.0	0757-0795	5	1.62K	0757-0873	0	38.3K	0698-3421	4	825K	0757-0870	7
82.5	0757-0796	6	1.78K	0698-0089	4	42.2K	0698-3422	5	909K	0757-0138	0
90.0	0757-0797	7	1.96K	0698-3407	6	46.4K	0698-3423	6	1M	0757-0059	4
100	0757-0198	2	2.15K	0698-3408	7	51.1K	0757-0853	6	1.1M	0757-0139	1
110	0757-0798	8	2.37K	0698-3409	8	56.2K	0757-0854	7	1.21M	0757-0871	8
121	0757-0799	9	2.61K	0698-0024	7	61.9K	0757-0309	7	1.33M	0757-0194	8
133	0698-3399	5	2.87K	0698-3101	7	68.1K	0757-0855	8	1.47M	0698-3464	5
147	0698-3400	9	3.16K	0698-3410	1	75.0K	0757-0856	9			
162	0757-0802	5	3.48K	0698-3411	2	82.5K	0757-0857	0			
178	0698-3334	8	3.83K	0698-3412	3	90.9K	0757-0858	1			
196	0757-1060	9	4.22K	0698-3346	2	100K	0757-0367	7			

1. Low-Voltage Power Supply Adjustments

Reference

A1A6 ± 15 V Regulator
A1A7 +120 V, +5.2 V Regulator
A8 Rectifier
A17 Positive Regulator
A18 Negative Regulator

Description

The +15 V supply is adjusted for the IF-display section, and the +22 V and +20 V supplies are adjusted for the RF section. All other low-voltage supplies are measured to ensure that they are within tolerance.

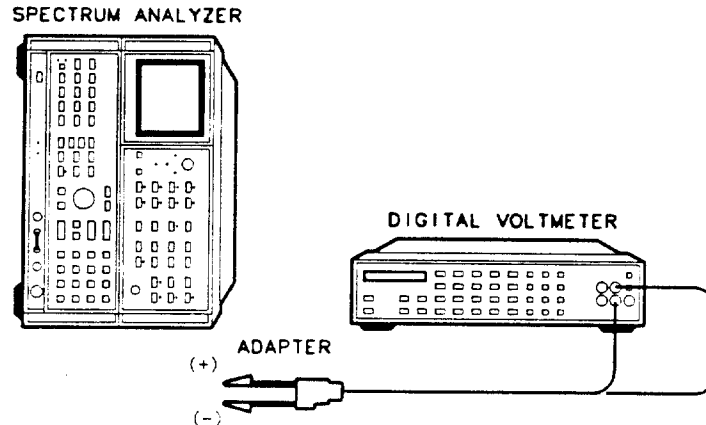


Figure 1. Low-Voltage Power Supply Adjustments Setup

Equipment

Digital Voltmeter (DVM) HP 3456A

Procedure

IF-Display Section

1. Position the instrument on its right side with the IF-display section facing right, as shown in Figure 1.
2. Set the LINE switch to ON and press **2-22 GHz**. Mains indicator A1A8DS1 (red LED) should be lit. See Figure 2 for the location of A1A8DS1.
3. The +15 V indicator A1A6DS1 (yellow LED) should be lit.

1. Low-Voltage Power Supply Adjustments

4. Connect the DVM to A1A6TP3 on the IF-Display Section. DVM indication should be $+15.000 \pm 0.010$ V dc. If the voltage is out of tolerance, adjust A1A6R9 $+15$ V ADJ for specified voltage.

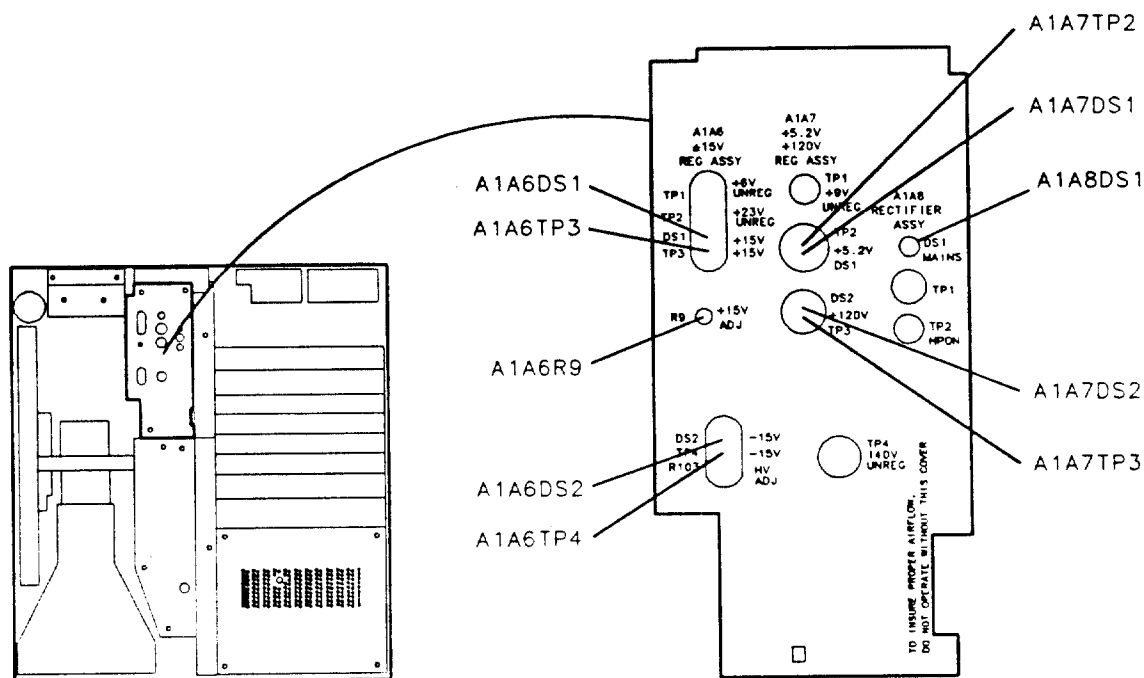


Figure 2. Location of IF-Display Section Low-Voltage Adjustments

5. The -15 V indicator A1A6DS2 (yellow LED) should be lit.
6. Connect the DVM to A1A6TP4. DVM indication should be -15.000 ± 0.050 V dc. The -15 V supply is referenced to the $+15$ V supply; therefore, if the -15 V supply is out of tolerance, a circuit malfunction is indicated.
7. The $+120$ V indicator A1A7DS2 (yellow LED) should be lit.
8. Connect the DVM to A1A7TP3. DVM indication should be $+120.0 \pm 3.0$ V dc. The $+120$ V supply is referenced to the $+15$ V supply; therefore, if the $+120$ V supply is out of tolerance, a circuit malfunction is indicated.
9. The $+5.2$ V indicator A1A7DS1 (yellow LED) should be lit.
10. Connect the DVM to A1A7TP2. DVM indication should be $+5.200 \pm 0.050$ V dc. The $+5.2$ V supply is referenced to the $+15$ V supply; therefore, if the $+5.2$ V supply is out of tolerance, a circuit malfunction is indicated.

1. Low-Voltage Power Supply Adjustments

RF Section

11. Connect the DVM to A8TP1. Connect the ground lead to chassis ground. The +22 V indicator A8DS1 (yellow LED) should be lit. See Figure 3.
12. Adjust A8R2 +22 V ADJ for a DVM indication of $+22.000 \pm 0.020$ V dc.

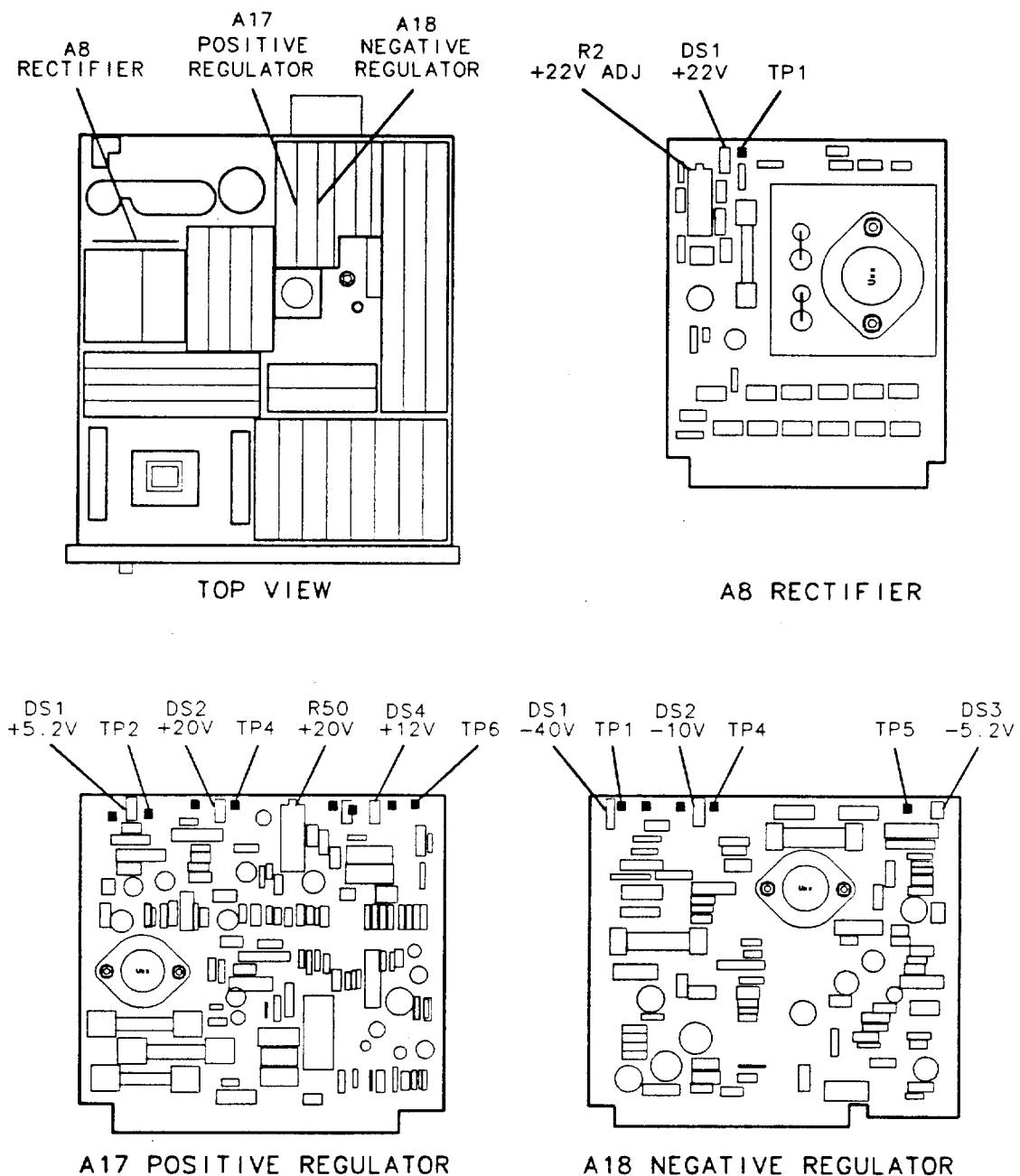


Figure 3. Location of RF Section Low-Voltage Adjustments

1. Low-Voltage Power Supply Adjustments

13. The +20 V indicator A17DS2 (yellow LED) should be lit.
14. Connect the DVM to A17TP4. Adjust A17R50 +20 V ADJ for a DVM indication of $+20.000 \pm 0.001$ V dc.
15. The +12 V indicator A17DS4 (yellow LED) should be lit.
16. Connect the DVM to A17TP6. DVM indication should be $+12.25 \pm 0.30$ V dc. The +12 V supply voltage is set by a precision voltage regulator; therefore, if the +12 V supply is out of tolerance, a circuit malfunction is indicated.
17. The +5.2 V indicator A17DS1 (yellow LED) should be lit.
18. Connect the DVM to A17TP2. DVM indication should be $+5.20 \pm 0.05$ V dc. The +5.2 V supply is referenced to the +20 V supply; therefore, if the +5.2 V supply is out of tolerance, a circuit malfunction is indicated.
19. The -5.2 V indicator A18DS3 (yellow LED) should be lit.
20. Connect the DVM to A18TP5. DVM indication should be -5.20 ± 0.05 V dc. The -5.2 V supply is referenced to the +20 V supply; therefore, if the -5.2 V supply is out of tolerance, a circuit malfunction is indicated.
21. The -40 V indicator A18DS1 (yellow LED) should be lit.
22. Connect the DVM to A18TP1. DVM indication should be $+39.8 \pm 0.4$ V dc. The -40 V supply is referenced to the +20 V supply; therefore, if the -40 V supply is out of tolerance, a circuit malfunction is indicated.
23. The -10 V indicator A18DS2 (yellow LED) should be lit.
24. Connect the DVM to A18TP4. DVM indication should be -10.0 ± 0.1 V dc. The -10 V supply is referenced to the +20 V supply; therefore, if the -10 V supply is out of tolerance, a circuit malfunction is indicated.

2. High-Voltage Adjustment

Reference

A1A3 High-Voltage Regulator
A1A6 ± 15 V Regulator
A1A7 +120 V, +5.2 V Regulator

Description

Warning



This procedure is intended for adjustment purposes only. Voltages are present which, if contacted, could cause serious personal injury. Approximately -2400 V dc is present on the A1A3 High Voltage assembly even when the ac line cord is disconnected. Do not attempt to remove the A1A3 High-Voltage Assembly from the instrument. Do not disconnect the CRT's post-accelerator cable; the CRT can hold a $+9500$ V dc charge for several days.

If for any reason the A1A3 High Voltage Assembly or the post-accelerator cable must be removed, refer to "Discharging A1A3 and CRT Assemblies" in this adjustment.

A 1000:1 divider probe is used to measure the CRT cathode voltage. First, the accuracy of this high-voltage probe is checked by comparing measurements of the $+120$ V dc supply voltage with and without the probe. Any measurement error due to the use of the high-voltage probe is calculated into the adjustment specification of the CRT cathode voltage, which is adjusted with the A1A6 HV ADJUST control. When the CRT cathode voltage is properly adjusted, the CRT filament voltage will be $+6.00 \pm 0.05$ V rms (measured at cut-off), which is required for maximum CRT life. (The filament voltage is referenced to the high-voltage cathode and can only be measured directly with special equipment.)

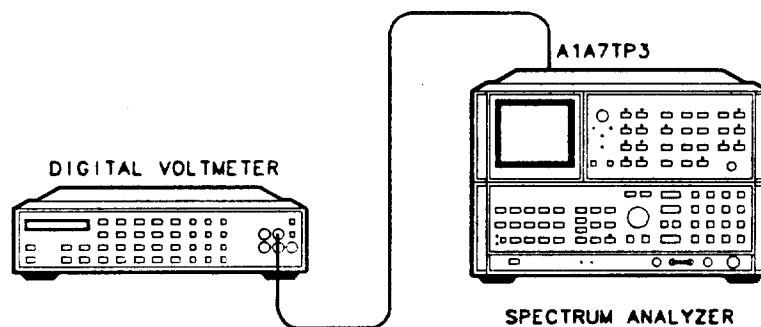


Figure 4. High Voltage Adjustment Setup

2. High-Voltage Adjustment

Equipment

Digital Voltmeter (DVM) HP 3456A
dc High-Voltage Probe (1000:1 divider) HP 34111A

High-Voltage Adjustment Procedure

Warning



In the following procedural steps, it is necessary to probe voltages which, if contacted, could cause serious personal injury. Use a nonmetallic alignment tool when making adjustments. Be extremely careful.

1. Set the LINE switch to STANDBY.
2. Connect the equipment as shown in Figure 4. Remove the top cover.
3. Connect the DVM to A1A7TP3 (+120 V) without the high-voltage probe. See Figure 5. Set the DVM to the 100 V range.

Note



The accuracy of the high-voltage probe is specified for a probe connected to a dc voltmeter with 10 M Ω input resistance. HP 3456A and HP 3455A digital voltmeters have a 10 M Ω input resistance on the 100 V and 1000 V ranges. All measurements in this procedure should be performed with the DVM manually set to the 100 V range (± 00.000 on the HP 3456A display).

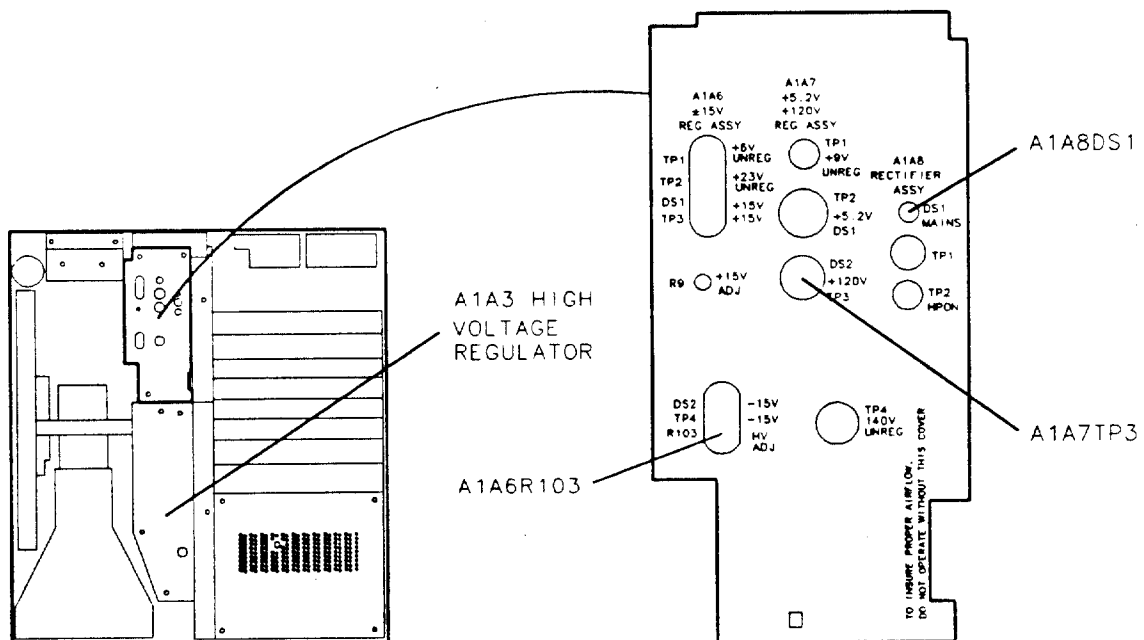


Figure 5. Location of High Voltage Adjustments

2. High-Voltage Adjustment

4. Set the LINE switch to ON and press **2-22 GHz**. Set the front-panel INTENSITY control fully counterclockwise (CRT beam at cut-off).
5. Note the DVM indication at A1A7TP3.
6. Connect the high-voltage probe to the DVM, and connect the probe to A1A7TP3.
7. Note the DVM indication.
8. Divide the DVM indication in step 7 by the DVM indication in step 5. This gives the calibration factor needed to compensate for the error of the high-voltage probe.

_____ Calibration Factor
9. Disconnect the high-voltage probe from A1A7TP3. Set the LINE switch to STANDBY. Remove the ac line cord from both instrument sections.

Warning



The MAINS power-on indicator A1A8DS1 (red LED) should be completely off before proceeding with this procedure. The indicator will remain lit for several seconds after the ac line cord has been removed, and will go out slowly (the light becomes dimmer until it is completely out).

Warning



With the protective cover removed in the following step, do not place hands near the A1A3 High-Voltage assembly. High voltage (approximately -2400 V dc) is present even when the ac line cord is disconnected.

10. Remove the protective cover from the A1A3 High-Voltage Regulator. A label should be visible on the A1A3A1 assembly. (A1A3A1 is mounted on the non-component side of the High-Voltage Regulator as shown in Figure 6.) Record the voltage listed on the label for use in step 14. (The voltage number will be between 2200V and 2600V. Disregard any other numbers on A1A3A1.)

_____ V dc

Warning



With power supplied to the instrument, A1A3TP2A is at a voltage level of approximately -2400 V dc. Be extremely careful.

11. Connect the high-voltage probe to A1A3TP2A. See Figure 6 for the location of the test point.

2. High-Voltage Adjustment

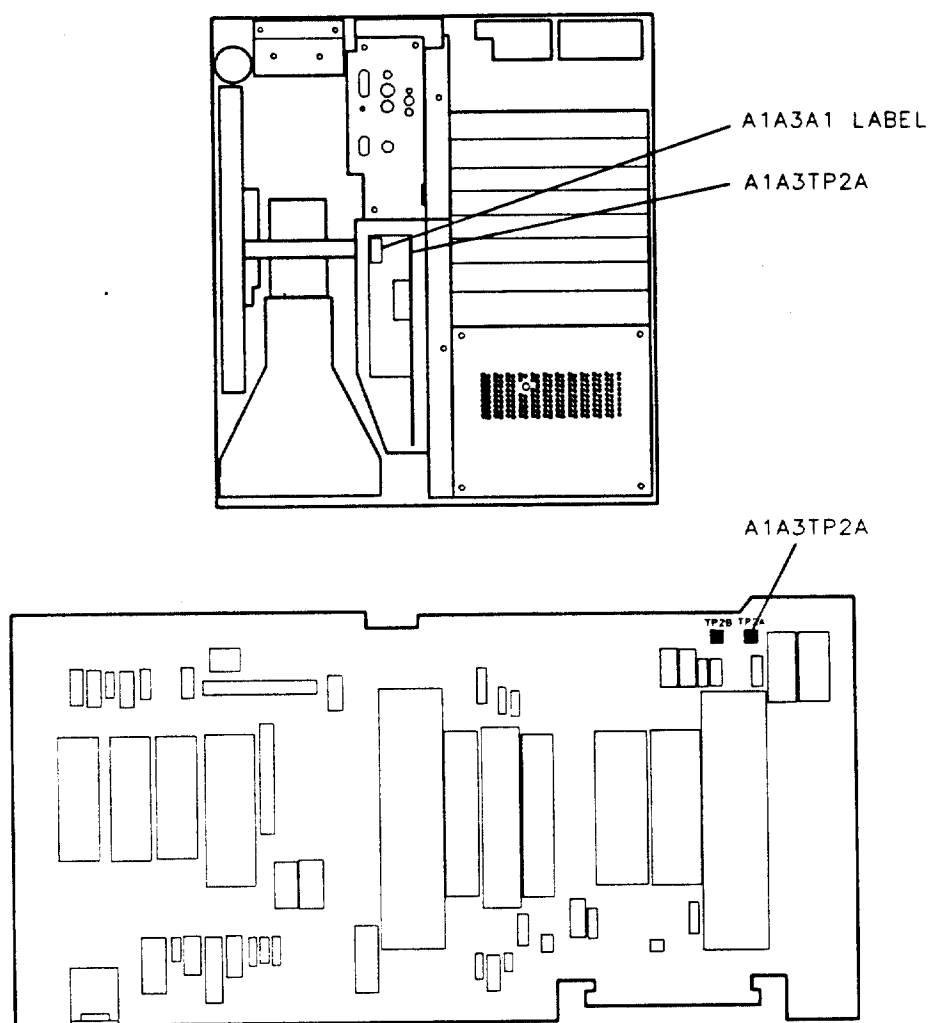


Figure 6. Location of Label and Test Point

12. Reconnect ac line cords to both instruments. Set the LINE switch to ON.
13. Wait approximately 30 seconds for dc regulator circuits to stabilize.
14. Adjust A1A6R103 HV ADJ for a DVM indication equal to the calibration factor (calculated in step 8) times the voltage labeled on the top of A1A3A1 High-Voltage Regulator (noted in step 10). See Figure 5 for the location of the adjustment.

EXAMPLE:

If the calibration factor calculated in step 8 is 0.00099, and A1A3A1 is labeled for -2400 V, then adjust A1A6R103 HV ADJ for a DVM indication of:

$$0.00099 \times (-2400 \text{ V}) = -2376 \text{ V dc}$$

15. Set the LINE switch to STANDBY. Remove the ac line cord from each instrument section.

2. High-Voltage Adjustment

16. Wait for the MAINS power-on indicator A1A8DS1 (red LED) to go out completely before proceeding.
17. Disconnect the high-voltage probe from A1A3TP2A.
18. Replace the A1A3 Assembly's cover.

Discharging A1A3 and CRT Assemblies

The High-Voltage Adjustment procedure does not require the removal or discharge of the A1A3 High-Voltage Regulator or CRT assemblies. However, if for any reason the A1A3 High Voltage Regulator assembly or the post-accelerator cable must be removed, perform the following procedure to ensure proper safety.

