Notice

Hewlett-Packard to Agilent Technologies Transition

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. To reduce potential confusion, the only change to product numbers and names has been in the company name prefix: where a product name/number was HP XXXX the current name/number is now Agilent XXXX. For example, model number HP 8648 is now model number Agilent 8648.

Contacting Agilent Sales and Service Offices

The sales and service contact information in this manual may be out of date. The latest service and contact information for your location can be found on the Web at:

`http://www.agilent.com/find/assist`

If you do not have access to the Internet, contact your field engineer. In any correspondence or telephone conversation, refer to your instrument by its model number and full serial number.

Printed in USA July 2004

OPERATING AND SERVICE MANUAL

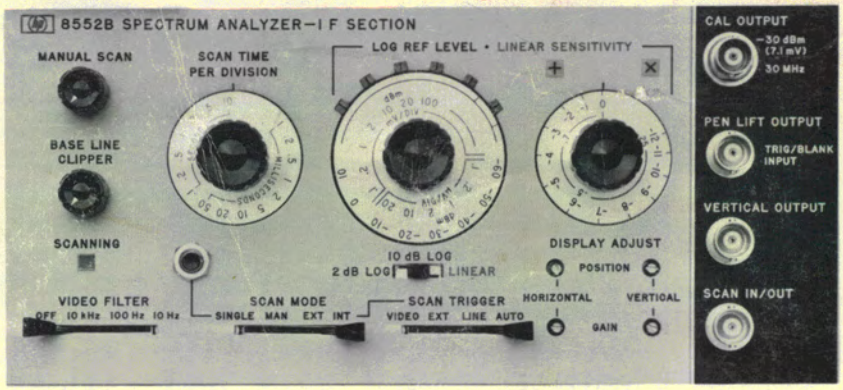
SPECTRUM ANALYZER IF SECTION

8552B

H01-8552B

H02-8552B

H04-8552B



HEWLETT hp PACKARD

SAFETY

This instrument has been designed and tested according to IEC Publication 348, "Safety Requirements for Electronic Measuring apparatus," and has been supplied in safe condition. This is a Safety Class I instrument. To ensure safe operation and to keep the instrument safe, the information, cautions, and warnings in this manual must be heeded. Refer to Section I for general safety considerations applicable to this instrument.

CERTIFICATION

The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facilities, or to the calibration facilities of other International Standards Organization members.

WARRANTY AND ASSISTANCE

This Hewlett-Packard product is warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery. Hewlett-Packard will repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard. No other warranty is expressed or implied. We are not liable for consequential damages.

Service contracts or customer assistance agreements are available for Hewlett-Packard products that require maintenance and repair on-site.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office.

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OPERATING AND SERVICE MANUAL

SPECTRUM ANALYZER
IF SECTION
8552B

SERIAL NUMBERS

This manual applies directly to instruments with serial numbers prefixed 1410A.

With changes described in Section VII, this manual also applies to instruments with serial numbers prefixed 971-, 974-, 977-, 1050A, 1107A, 1121A, 1131A, 1137A, 1144A, 1209A, 1210A, 1217A, 1234A, 1250A, 1311A, 1335A, and 1345A.

For additional important information about serial numbers, see INSTRUMENTS COVERED BY MANUAL in Section I.

MANUAL PART NO. 08552-90088
Microfiche Part No. 08552-90089
Operating Supplement Part No. 08552-90091

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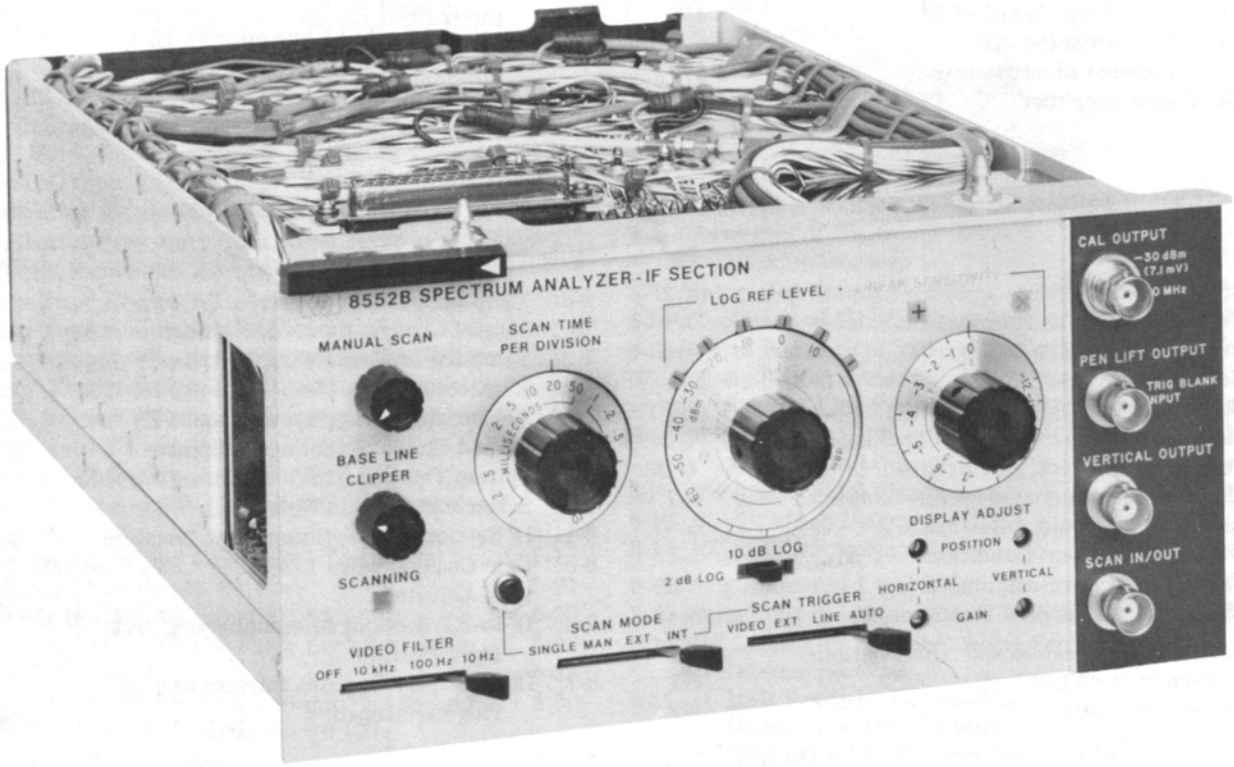


Figure 1-1. Model 8552B Spectrum Analyzer IF Section

SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION

1-2. This manual contains pertinent information required to install, operate, test, adjust and service the Hewlett-Packard Model 8552B Spectrum Analyzer IF Section. This section covers instrument identification, description, accessories, specifications and other basic information. A more complete discussion of overall operation of the Spectrum Analyzer system is given in RF Section manuals.

1-3. Figure 1-1 shows the Hewlett-Packard Model 8552B Spectrum Analyzer IF Section.

1-4. The various sections in this manual provide information as follows:

SECTION II, INSTALLATION, provides information relating to inspection, power requirements, mounting, packing and shipping, etc.

SECTION III, OPERATION, provides information relative to operating the equipment.

SECTION IV, PERFORMANCE TESTS, provides information required to ascertain whether the instrument is performing in accordance with published specifications.

SECTION V, ADJUSTMENTS, provides information required to properly adjust and align the instrument.

SECTION VI, REPLACEABLE PARTS, provides ordering information for all replaceable parts and assemblies.

SECTION VII, MANUAL CHANGES, provides back-dating information.

SECTION VIII, SERVICE, provides information required to service the instrument.

1-5. On the title page of this manual, below the manual part number, is a "Microfiche" part number. This number may be used to order 4 x 6-inch microfilm transparencies of the manual. Each microfiche contains up to 60 photo-duplicates of the manual pages. The microfiche package also includes the latest Manual Changes supplement as well as all pertinent Service Notes.

1-6. Instrument specifications are listed in Table 1-1. These specifications are the performance standards, or limits against which the instrument may be tested. Table 1-1 also lists supplemental characteristics. Supplemental characteristics are not specifications but are typical characteristics included as additional information for the user.

1-7. INSTRUMENTS COVERED BY MANUAL

1-8. This instrument has a two-part serial number. The first four digits and the letter or the first three digits and the hyphen comprise the serial number prefix. The last five digits form the sequential suffix that is unique to each instrument. The contents of this manual apply directly to instruments having the same serial number prefix(es) as listed under SERIAL NUMBERS on the title page.

1-9. An instrument manufactured after the printing of this manual may have a serial prefix that is not listed on the title page. This unlisted serial prefix indicates that the instrument is different from those documented in this manual. The manual for this instrument is supplied with a yellow Manual Changes supplement that contains "change information" that documents the differences.

1-10. In addition to change information, the supplement may contain information for correcting errors in the manual. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the *latest Manual Changes supplement. The supplement* for this manual is keyed to this manual's print date and part number, both of which appear on the title page. Complimentary copies of the supplement are available from Hewlett-Packard.

1-11. For information concerning a serial number prefix not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

1-12. DESCRIPTION

1-13. The HP Model 8552B Spectrum Analyzer IF Section was designed to be used in conjunction with an RF Section and a Display Section.

1-14. The complete analyzer is a highly sensitive superheterodyne receiver with spectrum scanning capabilities determined by the RF Section. Output video from the receiver circuits is applied to the CRT in the display section; thus, a signal or group of signals can be analyzed in the frequency

domain. Input signals are plotted on the CRT as a function of amplitude versus frequency. The amplitude (Y-axis) of the CRT is calibrated in absolute units of power (dBm) or voltage (μV/mV); accordingly, absolute and relative measurements of both amplitude and frequency can be made.

1-15. The instrument controls are arranged for easy operation. For wide spectrum analysis, the operator can use the preset scan of the RF Section used, or for a more detailed study, the spectrum width can be progressively narrowed. The frequency scan can be stopped to allow use of the instrument as a fixed frequency receiver. The RF Section's widest bandwidth is automatically selected for preset scan operation; for variable scan and fixed frequency operation, narrower bandwidths can be selected by the operator.

1-16. OPTIONS

1-17. The standard 8552B provides —30 ± 0.3 dBm calibrator output (7.07 mV into 50 ohms) at 30 ±0.003 MHz. A standard BNC connector is used.

1-18. Option H01. The calibrator output impedance is 75 ohms with an output of 8.66 mV (—30 dBm). The CAL OUTPUT Connector is equivalent to the Western Electric WE-560A.

1-19. Option H02. The calibrator output impedance is 75 ohms with an output of 8.66 mV (—30 dBm). The CAL OUTPUT connector is a BNC.

1-20. Option H04. The Log Amplitude reference is calibrated in dB μV (0 dBμV is 1 μV across 50 ohms).

1-21. EQUIPMENT REQUIRED BUT NOT SUPPLIED

1-22. The Model 8552B must be mated with a standard 8550 series RF Section and a 140 series Display Section before it can function as a spectrum analysis system.

1-23. RF Sections

1-24. The available 8552B Options must be mated with the following RF Sections:

1) 8552B-H01 . . . . . 8553B-H01
2) 8553B-H02 . . . . . 8553B-H02
3) 8552B-H04 . . 8553, 8554, 8555 (standard)
8556A-H11 (special)

1-25. Display Sections

1-26. The 140 Display Sections are equipped with a fixed-persistence, non-storage CRT. 141T Display Sections are equipped with a variable persistence, storage CRT. The 143 Display Sections have a large screen (8 x 10 inch) fixed-persistence, non-storage CRT.

Table 1-1. 8552B Specifications

SPECIFICATIONS

FREQUENCY

Resolution:

Bandwidth: IF bandwidths of 10 Hz to 300 kHz provided in a 1, 3 sequence.

Bandwidth Accuracy: Individual IF bandwidths' 3 dB points calibrated to ±20% (10 kHz bandwidth ±5%).

Bandwidth Selectivity: 60 dB/3 dB IF bandwidth ratio <11:1 for IF bandwidths from 10 Hz to 3 kHz and <20:1 for IF bandwidths from 10 kHz to 300 kHz, 60 dB points separated by <100 Hz for 10 Hz bandwidth.

AMPLITUDE

Absolute Amplitude Calibration Range:

Log: From −130 to +10 dBm, 10 dB/div on a 70 dB display or 2 dB/div expand below LOG reference.

H04: From −23 to +117 dBV, 10 dB/div on a 70 dB display or 2 dB/div expand below LOG reference.

Calibrator Output:

Amplitude: −30 dBm ± 0.3 dB; +77 dBμV (H04)
Standard/H04-8552B: 7.07 mV into 50 ohms
H01/H02-8552B: 8.66 mV into 75 ohms

Amplitude Accuracy:

Switching between bandwidths (at 20°C):	Log	Linear
0.1 - 300 kHz	±0.5 dB	±5.8%
0.03 - 300 kHz	±1.0 dB	±12.0%
0.01 - 300 kHz	±1.5 dB	±19.0%
Amplitude Display	±0.25 dB/dB but not more than ±1.5 dB over full 70 dB display range	±2.8% of full 8 div. deflection

GENERAL

Scan Time: 16 internal scan rates from 0.1 ms/div to 10 sec/div in a 1, 2, 5 sequence, or Manual Scan.

Scan Time Accuracy:
0.1 ms/div to 20 ms/div: ±10%
50 ms/div to 10 sec/div: ±20%

Power Requirements: 115 or 230 volts ±10%, 50 to 60 Hz, normally less than 225 watts for complete analyzer (varies with plug-in units used).

Weight: Model 8552B IF Section: Net 9 lb., 11 oz., (4,4 kg.)

Scan Characteristics

Scan Mode:

Internal: Analyzer repetitively scanned by internally generated ramp; synchronization selected by Scan Trigger.

Single: Single scan actuated by front panel push-button.

External: Scan determined by 0 to +8 volt external signal; scan input impedance >10 kΩ.

Blanking: −1.5V external blanking signal required.

Manual: Scan controlled by position of Manual Scan knob.

Scan Trigger: For Internal scan mode, select between:

Auto: Scan free runs.

Line: Scan synchronized with power line frequency.

External: Scan synchronized with >2 volt (20V max) trigger signal. Polarity selected by internal switch (on assembly A6) of 8552B IF Section. Scan triggers with negative impulse when switch in NORMAL position.

Video: Scan internally synchronized to envelope of RF input signal (signal amplitude of 1.5 major divisions peak-to-peak required on display section CRT).

Penlift Characteristics

Penlift output: 0 to +14 volts (0V pen down). Available in Internal and Single Scan modes and Auto, Line and Video Scan Trigger.

1-27. EQUIPMENT AVAILABLE

1-28. The following equipment is recommended for maintenance purposes:

a. HP 11592A Service Kit (shown in Figure 1-2).

b. Six-pin extender board (not included in HP 11592A Service Kit) HP Part Number 5060-5914.

1-29. RECOMMENDED TEST EQUIPMENT

1-30. Table 1-2 lists the test equipment and accessories required to check, adjust and repair the 8552B Spectrum Analyzer IF Section. If substitute equipment is used, it must meet the Minimum Specifications listed in Table 1-2.

Table 1-2. Test Equipment and Accessories

Item	Minimum Specifications or Required Features	Suggested Model	Note*
Amplifier	Frequency Range: 3 to 30 MHz Gain: 20 dB Input and Output Impedance: 50 ohms Flatness: ±1 dB	HP 8447A	P, A
Attenuator	Frequency Range: 0 — 30 MHz Flatness: ±0.5 dB Steps: 1 dB from 0 to 12 dB	HP 355C	A
Attenuator	Frequency Range: 0 — 30 MHz Flatness: ±0.5 dB Steps: 10 dB — 0 to 110 dB	HP 355D	A
Audio Oscillator	Frequency Range: 10 kHz Output Amplitude: 2V rms Frequency Accuracy: ±2% Output Impedance: 600 ohms	HP 200CD	P, A
Digital Voltmeter	Voltage Accuracy: ±0.2% Range Selection: Manual or Automatic Voltage Range: 1 — 1000 Vdc full scale Input Impedance: 10 megohms Polarity: Automatic Indication	HP 3440A Digital Voltmeter with HP 3443A Plug-in	P, A, T
Crystal Detector	Frequency: 1 — 50 MHz Sensitivity: >0.04 mV/μW Frequency Response: ±0.2 dB Polarity: Negative	HP 423A Crystal Detector	A
Frequency Counter	Frequency Range: 100 kHz — 50 MHz Accuracy: ±0.001% Sensitivity: 30 mV rms Readout Digits: 7	HP 5245L Frequency Counter with HP 5261A Plug-in	P, A
Oscilloscope	Frequency Range: Dc to 50 MHz Time Base: 1 μs/div to 10 ms/div Time Base Accuracy: ±3% Dual Channel, Alternate Operation Ac or dc Coupling External Sweep Mode Voltage Accuracy: ±3% Sensitivity: 0.005 V/div	HP 180A with HP 1801A Vertical Amplifier and HP 1821A Horizontal Amplifier HP 10004A 10:1 Divider Probes (2)	A, T

Note*
Performance = P; Adjustment = A; Troubleshooting = T

Table 1-2. Test Equipment and Accessories (cont'd)

Item	Minimum Specifications or Required Features	Suggested Model	Note*
Ohmmeter	Resistance Range: 1 ohm to 100 megohms Accuracy: ±10% of Reading	HP 412A	T
Power Supply	Output Voltage: Variable, 0 — 30 Vdc Output Current: 0 — 400 mA Meter Resolution: <5 mV	HP 6217A Power Supply	A
Signal Generator	Frequency Range: 1 — 30 MHz Output Amplitude: >0 dBm Amplitude Accuracy: ±1% Frequency Accuracy: ±1% Output Impedance: 50 ohms Modulation: External to 100%	HP 606B HF Signal Generator	A
Signal Generator	Frequency Range: 30 to 50 MHz Output Amplitude: >-20 dBm Amplitude Accuracy: ±1% Output Impedance: 50 ohms Modulation: External Pulse or CW to 100%	HP 608F VHF Signal Generator	P, A, T
Oscillator Synchronizer	Frequency Range: 50 kHz — 310 MHz Input Signal Level: 50 kHz — 20 MHz; 0.1 — 2V rms into 50 ohms, 10 — 310 MHz; 180 — 500 mV rms into 50 ohms. Frequency Reference Stability: Short term, 5 x 10^{-8}/minute Frequency Control Output: Frequency control voltage directly compatible with HP 606B and HP 608F signal generators; output voltage range, -2 to -32 Vdc (maximum)	HP 8708A Synchronizer	A
Sweep Oscillator	Frequency Range: 1 — 60 MHz Output Flatness: ±0.25 dB over full band Output Impedance: 50 ohms Sweep Width: Up to 10 MHz Output Amplitude: At least 0 dBm.	HP 8601A Generator/Sweeper	A
Pulse Generator	Rep Rate: 10 kHz to 100 kHz Pulse Width: 0.5 to 5 msec Pulse Amplitude: 2V	HP 222A	A
RF Voltmeter	Frequency Range: 3 MHz to 50 MHz Amplitude Range: 0 to -40 dBm Accuracy: ±5%	HP 3406A	T
Tunable RF Voltmeter	Bandwidth: 1 kHz Frequency Range: 1 — 50 MHz Sensitivity: 10 mV — 1V rms Input Impedance: ⩾0.1 megohms	HP 8405A Vector Voltmeter	P, A, T
Extender Board	6-Pin	HP 5060-5914	A, T
50-ohm Tee	Type N female connectors on two ports, with the third port able to accept HP 8405A probe tips.	HP 11536A 50-ohm Tee	P, A

Note*
Performance = P; Adjustment = A; Troubleshooting = T

Table 1-2. Test Equipment and Accessories (cont'd)

Item	Minimum Specifications or Required Features	Suggested Model	Note*
50-ohm Termination	Frequency Range: Dc — 310 MHz VSWR: 1.1 Power Rating: 0.5 Watt Connector: Type N Male	HP 908A Coaxial Termination	P, A
Variable Voltage Transformer	Range: 102 — 127 Vac Voltmeter Range: 103 — 127 Vac ±1 volt	General Radio W5MT3A or Superior Electric UC1M	A
BNC Tee (2)	Two BNC Female Connectors; one Male BNC Connector	UG-274B/U HP 1250-0781	P, A, T
Adapter	BNC Male to Type N Female	UG-349A/U HP 1250-0077	A
Adapter	BNC Male to Binding Post	HP 10110A	A
Adapter (3)	BNC Female to Type N Male	UG-201A/U HP 1250-0780	P, A
Voltage Probe	Dual Banana Plug-to-Probe Tip and Clip (Ground) Lead	HP 10025A Straight-thru Voltage Probe	A, T
Cable Assy (6)	Male BNC Connectors, 48 inches long	HP 10503A	P, A, T
Cable Assy	BNC Male to Dual Banana Plug, 45 inches long	HP 11001A	P, A, T
Cable Assy	Dual Banana Plug to Clip Leads, 45 inches long	HP 11002A	A, T
Cable Assy	Dual Banana Plug to Dual Banana Plug, 44 inches long	HP 11000A	A, T
Cable Assy	BNC Male to one end only; 44 inches. (Attach Test Clips to Shield and Center Conductor.)	HP 10501A	A, T
Tuning Tool, Slot	Nonmetallic, 6-inch shaft	Gowanda PC9668	A, T
Screwdrivers	Pozidrive No. 1 (small) Stanley No. 5531	HP 8710-0899	A, T
Tuning Tool, Slot	Nonmetallic, 2.5-inch shaft	HP 8710-0095	A, T
Capacitor	8200 pF (approx.), See paragraph 5-38	HP 0140-0184	A, T
Adapter	Type N Female Connector to Type N Female Connector	UG-29B/U HP 1250-0777	A, T
Adapter	Type N Female to BNC Female Adapter	FXR 21850	A, T
Adapter	Type NBC Plug-to-Plug Adapter	UG-491B/U HP 1250-0216	A, T
Tuning Tool	Fluted Tip, Siemans Halske B63399-B004-X000	HP 8710-0957	A

Note
Performance = P; Adjustment = A; Troubleshooting = T

Table 1-2. Test Equipment and Test Accessories (cont'd)

Item	Minimum Specifications or Required Features	Suggested Model	Note
Service Kit	Contents: 140/141 Display Section to Spectrum Analyzer Plug-in Extender Assembly (HP 11592-60015) IF to RF Unit Interconnection Extender Cable Assembly (HP 11592-60016) Selectro Female to BNC Male Test Cable, Three each, 36 inches long (HP 11592-60001) Selectro Male to Selectro Female Test Cable, Two each, 8 inches long (HP 11592-60003) Selectro Female to Selectro Female Cable, One each, 8 inches long (HP 11592-60002) Extender Board Assembly, 15 pins, 30 conductors, for Plug-in Circuit Boards (HP 11592-60011) Fastener Assembly, 8553 Circuit Board Extender, Two each (HP 11592-20001 and HP 1390-0170) Selectro Jack-to-Jack Adapter (HP 1250-0827) Wrench, open end, 15/64 inch (HP 8710-0946) BNC Jack-to-OSM Plug Adapter (HP 1250-1200) OSM Plug-to-Plug Adapter (HP 1250-1158) Cable Assembly, R and P Connector (HP 11592-60013)	HP 11592A Service Kit	Adjustment, Trouble-shooting

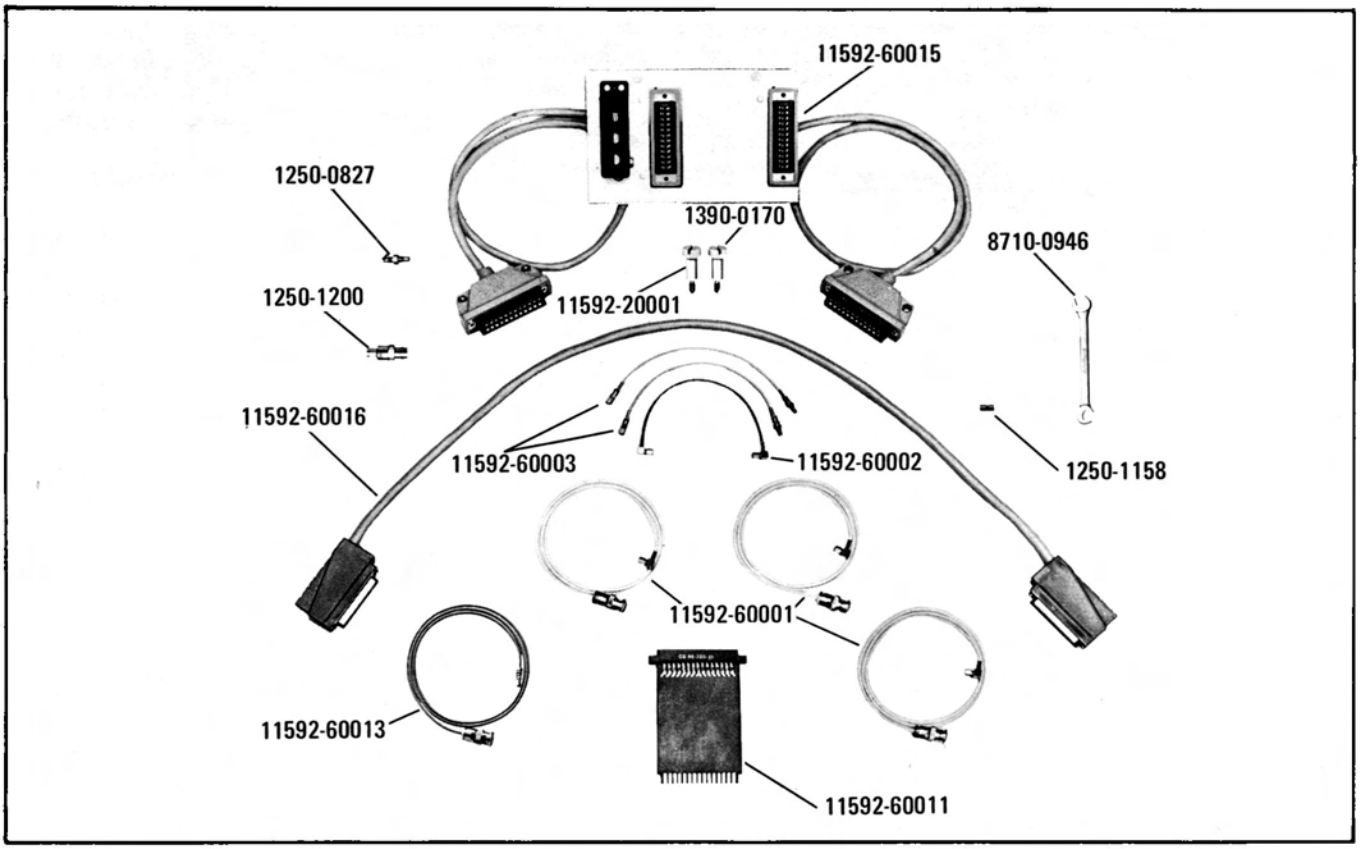


Figure 1-2. HP 11592A Service Kit Required for Maintenance

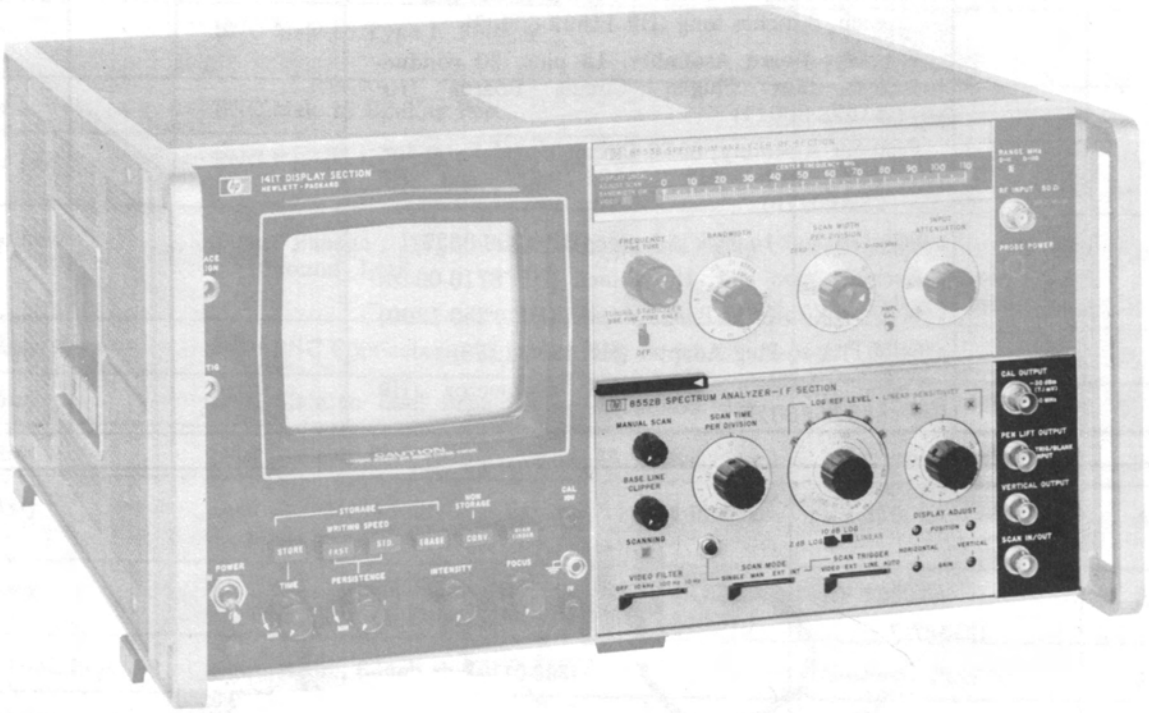


Figure 2-1. Model 8552B Spectrum Analyzer IF Section with 8553B RF Section and 141T Display Section

SECTION II
INSTALLATION

2-1. SHIPPING INFORMATION

2-2. Because of individual customer requirements, shipping configurations are flexible. Initial inspection is based on the premise that the RF and IF Sections are installed in the Display Section; thus the instrument is physically and functionally complete for test. Since the RF and IF Sections are received separately, the plug-ins must be mechanically fitted together, electrically connected, and inserted in a Display Section.

2-3. INITIAL INSPECTION

2-4. Mechanical Check

2-5. If shipping carton is damaged, ask that agent of carrier be present when instrument is unpacked. Inspect instrument for mechanical damage such as scratches, dents, broken knobs, or other defects. Also, check cushioning material for signs of severe stress.

2-6. Performance Check

2-7. As soon as possible after receipt, the instrument should be checked in accordance with the Performance Tests in Section IV.

2-8. CLAIMS FOR DAMAGE

2-9. If the Spectrum Analyzer IF Section is mechanically damaged or fails to meet the specified performance tests, immediately notify the carrier and the nearest Hewlett-Packard Sales and Service office. (A current list of sales and service offices appears at the back of this manual.) Retain shipping carton and padding material for inspection by the carrier. Any Hewlett-Packard Sales and Service office will arrange for instrument repair or replacement without waiting for a claim settlement with the carrier.

2-10. POWER REQUIREMENTS

2-11. The IF Section receives its power from the Display Section. Before connecting the analyzer to a line power source, perform the installation procedures given in the Display Section manual.

2-12. CONNECTIONS

2-13. Since the RF and IF Sections are shipped separately, the plug-ins must be mechanically fitted together, electrically connected, and then inserted into the Display Section mainframe. To make these connections refer to the RF Section Manual.

2-14. INSTALLATION CHECK

2-15. After installing the IF/RF Sections in the Display Section, the installation procedures given in Section II of the RF Section manual should be performed.

2-16. STORAGE AND SHIPMENT

2-17. Original Packaging

2-18. The same containers and materials used in factory packaging can be obtained through the Hewlett-Packard Sales and Service offices listed at the rear of this manual.

2-19. If the instrument is being returned to Hewlett-Packard for servicing attach a tag indicating the type of service required, return address, model number and full serial number. Also mark the container FRAGILE to assure careful handling.

2-20. In any correspondence refer to the instrument by model number and full serial number.

2-21. Other Packaging Materials

2-22. The following general instructions should be used for repackaging with commercially available materials.

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

b. Use a strong shipping container. A double-wall carton made of 350 pound test material is adequate.

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

d. Seal the shipping container securely.

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

SECTION III
OPERATION

3-1. INTRODUCTION

3-2. This section provides operating instructions for the HP 8552B IF Section. The panel features are described in Figure 3-1, Operator's Checks are outlined in Figure 3-2, and Operating Instructions are provided in the appropriate RF Section manual. Operator's Maintenance provides instructions for maintenance that can be done by the operator.

3-3. PANEL FEATURES

3-4. The panel features of the 8552B are shown and explained in Figure 3-1, 8552B Spectrum Analyzer IF Section Controls, Connectors and Indicators.

3-5. OPERATOR'S CHECKS

3-6. The Operator's Checks are designed to familiarize the operator with the 8552B and give him an understanding of the instrument capabilities.

3-7. The FRONT PANEL CHECK PROCEDURE and Table 4-1, (in Section 4), provide the Operator's Checks for the 8552B.

NOTE

When the 8552B-H04 is being used, the adjustments of paragraph 3-14 should be substituted for those in Section IV.

3-8. OPERATIONAL ADJUSTMENTS

3-9. During checkout at the factory, the IF Section is adjusted for proper operation. Upon receipt of the instrument the operator must perform the front panel adjustments as shown in the RF Section manual.

3-10. H01/H02 Instruments

3-11. For H01/H02 instruments it should be recalled that at −30 dBm, the equivalent voltage is 8.66 mV (75 ohms). Perform the tests and adjustments as shown in the RF Section Manual.

3-12. H04 Instruments

3-13. The −30 dBm CAL OUTPUT signal is used to calibrate the analyzer. However, since 0 dBμV (across 50 ohms) = −107 dBm, the −30 dBm signal corresponds to +77 dBμV. To achieve correct log calibration, LOG REF LEVEL is set to 80 dBμV and AMPL CAL is set so that the signal peaks 3 dB below the LOG REF graticule line. And since −30 dBm = 7.07 mV (across 50 ohms), AMPL CAL is fine-adjusted for 7.1 mV (≈7.07 mV) on the CRT display.

Use the following procedure as a supplement to the procedures specified in Section IV and the RF Section manuals for AMPL CAL adjustment.

NOTE

When the 8556A RF Section is used, the correct adjustment procedure is located in the RF Section manual.

1. Make VERTICAL GAIN and POSITION adjustments as specified in the manuals.
2. Set LOG REF LEVEL to 80 dBμV (check that LOG/LINEAR is set to 10 dB LOG, LOG REF LEVEL Vernier is set to 0, and CAL OUTPUT is connected to RF INPUT).
3. Adjust AMPL CAL to set the 30 MHz calibrator signal 3 dB *below* the top (0 dB) graticule line on the CRT.
4. Step INPUT ATTENUATION and LOG REF LEVEL through their ranges. The signal should increase or decrease 10 dB per step.
5. Set LOG/LINEAR to LINEAR and LINEAR SENSITIVITY to 1 mV/div. Adjust AMPL CAL to set the 30 MHz calibrator signal for 7.1 divisions on the CRT.

3-14. OPERATING INSTRUCTIONS

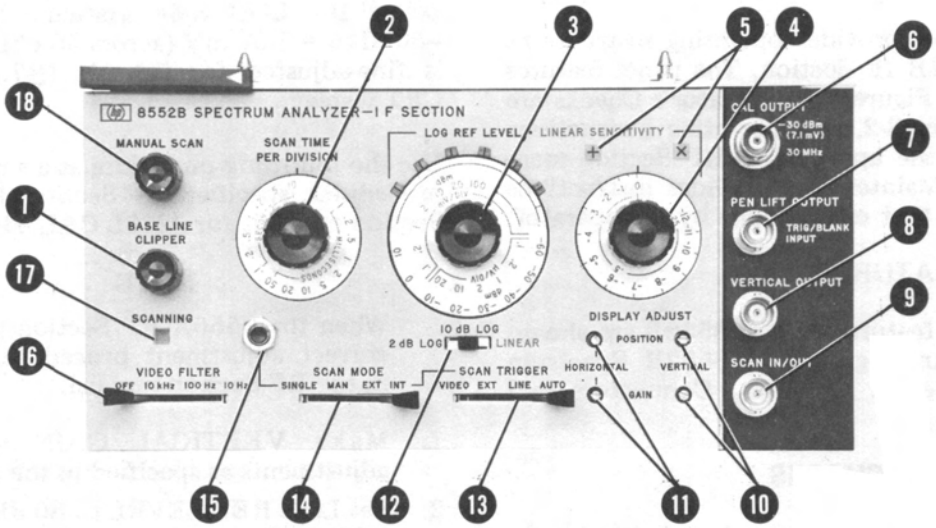
3-15. Refer to the RF Section manuals for specific operating instructions.

3-16. OPERATING TIPS

3-17. When using the 10 Hz Bandwidth, use a scan time of 1 second or slower. Special provision is made in the 8552B IF Section to increase the stability of the 50 MHz Converter during the slow scans.

3-18. When using MANUAL SCAN or EXTERNAL SCAN, the DISPLAY UNCAL lamp warns if the combination of control settings being used degrades the calibration. Do not sweep the analyzer any faster than it would be swept by an internal scan with the control settings selected.

FRONT



REAR

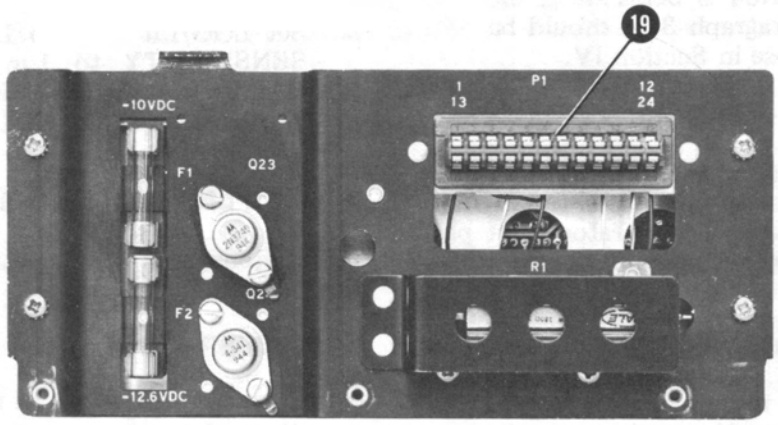


Figure 3-1. 8552B Spectrum Analyzer IF Section Controls and Connectors Indicators

FRONT AND REAR PANEL CONTROLS AND CONNECTORS

1. **BASE LINE CLIPPER.** Blanks lower part of trace to blank baseline noise. Blanking function also prevents blooming with a variable-persistence storage display section.

2. **SCAN TIME PER DIVISION.** Controls scan time.

3. **LOG REF LEVEL · LINEAR SENSITIVITY Ranges.** When the Log-Linear Mode Switch is in either of the Log positions and the vernier dial to the right is set at *black* zero, the *black* number under any illuminated index lamp indicates the power level at the display's LOG REF LEVEL. With the Log-Linear Mode Switch in the LINEAR position, the *blue* number under any illuminated index lamp indicates the per division multiplier for calibrated voltage amplitude, provided the vernier is set to *blue* 1. If the LOG REF LEVEL switch carries a third red scale, these numbers apply only when an 8556 RF Section is used.

4. **LOG REF LEVEL · LINEAR SENSITIVITY Vernier.** Indicates 1-dB increments for logarithmic amplification; indicates multiplication factors up to unity for linear amplification.

5. **LOG REF LEVEL LINEAR SENSITIVITY Mode Indicators.**
"+" indicates the amplitude is to be read in dB-Log mode (the Range, Vernier and Display levels are to be added algebraically).
"x" indicates the amplitude is to be read in volts-linear mode (the Range, Vernier and Display levels are to be multiplied together).

6. **CAL OUTPUT.** Provides a 30-MHz signal at -30 dBm for amplitude calibration of spectrum analyzer.

7. Provides penlift output 0 to 14 Vdc (0 Vdc while scanning) to compatible TTL HP recorders (HP 7005, 7035, 7004 and 7034). Blanking input when SCAN MODE is set to EXT (−15 Vdc required). Trigger Input of > 2 Vpk maximum) when SCAN MODE is set to INT and SCAN TRIG is set to EXT. (Polarity depends on position of internal switch A6S1, NORM-negative and REV-positive; factory set in the NORM (normal) position.

8. **VERTICAL OUTPUT.** Detected video output proportional to vertical deflection on CRT.

9. **SCAN IN/OUT.** Scan Output of −5 to +5 Vdc for 10-divisions of horizontal deflection on CRT (1k ohm output impedance). Scan Input 0 to +8 Vdc for 10-divisions of horizontal deflection on CRT (10k ohm input impedance).

10. **VERTICAL.** Adjusts vertical position and gain of deflection amplifier.

11. **HORIZONTAL.** Adjusts horizontal position and gain of deflection amplifier.

12. **Log-Linear Mode Switch.** Selects log (2 or 10 dB) or linear display modes.

13. **SCAN TRIGGER.** Selects scan trigger mode. Operable only when SCAN MODE is in the INT position.

14. **SCAN MODE.** Selects an internally generated ramp scan voltage in SINGLE or INT. The manual scan voltage is set by the MANUAL SCAN control. The EXT. scan voltage must be provided by an external generator.

15. **SINGLE.** Press to initiate or stop scan with SCAN MODE switch set to SINGLE.

16. **VIDEO FILTER.** May select 10 Hz, 100 Hz, 10 kHz or OFF sections of low-pass filter for detected video.

17. **SCANNING.** Lights for duration of each scan.

18. **MANUAL SCAN.** Controls scan in MAN position of SCAN MODE (14).

19. **P1.** Connects to display section.

NOTE

Do NOT make any VERTICAL GAIN or POSITION adjustments in the 2 dB LOG mode as the front panel calibration will become invalid.

Figure 3-1. 8552B Spectrum Analyzer IF Section Controls, Connectors and Indicators (cont'd)

3-19. OPERATOR'S MAINTENANCE

3-20. Operator's maintenance involves changing the –12.6 and –10 Vdc fuses, which are located on the rear panel of the 8552B.

3-21. Both fuses (F1 and F2), may be ordered under HP part number 2110-0001.

3-22. If the fuse is replaced and it immediately burns out again, a competent technician should be called to troubleshoot the instrument, or it should be returned to Hewlett-Packard for servicing. Refer to Section II under STORAGE AND SHIPMENT.

SECTION IV
PERFORMANCE TESTS

4-1. INTRODUCTION

4-2. Perform tests in procedural order with the test equipment called for, or with its equivalent. Specifications of test equipment and accessories required to performance-test the analyzer are given in Table 1-2.

4-3. Front panel checks for routine inspection are given in Table 4-1. Procedures for verifying that the instrument meets specifications are given in Paragraphs 4-23 through 4-28, and a test card in Table 4-5 contains data spaces for recording test results.

4-4. During any performance test, all shields and attaching hardware must be in place and the RF and IF Section plug-ins must be installed in the display section. The analyzer must be allowed to warm up at least one-half hour before being tested or adjusted.

4-5. FRONT PANEL CHECKS

4-6. Before proceeding to the front panel checks, the instrument must be adjusted and all the controls set as specified in the preset adjustment instructions in paragraph 4-13. After the instrument is set up, proceed with the checks. The instrument should perform as called out in the procedure (paragraphs 4-12 through 4-21) before going on to the performance tests.

4-7. PERFORMANCE TESTS

4-8. The performance tests given in this manual are suitable for incoming inspection, trouble-shooting or preventive maintenance. The tests are designed to verify published instrument specifications. Perform the tests in the order given, and record data on the test card (Table 4-5) at the end of this section. These tests assume the use of an 8553B RF Section and a 141T Display Section unless otherwise noted. If another RF Section is used the procedure must be adjusted accordingly: the frequencies used may change and some bandwidths will not be available for checking. If another Display Section is used, the tests that require variable persistence can be performed using an X-Y Recorder.