Warning



This procedure should be performed by qualified personnel only. Voltages are present which, if contacted, could cause serious personal injury. Approximately -2400 V dc is present on the A1A3 High-Voltage Regulator assembly even when the ac line cord is disconnected. The CRT can hold a +9500 V dc charge for several days if the post-accelerator cable is improperly disconnected.

1. Disconnect the analyzer from ac power.

Warning



With the ac power cord disconnected, voltages are still present which, if contacted, could cause serious personal injury.

2. Obtain an electrician's screwdriver which has a thin blade at least eight inches long. The handle of the screwdriver must be made of an insulating material.
3. Connect one end of a jumper cable (made of insulated wire and two alligator clips) to the blade of the screwdriver. Connect the other end of the jumper cable to the instrument's metal chassis. This grounds the screwdriver.
4. Slide the screwdriver's blade between the CRT and the sheet metal as shown in Figure 7. Gently work the tip of the screwdriver under the post-accelerator cable's rubber shroud. Make sure that the screwdriver's tip touches the connection between the post-accelerator cable and the CRT. You should hear a cracking sound when the cable discharges.
5. Remove the cover from the A1A3 High-Voltage Regulator assembly.
6. Touch the screwdriver's tip to the leads of each large capacitor which is visible on the A1A3 High-Voltage Regulator assembly.
7. The A1A3 High-Voltage Regulator and CRT assemblies should now be discharged.

2. High-Voltage Adjustment

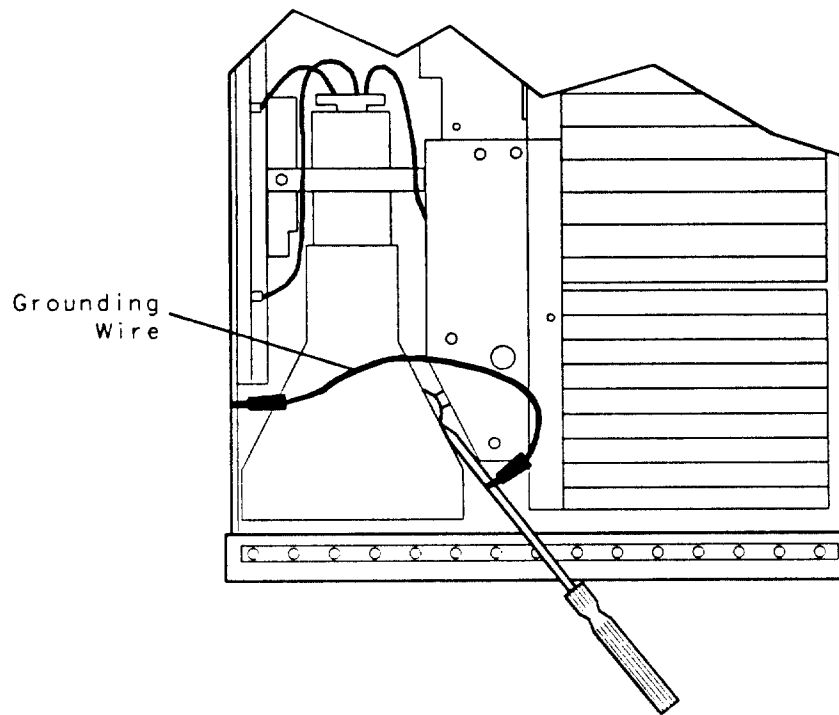


Figure 7. Discharging the Post-Accelerator Cable

3. Preliminary Display Adjustments

Reference

A1A1 Keyboard
A1A2 X, Y, Z Axis Amplifiers

Note



Adjustment 2, "High-Voltage Adjustment," should be performed before you perform these preliminary display adjustments.

Note



Perform this adjustment only if components have been replaced on the A1A2 assembly. Components R117, R217, R308, C104, C109, C204, C209, and C307 are factory adjusted and normally do not require adjustment. Components affecting these adjustments are located in function blocks F, H, M, N, O, P, R, and S of the A1A2 schematic diagram.

Description

All adjustments of the IF-display section are performed to adjust the CRT display for proper horizontal and vertical characteristics. These preliminary adjustments are included for adjustment of the display after major repairs (for example, replacement or repair of the A1A2 X, Y, Z Axis Amplifiers) have been performed in the IF-display section. If adjustment is being performed as the result of minor repair (for example, replacement of a transistor), or as a routine maintenance procedure, only adjustment 4, "Final Display Adjustments," needs to be performed.

Caution



Be sure not to allow a fixed spot of high intensity to remain on the spectrum analyzer CRT. A fixed spot of high intensity may permanently damage the CRT's phosphor coating. Monitor the CRT closely during the following adjustment procedures. If a spot occurs, move it off-screen by adjusting either the front-panel INTENSITY control, or the horizontal or vertical deflection position controls.

Equipment

Digitizing Oscilloscope	HP 54501A
Pulse/Function Generator	HP 8116A
10:1 Divider Probe (<i>2 required</i>)	HP 10435A
Display Adjustment PC Board (service accessory)	85662-60088
Adapter, BNC TEE	1250-0781
Termination, BNC 50Ω	HP 11593A

Procedure

Calibration of Pulse Generator, Oscilloscope, and Probes

1. Connect a 10:1 divider probe to channel 1 of the oscilloscope and a 10:1 divider probe to channel 2 AUX.
2. To calibrate the oscilloscope probes, perform the following:
 - a. On the oscilloscope, press **UTIL**, **probe cal menu**, **attenuation**, **channel 1**, and **start cal**.
 - b. Connect probe 1 to the DC Cal connector and press **continue**, **channel 2**, and **start cal**.
 - c. Connect probe 2 AUX to the DC cal connector and press **continue**.
3. Connect probe 2 to the oscilloscope's rear panel PROBE COMPENSATION AC CALIBRATOR OUTPUT connector. Press **AUTO SCALE**. Adjust the probe for an optimum square wave display on the oscilloscope.
4. Connect probe 1 to the oscilloscope's rear panel PROBE COMPENSATION AC CALIBRATOR OUTPUT connector. Press **AUTO SCALE**. Adjust the probe for an optimum square wave display on the oscilloscope.

Note



Each probe is now compensated for the oscilloscope input to which it is connected. Do not interchange probes without recalibrating.

5. Mark the probe connected to channel 1, and disconnect both 10:1 probes from the oscilloscope. Using two BNC cables, connect the equipment as shown in Figure 8. The Pulse/Function Generator's pulse output must be terminated with 50Ω using a BNC tee and 50Ω termination.

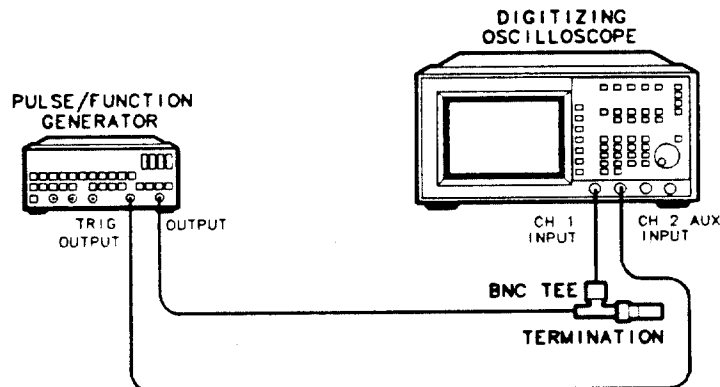


Figure 8. Equipment Calibration Setup

3. Preliminary Display Adjustments

6. Set instrument controls as follows:

Pulse/Function Generator:

MODE NORM
Frequency (FRQ) 200 kHz
Width (WID) 300 ns
Amplitude (AMP) 2.0 V p-p
Offset (OFS) 0.0 V dc (OFF)
Waveform pulse

7. Configure the oscilloscope's display by pressing **DISPLAY**, **DISPLAY norm**, **persistence 1.000 s**, **# of screens 1**, and **grid**.
8. Set the oscilloscope's triggering by pressing **TRIG**, **EDGE TRIGGER trig'd**, **edge**, **source 2**, **level 100 mV**, the leading-edge softkey, and **holdoff 5μ**.
9. On the oscilloscope, press **CHAN**, **CHANNEL 1 on**, **500 mV/div**, **offset 0V**, and **dc**.
10. Set the oscilloscope's channel 2 AUX settings by pressing **CHANNEL 2 off**, **1.00 V/div**, **offset 0V**, **dc**, **more preset probe**, **CHANNEL 1**, **1.000:1**, **CHANNEL 2**, and **1.000:1**.
11. Set the oscilloscope's x axis by pressing **TIME BASE**, **TIMEBASE 1.00 μs/div**, **delay 50 ns**, and **reference cntr**.
12. Adjust the pulse generator's frequency vernier so that pulses are approximately five divisions apart. See Figure 9.
13. Adjust the amplitude vernier on the pulse generator for a 2 V peak-to-peak signal.
14. On the oscilloscope, press **TIME BASE**, **TIMEBASE 50 ns/div**, and **delay**. Adjust **delay** to set the rising edge of the pulse on the first vertical graticule line.

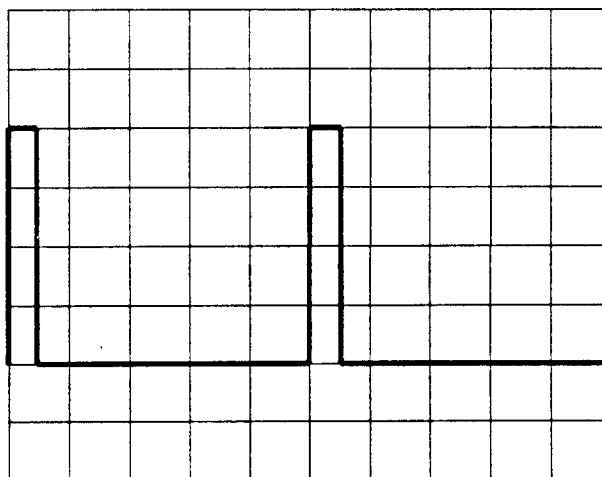


Figure 9. Equipment Calibration Waveform

3. Preliminary Display Adjustments

15. Adjust the pulse generator pulse width vernier for a pulse width of five divisions (250 ns). Disconnect the BNC cable from the pulse generator's pulse output and the oscilloscope's channel 1. Reconnect the calibrated 10:1 divider probes to channel 1 and 2 AUX of the oscilloscope. (Be sure to connect the probe marked in step 5 to channel 1.)

X and Y Deflection Amplifier Pulse Response Adjustments

16. Connect the channel 1 calibrated 10:1 divider probe to A1A2TP204, and the channel 2 AUX probe to A1A2TP205, as shown in Figure 10. Connect the probe's ground leads to A1A2TP106. See Figures 11 and 12 for the location of the assemblies and adjustments.

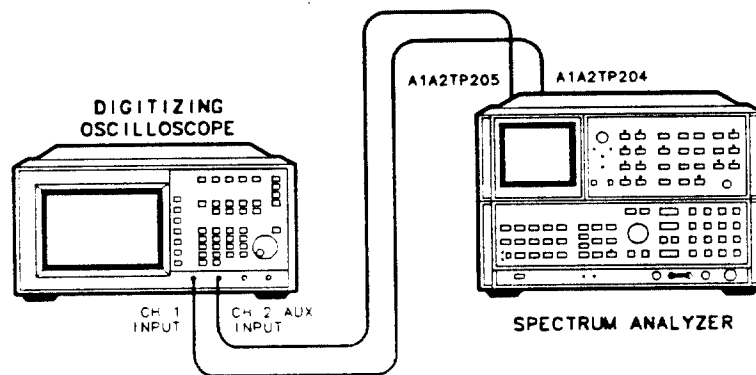


Figure 10. Preliminary Display Adjustments Setup

17. Remove the cover over A3 Digital Storage section and remove A3A2 Intensity Control Assembly. Insert the display adjustment PC board (HP part number 85662-60088) in place of A3A2. See Figure 11 for the location of the A3A2 assembly.

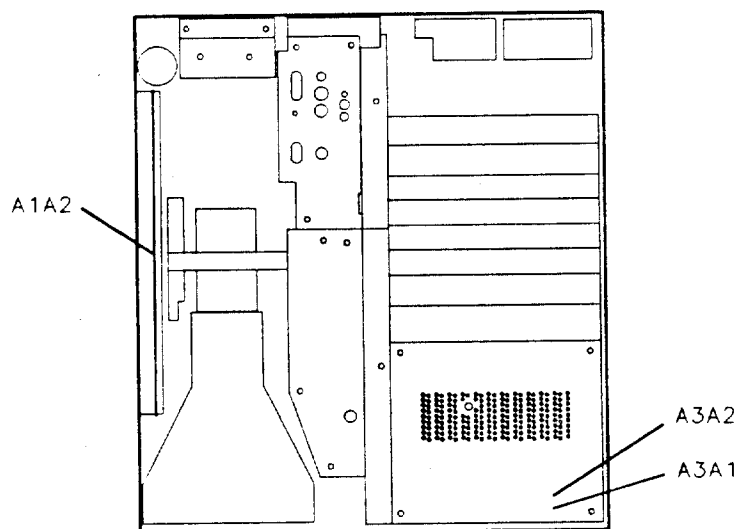


Figure 11. Location of A1A2 and A3A2

3. Preliminary Display Adjustments

18. Connect the output of the pulse generator to J1 (X input) on the A3A2 Display Adjustment PC board using a BNC female to SMB female adapter.

Note The pulse/function generator must remain terminated with 50Ω.



19. On the oscilloscope, press **TRIG**, **EDGE** **TRIGGER** **trig'd**, **edge**, **source 2**, **level 6V**, the leading-edge softkey, and **holdoff time 5μs**.
20. Set the spectrum analyzer **LINE** switch to **ON** and press **2-22 GHz**. Set the front-panel **INTENSITY** control fully counterclockwise.
21. Adjust **A1A2R227 X POSN** and **A1A2R220 X GAIN** for a full eight-division display on the oscilloscope, as shown in Figure 13. See Figure 12 for the location of the adjustments.

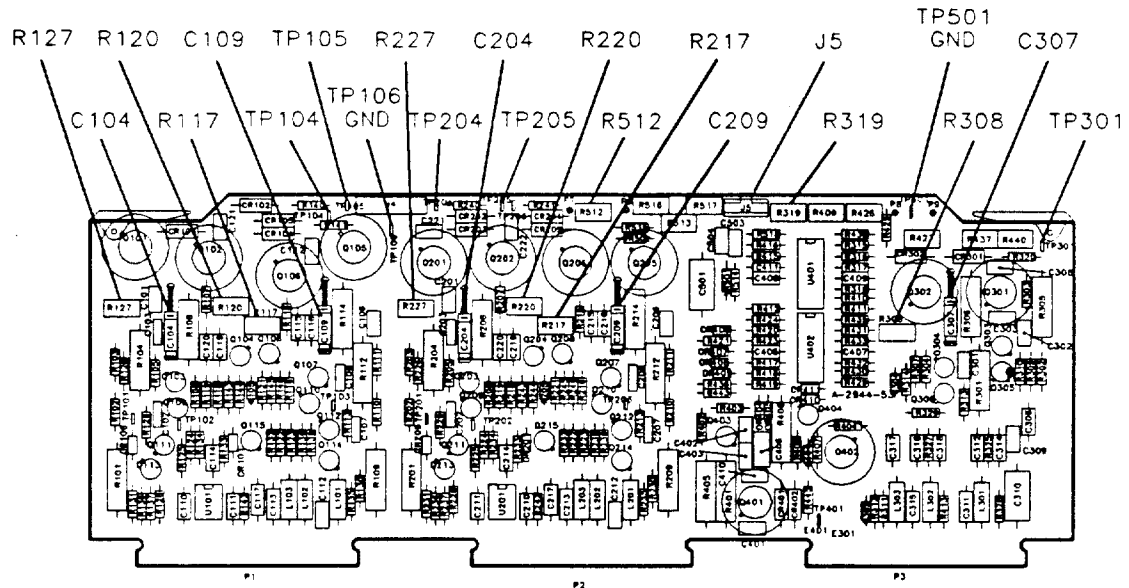


Figure 12. A1A2 Adjustment Locations

3. Preliminary Display Adjustments

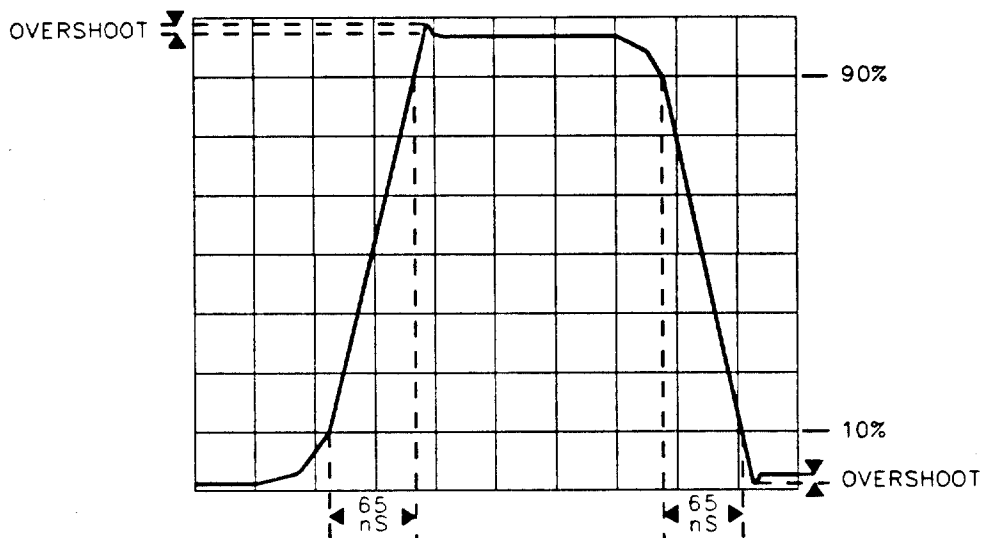


Figure 13. Rise and Fall Times and Overshoot Adjustment Waveform

22. Measure the rise and fall times between the 10% and 90% points on the display, by noting where the trace crosses the first and seventh horizontal graticule lines.
23. Adjust A1A2R217 HF GAIN, A1A2C204, and A1A2C209 for minimum overshoot and minimum rise and fall times.
24. Rise and fall times should both be less than 65 ns between 10% and 90%. Overshoot should be less than 3% (approximately 0.25 divisions).

Note



Always adjust A1A2C204 and A1A2C209 in approximately equal amounts. Do not adjust one to its minimum value and the other to its maximum value.

25. Connect the oscilloscope's channel 1 probe to A1A2TP104 and the channel 2 AUX probe to A1A2TP105. See Figure 12 for the location of the test points. Connect the output of the pulse generator to J2 (Y input) on the A3A2 Display Adjustment PC board.
26. The Y Deflection Amplifier is identical to the X Deflection Amplifier. Repeat steps 21 through 24 for the Y Deflection Amplifier using R127, R120, R117, C104, and C109, respectively.

Pulse Response of Control Gate Z Amplifier to BLANK Input

27. Set the pulse/function generator's controls as follows:

MODE	NORM
Frequency (FRQ)	200 kHz
Width (WID)	250 ns
Amplitude (AMP)	4.00 V

3. Preliminary Display Adjustments

Offset (OFS) 2.00 V
Waveform pulse

28. Configure the oscilloscope's display by pressing **DISPLAY**, **DISPLAY norm**, **persistence 1.00 s**, **# of screens 1**, and **grid**.
29. Set the oscilloscope's triggering by pressing **TRIG**, **EDGE TRIGGER trig'd**, **edge**, **source 2**, **level 3V**, the leading-edge softkey, and **holdoff 5 μ s**.
30. On the oscilloscope press **CHAN**, **CHANNEL 1 on**, **100 mV/div**, **offset 0V**, **dc**, and **CHANNEL 2 off**.
31. Connect the pulse/function generator's trigger output to the oscilloscope's channel 2 AUX.
32. Adjust the oscilloscope **offset** to position the 0V reference on the first horizontal graticule line from the bottom (one division).
33. Connect the oscilloscope's channel 1 probe to the output of the pulse/function generator. The pulse/function generator's output must be terminated with 50 Ω (use a BNC tee and a 50 Ω termination).
34. Adjust the pulse/function generator's amplitude and offset for a 4 V amplitude referenced at 0 V (0 V to 4 V) as indicated on the oscilloscope display.
35. Connect the oscilloscope's channel 1 probe to A1A2TP301. Connect the probe's ground lead to A1A2TP501. See Figure 12.
36. Connect the pulse/function generator's output (using a BNC tee, 50 Ω termination, and a BNC female to SMB female adapter) to J3 (Z input) on the display adjustment PC board. The display adjustment board is in the A3A2 slot. Set the board's switch to the *down* position.
37. Set the oscilloscope's channel 1 sensitivity to 1.00 V/div (10 V/div using 10:1 probe) and adjust the oscilloscope's **offset** to place the trace near the bottom of the graticule.
38. Disconnect the black connector with three wires (8, 98, and 96) from A1A2J5, and set A1A2R319 INT GAIN fully clockwise.
39. Set the spectrum analyzer's front-panel INTENSITY control fully clockwise. Note the display on the oscilloscope. The pulse should be ≥ 55 V peak-to-peak.
40. Adjust the spectrum analyzer's front-panel INTENSITY control for 50 V peak-to-peak (5 divisions) as indicated on the oscilloscope. Adjust the oscilloscope's channel 1 sensitivity and **offset** for a full eight-division display. See Figure 13.
41. Measure the rise and fall times of the pulse between the 10% and 90% points by noting where the trace crosses the first and seventh horizontal graticule lines.
42. Adjust A1A2R308 HP GAIN and A1A2C307 for minimum overshoot on rise and minimum rise and fall times. Rise and fall times should be less than 50 ns and 90 ns respectively. Overshoot on the rise should be less than 5%.
43. Set the spectrum analyzer's front-panel INTENSITY control fully counterclockwise and reconnect the cable to A1A2J5.

CRT Horizontal Adjustments

44. Set the pulse/function generator's controls as follows:

MODE NORM
 Frequency (FRQ) 500 kHz
 Amplitude (AMP) 2.00 V
 Offset (OFS) 1.00 V
 Waveform sine

45. Configure the oscilloscope's display by pressing **DISPLAY**, **DISPLAY norm**, **persistence 1.000 s**, **# of screens 1**, and **grid**.
46. Set the oscilloscope's triggering by pressing **TRIG**, **EDGE TRIGGER trig'd**, **edge**, **source 2**, **level 1V**, the leading-edge softkey, and **holdoff 5 μ s**.
47. On the oscilloscope press **CHAN**, **CHANNEL 1 on**, **50 mV/div**, **offset 100 mV**, **dc**, and **CHANNEL 2 off**.
48. Connect the pulse/function generator's trigger output to the oscilloscope's channel 2 AUX and shown in Figure 14.

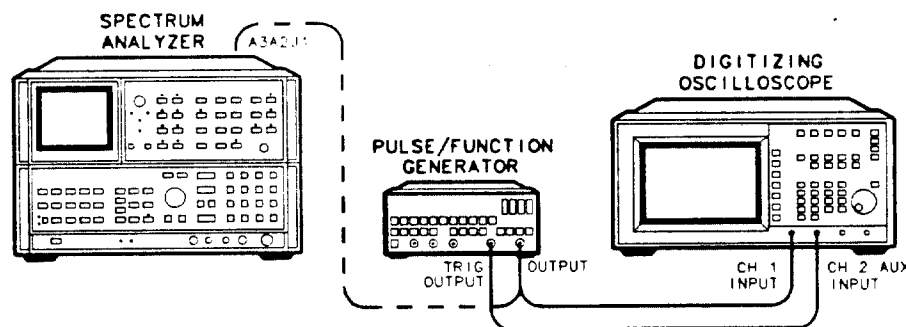


Figure 14. CRT Adjustments Setup

49. Adjust the oscilloscope's **offset** to position the 0 V reference on the second horizontal graticule line from the bottom (two divisions).
50. Connect the oscilloscope's channel 1 probe to the output of the pulse/function generator. The pulse/function generator's output must be terminated with 50 Ω (use a BNC tee and a 50 Ω termination).
51. Adjust the pulse/function generator's amplitude and offset for a 2 V peak-to-peak sinewave referenced at 0 V (0 V to 2 V) as indicated on the oscilloscope display.
52. Disconnect the oscilloscope probe and connect the output of the pulse/function generator (using a BNC tee, 50 Ω termination, and BNC female to SMB female adapter) to J1 (X input) on the display adjustment PC board in the A3A2 slot.
53. Adjust the spectrum analyzer's front-panel INTENSITY control for convenient viewing.

3. Preliminary Display Adjustments

54. Adjust the spectrum analyzer front-panel ALIGN control for a horizontal trace.
55. Adjust A1A2R220 X GAIN and A1A2R227 X POS to set the horizontal trace to the approximate position shown in Figure 15.

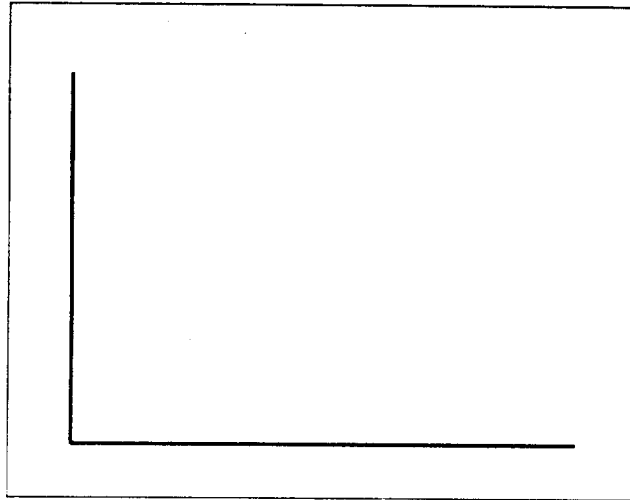


Figure 15. X and Y Deflection Adjustment Waveform

CRT Vertical Adjustments

56. Remove the function generator from J1 on the display adjustment PC board and connect it to J2 (Y input).
57. Adjust A1A2R512 ORTHO for a vertical trace.
58. Adjust A1A2R120 Y GAIN and A1A2R127 Y POS to set the vertical trace to the approximate position shown in Figure 15.
59. Remove the display adjustment PC board and replace the A3A2 Assembly.

4. Final Display Adjustments

Reference

A1A1 Keyboard
A1A2 X, Y, Z Axis Amplifiers

Description

This procedure is used to perform fine adjustment of the CRT display. First, the display is adjusted for best focus over the full CRT, then the graticule is adjusted for optimum rectangular display.

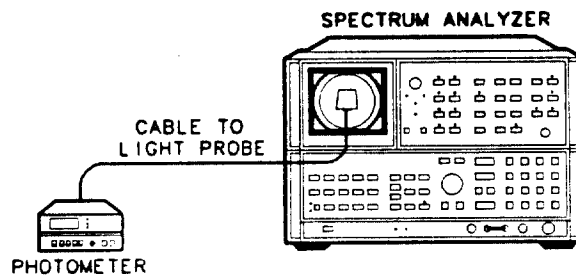


Figure 16. Final Display Adjustments Setup

Equipment

Digital Photometer	Tektronix J-16, Option 02
Photometer interconnect cable	Tektronix 012-0414-02
Photometer light occluder	Tektronix 016-0305-00

Procedure

1. Connect the equipment as shown in Figure 16.
2. Before turning on the power, set the potentiometers listed in the Table 5 as indicated.

Note



Do not change the following potentiometers and caps on the A1A2 board:
C104, C109, C204, C209, C307, R117, R217, or R308.

4. Final Display Adjustments

Table 5. Initial Adjustment Positions

Adjustment	Position
A1A2 R516 INT LIM	fully counterclockwise
A1A2 R319 INT GAIN	two-thirds clockwise
A1A2 R120 Y GAIN	center
A1A2 R127 Y POSN	center
A1A2 R220 X GAIN	center
A1A2 R227 X POSN	center
A1A2 R409 FOCUS COMP	center
A1A2 R426 T/B FOC	center
A1A2 R427 T/B CTR	center
A1A2 R437 R/L FOC	center
A1A2 R440 R/L CTR	center
A1A2 R513 3D	center
A1A2 R517 ASTIG	center
Front-panel INTENSITY	counterclockwise
Front-panel FOCUS	center
Front-panel ALIGN	center

3. Turn power on and wait 1 minute for the tube to warm up fully.
4. Adjust A1A2R516 INT LIM until the display is just extinguished with front-panel INTENSITY control fully counterclockwise. See Figure 17.
5. Move the front-panel INTENSITY control fully clockwise.
6. Adjust X/Y GAIN and X/Y POSN. (A1A2R120, R220, R127, and R227.)
7. For a rough focus, adjust the following potentiometers in this order: A1A3R14 FOCUS LIMIT, A1A2R517 ASTIG, A1A2R513 3D, A1A2R409 FOCUS COMP.
8. Press **[0-2.5 GHz]**, then adjust the reference level to bring the noise band to the top division of the graticule. Press **[ENTER dB/DIV]** and set to 1 dB/DIV. The noise should now completely fill the screen. If necessary, adjust the reference level until the screen is completely filled.
9. Press **[SHIFT] DISPLAY LINE [OFF]** and then **[SHIFT] THRESHOLD [OFF]** to turn off the text and graticule.
10. Using the Tektronix J-16 digital photometer (with a J6503 probe with the hood in place on the X1 range), adjust A1A2R319 INT GAIN for a light-meter reading of 75 NITS (cd/m^2).

Note



If a standard J-16 photometer is used (US instead of metric option 02), adjust A1A2R319 for a photometer reading of 22 fl (foot lamberts).

Note



This reading must be made with the glass RFI filter in place. Slightly trim the top and bottom of the light-meter probe's hood so that it will fit flush against the glass RFI filter.

-
11. Turn the power off, then back on, to power up the display.

4. Final Display Adjustments

12. For the best focus near the center of the screen, adjust the following potentiometers in the order listed below. Repeat as needed to optimize center-screen focus.

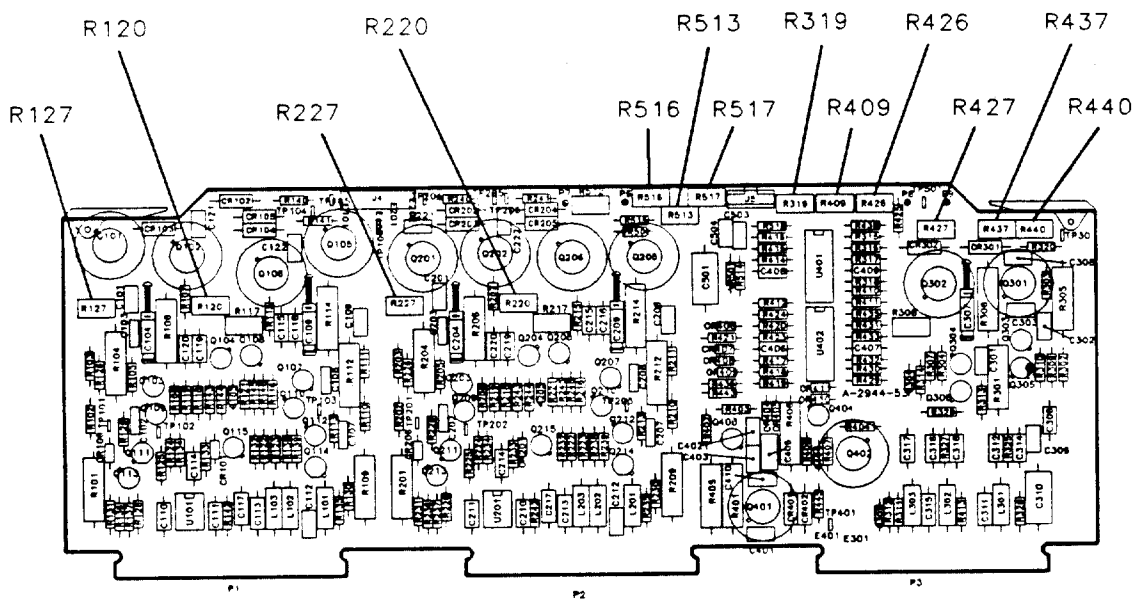
A1A3R14 FOCUS LIMIT

A1A2R517 ASTIG

A1A2R513 3D for best focus for short vectors (characters)

A1A2R409 FOCUS COMP for best focus of long vectors (graticule lines).

13. Adjust A1A2R426 T/B FOC for best focus at the top and bottom of the screen.
14. Adjust A1A2R437 R/L FOC for best focus at the right and left sides of the screen.
15. If you find that the top and bottom (or right and left sides) achieve best focus at different potentiometer settings, try adjusting A1A2R427 T/B CTR or A1A2R440 R/L CTR, and readjusting T/B FOC or R/L FOC, to optimize overall focus.
16. Repeat steps 12 through 15 as needed to optimize overall focus.



ADJUSTMENTS

5. LOG AMPLIFIER ADJUSTMENTS

REFERENCE:

A4A3 Log Amplifier-Filter
A4A2 Log Amplifier-Detector

RELATED PERFORMANCE TESTS:

Scale Fidelity Test

NOTE

The A4A3 Log Amplifier-Filter and A4A2 Log Amplifier-Detector are temperature compensated as a matched set at the factory. In the event of a circuit failure, rebuilt sets can be ordered. Contact your nearest HP Service Center.

DESCRIPTION:

First, the A4A2 Log Amplifier-Detector ZERO adjustment is adjusted for zero volts DVM indication, then the A4A3 Log Amplifier-Filter is set for center frequency by injecting a signal and adjusting the bandpass filter center adjustment for maximum DVM indication. The bandpass filter amplitude is adjusted by monitoring the output of the filter with a DVM, and adjusting the amplitude for the same DVM indication with the log amplifier filter control line shorted and not shorted to the +15V supply. Next, log fidelity (gain and offset of the log curve) is adjusted by adjusting the -12 VTV and the PIN diode attenuator. Last, the linear gain step adjustments are performed to set the proper amount of step gain in the linear mode of operation.

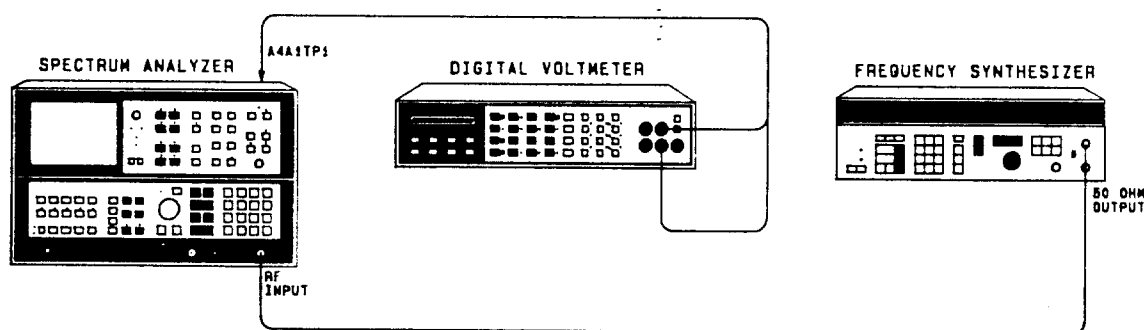


FIGURE 19. LOG AMPLIFIER ADJUSTMENTS SETUP

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
Frequency Synthesizer	HP 3335A

5. LOG AMPLIFIER ADJUSTMENTS (Cont'd)

22. Key in  . This disables IF Step Gains.
23. Key in  -60 dB. Decrease the frequency synthesizer output level by 10 dB.
24. Adjust A4A3R83 LG10 for DVM indication of $+1000 \pm 0.010$ Vdc. Refer to Figure 20 for location of adjustment. If unable to adjust LG10 for proper indication, increase or decrease value of A4A3R54. Refer to Table 3 for range of values.
25. Decrease the frequency synthesizer output level by 10 dB.
26. Key in  -70 dB.
27. Adjust A4A2R14 LG20 for DVM indication of $+1.000 \pm 0.010$ Vdc. Refer to Figure 20 for location of adjustment. If unable to adjust LG20 for proper indication, increase or decrease value of A4A2R18. Refer to Table 3 for range of values.
28. Press  to re-enable IF Step Gains.

ADJUSTMENTS

6. VIDEO PROCESSOR ADJUSTMENTS

REFERENCE:

A4A1 Video Processor

RELATED PERFORMANCE TEST:

Log Scale Switching Uncertainty Test

DESCRIPTION:

The CAL OUTPUT signal is connected to the RF INPUT through a step attenuator. The instrument is placed in zero frequency span to produce a dc level output from the log amplifier. This dc level is adjusted by varying the input signal level and reference level. The offsets and gains on the A4A1 Video Processor are adjusted for proper levels using a DVM.

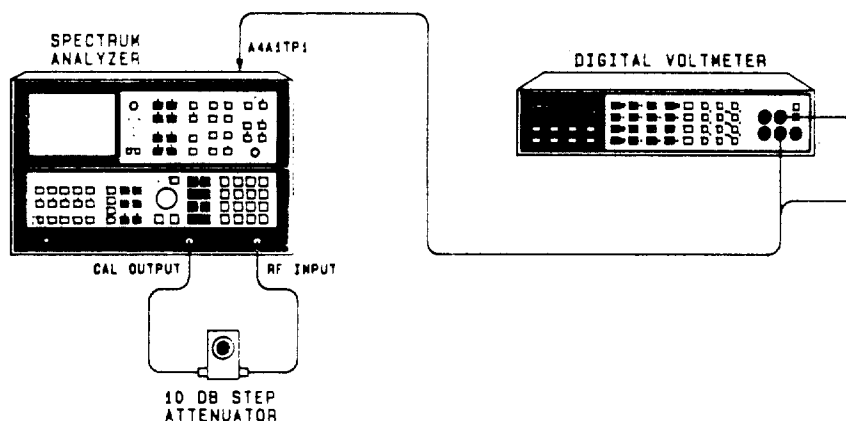


FIGURE 21. VIDEO PROCESSOR ADJUSTMENTS SETUP

EQUIPMENT:

Digital Voltmeter (DVM)	HP 3456A
10-dB Step Attenuator	HP 355D

NOTE

The voltage at A4A1TP3 may drift noticeably with temperature during this adjustment. Allow A4A1 (Video Processor) to warm up at least one-half hour prior to adjustment.

PROCEDURE:

1. Position instrument upright as shown in Figure 21. Remove top cover and A3 Digital Storage cover.
2. Set LINE switch to ON and press .
3. Connect DVM to A4A1TP1 and DVM ground to A3A9TP1.

6. VIDEO PROCESSOR ADJUSTMENTS (Cont'd)

4. Connect CAL OUTPUT to RF INPUT through 10-dB step attenuator.
5. Key in 100 MHz and 0 Hz. Press LIN pushbutton.
6. Set step attenuator to 120 dB. DVM indication should be 0.000 ± 0.001 Vdc. (If DVM indication is out of tolerance, perform test 5, Log Amplifier Adjustments.)
7. Connect DVM to A4A1TP2.
8. Adjust A4A1R14 OS for DVM indication of -5.000 ± 0.003 Vdc. Refer to Figure 22 for location of adjustment.

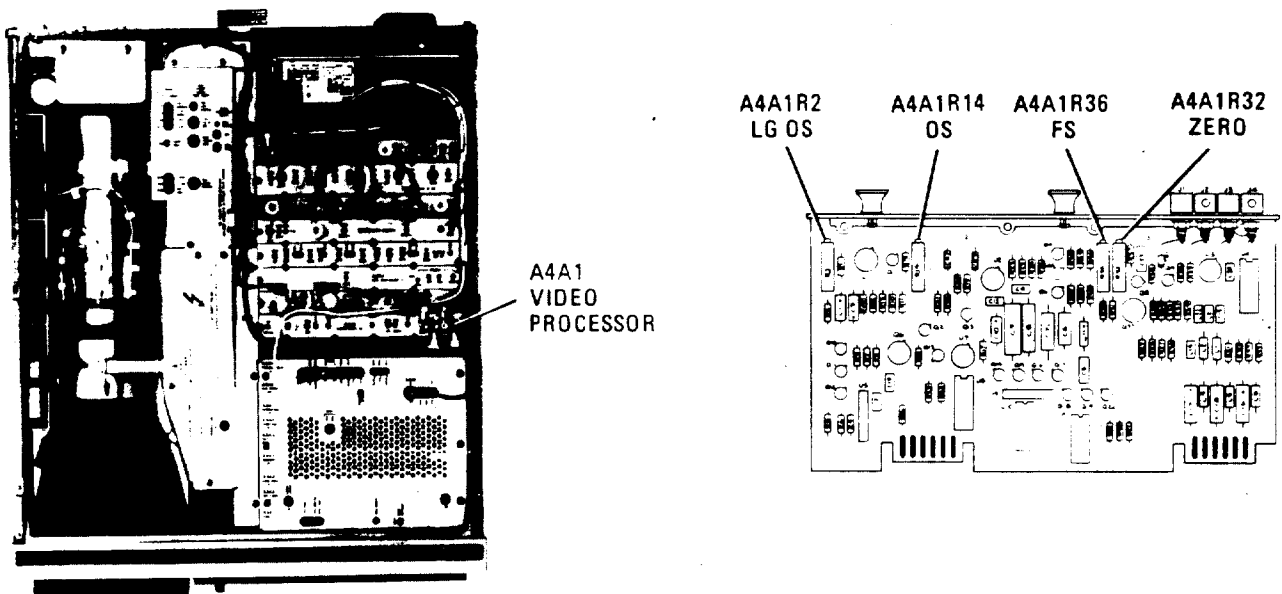


FIGURE 22. LOCATION OF VIDEO PROCESSOR ADJUSTMENTS

9. Connect DVM to A4A1TP1.
10. Set step attenuator to 0 dB.
11. Key in and adjust DATA knob for DVM indication as close to $+1.000 \pm 0.001$ Vdc as possible. (It may be necessary to slightly adjust the front panel AMPTD CAL control to achieve required tolerance.)
12. Connect DVM to A4A1TP3.
13. Press LOG . Note DVM indication (approximately $+2.000 \pm 0.040$ Vdc).
14. Key in LOG 1 dB.

ADJUSTMENTS

6. VIDEO PROCESSOR ADJUSTMENTS (Cont'd)

15. Adjust A4A1R14 OS (again) for DVM indication of $+2.000 \pm 0.010$ Vdc.
16. Press LIN pushbutton.
17. Adjust A4A1R36 FS for DVM indication of $+2.000 \pm 0.001$ Vdc. Refer to Figure 22 for location of adjustment.
18. Set step attenuator to 120 dB.
19. Adjust A4A1R32 ZERO for DVM indication of 0.000 ± 0.001 Vdc. Refer to Figure 22 for location of adjustment.
20. Set step attenuator to 0 dB.
21. Repeat steps 9 through 20 until specifications of steps 15, 17, and 19 are met.

LOG Offset Adjust

22. Set step attenuator to 40 dB.
23. Key in , , LOG ,  LOG ,  - 50 dBm.
24. Connect DVM to A4A1TP1. Record DVM indication. Indication should be approximately $+0.500$ Vdc.

_____ Vdc
25. Decrease reference level to - 60 dBm using the step key.
26. Adjust A4A1R2 LG OS for DVM indication of $+0.100 \pm 0.001$ Vdc greater than the DVM indication recorded in step 24. Refer to Figure 22 for location of adjustment.
27. Decrease reference level to - 70 dBm using the step key.
28. DVM indication should be $+0.200 \pm 0.002$ Vdc greater than the DVM indication recorded in step 24. If not, readjust A4A1R2 LG OS.
29. Decrease reference level to - 90 dBm using the step key.
30. DVM indication should be $+0.400 \pm 0.004$ Vdc greater than the indication recorded in step 24. If not, readjust A4A1R2 LG OS.
31. Repeat steps 25 through 30 until specifications of steps 26, 28, and 30 are met.

12. 10 MHz STANDARD ADJUSTMENT (Cont'd)

3. Connect a frequency standard whose accuracy is known to be better than that of the internal time base, such as an HP 5061A Cesium Beam, to the EXT TRIGGER input of the oscilloscope.
4. Remove cable between FREQ REFERENCE INT and EXT connectors on HP 8566B rear panel.
5. Connect the INT FREQ REFERENCE output to the Channel A input of the oscilloscope. Set rear-panel FREQ REFERENCE switch to INT.
6. Set oscilloscope controls as follows:

TIME/DIV	.1 μ sec
CHAN A VOLTS/DIV	.1
MAG x 10 pushbutton	IN
DISPLAY A pushbutton	IN
EXT/INT trigger pushbutton	IN
SWEEP VERNIER control	CAL
TRIGGER HOLDOFF	MIN
AC/DC trigger pushbutton	OUT
POS/NEG trigger pushbutton	OUT
TRIGGER LEVEL control	Centered

7. Adjust TRIGGER LEVEL control as necessary to display sine-wave signal on oscilloscope.

NOTE

If THERMAL SHUTDOWN indicator A17DS3 (red LED) is on, 10 MHz standard is disabled.

8. Adjust A22 COARSE frequency adjust for minimum sideways movement of the displayed signal. Adjust A22 FINE frequency adjust for minimum sideways movement of the displayed signal. No sideways movement indicates that frequency standard and internal time base frequency are the same. Refer to Figure 39 for location of A22 10 MHz Standard.
9. Note the time it takes one cycle of the sine wave to cross the oscilloscope display. When properly adjusted, it should take greater than 100 seconds for one cycle of the sine wave to cross the oscilloscope CRT display.
10. Reconnect the cable between FREQ REFERENCE INT and EXT connectors.

ADJUSTMENTS

12. 10 MHz STANDARD ADJUSTMENT (Cont'd)

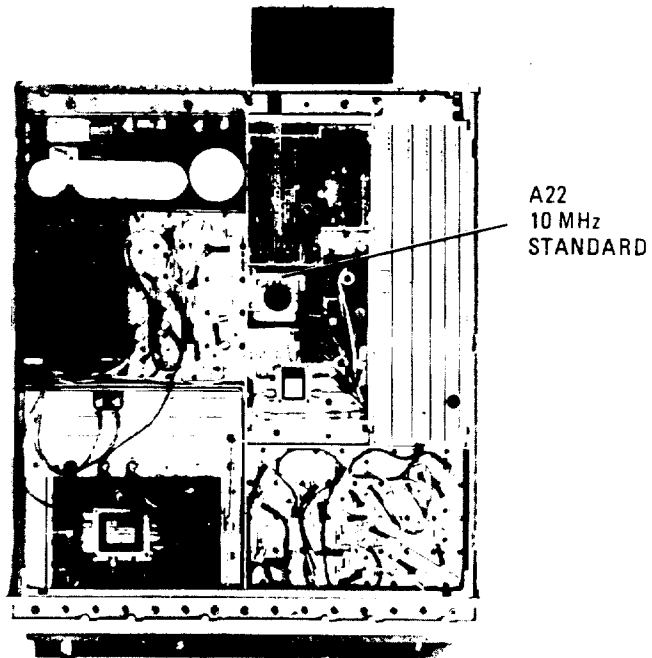


FIGURE 39. LOCATION OF 10 MHz STANDARD ADJUSTMENTS

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

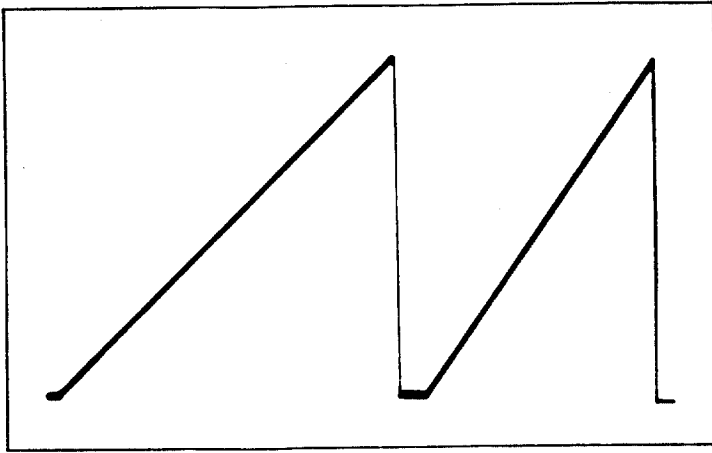


FIGURE 41. 0V TO -10V SWEEP RAMP AT A16TP3

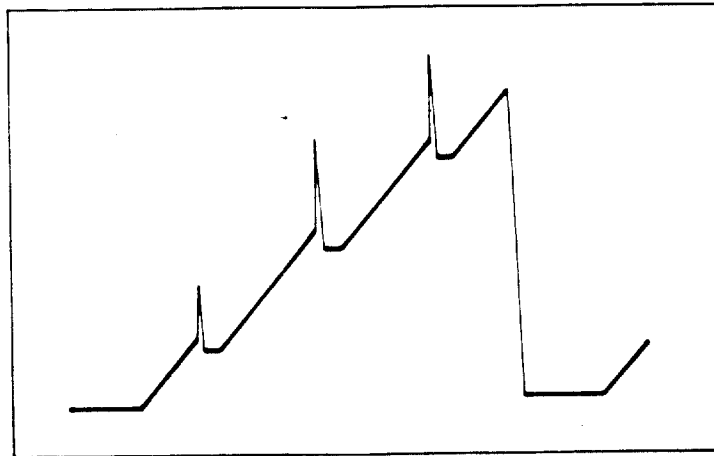


FIGURE 42. IMPROPERLY ADJUSTED DC LEVELS BETWEEN SWEEP RAMPS

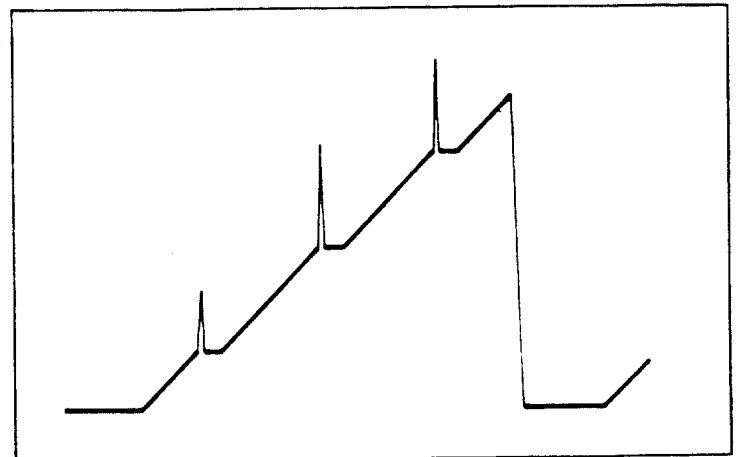


FIGURE 43. PROPERLY ADJUSTED DC LEVELS BETWEEN SWEEP RAMPS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

15. The difference between DVM indications for **RECALL** **1** and **RECALL** **2** should be less than 1 mVdc. DVM indication will be approximately -8 Vdc.
16. If necessary, adjust A19R19 Summing Amplifier OFFSET while alternating between **RECALL** **1** and **RECALL** **2** so that the difference in DVM indication is less than 1 mVdc.
17. Key in **STOP FREQ** **22 GHz**, **SAVE** **3**.
18. Press **RECALL** and alternate between **1** and **3** while monitoring DVM.
19. Difference between DVM indications for **RECALL** **1** and **RECALL** **3** should be less than 3 mVdc.
20. If necessary, adjust A19R41 25 GHz SPAN OFFSET while alternating between **RECALL** **1** and **RECALL** **3** so that the difference in DVM indication is less than 3 mVdc.