4-9. The tests are arranged in the following order:

Para.	Test Description
4-23	Calibrator Output
4-24	Bandwidth Accuracy
4-25	Bandwidth Selectivity
4-26	Switching between Bandwidths Accuracy
4-27	Amplitude Display Accuracy
4-28	Scan Time Accuracy

4-10. Each test is arranged so that the specification is written out as it appears in the Table of Specifications. Next, a description of the test and any special instructions or problem areas is included. Each test that requires test equipment has a test setup drawing and a list of required equipment. Each procedure gives control settings required for that particular test. Data spaces are included in each test procedure, and the spaces are repeated in the Performance Test Card at the end of this section.

4-11. Required specifications for test equipment are detailed in Table 1-2 in Section I. If substitute test equipment is to be used, it must meet the specifications listed in order to check the analyzer.

4-12. FRONT PANEL CHECK PROCEDURE

4-13. Preset Adjustments

4-14. Turn analyzer ON and preset the INTENSITY & FOCUS to approximately 1 o'clock. While the analyzer is warming up make the following control settings:

RANGE MHz ..... 0—110
FREQUENCY ..... 40 MHz
FINE TUNE ..... Centered
BANDWIDTH ..... 300 kHz
SCAN WIDTH ..... 0—100 MHz
SCAN WIDTH PER DIVISION ..... 10 MHz
INPUT ATTENUATION ..... 10 dB
TUNING STABILIZER ..... On
BASELINE CLIPPER ..... ccw
SCAN TIME PER DIVISION 5 MILLISECONDS
LOG REF LEVEL ..... -10 dBm
LOG REF LEVEL Vernier 0
LOG-LINEAR ..... 10 dB LOG
VIDEO FILTER ..... 10 kHz
SCAN MODE ..... INT
SCAN TRIGGER ..... AUTO

4-15. Connect CAL OUTPUT to RF INPUT using a BNC-to-BNC cable. The display on your analyzer should be similar to Figure 4-1.

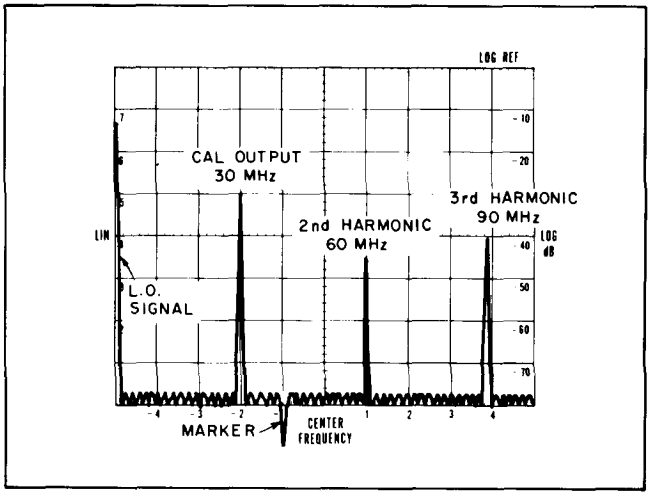


Figure 4-1. 30 MHz Calibrator Signal & Harmonics

4-16. Display Section Adjustments

a. Set LOG REF LEVEL max ccw.

b. Set SCAN TIME PER DIVISION to 10 SECONDS and adjust FOCUS and ASTIGMATISM for the smallest round spot possible.

c. Reset SCAN TIME PER DIVISION to 5 MILLISECONDS. Adjust TRACE ALIGN so that horizontal base line of the CRT trace is exactly parallel to the horizontal graticule lines.

4-17. IF Section Display Adjustments

a. Adjust VERTICAL POSITION so that the horizontal base line of the CRT trace is exactly on the bottom horizontal graticule line of the CRT. Set LOG REF LEVEL to 0 dBm.

b. Adjust HORIZONTAL POSITION so display is centered on CRT. Then adjust HORIZONTAL GAIN until the displayed scan width is exactly 10 divisions. Some interaction between HORIZONTAL POSITION and GAIN may occur, requiring slight readjustment of the controls.

The display on your CRT should now match Figure 4-1 almost exactly. (The amplitudes of the individual signals may be slightly different.)

c. Note the inverted marker below the bottom graticule line. This marker indicates the display center frequency of the ZERO and SCAN WIDTH PER DIVISION tuning modes. Adjust the FREQUENCY control to place this marker exactly under the signal three divisions from the left.

This signal is the 30 MHz calibrator signal. Tune the marker carefully to null the signal.

NOTE

The other signals on the display are the "zero frequency" First LO feedthrough and the 60 MHz and 90 MHz harmonics of the calibrator signal.

d. Set the SCAN WIDTH PER DIVISION control to .05 MHz and the BANDWIDTH to 10 kHz.

e. Switch the red SCAN WIDTH control to the PER DIVISION position. The BANDWIDTH, SCAN WIDTH PER DIVISION, and Center Frequency are now those selected in steps c and d. (The marker makes it easy to select any signal in 0—100 MHz scan and expand the display about that signal.)

f. Adjust FREQUENCY tuning to center 30 MHz calibrator signal, if necessary. Then reduce SCAN WIDTH PER DIVISION to 10 kHz. Use FINE TUNE to center the signal on the display. (The analyzer's First LO is automatically phase-locked to a crystal oscillator reference for the blue color-coded SCAN WIDTH positions since the TUNING STABILIZER was set on. Therefore, the FREQUENCY control — which tunes the First LO — should not be used to tune the analyzer; frequency would tune in 100 kHz steps.)

g. Adjust the LOG REF LEVEL controls so the maximum signal amplitude is exactly on the -70 dB graticule line. Rotate LOG REF LEVEL control seven steps in the clockwise direction. The amplitude of the signal should increase in increments of one division per 10-dB step (see Figure 4-2).

h. Adjust VERTICAL GAIN to place maximum signal amplitude exactly on LOG REF (top) graticule line (Figure 4-2). Repeat steps g and h to obtain optimum adjustment of VERTICAL GAIN (increments as close to one division per 10 dB step as possible).

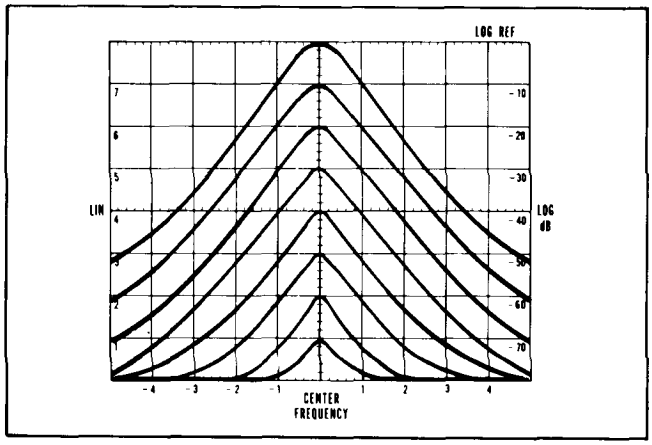


Figure 4-2. Vertical Gain Adjustment

4-18. Ampl. Cal Adjustment RF Section

a. Set the LOG REF LEVEL controls to -30 dBm (-30 +0).

b. Adjust AMPL CAL so that the signal amplitude (-30 dBm) is exactly on the LOG REF (top) graticule line of the CRT.

The analyzer is now calibrated in the LOG display mode.

4-19. Ampl Cal Check for Linear Sensitivity Accuracy

4-20. In the LINEAR display mode the vertical display is calibrated in absolute voltage. For LINEAR measurements the LIN scale factors on the left side of the CRT and the blue color-coded scales of the LINEAR SENSITIVITY controls are used. The signal voltage is the product (note lighted "x" lamp) of the CRT deflection and LINEAR SENSITIVITY control settings. It is usually most convenient to normalize the LINEAR SENSITIVITY vernier by setting it to "1" (blue scale).

a. Set the LOG-LINEAR switch to LINEAR. Set LINEAR SENSITIVITY to 1 mV/div (1 mV x 1). Since the −30 dBm calibrator output is ≅7.1 mV (across 50 ohms), the CRT deflection should be ≅7.1 divisions.

NOTE

For standard options H01/H02 the CRT deflection should be ≈8.7 mV across 75 ohms.

b. Adjust AMPL CAL on RF Section for a ≅7.1 div CRT deflection, if necessary. (LINEAR display is more expanded than the compressed LOG display, so adjustment of the AMPL CAL control can be made with more resolution in LINEAR without noticeable effect on the LOG calibration.)

The analyzer is now calibrated for both the LOG and LIN display modes.

4-21. Set controls as follows:

SCAN WIDTH	0—100 MHz
SCAN WIDTH PER DIVISION	10 MHz
BANDWIDTH	10 kHz
LOG·LINEAR	10 dB LOG
LOG REF LEVEL	-10 dBm
TUNING STABILIZER	On

Perform tests in Table 4-1, Front Panel Checks.

NOTE

Make NO Front Panel adjustments with LOG·LINEAR set to 2 dB LOG.

Table 4-1. Front Panel Checks

Function	Procedure	Result
Base Line Clipper	1. Turn BASE LINE CLIPPER cw. 2. Return clipper to ccw.	1. At least the bottom 2 divisions should blank.
Scan	3. Tune SCAN TIME across its range. 4. Return to 5 ms/div.	3. Scan should occur in all positions.
Scan Width	5. Turn SCAN WIDTH to PER DIVISION. 6. Center CAL OUTPUT signal on display. 7. Reduce SCAN WIDTH PER DIVISION to 20 kHz; use FINE TUNE to center display.	5. 30 MHz signal and harmonics visible. DISPLAY UNCAL light comes on. 7. Signal remains on-screen, centered.
Phase Lock	8. With TUNING STABILIZER on, slowly turn the FREQUENCY control. 9. Turn TUNING STABILIZER to OFF; use FREQUENCY to center display. 10. Turn TUNING STABILIZER on, use FINE TUNE to center display.	8. Signal jumps to left or right hand edges of CRT (±100 kHz). This corresponds to the 100 kHz reference oscillator in the automatic phase control circuit. 9. Signal should tune continuously. 10. Signal should not jump 100 kHz.
Bandwidth and Display Uncal Light	11. Reduce BANDWIDTH, SCAN TIME PER DIVISION, and SCAN WIDTH PER DIVISION, using FINE TUNE to center display. 12. Return BANDWIDTH to 10 kHz, SCAN WIDTH PER DIVISION to 20 kHz and SCAN TIME PER DIVISION to 5 MILLISECONDS.	11. Display should be stable, and viewable as long as DISPLAY UNCAL is unlit.
Calibration	13. Lit index light on LOG REF LEVEL· LINEAR SENSITIVITY corresponds to top line of graticule; with input attenuation at 20 dB and LOG REF LEVEL at -10 dBm, signal level is -30 dBm.	13. Calibrator signal is -30 dBm level (2 divisions down from top of graticule).
Gain Vernier	14. Turn LOG REF LEVEL·LINEAR SENSITIVITY vernier cw.	14. Signal level increases by amount marked on vernier dial.
Attenuators	15. Turn INPUT ATTENUATION and LOG REF LEVEL·LINEAR SENSITIVITY in 10 dB steps.	15. Signal increases or decreases one vertical division per 10 dB step.

PERFORMANCE TESTS

4-23. Calibrator Output

SPECIFICATION:
Amplitude: -30 dBm ±0.3 dB
Frequency: 30 MHz ±3 kHz

DESCRIPTION: The Calibrator's amplitude accuracy is checked by comparing the 30 MHz fundamental signal with a source of known accuracy. The frequency is checked by amplifying the signal and measuring it with a frequency counter.

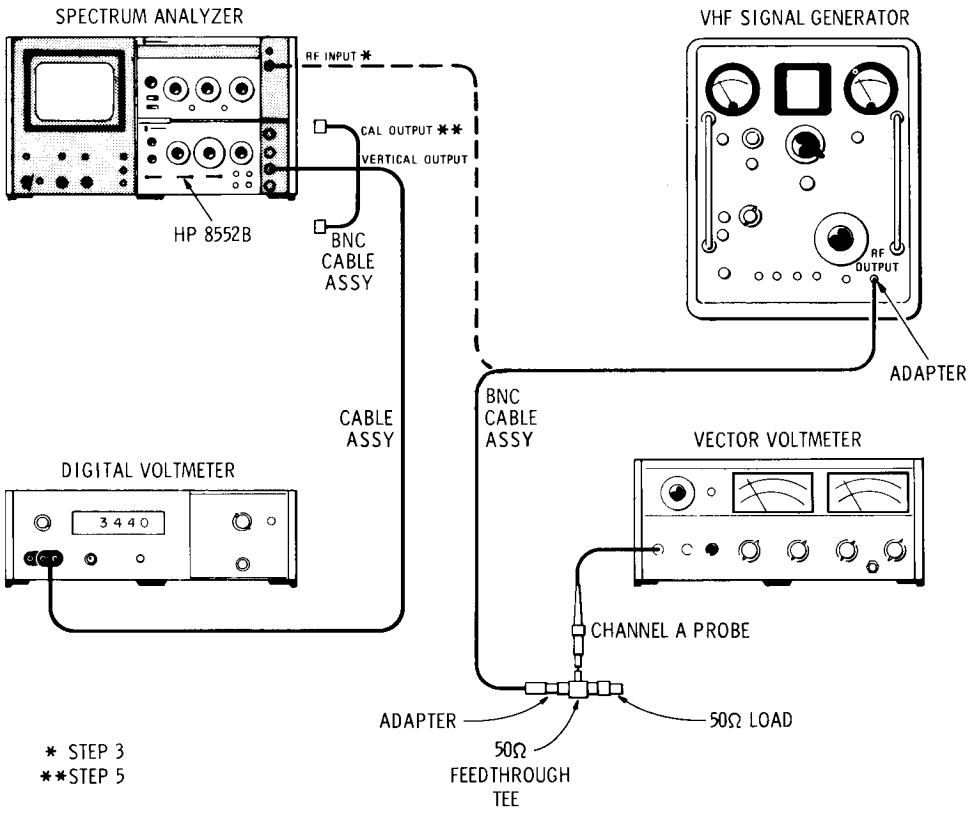


Figure 4-3. Calibrator Amplitude Test Setup

EQUIPMENT:

SIGNAL GENERATOR	HP 608F
CABLE ASSEMBLY (2)	HP 10503A
CABLE ASSEMBLY	HP 11001A
50-OHM TEE	HP 11536A
ADAPTER (2)	UG-201A/U
50-OHM TERMINATION	HP 908A
AMPLIFIER	HP 8447A
FREQUENCY COUNTER	HP 5245L
VECTOR VOLTMETER	HP 8405A
DIGITAL VOLTMETER	HP 3440A/3443A

PERFORMANCE TESTS

4-23. Calibrator Output (cont'd)

1. Connect the equipment as shown in Figure 4-3 and make the following settings:

ANALYZER:

RANGE MHz	0—110
FREQUENCY	30 MHz
BANDWIDTH	300 kHz
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	1 MHz
INPUT ATTENUATION	10 dB
SCAN TIME PER DIVISION	5 MILLISECONDS
LOG·LINEAR	LINEAR
LINEAR SENSITIVITY	1 mV/DIV
VIDEO FILTER	OFF
SCAN MODE	INT
SCAN TRIGGER	AUTO

8405A:

FREQ. RANGE — MC	20—40
CHANNEL	A
AMPLITUDE RANGE — dB	-30

608F:

FREQUENCY RANGE	B
MEGACYCLES	30
MODULATION	CW
ATTENUATION	-30 dBm

3440A:

RANGE	AUTO

2. Use signal generator ATTENUATOR VERNIER to set generator amplitude to exactly -30 dBm (7.22 mV for Options H01/H02) as read on vector voltmeter.

3. Disconnect the signal generator from the vector voltmeter; connect signal generator to analyzer RF INPUT. Center the signal on the CRT display with analyzer FREQUENCY control.

4. Set SCAN WIDTH to ZERO and peak the trace with analyzer FREQUENCY control. Use analyzer LINEAR SENSITIVITY vernier to set signal level (as read on digital voltmeter) to 700 ±0.4 mV. Do not change LINEAR SENSITIVITY vernier during remainder of check.

5. Disconnect the signal generator from RF INPUT and connect CAL OUTPUT to RF INPUT. Peak trace with FREQUENCY control. Signal level (as read on digital voltmeter) should be between 670 and 731 mV (±0.3 dB):

670 _____ 731 mV

PERFORMANCE TESTS

4-23. Calibrator Output (cont'd)

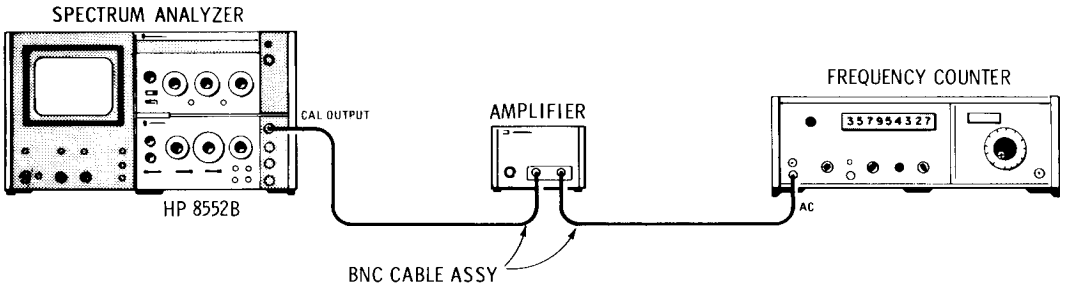


Figure 4-4. Calibrator Frequency Check Test Setup

6. Connect the equipment as shown in Figure 4-4 and make the following settings:

HP 5245L:

SAMPLE RATE	9 o'clock
TIME BASE	1s
FUNCTION	FREQUENCY

7. Read CAL OUTPUT on the frequency counter, 30 MHz ± 3 kHz.

29.997_____30.003 MHz

4-24. Bandwidth Accuracy

SPECIFICATION: Individual IF bandwidth 3 dB points calibrated to ±20% (10 kHz bandwidth ±5%).

DESCRIPTION: While observing a signal on the CRT display, all bandwidths except 10 kHz are verified by measuring the half-power points of the signal. The 10 kHz bandwidth is measured by using a frequency counter to monitor the input signal generator frequency as it is tuned between the IF filter half-power points.

EQUIPMENT:

SIGNAL GENERATOR	HP 608F
FREQUENCY COUNTER	HP 5245L
CABLE ASSEMBLY (2)	HP 10503A
ADAPTER	UG-201A/U

1. Make the following analyzer control settings:

RANGE — MHz	0—110
FREQUENCY	30 MHz
BANDWIDTH	300 kHz
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	.05 MHz
INPUT ATTENUATION	10 dB
SCAN TIME PER DIVISION	5 MILLISECONDS
TUNING STABILIZER	On
BASE LINE CLIPPER	Max ccw
LOG·LINEAR	LINEAR

PERFORMANCE TESTS

4-24. Bandwidth Accuracy (cont'd)

Analyzer control settings (cont'd)

LINEAR SENSITIVITY . . . . . 2 mV/Div
VIDEO FILTER . . . . . 10 kHz
SCAN MODE . . . . . INT
SCAN TRIGGER . . . . . AUTO

2. Connect CAL OUTPUT to RF INPUT.

3. Use LINEAR SENSITIVITY vernier control to adjust for 5.7 divisions signal amplitude.

4. Measure the bandwidth at the half-power points at the 4.0 division line. Bandwidth should be 300 ±60 kHz (4.8 to 7.2 divisions).

4.8_____7.2 div

NOTE

The bandwidth checks (Table 4-2), assume the use of the 8553B RF Section and 141T Display Section. With other RF Sections, some bandwidths aren't used; on bandwidths that are used it may be impossible to achieve the resolution needed to take the reading.

5. Repeat steps 3 and 4 to measure the bandwidths listed in Table 4-2, and set the controls as indicated in the table. (When checking .03 and .01 kHz bandwidths: set SCAN MODE to SINGLE, PERSISTENCE to MAX and push single scan button. When finished, set SCAN MODE to INT, PERSISTENCE to MIN.)

Table 4-2. Bandwidth Checks

BANDWIDTH	SCAN WIDTH PER DIVISION	SCAN TIME PER DIVISION	3 dB Bandwidth
100 kHz	20 kHz	5 MILLISECONDS	4.0_____6.0 div
30 kHz	5 kHz	5 MILLISECONDS	4.8_____7.2 div
3 kHz	0.5 kHz	10 MILLISECONDS	4.8_____7.2 div
1 kHz	0.2 kHz	10 MILLISECONDS	4.0_____6.0 div
0.3 kHz	.05 kHz	10 MILLISECONDS	4.8_____7.2 div
0.1 kHz	.02 kHz	0.2 SECONDS	4.0_____6.0 div
.03 kHz	.02 kHz	1 SECONDS	1.2_____1.8 div
.01 kHz	.02 kHz	1 SECONDS	0.4_____0.6 div

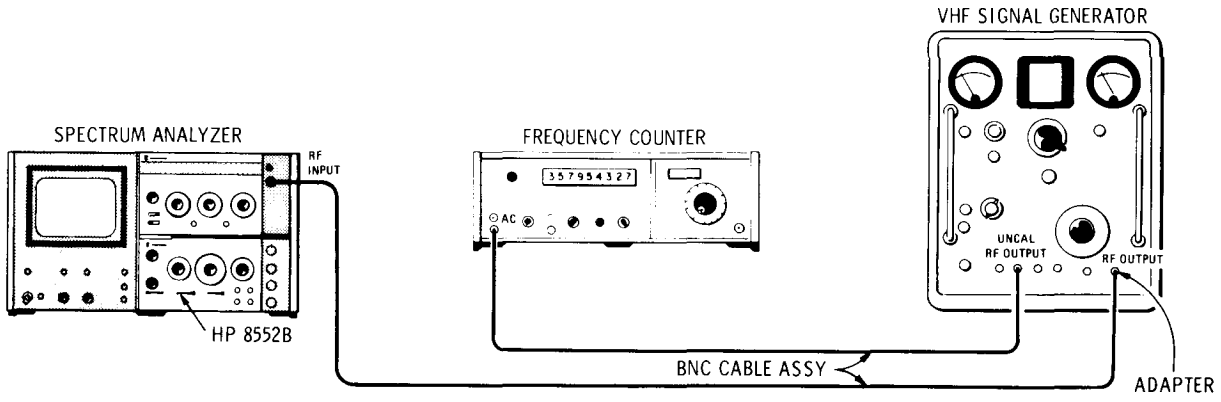


Figure 4-5. 10 kHz Bandwidth Accuracy Test Setup

PERFORMANCE TESTS

4-24. Bandwidth Accuracy (cont'd)

6. To check the 10 kHz bandwidth, connect the test setup shown in Figure 4-5 and make the following control settings.

ANALYZER:
- BANDWIDTH . . . . . 10 kHz
- SCAN WIDTH PER DIVISION . . . . . .0.05 MHz
- SCAN TIME PER DIVISION . . . . . 5 MILLISECONDS
- TUNING STABILIZER . . . . . On

608F:
- MEGACYCLES 30
- ATTENUATION . . . . . -30 dBm
- MODULATION . . . . . CW
- FREQUENCY RANGE . . . . . B
- RF OUTPUT . . . . . +7 (on meter)

5245L:
- SENSITIVITY (VOLTS RMS) 0.1
- FUNCTION . . . . . FREQUENCY

7. Fine adjust the signal generator frequency to center the 30 MHz signal on the CRT display.

8. Using FINE TUNE to keep the display centered, reduce SCAN WIDTH PER DIVISION to 20 kHz. Set SCAN WIDTH to ZERO scan. Set VIDEO FILTER to 10 Hz.

9. Peak the signal using FINE TUNE and adjust LINEAR SENSITIVITY Vernier control for a 7.1 division display.

NOTE
Steps 10 and 11 check upper and lower 3 dB points.

10. Decrease HP 608F frequency until the base line drops to the 5.0 division line. Record the signal generator frequency as read from the HP 5245L Frequency Counter.

_____ MHz

11. Increase HP 608F frequency until the base line peaks and then drops to the 5.0 division line. Record the signal generator frequency.

_____MHz

12. The difference in the readings of steps 10 and 11 equals the half-power bandwidth. The bandwidth should be 10 ±0.5 kHz.

9.5_____10.5 kHz

4-25. Bandwidth Selectivity

SPECIFICATION:
- 60 dB/3 dB IF bandwidth ratio <20:1 for IF bandwidths from 10 kHz to 300 kHz.
- 60 dB/3 dB IF bandwidth ratio <11:1 for IF bandwidths from 10 Hz to 3 kHz.
- 60 dB points separated by <100 Hz for 10 Hz bandwidth.

DESCRIPTION: Bandwidth selectivity is verified by observing the CAL OUTPUT signal in the LOG mode on the CRT and measuring the bandwidth at the -60 dB points using the analyzer's calibrated scan widths. The ratio of this bandwidth to the 3 dB bandwidths defines the analyzer selectivity.

PERFORMANCE TESTS

4-25. Bandwidth Selectivity (cont'd)

1. Connect CAL OUTPUT to RF INPUT and make the following control settings:

ANALYZER:

RANGE - MHz	0–110
FREQUENCY	30 MHz
BANDWIDTH	300 kHz
INPUT ATTENUATION	0 dB
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	1 MHz
SCAN TIME PER DIVISION	50 MILLISECONDS
LOG·LINEAR	10 dB LOG
LOG REF LEVEL	20 dBm
BASE LINE CLIPPER	Max ccw
TUNING STABILIZER	On
VIDEO FILTER	100 Hz
SCAN MODE	INT
SCAN TRIGGER	AUTO

2. Tune FREQUENCY to center the CAL OUTPUT signal on the CRT display; adjust LOG REF LEVEL Vernier to peak the signal on the top graticule line.

3. Compute the bandwidth at the –60 dB graticule line (SCAN WIDTH PER DIVISION setting times the number of divisions separating the signal's slopes). Compute the 60 dB/3 dB IF bandwidth ratio using the 3 dB bandwidth found in Paragraph 4-24.

$$\frac{\text{60 dB bandwidth}}{\text{3 dB bandwidth}} < \frac{20}{1}$$

_____ 20:1

NOTE

If the DISPLAY UNCAL lamp is illuminated in any of the steps shown in table 4-3, it may be disregarded.

4. To check the remaining BANDWIDTH settings, refer to Table 4-3 for control settings and test limits. Compute the 60 dB/3 dB IF bandwidth ratios using the 3 dB bandwidths found in Table 4-2. (When checking 0.03 and 0.01 bandwidths, set SCAN MODE to INT, PERSISTENCE to MIN.)

Table 4-3. Bandwidth Selectivity Checks

BANDWIDTH	SCAN WIDTH PER DIVISION	SCAN TIME PER DIVISION	60 dB BANDWIDTH DIVISIONS	RATIO FREQUENCY 60 dB/3 dB BANDWIDTHS
100 kHz	0.5 MHz	50 MILLISECONDS	_____	_____
30 kHz	0.1 MHz	50 MILLISECONDS	_____	_____
10 kHz	0.05 MHz	50 MILLISECONDS	_____	_____
3 kHz	5 kHz	50 MILLISECONDS	_____	_____
1 kHz	2 kHz	0.1 SECONDS	_____	_____
0.3 kHz	0.5 kHz	0.2 SECONDS	_____	_____
0.1 kHz	0.2 kHz	0.2 SECONDS	_____	_____
.03 kHz	0.05 kHz	0.2 SECONDS	_____	_____
.01 kHz*	0.02 kHz	0.5 SECONDS	_____	_____

*10 Hz 60 dB bandwidth must be less than the 11:1 ratio and the 60 dB points separated by less than 100 Hz.

PERFORMANCE TESTS

4-26. Switching Between Bandwidths Accuracy

SPECIFICATION: At 20°C,	Log	Linear
0.1 – 300 kHz	±0.5 dB	±5.8%
0.03 – 300 kHz	±1.0 dB	±12.0%
0.01 – 300 kHz	±1.5 dB	±19.0%

DESCRIPTION: Relative bandwidth amplitude accuracy is verified by observing the amplitude of the CAL OUTPUT signal while switching IF bandwidths. The display is observed in the LINEAR mode for best amplitude resolution.

1. Connect CAL OUTPUT to RF INPUT and set analyzer controls as follows:

RANGE — MHz	0—110
FREQUENCY	30 MHz
FINE TUNE	Centered
BANDWIDTH	300 kHz
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	0.5 MHz
INPUT ATTENUATION	10 dB
SCAN TIME PER DIVISION	5 MILLISECONDS
BASE LINE CLIPPER	Max ccw
LOG·LINEAR	LINEAR
LINEAR SENSITIVITY	2 mV/DIV
TUNING STABILIZER	On
VIDEO FILTER	10 kHz
SCAN MODE	INT
SCAN TRIGGER	AUTO

2. Adjust FREQUENCY to center CAL OUTPUT signal on CRT.

3. Set LINEAR SENSITIVITY controls for a 7.0 division display; set SCAN TIME PER DIVISION to 0.2 SECONDS, SCAN WIDTH PER DIVISION to .05 MHz.

4. Progressively switch BANDWIDTH from 300 kHz through 1 kHz. Note the signal amplitude at each BANDWIDTH setting.

NOTE

Steps 5 and 6 require use of a 141 type variable persistence Display Section.

5. Set SCAN WIDTH to .05 kHz; set SCAN TIME PER DIVISION to 1 SECOND.

6. Progressively switch BANDWIDTH from 0.3 kHz to 0.01 kHz. Again note the signal amplitude at each BANDWIDTH setting. The maximum deviation between any two bandwidths (100 Hz to 300 kHz) should be less than 0.8 division. The maximum deviation between any two bandwidths (30 Hz to 300 kHz) should be less than 1.6 division. The maximum deviation between any two bandwidths (10 Hz to 300 kHz) should be less than 2.6 division.

100 Hz to 300 kHz:	0.8 div
30 Hz to 300 kHz:	1.6 div
10 Hz to 300 kHz:	2.6 div

PERFORMANCE TESTS

4-27. Amplitude Display Accuracy

SPECIFICATION:
±0.25 dB/dB but not more than ±1.5 dB over the full 70 dB display range.

DESCRIPTION: A full eight division signal is displayed on the CRT in the LOG mode. The LOG REF LEVEL is then changed 70 dB in 10 dB steps. The error of the CRT display is measured at each step. It is assumed that the IF Section Display Adjustments in Paragraph 4-17 have been performed.

1. Connect CAL OUTPUT to RF INPUT.

2. Set Analyzer controls as follows:

RANGE — MHz	0—110
FREQUENCY	30 MHz
FINE TUNE	Centered
BANDWIDTH	100 kHz
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	0.5 MHz
INPUT ATTENUATION	20 dB
SCAN TIME PER DIVISION	5 MILLISECONDS
BASE LINE CLIPPER	Max ccw
LOG·LINEAR	10 dB LOG
LOG REF LEVEL	-20 dBm
VIDEO FILTER	OFF
SCAN MODE	INT
SCAN TRIGGER	AUTO

3. Adjust FREQUENCY to center the 30 MHz CAL signal on the CRT display and adjust LOG REF LEVEL Vernier for a full eight division vertical display.

4. Change the LOG REF LEVEL to reduce the displayed signal amplitude 10 dB. Signal amplitude should be seven divisions ±0.15 division.

6.85_____7.15 div

5. Change the LOG REF LEVEL to reduce the signal amplitude in 10 dB steps to verify the entire 70 dB display range.

a.	-20 dB	5.85_____6.15 div	d.	-50 dB	2.85_____3.15 div
b.	-30 dB	4.85_____5.15 div	e.	-60 dB	1.85_____2.15 div
c.	-40 dB	3.85_____4.15 div	f.	-70 dB	0.85_____1.15 div

PERFORMANCE TESTS

4-28. Scan Time Accuracy

SPECIFICATION:
0.1 ms/div up to 20 ms/div ±10%.
50 ms/div to 10s/div ±20%.

DESCRIPTION: A sine wave modulated RF signal is connected to the RF INPUT. The demodulated signal is displayed on the analyzer CRT and its peaks aligned with the CRT graticule by adjusting the modulation frequency. Scan time is verified by measuring the period average of the modulation signal using a frequency counter.

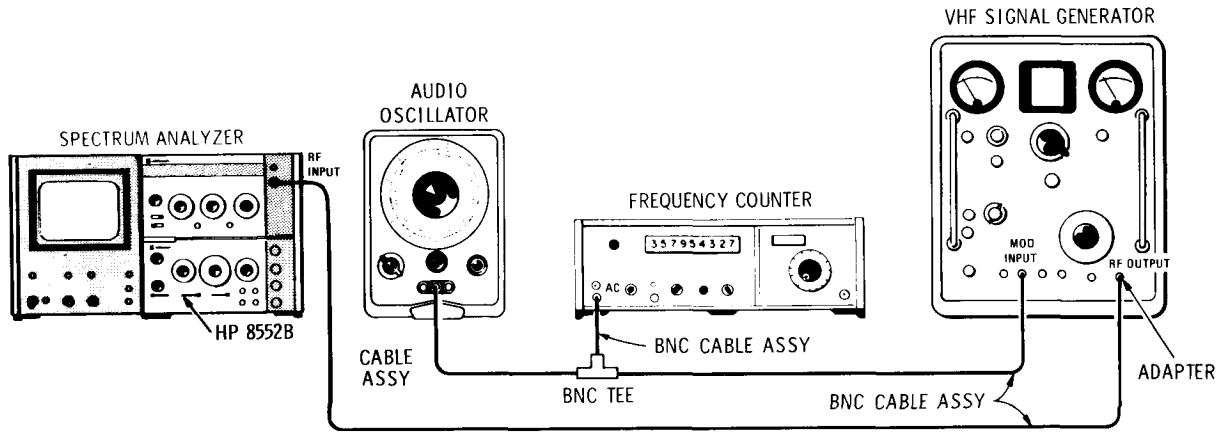


Figure 4-6. Scan Time Accuracy Test Setup

EQUIPMENT:

FREQUENCY COUNTER	HP 5245L
AUDIO OSCILLATOR	HP 200CD
SIGNAL GENERATOR	HP 608F
CABLE ASSEMBLY (3)	HP 10503A
CABLE ASSEMBLY	HP 11001A
BNC Tee	UG-274B/U
ADAPTER	UG-201A/U

1. Connect the test setup in Figure 4-6 and make the following control settings:

ANALYZER:

RANGE — MHz	0—110
FREQUENCY	30 MHz
FINE TUNE	Centered
BANDWIDTH	300 kHz
SCAN WIDTH	ZERO
INPUT ATTENUATION	10 dB
SCAN TIME PER DIVISION	2 MILLISECONDS
BASE LINE CLIPPER	Max ccw
LOG·LINEAR	LINEAR
LINEAR SENSITIVITY	1 mV/DIV
VIDEO FILTER	10 kHz
SCAN MODE	INT
SCAN TRIGGER	VIDEO

PERFORMANCE TESTS

4-28. Scan Time Accuracy (cont'd)

608F:
MEGACYCLES 30
ATTENUATION . . . . . -40 dBm
MODULATION . . . . . EXT AM
FREQUENCY RANGE . . . . . B

5245L:
SENSITIVITY (VOLTS RMS) 0.1
FUNCTION . . . . . PERIOD AVERAGE -(10)
TIME BASE . . . . . 10 μs

200CD:
RANGE X100
Frequency Dial 5

2. Adjust the HP 200CD AMPLITUDE for 90% modulation as indicated on the HP 608F panel meter.
3. Fine tune the HP 608F Signal Generator for maximum signal indication of the analyzer CRT. Adjust LINEAR SENSITIVITY Vernier control for a convenient display height.
4. Position the first modulation peak directly on the -5 graticule line by adjusting the HORIZONTAL POSITION control.
5. Adjust the audio oscillator modulation frequency to align the tenth modulation peak with the +4 graticule line (see Figure 4-7). Total scan time is read on the HP 5245L and should be 2.0 ±0.2 ms.
   1.8_____2.2 ms
6. Repeat steps 4 and 5 to verify the SCAN TIME PER DIVISION positions as listed in Table 4-4. The approximate HP 200CD frequency settings and HP 5245L PERIOD AVERAGE tolerances are also contained in Table 4-4.

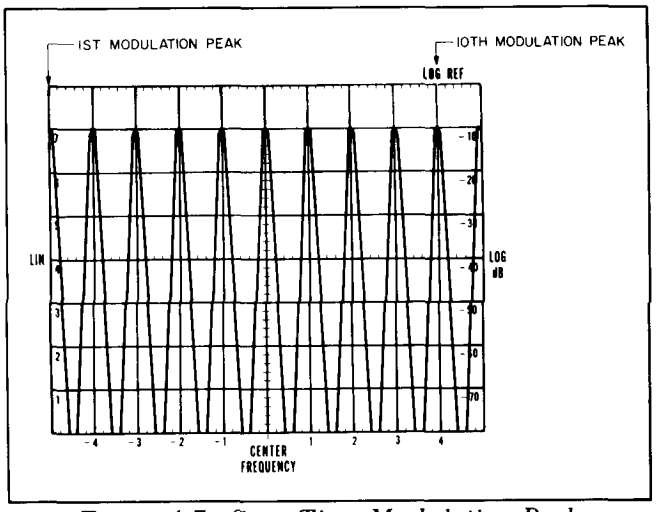


Figure 4-7. Scan Time Modulation Peaks

Table 4-4. Modulation Frequencies for Checking Scan Time

SCAN TIME PER DIVISION	HP 200CD Frequency	Scan Time
0.1 MILLISECONDS	10 kHz	90 _____ 110 μs
0.2 MILLISECONDS	5 kHz	180 _____ 220 μs
0.5 MILLISECONDS	2 kHz	450 _____ 550 μs
1 MILLISECOND	1 kHz	0.9 _____ 1.1 ms
2 MILLISECONDS	500 Hz	1.8 _____ 2.2 ms
5 MILLISECONDS	200 Hz	4.5 _____ 5.5 ms
10 MILLISECONDS	100 Hz	9.0 _____ 11.0 ms
20 MILLISECONDS	50 Hz	18.0 _____ 22.0 ms
50 MILLISECONDS	20 Hz	40.0 _____ 60.0 ms
0.1 SECONDS	10 Hz	80.0 _____ 120.0 ms
0.2 SECONDS	5 Hz	160 _____ 240.0 ms

Table 4-5. Performance Check Test Record

Hewlett-Packard Model 8552B
Spectrum Analyzer IF Section
Serial No._____-_____

Test Performed by:_____
Date: _____

Para. No.	Test Description	Measurement Unit	Min	Actual	Max
4-23	**Calibrator Output**				
	Amplitude: -30 dBm ±0.3 dB	millivolts	676	_____	724
	Frequency: 30 MHz, ±3 kHz	MHz	29.997	_____	30.003
4-24	**Bandwidth Accuracy**				
	Bandwidths: ±20% 10 kHz Bandwidth: ±5%				
	300 kHz Bandwidth	divisions		_____	7.2
	100 kHz Bandwidth	divisions		_____	6.0
	30 kHz Bandwidth	divisions		_____	7.2
	10 kHz Bandwidth	kHz		_____	10.5
	3 kHz Bandwidth	divisions		_____	7.2
	1 kHz Bandwidth	divisions		_____	6.0
	.3 kHz Bandwidth	divisions		_____	7.2
	.1 kHz Bandwidth	divisions		_____	6.0
	.03 kHz Bandwidth	divisions		_____	1.8
	.01 kHz Bandwidth	divisions		_____	0.6
4-25	**Bandwidth Selectivity**				
	Bandwidths	ratio		_____	20:1
	300 kHz	ratio		_____	20:1
	100 kHz	ratio		_____	20:1
	30 kHz	ratio		_____	20:1
	10 kHz	ratio		_____	20:1
	1 kHz	ratio		_____	11:1
	0.3 kHz	ratio		_____	11:1
	0.1 kHz	ratio		_____	11:1
	0.03 kHz	ratio		_____	11:1
	0.01 kHz	ratio		_____	11:1
	0.01 kHz	Hz		_____	100
4-26	**Switching Between Bandwidths**				
	±0.5 dB 100 Hz to 300 kHz	divisions		_____	0.8
	±1.0 dB 30 Hz to 300 kHz	divisions		_____	1.6
	±1.5 dB 10 Hz to 300 kHz	divisions		_____	2.6
4-27	**Amplitude Display**				
	Accuracy at -10 dB: ±.15 dB	divisions	6.85	_____	7.15
	-20 dB: ±.15 dB	divisions	5.85	_____	6.15
	-30 dB: ±.15 dB	divisions	4.85	_____	5.15
	-40 dB: ±.15 dB	divisions	3.85	_____	4.15
	-50 dB: ±.15 dB	divisions	2.85	_____	3.15
	-60 dB: ±.15 dB	divisions	1.85	_____	2.15
	-70 dB: ±.15 dB	divisions	0.85	_____	1.15

Table 4-5. Performance Check Test Record (cont'd)

Para. No.	Test Description	Measurement Unit	Min	Actual	Max
4-28	**Scan Time**				
	Accuracy at 0.1 MILLISECONDS	μs	90	_____	110
	0.2 MILLISECONDS	μs	180	_____	220
	0.5 MILLISECONDS	μs	450	_____	550
	1 MILLISECONDS	ms	0.9	_____	1.1
	2 MILLISECONDS	ms	1.8	_____	2.2
	5 MILLISECONDS	ms	4.5	_____	5.5
	10 MILLISECONDS	ms	9.0	_____	11.0
	20 MILLISECONDS	ms	18.0	_____	22.0
	50 MILLISECONDS	ms	40.0	_____	60.0
	0.1 SECONDS	ms	80	_____	120
	0.2 SECONDS	ms	160	_____	240

SECTION V
ADJUSTMENTS

5-1. INTRODUCTION

5-2. This section describes adjustments and checks required to return the analyzer IF section to peak operating condition when repairs are required. Included in this section are test setups, procedures, and tips about tools and test equipment. Adjustment location photographs are located on fold-outs at the back of the manual. A test record for recording data taken during adjustment procedures is included at the end of this section. The analyzer must warm up one hour before any adjustments are attempted.

5-3. EQUIPMENT REQUIRED

5-4. A complete list of test equipment and a list of accessories are contained in Table 1-2. In addition, each test procedure contains a list of test equipment and identifies all test equipment and accessories by call-outs. Any equipment substituted for the instruments or accessories listed must meet the minimum specifications in order to calibrate the analyzer.

5-5. Posidriv Screwdrivers

5-6. Many screws in the instrument appear to be Phillips, but are not. The table of accessories gives the name and number of the Posidriv screwdrivers designed to fit these screws. To avoid damage to the screw slots, the Posidriv screwdrivers should be used.

5-7. Slug Tuning Tools

5-8. Use HP 8710-1010 and HP 8710-0957 tuning tools for tuning the slugs in the ferrite inductors in the IF Section. No other tools should be used for this purpose.

5-9. Blade Tuning Tools

5-10. For adjustments requiring a nonmetallic metal-blade tuning tool, use the General Cement Model No. 5003 (HP 8730-0013). It may be necessary to cut away part of the plastic on the tuning blade end to use the tool on all the adjustments. In situations not requiring nonmetallic tuning tools, an ordinary small screwdriver or other suitable tool is sufficient. No matter what tool is used, never try to force any adjustment control in the analyzer. This is especially critical when tuning variable slug-tuned inductors and variable capacitors.

5-11. HP 11592A Service Kit

5-12. The HP 11592A Service Kit is an accessory item available from Hewlett-Packard for use in maintaining the spectrum analyzer. No attempt to adjust the analyzer should be made unless the user has the service kit. The kit can be obtained by contacting your nearest Hewlett-Packard Sales and Service office. A list of HP field offices is included at the back of this manual.

5-13. Table 1-2 contains a detailed description of the contents of the service kit. Any item in the kit may be ordered separately if desired. The wiring in the 11592-60015 Extender Assembly is especially critical and fabrication should not be attempted. Other items in the kit may be built if desired.

5-14. Extender Cable Installation

5-15. Plug-in Removal. Push the front panel latch in the direction indicated by the arrow until the latch disengages and pops out from the panel. Pull the plug-ins out of the instrument. Locate the black press-to-release button on the left side of the RF Section. Press the button and firmly pull the two sections apart.