YTO DAC Adjustment

21. Press **2-22 GHz**.
22. Key in **STOP FREQ** **3 GHz**, **SHIFT** **SWEEP** **CON**, **CENTER FREQUENCY** **2.0125 GHz**, **SHIFT** **SPAN-REF LV**, **SWEEP** **SINGLE**.
23. Key in **SHIFT** **CF STEP SIZE** **0 Hz**. (This sets the DAC to 0.)
24. Connect DVM to A19TP5. Clip GND lead of DVM to A19TP3.
25. Adjust A19R50 for +10.000V $\pm$.001V.
26. Connect DVM to A19TP2. Adjust A19R19 for -6.000V $\pm$.001V.
27. Key in **SHIFT** **CF STEP SIZE** and 4095 Hz. Adjust A19R19 for -18.600V $\pm$.00V at TP2.
28. Press **2-22 GHz**.
29. Key in **CENTER FREQUENCY** **3.4286 GHz**, **FREQUENCY SPAN** **2.5 GHz**, **SHIFT** **SPAN-REF LV**, **SWEEP** **SINGLE**, **SAVE** **1**.
30. Adjust A19R56 for -7.500V $\pm$.001V at TP2.
31. Press **2-22 GHz**, **RECALL** **1**.
32. Press **SWEEP** **SINGLE**.
33. Adjust A19R32 for -15.000V $\pm$.001V at A19TP2.
34. Repeat steps 32 and 33 until three consecutive voltage readings are within $\pm$.001V of one another.
35. Press **2-22 GHz**, **STOP FREQ** **5 GHz**, **SHIFT** **SWEEP** **CON**, **CENTER FREQUENCY** **3.4286 GHz**, **FREQUENCY SPAN** **3.0 GHz**, **SHIFT** **SPAN-REF LV**, **SWEEP** **SINGLE**, **SAVE** **2**.
36. Adjust A19R41 (25 GHz span offset) for -6.750V $\pm$.001V at A19TP2.
37. Press **2-22 GHz**, **RECALL** **2**.
38. Adjust A19R43 for -15.750V $\pm$.001V at A19TP2.

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

YTO Main Coil Driver Adjustment

39. Press , . Jumper A20TP5 to A21TP2.
40. Connect frequency counter to front-panel 1ST LO OUTPUT as shown in Figure 46.
41. Remove 8 (gray) cable at A11J1 0 DET OUT.
42. Key in 0 Hz and 2.3 GHz.
43. Adjust A20R34 2.3 GHz adjustment for a frequency counter indication of 2300.0 ± 0.1 MHz. Refer to Figure 45 for location of adjustments. Press .
44. Key in 6150.000 MHz.
45. Adjust A20R25 6.15 GHz adjustment for a frequency counter indication of 6150.0 ± 0.1 MHz. Press .
46. Alternate between and , making adjustments of steps 43 and 45 until requirements of both steps are met.
47. Remove jumper from between A20TP5 and A21TP2, and reconnect 8 (gray) cable to A11J1.

YTO Main Coil Driver Adjustment (Alternate Procedure)

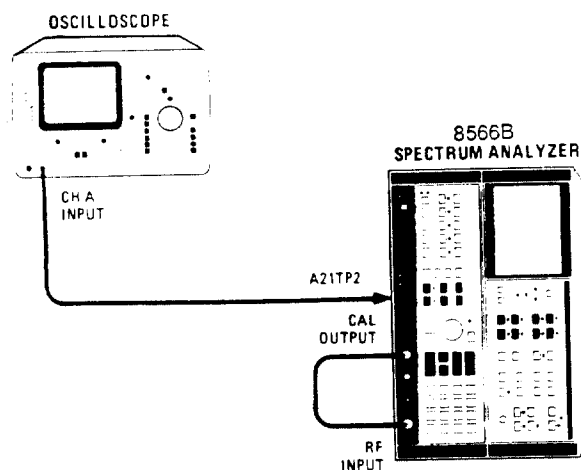


FIGURE 47. YTO MAIN COIL DRIVER ADJUSTMENTS SETUP (ALTERNATE PROCEDURE)

ADJUSTMENTS

13. SWEEP, DAC, AND MAIN COIL DRIVER ADJUSTMENTS (Cont'd)

48. Disconnect 8 (gray) cable from A11J1 Ø DET OUT. Jumper A12TP2 to A12TP3 (Lock Indicator Disable).
49. Connect CAL OUTPUT to RF INPUT and press **7-22 GHz**.
50. Key in **CENTER FREQUENCY** 0 Hz. (Frequency Span readout should indicate 2 GHz.)
51. Adjust A20R25 6.15 GHz adjustment to obtain two comb teeth (100 MHz harmonics) per division on the HP 8566B CRT. These comb teeth should be evenly spaced but not necessarily aligned with graticule lines. (Counterclockwise rotation of adjustment increases spacing between comb teeth.)
52. Adjust A20R34 2.3 GHz adjustment to align the LO feedthrough signal on the center graticule line. It may be necessary to disconnect RF INPUT to locate the LO feedthrough. (Counterclockwise rotation of adjustment moves signal to the right.)
53. Repeat steps 51 and 52 until comb teeth are spaced two per division and aligned with graticule lines. (Every other comb tooth will align with a graticule line.)
54. Key in **CENTER FREQUENCY** 2 GHz, **FREQUENCY SPAN** 100 MHz. At least one comb tooth should be visible on display.
55. Adjust A20R25 6.15 GHz to place comb tooth nearest the center of the display on the center graticule line.
56. Press **SAVE** **1**.
57. Key in **CENTER FREQUENCY**, **SHIFT** **HOLD** .9 GHz.
58. Press **SAVE** **2**.
59. Adjust A20R34 2.3 GHz to place comb tooth nearest the center of the display on the center graticule line.
60. Repeat adjustments of steps 55 and 59 by alternating between **RECALL** **1** and **RECALL** **2** until requirements of both steps are met.
61. Key in **CENTER FREQUENCY** 2 GHz, **FREQUENCY SPAN** 10 MHz.
62. Press **SAVE** **3**.
63. Adjust A20R25 6.15 GHz to move nearest comb tooth to center graticule line.
64. Key in **CENTER FREQUENCY**, **SHIFT** **HOLD** .9 GHz.
65. Press **SAVE** **4**.
66. Adjust A20R34 2.3 GHz to move nearest comb to center graticule line.
67. Repeat adjustments of steps 63 and 66 by alternating between **RECALL** **3** and **RECALL** **4**.

NOTE

Steps 68 and 69 may be omitted if an oscilloscope is not available.

68. Connect oscilloscope to A21TP2. Reconnect 8 (gray) cable to A11J1 Ø DET OUT. Remove jumper from A12TP2 to A12TP3 (Lock Indicator Disable).

ADJUSTMENTS

18. RF MODULE PHASE LOCK ADJUSTMENTS (Cont'd)

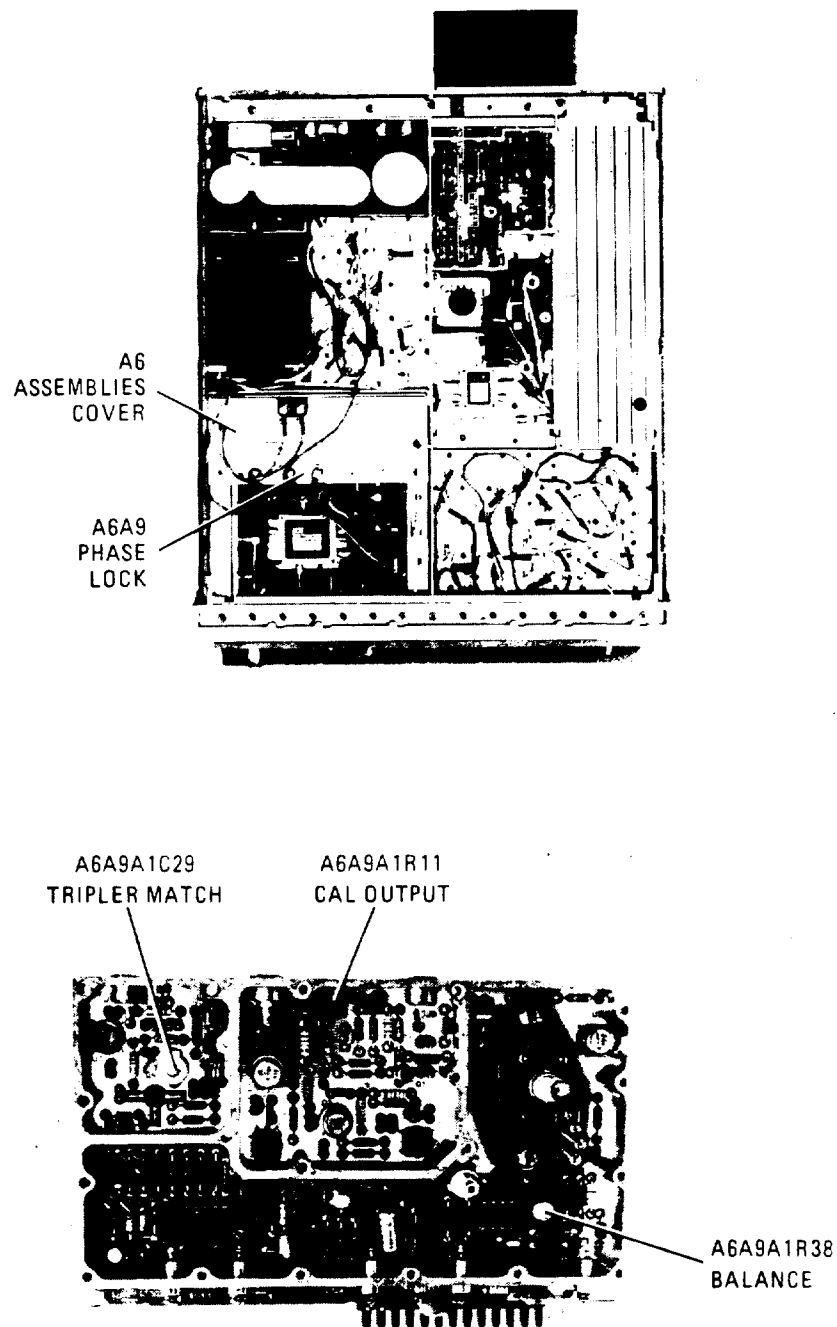


FIGURE 60. LOCATION OF RF MODULE PHASE LOCK ADJUSTMENTS

18. RF MODULE PHASE LOCK ADJUSTMENTS (Cont'd)**Tripler Adjustments**

5. Set spectrum analyzer controls as follows:

Full Span	7.22 GHz
Center Frequency	300 MHz
Freq Span	1 GHz
Input Attenuation	40 dB
Reference Level	+30 dBm

6. Connect A6A9J1 Phase Lock 300 MHz OUTPUT to the spectrum analyzer input.
7. Adjust A6A9A1C29 TRIPLER MATCH to set the 300 MHz signal level at +18.5 dB (+.5 or -1 dB).

Balance Adjustment

8. Key in 6.23 on HP 8566B Spectrum Analyzer (DUT).

9. Set the 1741 A oscilloscope controls as follows:

Sweep Time	1 msec/div
Amplitude	10 V/div

10. Connect A6A9J4 TUNE VOLTAGE output to the 1741A oscilloscope input, using an SMB to BNC cable.
11. The oscilloscope display waveform should be similar to Figure 61.
12. Adjust A6A9R38 for a $1.5 \pm .5$ msec "dead time."

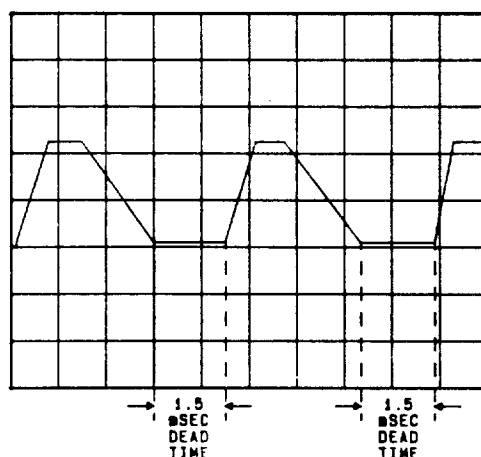


FIGURE 61. BALANCE ADJUSTMENT WAVEFORM

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

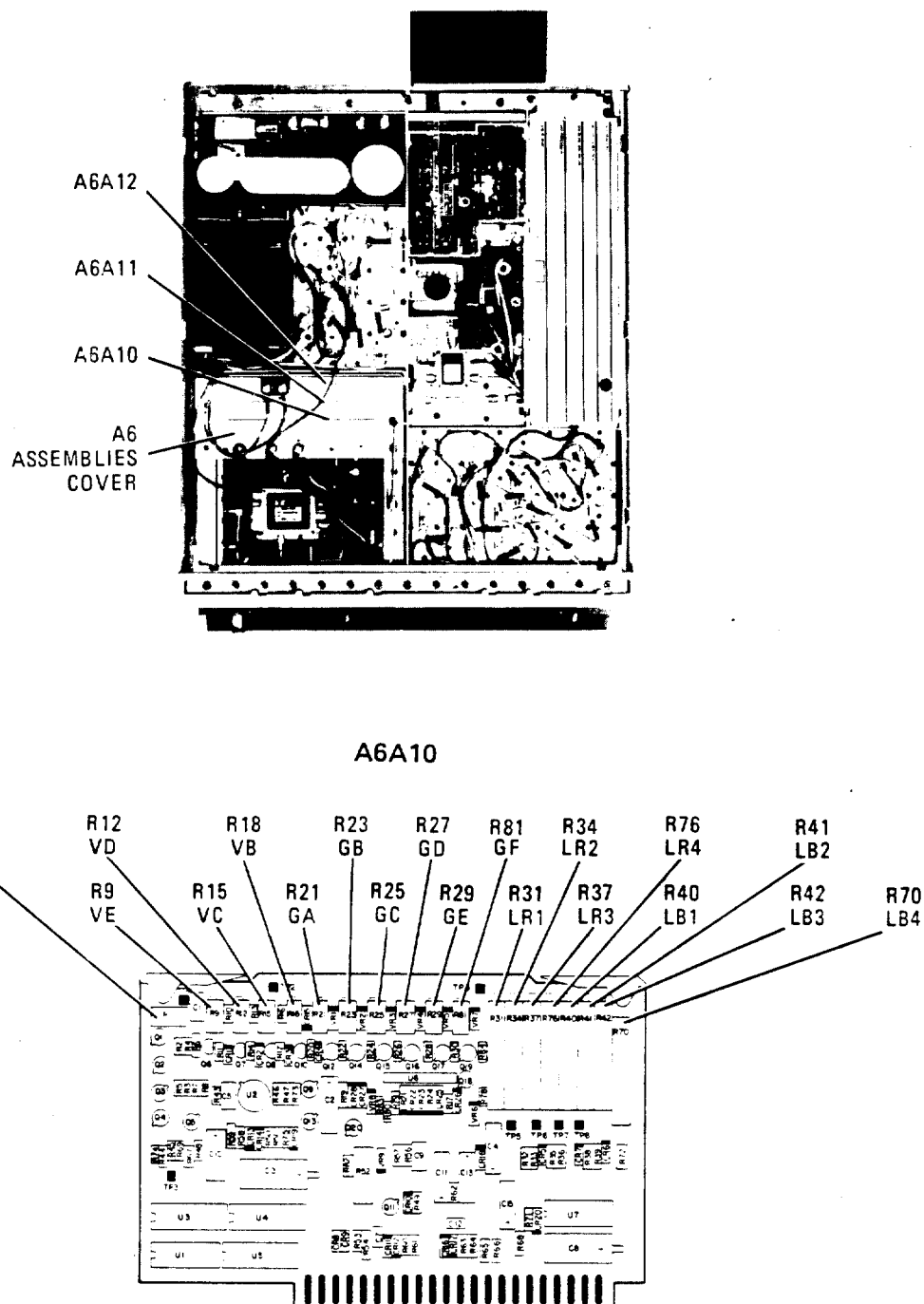
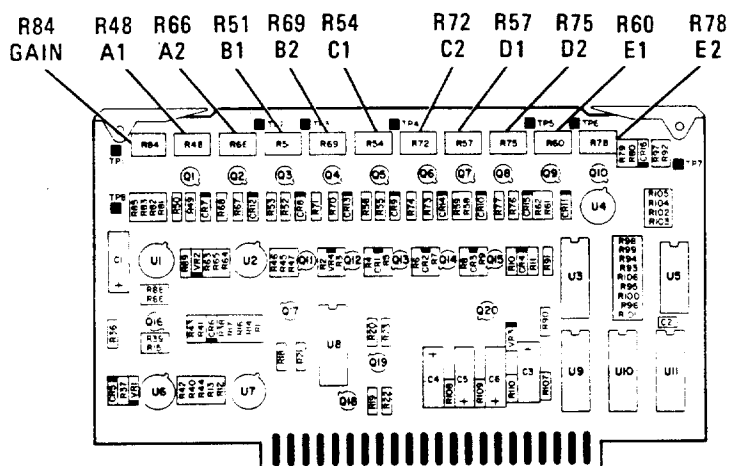


FIGURE 66. LOCATION OF FREQUENCY RESPONSE ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

A6A11



A6A12

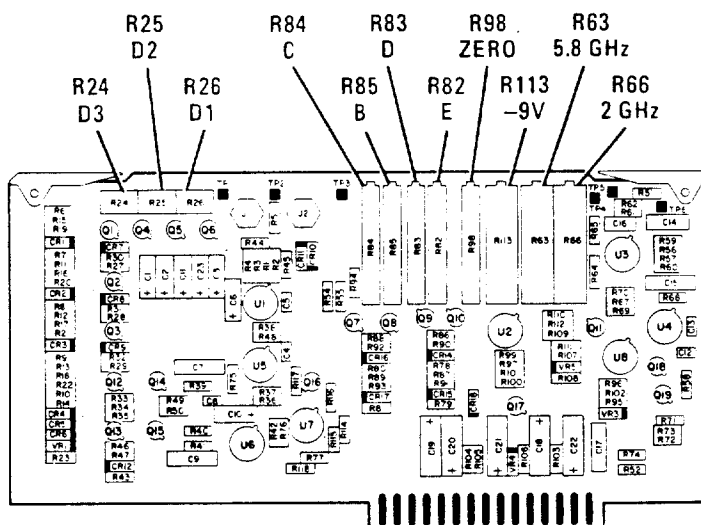


FIGURE 67. LOCATION OF FREQUENCY RESPONSE ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

8. Turn HP 86290B RF ON and adjust POWER LEVEL for -15 dBm on power meter. Disconnect power meter/mount and connect sweep oscillator to spectrum analyzer. Set sweep oscillator to Full Sweep (2 – 22 GHz).
9. Set analyzer LINE switch to ON and press . Instrument must remain in preset condition and sweep for one-half hour before performing adjustments. Key in , SWEEP .
10. Connect DVM to A6A12TP3 with ground lead to A6A12TP2.
11. Adjust A6A12R113 -9 V adjustment for DVM indication of -9.000 ± 0.001 Vdc.
12. Key in 4 GHz, 0 Hz.
13. Connect DVM to A6A12TP5, ground to A6A12TP2.
14. Adjust A6A12R85 B IF Offset adjustment for DVM indication of -2.100 ± 0.001 Vdc.
15. Key in 0 Hz.
16. Remove 82 (gray/red) cable from A6A12J2 Sweep + Tune output and connect DVM to A6A12J2.
17. Adjust A6A12R98 ZERO adjustment for DVM indication of 0.000 ± 0.001 Vdc.
18. Connect DVM to A6A10TP1 with ground lead to A6A10TP2.
19. Adjust A6A10R1 IO adjustment for DVM indication of -0.15 ± 0.01 Vdc.
20. Key in 2.0 GHz, 5.8 GHz, SWEEP .
21. Set HP 8620C Sweep Oscillator for a 5.7 GHz CW signal.
22. Adjust A6A12R63 5.8 GHz adjustment to maximize the 5.7 GHz signal on the HP 8566B Spectrum Analyzer (DUT) display.
23. Set HP 8620C Sweep Oscillator for a 2.1 GHz signal.
24. Adjust A6A12R66 2 GHz adjustment to maximize the 2.1 GHz signal on the HP 8566B Spectrum Analyzer (DUT) display.
25. Set HP 8620C Sweep Oscillator to Full Sweep in Band 4 (2 – 22 GHz).
26. Turn HP 8709A Synchronizer LINE power ON and set ERROR SIGNAL switch to minus (–). Key in 2 sec on HP 8566B Spectrum Analyzer (DUT).
27. Adjust special Tuning Voltage Circuit GAIN and OFFSET to lock the HP 8709A Synchronizer as the HP 8566B Spectrum Analyzer (DUT) sweeps from 2.0 to 5.8 GHz.
28. Adjust A6A12R63 5.8 GHz adjustment for maximum signal amplitude at 5.8 GHz on the HP 8566B Spectrum Analyzer (DUT) display.
29. Adjust A6A12R66 2 GHz adjustment for maximum signal amplitude at 2 GHz on HP 8566B Spectrum Analyzer (DUT) display.

ADJUSTMENTS

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

30. Adjust A6A10R18 YTX Bias VB for maximum amplitude of overall signal level from 2 to 5.8 GHz on the HP 8566B Spectrum Analyzer (DUT) display.
 31. Key in  5.8 GHz,  7 GHz,  50 msec.
 32. Turn HP 8709A Synchronizer LINE power OFF.
 33. Set HP 8620C Sweep Oscillator for a 6 GHz CW signal.
 34. Adjust A6A12R84 C IF Offset for maximum signal amplitude at 6 GHz on HP 8566B Spectrum Analyzer (DUT) display.
 35. Turn HP 8709A Synchronizer LINE power ON and set ERROR SIGNAL switch to plus (+).
 36. Set HP 8620C Sweep Oscillator for Full Sweep in Band 4 (2 – 22 GHz sweep).
 37. Key in  12.5 GHz,  2 sec.
 38. Adjust special Tuning Voltage Circuit GAIN and OFFSET to lock HP 8709A Synchronizer as the HP 8566B Spectrum Analyzer (DUT) sweeps from 5.8 to 12.5 GHz.
 39. Adjust A6A12R84 C IF Offset for maximum signal amplitude at 5.8 GHz on the HP 8566B Spectrum Analyzer (DUT) display. Ignore flatness at upper end of band.
 40. Adjust A6A10R15 VC YTX Bias for maximum amplitude of overall signal level from 5.8 to 12.5 GHz.
 41. Key in  12.5 GHz,  15 GHz,  50 msec.
 42. Turn HP 8709A Synchronizer LINE power OFF.
 43. Set HP 8620C Sweep Oscillator for a 15 GHz CW signal.
 44. Adjust A6A12R83 D IF Offset for maximum signal amplitude at 15 GHz on the HP 8566B Spectrum Analyzer (DUT) display.
 45. Turn HP 8709A Synchronizer LINE power ON.
 46. Set HP 8620C Sweep Oscillator for Full Sweep in Band 4 (2 – 22 GHz sweep).
 47. Key in  18.6 GHz,  2 sec.
 48. Adjust special Tuning Voltage Circuit GAIN and OFFSET to lock HP 8709A Synchronizer as the HP 8566B Spectrum Analyzer (DUT) sweeps from 12.5 to 18.6 GHz.
 49. Adjust A6A12R83 D IF Offset for maximum signal amplitude at 12.5 GHz on the HP 8566B Spectrum Analyzer (DUT) display.
 50. Adjust A6A10R12 VD YTX Bias for maximum amplitude of overall signal level from 12.5 to 18.6 GHz.
 51. Key in  18.6 GHz,  22 GHz,  50 msec.
 52. Turn HP 8709A Synchronizer LINE power OFF.
-

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

129. Key in  2 GHz,  5.8 GHz. Set HP 8709A Synchronizer ERROR SIGNAL switch to minus (-).
130. Set function generator output for 15V peak-to-peak signal at 200 Hz.
131. Adjust A6A12 Delay Compensation adjustment D1 (A6A10R26) for minimum peak-to-peak deviation of trace between 2 and 5.8 GHz.
132. Disconnect all test cables (including Tuning voltage Circuit power supply leads) from the HP 8566A Spectrum Analyzer and replace cover over A6 RF Module. Remove jumper between A12TP2 and A12TP3 (Lock Indicator Disable).

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

D. External Mixer Band

The IF gain of the analyzer is adjusted for a gain of 30 dB in the external mixer band (Band F). this is done to compensate for losses in the external mixer and to provide a known response level for the external mixer band.

This adjustment is performed by applying a -30 dBm signal at the front-panel IF INPUT and adjusting the analyzer gain for a 0 dBm response.

This known response level makes it possible to characterize (determine the conversion loss of) any external mixer simply by noting the difference in response level, at any given frequency, between the mixer's 321.4 MHz output and the calibrated response level of 0 dBm. Any difference can be considered mixer loss (combined with cables and connectors). This difference can then be used as a correction factor for measurements performed.

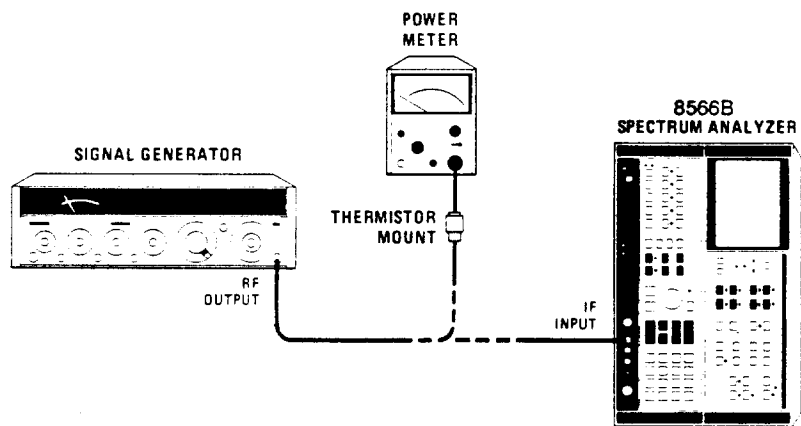
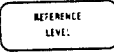


FIGURE 73A. FREQUENCY RESPONSE ADJUSTMENTS SETUP (EXTERNAL MIXING)

EQUIPMENT:

Signal Generator	HP 8640B, Opt. 002
Power Meter/Thermistor Mount	HP 432A/478A
Adapter, Type N Male to SMA Female	HP 1250-1250
Adapter, Type N Female to SMA Female	HP 86290-60005
Cable Assembly (SMA Connectors)	HP 8120-31214

21. FREQUENCY RESPONSE ADJUSTMENTS (Cont'd)

1. Adjust signal generator controls for an output of 321.4 MHz at -20 dBm.
2. Connect signal generator output to power meter/thermistor mount using SMA adapters and cable.
3. Adjust signal generator output level vernier for -20.0 dBm $\pm$ 0.1 dB indication on power meter. Set signal generator output level control to -30 dBm. Do not readjust vernier.
4. Remove jumper cable from between analyzer front-panel IF OUTPUT and IF INPUT connectors.
5. Disconnect signal generator output from power meter and connect to analyzer IF INPUT.
6. Key in   (KSU) 6 Hz, and (KSZ) 0 dB.
7. Key in  1 MHz, SCALE LOG  1 dB, and  3 dB.
8. Press MARKER  and readjust signal generator frequency to peak CRT trace. **DO NOT CHANGE SIGNAL GENERATOR OUTPUT LEVEL!**
9. Adjust A6A10 Band F IF Step Gain adjustment GF (A6A10R81) to place CRT trace at 0.00 dBm $\pm$ 0.01 dB, as indicated by MKR reading.
10. Disconnect test cables, reconnect jumper cable between IF OUTPUT and IF INPUT, and replace A6 RF Module PC Board cover.
11. Restore external mixer Ref Level offset to default value. Key in   , (KSU) 6 Hz, (KSZ) 12 .

22. ANALOG-TO-DIGITAL CONVERTER ADJUSTMENTS

REFERENCE:

A3A8 Analog-to-Digital Converter

DESCRIPTION:

The Analog-to-Digital Ramp Converter is adjusted at zero and full-scale by injecting a 0 Vdc input and + 10 Vdc input and adjusting the OFFS and GAIN controls until the ramp output at A3A8TP11 is at a maximum ac voltage as indicated by the digital voltmeter. This sets the horizontal end points for the CRT trace display; when the sweep ramp input is at 0 Vdc (the left graticule edge), trace position 1 is set, and when the sweep ramp input is at + 10 Vdc (the right graticule edge), trace position 1000 is set.

This procedure requires a +10 Vdc source which is stable and noise-free. A simple supply circuit, which can be built with common components, is illustrated in Figure 81. If these components are unavailable, the alternate procedure provided below (using only the digital voltmeter) can then be used.

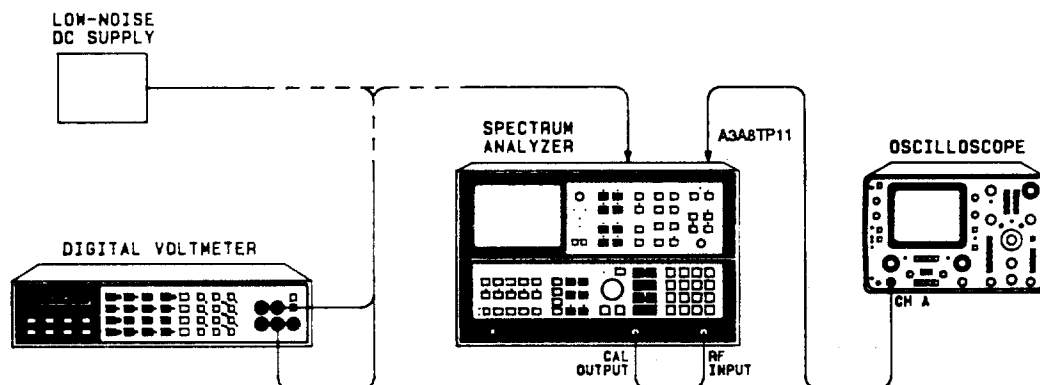


FIGURE 74. ANALOG-TO-DIGITAL CONVERTER ADJUSTMENTS SETUP

EQUIPMENT:

Oscilloscope	HP 1741A
Digital Voltmeter	HP 3456A
Low-Noise DC Supply (Optional)	Refer to Figure 81

PROCEDURE:

1. Position instrument upright as shown in Figure 74, and remove top cover. Install A3A8 Analog-to-Digital Converter Assembly on extender board.
2. Set LINE switch to ON and press 2-72 5Hz.

22. ANALOG-TO-DIGITAL CONVERTER ADJUSTMENTS (Cont'd)

3. Procedure using Low-Noise DC Supply is illustrated in Figure 81.
 - a. Key in TRACE A and SWEEP .
 - b. Disconnect 0 (black) cable from sweep ramp input A3A8J1.
 - c. Short A3A8TP4 to A3A8TP5, or connect SMB snap-on short to A3A8J1.
 - d. Connect oscilloscope to A3A8TP11 and ground to A3A8TP4.
 - e. Adjust A3A8R6 OFFS until A3A8 TP1 toggles. Center A3A8R6 in the range at which the output on A3A8TP11 toggles. Refer to Figure 75 for location of adjustment.

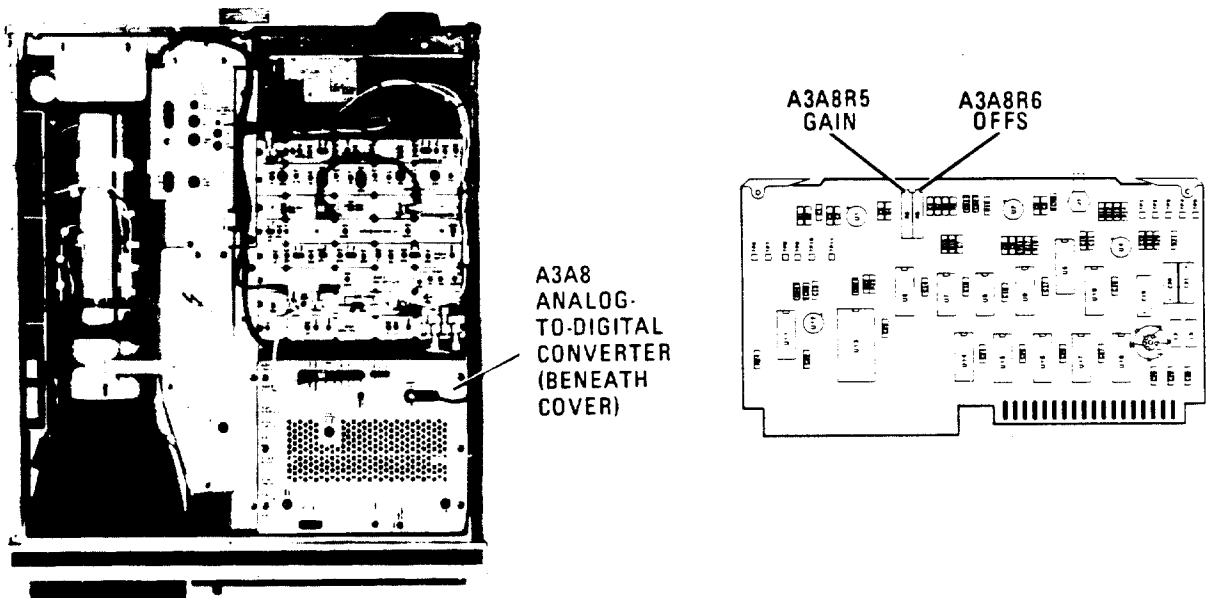


FIGURE 75. LOCATION OF ANALOG-TO-DIGITAL CONVERTER ADJUSTMENTS

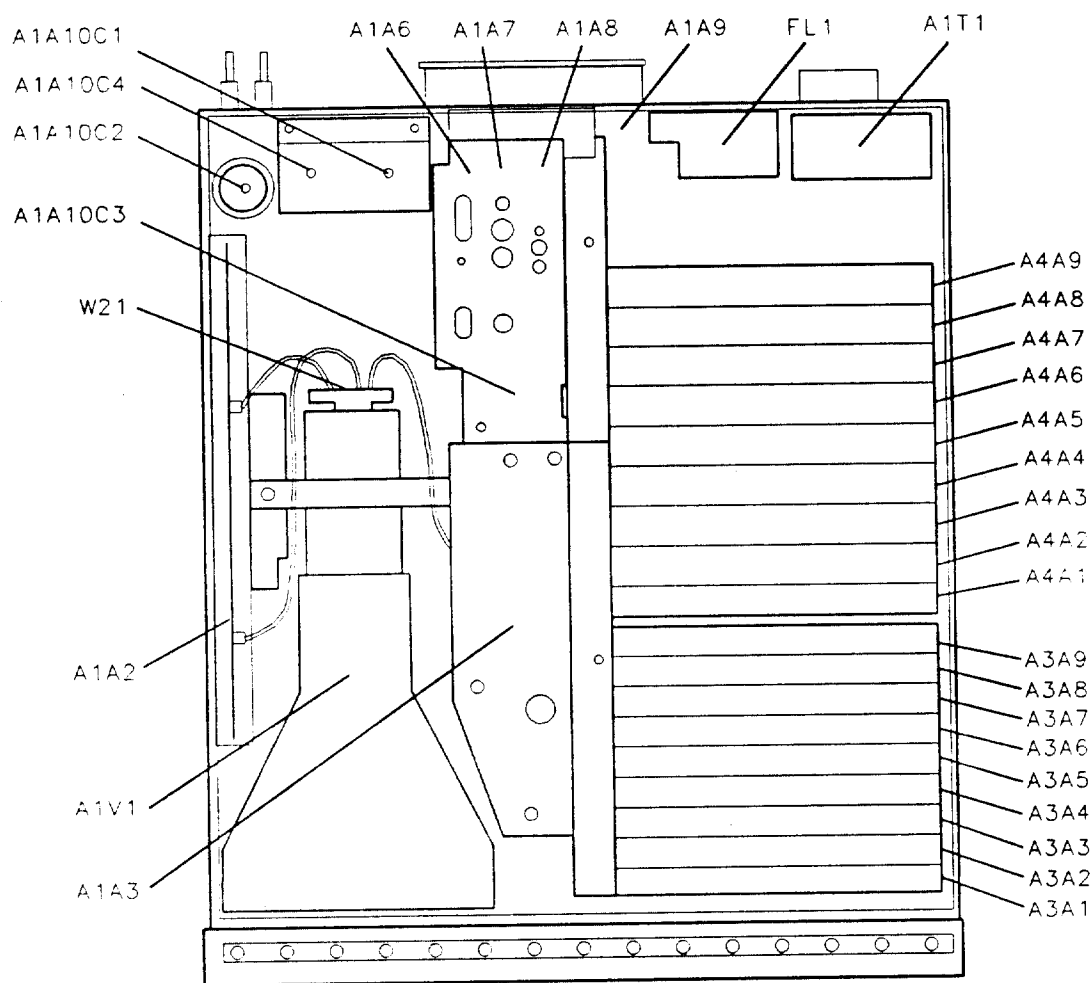
- f. Remove short from A3A8TP4 and A3A8TP5. Reconnect 0 (black) cable to A3A8J1.
- g. Press .
- h. Press MARKER , 1498 .
- i. Key in .
- j. Connect output of the Low-Noise DC Supply to A3A8J1. While monitoring the output voltage with a DVM, adjust the Low-Noise DC Supply for DVM indication of +10.000 Vdc.
- k. Connect DVM to A3A8TP5 and ground to A3A8TP4. Set DVM for Vac. Voltage should be 10.000 ± 0.001 Vdc.

22.. ANALOG-TO-DIGITAL CONVERTER ADJUSTMENTS (Cont'd)

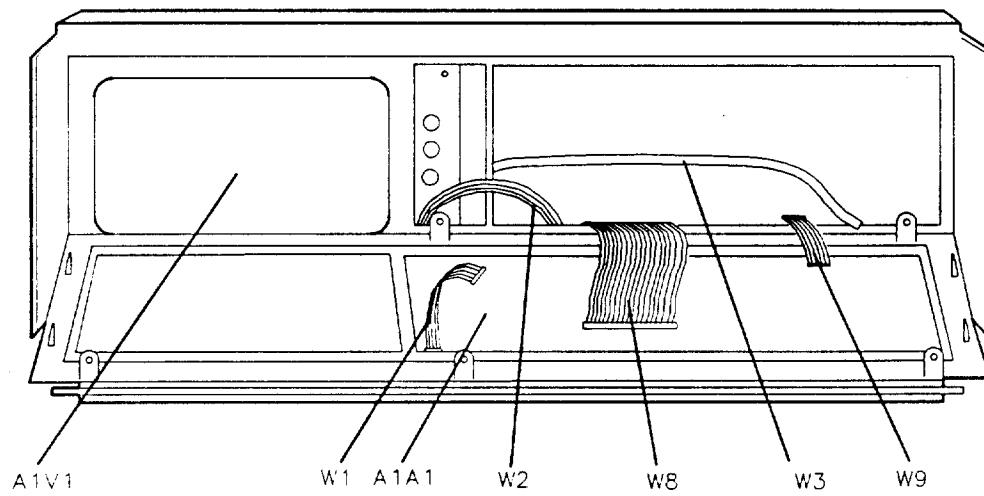
- l. Connect DVM to A3A8TP11 and ground to A3A8TP4.
- m. Adjust A3A8R5 GAIN until the level at A3A8TP11 is at maximum ac voltage as indicated by the DVM (approximately 2.0 Vac). Refer to Figure 75 for location of adjustment.

Alternate Procedure:**4. Procedure without using Low-Noise DC Supply:**

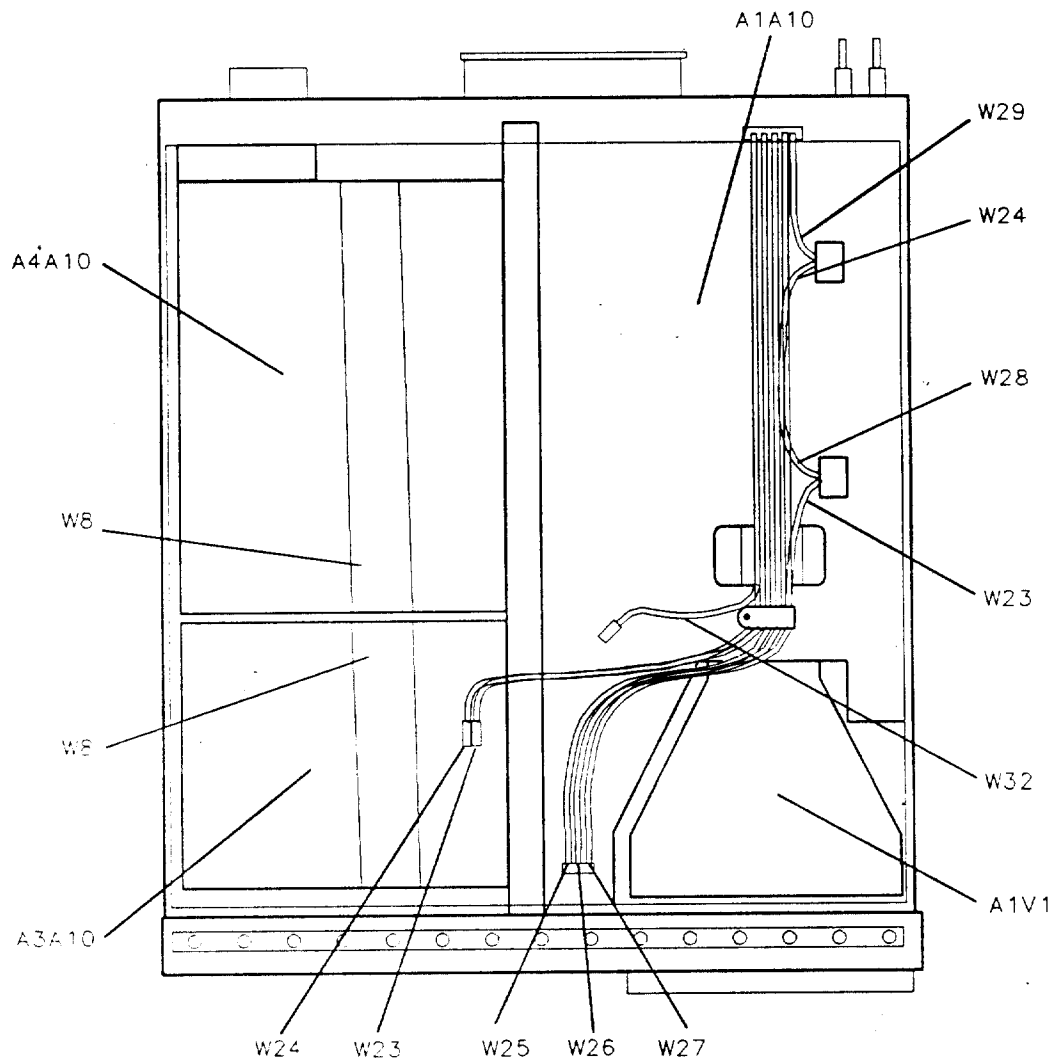
- a. Press **2-27** **SMI**.
- b. Key in TRACE A **BLANK** and SWEEP **SWEEP**.
- c. Disconnect 0 (black) cable from sweep ramp input A3A8J1.
- d. Short A3A8TP4 to A3A8TP5 or connect SMB snap-on short to A3A8J1.
- e. Connect oscilloscope to A3A8TP11 and ground to A3A8TP4.
- f. Adjust A3A8R6 OFFS until A3A8TP11 toggles. Center A3A8R6 in the range at which the output on A3A8TP11 toggles. Refer to Figure 75 for location of the adjustment.
- g. Remove short from A3A8TP4 and A3A8TP5. Reconnect 0 (black) cable to A3A8J1.
- h. Press **8-7.5** **SMI**.
- i. Connect DVM to A3A8TP5 and ground to A3A8TP4. Set DVM for Vdc.
- j. Press SWEEP **SWEEP**. Note DVM reading at the end of the sweep. The voltage will begin to drift immediately after the sweep ends. Therefore, the first indication after the sweep ends is the valid indication. It may be helpful to press **SWEEP** several times to ensure a valid indication at the end of the sweep.
- k. If DVM indication is $+10.020 \pm 0.005$ Vdc at the end of the sweep, no further adjustment is necessary. Otherwise, adjust A3A8R5 GAIN and repeat step j until the voltage at the end of the sweep is $+10.020 \pm 0.005$ Vdc.



Major Assembly and Component Locations (IF Display Section Top View)



Major Assembly and Component Locations (IF Display Section Front View)



Major Assembly and Component Locations (IF Display Section Bottom View)

HP 8566B Manual Changes Addendum

How to Use This Manual Changes Addendum

This manual changes addendum is intended for use with the *HP 8566B Troubleshooting and Repair Manual* (HP part number 08566-90042) and *HP 8566B Update Supplement* (HP part number 08566-90136).

This manual changes addendum lists changes that have been made since the last printing of your instrument's manual and manual update supplement. Mark up your manual with the appropriate changes to bring it up to date.

Insert the Cover Page

Insert the cover page of this manual changes addendum in front of your manual's cover page to indicate what version of documentation is currently being used. You may want to order a more recent version of this document in the future.

Make "Errata" and "All Serials" Corrections

Make all "Errata" and "All Serials" corrections to your manual.

"Errata" information corrects errors in the original manual.

"All Serials" changes include additional and changed information that applies to all instruments.

Make Serial Number Related Changes

Serial number related changes may or may not apply to your instrument depending on the serial number of your instrument. Check your instrument's serial number against the serial number referenced on each change or replacement page to determine whether that change applies to your instrument.

Serial number changes that call out a serial number numerically smaller than your instrument's serial number apply to your instrument unless they reference a serial number smaller than yours *and below*.

Serial number changes that call out your serial number or a serial number range that includes your serial number always apply to your instrument.