5-16. When the two sections separate at the front panel, raise the upper section until it is above the lower section by two or three inches at the front panel. Disengage the metal tab-slot connection at the rear of the plug-ins and separate the two sections.

5-17. Plug-In Cover Removal

5-18. Remove the bottom cover from the IF Section. Do not remove the shield covers from the A1/A12, A13 and A8 assemblies in the IF Section until those assemblies are to be adjusted.

WARNING

"Some of the maintenance and servicing operations described herein are performed with power supplied to the instrument while protective covers are removed. Be careful when performing these operations. Line voltage is always present on terminals including the power input connector, fuse holder, power switch, etc. In addition, when the in-

strument is on, energy available at many points may result in personal injury or death when contacted."

5-19. Extender Connections

5-20. Place the plate end of the HP 11592-60015 Extender Assembly in the display section and press firmly into place so that both plugs make contact. The plate and plugs cannot be installed upside down as the plate has two holes corresponding to two guide rods in the mainframe.

5-21. Connect the upper cable plug to the RF Section and the lower cable plug to the IF Section. The plugs are keyed so that they will go on correctly and will not make contact upside down. Connect the HP 11592-60016 Interconnection Cable Assembly between the RF and IF Sections. The connectors are keyed by the shape of the plug and the arrangement of the pins. Press the connectors firmly together and extend the instrument sections as far apart as the cables will allow without putting stress on the connectors.

5-22. FACTORY SELECTED COMPONENTS

5-23. Table 5-4 contains a list of factory selected components by reference designation, basis of selection, and schematic diagram location on which the component is illustrated. Factory selected components are designated by an asterisk (*) on the schematic diagrams in Section VIII of this manual.

5-24. RELATED ADJUSTMENTS

5-25. The adjustment procedures are arranged in numerical order. Many adjustments are directly related to preceding or following ones. The following sets of adjustments are related, and if one adjustment in the set is made, the other procedures in that set should be checked or adjusted.

Power Supply Checks and Adjustments (para. 5-27).

Scan Circuits

1. Horizontal Scan Checks and Adjustments (para. 5-28).
2. Final Scan Checks (para. 5-29).

Log/Linear Amplifier Circuits

1. Vertical Deflection Amplifier Checks (para. 5-30).
2. Log/Linear Amplifier Checks and Adjustments (para. 5-31).

3 MHz IF Circuits

1. 300 kHz Bandpass Filter Adjustment (para. 5-32).
2. LC Filter Adjustments (para. 5-33).
3. Crystal Filter Fine Adjustment (para. 5-34).
4. 3 MHz IF Gain Adjustment (para. 5-36).

Converter Circuits

1. 47 MHz Local Oscillator Automatic Phase Lock Check and Adjustment (para. 5-37).
2. 50 MHz IF Bandpass Check and Adjustment (para. 5-38).
3. 44 MHz Rejection Adjustment (para. 5-39).

30 MHz Calibration Oscillator Check and Adjustment (para. 5-40).

Analogic Check and Adjustment (para. 5-41).

ADJUSTMENTS

5-26. CHECKS AND ADJUSTMENTS

5-27. Power Supply Check and Adjustment

REFERENCE: Schematic 19.

DESCRIPTION: The spectrum analyzer IF Section regulates power fed from the display section. These checks verify and validate the display section power supply voltages and the regulated voltages in the spectrum analyzer plug-ins.

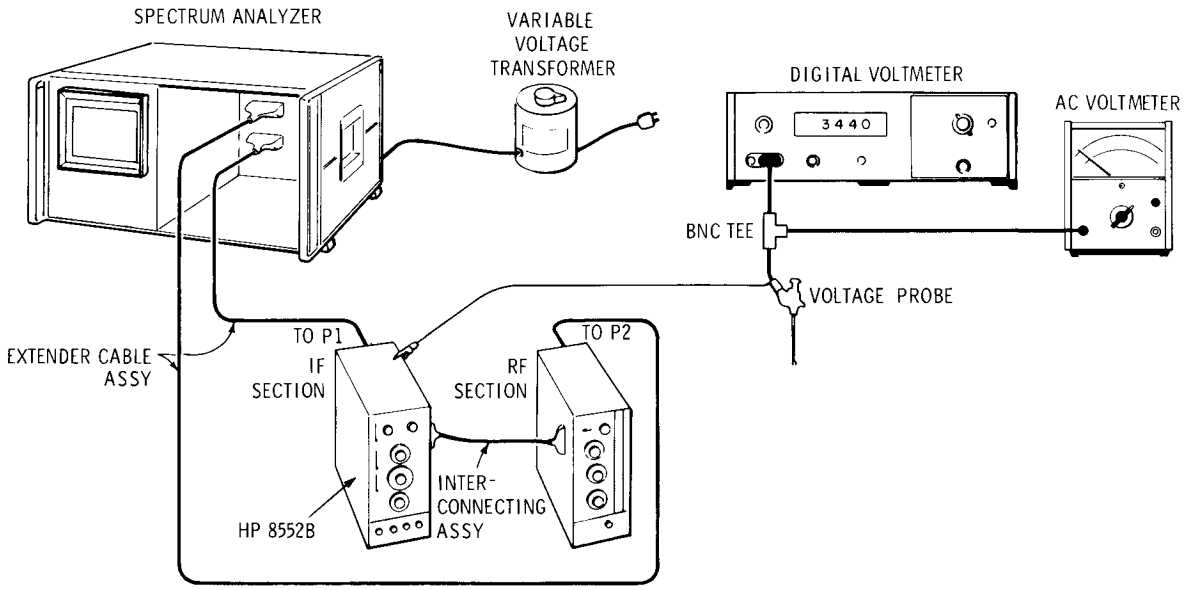


Figure 5-1. Power Supply Check and Adjustment Test Setup

EQUIPMENT:

EXTENDER ASSEMBLY	HP 11592-60015
DIGITAL VOLTMETER	HP 3440A/3443A
INTERCONNECTION ASSEMBLY	HP 11592-60016
STRAIGHT-THROUGH VOLTAGE PROBE	HP 10025A
VARIABLE VOLTAGE TRANSFORMER	W5MT3A
AC VOLTMETER	HP 400E
BNC TEE	UG-274 B/U

1. Connect the test setup shown in Figure 5-1. Measure the dc display voltages with the HP 3440A/3443A Digital Voltmeter while the analyzer plug-ins are installed on extender cables.

Test Point (to Chassis)	Wire Color	Voltage
P1-9	red	+250 ±3 Vdc
P1-4, P2-2	wht/red	+100 ±1 Vdc
P1-6, P2-6	vio	-100 ±1 Vdc
F1, F2	wht/vio	-12.6 ±1 Vdc

2. If the display section supplies need adjustment, refer to the manual provided with the display section for instructions.

ADJUSTMENTS

5-27. Power Supply Check and Adjustment (cont'd)

3. Connect the digital voltmeter to the IF Section XA5-11 (wht/blk/red lead, Figure 8-8) and measure +20 ±0.10 Vdc. Ripple should be < 0.5 mV rms. These tolerances should be maintained as the line voltage is varied between 103.5 Vac and 126.5 Vac using the variable voltage transformer.
   +19.90_____+20.10 Vdc

4. If the +20 Vdc supply is out of tolerance, adjust A5R16 +20V ADJ on the power supply assembly for +20V ± 0.1 Vdc.

5. Connect the digital and ac voltmeters to the IF Section XA5-8 (wht/blk/vio) and measure −10 ± 0.01 Vdc. Ripple should be <0.5 mV rms. These tolerances should be maintained as the line voltage is varied between 103.5 Vac and 126.5 Vac using the variable voltage transformer.
   −9.99 _____−10.01 Vdc

6. If the −10 Vdc supply is out of tolerance, adjust A5R32 −10V ADJ on the power supply assembly for −10V ±0.01 Vdc.

5-28. Horizontal Scan Check and Adjustment

REFERENCE: Schematic 15, 16.

DESCRIPTION: The SCAN OUT voltage is measured and pre-set in this procedure. The Final Scan Check (paragraph 5-29) is then performed. The SCAN OUT voltage waveform is observed and adjustments made, if necessary, to obtain the proper waveform.

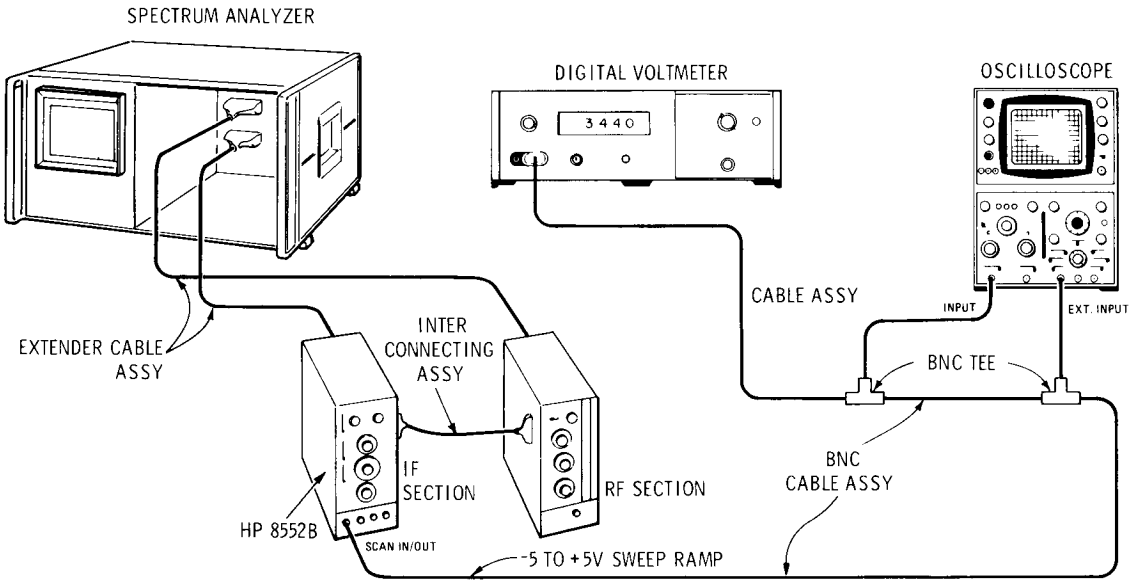


Figure 5-2. Scan Generator Check and Adjustment Test Setup

ADJUSTMENTS

5-28. Horizontal Scan Check and Adjustment (cont'd)

EQUIPMENT:

OSCILLOSCOPE	HP 180A/1801A/1821A
DIGITAL VOLTMETER	HP 3440/3443A
EXTENDER ASSEMBLY	HP 11592-60015
INTERCONNECTION ASSEMBLY	HP 11592-60016
BNC Tee (2)	UG-274B/U
CABLE ASSEMBLY (4)	HP 10503A
CABLE ASSEMBLY	HP 11001A

1. Connect the test setup shown in Figure 5-2 and make the following control settings:

ANALYZER:

BASE LINE CLIPPER	Max ccw
SCAN TIME PER DIVISION	5 MILLISECONDS
SCAN MODE	INT
SCAN TRIGGER	AUTO

180A/1801A/1821A:

HORIZONTAL SCALE	10 milliseconds/division
VERTICAL SENSITIVITY	2 volts/division
EXTERNAL TRIGGER	trigger on external dc signal

3440A/3443A:

SAMPLE RATE	9 o'clock
RANGE	AUTO

2. Synchronize the oscilloscope horizontal scan with the signal from the analyzer SCAN IN/OUT jack.
3. Observe and measure the SCAN IN/OUT waveform and compare it against the waveform shown in Figure 5-3. Rise time should be 54 ±4 milliseconds.
   50_____58 ms
4. If rise time of the scan voltage is out of tolerance, adjust A6R12 SCAN TIME control. Then proceed with the remainder of the scan generator adjustments given below.
5. Set the analyzer SCAN TRIGGER to EXT. Use the digital voltmeter to measure the dc voltage level at the SCAN IN/OUT jack. Voltage should be -5.0 ±0.02 Vdc.
   -4.98 _____-5.02 Vdc
6. If the voltage is out of tolerance, adjust A6R50 -5V ADJ control on the scan generator assembly.

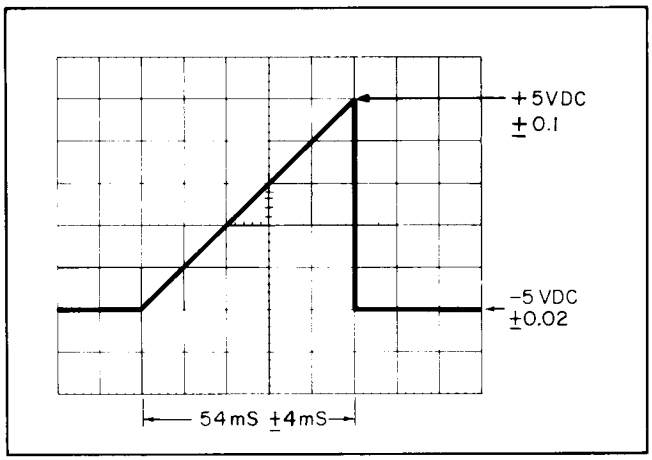


Figure 5-3. Scan Voltage Waveform Measurement

7. Turn the SCAN TIME PER DIVISION control to 10 SECONDS, SCAN MODE to SINGLE; push the SINGLE button. (Note: This requires 100 seconds to reach peak.)
8. Observe the SCAN IN/OUT voltage as the scan reaches the right-hand edge of the graticule. The highest reading should be +5.0 ±0.1 Vdc. Repeat this operation several times to make sure the voltage reading is correct.
   +4.9_____+5.1 Vdc
9. If the voltage is out of tolerance, adjust A6R46 SCAN AMPL control on the scan generator assembly and repeat steps 5 through 8 until both readings are correct.

ADJUSTMENTS

5-29. Final Scan Check

REFERENCE: Schematics 15, 16.

DESCRIPTION: A modulated RF signal is connected to the RF INPUT. The demodulated signal on the analyzer display is used to fine-adjust scan time circuits. Then, the operation of remaining scan circuits is checked. The analyzer's front panel calibration procedure (see paragraph 4-12) must be performed before these checks and adjustments are made.

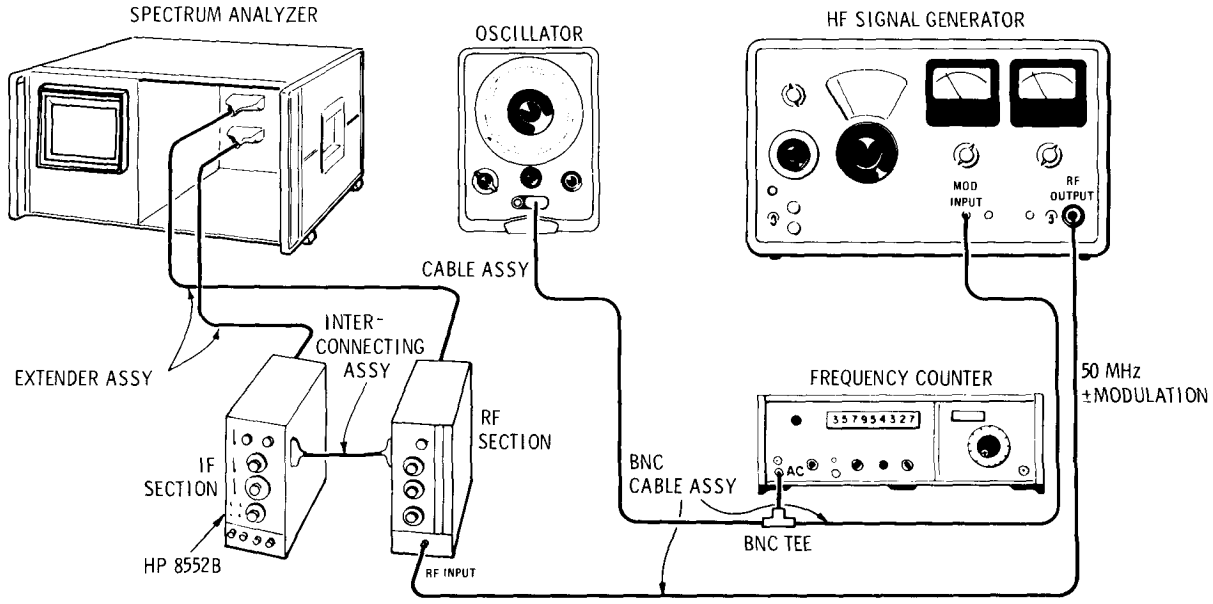


Figure 5-4. Final Scan Time Adjustment Test Setup

EQUIPMENT:

FREQUENCY COUNTER	HP 5245L
OSCILLATOR	HP 200CD
SIGNAL GENERATOR	HP 606B
CABLE ASSEMBLY (2)	HP 10503A
CABLE ASSEMBLY	HP 11001A
INTERCONNECTING ASSEMBLY	HP 11592-60016
EXTENDER ASSEMBLY	HP 11592-60015
BNC Tee	UG-274B/U

1. Connect the test setup shown in Figure 5-4 and make the following control settings:

ANALYZER:

FREQUENCY	50 MHz
FINE TUNE	Centered
BANDWIDTH	300 kHz
SCAN WIDTH	ZERO
INPUT ATTENUATION	0 dB
BASE LINE CLIPPER	Max ccw
SCAN TIME PER DIVISION	1 MILLISECOND
LINEAR SENSITIVITY	1 mV/DIV
LOG·LINEAR	LINEAR

ADJUSTMENTS

5-29. Final Scan Check (cont'd)

ANALYZER Control settings (cont'd)

VIDEO FILTER . . . . . 10 kHz
SCAN MODE . . . . . INT
SCAN TRIGGER . . . . . VIDEO

606B:

FREQUENCY . . . . . 30 MHz
ATTENUATOR (dBm) . . . . . -40
MODULATION SELECTOR . . . . . EXT DC
RANGE 6

5245L:

SENSITIVITY 0.1
FUNCTION . . . . . PERIOD AVERAGE - (10)
TIME BASE . . . . . 10 μs

2. Adjust the HP 200CD Audio Oscillator AMPLITUDE for 90 percent modulation as indicated on the HP 606B Signal Generator.

3. Fine tune the signal generator for maximum signal indication on the analyzer. Adjust LINEAR SENSITIVITY controls for a convenient display height.

4. Adjust the audio oscillator modulation frequency to give a 1.0 ms HP 5245L Period Average reading.

Table 5-1. Modulation Frequencies for Checking Scan Time

SCAN TIME PER DIVISION	HP 200CD Frequency	HP 5245L Period Average
1 MILLISECOND	≈ 1 kHz	1.0 ± 1 ms
5 MILLISECONDS	≈ 200 Hz	5.0 ±0.5 ms
10 MILLISECONDS	≈ 100 Hz	10.0 ± 1 ms
50 MILLISECONDS	≈ 20 Hz	50.0 ±10 ms
0.1 SECOND	≈ 10 Hz	100.0 ±20 ms

5. Position the first modulation peak directly on the -5 graticule line by adjusting the HORIZONTAL POSITION control.

6. If the tenth modulation peak does not align with the +4 graticule line, adjust the SCAN TIME control A6R12 on the Scan Generator Assembly (see Figure 4-7).

7. Check the scan time limits of the SCAN TIME PER DIVISION positions as listed in Table 5-1 by setting the first modulation peak in alignment with the -5 graticule line. Then align the tenth modulation peak with +4 graticule line by slightly changing, if necessary, the modulation frequency from the audio oscillator (one peak per division). The HP 5245L Period Average readings should be within the tolerances as listed in Table 5-1. If they are not, readjust A6R12 SCAN TIME for the best compromise at all SCAN TIME PER DIVISION settings.

8. To check scan time linearity, set the controls as follows:
SCAN TIME PER DIVISION . . . . . 2 MILLISECONDS
Modulation Frequency (HP 200CD) . . . . . ≈500 Hz

ADJUSTMENTS

5-29. Final Scan Check (cont'd)

9. Use the HORIZONTAL POSITION control to set the first modulation peak on the -5 graticule line. Adjust, if necessary, the audio oscillator modulation frequency to position the tenth modulation peak on the +4 graticule line. The peaks should align with each graticule line ±0.1 division.

Graticule	Min	Actual	Max	Graticule	Min	Actual	Max
-5	-0.1	_____	+0.1	CENTER FREQUENCY	-0.1	_____	+0.1
-4	-0.1	_____	+0.1	+1	-0.1	_____	+0.1
-3	-0.1	_____	+0.1	+2	-0.1	_____	+0.1
-2	-0.1	_____	+0.1	+3	-0.1	_____	+0.1
-1	-0.1	_____	+0.1	+4	-0.1	_____	+0.1

10. Switch to each position of the SCAN TRIGGER switch and make sure that the scan triggers. To verify the EXT position, place an ac signal (5 Hz to 50 kHz) at the TRIGGER/BLANK INPUT.

EXT Trigger: 2_____ 20 V p-p

11. To check VIDEO trigger operation, reduce the modulated signal input slowly to 1.5 divisions of vertical deflection. The scan should continue to trigger down to this level.

VIDEO TRIGGER: 1.5 divisions_____

12. To check the EXT position of the SCAN MODE switch, connect an 8-volt peak-to-peak, 1 kHz sine-wave signal from the HP 200CD Oscillator to the SCAN IN/OUT jack. A horizontal trace should appear on the CRT display.

EXT SCAN MODE: 8 V p-p_____

13. To check MAN position of the SCAN MODE switch, rotate MANUAL SCAN from full ccw to full cw. The trace should sweep across the CRT display from left to right (at least 10 full divisions).

MANUAL SCAN: 10 divisions_____

5-30. Vertical Deflection Amplifier Check

REFERENCE: Schematic 14.

DESCRIPTION: The A4 Crystal Filter Assembly is removed from the IF Section. A 3 MHz signal of known amplitude is applied at the input (XA4-14) of the LOG REF LEVEL·LINEAR SENSITIVITY attenuator. The VERTICAL POSITION and VERTICAL GAIN controls and 2 dB LOG mode are then checked. A time domain waveform is then placed on the analyzer by an AM modulated 3 MHz signal at XA4-14. Operation of the BASE LINE CLIPPER is checked visually on the display.

ADJUSTMENTS

5-30. Vertical Deflection Amplifier Check (cont'd)

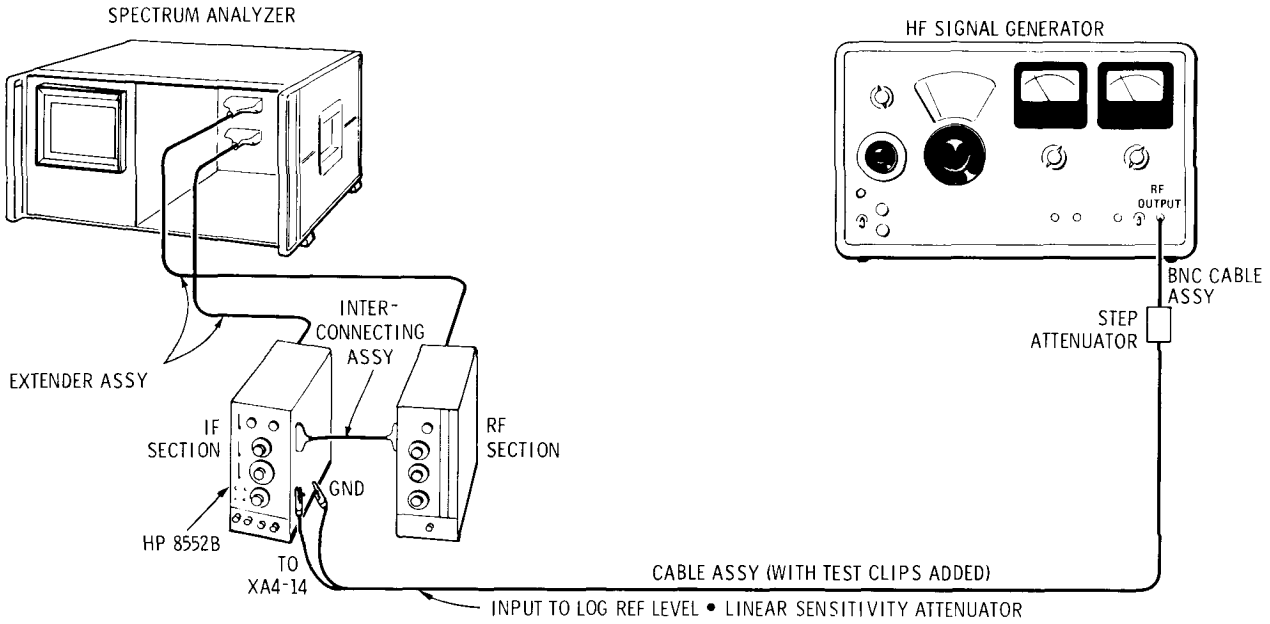


Figure 5-5. Vertical Deflection Amplifier Test Setup

EQUIPMENT:

SIGNAL GENERATOR	HP 606B
CABLE ASSEMBLY (with test clips installed)	HP 10501A
INTERCONNECTION ASSEMBLY	HP 11592-60016
EXTENDER ASSEMBLY	HP 11592-60015
ATTENUATOR	HP 355D
CABLE ASSEMBLY	HP 10503A

1. With the analyzer power off, remove the A4 Crystal Filter board from the 8552B.

2. Connect the test setup shown in Figure 5-5, turn analyzer power ON, and set controls as follows:

ANALYZER:

INPUT ATTENUATION	0 dB
SCAN TIME PER DIVISION	2 MILLISECONDS
LOG REF LEVEL	-20 dBm
LOG-LINEAR	10 dB LOG
BASE LINE CLIPPER	Max ccw
VIDEO FILTER	10 Hz
SCAN MODE	INT
SCAN TRIGGER	AUTO

606B:

FREQUENCY	3 MHz
ATTENUATOR (dBm)	0
MODULATION SELECTOR	CW
RANGE	4

ADJUSTMENTS

5-30. Vertical Deflection Amplifier Check (cont'd)

355D:
ATTENUATION . . . . . 100 dB

3. With an input signal at −100 dBm, adjust the front-panel VERTICAL POSITION control. The trace should move ±2 vertical divisions as the control is moved through its range.
−2 _____ +2 div

4. Reset the trace to the bottom vertical graticule line. Then increase the signal level to −50 dBm at XA4-14.

5. Switch LOG·LINEAR to LINEAR. Observe the display as the VERTICAL GAIN control is turned through its full range. The trace should move at least two vertical divisions.
2 div _____

6. Set LOG-LINEAR to 10 dB LOG; set 606B to −100 dB. Set trace to bottom graticule line with VERTICAL POSITION.

7. Set 355D to 70 dB; using 606B VERNIER and ATTENUATOR, adjust trace to −70 dB graticule on CRT.

8. Set 355D to 0 dB. Set trace to LOG REF graticule with VERTICAL GAIN. Check trace alignment and adjust if necessary.

9. Repeat steps 6 through 8 until trace is split by graticule in each step.

10. Set 355 D to 0 dB. Switch LOG-LINEAR to 2 dB LOG and adjust A7R35 2 dB OFFSET (see Figure 8-8) to set trace to LOG REF graticule.

11. Set 355D to 10 dB. Note the difference between the trace and the −50 dB graticule; adjust A7R35 2 dB GAIN to move the trace to the −50 dB graticule.

12. Repeat steps 10 and 11 until the trace is at LOG REF graticule at 0 dB and a −50 dB graticule at −10 dB.
LOG REF at 0 dB: _____ (√)
−50 dB at −10 dB: _____ (√)

13. Make the following control settings:
ANALYZER:
LOG·LINEAR . . . . . 10 dB LOG
VIDEO FILTER . . . . . OFF
606B:
MODULATION SELECTOR . . . . . INT 100 Hz
MODULATION AMPLITUDE 90%
355D:
ATTENUATION 110

14. Turn the BASE LINE CLIPPER until the signal is blanked. The control arrow should indicate between 8 and 12 o'clock.

15. Increase the 355D to 50 dB. Set the SCAN TRIGGER to VIDEO.

16. The scan should trigger on the video signal. Turn the BASE LINE CLIPPER fully clockwise and check signal clipping.

17. The clipping circuit should function so that two to eight divisions of signal above the base line are blanked when the BASE LINE CLIPPER is fully clockwise.
_____ 8 div

ADJUSTMENTS

5-31. Log-Linear Amplifier Check and Adjustment

REFERENCE: Schematics 12, 13.

DESCRIPTION: A 3 MHz signal is applied at the input to the LOG REF LEVEL-LINEAR SENSITIVITY attenuator (XA4-14). The log and linear amplifier circuits are calibrated by varying the signal amplitude by known increments.

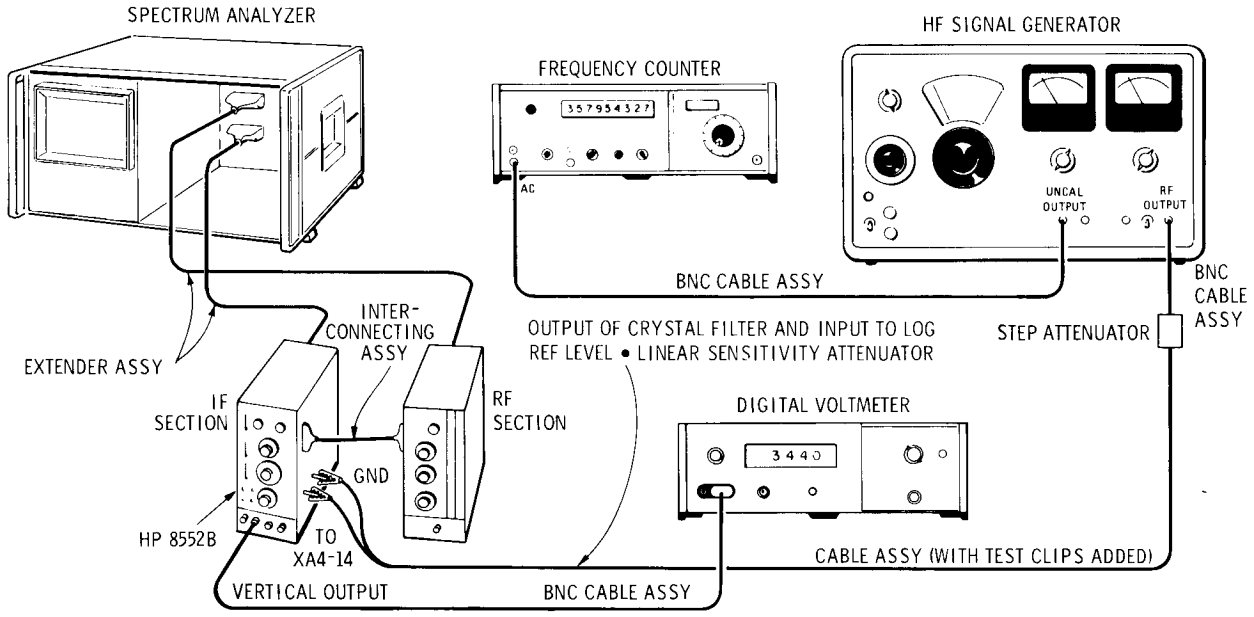


Figure 5-6. Log-Linear Amplifier Check and Adjustment Test Setup

EQUIPMENT:

SIGNAL GENERATOR	HP 606B
FREQUENCY COUNTER	HP 5245L
CABLE ASSEMBLY (install test clips on unterminated end)	HP 10501A
TUNING TOOL, SLOT	Gowanda PC-9668
STRAIGHT-THROUGH VOLTAGE PROBE	HP 10025A
DIGITAL VOLTMETER	HP 3440A/3443A
INTERCONNECTING ASSEMBLY	HP 11592-60016
EXTENDER ASSEMBLY	HP 11592-60015
CABLE ASSEMBLY	HP 11001A
ATTENUATOR	HP 355C
CABLE ASSEMBLY (3)	HP 10503A

1. With the analyzer power off, remove A4 Crystal Filter board.
2. Make the following control settings and then connect the test setup shown in Figure 5-6.

ANALYZER:

LOG-LINEAR	10 dB LOG
LOG REF LEVEL	-20 dBm
INPUT ATTENUATION	0 dB

ADJUSTMENTS

5-31. Log-Linear Amplifier Check and Adjustment (cont'd)

ANALYZER control settings (cont'd)

SCAN TIME PER DIVISION	2 MILLISECONDS
BASE LINE CLIPPER	Max ccw
VIDEO FILTER	10 kHz
SCAN MODE	INT
SCAN TRIGGER	AUTO

3440A/3443A:

SAMPLE RATE	9 o'clock
RANGE	AUTO

606B:

RANGE	4
FREQUENCY	3 MHz (±1 kHz)
MODULATION SELECTOR	CW
ATTENUATOR —dBm	-110
VERNIER	Set for 0 on meter dB scale

5245L:

SAMPLE RATE	9 o'clock
SENSITIVITY	1 (volts rms)
TIME BASE	1 s
FUNCTION	FREQUENCY

355C:

ATTENUATION	0 dB

3. Turn the analyzer power on and connect a 3 MHz ±1 kHz CW signal from the 606B to pin XA4-14. With an input signal of -110 dBm adjust the VERTICAL POSITION control to set the base line on the bottom graticule line.

4. Increase the signal generator level to —40 dBm and adjust A8L12 detector tuning on Service Sheet 13 for maximum vertical deflection on the trace. Repeat —110 dBm adjustment if necessary.

NOTE

Steps 5 and 6 may require iteration.

5. Increase the signal level to +10 dBm. Adjust the VERTICAL GAIN control for eight divisions of vertical deflection.

6. Decrease the signal generator level to —60 dBm and set ATTEN VERNIER on 606B for 1.0 division deflection of the vertical display. Retain this ATTEN VERNIER setting through step 14.

7. Repeat steps 5 and 6, then increase the signal level 20 dB (do not move 606B ATTEN VERNIER) and set LOG-LINEAR to LINEAR.

8. Adjust A8R52, LINEAR GAIN (sets basedrive to Linear Scale Factor Amplifier) for 7.07 divisions of vertical deflection. Measure the dc voltage present at the VERTICAL OUTPUT jack with a digital voltmeter. Record the voltage.

VERTICAL OUTPUT Voltage: _____

9. Set the HP 355C attenuation to 4 dB and turn LINEAR SENSITIVITY to 20 μV/DIV. Adjust 4 dB ADJ A8R63 to the reference voltage in step 8, ±6 mVdc. Repeat step 8 if necessary.

10. With the analyzer power off, remove the A7 Deflection Amplifier Assembly.

ADJUSTMENTS

5-31. Log·Linear Amplifier Check and Adjustment (cont'd)

11. Set the HP 355C to 0 dB; set the HP 606B Signal Generator 3 MHz level to -110 dBm, and set LOG·LINEAR to 10 dB LOG (LOG REF LEVEL at -20 dBm).

12. Turn the analyzer on and measure the dc voltage with the HP 3440A/3443A Digital Voltmeter and straight-through voltage probe (HP 10025A) connected to XA8-14. The dc level should measure more negative than -6 mVdc.

_____ -6 mVdc

13. Increase the signal generator level to +10 dBm. The signal level at XA8-14 should be -800 ±40 mVdc.

-840_____-760 mV

14. Decrease the signal generator level in 10 dB steps (to -60 dBm). For each 10 dB reduction, the dc level at XA8-14 should change by 100 ±40 mVdc.

Signal Generator Level at XA4-14	DC Level at XA8-14	Signal Generator Level at XA4-14	DC Level at XA8-14
0 dBm	-740 mVdc ___ -660	-40 dBm	-340 mVdc ___ -260
-10 dBm	-640 mVdc ___ -560	-50 dBm	-240 mVdc ___ -160
-20 dBm	-540 mVdc ___ -460	-60 dBm	-140 mVdc ___ - 60
-30 dBm	-440 mVdc ___ -360		

15. Turn the analyzer power off and re-install the A7 Deflection Amplifier assembly.

16. Turn the analyzer power on. Check vertical position, Step 3. Set the LOG·LINEAR switch to LINEAR. Set the signal generator output to -30 dBm.

17. Adjust the generator output level vernier for a full eight division display on the analyzer.

18. Carefully reduce the signal input to the analyzer at XA4-14 by the amounts shown in the table below using the HP 355C and HP 606B output attenuators. Deflection should be ±0.2 division for the levels indicated.

Input at XA14-14	CRT Display: Deflection in Divisions
Reference: -30 dBm (approx.)	8.0
Add: 6 dB attenuation	4.0 ±0.2
Add: 6 dB attenuation	2.0 ±0.2
Add: 8 dB attenuation	0.8 ±0.2
Add: 10 dB attenuation	0.25 ±0.2
Add: 40 dB attenuation	0 ±0.2

19. Reinstall A4 Crystal Filter Assembly.

ADJUSTMENTS

5-32. 300 kHz Bandpass Filter Adjustment

REFERENCE: Schematics 6, 7.

DESCRIPTION: The 300 kHz bandpass filter is adjusted for symmetry and center frequency. Then the 300 kHz bandwidth is checked.

EQUIPMENT:

CABLE ASSEMBLY	HP 10503A
INTERCONNECTING ASSEMBLY	HP 11592-60016
EXTENDER ASSEMBLY	HP 11592-60015
TUNING TOOL	HP 8710-0095

1. Install the analyzer plug-ins on the two extender cable assemblies, connect CAL OUTPUT to RF INPUT and make the following control settings:

ANALYZER:

INPUT ATTENUATION	20 dB
BANDWIDTH	3 kHz
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	5 kHz
FREQUENCY	30 MHz
FINE TUNE	Centered
SCAN TIME PER DIVISION	10 MILLISECONDS
VIDEO FILTER	10 kHz
TUNING STABILIZER	On
SCAN MODE	INT
SCAN TRIGGER	LINE
LOG·LINEAR	LINEAR
LINEAR SENSITIVITY	1 mV/DIV
BASE LINE CLIPPER	Max ccw

2. Place the A2 3 MHz Amplifier assembly on an extender and install it in the analyzer. Center the signal on the CRT display with the FINE TUNE control.

3. Set BANDWIDTH to 300 kHz and SCAN WIDTH PER DIVISION to .05 MHz.

4. Adjust A2A1L2, A2A1L4 and A2R1 for a smooth, symmetrical wave shape *centered* on the CRT display.

5. Set SCAN WIDTH PER DIVISION to 5 kHz and BANDWIDTH to 3 kHz. The display should remain centered. Return these controls to .05 MHz and 300 kHz, respectively.

6. Install the circuit board without the extender. Readjust A2R1 IMP if necessary.

7. Check 300 kHz bandwidth, paragraph 4-24: 300 kHz ±60 kHz

240_____360 kHz

8. If necessary, repeat adjustment procedure.

9. Switch BANDWIDTH to 10 kHz. The peak amplitude should remain the same ±0.4 division. If not, perform the LC Filter Adjustment, paragraph 5-33.

ADJUSTMENTS

5-33. LC Filter Adjustment

REFERENCE: Schematic 8.

DESCRIPTION: The LC Filter circuits (100, 30 and 10 kHz bandwidths) are peaked and centered. The 10 kHz gain control is set so that the 10 kHz bandwidth has the same gain as the 300 kHz bandwidth. Then the gain and bandwidth of the filters are checked.

EQUIPMENT:

CABLE ASSEMBLY	HP 10503A
TUNING TOOL	HP 8710-0095
INTERCONNECTING ASSEMBLY	HP 11592-60016
EXTENDER ASSEMBLY	HP 11592-60015

1. Install the analyzer plug-ins on the two extender cable assemblies; connect CAL OUTPUT to RF INPUT, and make the following control settings:

ANALYZER:

FREQUENCY	30 MHz
BANDWIDTH	3 kHz
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	5 kHz
INPUT ATTENUATION	20 dB
TUNING STABILIZER	On
SCAN TIME PER DIVISION	10 MILLISECONDS
LOG·LINEAR	LINEAR
LINEAR SENSITIVITY	2 mV/DIV
VIDEO FILTER	10 kHz
SCAN MODE	INT
SCAN TRIGGER	AUTO

2. Center the signal as carefully as possible on the CRT display with the FINE TUNE control.

3. Set BANDWIDTH to 10 kHz and SCAN WIDTH to ZERO. Peak A1C4, A1C10, A1C16 and A1C22 for maximum trace deflection on the display.

4. a. If one of the PEAK capacitors is at the end of its range (or if an inductor has been replaced) remove the circuit board from the analyzer.

   b. Free the related inductor core with acetone and center the capacitor.

   c. Install the circuit board on the extender. Perform steps 1 through 3 except tune the inductor, rather than the capacitors.

   d. Re-glue the inductor, using Duco cement, and re-install the circuit board without the extender.

   e. Again perform steps 1 through 3.

5. Set SCAN WIDTH to PER DIVISION and BANDWIDTH to 300 kHz. Use LINEAR SENSITIVITY to set signal for a 7.0 division display.

6. Set BANDWIDTH to 10 kHz and adjust A1R35 10 kHz ADJ for a 7.0 division display.

7. Install the shield cover and check the change in signal amplitude on the display as BANDWIDTH is switched from 300 kHz to 10 kHz. Deflection at these bandwidths should be within ±0.4 division of 300 kHz.

ADJUSTMENTS

5-33. LC Filter Adjustment (cont'd)

300 kHz: Reference

100 kHz: -0.4_____+0.4 div

30 kHz: -0.4_____+0.4 div

10 kHz: -0.4_____+0.4 div

8. Set BANDWIDTH to 3 kHz. Again the signal amplitude should not change more than ±0.4 divisions; if it does, perform the crystal filter adjustment, paragraph 5-34.

300 kHz: Reference

3 kHz: -0.4_____+0.4 div

9. Check 100, 30 and 10 kHz bandwidths, paragraph 4-24.

100 kHz Bandwidth: 80_____120 kHz

30 kHz Bandwidth: 24_____ 36 kHz

10 kHz Bandwidth: 9.5_____10.5 kHz

10. If necessary, repeat adjustment procedure.

5-34. Crystal Filter Fine Adjustment

REFERENCE: Schematics 10 and 11.

DESCRIPTION: This procedure fine adjusts the crystal filters for bandwidth and amplitude. If component changes are made, Coarse Adjustment (paragraph 5-35) may be necessary. The center frequency of the last four stages is referenced to the first stage, then all five stages are nulled. Next, the bandwidth amplitudes are set. Finally, the filters are checked for bandwidth and amplitude.

EQUIPMENT:

SIGNAL GENERATOR	HP 606B
OSCILLATOR SYNCHRONIZER	HP 8708A
FREQUENCY COUNTER	HP 5245L
CABLE ASSEMBLY (6)	HP 10503A
INTERCONNECTING ASSEMBLY	HP 11592-60016
EXTENDER ASSEMBLY	HP 11592-60015
OSCILLOSCOPE	HP 180A/1801A/1821A
CABLE ASSEMBLY	HP 10501A

1. Remove A2 3 MHz Amplifier Assembly, connect the test setup in Figure 5-7 and make the following control settings:

ANALYZER:

FREQUENCY	30 MHz
TUNING STABILIZER	On
BANDWIDTH	.01 kHz
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	1 MHz
INPUT ATTENUATION	20 dB
BASE LINE CLIPPER	Max ccw
SCAN TIME PER DIVISION	2 MILLISECONDS

ADJUSTMENTS

5-34. Crystal Filter Fine Adjustment (cont'd)

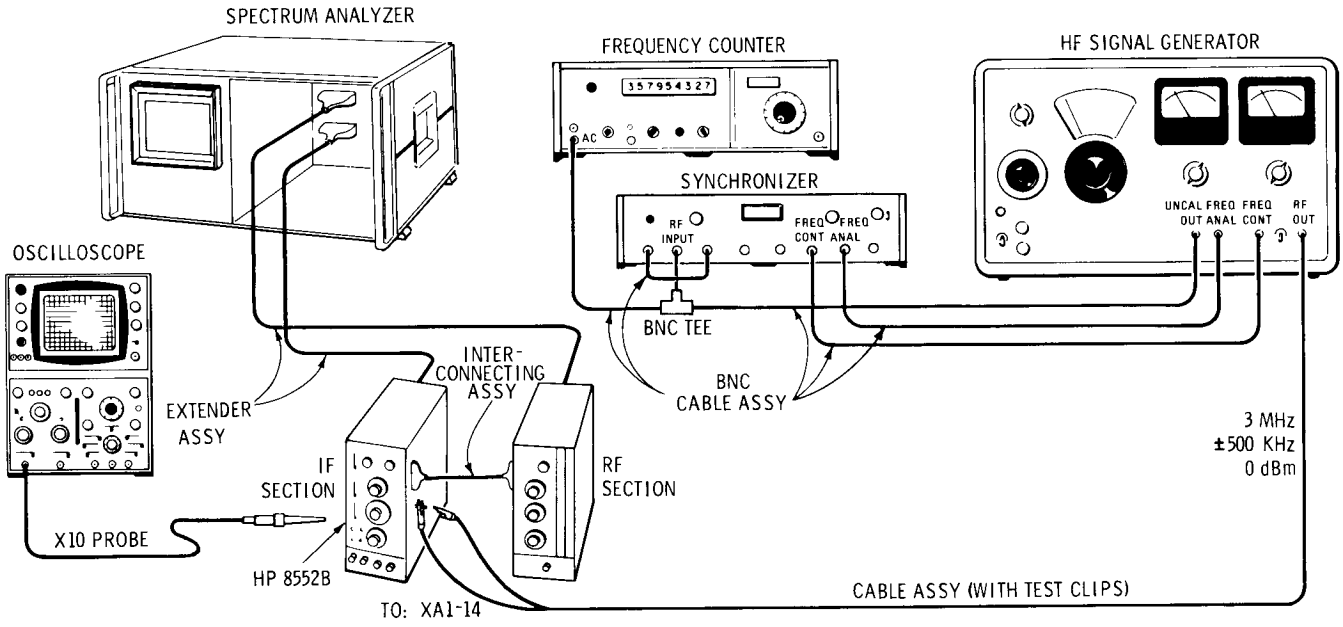


Figure 5-7. Crystal Filter Fine Adjustment Test Setup

ANALYZER control settings (cont'd)

LINEAR SENSITIVITY	20 μV/DIV
VIDEO FILTER	10 Hz
LOG·LINEAR	LINEAR
SCAN MODE	INT
SCAN TRIGGER	AUTO

606B:

RANGE	4
FREQUENCY	3 MHz
MODULATION SELECTOR	CW
ATTENUATOR (dBm)	-30
VERNIER	Set for 0 on dB meter

8708A:

FREQUENCY RANGE	4
RF INPUT	Under lit lamp
MODULATION	CW
FREQUENCY TUNING	Centered
AC-DC	AC

5245L:

SAMPLE RATE	9 o'clock
TIME BASE	1 s

ADJUSTMENTS

5-34. Crystal Filter Fine Adjustment (cont'd)

5245L settings (cont'd)
FUNCTION . . . . . FREQUENCY
SENSITIVITY . . . . . 0.1 (volts rms)

180A:
VOLTS/DIV 01
TIME/DIV . . . . . 1 MSEC

2. Tune the synchronizer for 3 MHz ±10 Hz, connect oscilloscope probe to A4TP6, then tune the synchronizer for a peak on the oscilloscope.

3. Remove the probe from TP6 and reduce LINEAR SENSITIVITY until trace appears on analyzer's CRT display. Adjust A4C30, 43, 57 and 70 for maximum trace deflection.

4. Repeat steps 2 and 3. Then remove the clip leads at XA1-14 and install A2 3 MHz Amplifier Assembly.

5. Connect CAL OUTPUT to RF INPUT and make the following control settings:

ANALYZER:
BANDWIDTH . . . . . 3 kHz
SCAN TIME PER DIVISION . . . . . 10 MILLISECONDS
LINEAR SENSITIVITY . . . . . 1 mV/DIV
VIDEO FILTER . . . . . 10 kHz

6. Center signal on display with FREQUENCY control and reduce SCAN WIDTH PER DIVISION to 1 kHz.

7. Adjust A4C19, 34, 47, 61 and 74 to null the signal. Set the signal to the 7 graticule line with LINEAR SENSITIVITY vernier.

8. Set BANDWIDTH to 1 kHz; signal level should not change more than ±0.3 division.

9. If signal is out of limits, repeat steps 6 and 7.

10. Set SCAN WIDTH to ZERO and make the BANDWIDTH changes and adjustments indicated below. Re-peak the signal with FINE TUNE every time BANDWIDTH is changed.

BANDWIDTH	Adjust for 7.0 Divisions	
0.3 kHz	A4R129	300 Hz
0.1 kHz	A4R126	100 Hz
.03 kHz	A4R122	30 Hz
.01 kHz	A4R115	10 Hz

ADJUSTMENTS

5-34. Crystal Filter Fine Adjustment (cont'd)

11. Repeat steps 8 through 10 until the bandwidth amplitude variations from 3 kHz through 0.1 kHz are as shown below:

3 kHz:	Set for 7 div
1 kHz:	6.7_____7.3 div
0.3 kHz:	6.7_____7.3 div
0.1 kHz:	6.7_____7.3 div
0.03 kHz:	6.5_____7.5 div
0.01 kHz:	6.0_____7.0 div

12. Place the A4 Crystal Filter Assembly on an extender. Set BANDWIDTH to 3 kHz, peak the trace with FINE TUNE and set the trace to the 7 graticule with LINEAR SENSITIVITY vernier.

13. Set BANDWIDTH to 300 kHz and adjust A4R133 to set the trace to the 7 graticule line.

14. Install the A4 Crystal Filter Assembly without the extender. Repeat steps 12 through 14 until the bandwidth amplitude variation between 3 kHz to 300 kHz is less than ±0.3 divisions.

6.7_____7.3 div

15. Perform the bandwidth checks for the 3 kHz through .01 kHz bandwidths, paragraphs 4-24, 4-25:

BANDWIDTH	3 dB Bandwidth	60 dB/3 dB Bandwidth Ratio
3 kHz	4.8_____7.2 div	_____11:1 div
1 kHz	4.0_____6.0 div	_____11:1 div
0.3 kHz	4.8_____7.2 div	_____11:1 div
0.1 kHz	4.0_____6.0 div	_____11:1 div
.03 kHz	1.2_____1.8 div	_____11:1 div
.01 kHz	0.4_____0.6 div	_____11:1 div

16. If necessary, repeat adjustment procedure.

ADJUSTMENTS

5-35. Crystal Filter Coarse Adjustment

REFERENCE: Schematics 10 and 11.

DESCRIPTION: This procedure adjusts A4C18, 32, 45, 59 and 73; it coarse adjusts A4C19, 34, 47, 61 and 74. It should be performed only if component changes that would affect the crystal alignment are made. The crystal filter circuits are adjusted, in turn, by bypassing all but the stage being adjusted; they are adjusted for center frequency, symmetry and null.

NOTE

This procedure can be difficult and time consuming and should not be attempted unless the Fine Adjustment procedure will not align the filters.

EQUIPMENT:

CRYSTAL FILTER BYPASS NETWORK (4)	(See Step 9)
CABLE ASSEMBLY	HP 10503A
INTERCONNECTING ASSEMBLY	HP 11592-60016
EXTENDER ASSEMBLY	HP 11592-60015

1. Install the analyzer plug-ins on the two extender cable assemblies, connect CAL OUTPUT to RF INPUT, and make the following control settings:

ANALYZER:

FREQUENCY	30 MHz
BANDWIDTH	3 kHz
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	.05 MHz
INPUT ATTENUATION	10 dB
TUNING STABILIZER	On
SCAN TIME PER DIVISION	5 MILLISECONDS
LOG·LINEAR	10 dB LOG
LOG REF LEVEL	-20 dBm
VIDEO FILTER	10 kHz
SCAN MODE	INT
SCAN TRIGGER	AUTO

2. Place the A4 Crystal Filter Assembly on an extender board and install it in the analyzer. Place the four Crystal Filter Bypass Networks across: TP2 to TP7, TP3 to TP8, TP4 to TP9 and TP5 to TP10.

3. Center the signal on the CRT display with the FREQUENCY control. Use the LOG REF LEVEL controls to set signal peak at LOG REF graticule.

4. Tune A4C19 and A4C18 respectively for signal null and symmetrical skirts (60 dB down).

NOTE

Oscillations sometimes occur when the Crystal Filter board is on the Extender board and the Crystal Filter Bypass Networks are being used. Place your fingers across the last Crystal Filter Bandpass Network. This will dampen the oscillations while the adjustments are being made.

5. Perform Step 4 for each of the Filter stages in turn, as indicated:

ADJUSTMENTS

5-35. Crystal Filter Coarse Adjustment (cont'd)

Place Bypass Networks Across Test Points	Tune for null and symmetrical skirts (60 dB down)
1 and 6, 3 and 8 4 and 9, 5 and 10	A4C34 and A4C32
1 and 6, 2 and 7 4 and 9, 5 and 10	A4C47 and A4C45
1 and 6, 2 and 7 3 and 8, 5 and 10	A4C61 and A4C59
1 and 6, 2 and 7 3 and 8, 4 and 9	A4C74 and A4C73

6. Repeat steps 4 and 5.
7. Remove the Bypass Networks and install A4 assembly without an extender.
8. Perform Crystal Filter Fine Adjustment, paragraph 5-34.
9. Assemble four Crystal Filter bypass networks from parts listed below:
   a. 4 capacitors — .047 microfarad 10% HP 0170-0040
   b. 4 resistors — 3.3 ohm 5% HP 0683-0335
   c. 8 receptacles — for .040 inch pin HP 1200-0063

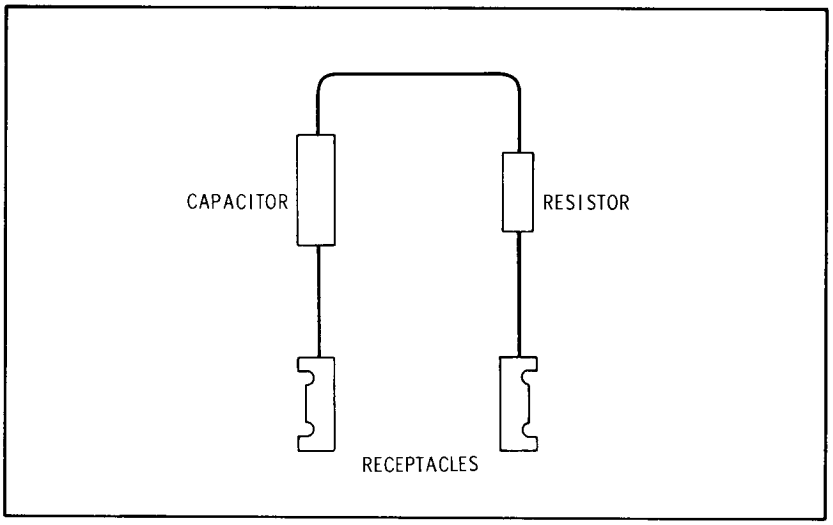


Figure 5-8. Crystal Filter Bypass Network

ADJUSTMENTS

5-36. 3 MHz IF Gain Adjustment

REFERENCE: Schematics 6, 7, 8.

DESCRIPTION: The amplifier gain controls are adjusted for various positions of the LOG REF LEVEL attenuator and then the remaining positions of the LINEAR SENSITIVITY dial are checked. The VERTICAL OUTPUT circuit adjustment is set for output voltage with full-scale display deflection.

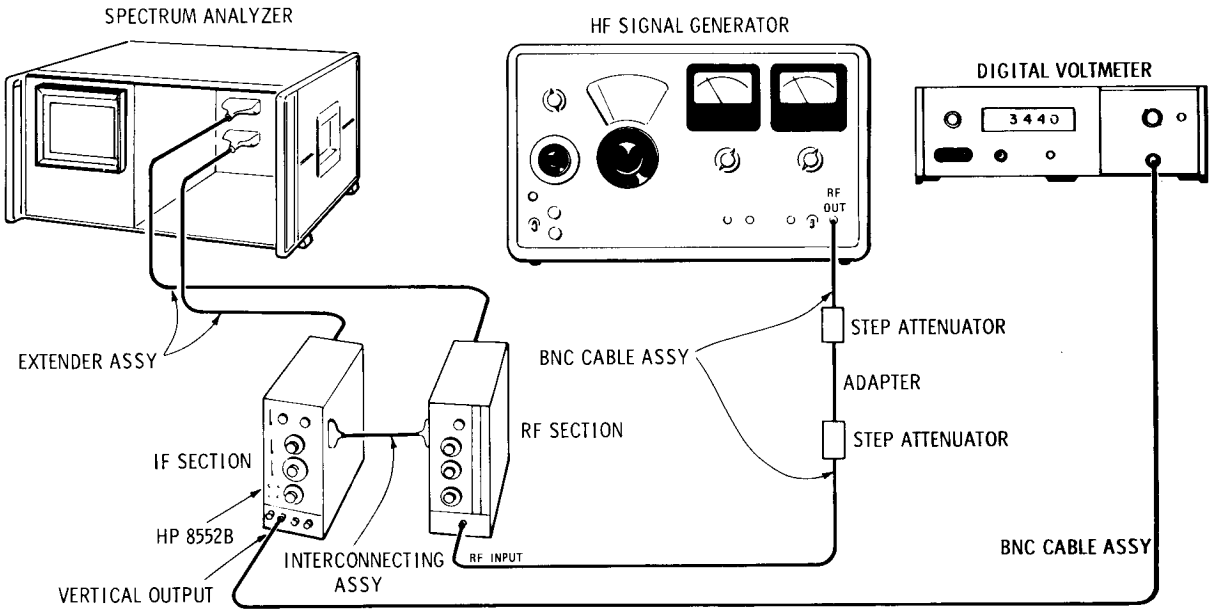


Figure 5-9. 3 MHz IF Gain Adjustment Test Setup

EQUIPMENT:

SIGNAL GENERATOR	HP 606B
DIGITAL VOLTMETER	HP 3440A/3443A
ATTENUATOR	HP 355C
ADAPTER	HP 1258-0216
INTERCONNECTING ASSEMBLY	HP 11592-60016
EXTENDER ASSEMBLY	HP 11592-60015
ATTENUATOR	HP 355D
CABLE ASSEMBLY (3)	HP 10503A

1. Remove the cover shield from the A1 LC Filter Assembly, connect the test setup shown in Figure 5-9 and make the following control settings:

ANALYZER:

FREQUENCY	30 MHz
TUNING STABILIZER	On
BANDWIDTH	100 kHz
SCAN WIDTH	ZERO
INPUT ATTENUATION	0 dB
SCAN TIME PER DIVISION	2 MILLISECONDS
LINEAR SENSITIVITY	1 mV/DIV
LOG-LINEAR	LINEAR
BASE LINE CLIPPER	Max ccw

ADJUSTMENTS

5-36. 3 MHz IF Gain Adjustment (cont'd)

ANALYZER control settings (cont'd)

SCAN MODE	INT
SCAN TRIGGER	AUTO
VIDEO FILTER	OFF

606B:

FREQUENCY	30 MHz
ATTENUATOR (dBm)	-20
RANGE	5
MODULATION SELECTOR	CW
VERNIER	Set for 0 dB on meter

3440A/3443A:

SAMPLE RATE	9 o'clock
RANGE	AUTO

355C and 355D:

ATTENUATION	0 dB

2. Adjust FREQUENCY control for maximum trace deflection.
3. Adjust signal generator output so that VERTICAL OUTPUT voltage is -1.000 ±0.005 Vdc.
4. Increase test attenuators by 12 dB.
5. Turn LOG REF LEVEL vernier to -12 dB.
6. Adjust A2R44 12 dB ADJ for -1.000 ±0.005 Vdc.
7. Decrease test attenuators by 12 dB.
8. Turn LOG REF LEVEL vernier to 0 dB.
9. Adjust A2R51 0 dB ADJ for -1.000 ±0.005 Vdc.
10. Repeat adjustments in steps 4 through 9 to minimize interaction between controls.
11. Set test attenuator to 6 dB.
12. Turn LOG REF LEVEL vernier to -6. Note error from 1.000 Vdc and adjust HP 606B output for -1.000 Vdc minus error.
13. Set test attenuator to 12 dB and repeat steps 5 through 10.

ADJUSTMENTS

5-36. 3 MHz IF Gain Adjustment (cont'd)

14. Measure the LOG REF LEVEL vernier accuracy at each dB mark by the substitution method employed in steps 4 through 9. The VERTICAL OUTPUT voltage at each step should be -1.000 ± 0.04 Vdc.

-1 dB	-0.96_____1.04 Vdc	-7 dB	-0.96_____-1.04 Vdc
-2 dB	-0.96_____-1.04 Vdc	-8 dB	-0.96_____-1.04 Vdc
-3 dB	-0.96_____-1.04 Vdc	-9 dB	-0.96_____-1.04 Vdc
-4 dB	-0.96_____-1.04 Vdc	-10 dB	-0.96_____-1.04 Vdc
-5 dB	-0.96_____-1.04 Vdc	-11 dB	-0.96_____-1.04 Vdc
-6 dB	-0.96_____-1.04 Vdc	-12 dB	-0.96_____-1.04 Vdc

15. Change the control settings as follows:

ANALYZER:
INPUT ATTENUATION . . . . . 10 dB
LOG REF LEVEL . . . . . 0 dBm
LOG·LINEAR . . . . . 10 dB LOG

606B:
ATTENUATOR (dBm) 0

355D and 355C:
ATTENUATION . . . . . 10 dB

16. Tune FREQUENCY control for maximum trace deflection.

17. Note reference voltage at VERTICAL OUTPUT.

Reference Voltage <– 600 mV (more negative) :_____

18. Adjust 3 MHz IF Gain positions as follows:

Test Attenuator	LOG REF LEVEL	Adjust	Error Limit: ±2 mVdc (from Reference Voltage)
10 dB	-10 dBm	A1R59	-2_____+2
20 dB	-20 dBm	A1R58	-2_____+2
30 dB	-30 dBm	A2R21	-2_____+2
40 dB	-40 dBm	A2R24	-2_____+2
50 dB	-50 dBm	A2R27	-2_____+2

ADJUSTMENTS

5-36. 3 MHz IF Gain Adjustment (cont'd)

19. Check the remaining attenuator steps as follows:

    a. Connect a shorting strap between the green and blue wires on the LOG REF LEVEL switch A10S1-2R.

    b. Set LOG-LINEAR control to LINEAR and test attenuators to 43 dB.

    c. Set LINEAR SENSITIVITY to 0.1 mV/DIV with INPUT ATTENUATION at 10 dB.

    d. Measure the voltage at the VERTICAL OUTPUT jack.

    Reference Voltage:_____

    e. Check the remaining LINEAR SENSITIVITY positions according to the table below:

Test Attenuator	LINEAR SENSITIVITY	Error Limit: ±15 mVdc
43 dB	0.1 mV/DIV	-15_____+15
33 dB	0.2 mV/DIV	-15_____+15
23 dB	1.0 mV/DIV	-15_____+15
13 dB	2.0 mV/DIV	-15_____+15
3 dB	10.0 mV/DIV	-15_____+15

    f. Remove the shorting strap installed in step a on page 5-24.

5-37. 47 MHz LO Automatic Phase Lock Check and Adjustment

REFERENCE: Schematics 3, 4, 5.

DESCRIPTION: The oscillator levels are set and checked and the phase lock loop is checked. The summing and shaping circuits are then adjusted by applying dc offsets and adjusting for a linear 47 MHz LO sweep.

ADJUSTMENTS

5-37. 47 MHz LO Automatic Phase Lock Check and Adjustment (cont'd)

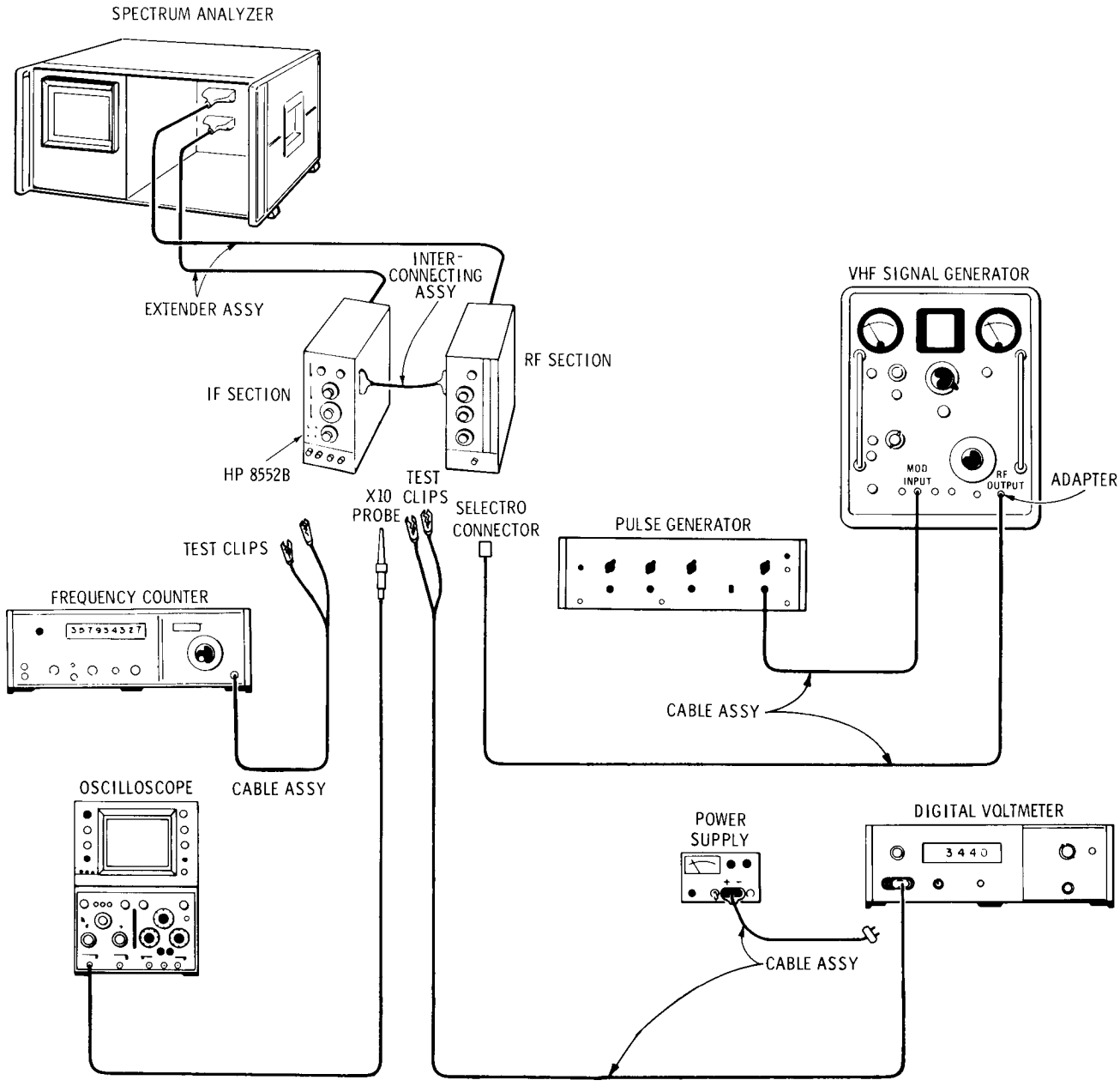


Figure 5-10. 47 MHz LO Automatic Phase Lock Test Setup

EQUIPMENT:

FREQUENCY COUNTER	HP 5245L/5261A
OSCILLOSCOPE	HP 180A/1801A/1820A
SIGNAL GENERATOR	HP 608F
PULSE GENERATOR	HP 222A
POWER SUPPLY	HP 6217A
6-PIN EXTENDER BOARD	HP 5060-5914

ADJUSTMENTS

5-37. 47 MHz LO Automatic Phase Lock Check and Adjustment (cont'd)

EQUIPMENT (cont'd)

EXTENDER ASSEMBLY	HP 11592-60015
INTERCONNECTING ASSEMBLY	HP 11592-60016
CABLE ASSEMBLY	HP 11592-60001
CABLE ASSEMBLY	HP 10503A
CABLE ASSEMBLY (w/test clips)	HP 10501A
DIGITAL VOLTMETER	HP 3440A/3443A
ADAPTER	UG-201A/U
CABLE ASSEMBLY	HP 11000A
CABLE ASSEMBLY (w/test clips)	HP 11002A
ALIGNMENT TOOL	HP 8710-0957

1. Connect the test setup in Figure 5-10. Remove the A1/A12 Assemblies cover shield and the A13 2 MHz VTO Assembly, and make the following control settings:

ANALYZER:

FINE TUNE	Centered
SCAN TIME PER DIVISION	50 MILLISECONDS
BANDWIDTH	1 kHz
TUNING STABILIZER	OFF
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	20 kHz
VIDEO FILTER	OFF
SCAN MODE	INT
SCAN TRIGGER	AUTO
LOG·LINEAR	10 dB LOG
LOG REF LEVEL	-40 dBm

180A/1801/1820:

VOLTS/DIV	.02
TIME/DIV	0.5 MSEC
Probe	X10

5245L/5261A:

SENSITIVITY	PLUG IN
SAMPLE RATE	ccw
TIME BASE	1 s
FUNCTION	FREQUENCY
SENSITIVITY (PLUG-IN)	30 mV RMS

608F:

MODULATION	EXT PULSE
ATTENUATION	-20 dBm
MEGACYCLES	50

222A:

REF RATE	10K — 100K
PULSE WIDTH	0.5 — 5 (vernier ccw)
PULSE AMPLITUDE	2V
PULSE POLARITY	+

2. Attach oscilloscope probe to A12TP2. Adjust A12T1 for maximum; signal level should be 650 ±200 mV p-p.

450_____850 mV p-p

ADJUSTMENTS

5-37. 47 MHz LO Automatic Phase Lock Check and Adjustment (cont'd)

3. Remove oscilloscope probe and attach frequency counter to A12TP2. 45 MHz Crystal Oscillator frequency should be 45 MHz ±10 kHz.

44.990_____45.010 MHz

4. Attach oscilloscope probe to feedthrough capacitor C8 (see Figure 8-8) and set oscilloscope VOLTS/DIV to 0.2 and TIME/DIV to 5 msec. Search waveform should be as shown in Figure 5-11 with amplitude from 8.5 to 11.5 V p-p.

8.5_____11.5 V p-p

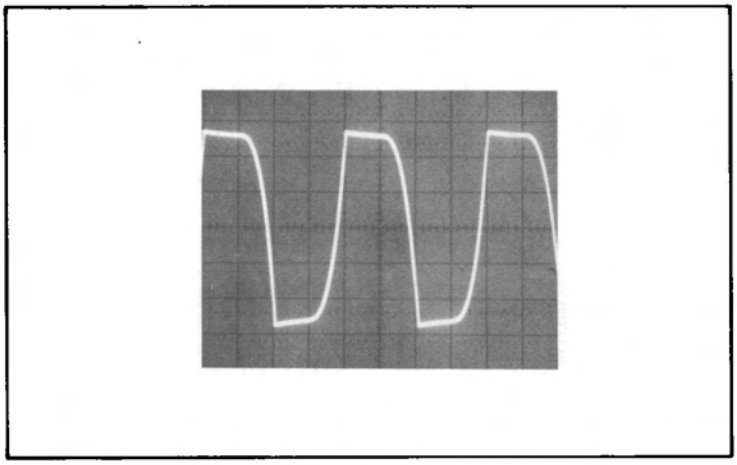


Figure 5-11. Search Waveform

5. Remove oscilloscope probe from C8 and attach to J8 (see Figure 8-8); set oscilloscope VOLTS/DIV to .05 and TIME/DIV to 5 msec. The 47 MHz LO level should be 2.0V ± 0.5.

1.5V _____2.5 V p-p

6. Remove oscilloscope probe from J8 and re-attach to feedthrough C8. Insert A13 2 MHz VTO Assembly into 8552B on 6-pin extender board. 47 MHz LO phase lock will be indicated by the 50 Hz square wave becoming steady dc.

NOTE

If square wave does not become steady dc, adjust 47 MHz LO (A3A2L1) as specified in step 16. Then repeat steps 4 through 6.

7. Remove oscilloscope probe from C8 and attach to A13TP1. Set oscilloscope VOLTS/DIV to .02 and TIME/DIV to 5 msec. Adjust A13R5 VTO LEVEL ADJ for 900 ±250 mV p-p.

650_____1150 mV p-p

8. Disconnect oscilloscope probe and attach frequency counter to A13TP1. Switch analyzer SCAN WIDTH to ZERO. With alignment tool, adjust A13T1 for 2 MHz ±2 kHz. (FINE TUNE must be centered and TUNING STABILIZER must be off.)

1998_____2002 kHz

ADJUSTMENTS

5-37. 47 MHz LO Automatic Phase Lock Check and Adjustment (cont'd)

9. Remove A13 2 MHz VTO and re-install in 8552B without extender.

NOTE

The following steps of this paragraph should be omitted if the RF Section being used is an 8554 or 8555.

Turn analyzer POWER off. Unsolder yellow wire at 8552B XA5 pin 3 and connect power supply positive lead to XA5 pin 3 (connect negative lead to chassis ground.) Adjust power supply for +7.50 V with digital voltmeter.

10. Connect pulse generator to frequency counter. Adjust REP RATE VERNIER for 20.000 kHz, then connect pulse generator to signal generator. Disconnect W7-50 MHz, white coax at J6 (see Figure 8-8). Connect the signal generator output to J6. Set analyzer SCAN WIDTH to PER DIVISION (SCAN WIDTH PER DIVISION should be 20 kHz).

11. Turn analyzer POWER on and observe signal on Display Section CRT.

12. Adjust A5R45 SHAPING ADJ for optimum linearity, aligning the pulses of the modulated signal on the vertical graticule lines. Adjust frequency of signal generator to keep pulses aligned on graticule lines as adjustment is made. Pulses should not deviate more than ±0.75 minor divisions from graticule lines across entire display.

Max. deviation: 0.75_____0.75 minor div

13. Change power supply to put -7.50V at XA5 pin 3. Adjust A5R71 OFFSET ADJ for optimum linearity, aligning pulses on vertical graticule lines and adjusting signal generator frequency as necessary to keep pulses on graticule lines. Pulses should not deviate more than ±0.75 minor divisions from graticule lines across entire display.

Max. deviation 0.75_____0.75 minor div

14. Set the power supply to 0V and check to see that the pulses do not deviate more than ±0.75 minor divisions from vertical graticule lines across entire display.

Max. deviation 0.75 _____0.75 minor div

15. Repeat steps 8 through 14 until no further adjustments are necessary to meet the specifications in each step. (Yellow wire at XA5 pin 3 can remain unsoldered until adjustments are completed.)

16. Set analyzer SCAN WIDTH to ZERO and attach DVM to feedthrough C8. Phase lock error signal should be +4 ±0.4V. If not, adjust A3A2L1 (accessible through hole in A3A2 cover).

+3.6_____+4.4V

17. Turn the analyzer POWER off, reconnect W6 to J6 and re-solder yellow wire to XA5 pin 3. Remove test equipment connections from analyzer and re-install the cover shields to the A13 and A1/A12 Assemblies.

5-38. 50 MHz IF Bandpass Check and Adjustment

REFERENCE: Schematic 3.

DESCRIPTION: The 50 MHz IF bandpass is checked by manually sweeping the 47 MHz Local Oscillator over a 200 kHz range and viewing the analyzer display for flatness. For adjustment, the 50 MHz IF is swept using a flat external source. The output is detected, filtered and displayed on an oscilloscope. The bandpass filter is adjusted for frequency, amplitude, width and flatness.

ADJUSTMENTS

5-38. 50 MHz IF Bandpass Check and Adjustment (cont'd)

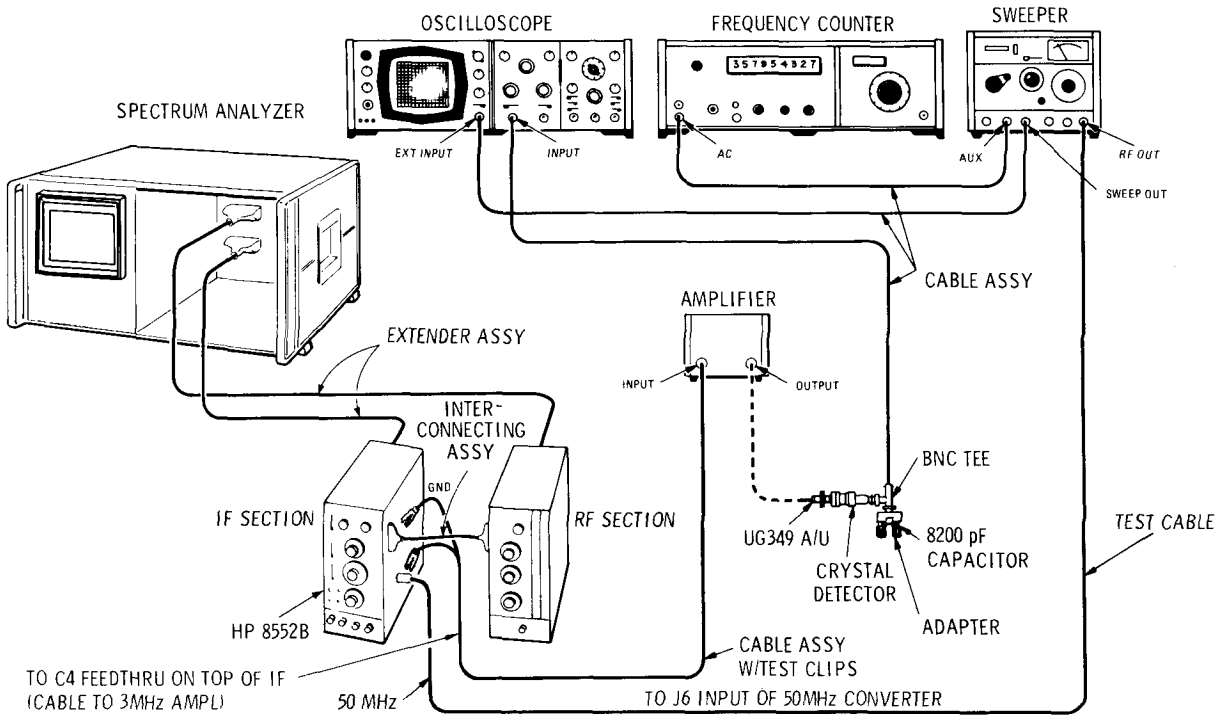


Figure 5-12. 50 MHz IF Bandpass Adjustment Test Setup

EQUIPMENT:

GENERATOR/SWEEPER	HP 8601A
OSCILLOSCOPE with 1801A/1821A PLUG-INS	HP 180A
FREQUENCY COUNTER	HP 5245L
AMPLIFIER	HP 8447A
CRYSTAL DETECTOR	HP 423A
CABLE ASSEMBLY	HP 10501A
CABLE ASSEMBLY (3)	HP 10503A
TEST CABLE	HP 11592-60001
EXTENDER ASSEMBLY	HP 11592-60015
INTERCONNECTING ASSEMBLY	HP 11592-60016
ADAPTER	HP 10110A
ADAPTER	UG-201A/U
BNC Tee	UG-274B/U
ADAPTER	UG-349A/U
CAPACITOR	8200 PF (approx.)

1. Connect the test setup as shown in Figure 5-12. Make the following control settings:

ANALYZER:
3 MHz Amplifier Assembly A2 removed.

8601A:

FREQUENCY	50 MHz
RANGE	110
SWEEP	SYM
OUTPUT LEVEL	-10 dBm
SWEEP MODE	LINE-FAST
1 kHz MODE	OFF

ADJUSTMENTS

5-38. 50 MHz IF Bandpass Check and Adjustment (cont'd)

180A/1801A:

MAGNIFIER	X5
POSITION	(see Figure 5-13)
VOLTS/DIV (Channel A)	.05
POLARITY	UP
INPUT	DC
DISPLAY	A

5245L:

SAMPLE RATE	9 o'clock
SENSITIVITY (volts rms)	0.1
TIME BASE	10 ms
FUNCTION	FREQUENCY

2. Adjust Generator/Sweeper and oscilloscope to display a 10 MHz swept signal centered on 50 MHz. (See Figure 5-13.)

3. If the bandpass is not flat (±2 mV) at least 0.3 MHz on either side of 50 MHz, adjust A3A1C5, 6, 9 and 10 for maximum amplitude and flatness.

4. Select 3 MHz sweep width on the HP 8601A and observe oscilloscope display for a bandpass as shown in Figure 5-13. Repeat Step 3 as required to obtain desired bandpass.

5. Remove power from display section and install 3 MHz Amplifier Assembly A2.

6. Remove cable assembly from Generator/Sweeper.

7. Perform 44 MHz Rejection Check, paragraph 5-39. If capacitors A3C11, 14 or 19 are adjusted, repeat steps 1 through 4 above.

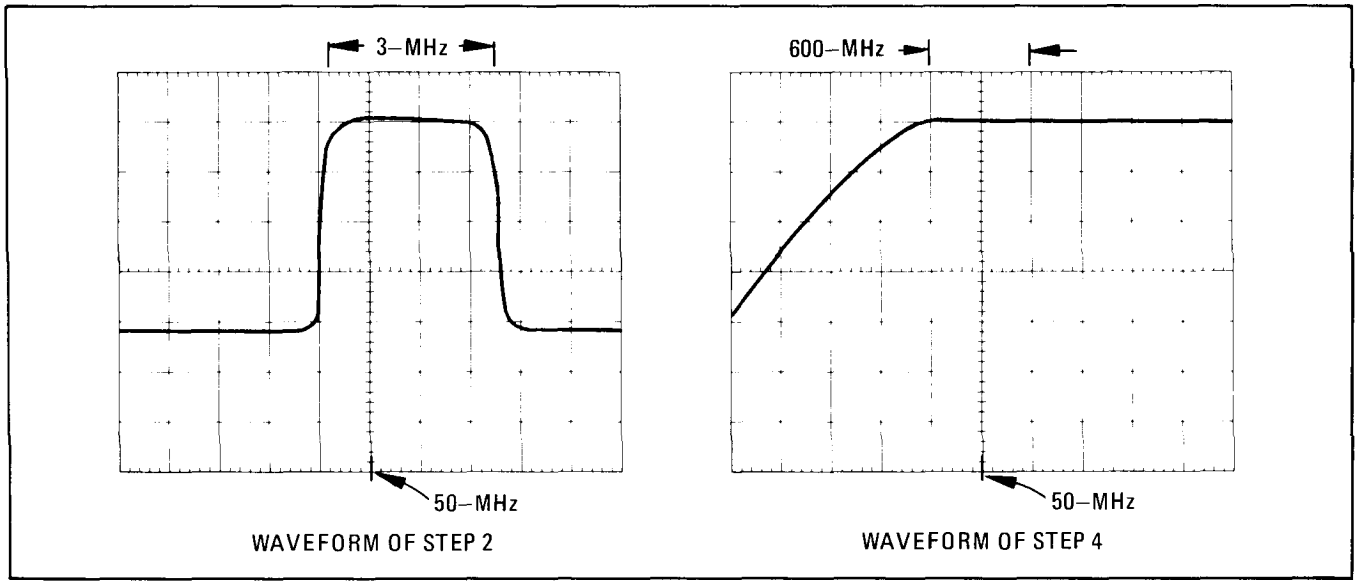


Figure 5-13. 50 MHz Bandpass Display for 10 MHz and 3 MHz Sweeps

ADJUSTMENTS

5-38. 50 MHz IF Bandpass Check and Adjustment (cont'd)

8. Connect a test cable from CAL OUTPUT to RF INPUT and make the following control settings:

ANALYZER:
- FREQUENCY . . . . . 30 MHz
- FINE TUNE . . . . . Full cw
- INPUT ATTENUATION . . . . . 0 dB
- TUNING STABILIZER . . . . . OFF
- BANDWIDTH . . . . . 10 kHz
- SCAN WIDTH . . . . . PER DIVISION
- *SCAN WIDTH PER DIVISION* . . . . . 100 kHz
- BASE LINE CLIPPER . . . . . Max ccw
- SCAN TIME PER DIVISION . . . . . 2 MILLISECONDS
- LINEAR SENSITIVITY . . . . . Set for full scale display
- VIDEO FILTER . . . . . OFF
- SCAN MODE . . . . . INT
- SCAN TRIGGER . . . . . LINE
- LOG-LINEAR . . . . . LINEAR

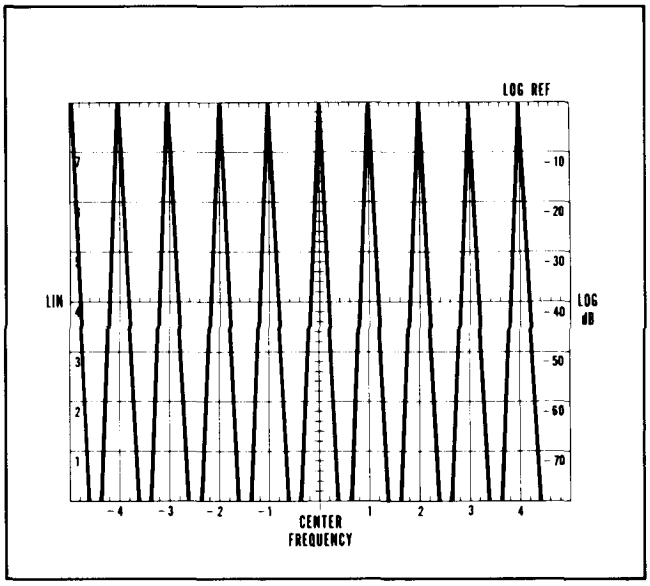


Figure 5-14. 50 MHz Bandpass Flatness Display

9. Tune FREQUENCY for display indicated in Figure 5-14 when FINE TUNE is rotated in 100 kHz steps.

10. Reduce LINEAR SENSITIVITY Vernier to a seven division vertical deflection. Rotate FINE TUNE through its range while observing display for flatness. Display should be flat ±0.2 division across the 1.0 MHz FINE TUNE range.

-0.2_____+0.2 div

5-39. 44 MHz Rejection Adjustment

REFERENCE: Schematic 3.

DESCRIPTION: A 50 MHz reference is established, then 44 MHz is fed into the 47 MHz converter and nulled 70 dB below the reference level. The 50 MHz IF Bandpass Check and Adjustment must be repeated after the 44 MHz rejected controls are adjusted.