Serial number changes that call out a serial number numerically larger than your instrument's serial number do not apply to your instrument.

Serial numbers and serial number ranges may call out an entire serial number or just a serial prefix or serial prefix range. The first four numbers and letter of a serial number make up the serial prefix. The last five numbers compose the serial suffix.

Insert Replacement and Additional Pages

Replace current pages with new pages that apply to your instrument. (Errata and All Serials changes apply to all instruments, Serial Number changes depend on your serial number.)

Replacement pages will have the same page number as the old page.

Additional pages have a decimal place and a letter added to the page number. These are inserted between existing pages.

For example: Page 6-5.a is added between pages 5-6 and 6-6.

Volume 1

A6 RF MODULE

PAGE 12:

►2747A & Above

Table 1. Replaceable Parts

Change A6A2 to HP Part Number 85660-60304, Check Digit 5.

Add A6A2W1, HP Part Number 5062-0701, Check Digit 5, Ribbon Cable Assembly 8.8.

Change A6A10 to HP Part Number 85660-60322, Check Digit 7.

Volume 1

A6A10 Miscellaneous Bias/Relay Driver

PAGES 3 THROUGH 5/6:

►2747A & Above

Table 1. Replaceable Parts

Change A6A10 to HP Part Number 85660-60322, Check Digit 7.

Add the following parts:

A6A10C16, HP Part Number 0160-4574, Check Digit 1, Capacitor-Ceramic 1000P 100V.

A6A10R85, HP Part Number 0698-7260, Check Digit 7, Resistor 10K 1% .05W.

A6A10R86*, HP Part Number 0698-7265, Check Digit 2, Resistor 16.2K 1% .05W.

A6A10R87* and A6A10R91*, HP Part Number 0698-7266. Check Digit 3, 17.8K 1% .05W.

A6A10R88*, HP Part Number 0698-7258, Check Digit 3, Resistor 8.25K 1% .05W.

A6A10R89*, HP Part Number 0698-7246, Check Digit 9, Resistor 2.61K 1% .05W.

A6A10R90*, HP Part Number 0698-7188, Check Digit 8, Resistor 10 1% .05W.

A6A10R92, HP Part Number 0698-7236, Check Digit 7, Resistor 1K 1% .05W.

Change the following parts:

A6A10R21, R23, R25, R27, R29, and R81 to HP Part number 2100-0670, Check Digit 6, Resistor - Variable 10K 10% 17T.

A6A10U1 to HP Part Number 1820-2922, Check Digit 0, IC Digital-ICHCOO P2NAND.

Delete A6A10C7 and C12.

Delete A6A10CR8, CR9, CR11, CR12, CR16, and CR17.

Delete A6A10R53 and R63.

PAGE 9/10:

►2747A & Above

Figure 2. A6A10 Miscellaneous Bias/Relay Driver, Component Locations

Replace Figure 2 with the new Figure 2 (Serial Prefix 2747A) included in the Manual Updating Supplement.

PAGE 11/12:

►2747A & Above

Figure 3. A6A10 Miscellaneous Bias/Relay Driver, Schematic Diagram.

Replace function blocks (B), (C) and (I) with the new function blocks (B), (C) and (I) in P/O Figure 3. (Serial Prefix 2747A)

In the upper left of the schematic, change the HP Part Number to 85660-60322.

In the lower left of the schematic, change the Serial Prefix to 2747A.

Volume 1

A15 CONTROLLER

PAGE 9/10:

2635A & Above

Table 2. Replaceable Parts

Change A15U37 to HP Part Number 85660-80123, Check Digit 8.

Change A15U38 to HP Part Number 85660-80125, Check Digit 0.

Change A15U39 to HP Part Number 85660-80124, Check Digit 9.

Change A15U40 to HP Part Number 85660-80126, Check Digit 1.

2635A03232, -03234, Change A15U37 to HP Part Number 85660-80148, Check Digit 7.
-03246, -03247, Change A15U38 to HP Part Number 85660-80150, Check Digit 1.
-03249 through Change A15U39 to HP Part Number 85660-80149, Check Digit 8.
-03251, -03253, Change A15U40 to HP Part Number 85660-80151, Check Digit 2.
-03256, -03260, through -03265,
-03267 through
-03269, and 2637A
& Above

Volume 1

A17 POSITIVE REGULATOR

PAGE 4:

►2747A & Above

Table 1. Replaceable Parts

Change A17 to HP Part Number 85660-60323, Check Digit 8.

PAGE 6:

►2747A & Above

Figure 2. A17 Positive Regulator, Component Locations

At the top of the page, change the HP Part Number to 85660-60323.

At the bottom of the page, add the Serial Prefix 2747A.

Move R66 to between TP7 and C15, parallel to the top edge of the board.

Move VR7 to between TP9 and R14, parallel to the top edge of the board.

PAGE 7/8:

►2747A & Above

Figure 3. A17 Positive Regulator, Schematic Diagram

At the upper left of the schematic, change the HP Part Number to 85660-60323.

At the lower left of the schematic, change the Serial Prefix to 2747A.

Volume 1

A22 10 MHz FREQUENCY STANDARD

2725A & Above

After the A21 tab, add the new A22 10 MHz Frequency Standard tab, included in this Addendum

After the new A22 10 MHz Frequency Standard tab, add the new pages 1 through 4, included in this addendum.

Volume 1

GENERAL PARTS LISTING

PAGES 8 and 9:

2725A & Above

Table 5. Replaceable Parts

Add A22, HP Part Number 5062-1916, Check Digit 6, 10 MHz Frequency Reference Standard Assembly.

Add A22A1, HP Part Number 5062-1909, Check Digit 7, Board Assembly, 10 MHz Frequency Standard Regulator.

Add A22A2, HP Part Number 10811-60111, Check Digit 8, Oscillator, 10 MHz Quartz Crystal (see HP 10811A/B Operating and Service Manual, HP Part Number 10811-90002).

►2747A & Above

Change A6A2 to HP Part Number 85660-60304, Check Digit 5.

Change A6A10 to HP Part Number 85660-60322, Check Digit 7.

Change A17 to HP Part Number 85660-60323, Check Digit 8.

A22 10 MHz FREQUENCY STANDARD, CIRCUIT DESCRIPTION

The 10 MHz Frequency Standard provides a stable frequency reference signal to which the 100 MHz reference loop is phase-locked. The 100 MHz reference loop (A7A1 Reference Phase Detector and A7A2 100 MHz VCXO) in turn provides stable frequency reference signals of 10 MHz, 20 MHz, and 100 MHz to which the remaining phase-locked loops are locked. These remaining loops are the A7 M/N Reference, A10 20/30 Synthesizer, and A6A9 Phase Lock.

Alternately, the rear-panel FREQUENCY REFERENCE jumper cable can be removed, and an external 5 MHz ± 25 Hz or 10 MHz ± 50 Hz (0 to +10 dBm) reference signal connected to the EXTERNAL FREQUENCY REFERENCE INPUT. Analyzer performance will be degraded unless frequency reference phase noise and spurious signals are < -140 dBc single-sideband (1 Hz) referred to 10 MHz at a 100 Hz to 10 kHz offset.

A22A1 10 MHz Frequency Standard Regulator

A22A1 Regulator provides +12V regulated voltage, derived from the +20V supply on the A17 Positive Regulator, to the A22A2 Quartz Crystal Oscillator. Voltage regulator U1 provides +12V regulation, with capacitors C1 and C2 providing compensation and CR1 providing reverse-bias protection.

The regulator also supplies necessary mounting hardware to allow the A22A2 Quartz Crystal Oscillator to mount properly into its shock mounting brackets.

A22A2 10 MHz Quartz Crystal Oscillator

The Quartz Crystal Oscillator is an extremely stable, compact, low-power source of 10 MHz. It has a very fast warm-up time, exhibits excellent temperature characteristics, and has low phase noise and power consumption. The oscillator can be adjusted over a range of 20 Hz (2×10^{-6}), yet the control is sensitive enough to allow adjustment to better than 0.1 Hz (1×10^{-8}). The oscillator, HP Part Number 10811-60111, is field-repairable, as documented in the HP 10811A/B Quartz Crystal Oscillator Operating and Service Manual, HP Part Number 10811-90002.

RF SECTION

TABLE 1. REPLACEABLE PARTS

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A22	5062-1916	6	1	10 MHZ FREQUENCY STANDARD ASSEMBLY CABLE ASSEMBLY, WIRE HARNESS, 5-WIRE (A22 TO A23J3) TOP COVER/BRACKET	28480	5062-1916
A22W1	5062-1922	4	1		28480	5062-1922
A22MP1	5021-7432	7	1		28480	5021-7432
A22A1	5062-1909	7	1		28480	5062-1909
A22A1C1	0180-2205	3	1	BOARD ASSEMBLY, 10 MHZ FREQUENCY STANDARD REGULATOR CAPACITOR-FXD .33UF +-10% 35VDC TA CAPACITOR-FXD 2.2UF +-10% 20VDC TA DIODE-SCHOTTKY SM SIL CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS CONNECTOR-RF SM-SNP M PC 50-OHM CONNECTOR 5-PIN/ROW 1-ROW IC V RGLTR-FXD-POS 11.5/12.5V TO-92 PKG	28480	0180-2205
A22A1C2	0180-0197	8	1		28480	0180-0197
A22A1CR1	1901-0518	8	1		28480	1901-0518
A22A1J1	1251-2035	9	1		28480	1251-2035
A22A1J2	1250-0543	8	1		28480	1250-0543
A22A1J3	1252-2162	5	1		28480	1252-2162
A22A1U1	1826-0275	4	1		28480	1826-0275
A22A2	10811-60111	8	1	OSCILLATOR, 10 MHZ QUARTZ CRYSTAL SEE HP 10811A/B QUARTZ CRYSTAL OSCILLATOR OPERATING AND SERVICE MANUAL, PART NUMBER 10811-90002.	28480	10811-60111

A22A1
10MHz FREQ. STANDARD REGULATOR
5062-1909

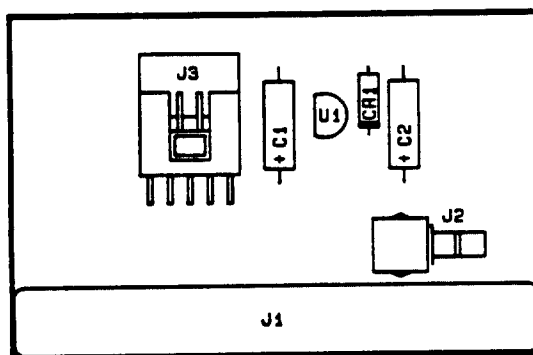
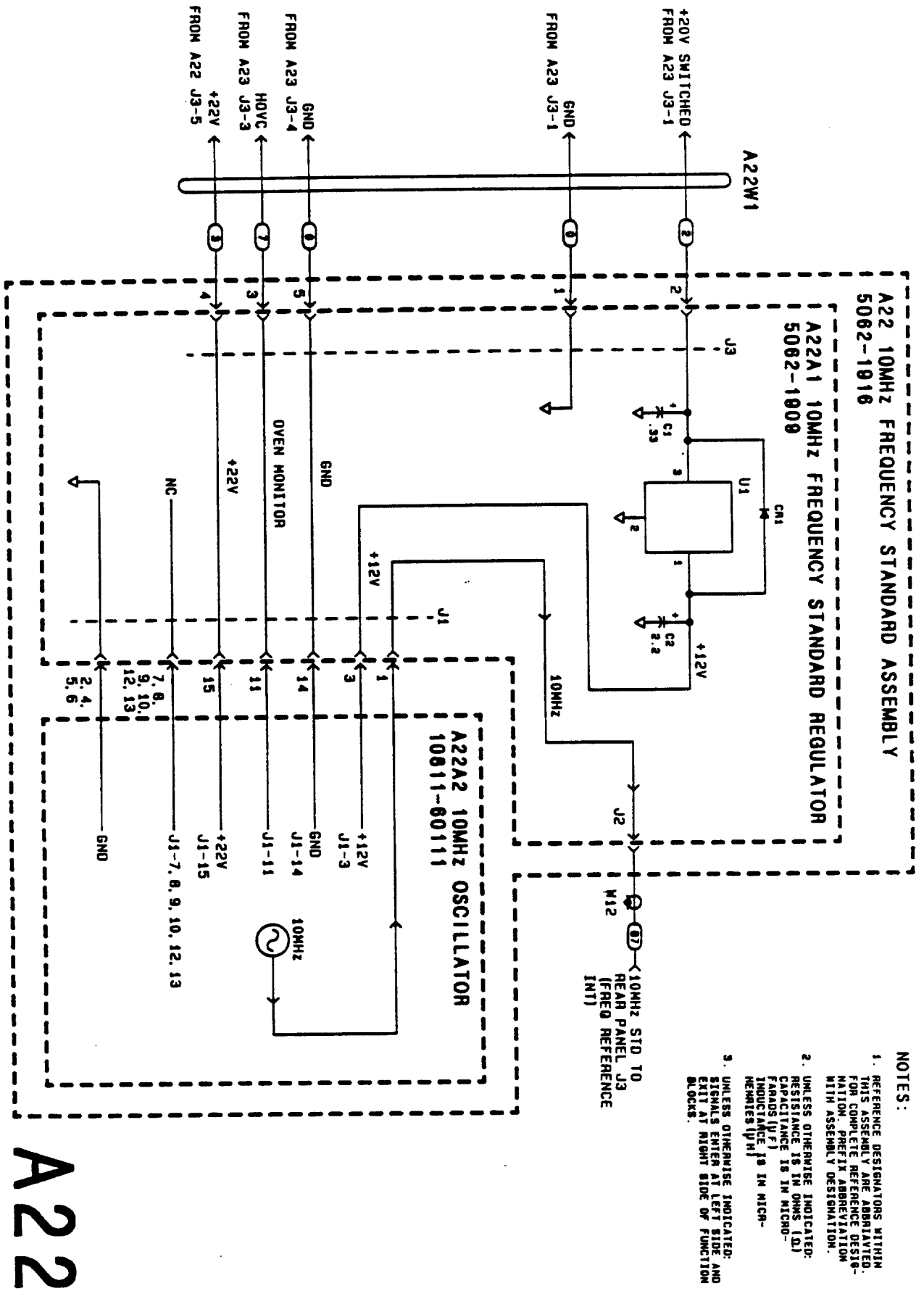


FIGURE 1. A22A1 10MHz FREQUENCY STANDARD REGULATOR,
COMPONENT LOCATION. (SERIAL PREFIX 2725A)

(MODEL 8506A) FIGURE 2. A22, 10MHz FREQUENCY STANDARD ASSEMBLY, SCHEMATIC DIAGRAM (CHANGE 84)
 (MODEL 8506B) FIGURE 2. A22, 10MHz FREQUENCY STANDARD ASSEMBLY, SCHEMATIC DIAGRAM (SERIAL PREFIX 2725A)



**A6A10
MISCELLANEOUS BIAS/RELAY DRIVER
85660-60322**

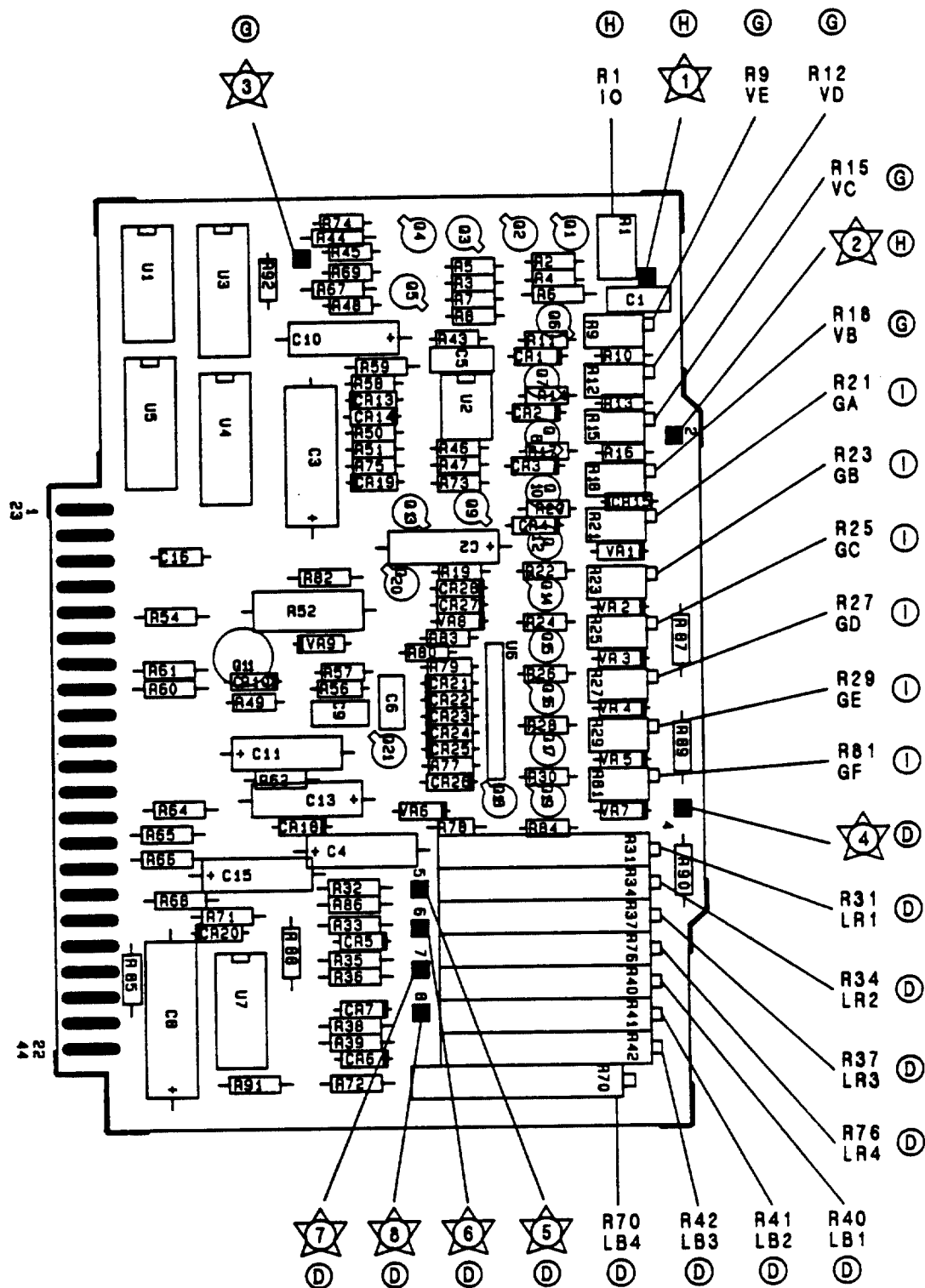
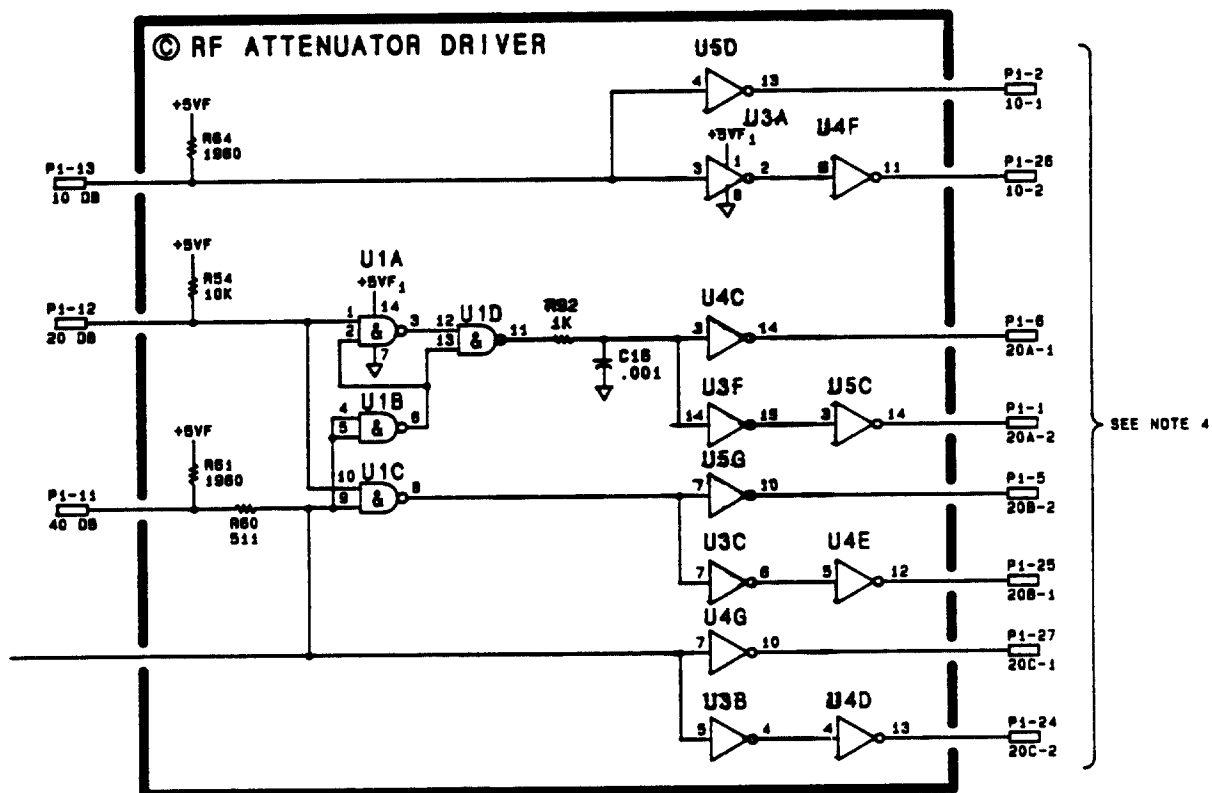
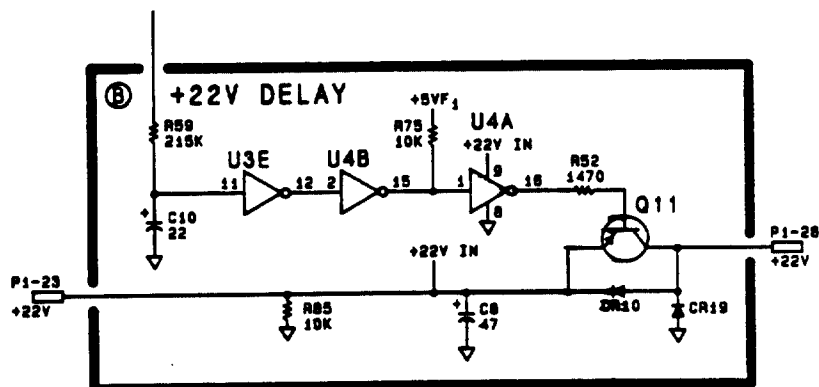


FIGURE 2. A6A10 MISCELLANEOUS BIAS/RELAY DRIVER, COMPONENT LOCATIONS (SERIAL PREFIX 2747A)



P/D FIGURE 3. A6A10 MISCELLANEOUS BIAS/RELAY DRIVER, SCHEMATIC DIAGRAM (SERIAL PREFIX 2747A)

Manual Changes

Volume 2

A1A1/A1A2

Pages 10-20:

Serial Prefix 3004A and above.

- Replace the A1A2 Z Axis Amplifier Board Assembly replaceable parts table on pages 10 and 11/12 with the new A1A2 XYZ Driver Board Assembly replaceable parts table for the 85662-60236, provided in this addendum.
- Replace the A1A2 Z Axis Amplifier component locations on page 17/18 with the new A1A2 XYZ Driver Amplifier component locations for the 85662-60236 board, provided in this addendum.
- Replace the A1A2 Z Axis Amplifier schematic on page 19/20 with the new A1A2 XYZ Driver Amplifier schematic for the 85662-60236, provided in this addendum. Cross out the old schematic instead of throwing the page away, since page 19/20 also documents the schematic for the A1A1 Keyboard Assembly.

A1A3

Pages 2-10:

Serial Prefix 3004A and above.

- Replace the A1A3 High Voltage Regulator Board Assembly replaceable parts table on page 2 with the new A1A3 replaceable parts table for the 85662-60233, provided in this addendum.
- Replace the A1A3 High Voltage Regulator Board Assembly component locations on page 7/8 with the new A1A3 component locations for the 85662-60233, provided in this addendum.
- Replace the A1A3 High Voltage Regulator Board Assembly schematic on page 9/10 with the new A1A3 schematic for the 85662-60233, provided in this addendum.

A1A4/A1A5

Pages 1-12:

Serial Prefix 3004A and above.

- Delete all information under this tab (pages 1-12).
- Delete the A1A4/A1A5 tab.

A1A6/A1A7

Pages 5-13:

Serial Prefix 3004A and above

- Replace the A1A6 High Voltage Power Supply Board Assembly replaceable parts table on pages 5 and 6 with the new A1A6 replaceable parts table for the 85662-60232, provided in this addendum.
- On page 7/8 of the A1A7 Regulator Board Assembly replaceable parts table, make the following corrections:
 - Change the A1A7 Regulator Board Assembly part number to 85662-60235, check digit 3.
 - Change the A1A7R23 part number to 0757-0466, 110K, check digit 7.
 - Change the A1A7CR5 part number to 1902-1415, 47V, check digit 8.
- Replace the A1A6 High Voltage Power Supply Board Assembly component locations on page 11 with the new A1A6 component locations for the 85662-60232, provided in this addendum.
- Replace the A1A6 High Voltage Power Supply Board Assembly schematic on page 13/14 with the new A1A6 schematic for the 85662-60232, provided in this addendum.
- On page 13/14 of the A1A7 Regulator Board Assembly schematic, make the following corrections:
 - In function block A, change the value of R23 to 110K.
 - In function block A, change the voltage of CR5 to 47V.

A1A8/A1A9

Pages 4-12:

Serial Prefix 3004A and above.

- Replace the A1A8 Rectifier Board Assembly replaceable parts table on pages 4-6 with the new A1A8 replaceable parts table for 85662-60234, provided in this addendum.
- Replace the A1A8 Rectifier Board Assembly component locations on page 9 with the new A1A8 component locations for the 85662-60234, provided in this addendum.
- Replace the A1A8 Rectifier Board Assembly schematic on page 11/12 with the new A1A8 schematic for the 85662-60234, provided in this addendum. Cross out the old schematic instead of throwing the page away, since page 11/12 also documents the schematic for the A1A9 Bus Transition.

A3A1

Pages 8-16:

Serial Prefix 3004A and above.

- On page 9, the A3A1 Trigger Board Assembly replaceable parts table, make the following corrections:
 - Change the A3A1 board number to 85662-60244, check digit 4.
 - Change A3A1R72 to part number 0757-0447, 16.2K, check digit 4.
- On page 15/16, the schematic for A3A1 Trigger Board Assembly, make the following corrections:
 - Change the A3A1 Trigger Board Assembly part number to 85662-60244.
 - Change the value of R72 to 16.2K in function block *E*.

A3A2

Pages 8-10:

Serial Prefix 3004A and above.

- On page 8, the A3A2 Intensity Control Board Assembly replaceable parts table, change A3A2 board number to 85662-60245, check digit 5.
- On page 9, the A3A2 Intensity Control Board Assembly replaceable parts table, make the following corrections:
 - Change the A3A2R20 part number to 0698-0085, 2.61K, check digit 0.
 - Change the A3A2R21 part number to 0698-3158, 23.7K, check digit 4.
 - Change the A3A2R25 part number to 0757-0279, 3.16K, check digit 0.
- On page 17/18, page 1 of 2 of the A3A2 Intensity Control Board Assembly schematic, change the board number to 85662-60245.
- On page 19/20, page 2 of 2 of the A3A2 Intensity Control Board Assembly schematic, make the following changes:
 - Change the board number to 85662-60245.
 - Change the value of R20 to 2.61K in function block *J*.
 - Change the value of R21 to 23.7K in function block *J*.
 - Change the value of R25 to 3.16K in function block *K*.

HP Part Number 85662-60232
A1A6 High Voltage Power Supply Board Assembly

Reference Designation	HP Part Number	C	Qty	Description	Mfr Code	Mfr Part Number
C1	0180-2205	3	1	CAP-FXD 0.33uF 35 V TA	04200	150D334X9035A2-DYS
C2	0180-0116	1	1	CAP-FXD 6.8uF 35 V TA	04200	150D685X9035B2-DYS
C3	0160-5271	7	1	CAP-FXD 30pF 100 V	02010	SA102A300JAAH
C4	0180-1746	5	1	CAP-FXD 15uF 20 V TA	04200	150D156X9020B2-DYS
C5	0180-0228	6	1	CAP-FXD 22uF 15 V TA	04200	150D226X9015B2-DYS
C6	0180-1746	5	1	CAP-FXD 15uF 20 V TA	04200	150D156X9020B2-DYS
C7	0180-0197	8	1	CAP-FXD 2.2uF 20 V TA	04200	150D225X9020A2-DYS
C8	0160-4822	2	1	CAP-FXD 1000pF 100 V	02010	SA201A102JAAH
C9	0160-5271	7	1	CAP-FXD 30pF 100 V	02010	SA102A300JAAH
C10	0180-0291	3	1	CAP-FXD 1uF 35 V TA	04200	150D105X9035A2-DYS
C11	0180-1746	5	1	CAP-FXD 15uF 20 V TA	04200	150D156X9020B2-DYS
C16	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C17	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C100	0180-4221	7	1	CAP-FXD 47uF 100 V AL-ELCTLT	00493	KMC100VB47RM10X20LL
C102	0180-3847	1	1	CAP-FXD 22uF 25 V TA	04200	299D226X9025DB1
C103	0180-4221	7	1	CAP-FXD 47uF 100 V AL-ELCTLT	00493	KMC100VB47RM10X20LL
C104	0180-4221	7	1	CAP-FXD 47uF 100 V AL-ELCTLT	00493	KMC100VB47RM10X20LL
C106	0160-5583	4	1	CAP-FXD 1uF 160 V POLYP-MET	06127	MKP-10
C107	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C108	0160-4832	4	1	CAP-FXD 0.01uF 100 V	02010	SA101C103KAAH
C109	0180-3847	1	1	CAP-FXD 22uF 25 V TA	04200	299D226X9025DB1
C110	0160-4832	4	1	CAP-FXD 0.01uF 100 V	02010	SA101C103KAAH
C111	0160-0156	7	1	CAP-FXD 3900pF 200 V POLYE-FL	02367	WMC 2D39
C112	0160-0161	4	1	CAP-FXD 0.01uF 200 V POLYE-FL	02367	WMC2S1
C113	0160-4822	2	1	CAP-FXD 1000pF 100 V	02010	SA201A102JAAH
C114	0160-4832	4	1	CAP-FXD 0.01uF 100 V	02010	SA101C103KAAH
C115	0180-3771	0	1	CAP-FXD 1uF 35 V TA	04200	299D105X9035AB1
C116	0180-3850	6	1	CAP-FXD 68uF 10 V TA	04200	299D686X9010DB1
C117	0160-5100	1	1	CAP-FXD 2700pF 100 V	02010	SA301A272JAAH
C118	0160-4832	4	1	CAP-FXD 0.01uF 100 V	02010	SA101C103KAAH
C119	0160-4832	4	1	CAP-FXD 0.01uF 100 V	02010	SA101C103KAAH
C121	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C122	0160-4832	4	1	CAP-FXD 0.01uF 100 V	02010	SA101C103KAAH
CR2	1901-0033	2	1	DIODE-GEN PRP 180V 200MA DO-35	00046	1N645
CR4	1884-0316	6	1	THYRISTOR-SCR 2N6402 TO-220AB VRRM=200	02037	2N6402
CR6	1901-0033	2	1	DIODE-GEN PRP 180V 200MA DO-35	00046	1N645
CR8	1901-0033	2	1	DIODE-GEN PRP 180V 200MA DO-35	00046	1N645
CR9	1884-0316	6	1	THYRISTOR-SCR 2N6402 TO-220AB VRRM=200	02037	2N6402
CR10	1901-0033	2	1	DIODE-GEN PRP 180V 200MA DO-35	00046	1N645
CR11	1901-0200	5	1	DIODE-PWR RECT 100V 1.5A	02037	
CR18	1901-0033	2	1	DIODE-GEN PRP 180V 200MA DO-35	00046	1N645
CR100	1901-0376	6	1	DIODE-GEN PRP 35V 50MA DO-35	00046	1N3595
CR102	1901-0376	6	1	DIODE-GEN PRP 35V 50MA DO-35	00046	1N3595
CR103	1901-1065	2	1	DIODE-PWR RECT 1N4936 400V 1A 200NS	02037	1N4936
CR104	1901-1065	2	1	DIODE-PWR RECT 1N4936 400V 1A 200NS	02037	1N4936
CR105	1901-1065	2	1	DIODE-PWR RECT 1N4936 400V 1A 200NS	02037	1N4936
DS1	1990-0487	7	1	LED-LAMP LUM-INT=2MCD BVR=5V	01542	HLMP-1401
DS2	1990-0487	7	1	LED-LAMP LUM-INT=2MCD BVR=5V	01542	HLMP-1401

*Indicates factory-selected value

HP Part Number 85662-60232
A1A6 High Voltage Power Supply Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
F1	2110-0681	0	1	FUSE 2.5A 250V NTD FE IEC	04703	21202.5
F2	2110-0702	6	1	FUSE 2A 250V NTD FE IEC	02805	GDB-2
F100	2110-0605	8	1	FUSE .5A 250V NTD FE	04703	217.500
L100	9140-0736	6	1	INDUCTOR-FIXED L:200 UH MIN @ 0.35 ADC,1	04200	
L101	9140-1181	7	1	INDUCTOR-FIXED L(@10 KHZ): 12 UH+-10% @	01886	G6925-A
L102	9140-0210	1	1	INDUCTOR RF-CH-MLD 100UH +-5% .166D-INX.	03273	15M103J
MP1	85662-20232	6	1		28480	85662-20232
MP2	4040-0754	1	1	EXTR-PC BD BLU POLYC .062-IN-BD-THKNS 1-	10401	
MP3	1480-0059	8	1	PIN-ROLL .062-IN-DIA .25-IN-LG STL	04559	52-012-062-0250
MP4	85662-20044	8	1		28480	85662-20044
MP5	0380-0886	6	1	STANDOFF-RVT-ON .1-IN-LG 4-40-THD	02121	
MP6	1200-0081	4	1	INSULATOR-FLG-BSHG NYLON	03232	
MP7	2200-0107	6	1	SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	01125	
MP8	2200-0107	6	1	SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	01125	
MP9	3050-0105	6	1	WASHER-FL MTLC NO. 4 .125-IN-ID	04821	
MP10	0340-1114	1	1	INSULATOR-XSTR THRM-CNDCT	05447	K-4-05
MP11	5041-7282	7	1		28480	5041-7282
MP12	3050-0890	6	1	WASHER-FL MTLC 2.5 MM 2.78-MM-ID	06691	
MP13	0515-1548	6	1	SCREW-MACHINE ASSEMBLY M2.5 X 0.45	01125	
MP14	0340-0949	8	1	INSULATOR-XSTR THRM-CNDCT	02923	60-11-5791-1674
MP15	0515-0866	9	1	SCREW-MACHINE ASSEMBLY M3 X 0.5 8MM-LG	05610	
MP16	0535-0025	4	1	NUT-HEX DBL-CHAM M3 X 0.5 2.4MM-THK	06691	
MP17	0360-1852	6	1	TERMINAL-SLDR LUG PL-MTG FOR-#5-SCR	04880	342-130
MP18	0515-2051	8	1		01125	
MP21	0340-0039	7	1	BUSHING-INSULATOR FOR STAND OFF	01461	HP-3000T-1
Q1	1853-0281	9	1	TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	02037	2N2907A
Q2	1853-0281	9	1	TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	02037	2N2907A
Q3	1854-0477	7	1	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	02037	2N2222A
Q4	1854-0019	3	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q5	1854-0611	1	1	TRANSISTOR NPN 2N6055 SI DARL TO-3	02037	2N6055
Q6	1854-0019	3	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q9	1854-0611	1	1	TRANSISTOR NPN 2N6055 SI DARL TO-3	02037	2N6055
Q10	1853-0281	9	1	TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	02037	2N2907A
Q100	1855-0565	6	1	TRANSISTOR MOSFET N-CHAN E-MODE TO-220 S	02037	MTP10N12
R1	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R2	0757-0403	2	1	RESISTOR 121 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R3	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R4	0698-3150	6	1	RESISTOR 2.37K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R5	0698-3442	9	1	RESISTOR 237 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R6	0757-1094	9	1	RESISTOR 1.47K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R7	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R8	0698-3247	2	1	RESISTOR 4.53K .25% .125W TF TC=0+-50	00746	CRB14 OR CRB25
R9	2100-3095	5	1	RESISTOR-TRMR 200 10% TKF SIDE-ADJ 17-TR	03744	3006P-DM3-201
R10	0698-6835	0	1	RESISTOR 3.16K +-0.5% .125W TF TC=0+-50	00746	CRB14 OR CRB25
R11	0811-1669	0	1	RESISTOR 1.8 +-5% 2W PWI TC=0+-400	02499	SPH
R12	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R13	0757-0424	7	1	RESISTOR 1.1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25

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Reference Designation	HP Part Number	C	Qty	Description	Mfr Code	Mfr Part Number
R14	0683-0275	9	1	RESISTOR 2.7 5% .25W CF TC=0-400	00746	R-25J
R15	0698-3444	1	1	RESISTOR 316 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R16	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R17	0757-0317	7	1	RESISTOR 1.33K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R18	0811-1669	0	1	RESISTOR 1.8 +-5% 2W PWI TC=0+-400	02499	SPH
R19	0698-7794	2	1	RESISTOR 10K +-0.25% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R20	0698-7794	2	1	RESISTOR 10K +-0.25% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R21	0698-3444	1	1	RESISTOR 316 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R22	0757-0418	9	1	RESISTOR 619 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R23	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R24	0757-0276	7	1	RESISTOR 61.9 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R25	0757-0418	9	1	RESISTOR 619 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R26	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R27	0757-0317	7	1	RESISTOR 1.33K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R28	0811-1661	2	1	RESISTOR .39 +-5% 2W PWI TC=0+-800	02499	SPH
R29	0683-0275	9	1	RESISTOR 2.7 5% .25W CF TC=0-400	00746	R-25J
R39	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R40	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R41	0698-3446	3	1	RESISTOR 383 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R42	0757-0443	0	1	RESISTOR 11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R43	0698-4405	6	1	RESISTOR 107 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R44	0757-1094	9	1	RESISTOR 1.47K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R45	0757-0443	0	1	RESISTOR 11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R46	0837-0126	6	1	THERMISTOR DISC 1K-OHM TC=-4.4%/C-DEG	12830	STD-0163
R48	0698-3154	0	1	RESISTOR 4.22K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R49	0757-0816	1	1	RESISTOR 681 +-1% .5W TF TC=0+-100	01074	H2
R100	0698-3442	9	1	RESISTOR 237 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R101	0757-0279	0	1	RESISTOR 3.16K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R102	0757-0458	7	1	RESISTOR 51.1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R103	2100-3054	6	1	RESISTOR-TRMR 50K 10% TKF SIDE-ADJ 17-TR	03744	3006P-DM3-503
R104	0757-0123	3	1	RESISTOR 34.8K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R105	0757-0466	7	1	RESISTOR 110K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R106	0698-0085	0	1	RESISTOR 2.61K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R107	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R108	0757-0438	3	1	RESISTOR 5.11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R109	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R110	0757-0199	3	1	RESISTOR 21.5K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R111	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R112	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R113	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R114	0757-0466	7	1	RESISTOR 110K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R115	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R116	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R117	0757-0279	0	1	RESISTOR 3.16K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R118	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R119	0757-0442	9	1	RESISTOR 10K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R120	0698-3601	2	1	RESISTOR 10 5% 2W MO TC=0+-200	02499	GS-3
R121	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25

**Indicates factory-selected value*

HP Part Number 85662-60232
A1A6 High Voltage Power Supply Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
R122	0757-0402	1	1	RESISTOR 110 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R123	0757-0467	8	1	RESISTOR 121K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R124	0812-0019	4	1	RESISTOR .33 +-5% 3W PWI TC=0+-90	01854	T2B-79
R125	0698-8817	2	1	RESISTOR 2.61 +-1% .125W TF TC=0+-100	02995	SFR25H
R126	0698-8815	0	1	RESISTOR 1.78 +-1% .125W TF TC=0+-100	02995	SFR25H
TP1	1251-0600	0	1	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	01136	928-196-004140
TP2	1251-0600	0	1	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	01136	928-196-004140
TP3	1251-0600	0	1	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	01136	928-196-004140
TP4	1251-0600	0	1	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	01136	928-196-004140
TP100	1251-8427	5	1	CONN-POST TYPE .150-PIN-SPCG 5-CONT	01380	87221-4
U1	1826-1227	8	1	IC OP AMP GP 8-DIP-C PKG	01698	LM301AJG
U2	1826-1227	8	1	IC OP AMP GP 8-DIP-C PKG	01698	LM301AJG
U100	1826-0806	7	1	IC V RGLTR-SWG 18V 16-DIP-P PKG	02910	NE5560N
U101	1820-4032	7	1	IC-INTERFACE DRVR CMOS PERIPHERAL HIGH	02763	TSC426CPA
U102	1810-0945	2	1	NETWORK-RES 8-SIP MULTI-VALUE	02483	750-8P-5R
U103	1826-0412	1	1	IC COMPARATOR PRCN DUAL 8-DIP-P PKG	03406	LM393N
U104	1826-0393	7	1	IC V RGLTR-ADJ-POS 1.2/37V T0-220 PKG	01698	LM317KC
U105	1826-0785	1	1	IC OP AMP LOW-BIAS-H-IMPD DUAL 8-DIP-C	01698	TL072ACJG
VR1	1902-0686	3	1	DIODE-ZNR 6.2V 2% DO-7 PD=.4W TC=+.002%	02037	1N825
VR2	1902-0202	9	1	DIODE-ZNR 15V 5% PD=1W IR=5UA	02037	
VR3	1902-3224	1	1	DIODE-ZNR 17.8V 5% DO-35 PD=.4W	02037	
VR7	1902-3224	1	1	DIODE-ZNR 17.8V 5% DO-35 PD=.4W	02037	
VR17	1902-0556	6	1	DIODE-ZNR 20V 5% PD=1W IR=5UA	02037	
VR101	1902-0949	1	1	DIODE-ZNR 4.3V 5% DO-35 PD=.4W TC=+.017%	02037	
XF1	2110-0714	0	1	FUSEHOLDER-BLOCK 2A 250 V 1-FU	06328	OGB 031.8101
XF2	2110-0714	0	1	FUSEHOLDER-BLOCK 2A 250 V 1-FU	06328	OGB 031.8101
XF100	2110-0714	0	1	FUSEHOLDER-BLOCK 2A 250 V 1-FU	06328	OGB 031.8101

HP Part Number 85662-60233
A1A3 High Voltage Regulator Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
C1	0160-4148	5	1	CAP-FXD 0.033uF 6 kV POLYE-MET	04200	430P333060
C2	0160-0684	6	1	CAP-FXD 1000pF 4 kV POLYE-MET	04200	430P102040
C3	0160-4148	5	1	CAP-FXD 0.033uF 6 kV POLYE-MET	04200	430P333060
C4	0160-0684	6	1	CAP-FXD 1000pF 4 kV POLYE-MET	04200	430P102040
C5	0160-4051	9	1	CAP-FXD 0.01uF 4 kV POLYE-MET	04200	430P103040
C6	0160-4051	9	1	CAP-FXD 0.01uF 4 kV POLYE-MET	04200	430P103040
C7	0160-4051	9	1	CAP-FXD 0.01uF 4 kV POLYE-MET	04200	430P103040
C8	0160-0543	6	1	CAP-FXD 4700pF 4 kV POLYE-MET	04200	430P472040
C9	0160-0543	6	1	CAP-FXD 4700pF 4 kV POLYE-MET	04200	430P472040
C10	0160-0543	6	1	CAP-FXD 4700pF 4 kV POLYE-MET	04200	430P472040
C11	0180-0269	5	1	CAP-FXD 1uF 150 V AL-ELCTLT	00493	150T1R0T6X13M
C13	0160-2201	7	1	CAP-FXD 51pF 300 V MICA	02367	CD15ED510J03
C14	0160-2201	7	1	CAP-FXD 51pF 300 V MICA	02367	CD15ED510J03
C15	0160-3456	6	1	CAP-FXD 1000pF 1 kV	06352	CK45XE3A102K-H
CR1	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR2	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR3	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR4	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR5	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR6	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR7	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR8	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
DS1	2140-0018	0	1	LAMP-GLOW A9A-CT 90VDC 700UA T-2-BULB	00466	A9A-CT
DS2	2140-0018	0	1	LAMP-GLOW A9A-CT 90VDC 700UA T-2-BULB	00466	A9A-CT
J1	1252-1744	7	1	CONN-POST TYPE .100-PIN-SPCG 5-CONT	01380	103414-3
J3	1252-1644	6	1	CONN-POST TYPE .156-PIN-SPCG 4-CONT	01380	644087-2
J4	1252-1645	7	1	CONN-POST TYPE .156-PIN-SPCG 5-CONT	01380	643734-2
MP1	85662-20233	7	1		28480	85662-20233
MP4	2360-0117	6	1	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	01125	
MP5	8151-0013	4	1	WIRE 22AWG 1X22	02805	8021-100
MP6	0590-1076	3	1	THREADED INSERT-NUT M3 X 0.5 1.5-MM-LG	03981	KFS2-M3
R1	0687-4721	6	1	RESISTOR 4.7K 10% .5W CC TC=0+647	01607	EB4721
R2	0699-0172	8	1	RESISTOR 3M +-5% 1W TF TC=0+-250	01992	FL1
R3	0698-8018	5	1	RESISTOR 30M +-1% 3W TKF TC=0+-100	01992	PVC175
R4	0698-8777	3	1	RESISTOR 1K +-5% .25W CC TC=-400/+900	01607	CB1025
R5	0686-1065	3	1	RESISTOR 10M 5% .5W CC TC=0+1059	01607	EB1065
R6	0699-1064	9	1	RESISTOR 1M +-5% .25W CC TC=-600/+900	01607	CB1055
R7	0698-8768	2	1	RESISTOR 100 +-5% .25W CC TC=-400/+500	01607	CB1015
R8	0698-8777	3	1	RESISTOR 1K +-5% .25W CC TC=-400/+900	01607	CB1025
R9	0757-0127	7	1	RESISTOR 215K +-1% .5W TF TC=0+-100	01074	H2
R10	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R11	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R12	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R13	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R14	2100-3626	8	1	RESISTOR-TRMR 2M 20% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-205
R15	0699-0171	7	1	RESISTOR 6.5M +-5% 1W TF TC=0+-250	01992	FL1
R16	0699-1065	0	1	RESISTOR 10K +-5% .25W CC TC=-400/+700	01607	CB1035
R17	0686-1065	3	1	RESISTOR 10M 5% .5W CC TC=0+1059	01607	EB1065

**Indicates factory-selected value*

HP Part Number 85662-60233
A1A3 High Voltage Regulator Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
R18	0699-1064	9	1	RESISTOR 1M +-5% .25W CC TC=-600/+900	01607	CB1055
R19	0698-8777	3	1	RESISTOR 1K +-5% .25W CC TC=-400/+900	01607	CB1025
R20	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R21	0757-0199	3	1	RESISTOR 21.5K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R22	0757-0397	3	1	RESISTOR 68.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R23	0757-0127	7	1	RESISTOR 215K +-1% .5W TF TC=0+-100	01074	H2
R26	0698-8777	3	1	RESISTOR 1K +-5% .25W CC TC=-400/+900	01607	CB1025
TP3	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP4	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP5	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP6	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP7	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
VR1	1902-3301	5	1	DIODE-ZNR 34.8V 5% D0-35 PD=.4W	02037	
VR2	1902-0197	1	1	DIODE-ZNR 82V 5% PD=1W IR=5UA	02037	
TP7	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
VR1	1902-3301	5	1	DIODE-ZNR 34.8V 5% D0-35 PD=.4W	02037	
VR2	1902-0197	1	1	DIODE-ZNR 82V 5% PD=1W IR=5UA	02037	
TP7	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
VR1	1902-3301	5	1	DIODE-ZNR 34.8V 5% D0-35 PD=.4W	02037	
VR2	1902-0197	1	1	DIODE-ZNR 82V 5% PD=1W IR=5UA	02037	