ADJUSTMENTS

5-39. 44 MHz Rejection Adjustment (cont'd)

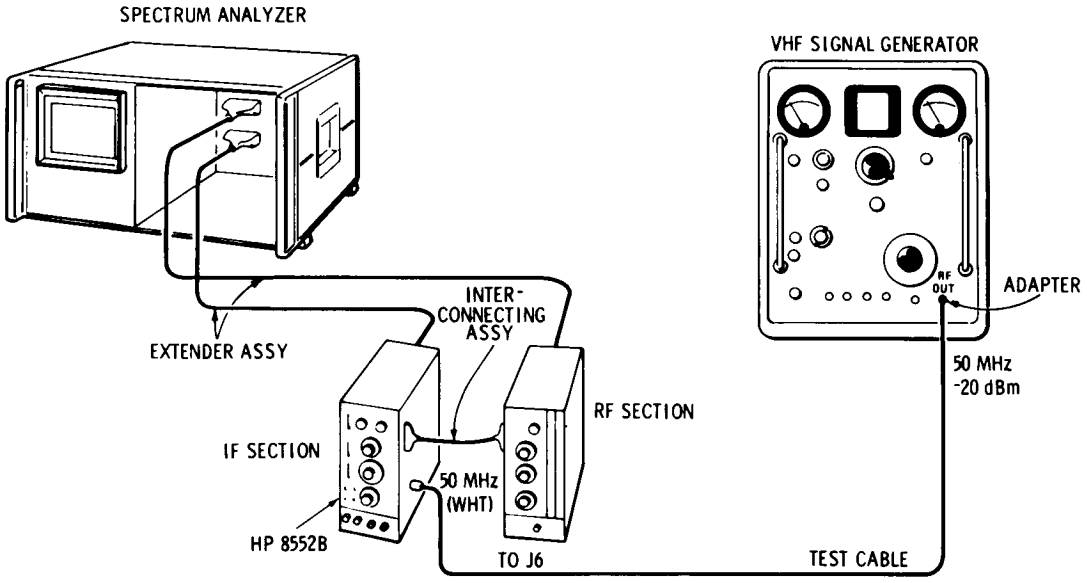


Figure 5-15. 44 MHz Rejection Adjustment Test Setup

EQUIPMENT:

SIGNAL GENERATOR	HP 608F
TEST CABLE	HP 11592-60001
INTERCONNECTING ASSEMBLY	HP 11592-60016
EXTENDER ASSEMBLY	HP 11592-60015
ADAPTER	UG-201A/U

1. Connect the test setup shown in Figure 5-15 and make the following control settings:

ANALYZER:

INPUT ATTENUATION	0 dB
FINE TUNE	Centered
TUNING STABILIZER	OFF
BANDWIDTH	10 kHz
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	20 kHz
BASE LINE CLIPPER	Max ccw
SCAN TIME PER DIVISION	2 MILLISECONDS
LOG REF LEVEL controls	See text
VIDEO FILTER	OFF
SCAN MODE	INT
SCAN TRIGGER	LINE
LOG-LINEAR	10 dB LOG

608F:

MODULATION	CW
ATTENUATION	-20 dBm

ADJUSTMENTS

5-39. 44 MHz Rejection Adjustment (cont'd)

608F control settings (cont'd)

MEGACYCLES	50
AMPL TRIMMER	Press & peak meter reading
FREQUENCY RANGE	C

2. Adjust LOG REF LEVEL controls for a full-scale signal display. Use the signal generator frequency control to center the display.

3. Establish a reference by observing the position of the LOG REF LEVEL control with reference to the lit indicator light.

4. Tune the signal generator to 44 MHz and peak the AMPL TRIMMER. Use the LOG REF LEVEL control to once more get an on-screen display, but without disturbing the vernier. If necessary, use the signal generator frequency control to center the display.

5. Increase the signal level on the display while keeping track of the number of LOG REF LEVEL 10-dB steps. Use LOG REF LEVEL vernier for the final small adjustment.

6. Add up total attenuation. The level of the 44 MHz signal in step 5 should be at least 70 dB below the level in step 2.

44 MHz Rejection: 70 dB_____

7. If the rejection is not at least 70 dB, adjust the 44 MHz capacitors A3C11, 14, and 19 on the A3 50 MHz Converter assembly for minimum 44 MHz signal indication on the analyzer display.

8. When the 44 MHz rejection adjustment is completed, repeat the check and adjustment procedure in the 50 MHz IF Bandpass Check and Adjustment, paragraph 5-38.

5-40. 30 MHz Calibration Oscillator Check and Adjustment

REFERENCE: Schematic 18.

DESCRIPTION: The CAL OUTPUT at the front panel is measured and adjusted for 30 MHz at -30 dBm. The amplitude is measured on the analyzer CRT by comparing it to a calibrated signal. The frequency is amplified and measured with a counter.

ADJUSTMENTS

5-40. 30 MHz Calibration Oscillator Check and Adjustment (cont'd)

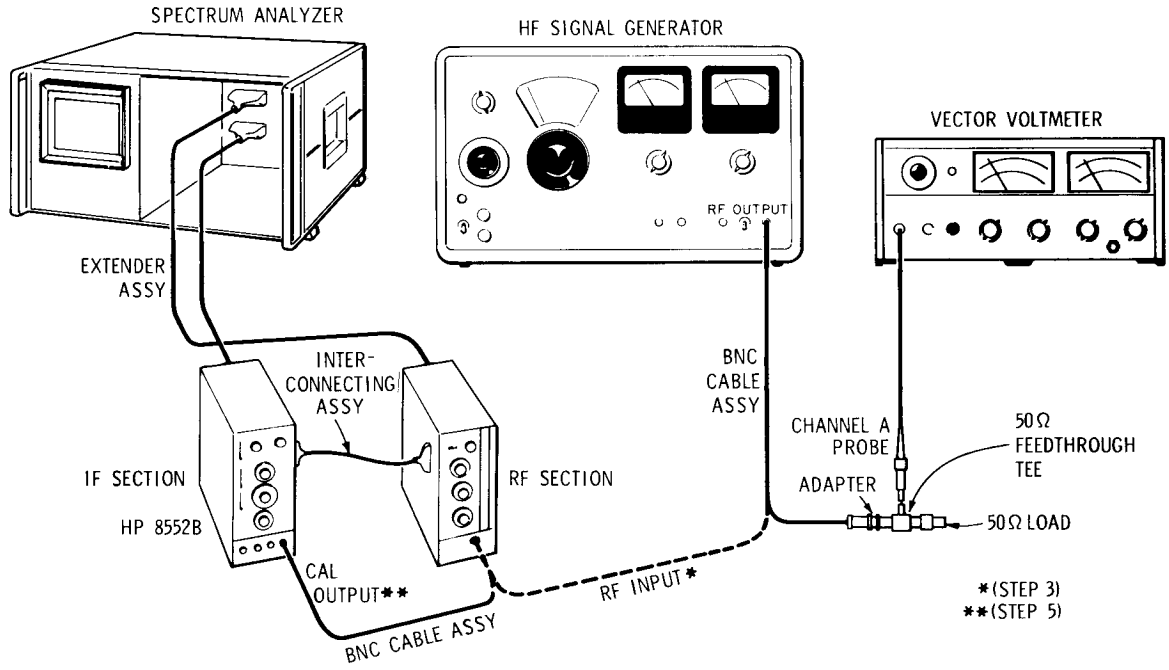


Figure 5-16. 30 MHz Calibration Amplitude Adjustment Setup

EQUIPMENT:

VECTOR VOLTMETER	HP 8405A
CABLE ASSEMBLY (2)	HP 10503A
EXTENDER ASSEMBLY	HP 11592-60015
INTERCONNECTING ASSEMBLY	HP 11592-60016
50-OHM LOAD	HP 908A
50-OHM TEE	HP 11536A
ADAPTER	UG-201A/U
SIGNAL GENERATOR	HP 606B

1. Connect the equipment shown in Figure 5-16 and make the following control settings:

ANALYZER:

FREQUENCY	30 MHz
BANDWIDTH	30 kHz
SCAN WIDTH	PER DIVISION
SCAN WIDTH PER DIVISION	20 kHz
TUNING STABILIZER	On
INPUT ATTENUATOR	10 dB
SCAN TIME PER DIVISION	5 MILLISECONDS

ADJUSTMENTS

5-40. 30 MHz Calibration Oscillator Check and Adjustment (con't.)

ANALYZER control settings (cont'd)

LOG·LINEAR	LINEAR
LINEAR SENSITIVITY	1 mV/DIV
SCAN MODE	INT
SCAN TRIGGER	AUTO

8405A:

FREQUENCY RANGE — MHz	20—40
CHANNEL	A
AMPLITUDE RANGE — dB	-30

606B:

RANGE	6
FREQUENCY	30 MHz
MODULATION	CW
ATTENUATOR	30 dB
VERNIER	0 dB

2. Set amplitude of signal generator (as read on vector voltmeter) to exactly -30 dBm with ATTENUATOR VERNIER.

3. Disconnect signal generator from vector voltmeter and connect to analyzer RF INPUT. Adjust analyzer FINE TUNE control to center signal.

4. Adjust signal with LINEAR SENSITIVITY vernier for a 7.0 division reference on CRT display.

5. Disconnect signal generator from RF INPUT. Connect CAL OUTPUT to RF INPUT.

6. Signal Amplitude should be 7.0 division ±0.2 divisions.

6.8_____7.2 div

7. If it is out of limits, peak signal with A6C15 and set signal level to 7.0 division with A6R54 CAL LEVEL.

NOTE

A6 must not be operated on extender board for this adjustment.

8. Measure the Calibrator frequency (see paragraph 4-23). Frequency limits:

29.997_____30.003 MHz

9. If frequency is out of limits, replace A6Y1 and repeat steps 1 through 8.

ADJUSTMENTS

5-41. Analogic Check and Adjustment

REFERENCE: Schematic 17.

DESCRIPTION: The A5R75 THRESH control is adjusted so that under the conditions specified in this test, the DISPLAY UNCAL light comes on. Check the remaining positions of the switches in the table to verify operation of the DISPLAY UNCAL switch matrix.

1. Install the analyzer plug-ins on the two extender cable assemblies, and make the following control settings:

ANALYZER:

VIDEO FILTER . . . . . OFF
SCAN TIME PER DIVISION . . . . . 1 MILLISECOND
SCAN WIDTH . . . . . PER DIVISION
SCAN WIDTH PER DIVISION . . . . . 1 MHz
BANDWIDTH . . . . . 30 kHz

2. With the controls set as in step 1 above, the DISPLAY UNCAL light should be on. If not, adjust A5R75 THRESH control until the light just comes on.

3. Use Table 5-2 below to complete adjusting the THRESH control:

Table 5-2. Analogic Threshold Adjustment

SCAN TIME PER DIVISION	BANDWIDTH	SCAN WIDTH PER DIVISION	DISPLAY UNCAL Light
1 ms	30 kHz	1 MHz	On
2 ms	30 kHz	1 MHz	Off
10 s	1 kHz	10 MHz	On
10 s	1 kHz	5 MHz	Off

CHECKS AND ADJUSTMENTS

5-41. Analogic Test and Adjustment (cont'd)

4. Check operation of DISPLAY UNCAL light using Table 5-3. When the table indicates the DISPLAY UNCAL light to be "off", it is acceptable for light to be "on" if the light subsequently goes "off" when either the SCAN TIME PER DIVISION or the SCAN WIDTH PER DIVISION control is switched one position counterclockwise.

Table 5-3. Display Calibration Conditions

SCAN TIME PER DIVISION	BANDWIDTH	SCAN WIDTH PER DIVISION	DISPLAY UNCAL Light
1 ms	300 kHz	10 MHz	Off
1 ms	100 kHz	10 MHz	On
1 ms	100 kHz	5 MHz	Off
1 ms	30 kHz	5 MHz	On
5 ms	30 kHz	2 MHz	Off
5 ms	10 kHz	2 MHz	On
20 ms	10 kHz	1 MHz	Off
20 ms	3 kHz	1 MHz	On
0.1 s	3 kHz	0.5 MHz	Off
0.1 s	1 kHz	0.5 MHz	On
0.5 s	1 kHz	0.2 MHz	Off
0.5 s	0.3 kHz	0.2 MHz	On
2 s	0.3 kHz	0.1 MHz	Off
2 s	0.1 kHz	0.1 MHz	On
10 s	0.1 kHz	.05 MHz	Off
10 s	.05 kHz	.05 MHz	On
5 s	0.1 kHz	20 kHz	Off
2 s	0.1 kHz	20 kHz	On
2 s	0.1 kHz	10 kHz	Off
1 s	0.1 kHz	10 kHz	On
1 s	0.1 kHz	5 kHz	Off
0.5 s	0.1 kHz	5 kHz	On
0.5 s	0.1 kHz	2 kHz	Off
0.2 s	0.1 kHz	2 kHz	On
0.2 s	0.1 kHz	1 kHz	Off
0.1 s	0.1 kHz	1 kHz	On
0.1 s	0.1 kHz	0.5 kHz	Off
50 ms	0.1 kHz	0.5 kHz	On
50 ms	0.1 kHz	0.2 kHz	Off
20 ms	0.1 kHz	0.2 kHz	On

Table 5-4. Factory Selected Components

Component	Service Sheet	Basis of Selection
A1R16	8	Adjusts 10 kHz Bandwidth amplitude: 750 to 1200 ohms.
A1R38	8	Adjusts 300 kHz Bandwidth amplitude: 10 to 50 ohms.
A3R3	3	Adjusts 47 MHz LO level: 1.5K to 2.15K ohms.
A3R9	3	Adjusts 50 MHz Converter Gain: 18 to 52 ohms (4 ohm/dB change).
A4R125	11	Adjusts overall gain of 8552B for full deflection to Log Ref graticule with −13 dBm input at J6 (LOG REF LEVEL at −10 dBm): 200 to 700 ohms.
A6C13	15	Adjusts scan time at 0.2 to 10 sec/div: 0 to 15 microfarads.
A8R3	12	Optimizes 10 dB gain step: 1.47K to 2.37K.
A10R8 A10R9	11	Insures 10 dB/step attenuation: R8, 6.81K to 16.2K; R9, 21.5K to 51.1K.
A4R25 A4R26	11	Adjusts crystal filter skirt width. If out of specifications, change both resistors. Possible value ranges: R25, 19.6K to 23.7K; R26, 42.2K to 51.1K.
A4R44 A4R45	11	Adjusts crystal filter skirt width. If out of specifications, change both resistors. Possible value ranges: R44, 23.7K to 26.1K; R45, 51.1K to 56.2K.
A4R70 A4R71	11	Adjusts crystal filter skirt width. If out of specifications change both resistors. Possible value ranges: R70, 23.7K to 26.1K; R71, 51.1K to 56.2K.
A4R81 A4R82	11	Adjusts crystal filter skirt width. If out of specifications change both resistors. Possible value ranges: R81, 23.7K to 26.1K; R82, 51.1K to 56.2K.
A12R14	4	Adjusts search loop gain: 0 to 1K ohm.

Table 5-5. Check and Adjustment Test Record

Hewlett-Packard Model 8552
Spectrum Analyzer IF Section

Test Performed by _____
Date _____

Serial No. ____ - _____

Para. No.	Test Description	Measurement Unit	Min	Actual	Max
5-27	**Power Supply Checks and Adjustments**				
	103.5 — 126.5 Line Voltage:				
	+20 Vdc supply	Vdc	+19.90	_____	+20.10
	Ripple	mVrms		_____	0.5
	-10 Vdc supply	Vdc	- 9.99	_____	-10.01
	Ripple	mVp-p		_____	0.02
5-28	**Horizontal Scan Checks & Adjustments**				
	SCAN IN/OUT voltage:				
	Rise Time	ms	50	_____	58
	SCAN TRIGGER . . . . EXT	Vdc	- 4.98	_____	- 5.02
	Scan Amplitude	Vdc	+ 4.9	_____	+ 5.1
5-29	**Final Scan Checks**				
	Scan Linearity Graticule:				
	-5	divisions	- 0.1	_____	+ 0.1
	-4	divisions	- 0.1	_____	+ 0.1
	-3	divisions	- 0.1	_____	+ 0.1
	-2	divisions	- 0.1	_____	+ 0.1
	-1	divisions	- 0.1	_____	+ 0.1
	0	divisions	- 0.1	_____	+ 0.1
	+1	divisions	- 0.1	_____	+ 0.1
	+2	divisions	- 0.1	_____	+ 0.1
	+3	divisions	- 0.1	_____	+ 0.1
	+4	divisions	- 0.1	_____	+ 0.1
	SCAN TRIGGER . . . . EXT	Vp-p	2	_____	20
	EXT SCAN MODE: voltage required for trace	Vp-p	8	_____	
	VIDEO TRIGGER: voltage required for trace	divisions	1.5	_____	
	MANUAL SCAN	divisions	10	_____	
5-30	**Vertical Deflection Amplifier Checks**				
	VERTICAL POSITION control check	divisions	- 2	_____	+ 2
	VERTICAL GAIN control check	divisions	2	_____	
	2 dB LOG: at 0 dB	LOG REF		_____	(√)
	at -10 dB	-50 dB		_____	(√)
	BASE LINE CLIPPER Check: full CW	divisions	2	_____	8

Table 5-5. Check and Adjustment Test Record (cont'd)

Para. No.	Test Description	Measurement Unit	Min	Actual	Max
5-31	**Log/Linear Amplifier Checks & Adjustments**				
	VERTICAL OUTPUT voltage: 7.07 div deflection	Vdc		_____	
	Input Level at XA4-14 / Output at XA8-14				
	- 100 dBm / < 6 mVdc	mVdc		_____	-6
	+ 10 dBm / 800 ±40	mVdc	-840	_____	-760
	0 dBm / 700 ±40	mVdc	-740	_____	-660
	- 10 dBm / 600 ±40	mVdc	-640	_____	-560
	- 20 dBm / 500 ±40	mVdc	-540	_____	-460
	- 30 dBm / 400 ±40	mVdc	-440	_____	-360
	- 40 dBm / 300 ±40	mVdc	-340	_____	-260
	- 50 dBm / 200 ±40	mVdc	-240	_____	-160
	- 60 dBm / 100 ±40	mVdc	-140	_____	- 60
5-32	**300 kHz Bandpass Filter Adjustment**				
	Bandwidth	kHz	240	_____	360
5-33	**LC Filter Adjustment**				
	Gain Check:				
	300 kHz / Reference				
	100 kHz / ±0.4 div	divisions	-0.4	_____	+0.4
	30 kHz / ±0.4 div	divisions	-0.4	_____	+0.4
	10 kHz / ±0.4 div	divisions	-0.4	_____	+0.4
	3 kHz / ±0.4 div	divisions	-0.4	_____	+0.4
	Bandwidth Check:				
	100 kHz	kHz	80	_____	120
	30 kHz	kHz	24	_____	36
	10 kHz	kHz	9.5	_____	10.5
5-34	**Crystal Filter Fine Adjustment**				
	Gain Check:				
	3 kHz : set for 7 div	divisions	6.7	_____	7.3
	1 kHz	divisions	6.7	_____	7.3
	0.3 kHz	divisions	6.7	_____	7.3
	0.1 kHz	divisions	6.7	_____	7.3
	0.03 kHz	divisions	6.5	_____	7.5
	0.01 kHz	divisions	6.0	_____	7.0

Table 5-5. Check and Adjustment Test Record (cont'd)

Para. No.	Test Description	Measurement Unit	Min	Actual	Max
5-34 (cont)	Between 3 kHz and 300 kHz Bandwidth Check:				
	3 kHz	divisions	4.8	_____	7.2
	1 kHz	divisions	4.0	_____	6.0
	0.3 kHz	divisions	4.8	_____	7.2
	0.1 kHz	divisions	4.0	_____	6.0
	.03 kHz	divisions	1.2	_____	1.8
	.01 kHz	divisions	0.4	_____	0.6
	60 dB/3 dB Bandwidth Ratio				
	3 kHz	Ratio		_____	11:1
	1 kHz	Ratio		_____	11:1
	0.3 kHz	Ratio		_____	11:1
	0.1 kHz	Ratio		_____	11:1
	.03 kHz	Ratio		_____	11:1
	.01 kHz	Ratio		_____	11:1
5-35	**Crystal Filter Coarse Adjustment**				
	If necessary	(√)		_____	
5-36	**3 MHz If Gain Log Adjustments**				
	LOG REF LEVEL vernier: -0	Vdc	-0.96	_____	+1.04
	-1	Vdc	-0.96	_____	+1.04
	-2	Vdc	-0.96	_____	+1.04
	-3	Vdc	-0.96	_____	+1.04
	-4	Vdc	-0.96	_____	+1.04
	-5	Vdc	-0.96	_____	+1.04
	-6	Vdc	-0.96	_____	+1.04
	-7	Vdc	-0.96	_____	+1.04
	-8	Vdc	-0.96	_____	+1.04
	-9	Vdc	-0.96	_____	+1.04
	-10	Vdc	-0.96	_____	+1.04
	-11	Vdc	-0.96	_____	+1.04
	-12	Vdc	-0.96	_____	+1.04
	VERTICAL OUTPUT voltage: 7.07 div deflection	Vdc		_____	

Table 5-5. Check and Adjustment Test Record (cont'd)

Para. No.	Test Description	Measurement Unit	Min	Actual	Max
5-36 (cont)	Test Atten. / LOG REF LEVEL / Error Limit				
	10 dB / -10 dBm / 2 mVdc	mVdc	-2	_____	+2
	20 dB / -20 dBm / 2 mVdc	mVdc	-2	_____	+2
	30 dB / -30 dBm / 2 mVdc	mVdc	-2	_____	+2
	40 dB / -40 dBm / 2 mVdc	mVdc	-2	_____	+2
	50 dB / -50 dBm / 2 mVdc	mVdc	-2	_____	+2
	Test Atten. / LINEAR SENSITIVITY / Error Limit				
	43 dB / 0.1 mV/DIV / ±15 mVdc	mVdc	-15	_____	+15
	33 dB / 0.2 mV/DIV / ±15 mVdc	mVdc	-15	_____	+15
	23 dB / 1 mV/DIV / ±15 mVdc	mVdc	-15	_____	+15
	13 dB / 2 mV/DIV / ±15 mVdc	mVdc	-15	_____	+15
	3 dB / 10 mV/DIV / ±15 mVdc	mVdc	-15	_____	+15
5-37	**47 MHz LO Automatic Phase Lock Check and Adjustment**				
	Level at A12TP2	mV p-p	450	_____	850
	Frequency at A12TP2	MHz	44.990	_____	45.010
	Level at C8	V p-p	8.5	_____	11.5
	Level at J8	V p-p	1.5	_____	2.5
	Level at A13TP1	mV p-p	650	_____	1150
	Frequency at A13TP1	kHz	1998	_____	2002
	Frequency Linearity: Positive Offset	divisions	0.75	_____	0.75
	Negative Offset	divisions	0.75	_____	0.75
	No Offset	divisions	0.75	_____	0.75
	APC Error at C8	V dc	+3.6	_____	+4.4
5-38	**50 MHz IF Bandpass Check & Adjustment**				
	Flatness: ±0.2 vertical divisions over 2 horizontal divisions	divisions	-0.2	_____	+0.2
5-39	**44 MHz Rejection Adjustment**				
	44 MHz Rejection >70 dB	dB	70	_____	
5-40	**30 MHz Calibration Oscillator Check & Adjustment**				
	Amplitude	divisions	6.8	_____	7.2
	Frequency	MHz	29.997	_____	30.003

Table 5-5. Check and Adjustment Test Record (cont'd)

Para. No.	Test Description	Measurement Unit	Min	Actual	Max
5-41	**Analogic Check and Adjustment**				
	SCAN TIME / SCAN WIDTH / BAND-WIDTH / DISPLAY UNCAL				
	1 ms / 1 MHz / 30 kHz / On	(√)		_____	
	2 ms / 1 MHz / 30 kHz / Off	(√)		_____	
	10 s / 10 MHz / 1 kHz / On	(√)		_____	
	10 s / 5 MHz / 1 kHz / Off	(√)		_____	

SECTION VI
REPLACEABLE PARTS

6-1. INTRODUCTION

6-2. This section contains information for ordering parts. Table 6-1 is a list of exchange assemblies and Table 6-2 lists abbreviations used in the parts list and throughout the manual. Table 6-3 lists all replaceable parts in reference designator order. Table 6-4 contains names and addresses that correspond to the manufacturer's code numbers.

6-3. EXCHANGE ASSEMBLIES

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

6-5. ABBREVIATIONS

6-6. Table 6-2 gives a list of abbreviations used in the parts list, schematics, and throughout the manual. In some cases, two forms of the abbreviation are given, one all capital letters, and one partial or no capitals. This occurs because the abbreviations in the parts list are always all capitals. However, in the schematics and other parts of the manual, other abbreviation forms are used with both lower case and upper case letters.

6-7. REPLACEABLE PARTS LIST

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

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

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

c. Miscellaneous parts.

d. Illustrated parts breakdown, if appropriate.

The information given for each part consists of the following:

a. The Hewlett-Packard part number.

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

c. The description of the part.

d. The typical manufacturer of the part in a five-digit code.

e. Manufacturer code number for the part.

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

6-9. ORDERING INSTRUCTIONS

6-10. To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number, indicate quantity required, and address the order to the nearest Hewlett-Packard office.

6-11. To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

Table 6-1. Assemblies Available for Module Exchange

Assembly	New Part No.	Exchange Part No.
A2 3 MHz Amplifier	08552-60139	08552-60116
A3 50 MHz Converter	08552-60149	08552-60140
A4 Crystal Filter	08552-60141	08552-60111
A8 Log Amplifier	08552-6056	08552-6007
A12 47 MHz APC	08552-60145	08552-60115

*For module exchange procedure, see Paragraph 8-10.

Table 6-2. Reference Designations and Abbreviations

REFERENCE DESIGNATIONS

A . . . . . assembly
AT . . attenuator; isolator; termination
B . . . . . fan; motor
BT . . . . . battery
C . . . . . capacitor
CP . . . . . coupler
CR . . . . . diode; diode thyristor; varactor
DC . . . directional coupler
DL . . . . . delay line
DS . . . . . annunciator; signaling device (audible or visual); lamp; LED
E . . . . . miscellaneous electrical part
F . . . . . fuse
FL . . . . . filter
H . . . . . hardware
HY . . . . . circulator
J . . . electrical connector (stationary portion); jack
K . . . . . relay
L . . . . . coil; inductor
M . . . . . meter
MP . . . . . miscellaneous mechanical part
P . . . electrical connector (movable portion); plug
Q . . . . . transistor: SCR; triode thyristor
R . . . . . resistor
RT . . . . . thermistor
S . . . . . switch
T . . . . . transformer
TB . . . . . terminal board
TC . . . . . thermocouple
TP . . . . . test point
U . . . . . integrated circuit; microcircuit
V . . . . . electron tube
VR . . . . voltage regulator; breakdown diode
W . . . . cable; transmission path; wire
X . . . . . socket
Y . . . . crystal unit (piezo-electric or quartz)
Z . . . . tuned cavity; tuned circuit

ABBREVIATIONS

A . . . . . ampere
ac . . . . alternating current
ACCESS . . . . . accessory
ADJ . . . . . adjustment
A/D . . . . analog-to-digital
AF . . . . . audio frequency
AFC . . . . . automatic frequency control
AGC . . . . . automatic gain control
AL . . . . . aluminum
ALC . . . . . automatic level control
AM . . . amplitude modulation
AMPL . . . . . amplifier
APC . . . . automatic phase control
ASSY . . . . . assembly
AUX . . . . . auxiliary
avg . . . . . average
AWG . . . . American wire gauge
BAL . . . . . balance
BCD . . . . . binary coded decimal
BD . . . . . board
BE CU . . . . . beryllium copper
BFO . . . . . beat frequency oscillator
BH . . . . . binder head
BKDN . . . . . breakdown
BP . . . . . bandpass
BPF . . . . . bandpass filter
BRS . . . . . brass
BWO . . . . . backward-wave oscillator
CAL . . . . . calibrate
ccw . . counter-clockwise
CER . . . . . ceramic
CHAN . . . . . channel
cm . . . . . centimeter
CMO . . cabinet mount only
COAX . . . . . coaxial
COEF . . . . . coefficient
COM . . . . . common
COMP . . . . . composition
COMPL . . . . . complete
CONN . . . . . connector
CP . . . . . cadmium plate
CRT . . . cathode-ray tube
CTL . . . . complementary transistor logic
CW . . . . . continuous wave
cw . . . . . clockwise
cm . . . . . centimeter
D/A . . . . digital-to-analog
dB . . . . . decibel
dBm . . . . decibel referred to 1 mW
dc . . . . . direct current
deg . . degree (temperature interval or difference)
° . . . . . degree (plane angle)
°C . . . . . degree Celsius (centigrade)
°F . . . . degree Fahrenheit
°K . . . . . degree Kelvin
DEPC . . deposited carbon
DET . . . . . detector
diam . . . . . diameter
DIA . . . diameter (used in parts list)
DIFF AMPL . . differential amplifier
div . . . . . division
DPDT . . . . . double-pole, double-throw
DR . . . . . drive
DSB . . . . double sideband
DTL . . . . diode transistor logic
DVM . . . digital voltmeter
ECL . . . . emitter coupled logic
EMF . . electromotive force
EDP . . . . . electronic data processing
ELECT . . . . . electrolytic
ENCAP . . . . encapsulated
EXT . . . . . external
F . . . . . farad
FET . . . . . field-effect transistor
F/F . . . . . flip-flop
FH . . . . . flat head
FIL H . . . . . fillister head
FM . . frequency modulation
FP . . . . . front panel
FREQ . . . . . frequency
FXD . . . . . fixed
g . . . . . gram
GE . . . . . germanium
GHz . . . . . gigahertz
GL . . . . . glass
GRD . . . . . ground(ed)
H . . . . . henry
h . . . . . hour
HET . . . . . heterodyne
HEX . . . . . hexagonal
HD . . . . . head
HDW . . . . . hardware
HF . . . . . high frequency
HG . . . . . mercury
HI . . . . . high
HP . . . . . Hewlett-Packard
HPF . . . . . high pass filter
HR . . . . . hour (used in parts list)
HV . . . . . high voltage
Hz . . . . . Hertz
IC . . . . integrated circuit
ID . . . . . inside diameter
IF . . . . . intermediate frequency
IMPG . . . . . impregnated
in . . . . . inch
INCD . . . . . incandescent
INCL . . . . . include(s)
INP . . . . . input
INS . . . . . insulation
INT . . . . . internal
kg . . . . . kilogram
kHz . . . . . kilohertz
kΩ . . . . . kilohm
kV . . . . . kilovolt
lb . . . . . pound
LC . . . . . inductance-capacitance
LED . . light-emitting diode
LF . . . . . low frequency
LG . . . . . long
LH . . . . . left hand
LIM . . . . . limit
LIN . . . linear taper (used in parts list)
lin . . . . . linear
LK WASH . . . lock washer
LO . . . low; local oscillator
LOG . . . . logrithmic taper (used in parts list)
log . . . . . logrithm(ic)
LPF . . . . . low pass filter
LV . . . . . low voltage
m . . . . . meter (distance)
mA . . . . . milliampere
MAX . . . . . maximum
MΩ . . . . . megohm
MEG . . . . meg (10^6) (used in parts list)
MET FLM . . . . metal film
MET OX . . metallic oxide
MF . . . medium frequency; microfarad (used in parts list)
MFR . . . . . manufacturer
mg . . . . . milligram
MHz . . . . . megahertz
mH . . . . . millihenry
mho . . . . . mho
MIN . . . . . minimum
min . . . . . minute (time)
. . .' . . . . . minute (plane angle)
MINAT . . . . . minature
mm . . . . . millimeter

NOTE

All abbreviations in the parts list will be in upper-case.

Table 6-2. Reference Designations and Abbreviations (cont'd)

MOD . . . . . modulator
MOM . . . . . momentary
MOS . . . . . metal-oxide semiconductor
ms . . . . . millisecond
MTG . . . . . mounting
MTR . . . meter (indicating device)
mV . . . . . millivolt
mVac . . . . . millivolt, ac
mVdc . . . . . millivolt, dc
mVpk . . . . millivolt, peak
mVp-p . . . millivolt, peak-to-peak
mVrms . . . . millivolt, rms
mW . . . . . milliwatt
MUX . . . . . multiplex
MY . . . . . mylar
μA . . . . . microampere
μF . . . . . microfarad
μH . . . . . microhenry
μmho . . . . . micromho
μs . . . . . microsecond
μV . . . . . microvolt
μVac . . . . . microvolt, ac
μVdc . . . . . microvolt, dc
μVpk . . . microvolt, peak
μVp-p . . . microvolt, peak-to-peak
μVrms . . . . microvolt, rms
μW . . . . . microwatt
nA . . . . . nanoampere
NC . . . . . no connection
N/C . . . . normally closed
NE . . . . . neon
NEG . . . . . negative
nF . . . . . nanofarad
NI PL . . . . . nickel plate
N/O . . . . . normally open
NOM . . . . . nominal
NORM . . . . . normal
NPN . . . negative-positive-negative
NPO . . . . negative-positive zero (zero temperature coefficient)
NRFR . . not recommended for field replacement
NSR . . . . . not separately replaceable
ns . . . . . nanosecond
nW . . . . . nanowatt
OBD . . . order by description
OD . . . . . outside diameter
OH . . . . . oval head
OP AMPL . . . operational amplifier
OPT . . . . . option
OSC . . . . . oscillator
OX . . . . . oxide
oz . . . . . ounce
Ω . . . . . ohm
P . . . . peak (used in parts list)
PAM . . . . pulse-amplitude modulation
PC . . . . . printed circuit
PCM . . pulse-code modulation; pulse-count modulation
PDM . . . . . pulse-duration modulation
pF . . . . . picofarad
PH BRZ phosphor bronze
PHL . . . . . Phillips
PIN . . . positive-intrinsic-negative
PIV . . . . . peak inverse voltage
pk . . . . . peak
PL . . . . . phase lock
PLO . . . . . phase lock oscillator
PM . . . . phase modulation
PNP . . . positive-negative-positive
P/O . . . . . part of
POLY . . . . . polystyrene
PORC . . . . . porcelain
POS . . positive; position(s) (used in parts list)
POSN . . . . . position
POT . . . . . potentiometer
p-p . . . . . peak-to-peak
PP . . . peak-to-peak (used in parts list)
PPM . . . . . pulse-position modulation
PREAMPL . . . preamplifier
PRF . . . . pulse-repetition frequency
PRR . . . . pulse repetition rate
ps . . . . . picosecond
PT . . . . . point
PTM . . . . . pulse-time modulation
PWM . . . . . pulse-width modulation
PWV . . . . . peak working voltage
RC . . . . . resistance-capacitance
RECT . . . . . rectifier
REF . . . . . reference
REG . . . . . regulated
REPL . . . . . replaceable
RF . . . . . radio frequency
RFI . . . . radio frequency interference
RH . . . . round head; right hand
RLC . . . . . resistance-inductance-capacitance
RMO . . . rack mount only
rms . . . . root-mean-square
RND . . . . . round
ROM . . read-only memory
R&P . . . . . rack and panel
RWV . . . reverse working voltage
S . . . scattering parameter
s . . . . . second (time)
. . . " . second (plane angle)
S-B . . . . . slow-blow (fuse) (used in parts list)
SCR . . . silicon controlled rectifier; screw
SE . . . . . selenium
SECT . . . . . sections
SEMICON . . . . . semiconductor
SHF . . . . . superhigh frequency
SI . . . . . silicon
SIL . . . . . silver
SL . . . . . slide
SNR . . signal-to-noise ratio
SPDT . . . . . single-pole, double-throw
SPG . . . . . spring
SR . . . . . split ring
SPST . . . . . single-pole, single-throw
SSB . . . . . single sideband
SST . . . . . stainless steel
STL . . . . . steel
SQ . . . . . square
SWR . . standing-wave ratio
SYNC . . . . . synchronize
T . . timed (slow-blow fuse)
TA . . . . . tantalum
TC . . . . . temperature compensating
TD . . . . . time delay
TERM . . . . . terminal
TFT . . thin-film transistor
TGL . . . . . toggle
THD . . . . . thread
THRU . . . . . through
TI . . . . . titanium
TOL . . . . . tolerance
TRIM . . . . . trimmer
TSTR . . . . . transistor
TTL . . transistor-transistor logic
TV . . . . . television
TVI television interference
TWT . . traveling wave tube
U . . . . . micro (10^{-6}) (used in parts list)
UF . . . microfarad (used in parts list)
UHF . . ultrahigh frequency
UNREG . . . . unregulated
V . . . . . volt
VA . . . . . voltampere
Vac . . . . . volts, ac
VAR . . . . . variable
VCO . . . voltage-controlled oscillator
Vdc . . . . . volts, dc
VDCW . . volts, dc, working (used in parts list)
V(F) . . . . . volts, filtered
VFO . . variable-frequency oscillator
VHF . . . . . very-high frequency
Vpk . . . . . volts, peak
Vp-p . . volts, peak-to-peak
Vrms . . . . . volts, rms
VSWR . . . voltage standing wave ratio
VTO . . . . . voltage-tuned oscillator
VTVM . . . . vacuum-tube voltmeter
V(X) . . . . . volts, switched
W . . . . . watt
W/ . . . . . with
WIV . . . . working inverse voltage
WW . . . . . wirewound
W/O . . . . . without
YIG . . yttrium-iron-garnet
Z_o . . . . . characteristic impedance

NOTE

All abbreviations in the parts list will be in upper-case.

MULTIPLIERS

Abbreviation	Prefix	Multiple
T	tera	10^{12}
G	giga	10^{9}
M	mega	10^{6}
k	kilo	10^{3}
da	deka	10
d	deci	10^{-1}
c	centi	10^{-2}
m	milli	10^{-3}
μ	micro	10^{-6}
n	nano	10^{-9}
p	pico	10^{-12}
f	femto	10^{-15}
a	atto	10^{-18}

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	08552-60109	1	BOARD ASSY:LC FILTER	28480	08552-60109
A1C1	0160-2055	92	C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C2	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C3	0160-3024	4	C:FXD MICA 1700 PF 1% 100VDCW	28480	0160-3024
A1C4	0121-0105	9	C:VAR CER 9-35 PF NPO	28480	0121-0105
A1C5	0160-3132	4	C:FXD CER 200 PF 10% 500VDCW	00656	CN-19-201K N750
A1C6	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C7	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C8	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C9	0160-3024		C:FXD MICA 1700 PF 1% 100VDCW	28480	0160-3024
A1C10	0121-0105		C:VAR CER 9-35 PF NPO	28480	0121-0105
A1C11	0160-3132		C:FXD CER 200 PF 10% 500VDCW	00656	CN-19-201K N750
A1C12	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C13	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C14	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C15	0160-3024		C:FXD MICA 1700 PF 1% 100VDCW	28480	0160-3024
A1C16	0121-0105		C:VAR CER 9-35 PF NPO	28480	0121-0105
A1C17	0160-3132		C:FXD CER 200 PF 10% 500VDCW	00656	CN-19-201K N750
A1C18	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C19	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C20	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C21	0160-3024		C:FXD MICA 1700 PF 1% 100VDCW	28480	0160-3024
A1C22	0121-0105		C:VAR CER 9-35 PF NPO	28480	0121-0105
A1C23	0160-3132		C:FXD CER 200 PF 10% 500VDCW	00656	CN-19-201K N750
A1C24	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C25	0180-0116	17	C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A1C26	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A1C27	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C28	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C29	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C30			NOT ASSIGNED		
A1C31	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C32	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C33	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C34	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C35	0160-2201	4	C:FXD MICA 51 PF 5%	72136	RDM15E510J1C
A1C36	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C37	0160-2150	4	C:FXD MICA 33 PF 5%	28480	0160-2150
A1C38	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A1C39	0160-3460	16	C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A1C40	0160-2150		C:FXD MICA 33 PF 5%	28480	0160-2150
A1C41	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A1C42	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A1C43	0160-3060	10	C:FXD CER 0.1 UF 20% 25VDCW	56289	3C42A-CML
A1C44	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A1CR1	1901-0040	86	DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR2	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR3	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR4	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR5	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR6	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR7	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR8	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR9	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR10	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR11	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR12	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR13	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR14	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR15	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR16	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR17	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR18	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR19	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR20	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR21	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1CR22	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A1L1	9140-0237	11	COIL:FXD 200 UH 5%	28480	9140-0237
A1L2	9140-0237		COIL:FXD 200 UH 5%	28480	9140-0237
A1L3	08552-6025	4	INDUCTOR:LC FILTER	28480	08552-6025
A1L4	08552-6025		INDUCTOR:LC FILTER	28480	08552-6025
A1L5	08552-6025		INDUCTOR:LC FILTER	28480	08552-6025
A1L6	08552-6025		INDUCTOR:LC FILTER	28480	08552-6025

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1L7	9140-0137	2	COIL:FXD RF 1000 UH 5%	28480	9140-0137
A1L8	9100-1630	2	COIL/CHOKE 51.0 UH 5%	28480	9100-1630
A1L9	9140-0237		COIL:FXD 200 UH 5%	28480	9140-0237
A1L10	9140-0210	5	COIL/CHOKE 100 UH 5%	82142	15-1315-12J
A1Q1	1854-0071	39	TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A1Q2	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A1Q3	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A1Q4	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A1Q5	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A1Q6	1853-0020	27	TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A1Q7	1854-0019	12	TSTR:SI NPN	28480	1854-0019
A1R1	0757-0438	21	R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A1R2	0757-0428	8	R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A1R3	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A1R4	0698-3153	4	R:FXD MET FLM 3.83K OHM 1% 1/8W	28480	0698-3153
A1R5	0698-3445	7	R:FXD MET FLM 348 OHM 1% 1/8W	28480	0698-3445
A1R6	0757-0401	26	R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A1R7	0757-0421	2	R:FXD MET FLM 825 OHM 1% 1/8W	28480	0757-0421
A1R8	0698-0084	14	R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A1R9	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A1R10	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A1R11	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A1R12	0698-3153		R:FXD MET FLM 3.83K OHM 1% 1/8W	28480	0698-3153
A1R13	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A1R14	0698-3445		R:FXD MET FLM 348 OHM 1% 1/8W	28480	0698-3445
A1R15	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A1R16	0757-0421	3	R:FXD MET FLM 825 OHM 1% 1/8W	28480	0757-0421
A1R16			FACTORY SELECTED PART		
A1R17	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A1R18	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A1R19	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A1R20	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A1R21	0698-3153		R:FXD MET FLM 3.83K OHM 1% 1/8W	28480	0698-3153
A1R22	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A1R23	0698-3445		R:FXD MET FLM 348 OHM 1% 1/8W	28480	0698-3445
A1R24	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A1R25	0757-0421		R:FXD MET FLM 825 OHM 1% 1/8W	28480	0757-0421
A1R26	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A1R27	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A1R28	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A1R29	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A1R30	0698-3153		R:FXD MET FLM 3.83K OHM 1% 1/8W	28480	0698-3153
A1R31	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A1R32	0757-0420	8	R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A1R33	0698-3445		R:FXD MET FLM 348 OHM 1% 1/8W	28480	0698-3445
A1R34	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A1R35	2100-1757	4	R:VAR WW 500 OHM 5% TYPE V 1W	28480	2100-1757
A1R36	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A1R37	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A1R38	0698-4087	1	R:FXD MET FLM 24.6 OHM 1% 1/8W	28480	0698-4087
A1R38			FACTORY SELECTED PART		
A1R39	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A1R40	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A1R41	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A1R42	0757-0440	10	R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A1R43	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A1R44	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A1R45	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A1R46	0757-0280	39	R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R47	0757-0421		R:FXD MET FLM 825 OHM 1% 1/8W	28480	0757-0421
A1R48	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A1R49	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A1R50	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A1R51	0698-3157	6	R:FXD MET FLM 19.6K OHM 1% 1/8W	28480	0698-3157
A1R52	0698-3442	1	R:FXD MET FLM 237 OHM 1% 1/8W	28480	0698-3442
A1R53	0757-0416	10	R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A1R54	0698-3429	2	R:FXD MET FLM 19.6 OHM 1% 1/8W	28480	0698-3429
A1R55	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A1R56	0698-4037	1	R:FXD MET FLM 46.4 OHM 1% 1/8W	28480	0698-4037
A1R57	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R58	2100-1755	4	R:VAR WW 100 OHM 5% TYPE V 1W	28480	2100-1755
A1R59	2100-1756	3	R:VAR WW 200 OHM 5% TYPE V 1W	28480	2100-1756
A1R60	0698-3443	3	R:FXD MET FLM 287 OHM 1% 1/8W	28480	0698-3443
A1R61	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R62	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1TP1 THRU A1TP5	0360-1514	26	TERMINAL PIN:SQUARE	28480	0360-1514