HP Part Number 85662-60234
A1A8 Rectifier Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
C1	0160-4832	4	1	CAP-FXD 0.01uF 100 V	02010	SA101C103KAAH
C2	0160-4298	6	1	CAP-FXD 4700pF 250 V	06352	CK45XR2E472M-H
C3	0160-4832	4	1	CAP-FXD 0.01uF 100 V	02010	SA101C103KAAH
C4	0160-0168	1	1	CAP-FXD 0.1uF 200 V POLYE-FL	02367	WMC2P1
C5	0160-0168	1	1	CAP-FXD 0.1uF 200 V POLYE-FL	02367	WMC2P1
C6	0160-0970	3	1	CAP-FXD 0.47uF 80 V POLYE-FL	02995	708D1HV474PK800AX
C7	0180-0197	8	1	CAP-FXD 2.2uF 20 V TA	04200	150D225X9020A2-DYS
CR1	1901-0662	3	1	DIODE-PWR RECT 100V 6A	02037	MR751
CR2	1901-0662	3	1	DIODE-PWR RECT 100V 6A	02037	MR751
CR3	1901-0662	3	1	DIODE-PWR RECT 100V 6A	02037	MR751
CR4	1901-0662	3	1	DIODE-PWR RECT 100V 6A	02037	MR751
CR5	1884-0316	6	1	THYRISTOR-SCR 2N6402 TO-220AB VRRM=200	02037	2N6402
CR6	1902-0856	7	1	DIODE-ZNR 39V 5% PD=1W IR=5UA	02037	
CR7	1901-0662	3	1	DIODE-PWR RECT 100V 6A	02037	MR751
CR8	1901-0662	3	1	DIODE-PWR RECT 100V 6A	02037	MR751
CR9	1901-0662	3	1	DIODE-PWR RECT 100V 6A	02037	MR751
CR10	1901-0662	3	1	DIODE-PWR RECT 100V 6A	02037	MR751
CR11	1901-0662	3	1	DIODE-PWR RECT 100V 6A	02037	MR751
CR12	1901-0662	3	1	DIODE-PWR RECT 100V 6A	02037	MR751
CR13	1901-0029	6	1	DIODE-PWR RECT 600V 750MA DO-29	02037	
CR14	1901-0029	6	1	DIODE-PWR RECT 600V 750MA DO-29	02037	
CR15	1901-0029	6	1	DIODE-PWR RECT 600V 750MA DO-29	02037	
CR16	1901-0029	6	1	DIODE-PWR RECT 600V 750MA DO-29	02037	
F1	2110-0007	4	1	FUSE 1A 250V TD FE UL	02805	MDL-1
MP2	4040-0747	2	1	EXTR-PC BD GRA POLYC .062-IN-BD-THKNS 1-	10401	
MP3	1480-0073	6	1	PIN-ROLL .062-IN-DIA .25-IN-LG BE-CU	04559	99-012-062-0250
MP4	2110-0643	4	1	FUSEHOLDER-CLP-TYP 15A 250 V	09694	FH-8000
R1	0757-0420	3	1	RESISTOR 750 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R2	0698-3155	1	1	RESISTOR 4.64K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R3	0698-0085	0	1	RESISTOR 2.61K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R4	0698-3152	8	1	RESISTOR 3.48K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R5	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R6	0757-0367	7	1	RESISTOR 100K +-1% .5W TF TC=0+-100	01074	H2
R7	0698-3407	6	1	RESISTOR 1.96K 1% .5W TF TC=0+-100	01074	H2
R8	0698-3447	4	1	RESISTOR 422 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
TP1	0360-1788	7	1	CONNECTOR-SGL CONT PIN .045-IN-BSC-SZ SQ	02031	
TP2	0360-1788	7	1	CONNECTOR-SGL CONT PIN .045-IN-BSC-SZ SQ	02031	

*Indicates factory-selected value

HP Part Number 85662-60236
A1A2 XYZ Driver Amplifier Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
C101	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C102	0160-3026	6	1	CAP-FXD 0.01uF 200 V	04200	1C20Z5U104M050B
C103	0160-3026	6	1	CAP-FXD 0.01uF 200 V	04200	1C20Z5U104M050B
C104	0121-0474	0	1	CAP-VAR 3pF 1.5pF 600 V FEP	04670	273-0001-002
C105	0160-4808	4	1	CAP-FXD 470pF 100 V	02010	SA101A471JAAH
C106	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C107	0160-3026	6	1	CAP-FXD 0.01uF 200 V	04200	1C20Z5U104M050B
C108	0160-3026	6	1	CAP-FXD 0.01uF 200 V	04200	1C20Z5U104M050B
C109	0121-0474	0	1	CAP-VAR 3pF 1.5pF 600 V FEP	04670	273-0001-002
C110	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C111	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C112	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C113	0180-4136	3	1	CAP-FXD 10uF 20 V TA	04200	173D106X9020W
C114	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C115	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C116	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C117	0180-4136	3	1	CAP-FXD 10uF 20 V TA	04200	173D106X9020W
C119	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C120	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C121	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C122	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C201	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C202	0160-3026	6	1	CAP-FXD 0.01uF 200 V	04200	1C20Z5U104M050B
C203	0160-3026	6	1	CAP-FXD 0.01uF 200 V	04200	1C20Z5U104M050B
C204	0121-0474	0	1	CAP-VAR 3pF 1.5pF 600 V FEP	04670	273-0001-002
C205	0160-4808	4	1	CAP-FXD 470pF 100 V	02010	SA101A471JAAH
C206	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C207	0160-3026	6	1	CAP-FXD 0.01uF 200 V	04200	1C20Z5U104M050B
C208	0160-3026	6	1	CAP-FXD 0.01uF 200 V	04200	1C20Z5U104M050B
C209	0121-0474	0	1	CAP-VAR 3pF 1.5pF 600 V FEP	04670	273-0001-002
C210	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C211	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C212	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C213	0180-4136	3	1	CAP-FXD 10uF 20 V TA	04200	173D106X9020W
C214	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C215	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C216	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C217	0180-4136	3	1	CAP-FXD 10uF 20 V TA	04200	173D106X9020W
C219	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C220	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C221	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C222	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C301	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C302	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C303	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C304	0160-5913	4	1	CAP-FXD 36pF 200 V	06352	MA12C0G2D360J
C305	0160-4801	7	1	CAP-FXD 100pF 100 V	02010	SA102A101JAAH
C306	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH

**Indicates factory-selected value*

HP Part Number 85662-60236
A1A2 XYZ Driver Amplifier Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
C307	0121-0474	0	1	CAP-VAR 3pF 1.5pF 600 V FEP	04670	273-0001-002
C308	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C309	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C310	0180-0269	5	1	CAP-FXD 1uF 150 V AL-ELCTLT	00493	150T1R0T6X13M
C311	0180-4136	3	1	CAP-FXD 10uF 20 V TA	04200	173D106X9020W
C313	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C314	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C315	0180-4136	3	1	CAP-FXD 10uF 20 V TA	04200	173D106X9020W
C316	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C317	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C318	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C401	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C402	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C403	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C404	0160-4801	7	1	CAP-FXD 100pF 100 V	02010	SA102A101JAAH
C405	0160-2238	0	1	CAP-FXD 1.5pF 500 V	01468	
C406	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C407	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C408	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C409	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C410	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C411	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C412	0160-4835	7	1	CAP-FXD 0.1uF 50 V	02010	SA115C104KAAH
C501	0180-0269	5	1	CAP-FXD 1uF 150 V AL-ELCTLT	00493	150T1R0T6X13M
C503	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
C504	0160-3670	6	1	CAP-FXD 0.1uF 200 V	02010	SR302E104MAAH
CR101	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR102	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR103	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR104	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR105	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR106	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR201	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR202	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR203	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR204	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR205	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR206	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR301	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR302	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR303	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR401	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR402	1901-0028	5	1	DIODE-PWR RECT 400V 750MA DO-29	02037	
CR404	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR405	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR406	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR407	1901-0050	3	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150

HP Part Number 85662-60236
A1A2 XYZ Driver Amplifier Board Assembly

Reference Designation	HP Part Number	C	D	Qty	Description	Mfr Code	Mfr Part Number
CR408	1901-0050	3	1	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR409	1901-0050	3	1	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR410	1901-0050	3	1	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
CR411	1901-0050	3	1	1	DIODE-SWITCHING 80V 200MA 2NS DO-35	00046	1N4150
E1	9170-0029	3	1	1	CORE-SHIELDING BEAD	01887	56-590-65A2/4A
J4	1252-3179	6	1	1		02946	69167-107
J5	1252-2154	5	1	1	CONN-POST TYPE .100-PIN-SPCG 5-CONT	02946	69167-105
L101	9140-0210	1	1	1	INDUCTOR RF-CH-MLD 100UH +-5% .166D-INX.	03273	15M103J
L102	9140-0210	1	1	1	INDUCTOR RF-CH-MLD 100UH +-5% .166D-INX.	03273	15M103J
L103	9140-0210	1	1	1	INDUCTOR RF-CH-MLD 100UH +-5% .166D-INX.	03273	15M103J
L201	9140-0210	1	1	1	INDUCTOR RF-CH-MLD 100UH +-5% .166D-INX.	03273	15M103J
L202	9140-0210	1	1	1	INDUCTOR RF-CH-MLD 100UH +-5% .166D-INX.	03273	15M103J
L203	9140-0210	1	1	1	INDUCTOR RF-CH-MLD 100UH +-5% .166D-INX.	03273	15M103J
L301	9140-0210	1	1	1	INDUCTOR RF-CH-MLD 100UH +-5% .166D-INX.	03273	15M103J
L302	9140-0210	1	1	1	INDUCTOR RF-CH-MLD 100UH +-5% .166D-INX.	03273	15M103J
L303	9140-0210	1	1	1	INDUCTOR RF-CH-MLD 100UH +-5% .166D-INX.	03273	15M103J
MP1	85662-20236	0	1	1		28480	85662-20236
MP2	4040-0750	7	1	1	EXTR-PC BD RED POLYC .062-IN-BD-THKNS 1-	10401	
MP3	1480-0073	6	1	1	PIN-ROLL .062-IN-DIA .25-IN-LG BE-CU	04559	99-012-062-0250
MP4	1205-0095	0	1	1	HEAT SINK SGL TO-5/TO-39-CS	02608	2225B
MP5	0403-0026	6	1	1	PLUG-HOLE BDR-HD FOR .19-D-HOLE NYL	01924	207-120241-03-0101
MP6	0380-1194	1	1	1	STANDOFF-RND .594-IN-LG 4-40-THD	02038	P-535-M17-F16-440
MP7	2200-0143	0	1	1	SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	01125	
MP8	2190-0003	8	1	1	WASHER-LK HLCL NO. 4 .115-IN-ID	04939	
MP10	0340-0595	0	1	1	INSULATOR-XSTR NYLON WHITE	02608	7717-131N WHITE
P6	1251-0600	0	1	1	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	01136	928-196-004140
P7	1251-0600	0	1	1	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	01136	928-196-004140
P8	1251-0600	0	1	1	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	01136	928-196-004140
P9	1251-0600	0	1	1	CONNECTOR-SGL CONT PIN 1.14-MM-BSC-SZ SQ	01136	928-196-004140
Q101	1853-0232	0	1	1	TRANSISTOR PNP SI TO-39 PD=1W FT=200MHZ	02037	
Q102	1854-0523	4	1	1	TRANSISTOR NPN SI TO-39 PD=1W FT=150MHZ	02037	
Q103	1854-0404	0	1	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q104	1853-0007	7	1	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q105	1853-0232	0	1	1	TRANSISTOR PNP SI TO-39 PD=1W FT=200MHZ	02037	
Q106	1854-0523	4	1	1	TRANSISTOR NPN SI TO-39 PD=1W FT=150MHZ	02037	
Q107	1854-0404	0	1	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q108	1853-0007	7	1	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q109	1854-0404	0	1	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q110	1854-0404	0	1	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q111	1853-0007	7	1	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q112	1853-0007	7	1	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q113	1853-0007	7	1	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q114	1853-0007	7	1	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q115	1853-0007	7	1	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q201	1853-0232	0	1	1	TRANSISTOR PNP SI TO-39 PD=1W FT=200MHZ	02037	
Q202	1854-0523	4	1	1	TRANSISTOR NPN SI TO-39 PD=1W FT=150MHZ	02037	
Q203	1854-0404	0	1	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q204	1853-0007	7	1	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251

**Indicates factory-selected value*

HP Part Number 85662-60236
A1A2 XYZ Driver Amplifier Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
Q205	1853-0232	0	1	TRANSISTOR PNP SI TO-39 PD=1W FT=200MHZ	02037	
Q206	1854-0523	4	1	TRANSISTOR NPN SI TO-39 PD=1W FT=150MHZ	02037	
Q207	1854-0404	0	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q208	1853-0007	7	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q209	1854-0404	0	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q210	1854-0404	0	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q211	1853-0007	7	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q212	1853-0007	7	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q213	1853-0007	7	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q214	1853-0007	7	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q215	1853-0007	7	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q301	1853-0232	0	1	TRANSISTOR PNP SI TO-39 PD=1W FT=200MHZ	02037	
Q302	1854-0419	7	1	TRANSISTOR NPN SI TO-39 PD=1W FT=200MHZ	02037	
Q303	1853-0007	7	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q304	1854-0404	0	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q305	1854-0404	0	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q306	1854-0404	0	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
Q401	1853-0232	0	1	TRANSISTOR PNP SI TO-39 PD=1W FT=200MHZ	02037	
Q402	1854-0419	7	1	TRANSISTOR NPN SI TO-39 PD=1W FT=200MHZ	02037	
Q403	1853-0007	7	1	TRANSISTOR PNP 2N3251 SI TO-18 PD=360MW	02037	2N3251
Q404	1854-0404	0	1	TRANSISTOR NPN SI TO-18 PD=360MW	02037	
R101	0757-0873	0	1	RESISTOR 1.62K +-1% .5W TF TC=0+-100	01074	H2
R102	0757-0438	3	1	RESISTOR 5.11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R103	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R104	0757-0851	4	1	RESISTOR 43.2K +-1% .5W TF TC=0+-100	01074	H2
R105	0757-0439	4	1	RESISTOR 6.81K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R106	0698-3417	8	1	RESISTOR 23.7K 1% .5W TF TC=0+-100	01074	H2
R107	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R108	0757-0460	1	1	RESISTOR 61.9K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R109	0757-0873	0	1	RESISTOR 1.62K +-1% .5W TF TC=0+-100	01074	H2
R110	0757-0438	3	1	RESISTOR 5.11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R111	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R112	0757-0851	4	1	RESISTOR 43.2K +-1% .5W TF TC=0+-100	01074	H2
R113	0757-0439	4	1	RESISTOR 6.81K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R114	0698-3417	8	1	RESISTOR 23.7K 1% .5W TF TC=0+-100	01074	H2
R115	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R116	0757-0460	1	1	RESISTOR 61.9K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R117	2100-3273	1	1	RESISTOR-TRMR 2K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-202
R118	0698-3153	9	1	RESISTOR 3.83K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R119	0757-0419	0	1	RESISTOR 681 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R120	2100-3273	1	1	RESISTOR-TRMR 2K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-202
R121	0698-3153	9	1	RESISTOR 3.83K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R122	0698-3155	1	1	RESISTOR 4.64K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R123	0757-1094	9	1	RESISTOR 1.47K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R124	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R125	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R126	0757-0440	7	1	RESISTOR 7.5K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25

HP Part Number 85662-60236
A1A2 XYZ Driver Amplifier Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
R127	2100-3353	8	1	RESISTOR-TRMR 20K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-203
R128	0757-0444	1	1	RESISTOR 12.1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R129	0757-0428	1	1	RESISTOR 1.62K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R130	0757-0428	1	1	RESISTOR 1.62K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R131	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R132	0698-3150	6	1	RESISTOR 2.37K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R133	0698-3150	6	1	RESISTOR 2.37K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R134	0698-3155	1	1	RESISTOR 4.64K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R135	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R136	0757-0438	3	1	RESISTOR 5.11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R137	0698-3153	9	1	RESISTOR 3.83K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R138	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R139	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R140	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R141	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R142	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R143	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R144	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R145	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R146	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R201	0757-0873	0	1	RESISTOR 1.62K +-1% .5W TF TC=0+-100	01074	H2
R202	0757-0438	3	1	RESISTOR 5.11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R203	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R204	0757-0851	4	1	RESISTOR 43.2K +-1% .5W TF TC=0+-100	01074	H2
R205	0757-0439	4	1	RESISTOR 6.81K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R206	0698-3417	8	1	RESISTOR 23.7K 1% .5W TF TC=0+-100	01074	H2
R207	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R208	0757-0460	1	1	RESISTOR 61.9K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R209	0757-0873	0	1	RESISTOR 1.62K +-1% .5W TF TC=0+-100	01074	H2
R210	0757-0438	3	1	RESISTOR 5.11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R211	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R212	0757-0851	4	1	RESISTOR 43.2K +-1% .5W TF TC=0+-100	01074	H2
R213	0757-0439	4	1	RESISTOR 6.81K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R214	0698-3417	8	1	RESISTOR 23.7K 1% .5W TF TC=0+-100	01074	H2
R215	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R216	0757-0460	1	1	RESISTOR 61.9K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R217	2100-3273	1	1	RESISTOR-TRMR 2K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-202
R218	0698-3153	9	1	RESISTOR 3.83K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R219	0757-0419	0	1	RESISTOR 681 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R220	2100-3273	1	1	RESISTOR-TRMR 2K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-202
R221	0698-3153	9	1	RESISTOR 3.83K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R222	0698-3155	1	1	RESISTOR 4.64K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R223	0757-1094	9	1	RESISTOR 1.47K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R224	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R225	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R226	0757-0440	7	1	RESISTOR 7.5K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R227	2100-3353	8	1	RESISTOR-TRMR 20K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-203
R228	0757-0444	1	1	RESISTOR 12.1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25

**Indicates factory-selected value*

HP Part Number 85662-60236
A1A2 XYZ Driver Amplifier Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
R229	0757-0428	1	1	RESISTOR 1.62K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R230	0757-0428	1	1	RESISTOR 1.62K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R231	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R232	0698-3150	6	1	RESISTOR 2.37K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R233	0698-3150	6	1	RESISTOR 2.37K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R234	0698-3155	1	1	RESISTOR 4.64K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R235	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R236	0757-0438	3	1	RESISTOR 5.11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R237	0698-3153	9	1	RESISTOR 3.83K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R238	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R239	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R240	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R241	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R242	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R243	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R244	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R245	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R246	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R301	0757-0819	4	1	RESISTOR 909 +-1% .5W TF TC=0+-100	01074	H2
R302	0698-3151	7	1	RESISTOR 2.87K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R303	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R304	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R305	0698-3416	7	1	RESISTOR 21.5K 1% .5W TF TC=0+-100	01074	H2
R306	0698-3414	5	1	RESISTOR 14.7K 1% .5W TF TC=0+-100	01074	H2
R307	0698-3152	8	1	RESISTOR 3.48K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R308	2100-3207	1	1	RESISTOR-TRMR 5K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-502
R309	0757-0428	1	1	RESISTOR 1.62K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R310	0757-0443	0	1	RESISTOR 11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R311	0757-0441	8	1	RESISTOR 8.25K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R312	0698-0085	0	1	RESISTOR 2.61K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R313	0757-0346	2	1	RESISTOR 10 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R314	0757-0443	0	1	RESISTOR 11K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R315	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R316	0757-0444	1	1	RESISTOR 12.1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R317	0757-0466	7	1	RESISTOR 110K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R318	0698-3155	1	1	RESISTOR 4.64K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R319	2100-3207	1	1	RESISTOR-TRMR 5K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-502
R320	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R325	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R327	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R328	8159-0005	0	1	RESISTOR-ZERO OHMS 22 AWG LEAD DIA	01339	L-2007-1
R329	0757-0288	1	1	RESISTOR 9.09K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R401	0757-0819	4	1	RESISTOR 909 +-1% .5W TF TC=0+-100	01074	H2
R402	0698-3151	7	1	RESISTOR 2.87K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R403	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R404	0757-0394	0	1	RESISTOR 51.1 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R405	0698-3416	7	1	RESISTOR 21.5K 1% .5W TF TC=0+-100	01074	H2

HP Part Number 85662-60236
A1A2 XYZ Driver Amplifier Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
R406	0757-0841	2	1	RESISTOR 12.1K +-1% .5W TF TC=0+-100	01074	H2
R407	0698-3152	8	1	RESISTOR 3.48K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R408	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R409	2100-3207	1	1	RESISTOR-TRMR 5K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-502
R410	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R411	0698-3154	0	1	RESISTOR 4.22K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R412	0757-0416	7	1	RESISTOR 511 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R413	0757-0465	6	1	RESISTOR 100K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R415	0757-0459	8	1	RESISTOR 56.2K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R416	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R417	0698-6322	0	1	RESISTOR 4K +-0.1% .125W TF TC=0+-25	00746	CRB14 OR CRB25
R418	0698-6322	0	1	RESISTOR 4K +-0.1% .125W TF TC=0+-25	00746	CRB14 OR CRB25
R419	0698-6322	0	1	RESISTOR 4K +-0.1% .125W TF TC=0+-25	00746	CRB14 OR CRB25
R420	0698-6322	0	1	RESISTOR 4K +-0.1% .125W TF TC=0+-25	00746	CRB14 OR CRB25
R421	0698-6624	5	1	RESISTOR 2K +-0.1% .125W TF TC=0+-25	00746	CRB14 OR CRB25
R423	0757-0199	3	1	RESISTOR 21.5K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R424	0698-3154	0	1	RESISTOR 4.22K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R425	0757-0444	1	1	RESISTOR 12.1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R426	2100-3273	1	1	RESISTOR-TRMR 2K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-202
R427	2100-3273	1	1	RESISTOR-TRMR 2K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-202
R429	0698-6322	0	1	RESISTOR 4K +-0.1% .125W TF TC=0+-25	00746	CRB14 OR CRB25
R430	0698-6322	0	1	RESISTOR 4K +-0.1% .125W TF TC=0+-25	00746	CRB14 OR CRB25
R431	0698-6322	0	1	RESISTOR 4K +-0.1% .125W TF TC=0+-25	00746	CRB14 OR CRB25
R432	0698-6322	0	1	RESISTOR 4K +-0.1% .125W TF TC=0+-25	00746	CRB14 OR CRB25
R433	0698-6624	5	1	RESISTOR 2K +-0.1% .125W TF TC=0+-25	00746	CRB14 OR CRB25
R435	0757-0199	3	1	RESISTOR 21.5K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R436	0698-3154	0	1	RESISTOR 4.22K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R437	2100-3273	1	1	RESISTOR-TRMR 2K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-202
R438	0757-0444	1	1	RESISTOR 12.1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R440	2100-3273	1	1	RESISTOR-TRMR 2K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-202
R443	0757-0279	0	1	RESISTOR 3.16K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R445	0757-0401	0	1	RESISTOR 100 +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R512	2100-3353	8	1	RESISTOR-TRMR 20K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-203
R513	2100-3355	0	1	RESISTOR-TRMR 100K 10% TKF SIDE-ADJ 1-TR	03744	3386X-Y46-104
R514	0757-0199	3	1	RESISTOR 21.5K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R515	0757-0280	3	1	RESISTOR 1K +-1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
R516	2100-3354	9	1	RESISTOR-TRMR 50K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-503
R517	2100-3354	9	1	RESISTOR-TRMR 50K 10% TKF SIDE-ADJ 1-TRN	03744	3386X-Y46-503
R518	0698-0084	9	1	RESISTOR 2.15K 1% .125W TF TC=0+-100	00746	CRB14 OR CRB25
TP104	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP105	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP106	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP204	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP205	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP301	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP401	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
TP501	0360-0535	0	1	TERMINAL-TEST POINT .330IN ABOVE	04055	
U101	1826-1796	6	1	IC OP AMP H-SLEW-RATE DUAL 8-DIP-P PKG	02037	MC34082P

**Indicates factory-selected value*

HP Part Number 85662-60236
A1A2 XYZ Driver Amplifier Board Assembly

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
U201	1826-1796	6	1	IC OP AMP H-SLEW-RATE DUAL 8-DIP-P PKG	02037	MC34082P
U401	1826-1422	5	1	IC OP AMP WB QUAD 14-DIP-P PKG	02037	MC34084P
U402	1826-1422	5	1	IC OP AMP WB QUAD 14-DIP-P PKG	02037	MC34084P
VR501	1902-1422	7	1	DIODE-ZNR 56V 5% DO-35 PD=.4W TC=+.116%	02037	
VR502	1902-1422	7	1	DIODE-ZNR 56V 5% DO-35 PD=.4W TC=+.116%	02037	