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2	08552-60116	1	BOARD ASSY:3 MHZ AMPLIFIER	28480	08552-60116
A2	08552-60139	1	EXCHANGE ASSY:3 MHZ AMPLIFIER	28480	08552-60139
	0380-0863	2	STANDOFF:1/8" LG	06540	9531-125-BC440-0
A2C1	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A2C2	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A2C3	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C4	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C5	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C6-A2C9			NOT ASSIGNED		
A2C10	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C11	0180-0291	4	C:FXD ELECT 1.0 UF 10% 35VDCW	56289	150D105X9035A2-DYS
A2C12	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C13	0122-0221	2	C:VOLTAGE VAR 100 PF 10% 30VDCW	28480	0122-0221
A2C14	0140-0205	7	C:FXD MICA 62 PF 5% 300VDCW	00853	RDM15E620J3C
A2C15	0122-0211	1	C:VOLTAGE VAR 39 PF 1N4810A	28480	0122-0211
A2C16	0122-0221		C:VOLTAGE VAR 100 PF 10% 30VDCW	28480	0122-0221
A2C17	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C18	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C19	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C20	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C21	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C22	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C23	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C24	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C25	0140-0205		C:FXD MICA 62 PF 5% 300VDCW	00853	RDM15E620J3C
A2C26	0160-2257	3	C:FXD CER 10 PF 5% 500VDCW	72982	301-000-COH0-100J
A2C27	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C28	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C29	0140-0205		C:FXD MICA 62 PF 5% 300VDCW	00853	RDM15E620J3C
A2C30	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C31	0122-0043	2	C:VOLTAGE VAR 39-17.95PF 2% 4-25VDCW	28480	0122-0043
A2C32	0122-0044	2	C:VOLTAGE VAR 100-45.9PF 2% 4-25VDCW	28480	0122-0044
A2C33	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C34	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C35	0180-0291		C:FXD ELECT 1.0 UF 10% 35VDCW	56289	150D105X9035A2-DYS
A2C36	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C37			NOT ASSIGNED		
A2C38	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C39	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C40	0122-0043		C:VOLTAGE VAR 39-17.95PF 2% 4-25VDCW	28480	0122-0043
A2C41	0122-0044		C:VOLTAGE VAR 100-45.9PF 2% 4-25VDCW	28480	0122-0044
A2C42	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2C43	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A2CR1	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR2	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR3	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR4	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR5	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR6	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR7	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR8	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR9	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR10	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR11	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2CR12	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A2L1	9140-0237		COIL:FXD 200 UH 5%	28480	9140-0237
A2L2	9140-0237		COIL:FXD 200 UH 5%	28480	9140-0237
A2L3	9140-0237		COIL:FXD 200 UH 5%	28480	9140-0237
A2L4	9140-0237		COIL:FXD 200 UH 5%	28480	9140-0237
A2L5	9140-0237		COIL:FXD 200 UH 5%	28480	9140-0237
A2L6-A2L9			NOT ASSIGNED		
A2L10	9100-1611	2	COIL:FXD 0.22 UH 20%	28480	9100-1611
A2L11	9100-1636	2	COIL/CHOKE 110 UH 5%	28480	9100-1636
A2L12	9140-0137		COIL:FXD RF 1000 UH 5%	28480	9140-0137
A2L13	9100-1611		COIL:FXD 0.22 UH 20%	28480	9100-1611
A2Q1	1854-0092	2	TSTR:SI NPN	80131	2N3563
A2Q2	1853-0010	9	TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010
A2Q3	1853-0010		TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010
A2Q4	1854-0092		TSTR:SI NPN	80131	2N3563
A2Q5	1853-0010		TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010
A2Q6	1853-0010		TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010
A2Q7	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A2Q8	1853-0010		TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2Q9	1853-0010		TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010
A2Q10	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A2R1	2100-1755		R:VAR WW 100 OHM 5% TYPE V 1W	28480	2100-1755
A2R2	0698-3151	1	R:FXD MET FLM 2.87K OHM 1% 1/8W	28480	0698-3151
A2R3	0757-0199	8	R:FXD MET FLM 21.5K OHM 1% 1/8W	28480	0757-0199
A2R4	0757-0447	4	R:FXD MET FLM 16.2K OHM 1% 1/8W	28480	0757-0447
A2R5	0757-0442	13	R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2R6	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2R7	0698-3162	5	R:FXD MET FLM 46.4K OHM 1% 1/8W	28480	0698-3162
A2R8	0757-1094	4	R:FXD MET FLM 1.47K OHM 1% 1/8W	28480	0757-1094
A2R9	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A2R10	0757-0279	14	R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A2R11	0757-0346	8	R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A2R12	0698-3446	10	R:FXD MET FLM 383 OHM 1% 1/8W	28480	0698-3446
A2R13	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2R14	0698-3428	2	R:FXD MET FLM 14.7 OHM 1% 1/8W	28480	0698-3428
A2R15	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A2R16	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A2R17	0757-0199		R:FXD MET FLM 21.5K OHM 1% 1/8W	28480	0757-0199
A2R18	0757-0276	4	R:FXD MET FLM 61.9 OHM 1% 1/8W	28480	0757-0276
A2R19	0757-1094		R:FXD MET FLM 1.47K OHM 1% 1/8W	28480	0757-1094
A2R20	0757-0418	6	R:FXD MET FLM 619 OHM 1% 1/8W	28480	0757-0418
A2R21	2100-1757		R:VAR WW 500 OHM 5% TYPE V 1W	28480	2100-1757
A2R22	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A2R23	0698-3441	7	R:FXD MET FLM 215 OHM 1% 1/8W	28480	0698-3441
A2R24	2100-1755		R:VAR WW 100 OHM 5% TYPE V 1W	28480	2100-1755
A2R25	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A2R26	0757-0276		R:FXD MET FLM 61.9 OHM 1% 1/8W	28480	0757-0276
A2R27	2100-1754	1	R:VAR WW 50 OHM 5% TYPE V 1W	28480	2100-1754
A2R28	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A2R29	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A2R30	0698-3441		R:FXD MET FLM 215 OHM 1% 1/8W	28480	0698-3441
A2R31	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A2R32	0698-3446		R:FXD MET FLM 383 OHM 1% 1/8W	28480	0698-3446
A2R33	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A2R34	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A2R35	0757-0199		R:FXD MET FLM 21.5K OHM 1% 1/8W	28480	0757-0199
A2R36	0757-0460	6	R:FXD MET FLM 61.9K OHM 1% 1/8W	28480	0757-0460
A2R37	0757-1094		R:FXD MET FLM 1.47K OHM 1% 1/8W	28480	0757-1094
A2R38	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A2R39	0698-3446		R:FXD MET FLM 383 OHM 1% 1/8W	28480	0698-3446
A2R40	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A2R41	0698-3428		R:FXD MET FLM 14.7 OHM 1% 1/8W	28480	0698-3428
A2R42	0757-0199		R:FXD MET FLM 21.5K OHM 1% 1/8W	28480	0757-0199
A2R43	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A2R44	2100-1760	4	R:VAR WW 5K OHM 5% TYPE V 1W	28480	2100-1760
A2R45	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A2R46	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2R47	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2R48	0757-0288	1	R:FXD MET FLM 9.09K OHM 1% 1/8W	28480	0757-0288
A2R49	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A2R50	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A2R51	2100-1758	2	R:VAR WW 1K OHM 5% TYPE V 1W	28480	2100-1758
A2R52	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A2R53	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A2R54	0757-0199		R:FXD MET FLM 21.5K OHM 1% 1/8W	28480	0757-0199
A2R55	0698-3162		R:FXD MET FLM 46.4K OHM 1% 1/8W	28480	0698-3162
A2R56	0698-3162		R:FXD MET FLM 46.4K OHM 1% 1/8W	28480	0698-3162
A2R57	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A2R58	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A2R59			NOT ASSIGNED		
A2R60	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A2R61	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A2TP1 THRU A2TP4	0360-0124	25	TERMINAL:SOLDER LUG	28480	0360-0124
A2Z1	9170-0847		CORE,MAG,SHIELDING BEAD .130D.047 ID	02114	56-590-65/38
A2A1	08552-60129	1	BOARD ASSY:300 KHZ	28480	08552-60129
A2A1C1	0160-3046	1	C:FXD MICA 250 PF 1% 100VDCW	28480	0160-3046
A2A1C2	0160-3047	1	C:FXD MICA 3280 PF 1% 100VDCW	28480	0160-3047
A2A1C3	0160-3045	1	C:FXD MICA 53.8 PF 1% 100VDCW	28480	0160-3045
A2A1C4	0160-3048	2	C:FXD MICA 8000 PF 1% 100VDCW	28480	0160-3048
A2A1L1	9100-2744	1	COIL/CHOKE 7.8 UH 2%	82142	10132-17
A2A1L2	08552-6012	1	INDUCTOR:300 KHZ FILTER #2	28480	08552-6012
A2A1L3	9100-2476	1	COIL/CHOKE 52.3 UH 1%	82142	10176-40

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2A1L4	08552-6011	1	INDUCTOR:300 KHZ FILTER #1	28480	08552-6011
A2A1MP1	08552-00113	1	FILTER CAN ASSY:300 KHZ	28480	08552-00113
A2A1MP2	08552-00112	1	FILTER COVER ASSY:300 KHZ	28480	08552-00112
A2A1MP3	08552-00123	1	INSULATOR:300 KHZ FILTER	28480	08552-00123
A3	08552-60149	1	BOARD ASSY:50 MHZ CONVERTER	28480	08552-60149
A3	08552-60140	1	EXCHANGE ASSY:50 MHZ CONVERTER	28480	08552-60140
A3C1	0160-3456	21	C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3C2	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3C3	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3C4	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A3C5			NOT ASSIGNED		
A3C6	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A3C7	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3C8	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3C9	0160-2142	1	C:FXD CER 1500 PF +100-0% 500VDCW	91418	TYPE SM
A3C10	0160-2307	1	C:FXD MICA 47 PF 5%	28480	0160-2307
A3C11	0121-0059	4	C:VAR CER 2-8 PF 300VDCW	28480	0121-0059
A3C12	0160-2254	3	C:FXD CER 7.5 PF 500VDCW	72982	301-000-C0H0-759C
A3C13	0160-2254		C:FXD CER 7.5 PF 500VDCW	72982	301-000-C0H0-759C
A3C14	0121-0059		C:VAR CER 2-8 PF 300VDCW	28480	0121-0059
A3C15	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3C16	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3C17	0160-2201		C:FXD MICA 51 PF 5%	72136	RDM15E510J1C
A3C18	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3C19	0121-0059		C:VAR CER 2-8 PF 300VDCW	28480	0121-0059
A3C20	0160-2254		C:FXD CER 7.5 PF 500VDCW	72982	301-000-C0H0-759C
A3CR1	1901-0050	7	DIODE:SI 200 MA AT 1V	07263	FDA 6308
A3CR2	1901-0050		DIODE:SI 200 MA AT 1V	07263	FDA 6308
A3CR3	1901-0050		DIODE:SI 200 MA AT 1V	07263	FDA 6308
A3CR4	1901-0050		DIODE:SI 200 MA AT 1V	07263	FDA 6308
A3L1	9140-0114	2	COIL:FXD RF 10 UH	28480	9140-0114
A3L2	9140-0129	4	COIL:FXD RF 220 UH	28480	9140-0129
A3L3	9140-0129		COIL:FXD RF 220 UH	28480	9140-0129
A3L4	9100-0346	1	COIL:FXD 0.05 UH 20%	36196	H-10886
A3L5	9140-0096	4	COIL/CHOKE 1.00 UH 10%	99800	1537-12
A3L6	9140-0096		COIL/CHOKE 1.00 UH 10%	99800	1537-12
A3L7	9140-0114		COIL:FXD RF 10 UH	28480	9140-0114
A3L8	9140-0096		COIL/CHOKE 1.00 UH 10%	99800	1537-12
A3L9	9140-0096		COIL/CHOKE 1.00 UH 10%	99800	1537-12
A3Q1	1854-0247	1	TSTR:SI NPN	28480	1854-0247
A3Q2	1853-0089	1	TSTR:SI PNP	80131	2N4917
A3R1	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A3R2	0698-3155	1	R:FXD MET FLM 4.64K OHM 1% 1/8W	28480	0698-3155
A3R3	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A3R4	0757-0159	1	R:FXD MET FLM 1000 OHM 1% 1/2W	28480	0757-0159
A3R5	0698-3429		R:FXD MET FLM 19.6 OHM 1% 1/8W	28480	0698-3429
A3R6	0698-3441		R:FXD MET FLM 215 OHM 1% 1/8W	28480	0698-3441
A3R7	0757-1092	1	R:FXD MET FLM 287 OHM 1% 1/2W	28480	0757-1092
A3R8	0698-3438	2	R:FXD MET FLM 147 OHM 1% 1/8W	28480	0698-3438
A3R8			FACTORY SELECTED PART		
A3R9	0698-3433	1	R:FXD MET FLM 28.7 OHM 1% 1/8W	28480	0698-3433
A3R9			FACTORY SELECTED PART		
A3R10	0757-0180	1	R:FXD MET FLM 31.6 OHM 1% 1/8W	28480	0757-0180
A3R11	0757-0394	8	R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A3R12	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A3R13	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A3R14	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A3R15	0757-0398	1	R:FXD MET FLM 75 OHM 1% 1/8W	28480	0757-0398
A3R16	0698-0082	3	R:FXD MET FLM 464 OHM 1% 1/8W	28480	0698-0082
A3R17	0757-0465	12	R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A3T1	08552-80105	2	TRANSFORMER:RF 5 PIN	50436	08552-80105
A3T2	08552-6044	2	TRANSFORMER:RF 5 PIN	50436	08552-6044
A3T3	08552-80105		TRANSFORMER:RF 5 PIN	50436	08552-80105
A3T4	08552-6044		TRANSFORMER:RF 5 PIN	50436	08552-6044
A3A1	08552-60148	1	FILTER ASSY:50 MHZ	50436	08552-60148
A3A1			SEALED UNIT:NRFR		
A3A1C1	0160-0778	2	C:FXD CER 56 PF 10% 500VDCW	01121	FR28
A3A1C2	0160-2236	1	C:FXD CER 1.0 PF 500VDCW	72982	301-000-C0K0-109C
A3A1C3	0160-0145	2	C:FXD MICA 82 PF 2% 100VDCW	84171	RDM15E820G1S
A3A1C4	0160-2258	4	C:FXD CER 11 PF 5% 500VDCW	72982	301-000-C0G0-110J
A3A1C5	0121-0036	10	C:VAR CER 5.5-18 PF	28480	0121-0036
A3A1C6	0121-0036		C:VAR CER 5.5-18 PF	28480	0121-0036
A3A1C7	0160-2258		C:FXD CER 11 PF 5% 500VDCW	72982	301-000-C0G0-110J
A3A1C8	0160-2258		C:FXD CER 11 PF 5% 500VDCW	72982	301-000-C0G0-110J

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3A1C9	0121-0036		C:VAR CER 5.5-18 PF	28480	0121-0036
A3A1C10	0121-0036		C:VAR CER 5.5-18 PF	28480	0121-0036
A3A1C11	0160-2258		C:FXD CER 11 PF 5% 500VDCW	72982	301-000-C0G0-110J
A3A1C12	0160-0145		C:FXD MICA 82 PF 2% 100VDCW	84171	RDM15E820G1S
A3A1C13	0160-0778		C:FXD CER 56 PF 10% 500VDCW	01121	FB2B
A3A1J1	1250-0829	1	CONNECTOR:RF 50-OHM SCREW ON TYPE	98291	50-045-4610
A3A1L1	08552-6023	2	INDUCTOR ASSY:AIR CORE	28480	08552-6023
A3A1L2	08552-6017	7	INDUCTOR ASSY:50 MHZ	28480	08552-6017
A3A1L3	08552-6023		INDUCTOR ASSY:AIR CORE	28480	08552-6023
A3A1MP1	08552-00127	1	SHIELD CAN:50 MHZ FILTER	28480	08552-00127
A3A1MP2	08552-0022	2	SHIELD COVER:47 MHZ OSC	28480	08552-0022
A3A1MP3	08552-0023	2	INSULATOR:47 MHZ OSC	28480	08552-0023
A3A2	08552-60112	1	OSCILLATOR ASSY:47 MHZ	50436	08552-60112
A3A2			SEALED UNIT:NREF		
	0380-0810	4	STANDOFF:0.437" LG	01255	153087/16-11
A3A2C1	0122-0263	1	C:VOLTAGE VAR 47 PF 10% 60WV	04713	1N5148
A3A2C2	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3A2C3	0160-2200	1	C:FXD MICA 43 PF 5%	72136	RDM15E430J3C
A3A2C4	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3A2C5	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A3A2C6	0160-2261	1	C:FXD CER 15 PF 5% 500VDCW	72982	301-NP0-15 PF
A3A2C7	0160-2265	2	C:FXD CER 22 PF 5% 500VDCW	72982	301-NP0-22PF
A3A2C8	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3A2C9	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3A2C10	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3A2C11	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3A2C12	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3A2C13	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A3A2C14	0160-0134	2	C:FXD MICA 220PF 5% 300VDCW	14655	RDM15F221J3C
A3A2C15	0160-2199	2	C:FXD MICA 30 PF 5% 300VDCW	28480	0160-2199
A3A2CR1	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A3A2CR2	1902-0041	2	DIODE:BREAKDOWN 5.11V 5%	04713	SZ10939-98
A3A2CR3	1902-0041		DIODE:BREAKDOWN 5.11V 5%	04713	SZ10939-98
A3A2J1	1250-1194	1	CONNECTOR:RF BULKHEAD RECEPTACLE	98291	52-045-4610
A3A2L1	08552-80103	1	INDUCTOR ASSY:47 MHZ OSCILLATOR	28480	08552-80103
A3A2L2	9100-2258	1	COIL/CHOKE 1.20UH 10%	28480	9100-2258
A3A2MP1	0340-0038	5	FEEDTHRU:TERMINAL	28480	0340-0038
A3A2MP2	0340-0039	5	INSULATOR:BUSHING	28480	0340-0039
A3A2MP3	08552-00114	1	SHIELD CAN:47 MC OSCILLATOR	28480	08552-00114
A3A2MP4	08552-0022		SHIELD COVER:47 MHZ OSC	28480	08552-0022
A3A2MP5	08552-0023		INSULATOR:47 MHZ OSC	28480	08552-0023
A3A2Q1	1854-0238	1	TSTR:SI NPN	80131	2N3933
A3A2Q2	1853-0038	1	TSTR:SI PNP	28480	1853-0038
A3A2Q3	1854-0019		TSTR:SI NPN	28480	1854-0019
A3A2Q3	1205-0037	2	HEAT SINK:TRANSISTOR	28480	1205-0037
A3A2Q4	1854-0019		TSTR:SI NPN	28480	1854-0019
A3A2Q4	1205-0037		HEAT SINK:TRANSISTOR	28480	1205-0037
A3A2R1	0698-3157		R:FXD MET FLM 19.6K OHM 1% 1/8W	28480	0698-3157
A3A2R2	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A3A2R3	0757-0278	2	R:FXD MET FLM 1.78K OHM 1% 1/8W	28480	0757-0278
A3A2R4	0757-0405	4	R:FXD MET FLM 162 OHM 1% 1/8W	28480	0757-0405
A3A2R5	0698-3441		R:FXD MET FLM 215 OHM 1% 1/8W	28480	0698-3441
A3A2R6	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A3A2R7	0757-0401	1	R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A3A2R8	0757-0403		R:FXD MET FLM 121 OHM 1% 1/8W	28480	0757-0403
			IF REPLACING EITHER/OR A3A2R7,8, REPLACE BOTH		
A3A2R9	0757-0417	1	R:FXD MET FLM 562 OHM 1% 1/8W	28480	0757-0417
A3A2R10	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A3A2R11	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A3A2R12	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A3A2R13	0757-0379	1	R:FXD MET FLM 12.1 OHM 1% 1/8W	28480	0757-0379
A3A2R14	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A3A2R15	0757-0402	3	R:FXD MET FLM 110 OHM 1% 1/8W	28480	0757-0402
A3A2R16	0698-3441		R:FXD MET FLM 215 OHM 1% 1/8W	28480	0698-3441
A3A2T1	08552-80102	1	INDUCTOR ASSY:47 MHZ OUT	28480	08552-80102
A4	08552-60111	1	BOARD ASSY:CRYSTAL FILTER	28480	08552-60111
A4	08552-60141	1	EXCHANGE ASSY:CRYSTAL FILTER	28480	08552-60141
A4C1	0150-0121	3	C:FXD CER 0.1 UF +80-20% 50VDCW	56289	5C50BIS-CML
A4C2	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C3	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C4	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C5	0180-0197	15	C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A4C6	0180-0291		C:FXD ELECT 1.0 UF 10% 35VDCW	56289	150D105X9035A2-DYS
A4C7	0180-1745	1	C:FXD ELECT 1.5 UF 10% 20VDCW	28480	0180-1745
A4C8	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C9	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4C10	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C11	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C12	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C13	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C14	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C15	0160-2308	1	C:FXD MICA 36 PF 5%	28480	0160-2308
A4C16	0160-2202	1	C:FXD MICA 75 PF 5%	28480	0160-2202
A4C17	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A4C18	0121-0443	5	C:VAR CER 3-9 PF 160VDCW	28480	0121-0443
A4C19	0121-0105		C:VAR CER 9-35 PF NPO	28480	0121-0105
A4C20	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A4C21	0160-3060		C:FXD CER 0.1 UF 20% 25VDCW	56289	3C42A-CML
A4C22	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C23	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C24	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A4C25	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C26	0140-0191	5	C:FXD MICA 56 PF 5% 300VDCW	19701	RDM15E560J 300V
A4C27	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C28	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C29	0140-0205		C:FXD MICA 62 PF 5% 300VDCW	00853	RDM15E620J3C
A4C30	0121-0036		C:VAR CER 5.5-18 PF	28480	0121-0036
A4C31	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A4C32	0121-0443		C:VAR CER 3-9 PF 160VDCW	28480	0121-0443
A4C33	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A4C34	0121-0105		C:VAR CER 9-35 PF NPO	28480	0121-0105
A4C35	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C36	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C37	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A4C38	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C39	0140-0191		C:FXD MICA 56 PF 5% 300VDCW	19701	RDM15E560J 300V
A4C40	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C41	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C42	0140-0205		C:FXD MICA 62 PF 5% 300VDCW	00853	RDM15E620J3C
A4C43	0121-0036		C:VAR CER 5.5-18 PF	28480	0121-0036
A4C44	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A4C45	0121-0443		C:VAR CER 3-9 PF 160VDCW	28480	0121-0443
A4C46	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A4C47	0121-0105		C:VAR CER 9-35 PF NPO	28480	0121-0105
A4C48	0160-3060		C:FXD CER 0.1 UF 20% 25VDCW	56289	3C42A-CML
A4C49	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C50	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A4C51	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C52	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C53	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C54	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C55	0140-0191		C:FXD MICA 56 PF 5% 300VDCW	19701	RDM15E560J 300V
A4C56	0140-0205		C:FXD MICA 62 PF 5% 300VDCW	00853	RDM15E620J3C
A4C57	0121-0036		C:VAR CER 5.5-18 PF	28480	0121-0036
A4C58	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A4C59	0121-0443		C:VAR CER 3-9 PF 160VDCW	28480	0121-0443
A4C60	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A4C61	0121-0105		C:VAR CER 9-35 PF NPO	28480	0121-0105
A4C62	0160-3060		C:FXD CER 0.1 UF 20% 25VDCW	56289	3C42A-CML
A4C63	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C64	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C65	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A4C66	0140-0191		C:FXD MICA 56 PF 5% 300VDCW	19701	RDM15E560J 300V
A4C67	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C68	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C69	0140-0205		C:FXD MICA 62 PF 5% 300VDCW	00853	RDM15E620J3C
A4C70	0121-0036		C:VAR CER 5.5-18 PF	28480	0121-0036
A4C71	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C72	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A4C73	0121-0443		C:VAR CER 3-9 PF 160VDCW	28480	0121-0443
A4C74	0121-0105		C:VAR CER 9-35 PF NPO	28480	0121-0105
A4C75	0160-3060		C:FXD CER 0.1 UF 20% 25VDCW	56289	3C42A-CML
A4C76	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A4C77	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C78	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDM
A4C79	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C80	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C81	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C82	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C83	0160-2150		C:FXD MICA 33 PF 5%	28480	0160-2150
A4C84	0160-2257		C:FXD CER 10 PF 5% 500VDCW	72982	301-000-COH0-100J

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4C85	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C86	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDH
A4C87	0160-2150		C:FXD MICA 33 PF 5%	28480	0160-2150
A4C88	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A4C89	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C90	0160-3460		C:FXD CER 0.05 UF +80-20% 100VDCW	56289	C023E101L503ZS22-CDH
A4C91	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C92	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C93	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C94	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C95	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A4C96	0160-3060		C:FXD CER 0.1 UF 20% 25VDCW	56289	3C42A-CML
A4CR1	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR2	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR3	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR4	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR5	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR6	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR7	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR8	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR9	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR10	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR11	1901-0639	5	DIODE:PIN 1MHZ TO 1GHZ	28480	1901-0639
A4CR12	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR13	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR14	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR15	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR16	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR17	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR18	1901-0639		DIODE:PIN 1MHZ TO 1GHZ	28480	1901-0639
A4CR19	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR20	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR21	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR22	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR23	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR24	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR25	1901-0639		DIODE:PIN 1MHZ TO 1GHZ	28480	1901-0639
A4CR26	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR27	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR28	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR29	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR30	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR31	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR32	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR33	1901-0639		DIODE:PIN 1MHZ TO 1GHZ	28480	1901-0639
A4CR34	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR35	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR36	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR37	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR38	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR39	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR40	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR41	1901-0639		DIODE:PIN 1MHZ TO 1GHZ	28480	1901-0639
A4CR42	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR43	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR44	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR45	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR46	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR47	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR48	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4CR49	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A4L1	9100-1648	6	COIL/CHOKE 560 UH 5%	82142	19-1331-29J
A4L2	9100-1648		COIL/CHOKE 560 UH 5%	82142	19-1331-29J
A4L3	9140-0129		COIL:FXD RF 220 UH	28480	9140-0129
A4L4	9100-1629	8	COIL/CHOKE 47.0 UH 5%	28480	9100-1629
A4L5	9100-1629		COIL/CHOKE 47.0 UH 5%	28480	9100-1629
A4L6	9100-1648		COIL/CHOKE 560 UH 5%	82142	19-1331-29J
A4L7	9100-1648		COIL/CHOKE 560 UH 5%	82142	19-1331-29J
A4L8	9100-1648		COIL/CHOKE 560 UH 5%	82142	19-1331-29J
A4L9	9100-1648		COIL/CHOKE 560 UH 5%	82142	19-1331-29J
A4L10	9100-1629		COIL/CHOKE 47.0 UH 5%	28480	9100-1629
A4L11	9100-1622	10	COIL/CHOKE 24.0 UH 5%	28480	9100-1622
A4L12	9100-1622		COIL/CHOKE 24.0 UH 5%	28480	9100-1622
A4L13	9100-1629		COIL/CHOKE 47.0 UH 5%	28480	9100-1629
A4L14	9100-1622		COIL/CHOKE 24.0 UH 5%	28480	9100-1622

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4L15	9100-1622		COIL/CHOKE 24.0 UH 5%	28480	9100-1622
A4L16	9100-1629		COIL/CHOKE 47.0 UH 5%	28480	9100-1629
A4L17	9100-1622		COIL/CHOKE 24.0 UH 5%	28480	9100-1622
A4L18	9100-1622		COIL/CHOKE 24.0 UH 5%	28480	9100-1622
A4L19	9100-1629		COIL/CHOKE 47.0 UH 5%	28480	9100-1629
A4L20	9100-1622		COIL/CHOKE 24.0 UH 5%	28480	9100-1622
A4L21	9100-1622		COIL/CHOKE 24.0 UH 5%	28480	9100-1622
A4L22	9100-1629		COIL/CHOKE 47.0 UH 5%	28480	9100-1629
A4L23	9100-1622		COIL/CHOKE 24.0 UH 5%	28480	9100-1622
A4L24	9100-1622		COIL/CHOKE 24.0 UH 5%	28480	9100-1622
A4L25	9100-1629		COIL/CHOKE 47.0 UH 5%	28480	9100-1629
A4L26	9140-0210		COIL/CHOKE 100 UH 5%	82142	15-1315-12J
A4MP1	0360-0124		TERMINAL:SOLDER LUG	28480	0360-0124
A4MP10	0360-0124		TERMINAL:SOLDER LUG	28480	0360-0124
A4Q1	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A4Q2	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q3	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q4	1854-0019		TSTR:SI NPN	28480	1854-0019
A4Q5	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A4Q6	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q7	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q8	1854-0019		TSTR:SI NPN	28480	1854-0019
A4Q9	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A4Q10	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q11	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q12	1854-0019		TSTR:SI NPN	28480	1854-0019
A4Q13	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A4Q14	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q15	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q16	1854-0019		TSTR:SI NPN	28480	1854-0019
A4Q17	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A4Q18	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q19	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q20	1854-0019		TSTR:SI NPN	28480	1854-0019
A4Q21	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A4Q22	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A4Q23	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A4Q24	1854-0019		TSTR:SI NPN	28480	1854-0019
A4R1	0698-7253	3	R:FXD MET FLM 5.11K OHM 2% 1/8W	28480	0698-7253
A4R2	0698-7223	5	R:FXD FLM 287 OHM 2% 1/8W	28480	0698-7223
A4R3	0698-7267	5	R:FXD MET FLM 19.6K OHM 2% 1/8W	28480	0698-7267
A4R4	0698-7212	13	R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R5	0698-7260	3	R:FXD FLM 10K OHM 2% 1/8W	28480	0698-7260
A4R6	0698-7267		R:FXD MET FLM 19.6K OHM 2% 1/8W	28480	0698-7267
A4R7	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R8	0698-7260		R:FXD FLM 10K OHM 2% 1/8W	28480	0698-7260
A4R9	0698-7268	1	R:FXD FLM 21.5K OHM 2% 1/8W	28480	0698-7268
A4R10	0698-7260		R:FXD FLM 10K OHM 2% 1/8W	28480	0698-7260
A4R11	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R12	0698-7213	1	R:FXD FLM 110 OHM 2% 1/8W	28480	0698-7213
A4R13	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R14	0698-7209	1	R:FXD FLM 75 OHM 2% 1/8W	28480	0698-7209
A4R15	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R16	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R17	0698-7236	15	R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R18	0698-3334	1	R:FXD MET FLM 178 OHM 1% 1/2W	28480	0698-3334
A4R19	0698-7284	2	R:FXD FLM 100K OHM 2% 1/8W	28480	0698-7284
A4R20	0698-7231	14	R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R21	0698-7227	6	R:FXD FLM 422 OHM 2% 1/8W	28480	0698-7227
A4R22	0698-7202	5	R:FXD FLM 38.3 OHM 2% 1/8W	28480	0698-7202
A4R23	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R24	0698-7214	5	R:FXD FLM 121 OHM 2% 1/8W	28480	0698-7214
A4R25 **	0698-7269		R:FXD FLM 23.7K OHM 2% 1/8W(FACTORY SELECT)	28480	0698-7269
A4R26 **	0698-7277	1	R:FXD FLM 51.1K OHM 2% 1/8W(FACTORY SELECT)	28480	0698-7277
A4R27	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R28	0698-7223		R:FXD FLM 287 OHM 2% 1/8W	28480	0698-7223
A4R29	0698-7227		R:FXD FLM 422 OHM 2% 1/8W	28480	0698-7227
A4R30	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R31	0698-7200	5	R:FXD FLM 31.6 OHM 2% 1/8W	28480	0698-7200
A4R32	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R33	0698-7240	6	R:FXD MET FLM 1.47K OHM 2% 1/8W	28480	0698-7240
A4R34	0698-7244	18	R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R35	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R36	0698-7256	4	R:FXD FLM 6810 OHM 2% 1/8W	28480	0698-7256
A4R37	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244

See introduction to this section for ordering information

** RECOMMENDED REPLACEMENT, SEE PAGE 5-39

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4R38	0757-1060	1	R:FXD MET FLM 196 OHM 1% 1/2W	28480	0757-1060
A4R39	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R40	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R41	0698-7202		R:FXD FLM 38.3 OHM 2% 1/8W	28480	0698-7202
A4R42	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R43	0698-7214		R:FXD FLM 121 OHM 2% 1/8W	28480	0698-7214
A4R44 *	0698-7270	3	R:FXD FLM 26.1K OHM 2% 1/8W(FACTORY SELECT)	28480	0698-7270
A4R45 *	0698-7278	3	R:FXD FLM 56.2K OHM 2% 1/8W(FACTORY SELECT)	28480	0698-7278
A4R46	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R47	0698-7223		R:FXD FLM 287 OHM 2% 1/8W	28480	0698-7223
A4R48	0698-7227		R:FXD FLM 422 OHM 2% 1/8W	28480	0698-7227
A4R49	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R50	0698-7200		R:FXD FLM 31.6 OHM 2% 1/8W	28480	0698-7200
A4R51	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R52	0698-7240		R:FXD MET FLM 1.47K OHM 2% 1/8W	28480	0698-7240
A4R53	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R54	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R55	0698-7256		R:FXD FLM 6810 OHM 2% 1/8W	28480	0698-7256
A4R56	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R57	0757-1090	3	R:FXD MET FLM 261 OHM 1% 1/2W	28480	0757-1090
A4R58	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R59	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R60	0698-7202		R:FXD FLM 38.3 OHM 2% 1/8W	28480	0698-7202
A4R61	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R62	0698-7214		R:FXD FLM 121 OHM 2% 1/8W	28480	0698-7214
A4R63	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R64	0698-7227		R:FXD FLM 422 OHM 2% 1/8W	28480	0698-7227
A4R65	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R66	0698-7240		R:FXD MET FLM 1.47K OHM 2% 1/8W	28480	0698-7240
A4R67	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R68	0698-7257	1	R:FXD FLM 7.5K OHM 2% 1/8W	28480	0698-7257
A4R69	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R70 *	0698-7270		R:FXD FLM 26.1K OHM 2% 1/8W(FACTORY SELECT)	28480	0698-7270
A4R71 *	0698-7278		R:FXD FLM 56.2K OHM 2% 1/8W(FACTORY SELECT)	28480	0698-7278
A4R72	0698-7223		R:FXD FLM 287 OHM 2% 1/8W	28480	0698-7223
A4R73	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R74	0698-7200		R:FXD FLM 31.6 OHM 2% 1/8W	28480	0698-7200
A4R75	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R76	0757-1090		R:FXD MET FLM 261 OHM 1% 1/2W	28480	0757-1090
A4R77	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R78	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R79	0698-7202		R:FXD FLM 38.3 OHM 2% 1/8W	28480	0698-7202
A4R80	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R81 *	0698-7270		R:FXD FLM 26.1K OHM 2% 1/8W(FACTORY SELECT)	28480	0698-7270
A4R82 *	0698-7278		R:FXD FLM 56.2K OHM 2% 1/8W(FACTORY SELECT)	28480	0698-7278
A4R83	0698-7214		R:FXD FLM 121 OHM 2% 1/8W	28480	0698-7214
A4R84	0698-7223		R:FXD FLM 287 OHM 2% 1/8W	28480	0698-7223
A4R85	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R86	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R87	0698-7200		R:FXD FLM 31.6 OHM 2% 1/8W	28480	0698-7200
A4R88	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R89	0698-7227		R:FXD FLM 422 OHM 2% 1/8W	28480	0698-7227
A4R90	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R91	0757-1090		R:FXD MET FLM 261 OHM 1% 1/2W	28480	0757-1090
A4R92	0698-7240		R:FXD MET FLM 1.47K OHM 2% 1/8W	28480	0698-7240
A4R93	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R94	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R95	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R96	0698-7256		R:FXD FLM 6810 OHM 2% 1/8W	28480	0698-7256
A4R97	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R98	0698-7202		R:FXD FLM 38.3 OHM 2% 1/8W	28480	0698-7202
A4R99	0698-7231		R:FXD FLM 619 OHM 2% 1/8W	28480	0698-7231
A4R100	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R101	0698-7214		R:FXD FLM 121 OHM 2% 1/8W	28480	0698-7214
A4R102	0698-7267		R:FXD MET FLM 19.6K OHM 2% 1/8W	28480	0698-7267
A4R103	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R104	0698-7253		R:FXD MET FLM 5.11K OHM 2% 1/8W	28480	0698-7253
A4R105	0698-7227		R:FXD FLM 422 OHM 2% 1/8W	28480	0698-7227
A4R106	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R107	0698-7267		R:FXD MET FLM 19.6K OHM 2% 1/8W	28480	0698-7267
A4R108	0698-7240		R:FXD MET FLM 1.47K OHM 2% 1/8W	28480	0698-7240
A4R109	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R110	0698-7265	1	R:FXD FLM 16.2K OHM 2% 1/8W	28480	0698-7265
A4R111	0698-7284		R:FXD FLM 100K OHM 2% 1/8W	28480	0698-7284
A4R112	0698-7256		R:FXD FLM 6810 OHM 2% 1/8W	28480	0698-7256

See introduction to this section for ordering information

* RECOMMENDED REPLACEMENT, SEE PAGE 5-39.

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4R113	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R114	0698-7224	1	R:FXD FLM 316 OHM 2% 1/8W	28480	0698-7224
A4R115	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R116	2100-2574	1	R:VAR CERMET 500 OHM 10% LIN 1/2W	28480	2100-2574
A4R117	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R118	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R119	0698-7212		R:FXD FLM 100 OHM 2% 1/8W	28480	0698-7212
A4R120	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R121	0698-3403	1	R:FXD MET FLM 348 OHM 1% 1/2W	28480	0698-3403
A4R122	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R123	2100-2633	1	R:VAR CERMET 1K OHM 10% LIN 1/2W	28480	2100-2633
A4R124	0698-7236		R:FXD FLM 1K OHM 2% 1/8W	28480	0698-7236
A4R125	0698-7229	1	R:FXD FLM 511 OHM 2% 1/8W	28480	0698-7229
A4R125			FACTORY SELECTED PART		
A4R126	0698-7240		R:FXD MET FLM 1.47K OHM 2% 1/8W	28480	0698-7240
A4R127	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R128	0698-7253		R:FXD MET FLM 5.11K OHM 2% 1/8W	28480	0698-7253
A4R129	2100-2522	2	R:VAR CERMET 10K OHM 10% LIN 1/2W	28480	2100-2522
A4R130	0698-7244		R:FXD FLM 2.15K OHM 2% 1/8W	28480	0698-7244
A4R131	0698-7188	1	R:FXD MET FLM 10 OHM 2% 1/8W	28480	0698-7188
A4R132	2100-2489	2	R:VAR FLM 5K OHM 10% LIN 1/2W	28480	2100-2489
A4R133	2100-1788	1	R:VAR FLM 500 OHM 10% LIN 1/2W	28480	2100-1788
A4TP1 THRU	0360-0124		TERMINAL PIN:ROUND	28480	0360-0124
A4TP10	0360-0124		TERMINAL PIN:ROUND	28480	0360-0124
A4W1	08552-60128	2	CABLE ASSY:CRYSTAL	28480	08552-60128
A4W2	08552-60128		CABLE ASSY:CRYSTAL	28480	08552-60128
A4Y1	0410-0404	1	CRYSTAL:QUARTZ,MATCHED SET OF FIVE	00136	0410-0404
A4Y2			N.S.R. PART OF A4Y1		
A4Y3			N.S.R. PART OF A4Y1		
A4Y4			N.S.R. PART OF A4Y1		
A4Y5			N.S.R. PART OF A4Y1		
A5	08552-60107	1	BOARD ASSY:POWER SUPPLY	28480	08552-60107
A5C1	0160-0163	2	C:FXD MY 0.033 UF 10% 200VDCW	56289	192P33392-PTS
A5C2	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A5C3	0160-2208	1	C:FXD MICA 330 PF 5% 300VDCW	28480	0160-2208
A5C4	0180-1747	2	C:FXD ELECT 150 UF 20% 15VDCW	28480	0180-1747
A5C5	0160-0162	5	C:FXD MY 0.022 UF 10% 200VDCW	56289	192P22392-PTS
A5C6	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A5C7	0180-1747		C:FXD ELECT 150 UF 20% 15VDCW	28480	0180-1747
A5C8	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A5C9	0160-0153	4	C:FXD MY 0.001 UF 10% 200VDCW	56289	192P10292-PTS
A5C10	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A5C11	0150-0121		C:FXD CER 0.1 UF +80-20% 50VDCW	56289	5C50BIS-CML
A5C12	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A5C13	0160-2211	1	C:FXD MICA 510 PF 5% 300VDCW	28480	0160-2211
A5C14	0180-0058	3	C:FXD AL ELECT 50 UF +75-10% 25VDCW	56289	30D506G025CC2-DSM
A5C15	0180-0058		C:FXD AL ELECT 50 UF +75-10% 25VDCW	56289	30D506G025CC2-DSM
A5C16	0180-2215	1	C:FXD AL ELECT 170 UF +75-10% 170VDCW	56289	30D177G015DD2-DSM
A5C17, C18	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A5C19	0180-0058		C:FXD AL ELECT 50UF +75-10% 25VDCW	56289	30D506G025CC2-DSM
A5C20	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A5CR1	1901-0416	8	DIODE:SILICON 200PIV 3A	28480	1901-0416
A5CR2	1902-3104	1	DIODE:BREAKDOWN 5.62V 5%	04713	SZ10939-110
A5CR3	1901-0416		DIODE:SILICON 200PIV 3A	28480	1901-0416
A5CR4	1884-0012	2	RECTIFIER:SILICON CONTROLLED 2N3528	02735	2N3528
A5CR5	1902-3268	1	DIODE BREAKDOWN:26.1V 5%	28480	1902-3268
A5CR6	1902-0033	2	DIODE:BREAKDOWN 6.2V	04713	1N823
A5CR7	1901-0416		DIODE:SILICON 200PIV 3A	28480	1901-0416
A5CR8	1901-0416		DIODE:SILICON 200PIV 3A	28480	1901-0416
A5CR9	1901-0416		DIODE:SILICON 200PIV 3A	28480	1901-0416
A5CR10	1884-0012		RECTIFIER:SILICON CONTROLLED 2N3528	02735	2N3528
A5CR11	1902-3256	1	DIODE:BREAKDOWN SILICON 23.7V 5%	28480	1902-3256
A5CR12	1902-0040	1	DIODE BREAKDOWN:14.0V 5%	28480	1902-0040
A5CR13	1901-0416		DIODE:SILICON 200PIV 3A	28480	1901-0416
A5CR14	1902-0033		DIODE:BREAKDOWN 6.2V	04713	1N823
A5CR15	1901-0416		DIODE:SILICON 200PIV 3A	28480	1901-0416
A5CR16	1901-0025	13	DIODE:SILICON 100MA/1V	07263	FD 2387
A5CR17	1902-3070	2	DIODE:BREAKDOWN 4.22V 5%	04713	SZ10939-74
A5CR18	1902-3070		DIODE:BREAKDOWN 4.22V 5%	04713	SZ10939-74
A5Q1	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q2	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A5Q3	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q4	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q5	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5Q6	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q7	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q8	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q9	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q10	1854-0221	2	TSTR:SI NPN(REPL.BY 2N4044)	28480	1854-0221
A5Q11	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A5Q12	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A5Q12	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A5Q13	1854-0221		TSTR:SI NPN(REPL.BY 2N4044)	28480	1854-0221
A5Q14	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q15	1853-0006	1	TSTR:SI PNP	80131	2N3134
A5Q16	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A5Q17	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A5Q18	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q19	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q20	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q21	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q22	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A5Q23	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q24	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A5Q25	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A5Q26	1854-0003	1	TSTR:SI NPN(SELECTED FROM 2N1711)	28480	1854-0003
A5Q27	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A5R1			NOT ASSIGNED		
A5R2	0698-3420	1	R:FXD MET FLM 34.8K OHM 1% 1/2W	28480	0698-3420
A5R3	0764-0018	1	R:FXD MET FLM 4700 OHM 5% 2W	28480	0764-0018
A5R4	0757-0276		R:FXD MET FLM 61.9 OHM 1% 1/8W	28480	0757-0276
A5R5	0757-0416		R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A5R6	0757-0405		R:FXD MET FLM 162 OHM 1% 1/8W	28480	0757-0405
A5R7	0698-3408	1	R:FXD MET FLM 2.15K OHM 1% 1/2W	28480	0698-3408
A5R8	0699-0001	2	R:FXD COMP 2.7 OHM 10% 1/2W	01121	EB 27G1
A5R9	0757-0278		R:FXD MET FLM 1.78K OHM 1% 1/8W	28480	0757-0278
A5R10	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A5R11	0757-0460		R:FXD MET FLM 61.9K OHM 1% 1/8W	28480	0757-0460
A5R12	0698-3150	4	R:FXD MET FLM 2.37K OHM 1% 1/8W	28480	0698-3150
A5R13	0698-3136	5	R:FXD MET FLM 17.8K OHM 1% 1/8W	28480	0698-3136
A5R14	0757-0460		R:FXD MET FLM 61.9K OHM 1% 1/8W	28480	0757-0460
A5R15	0698-0089	1	R:FXD MET FLM 1780 OHM 1% 1/2W	28480	0698-0089
A5R16	2100-1756		R:VAR WW 200 OHM 5% TYPE V 1W	28480	2100-1756
A5R17	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A5R18			NOT ASSIGNED		
A5R19	0757-0276		R:FXD MET FLM 61.9 OHM 1% 1/8W	28480	0757-0276
A5R20	0698-3419	17	R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A5R21	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A5R22	0757-0405		R:FXD MET FLM 162 OHM 1% 1/8W	28480	0757-0405
A5R23	0757-0416		R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A5R24	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A5R25	0757-0317	1	R:FXD MET FLM 1.33K OHM 1% 1/8W	28480	0757-0317
A5R26	0699-0001		R:FXD COMP 2.7 OHM 10% 1/2W	01121	EB 27G1
A5R27	0757-0199		R:FXD MET FLM 21.5K OHM 1% 1/8W	28480	0757-0199
A5R28	0757-0441	4	R:FXD MET FLM 8.25K OHM 1% 1/8W	28480	0757-0441
A5R29	0757-0418		R:FXD MET FLM 619 OHM 1% 1/8W	28480	0757-0418
A5R30	0757-0199		R:FXD MET FLM 21.5K OHM 1% 1/8W	28480	0757-0199
A5R31	0698-3446		R:FXD MET FLM 383 OHM 1% 1/8W	28480	0698-3446
A5R32	2100-1756		R:VAR WW 200 OHM 5% TYPE V 1W	28480	2100-1756
A5R33	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A5R34	0757-0199		R:FXD MET FLM 21.5K OHM 1% 1/8W	28480	0757-0199
A5R35	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A5R36	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A5R37	0698-3453	5	R:FXD MET FLM 196K OHM 1% 1/8W	28480	0698-3453
A5R38	0698-3453		R:FXD MET FLM 196K OHM 1% 1/8W	28480	0698-3453
A5R39	0698-4519	1	R:FXD FLM 140K OHM 1% 1/8W	28480	0698-4519
A5R40	0698-3458	1	R:FXD MET FLM 348K OHM 1% 1/8W	28480	0698-3458
A5R41	0698-3453		R:FXD MET FLM 196K OHM 1% 1/8W	28480	0698-3453
A5R42	0698-3447	1	R:FXD MET FLM 422 OHM 1% 1/8W	28480	0698-3447
A5R43	0757-0444	1	R:FXD MET FLM 12.1K OHM 1% 1/8W	28480	0757-0444
A5R44	0757-0441		R:FXD MET FLM 8.25K OHM 1% 1/8W	28480	0757-0441
A5R45	2100-1760		R:VAR WW 5K OHM 5% TYPE V 1W	28480	2100-1760
A5R46	0698-3444	5	R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A5R47	0757-0400		R:FXD MET FLM 90.9 OHM 1% 1/8W	28480	0757-0400
A5R48	0698-3450	6	R:FXD MET FLM 42.2K OHM 1% 1/8W	28480	0698-3450
A5R49	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A5R50	0698-3162		R:FXD MET FLM 46.4K OHM 1% 1/8W	28480	0698-3162
A5R51	0757-0402		R:FXD MET FLM 110 OHM 1% 1/8W	28480	0757-0402
A5R52	0757-0458	1	R:FXD MET FLM 51.1K OHM 1% 1/8W	28480	0757-0458

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5R53	0757-0403	1	R:FXD MET FLM 121 OHM 1% 1/8W	28480	0757-0403
A5R54	0757-0459	3	R:FXD MET FLM 56.2K OHM 1% 1/8W	28480	0757-0459
A5R55	0698-3437		R:FXD MET FLM 133 OHM 1% 1/8W	28480	0698-3437
A5R56	0757-0460		R:FXD MET FLM 61.9K OHM 1% 1/8W	28480	0757-0460
A5R57	0698-3438		R:FXD MET FLM 147 OHM 1% 1/8W	28480	0698-3438
A5R58	0757-0461	3	R:FXD MET FLM 68.1K OHM 1% 1/8W	28480	0757-0461
A5R59	0757-0405		R:FXD MET FLM 162 OHM 1% 1/8W	28480	0757-0405
A5R60	0757-0462	1	R:FXD MET FLM 75.0K OHM 1% 1/8W	28480	0757-0462
A5R61	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A5R62	0698-0085	3	R:FXD MET FLM 2.61K OHM 1% 1/8W	28480	0698-0085
A5R63	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A5R64	0698-3439	1	R:FXD MET FLM 178 OHM 1% 1/8W	28480	0698-3439
A5R65	0757-0463	3	R:FXD MET FLM 82.5K OHM 1% 1/8W	28480	0757-0463
A5R66	0698-3440	4	R:FXD MET FLM 196 OHM 1% 1/8W	28480	0698-3440
A5R67	0757-0464	2	R:FXD MET FLM 90.9K OHM 1% 1/8W	28480	0757-0464
A5R68	0757-0416		R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A5R69	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A5R70	0698-3150		R:FXD MET FLM 2.37K OHM 1% 1/8W	28480	0698-3150
A5R71	2100-1760		R:VAR WW 5K OHM 5% TYPE V 1W	28480	2100-1760
A5R72	0698-3150		R:FXD MET FLM 2.37K OHM 1% 1/8W	28480	0698-3150
A5R73			NOT ASSIGNED		
A5R74	0757-0453	1	R:FXD MET FLM 30.1K OHM 1% 1/8W	28480	0757-0453
A5R75	2100-2489		R:VAR FLM 5K OHM 10% LIN 1/2W	28480	2100-2489
A5R76	0757-0122	1	R:FXD MET FLM 27.1K OHM 1% 1/8W	28480	0757-0122
A5R77	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A5R78	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A5R79	0757-0795	1	R:FXD MET FLM 75 OHM 1% 1/2W	28480	0757-0795
A5TP1	0360-1514		TERMINAL PIN:SQUARE	28480	0360-1514
A5TP2	0360-1514		TERMINAL PIN:SQUARE	28480	0360-1514
A5TP3	0360-1514		TERMINAL PIN:SQUARE	28480	0360-1514
A5U1, U2	1826-0013	5	IC:LINEAR	28480	1826-0013
A5Z1	9170-0016	1	BEAD, MAGNETIC SHIELDING	02114	56-590-65/38
A5Z2	9170-0029	1	CORE, MAG, SHIELDING BEAD .1380D .047 ID	02114	56-590-65A2/4A
A6	08552-60137	1	BOARD ASSY:SCAN GENERATOR(DELETE-OPT H01-02)	28480	08552-60137
A6	08552-62006	1	BOARD ASSY:SCAN GEN(OPT H01-H02 ONLY)	28480	08552-62006
A6C1	0180-1743	1	C:FXD ELECT 0.1 UF 10% 35VDCW	56289	150D104X9035A2-DYS
A6C2	0140-0198	1	C:FXD MICA 200 PF 5%	72136	RDM15F201J3C
A6C3	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A6C4	0160-2218	1	C:FXD MICA 1000 PF 5%	28480	0160-2218
A6C5	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A6C6	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A6C7	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A6C8	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A6C9	0160-0939	1	C: FXD MICA 430 PF 5% 300 VDCW	28480	0160-0939
A6C10	0160-0168	1	C:FXD MY 0.1 UF 10% 200VDCW	56289	192P10492-PTS
A6C11	0160-0153		C:FXD MY 0.001 UF 10% 200VDCW	56289	192P10292-PTS
A6C12	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A6C13	0180-2195	1	C:FXD ELECT 15 UF 10% 35VDCW	28480	0180-2195
A6C14			FACTORY SELECTED PART		
A6C15	0180-2268	1	C:FXD TA ELECT 140 UF 10% 30VDCW	56289	109D147X9030T2-DYP
A6C16	0121-0059		C:VAR CER 2-8 PF 300VDCW	28480	0121-0059
A6C17	0150-0050	3	C:FXD CER 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZS26-CDH
A6C18	0160-2205	1	C:FXD MICA 120 PF 5%	28480	0160-2205
A6C19	0150-0050		C:FXD CER 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZS26-CDH
A6C20	0160-2257		C:FXD CER 10 PF 5% 500VDCW	72982	301-000-COH0-100J
A6C21	0160-2238	1	C:FXD CER 1.5 PF 500VDCW	72982	301-000-COK0-159C
A6C22	0150-0050		C:FXD CER 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZS26-CDH
A6CR1	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A6CR2	1902-3171	1	DIODE BREAKDOWN:11.0V 5%	28480	1902-3171
A6CR3	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6CR4	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6CR5	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6CR6	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6CR7	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6CR8	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6CR9	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6CR10	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6CR11	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6CR12	1902-0785	1	DIODE:BREAKDOWN 9.09V 5%	04713	1N936
A6CR13	1902-0202	1	DIODE BREAKDOWN:15.0V 5% 1W	28480	1902-0202
A6CR14	1902-0556	1	DIODE:BREAKDOWN 20.0V 5% 1W	28480	1902-0556
A6CR15	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6CR16	1901-0025		DIODE:SILICON 100MA/1V	07263	FD 2387
A6L1	9140-0210		COIL/CHOKE 100 UH 5%	82142	15-1315-12J

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A6L2	9140-0210		COIL/CHOKE 100 UH 5%	82142	15-1315-12J
A6L3	9140-0210		COIL/CHOKE 100 UH 5%	82142	15-1315-12J
A6L4	9100-2267	1	COIL/CHOKE 18 UH	28480	9100-2267
A6L5	9100-2259	1	COIL/CHOKE 1.50 UH 10%	99800	1025-24
A6MP1	08552-0024	1	SHIELD:CAN,SCAN GENERATOR	28480	08552-0024
A6Q1	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A6Q2	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A6Q3	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A6Q4	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A6Q5	1854-0039	2	TSTR:SI NPN	80131	2N3053
A6Q6	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A6Q7	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A6Q8	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A6Q9	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A6Q10	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A6Q11	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A6Q12	1854-0232	12	TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A6Q13	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A6Q14	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A6Q15	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A6Q16	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A6Q17	1854-0019		TSTR:SI NPN	28480	1854-0019
A6Q18	1854-0019		TSTR:SI NPN	28480	1854-0019
A6R1	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A6R2	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A6R3	0757-0461		R:FXD MET FLM 68.1K OHM 1% 1/8W	28480	0757-0461
A6R4	0698-3154	6	R:FXD MET FLM 4.22K OHM 1% 1/8W	28480	0698-3154
A6R5	0757-0463		R:FXD MET FLM 82.5K OHM 1% 1/8W	28480	0757-0463
A6R6	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A6R7	0757-0418		R:FXD MET FLM 619 OHM 1% 1/8W	28480	0757-0418
A6R8	0757-0418		R:FXD MET FLM 619 OHM 1% 1/8W	28480	0757-0418
A6R9	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A6R10	0698-3136		R:FXD MET FLM 17.8K OHM 1% 1/8W	28480	0698-3136
A6R11	0757-0441		R:FXD MET FLM 8.25K OHM 1% 1/8W	28480	0757-0441
A6R12	2100-1760		R:VAR WW 5K OHM 5% TYPE V 1W	28480	2100-1760
A6R13	0698-3455	2	R:FXD MET FLM 261K OHM 1% 1/8W	28480	0698-3455
A6R14	0757-0290	6	R:FXD MET FLM 6.19K OHM 1% 1/8W	28480	0757-0290
A6R15	0757-0416		R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A6R16	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A6R17	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A6R18	0698-3136		R:FXD MET FLM 17.8K OHM 1% 1/8W	28480	0698-3136
A6R19	0698-3454	2	R:FXD MET FLM 215K OHM 1% 1/8W	28480	0698-3454
A6R20	0698-3162		R:FXD MET FLM 46.4K OHM 1% 1/8W	28480	0698-3162
A6R21	0757-0418		R:FXD MET FLM 619 OHM 1% 1/8W	28480	0757-0418
A6R22	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A6R23	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A6R24	0757-0123	3	R:FXD MET FLM 34.8K OHM 1% 1/8W	28480	0757-0123
A6R25	0698-3451	3	R:FXD MET FLM 133K OHM 1% 1/8W	28480	0698-3451
A6R26	0698-3154		R:FXD MET FLM 4.22K OHM 1% 1/8W	28480	0698-3154
A6R27	0698-3451		R:FXD MET FLM 133K OHM 1% 1/8W	28480	0698-3451
A6R28	0757-0123		R:FXD MET FLM 34.8K OHM 1% 1/8W	28480	0757-0123
A6R29	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A6R30	0698-3454		R:FXD MET FLM 215K OHM 1% 1/8W	28480	0698-3454
A6R31	0757-0290		R:FXD MET FLM 6.19K OHM 1% 1/8W	28480	0757-0290
A6R32	0698-3158	2	R:FXD MET FLM 23.7K OHM 1% 1/8W	28480	0698-3158
A6R33	0757-0416		R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A6R34	0698-3152	6	R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152
A6R35	0698-3156	2	R:FXD MET FLM 14.7K OHM 1% 1/8W	28480	0698-3156
A6R36	0698-3136		R:FXD MET FLM 17.8K OHM 1% 1/8W	28480	0698-3136
A6R37	0757-0290		R:FXD MET FLM 6.19K OHM 1% 1/8W	28480	0757-0290
A6R38	0757-0123		R:FXD MET FLM 34.8K OHM 1% 1/8W	28480	0757-0123
A6R39	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A6R40	0757-0418		R:FXD MET FLM 619 OHM 1% 1/8W	28480	0757-0418
A6R41	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A6R42	0698-0083	6	R:FXD MET FLM 1.96K OHM 1% 1/8W	28480	0698-0083
A6R43	0698-3136		R:FXD MET FLM 17.8K OHM 1% 1/8W	28480	0698-3136
A6R44	0757-0289	1	R:FXD MET FLM 13.3K OHM 1% 1/8W	28480	0757-0289
A6R45	0698-3451		R:FXD MET FLM 133K OHM 1% 1/8W	28480	0698-3451
A6R46	2100-1758		R:VAR WW 1K OHM 5% TYPE V 1W	28480	2100-1758
A6R47	0698-3160	2	R:FXD MET FLM 31.6K OHM 1% 1/8W	28480	0698-3160
A6R48	0698-0085		R:FXD MET FLM 2.61K OHM 1% 1/8W	28480	0698-0085
A6R49	0698-0085		R:FXD MET FLM 2.61K OHM 1% 1/8W	28480	0698-0085
A6R50	2100-1757		R:VAR WW 500 OHM 5% TYPE V 1W	28480	2100-1757
A6R51	0698-0083		R:FXD MET FLM 1.96K OHM 1% 1/8W	28480	0698-0083
A6R52	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A6R53	0698-3154		R:FXD MET FLM 4.22K OHM 1% 1/8W	28480	0698-3154
A6R54	2100-1757		R:VAR WW 500 OHM 5% TYPE V 1W	28480	2100-1757
A6R55	0698-7232	1	R:FXD FLM 681 OHM 2% 1/8W	28480	0698-7232
A6R56	0698-7200		R:FXD FLM 31.6 OHM 2% 1/8W	28480	0698-7200
A6R57	0698-7236		R:FXD FLM 1K OHM 2% 1/8W(DELETE FOR H01-02)	28480	0698-7236
A6R57	0698-7236		R:FXD 1.1K OHM 2% 1/8W(OPT H01-02)	28480	0698-7236
A6R58	0757-0398		R:FXD 75 OHM 1% 1/8W(OPT H01-02 ONLY)	28480	0757-0398
A6R58	0698-7205	1	R:FXD FLM 51.1 OHM 2% 1/8W(DELETE FOR H01-02)	28480	0698-7205
A6R59	0698-7238	1	R:FXD FLM 1.21K OHM 2% 1/8W	28480	0698-7238
A6R60	0698-7243	1	R:FXD FLM 1.96K OHM 2% 1/8W	28480	0698-7243
A6R61	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A6R62	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A6S1	3101-0973	1	SWITCH:SLIDE DPDT 0.5A 125V AC/DC	79727	G126-0018
A6TP1 THRU	0360-1514		TERMINAL PIN:SQUARE	28480	0360-1514
A6TP5	0360-1514		TERMINAL PIN:SQUARE	28480	0360-1514
A6U1	1826-0013		IC:LINEAR	28480	1826-0013
A6U2	1826-0013		IC:LINEAR	28480	1826-0013
A6Y1	0410-0301	1	CRYSTAL:QUARTZ 30 MHZ	28480	0410-0301
A7	08552-60084	1	BOARD ASSY:DEFLECTOR AMPLIFIER	28480	08552-60084
A7C1	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A7C2	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A7C3	0160-2265		C:FXD CER 22 PF 5% 500VDCW	72982	301-NP0-22PF
A7C4	0180-0269	1	C:FXD ELECT 1.0 UF +50-10% 150VDCW	56289	300105F150BA2-DSM
A7C5	0160-3448	1	C:FXD CER 1000 PF 10% 1000VDCW	56289	C067B251F102KS25-CDH
A7C6	0140-0194	3	C:FXD MICA 110 PF 5%	72136	RDM15F111J3C
A7C7	0160-2246	2	C:FXD CER 3.6+/-0.25 PF 500VDCW	72982	301-000-C0J0-369C
A7C8	0160-2246		C:FXD CER 3.6+/-0.25 PF 500VDCW	72982	301-000-C0J0-369C
A7C9	0160-0153		C:FXD MY 0.001 UF 10% 200VDCW	56289	192P10292-PTS
A7C10	0160-0194	2	C:FXD MY 0.015 UF 10%	56289	192P15392-PTS
A7C11	0160-2201		C:FXD MICA 51 PF 5%	72136	RDM15E510J1C
A7C12	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A7C13	0160-3450	1	C:FXD CER 5000 PF 10% 250VDCW	56289	C067B251H502KS25-CDH
A7C14	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A7C15	0140-0194		C:FXD MICA 110 PF 5%	72136	RDM15F111J3C
A7C16	0180-1746	3	C:FXD ELECT 15 UF 10% 20VDCW	28480	0180-1746
A7C17	0160-2256	2	C:FXD CER 9.1 PF 500VDCW	72982	301-000-C0K0-919C
A7C18	0160-2256		C:FXD CER 9.1 PF 500VDCW	72982	301-000-C0K0-919C
A7C19	0160-2201		C:FXD MICA 51 PF 5%	72136	RDM15E510J1C
A7C20	0160-0155	1	C:FXD MY 0.0033 UF 10% 200VDCW	56289	192P33292-PTS
A7CR1	1901-0096	2	DIODE:SILICON 120V	01295	UG-888
A7CR2	1901-0081	8	DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR3	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR4	1901-0096		DIODE:SILICON 120V	01295	UG-888
A7CR5	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR6	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR7	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR8	1902-0683	2	DIODE BREAKDOWN:100V 2%	28480	1902-0683
A7CR9	1902-0683		DIODE BREAKDOWN:100V 2%	28480	1902-0683
A7CR10	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR11	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR12	1902-0025	2	DIODE,BREAKDOWN:10.0V 5% 400 MW	28480	1902-0025
A7CR13	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A7CR14	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A7CR15	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A7CR16	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR17	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A7CR18	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A7CR19	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A7CR20	1901-0040		DIODE:SILICON 50 MA 30 WV	07263	FDG1088
A7K1	0490-0399	1	RELAY:REED ASSY, 1200 OHM 12VDC	28480	0490-0399
A7L1	9140-0129		COIL:FXD RF 220 UH	28480	9140-0129
A7MP1	1205-0011	2	HEAT DISSIPATOR:FOR TO-5 AND TO-9 CASES	98978	TXBF-032-025B
A7MP2	1205-0011		HEAT DISSIPATOR:FOR TO-5 AND TO-9 CASES	98978	TXBF-032-025B
A7Q1	1853-0034	2	TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0034
A7Q2	1854-0404	4	TSTR:SI NPN	28480	1854-0404
A7Q3	1853-0007	3	TSTR:SI PNP	80131	2N3251
A7Q4	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q5	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q6	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q7	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q8	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q9	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q10	1854-0404		TSTR:SI NPN	28480	1854-0404
A7Q11	1854-0404		TSTR:SI NPN	28480	1854-0404
A7Q12	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q13	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7Q14	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q15	1853-0007		TSTR:SI PNP	80131	2N3251
A7Q16	1853-0007		TSTR:SI PNP	80131	2N3251
A7Q17	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q18	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q19	1854-0404		TSTR:SI NPN	28480	1854-0404
A7R1	0757-0447		R:FXD MET FLM 16.2K OHM 1% 1/8W	28480	0757-0447
A7R2	0757-0443	7	R:FXD MET FLM 11.0K OHM 1% 1/8W	28480	0757-0443
A7R3	0698-3152		R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152
A7R4	0698-0082		R:FXD MET FLM 464 OHM 1% 1/8W	28480	0698-0082
A7R5	0757-0464		R:FXD MET FLM 90.9K OHM 1% 1/8W	28480	0757-0464
A7R6	0698-3152		R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152
A7R7	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R8	0698-3418	2	R:FXD MET FLM 26.1K OHM 1% 1/2W	28480	0698-3418
A7R9	0757-0443		R:FXD MET FLM 11.0K OHM 1% 1/8W	28480	0757-0443
A7R10	0698-3418		R:FXD MET FLM 26.1K OHM 1% 1/2W	28480	0698-3418
A7R11	0757-0439	1	R:FXD MET FLM 6.81K OHM 1% 1/8W	28480	0757-0439
A7R12	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A7R13	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R14	0698-3154		R:FXD MET FLM 4.22K OHM 1% 1/8W	28480	0698-3154
A7R15	0757-0460		R:FXD MET FLM 61.9K OHM 1% 1/8W	28480	0757-0460
A7R16	0757-0470	1	R:FXD MET FLM 162K OHM 1% 1/8W	28480	0757-0470
A7R17	0698-3158		R:FXD MET FLM 23.7K OHM 1% 1/8W	28480	0698-3158
A7R18	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R19	0698-3445		R:FXD MET FLM 348 OHM 1% 1/8W	28480	0698-3445
A7R20	0698-3421	1	R:FXD MET FLM 38.3K OHM 1% 1/2W	28480	0698-3421
A7R21	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A7R22	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R23	0698-3455		R:FXD MET FLM 261K OHM 1% 1/8W	28480	0698-3455
A7R24	0698-3453		R:FXD MET FLM 196K OHM 1% 1/8W	28480	0698-3453
A7R25	0757-0460		R:FXD MET FLM 61.9K OHM 1% 1/8W	28480	0757-0460
A7R26	0757-0463		R:FXD MET FLM 82.5K OHM 1% 1/8W	28480	0757-0463
A7R27	0757-0443		R:FXD MET FLM 11.0K OHM 1% 1/8W	28480	0757-0443
A7R28	0698-3132	1	R:FXD FLM 261 OHM 1% 1/8W	28480	0698-3132
A7R29	0757-0290		R:FXD MET FLM 6.19K OHM 1% 1/8W	28480	0757-0290
A7R30	0757-0290		R:FXD MET FLM 6.19K OHM 1% 1/8W	28480	0757-0290
A7R31	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A7R32	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A7R33	0698-3152		R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152
A7R34	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A7R35	2100-2514	1	R:VAR CERMET 20K OHM 10% LIN 1/2W	28480	2100-2514
A7R36	0757-0421		R:FXD MET FLM 825 OHM 1% 1/8W	28480	0757-0421
A7R37	2100-2413	2	R:VAR FLM 200 OHM 10% LIN 1/2W	28480	2100-2413
A7R38	0698-3152		R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152
A7R39	0757-0290		R:FXD MET FLM 6.19K OHM 1% 1/8W	28480	0757-0290
A7R40	0757-0400		R:FXD MET FLM 90.9 OHM 1% 1/8W	28480	0757-0400
A7R41	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A7R42	0698-3453		R:FXD MET FLM 196K OHM 1% 1/8W	28480	0698-3453
A7R43	0757-0443		R:FXD MET FLM 11.0K OHM 1% 1/8W	28480	0757-0443
A7R44	0757-0459		R:FXD MET FLM 56.2K OHM 1% 1/8W	28480	0757-0459
A7R45	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A7R46	0698-3157		R:FXD MET FLM 19.6K OHM 1% 1/8W	28480	0698-3157
A7R47	0757-0443		R:FXD MET FLM 11.0K OHM 1% 1/8W	28480	0757-0443
A7R48	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A7R49	0757-0443		R:FXD MET FLM 11.0K OHM 1% 1/8W	28480	0757-0443
A7R50	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A7R51	0698-3450		R:FXD MET FLM 42.2K OHM 1% 1/8W	28480	0698-3450
A7R52	0698-3450		R:FXD MET FLM 42.2K OHM 1% 1/8W	28480	0698-3450
A7R53	0764-0012	2	R:FXD MET FLM 6800 OHM 5% 2W	28480	0764-0012
A7R54	0757-0436	2	R:FXD MET FLM 4.32K OHM 1% 1/8W	28480	0757-0436
A7R55	0757-0436		R:FXD MET FLM 4.32K OHM 1% 1/8W	28480	0757-0436
A7R56	0698-3150		R:FXD MET FLM 2.37K OHM 1% 1/8W	28480	0698-3150
A7R57	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A7R58	0698-0083		R:FXD MET FLM 1.96K OHM 1% 1/8W	28480	0698-0083
A7R59	0698-0083		R:FXD MET FLM 1.96K OHM 1% 1/8W	28480	0698-0083
A7R60	0698-3446		R:FXD MET FLM 383 OHM 1% 1/8W	28480	0698-3446
A7R61	0698-3446		R:FXD MET FLM 383 OHM 1% 1/8W	28480	0698-3446
A7U1	1821-0001	2	TSTR ARRAY:SI NPN	02735	CA3046
A7U2	1821-0001		TSTR ARRAY:SI NPN	02735	CA3046
A7U3	1826-0081	1	IC:LINEAR OPERATIONAL AMPLIFIER	12040	LM318H
A8	08552-6007	1	BOARD ASSY:LOG AMPL(DELETE FOR OPT H01-02)	28480	08552-6007
A8	08552-62003	1	BOARD ASSY:LOG AMPL(OPT H01-H02 ONLY)	28480	08552-62003

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8	08552-6056	1	EXCHANGE ASSY:LOG AMPLIFIER	28480	08552-6056
A8C1	0160-3208	19	C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C2	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C3	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C4	0160-0162		C:FXD MY 0.022 UF 10% 200VDCW	56289	192P22392-PTS
A8C5	0160-0162		C:FXD MY 0.022 UF 10% 200VDCW	56289	192P22392-PTS
A8C6	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C7	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C8	0160-0339	1	C:FXD MICA 534 PF 1%	28480	0160-0339
A8C9	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C10	0160-2207	8	C:FXD MICA 300 PF 5%	28480	0160-2207
A8C11	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C12	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A8C13	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C14	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A8C15	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C16	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A8C17	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C18	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A8C19	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C20	0160-0162		C:FXD MY 0.022 UF 10% 200VDCW	56289	192P22392-PTS
A8C21	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C22	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C23	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C24	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C25	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A8C26	0160-0162		C:FXD MY 0.022 UF 10% 200VDCW	56289	192P22392-PTS
A8C27	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C28	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A8C29	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C30	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C31	0160-3048		C:FXD MICA 8000 PF 1% 100VDCW	28480	0160-3048
A8C32	0160-3208		C:FXD CER 0.025 UF +80-20% 100VDCW	84411	TA
A8C33	0160-2207		C:FXD MICA 300 PF 5%	28480	0160-2207
A8C34	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A8C35	0150-0121		C:FXD CER 0.1 UF +80-20% 50VDCW	56289	5C50BIS-CML
A8C36	0160-2199		C:FXD MICA 30 PF 5% 300VDCW	28480	0160-2199
A8C37	0140-0194		C:FXD MICA 110 PF 5%	72136	RDM15F111J3C
A8C38	0140-0193	1	C:FXD MICA 82 PF 5%	28480	0140-0193
A8CR1	1901-0050		DIODE:SI 200 MA AT 1V	07263	FDA 6308
A8CR2	1901-0050		DIODE:SI 200 MA AT 1V	07263	FDA 6308
A8CR3	1901-0179	2	DIODE:SILICON 15WV	28480	1901-0179
A8CR4	1901-0179		DIODE:SILICON 15WV	28480	1901-0179
A8CR5	1901-0028	1	DIODE:SILICON 0.75A 400PIV	04713	SR1358-9
A8L1	9100-2474	1	COIL/CHOKE 5.6 UH 1%	82142	10133-4
A8L2	9100-1641	10	COIL:MOLDED CHOKE 240.0 UH	28480	9100-1641
A8L3	9100-1641		COIL:MOLDED CHOKE 240.0 UH	28480	9100-1641
A8L4	9100-1641		COIL:MOLDED CHOKE 240.0 UH	28480	9100-1641
A8L5	9100-1641		COIL:MOLDED CHOKE 240.0 UH	28480	9100-1641
A8L6	9100-1641		COIL:MOLDED CHOKE 240.0 UH	28480	9100-1641
A8L7	9100-1641		COIL:MOLDED CHOKE 240.0 UH	28480	9100-1641
A8L8	9100-1641		COIL:MOLDED CHOKE 240.0 UH	28480	9100-1641
A8L9	9100-1641		COIL:MOLDED CHOKE 240.0 UH	28480	9100-1641
A8L10	9100-1641		COIL:MOLDED CHOKE 240.0 UH	28480	9100-1641
A8L11	9100-1641		COIL:MOLDED CHOKE 240.0 UH	28480	9100-1641
A8L12	08552-6013	1	INDUCTOR ASSY:VAR 10T	28480	08552-6013
A8L13	9100-1636		COIL/CHOKE 110 UH 5%	28480	9100-1636
A8L14	9100-1644	1	COIL/CHOKE 330 UH 5%	28480	9100-1644
A8Q1	1854-0351	25	TSTR:SI NPN	04713	2N3904
A8Q2	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q3	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q4	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q5	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q6	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q7	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q8	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q9	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q10	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q11	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q12	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q13	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q14	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q15	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q16	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q17	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q18	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q19	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q20	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q21	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q22	1854-0351		TSTR:SI NPN	04713	2N3904

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8Q23	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q24	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q25	1853-0010		TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010
A8Q26	1854-0039		TSTR:SI NPN	80131	2N3053
A8Q27	1854-0351		TSTR:SI NPN	04713	2N3904
A8Q28	1853-0010		TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010
A8Q29	1853-0010		TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010
A8R1	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R2	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R3	0698-0083		R:FXD MET FLM 1.96K OHM 1% 1/8W	28480	0698-0083
A8R3			FACTORY SELECTED PART		
A8R4	0698-3440		R:FXD MET FLM 196 OHM 1% 1/8W	28480	0698-3440
A8R5	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A8R6	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R7	0698-6694	8	R:FXD MET FLM 178 OHM 0.25% 1/8W	28480	0698-6694
A8R8	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R9	0698-6696	7	R:FXD MET FLM 619 OHM 0.25% 1/8W	28480	0698-6696
A8R10	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A8R11	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A8R12	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A8R13	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R14	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R15	0698-6694		R:FXD MET FLM 178 OHM 0.25% 1/8W	28480	0698-6694
A8R16	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R17	0698-6696		R:FXD MET FLM 619 OHM 0.25% 1/8W	28480	0698-6696
A8R18	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R19	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A8R20	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A8R21	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A8R22	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R23	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R24	0698-6694		R:FXD MET FLM 178 OHM 0.25% 1/8W	28480	0698-6694
A8R25	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R26	0698-6696		R:FXD MET FLM 619 OHM 0.25% 1/8W	28480	0698-6696
A8R27	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R28	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A8R29	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A8R30	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A8R31	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R32	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R33	0698-6694		R:FXD MET FLM 178 OHM 0.25% 1/8W	28480	0698-6694
A8R34	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R35	0698-6696		R:FXD MET FLM 619 OHM 0.25% 1/8W	28480	0698-6696
A8R36	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R37	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A8R38	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A8R39	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A8R40	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R41	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R42	0698-6694		R:FXD MET FLM 178 OHM 0.25% 1/8W	28480	0698-6694
A8R43	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R44	0698-6696		R:FXD MET FLM 619 OHM 0.25% 1/8W	28480	0698-6696
A8R45	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R46	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A8R47	0698-3446		R:FXD MET FLM 383 OHM 1% 1/8W	28480	0698-3446
A8R48	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A8R49	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R50	0698-3446		R:FXD 383 OHM 1% 1/8W(DELETE FOR H01-02)	28480	0698-3446
A8R50	0698-3132		R:FXD 261 OHM 1% 1/8W(OPT H01-02 ONLY)	28480	0698-3132
A8R51	0698-3440		R:FXD 196 OHM 1% 1/8W(DELETE FOR H01-02)	28480	0698-3440
A8R51	0757-0405		R:FXD 162 OHM 1% 1/8W(OPT H01-02 ONLY)	28480	0757-0405
A8R52	2100-2413		R:VAR FLM 200 OHM 10% LIN 1/2W	28480	2100-2413
A8R53	0698-3417	2	R:FXD MET FLM 23.7K OHM 1% 1/8W	28480	0698-3417
A8R54	0698-6696		R:FXD MET FLM 619 OHM 0.25% 1/8W	28480	0698-6696
A8R55	0698-6694		R:FXD MET FLM 178 OHM 0.25% 1/8W	28480	0698-6694
A8R56	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R57	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R58	0698-3417		R:FXD MET FLM 23.7K OHM 1% 1/2W	28480	0698-3417
A8R59	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R60	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A8R61	0698-3446		R:FXD MET FLM 383 OHM 1% 1/8W	28480	0698-3446
A8R62	0698-3440		R:FXD 196 OHM 1% 1/8W(DELETE FOR H01-02)	28480	0698-3440
A8R62	0698-3437		R:FXD 133 OHM 1% 1/8W(OPT H01-02 ONLY)	28480	0698-3437
A8R63	2100-1755		R:VAR WW 100 OHM 5% TYPE V 1W	28480	2100-1755
A8R64	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A8R65	0698-3159	1	R:FXD MET FLM 26.1K OHM 1% 1/8W	28480	0698-3159
A8R66	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A8R67	0698-3152		R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A8R68	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A8R69	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R70	0698-6696		R:FXD MET FLM 619 OHM 0.25% 1/8W	28480	0698-6696
A8R71	0698-6694		R:FXD MET FLM 178 OHM 0.25% 1/8W	28480	0698-6694
A8R72	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R73	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R74	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R75	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A8R76	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A8R77	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A8R78	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R79	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A8R80	0698-6694		R:FXD MET FLM 178 OHM 0.25% 1/8W	28480	0698-6694
A8R81	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R82	0698-3419		R:FXD MET FLM 31.6K OHM 1% 1/2W	28480	0698-3419
A8R83	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A8R84	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A8R85	0698-3446		R:FXD MET FLM 383 OHM 1% 1/8W	28480	0698-3446
A8R86	0757-0346		R:FXD MET FLM 10 OHM 1% 1/8W	28480	0757-0346
A8R87	0757-0416		R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A8R88	0757-0416		R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A8R89	0757-0401		R:FXD MET FLM 100 OHM 1% 1/8W	28480	0757-0401
A8R90	0698-3450		R:FXD MET FLM 42.2K OHM 1% 1/8W	28480	0698-3450
A8R91	0698-3154		R:FXD MET FLM 4.22K OHM 1% 1/8W	28480	0698-3154
A8R92	0698-3156		R:FXD MET FLM 14.7K OHM 1% 1/8W	28480	0698-3156
A8R93	0764-0012		R:FXD MET FLM 6800 OHM 5% 2W	28480	0764-0012
A8R94	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A8R95	0757-0424	1	R:FXD MET FLM 1.10K OHM 1% 1/8W	28480	0757-0424
A8R96	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A8R97	0698-3154		R:FXD MET FLM 4.22K OHM 1% 1/8W	28480	0698-3154
A8R98	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A8TP1 THRU	0360-0124		TERMINAL:SOLDER LUG	28480	0360-0124
A8TP5	0360-0124		TERMINAL:SOLDER LUG	28480	0360-0124
A9	08552-60123	1	SWITCH ASSY:SCAN TIME	28480	08552-60123
A9C1	0180-2125	1	C:FXD ELECT 15 UF 5% 20VDCW	28480	0180-2125
A9C2	0180-2126	1	C:FXD ELECT 1.5 UF 5% 35VDCW	28480	0180-2126
A9C3	0180-2127	1	C:FXD ELECT 0.15 UF 5% 35VDCW	28480	0180-2127
A9C4	0160-3017	1	C:FXD MY 0.015 UF 5% 200VDCW	28480	0160-3017
A9C5	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A9R1	0757-0459		R:FXD MET FLM 56.2K OHM 1% 1/8W	28480	0757-0459
A9R2	0698-3449	1	R:FXD MET FLM 28.7K OHM 1% 1/8W	28480	0698-3449
A9R3	0757-0443		R:FXD MET FLM 11.0K OHM 1% 1/8W	28480	0757-0443
A9R4	0683-3355	1	R:FXD COMP 3.3 MEGOHM 5% 1/4W	01121	CB 3355
A9R5	0757-0485	1	R:FXD MET FLM 681K OHM 1% 1/8W	28480	0757-0485
A9R6	0698-3450		R:FXD MET FLM 42.2K OHM 1% 1/8W	28480	0698-3450
A9R7	0698-3153	1	R:FXD MET FLM 3.83K OHM 1% 1/8W	28480	0698-3153
A9R8	0698-3260	7	R:FXD MET FLM 464K OHM 1% 1/8W	28480	0698-3260
A9R9	0698-3260		R:FXD MET FLM 464K OHM 1% 1/8W	28480	0698-3260
A9R10	0698-3260		R:FXD MET FLM 464K OHM 1% 1/8W	28480	0698-3260
A9R11	0698-3260		R:FXD MET FLM 464K OHM 1% 1/8W	28480	0698-3260
A9R12	0698-3260		R:FXD MET FLM 464K OHM 1% 1/8W	28480	0698-3260
A9R13	0698-3260		R:FXD MET FLM 464K OHM 1% 1/8W	28480	0698-3260
A9R14	0698-3260		R:FXD MET FLM 464K OHM 1% 1/8W	28480	0698-3260
A9R15	0698-3271	6	R:FXD MET FLM 115K OHM 1% 1/8W	28480	0698-3271
A9R16	0698-3271		R:FXD MET FLM 115K OHM 1% 1/8W	28480	0698-3271
A9R17	0698-3157		R:FXD MET FLM 19.6K OHM 1% 1/8W	28480	0698-3157
A9R18	0698-3157		R:FXD MET FLM 19.6K OHM 1% 1/8W	28480	0698-3157
A9R19	0698-3271		R:FXD MET FLM 115K OHM 1% 1/8W	28480	0698-3271
A9R20	0698-3271		R:FXD MET FLM 115K OHM 1% 1/8W	28480	0698-3271
A9R21	0698-3271		R:FXD MET FLM 115K OHM 1% 1/8W	28480	0698-3271
A9R22	0698-3271		R:FXD MET FLM 115K OHM 1% 1/8W	28480	0698-3271
A9R23	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A9S1	3100-2656	1	SWITCH:ROTARY 16 POSITION	28480	3100-2656
A10	08552-60134	1	SWITCH ASSY:REF LEVEL	28480	08552-60134
A10L1	9100-1630		COIL/CHOKE 51.0 UH 5%	28480	9100-1630
A10R1	0698-6310	1	R:FXD MET FLM 78.41 OHM 0.25% 1/8W	28480	0698-6310
A10R2	0698-5401	1	R:FXD MET FLM 247.50 OHM 0.25% 1/8W	28480	0698-5401
A10R3	0698-6311	1	R:FXD MET FLM 139.8 OHM 0.25% 1/8W	28480	0698-6311
A10R4	0698-0082		R:FXD MET FLM 464 OHM 1% 1/8W	28480	0698-0082
A10R5	0757-1094		R:FXD MET FLM 1.47K OHM 1% 1/8W	28480	0757-1094
A10R6	0698-6941	1	R:FXD MET FLM 114.6 OHM 0.25% 1/8W	28480	0698-6941
A10R7	0757-0440		R:FXD MET FLM 7.50K OHM 1% 1/8W	28480	0757-0440
A10R8	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A10R9	0698-3160		R:FXD MET FLM 31.6K OHM 1% 1/8W	28480	0698-3160
A10R10	0757-0001	1	R:FXD MET FLM 13.3 OHM 1% 1/2W	28480	0757-0001

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A10S1	3100-2092	1	SWITCH:ROTARY	28480	3100-2092
A11	08552-60106	1	SWITCH ASSY:VIDEO FILTER	28480	08552-60106
A11C1	0180-0374	1	C:FXD TANT. 10 UF 10% 20VDCW	56289	150D106X902082-DYS
A11C2	0160-0161	1	C:FXD MY 0.01 UF 10% 200VDCW	56289	192P10392-PTS
A11C3	0180-0291		C:FXD ELECT 1.0 UF 10% 35VDCW	56289	150D105X9035A2-DYS
A11R1	0757-0454	1	R:FXD MET FLM 33.2K OHM 1% 1/8W	28480	0757-0454
A11R2	0698-4507	1	R:FXD MET FLM 76.8K OHM 1% 1/8W	28480	0698-4507
A11R3	0698-4207	1	R:FXD MET FLM 44.2K OHM 1% 1/8W	28480	0698-4207
A11S1	3100-2673	1	SWITCH:LEVER 4 POSITION	28480	3100-2673
A12	08552-60115	1	BOARD ASSY:47 MHZ APC	28480	08552-60115
A12	08552-60145	1	EXCHANGE ASSY:47 MHZ APC	28480	08552-60145
A12C1	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A12C2	0140-0191		C:FXD MICA 56 PF 5% 300VDCW	19701	RDM15E560J 300V
A12C3	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A12C4	0160-0134		C:FXD MICA 220PF 5% 300VDCW	14655	RDM15F221J3C
A12C5	0140-0200	2	C:FXD MICA 390 PF 5%	72136	RDM15F391-J3C
A12C6	0140-0200		C:FXD MICA 390 PF 5%	72136	RDM15F391-J3C
A12C7	0160-0153		C:FXD MY 0.001 UF 10% 200VDCW	56289	192P10292-PTS
A12C8	0160-0298	1	C:FXD MY 0.0015 UF 10% 200VDCW	56289	192P15292-PTS
A12C9	0160-0302	1	C:FXD MY 0.018 UF 10% 200VDCW	56289	192P18392-PTS
A12C10	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A12C11	0160-0163		C:FXD MY 0.033 UF 10% 200VDCW	56289	192P33392-PTS
A12C12	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A12C13	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A12C14	0160-3456		C:FXD CER 1000 PF 10% 250VDCW	56289	C067F251F102KS22-CDH
A12CR1	1902-0025		DIODE,BREAKDOWN:10.0V 5% 400 MW	28480	1902-0025
A12E1	10534C	2	MIXER:200 MHZ	28480	10534C
A12E2	10534C		MIXER:200 MHZ	28480	10534C
A12L1	9140-0098	2	COIL/CHOKE 2.20 UH 10%	99800	1537-20
A12L2	9140-0098		COIL/CHOKE 2.20 UH 10%	99800	1537-20
A12L3	9100-1621	1	COIL/CHOKE 18.0 UH 10%	99800	1537-42
A12L4	9100-1618	2	COIL:MOLDED CHOKE 5.60 UH	28480	9100-1618
A12L5	9100-1618		COIL:MOLDED CHOKE 5.60 UH	28480	9100-1618
A12L6	9140-0237		COIL:FXD 200 UH 5%	28480	9140-0237
A12L7	9140-0129		COIL:FXD,MOLDED RF CHOKE 220UH 5%	28480	9140-0129
A12Q1	1854-0019		TSTR:SI NPN	28480	1854-0019
A12Q2	1853-0034		TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0034
A12R1	0757-0316	1	R:FXD MET FLM 42.2 OHM 1% 1/8W	28480	0757-0316
A12R2	0757-0402		R:FXD MET FLM 110 OHM 1% 1/8W	28480	0757-0402
A12R3	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A12R4	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A12R5	0757-0382	2	R:FXD MET FLM 16.2 OHM 1% 1/8W	28480	0757-0382
A12R6	0757-0397	1	R:FXD MET FLM 68.1 OHM 1% 1/8W	28480	0757-0397
A12R7	0757-0382		R:FXD MET FLM 16.2 OHM 1% 1/8W	28480	0757-0382
A12R8	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A12R9	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A12R10	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A12R11	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A12R12	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A12R13	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A12R14	0757-0416		R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A12R15	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A12R16	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A12T1	08552-80101	1	INDUCTOR ASSY:45 MHZ OSC	50436	08552-80101
A12TP1	0360-1514		TERMINAL PIN:SQUARE	28480	0360-1514
A12U1	1826-0013		IC:LINEAR	28480	1826-0013
A12XA13	1251-0478	1	CONNECTOR:PC (2 X 6) 12 CONTACTS	71785	252-06-30-340
A12Y1	0410-0406	1	CRYSTAL:QUARTZ 45 MHZ	28480	0410-0406
A13	08552-60117	1	BOARD ASSY:2 MHZ OSCILLATOR	28480	08552-60117
A13C1	0122-0051	2	DIODE:TUNING 100 PF 5%	28480	0122-0051
A13C2	0122-0051		DIODE:TUNING 100 PF 5%	28480	0122-0051
A13C3	0180-1746		C:FXD ELECT 15 UF 10% 20VDCW	28480	0180-1746
A13C4	0160-0194		C:FXD MY 0.015 UF 10%	56289	192P15392-PTS
A13C5	0160-3060		C:FXD CER 0.1 UF 20% 25VDCW	56289	3C42A-CML
A13C6	0160-2055		C:FXD CER 0.01 UF +80-20% 100VDCW	56289	C023F101F103ZS22-CDH
A13C7	0160-3060		C:FXD CER 0.1 UF 20% 25VDCW	56289	3C42A-CML
A13C8	0160-3060		C:FXD CER 0.1 UF 20% 25VDCW	56289	3C42A-CML
A13C9	0160-3060		C:FXD CER 0.1 UF 20% 25VDCW	56289	3C42A-CML

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A13C10	0180-2207	1	C:FXD ELECT 100 UF 10% 10VDCW	56289	150D101X9010R2-DYS
A13C11	0180-0197		C:FXD ELECT 2.2 UF 10% 20VDCW	56289	150D225X9020A2-DYS
A13C12	0180-1746		C:FXD ELECT 15 UF 10% 20VDCW	28480	0180-1746
A13L1	9140-0237		COIL:FXD 200 UH 5%	28480	9140-0237
A13L2	9140-0237		COIL:FXD 200 UH 5%	28480	9140-0237
A13Q1	1853-0050	1	TSTR:SI PNP	28480	1853-0050
A13Q2	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A13Q3	1853-0012	1	TSTR:SI PNP	80131	2N2904A
A13Q4	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A13R1	0757-0447		R:FXD MET FLM 16.2K OHM 1% 1/8W	28480	0757-0447
A13R2	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A13R3	0698-3445		R:FXD MET FLM 348 OHM 1% 1/8W	28480	0698-3445
A13R4	0698-0083		R:FXD MET FLM 1.96K OHM 1% 1/8W	28480	0698-0083
A13R5	2100-2522		R:VAR CERMET 10K OHM 10% LIN 1/2W	28480	2100-2522
A13R6	0757-0447		R:FXD MET FLM 16.2K OHM 1% 1/8W	28480	0757-0447
A13R7	0698-3450		R:FXD MET FLM 42.2K OHM 1% 1/8W	28480	0698-3450
A13R8	0698-3445		R:FXD MET FLM 348 OHM 1% 1/8W	28480	0698-3445
A13R9	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A13R10	0698-3157		R:FXD MET FLM 19.6K OHM 1% 1/8W	28480	0698-3157
A13R11	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A13R12	0698-3441		R:FXD MET FLM 215 OHM 1% 1/8W	28480	0698-3441
A13R13	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A13R14	0698-3441		R:FXD MET FLM 215 OHM 1% 1/8W	28480	0698-3441
A13R15	0698-3435	1	R:FXD MET FLM 38.3 OHM 1% 1/8W	28480	0698-3435
A13R16	0698-3430	1	R:FXD MET FLM 21.5 OHM 1% 1/8W	28480	0698-3430
A13R17	0698-0083		R:FXD MET FLM 1.96K OHM 1% 1/8W	28480	0698-0083
A13T1	08552-80104	1	INDUCTOR ASSY:2 MHZ VTO	50436	08552-80104
A13TP1	0360-1514		TERMINAL PIN:SQUARE	28480	0360-1514

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			CHASSIS PARTS		
C1	0160-2049	2	C:FXD CER FEED-THRU 5000 PF +80-20%	28480	0160-2049
C2	0160-3219	3	C:FXD FEED-THRU 100 PF	28480	0160-3219
C3	0160-2049		C:FXD CER FEED-THRU 5000 PF +80-20%	28480	0160-2049
C4	0160-3219		C:FXD FEED-THRU 100 PF	28480	0160-3219
C5	0150-0093	1	C:FXD CER 0.01 UF +80-20% 100VDCW	72982	8C1-K800011
C6	0160-2437	4	C:FXD CER 5000 PF +80-20% 200VDCW	72982	2425-000-X5V-502P
C7	0160-2437		C:FXD CER 5000 PF +80-20% 200VDCW	72982	2425-000-X5V-502P
C8	0160-2436	1	C:FXD CER 10 PF 20% 200VDCW	72982	2425-000-X5P-100G
C9	0160-2437		C:FXD CER 5000 PF +80-20% 200VDCW	72982	2425-000-X5V-502P
C10	0160-2437		C:FXD CER 5000 PF +80-20% 200VDCW	72982	2425-000-X5V-502P
C11					
C18			NOT ASSIGNED		
C19	0160-3219		C:FXD FEED-THRU 100 PF	28480	0160-3219
CR1	1901-0416		DIODE:SILICON 200PIV 3A	28480	1901-0416
DS1	2140-0058	6	LAMP:INCANDESCENT 10.0V 0.04 AMPS	08806	367
DS2	2140-0058		LAMP:INCANDESCENT 10.0V 0.04 AMPS	08806	367
DS3	2140-0058		LAMP:INCANDESCENT 10.0V 0.04 AMPS	08806	367
DS4	2140-0058		LAMP:INCANDESCENT 10.0V 0.04 AMPS	08806	367
DS5	2140-0058		LAMP:INCANDESCENT 10.0V 0.04 AMPS	08806	367
DS6	2140-0058		LAMP:INCANDESCENT 10.0V 0.04 AMPS	08806	367
DS7	2140-0258	2	LAMP:INCANDESCENT 10V	71744	CM-2107
DS7	5040-0235	3	BASE:LAMPHOLDER	28480	5040-0235
DS7	08552-8002	1	LAMPHOLDER:TIMES	28480	08552-8002
DS8	2140-0258		LAMP:INCANDESCENT 10V	71744	CM-2107
DS8	5040-0235		BASE:LAMPHOLDER	28480	5040-0235
DS8	08552-8001	1	LAMPHOLDER:PLUS	28480	08552-8001
DS9	2140-0022	1	LAMP:GLOW 1.0 MILLIAMPS 0.1W	08806	A9A(NE-2E)
DS9	5040-0234	1	LAMPHOLDER	28480	5040-0234
DS9	5040-0235		BASE:LAMPHOLDER	28480	5040-0235
F1	2110-0001	2	FUSE:1 AMP 250V	75915	312001.
F2	2110-0001		FUSE:1 AMP 250V	75915	312001.
J1	1250-0252	1	BODY:RF CONNECTOR BULKHEAD RECEPTACLE	28480	1250-0252
J1			(CAL OUT) P/O W4		
J2	1250-0118	3	CONNECTOR:BNC	24931	28JR 128-1
J2			(PEN LIFT OUT, TRIG IN)		
J3	1251-2080	1	CONNECTOR:41 FEMALE CONTACT	83148	00MF-43W2S
J3			(INTERCONNECTING PLUG, RF/IF)		
J4	1250-0118		CONNECTOR:BNC	24931	28JR 128-1
J4			(VERTICAL OUT)		
J5	1250-0118		CONNECTOR:BNC	24931	28JR 128-1
J5			(SCAN IN, OUT)		
J6	1250-0830	2	CONNECTOR:RF	98291	50-047-0000
J6			(RF INPUT)		
J7	1250-0830		CONNECTOR:RF	98291	50-047-0000
J7			(47 MHZ OUTPUT)		
J8	1250-0828	1	CONNECTOR:RF 50-OHM SCREW ON TYPE	98291	50-043-4610
L1	9140-0142	3	COIL:FXD RF 2.20 UH 10%	82142	09-4436-4K
L2	9140-0142		COIL:FXD RF 2.20 UH 10%	82142	09-4436-4K
L3	9140-0142		COIL:FXD RF 2.20 UH 10%	82142	09-4436-4K
L4	9100-1615	1	COIL/CHOKE FXD 1.20 UH 10%	28480	9100-1615
P1	1251-0055	1	CONNECTOR:MALE 24 CONTACTS	28480	1251-0055
Q1					
Q22			NOT ASSIGNED IN CHASSIS PARTS		
Q23	1853-0052	1	TSTR:SI PNP	80131	2N3740
Q23	0340-0162	2	INSULATOR:TSTR FOR TO-66	13103	A0340-0162-1
Q23	1200-0168	2	SOCKET:TRANSISTOR	28480	1200-0168
Q24	1854-0341	1	TSTR:SI NPN	28480	1854-0341
Q24	0340-0162		INSULATOR:TSTR FOR TO-66	13103	A0340-0162-1
Q24	1200-0168		SOCKET:TRANSISTOR	28480	1200-0168
R1	0811-2501	1	R:FXD WW 180 OHM 3% 50W	28480	0811-2501
R2	0683-3315	2	R:FXD COMP 330 OHM 5% 1/4W	01121	CB 3315
R3	0683-3315		R:FXD COMP 330 OHM 5% 1/4W	01121	CB 3315
R4	2100-2492	2	R:VAR COMP 5K OHM 20% LIN 1/2W	28480	2100-2492
R5	2100-2488	2	R:VAR COMP 10K OHM 20% LIN 1/2W	28480	2100-2488
R6	0757-0441		R:FXD MET FLM 8.25K OHM 1% 1/8W	28480	0757-0441
R7	0767-0010	2	R:FXD MET FLM 15K OHM 5% 3W	28480	0767-0010
R8	0767-0010		R:FXD MET FLM 15K OHM 5% 3W	28480	0767-0010
R9	0757-0461		R:FXD MET FLM 68.1K OHM 1% 1/8W	28480	0757-0461
R10	2100-2806	1	R:VAR COMP 2.5K OHM 20% LIN 1/2W	28480	2100-2806
R11	2100-2661	1	R:VAR COMP 1K OHM 20% LIN 1/2W	28480	2100-2661
R12	2100-2501	1	R:VAR WW 2K OHM 20% LIN 1.5W	28480	2100-2501
R13	0698-3399	1	R:FXD MET FLM 133 OHM 1% 1/2W	28480	0698-3399
R14	0698-3400	1	R:FXD MET FLM 147 OHM 1% 1/2W	28480	0698-3400
R15	2100-2488		R:VAR COMP 10K OHM 20% LIN 1/2W	28480	2100-2488

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
R16	0687-2731	1	R:FXD COMP 27K OHM 10% 1/2W	01121	EB 2731
R17	0812-0100	1	R:FXD WW 2K OHM 5% 5W	28480	0812-0100
R18	0811-1666	1	R:FXD WW 1.0 OHM 5% 2W	28480	0811-1666
R19	0683-1045	1	R:FXD COMP 100K OHMS 5% 1/4W	01121	CB 1045
R20	2100-2492		R:VAR COMP 5K OHM 20% LIN 1/2W	28480	2100-2492
S1	3101-0897	1	SWITCH:SLIDE DP3T 0.5 AMP	79727	G-128S-0021
S1			(LOG/LINEAR)		
S2	3101-0052	1	SWITCH:PUSHBUTTON SPST	82389	961 LESS HWD
S3	08552-60105	1	SWITCH ASSY:SCAN MODE	28480	08552-60105
S4	08552-60135	1	SWITCH ASSY:SCAN TRIGGER	28480	08552-60135
W1	8120-1110	1	CABLE:RF(GREEN)	28480	8120-1110
W2	8120-1111	1	CABLE:RF(BLUE)	28480	8120-1111
W3	08552-6015	1	CABLE ASSY:GRAY	28480	08552-6015
W4	08552-60118	1	CABLE ASSY:CAL OUT(DELETE FOR OPT H01-02)	28480	08552-60118
W4	08552-62001	1	CABLE ASSY:CAL OUT(OPT H01 ONLY)	28480	08552-62001
W4	08552-62004	1	CABLE ASSY:CAL OUT(OPT H02 ONLY)	28480	08552-62004
W5	08552-60136	1	CABLE ASSY:ORANGE	28480	08552-60136
W6	08552-60119	1	CABLE ASSY:VERTICAL OUTPUT	28480	08552-60119
W7	08552-6038	1	CABLE ASSY:50 MHZ	28480	08552-6038
W8	08552-6039	1	CABLE ASSY:47 MHZ(YELLOW STRIPE)	28480	08552-6039
W9	08552-60122	1	CABLE ASSY:47 MHZ APC	28480	08552-60122
W10	08552-60132	1	CABLE ASSY:BLUE	28480	08552-60132
W11	08552-60131	1	CABLE ASSY:SHIELDED	28480	08552-60131
W12	08552-6028	1	CABLE ASSY:RED	28480	08552-6028
W13	08552-60083	1	CABLE ASSY:3 MHZ	28480	08552-60083
XA1	1251-0135	4	CONNECTOR:PC EDGE 15 CONTACT	95354	91-6915-1500-00
XA2	1251-0135		CONNECTOR:PC EDGE 15 CONTACT	95354	91-6915-1500-00
XA3	1251-0194	1	CONNECTOR:PC EDGE 15 CONTACT	95354	91-6915-1113-00
XA4	1251-0135		CONNECTOR:PC EDGE 15 CONTACT	95354	91-6915-1500-00
XA5	1251-0159	3	CONNECTOR:PC EDGE 2 X 15 CONTACT	71785	251-15-30-261
XA6	1251-0159		CONNECTOR:PC EDGE 2 X 15 CONTACT	71785	251-15-30-261
XA7	1251-0159		CONNECTOR:PC EDGE 2 X 15 CONTACT	71785	251-15-30-261
XA8	1251-0135		CONNECTOR:PC EDGE 15 CONTACT	95354	91-6915-1500-00
XF1	2110-0087	2	FUSEHOLDER:OPEN TYPE	28480	2110-0087
XF2	2110-0087		FUSEHOLDER:OPEN TYPE	28480	2110-0087
			MISCELLANEOUS		
	0370-0151	2	KNOB:ROUND FOR 0.125" DIA SHAFT	28480	0370-0151
	0370-0432	3	KNOB:BLACK LEVER	28480	0370-0432
	0403-0026	8	GLIDE:NYLON	28480	0403-0026
	0510-0048	2	FASTENER:6-32 THREADED HOLE	16585	T71C065-632
	0590-0159	4	NUT:HEX FOR 0160-3219 CAPACITOR	72982	2499-202
	1400-0093	6	CLAMP:CABLE FOR 1/4" DIA HOLE	00000	OBD
	1460-0931	1	SPRING:EXTENSION	00000	OBD
	1490-0838	2	STUD:LATCHING #8-32 THREAD	28480	1490-0838
	2190-0057	4	WASHER:LOCK FOR #12 HDW	00000	OBD
	3050-0381	4	WASHER:THRUST(DELRIN)	28480	3050-0381
	6960-0016	4	PLUG:NYLON 0.125" DIA HOLE	00000	OBD
	03950-4001	1	EXTRACTOR:TOOL	28480	03950-4001
	08552-0016	1	DIAL-KNOB ASSY:LOG REF. FINE	28480	08552-0016
	08552-0015	1	DIAL-KNOB ASSY:SCAN TIME	28480	08552-0015
	08552-0025	9	INSULATOR:VERTICAL	28480	08552-0025
	08552-4006	1	INDICATOR UNIT:IF GAIN	28480	08552-4006
	08552-6017		INDUCTOR ASSY:50 MHZ	28480	08552-6017
	08552-2016	1	RETAINER:BULB	28480	08552-2016
	08552-60133	1	CHASSIS ASSY:MAIN BODY	28480	08552-60133
	08552-90013	1	GRATICULE:OVERLAY	28480	08552-90013
	08552-90014	1	GRATICULE:OVERLAY	28480	08552-90014
	0360-0268	15	TERMINAL SOLDER:LUG	78189	2103-06-00
	5000-0230	1	INSULATOR:P.C. BOARD	28480	5000-0230
	08552-0018	2	BRACKET:SHIELD	28480	08552-0018
	08552-2017	6	CONTACT:LAMPHOLDER P/O A10	28480	08552-2017
	0460-0114		TAPE:POLYURETHANE 1-1/4 IN WIDE	85471	TESAMOLL-2
	08552-0014	1	DIAL-KNOB ASSY IF LEVEL(DELETE FOR H01-02-04)	28480	08552-0014
	08552-02002	1	DIAL-KNOB ASSY IF LEVEL(OPT H01-02 ONLY)	28480	08552-02002
	08552-0027	1	DIAL-KNOB ASSY IF LEVEL(OPT H04 ONLY)	28480	08552-0027
	08552-00131	1	PLATE:CONNECTOR(DELETE FOR OPT H01-02)	28480	08552-00131
	08552-02005	1	PLATE:CONNECTOR(OPT H01-02 ONLY)	28480	08552-02005

See introduction to this section for ordering information

Table 6-3. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			CABINET PARTS		
	08552-0003	1	PANEL:REAR	28480	08552-0003
	08552-0009	1	COVER:SHIELD	28480	08552-0009
	08552-00104	1	PLATE:CONNECTOR	28480	08552-00104
	08552-00106	1	PANEL:FRONT	28480	08552-00106
	08552-00107	1	PANEL:SUB	28480	08552-00107
	08552-00108	1	BRACE	28480	08552-00108
	08552-00109	1	COVER:VTO	28480	08552-00109
	08552-00111	1	COVER:PHASE LOCK	28480	08552-00111
	08552-00124	1	COVER:BOTTOM	28480	08552-00124
	08552-00132	1	PANEL:FRONT, MINT GRAY	28480	08552-00132
	08552-00131	1	PLATE:CONNECTOR, OLIVE BLACK	*28480*	*08552-00131*
	08552-0014	1	DIAL-KNOB ASSY:IF LEVEL	28480	08552-0014
	08552-0013	1	BRACKET:POT	*28480*	*08552-0013*
	08552-0018		BRACKET:SHIELD	28480	08552-0018
	08552-2044	1	BAR LATCH	28480	08552-2044
	08552-4001	1	HANDLE:LATCH	28480	08552-4001
	08552-0004	1	DECK:PLUG-IN	28480	08552-0004
	08552-0005	1	DECK:RIGHT SIDE	28480	08552-0005
	08552-0006	1	DECK:LEFT SIDE	28480	08552-0006
	08552-0007	6	DECK:DIVIDER	28480	08552-0007
	08552-00121	1	PHASE LOCK BOX ASSY	28480	08552-00121
	08552-00125	1	DECK:BRACE	28480	08552-00125
	08552-0017	1	DECK:REAR DIVIDER	28480	08552-0017

Table 6-4. Code List of Manufacturers

MFR NO.	MANUFACTURER NAME	ADDRESS	ZIP CODE
00000	U.S.A. COMMON	ANY SUPPLIER OF U.S.A.	
00136	MC COY ELECTRONICS CO.	MT. HOLLY SPRINGS, PA.	17065
00656	AEROVOX CORP.	NEW BEDFORD, MASS.	02745
00853	SANGAMO ELECTRIC CO.PICKENS DIV.	PICKENS, S.C.	29671
01121	ALLEN BRADLEY CO.	MILWAUKEE, WIS.	53204
01255	LITTON INDUSTRIES INC. (USECO)	BEVERLY HILLS, CALIF.	90210
01295	TEXAS INSTRUMENTS INC. SEMICONDUCTOR COMPONENTS DIV.	DALLAS, TEX.	75231
02114	FERROXCUBE CORP.	SAUGERTIES, N.Y.	12477
02735	*RCA SOLID STATE & RECEIVING TUBE DIV.*	*SOMERVILLE, N.J.*	*08876*
04713	MOTOROLA SEMICONDUCTOR PROD.INC.	PHOENIX, ARIZ.	85008
06540	*AMATOM ELECT. HARDWARE CO. INC.*	*NEW ROCHELLE, N.Y.*	*10801*
07263	FAIRCHILD CAMERA & INST. CORP. SEMICONDUCTOR DIV.	MOUNTAIN VIEW, CALIF.	94040
08806	G.E. CO. MINIATURE LAMP DEPT.	CLEVELAND, OHIO	44112
12040	NATIONAL SEMICONDUCTOR CORP.	DANBURY, CONN.	06810
13103	THERMALLOY CO.	DALLAS, TEX.	75247
14655	CORNELL DUBLIER ELECT. DIV.FEDERAL PACIFIC ELECT. CO.	NEWARK, N.J.	07105
16585	BOOTS AIRCRAFT NUT CORP. WESTERN DIV.	PASENDENA, CALIF.	91100
19701	ELECTRA/MIDLAND CORP.	MINERAL WELLS, TEX.	76067
24931	SPECIALTY CONNECTOR CO. INC.	INDIANAPOLIS, IND.	46227
28480	HEWLETT-PACKARD CO. CORPORATE HQ	YOUR NEAREST HP OFFICE	
36196	STANWYCK COIL PROD. LTD.	HAWKSBURY ONTARIO, CANADA	
50436	HEWLETT-PACKARD CO. MICROWAVE DIV	PALO ALTO, CALIF	94304
56289	SPRAGUE ELECTRIC CO.	N. ADAMS, MASS.	01247
71744	CHICAGO MINIATURE LAMP WORKS	CHICAGO, ILL.	60640
71785	CINCH MFG. CO. DIV TRW INC.	ELK GROVE VILLAGE, ILL.	
72136	ELECTRO MOTIVE MFG. CO. INC.	WILLIMANTIC, CONN.	06226
72982	ERIE TECHNOLOGICAL PROD. INC.	ERIE, PA.	16512
75915	LITTELFUSE INC.	DES PLAINES, ILL.	60016
78189	SHAKEPROOF DIV. ILLINOIS TOOL WORKS	ELGIN, ILL.	60120
79727	CONTINENTAL-WIRT ELECTRONICS CORP.	WARMINSTER, PA.	18974
80131	ELECTRONIC INDUSTRIES ASSOCIATION	WASHINGTON D.C.	20006
82142	AIRCO SPEER ELECT. COMP.	DU BOIS, PA.	15801
82389	SWITCHCRAFT INC.	CHICAGO, ILL.	60630
83148	ITT WIRE & CABLE DIV.	LOS ANGELES, CALIF.	90031
84171	ARCO ELECT. INC.	GREAT NECK, N.Y.	11022
84411	TRW CAPACITOR DIV.	OGALLALA, NEBR.	69153
85471	BOYD A.B. CO.	SAN FRANCISCO,CALIF.	94103
91418	RADIO MATERIALS CO.	CHICAGO, ILL.	60646
95354	METHODE MFG. CO.	ROLLING MEADOWS, ILL.	60008
98291	SEALECTRO CORP.	MAMARONECK, N.Y.	10544
98978	INTERNATIONAL ELECT. RESEARCH CORP.	BURBANK, CALIF.	91502
99800	DELEVAN ELECTRONICS CORP.	E. AURORA, N.Y.	14052

See introduction to this section for ordering information

SECTION VII
MANUAL CHANGES

7-1. INTRODUCTION

7-1. This section contains information for adapting this manual to instruments for which the content does not apply directly.

7-3. To adapt this manual to your instrument, refer to Table 7-1 and make all of the manual changes listed opposite your instrument serial number. Perform these changes in the sequence listed.

7-4. If your instrument serial number is not listed on the title page of this manual, or in Table 7-1, it may be documented in a yellow MANUAL CHANGES supplement available from Hewlett-Packard. For additional important information about serial number coverage, refer to INSTRUMENTS COVERED BY MANUAL in Section I.

Table 7-1. Manual Changes by Serial Number

Serial Prefix or No.	Make Manual Changes
1345A	A
1335A04961 to 05360	A, B
1335A04861 to 04960	A, B, C
1311A	A through D
1250A	A through E
1234A02983 to 03210	A through F
1217A	A through G
1210A	A through H
1209A	A through I
1144A01311 to 01810	A through J
1144A01211 to 01310	A through K
1137A	A through L

Serial Prefix or No.	Make Manual Changes
1131A	A through M
1121A00811 to 00960	A through N
1121A00761 to 00810	A through 0
1107A00561 to 00760	A through P
1107A00436 to 00560	A through Q
1050A00386 to 00435	A through R
1050A00311 to 00385	A through S
977-00261 to 00310	A through T
977-00186 to 00260	A through U
977-00161 to 00185	A through V
974	A through W
971	A through X

Table 7-2. Summary of Changes by Component (1 of 2)

Changes	A	B	C	D	E	G	H	I	J	K
A1	L7	R4, R7, R12, R21, R25, R26, R30, R44, R45, R70, R71, R81, R82			R60					
A2			Z1							
A3										
A3A2										
A4								R36 R55 R96 R112		R122
A5				C20 R18						
A6					R57					
A7							Note 2			
A8									R98	
A10										
A11										
A12										
A13										
W13									W13	
CHASSIS PARTS										

Table 7-2. Summary of Changes by Component (2 of 2)

Changes	L	N	O	P	R	S	T	V	W	X	Y
A1									R38		
A2											
A3										Note1	
A3A2									C15, R3 R7, R8, R13, R14		
A4				CR48 CR49	CR11 CR18 CR25 CR33 CR41			R115 R122	R10, R44, R45, R70 R71, R81, R82, R102, R115, R117 R122, R126 R132		
A5				Z1				U1 U2			C14,15 C19
A6								C13			
A7	C4, R7		Q2,Q9 R7,R20 R21,R24 R25, CR23 R12				Q10 Q19	R23 R24			
A8											
A10						R10					
A11							R1				
A12		C1 C3 C13 C14									L4, L5 L6 R14 R16
A13										L2	
W13											
CHASSIS PARTS						R13	XF1 XF2				

NOTES

1. Extensive changes in A3 assembly. New parts list and schematic for instruments with serial prefix 974- and lower.
2. The instrument contains a new A7 board assembly. Section 7 of this manual contains the information contained on Service Sheet 14 for instruments with serial number prefixes 1217A and lower.

7-5. MANUAL CHANGE INSTRUCTIONS

CHANGE A

Page 6-23, Table 6-3:
Delete A12L7 (entire line).

Page 8-27, Figure 8-19 (Service Sheet 4):
Delete L7 on lead from "+20" to "TO C10" on right-hand side of A12 assembly.

Page 8-21 (Service Sheet 4):
Add A12L7 between "+20 V" on A12 Assembly and C10 feedthrough capacitor.

CHANGE B

Page 6-5, Table 6-3:
Change A1R7 and A1R25 to 0757-0421, R: FXD MET FLM 909 OHM 1% 1/8W, 28480, 0757-0422.

Change A1R4, A1R12, A1R21, and A1R30 to 0757-0434, R: FXD MET FLM 3.65K OHM 1% 1/8W, 28480, 0757-0434.

Page 6-12, Table 6-3:
Change A4R25 to 0698-7267, R: FXD MET FLM 19.6K OHM 2% 1/8W, 28480, 0698-7267.

Change A4R26 to 0698-7275, R: FXD FLM 42.2K OHM 2% 1/8W, 28480, 0698-7275.

Page 6-13, Table 6-3:
Change A4R44, A4R70, and A4R81 to 0698-7269, R: FXD FLM 23.7K OHM 2% 1/8W, 28480, 0698-7269.

Change A4R45, A4R71, and A4R82 to 0698-7277, R: FXD MET FLM 51.1K OHM 2% 1/8W, 28480, 0698-7277.

Page 8-35, Figure 8-29 (Service Sheet 8):
Change A1R4, A1R12, A1R21, and A1R30 to 3.65K ohms.

Page 8-39, Figure 8-32 (Service Sheet 10):
Change A4R25* to A4R25 19.6K ohms.
Change A4R26* to A4R26 42.2K ohms.
Change A4R44†* to A4R44† 23.7K ohms.
Change A4R45†* to A4R45† 51.1K ohms.

Page 8-41, Figure 8-34 (Service Sheet 11):
Change A4R70†* to A4R70† 23.7K ohms.
Change A4R71†* to A4R71† 51.1K ohms.
Change A4R81†* to A4R81† 23.7K ohms.
Change A4R82†* to A4R82† 51.1K ohms.

CHANGE C

Page 6-7, Table 6-3:
Delete A2Z1 (entire line).

Page 6-16, Table 6-3:
Delete A5Z2 (entire line).

Page 8-31, Figure 8-25 (Service Sheet 6):
Delete shielding bead A2Z1 adjacent to A2C10.

Page 8-57, Figure 8-51 (Service Sheet 19):
Delete A5Z2 at base lead of A5Q23 (top left-hand side of schematic).

CHANGE D

Page 6-14, Table 6-3:
Delete A5C20 (entire line).

Page 6-15, Table 6-3:
Add A5R18, 0757-0416, R: FXD MET FLM 511 OHM 1% 1/8W, 28480, 0757-0416.

Page 8-57, Figure 8-50, (Service Sheet 19):
Change C20 to R18 on A5 Power Supply.

Page 8-57, Figure 8-51 (Service Sheet 19):
Delete A5C20 .01 μF (lower left-hand portion of schematic).

Add A5R18 511 ohms in place of A5C20 (from gate to cathode of A5CR10).

CHANGE E

Page 6-5, Table 6-3:
Change A1R60 to 0698-3438, R: FXD MET FLM 147 OHM 1% 1/8W, 28480, 0698-3438.

Page 8-35, Figure 8-29 (Service Sheet 8):
Change the value of R60 to 147 ohms.

CHANGE F

Page 8-23, Table 8-5 (Service Sheet 2):
Delete under connector J3: Pin 22, Wire Color Code, 90; Function, Scan width Ground.

Page 8-29, Figure 8-23 (Service Sheet 5):
Change the diagram as shown in the partial schematic.

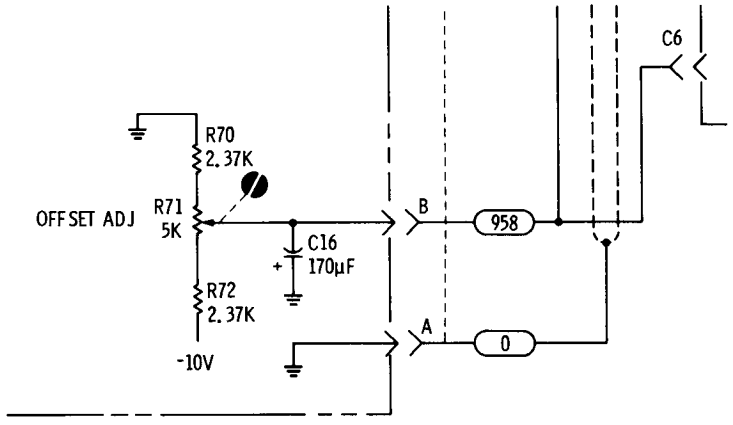


Figure 7-1. Power Supply Partial Schematic (Part of Change F)

CHANGE G

Page 6-18, Table 6-3:
Change A6R57 to 0757-0274, R: FXD 1.21K OHM 1% 1/8W (OPT H01-02 ONLY), 28480, 0757-0274.

Page 8-55, Figure 8-49 (Service Sheet 18):
Change Note 1 to: R57 is 1.1K ohms for Options H01/H02.

CHANGE H

Table 6-3:
Change parts list of A7 assembly to the list of Table 7-3.
Service Sheet 14 Component Locations:
Change to Figure 7-10.
Service Sheet 14 Schematic:
Change the figure as shown by Figure 7-11.
Service Sheet 14 Text:
Replace the text material with the information contained under the heading SERVICE SHEET 14 TEXT.

SERVICE SHEET 14 TEXT (Part of Change H)

It is assumed that the video signal from the Log/Lin assembly and dc supply voltages are present and correct but that the vertical deflection output signals are not correct.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated to the Deflection Amplifier assembly, the assembly should be removed from the chassis and re-installed using an extender board to provide easy access to components. Test procedures follow the technical discussions of individual circuits.

EQUIPMENT REQUIRED

SERVICE KIT . . . . . HP 11592A
OSCILLOSCOPE . . . .HP 180A/1801A/1821A
DIGITAL VOLTMETER . . . HP 3440A/3443A

CONTROL SETTINGS

Unless otherwise specified in individual tests.

SCAN WIDTH PER DIVISION . . . . . 2 MHz
LOG REF LEVEL . . . . . -30 dBm
VIDEO FILTER . . . . . OFF
SCAN TRIGGER . . . . . .LINE
INPUT ATTENUATION . . . . . 0 dB
LOG-LINEAR . . . . . .10 dB LOG
SCAN MODE . . . . . INT
SCAN TIME PER DIVISION . 1 MILLISECOND
CAL OUTPUT connected to . . . . . RF INPUT
FREQUENCY . . . . . 30 MHz

1 BLANKING AND BLANKING CONTROL CIRCUITS

Operation of the blanking preamplifier Q12/Q21 is controlled by the scan generator in the INT (internal) mode of operation and by an external source (via J2) in the EXT (external) mode. In the SINGLE mode a -12.6V dc level is applied to the trigger circuit in the scan generator to enable the circuit for one scan only. In the MANUAL mode, blanking is not used.

Q12/Q21 act as a switch to control the operation of Q11. When Q11 is turned off the CRT is blanked. Blanking is also partially controlled by the baseline clipper and clipper override circuits. See step 2

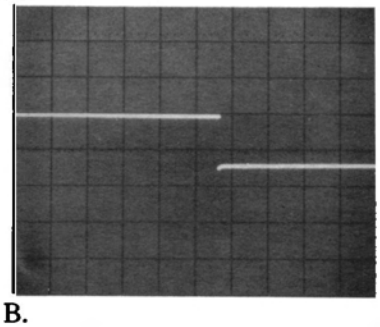
TEST PROCEDURE 1

Connect the HP 180A/1801A/1821A to TP A (Q11-e) and observe the waveforms shown in A and B below.

CONTROL SETTINGS:
(Waveform A)

Oscilloscope:
5V/Div
2 msec/Div
10:1 Probe

Analyzer:
BASE LINE
CLIPPER ccw



Waveform GOOD:
Proceed to waveform B.

Waveform BAD:
Check Q11/Q12/Q21
and associated components.

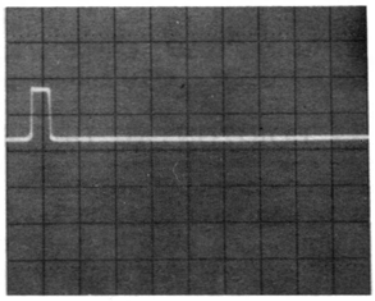
SERVICE SHEET 14 TEXT (cont'd)
(Part of Change H)

CONTROL SETTINGS:
(Waveform B)

Oscilloscope:
Same as A.

Analyzer: Same as above except rotate BASE LINE CLIPPER full cw.

If waveform A was GOOD and B was BAD, trouble should be in the baseline clipper circuits.



If correct waveforms were obtained, blanking circuits and baseline clipper circuit is functioning properly. Proceed to step 2

2 BASELINE CLIPPER AND CLIPPER CIRCUIT

Q3/Q13 operates as a comparator in which the video signal is compared to a reference level established by the BASE LINE CLIPPER control and the clipper override circuit.

When R10 is turned fully ccw and marker signals are not present, Q13 conducts heavily and the dc level at the junction of CR5/CR6 reaches approximately +14 volts dc. Under these conditions Q3 cannot conduct and the display CRT is unblanked except when blanking pulses are present.

When the BASE LINE CLIPPER control is turned in a clockwise direction, Q13 conduction decreases, the dc level at the junction of CR5/CR6 decreases, and Q3 conducts when the negative-going deflection pulses are more positive than the established threshold. When Q3 conducts the CRT display is blanked. When a marker signal appears, Q20 inverts the marker and the dc level at the base of Q13 rises. Q13 conduction increases and holds Q3 off while the marker is present regardless of the position of the BASE LINE CLIPPER control.

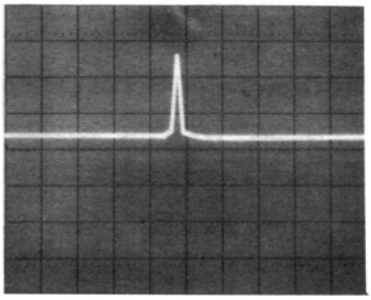
TEST PROCEDURE **2**

Operation of the BASE LINE CLIPPER is verified by the test procedure in step 1 To verify operation of the clipper override circuit, connect the HP 180A/1801A/1821A to TP B (Q20-c) and observe the waveform.

CONTROL SETTINGS:

Oscilloscope:
0.1 V/Div
2 msec/Div
10:1 probe

Analyzer:
SCAN WIDTH:
preset SCAN



Rotate the BASE LINE CLIPPER control and observe that marker signal remains regardless of BASE LINE CLIPPER control position.

Waveform GOOD: Clipper override functions properly.

Waveform BAD: Check Q20. (After verifying presence of marker input.)

3 2 dB LOG AND VERTICAL PREAMPLIFIER CIRCUITS

Q15, Q16 and associated circuitry comprise an operational amplifier; when S1 (LOG·LINEAR switch) is in the 10 dB LOG position the amplifier's gain is 1. When S1 is in the 2 dB LOG position, K1 is energized by Q25. This adds a feedback divider and an offset to the amplifier to increase its gain to 5 and re-reference the maximum signal point to the CRT LOG REF graticule. Q24 is used as a dual diode and prevents any signal on the CRT display from going below the base line.

Q5, Q6, Q7 and associated circuitry comprise an operational amplifier with a gain of approximately 10. VERTICAL GAIN control, R11, controls the amplifier's feedback and thus its gain.

TEST PROCEDURE **3**

3a. With LOG·LINEAR in 10 dB LOG, switch LOG REF LEVEL to -20 dBm to put the signal peak at the -10 dB graticule on the CRT display. Switch LOG·LINEAR to 2 dB LOG; signal should drop approximately to the -50 dB graticule.

Test GOOD: Proceed to 3b.

Test BAD: Check Q15, Q16, Q24, Q25 and associated circuitry.

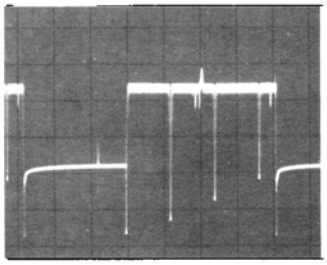
3b. Connect HP 180A/1801A/1821A to TP C (Q5-c) and observe the waveform.

SERVICE SHEET 14 TEXT (cont'd)

(Part of Change H)

CONTROL SETTINGS

Oscilloscope:
0.1 V/Div
2 msec/Div
10:1 probe



Analyzer:
Same as basic except:

SCAN WIDTH . . . . . 0—100 MHz
SCAN TIME PER DIVISION . 1 MILLISECOND
LOG REF LEVEL . . . . . -10 dBm
FREQUENCY . . . . . 50 MHz

Note negative-going video and positive-going marker pulses. Rotate vertical gain control to verify proper operation.
Waveform GOOD: Proceed to step
Waveform BAD: Check Q5, Q6, Q7 and associated circuity.

NOTE

If repairs to the 2 dB LOG and vertical preamplifier circuits are required, the adjustments specified in paragraphs 5-30 of Section V should be performed.

VERTICAL DEFLECTION POWER AMPLIFIERS

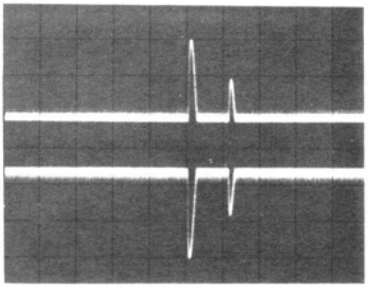
The vertical deflection signals from the vertical preamplifier are dc coupled through VR1 and R34 to output drive stage Q2. VR1 also provides a dc offset level for the vertical signals and Q1 provides a temperature compensation for the voltage control circuit. Q8 inverts the deflection signals to provide negative-going signals at the Q8 collector to drive one of the CRT deflection plates. Q8 also provides a non-inverted signal which is emitter coupled to Q18. Q18 does not invert the signal and it appears at the collector of Q18 as a positive-going deflection signal. Thus the signals at the emitters and bases of Q8 and Q18 are in phase and the collector signals are 180 degrees out of phase to provide push-pull deflection. VERTICAL POSITION control R15 controls the vertical position of the CRT trace by controlling the dc level of the pedestal on which the vertical deflection signals are applied to the CRT deflection plates.

TEST PROCEDURE **4**

Connect the HP 180A/1801A/1821A Channel A probe to TP D (Q8-e) and the Channel B probe to TP E (Q18-e), and observe the waveforms.

CONTROL SETTINGS

Oscilloscope:
1 V/Div
2 msec/Div
10:1 probes



Analyzer:
Same as basic except:

SCAN TIME PER DIVISION 0.5 MILLISECOND
LOG REF LEVEL . . . . . -10 dBm

Waveform GOOD: Proceed to step **5**

Waveform BAD: Check Q1, VR1, VR2, Q2, Q8, Q9, Q10, Q18, Q19 and associated components.

5 HORIZONTAL DEFLECTION AMPLIFIER

Driver stage Q23 inverts the scan ramp and applies it to the base of Q22. Q22 inverts the signal and supplies the positive-going deflection signal. The scan ramp is also emitter coupled to Q14 which supplies the negative-going deflection signal. The signals at the emitters and bases of Q14 and Q22 are in phase but the collector signals are 180 degrees out of phase and provide push-pull deflection signals to the horizontal deflection plates of the CRT. Controls are provided to vary the width and position of the CRT trace.

TEST PROCEDURE **5**

Connect the HP 180A/1801A/1821A Channel A input to TP G (Q22-c) and the Channel B input to TP H (Q14-c) and observe the waveforms.

Waveform GOOD: Assembly functions properly.

If neither waveform is good, check Q1/Q2/Q8/Q10 and associated components.

If Channel A waveform is good and Channel B waveform is bad, check Q9/Q18/Q19 and associated components.

NOTE

If repairs to the deflection amplifier assembly are required, the Front Panel Check Procedure, paragraph 4-12 of Section IV, should be performed.

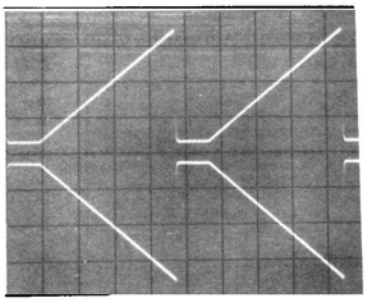
SERVICE SHEET 14 TEXT (cont'd)

(Part of Change H)

CONTROL SETTINGS

Oscilloscope:
2V/Div
5 msec/Div
10:1 probe

Waveform GOOD:
Unit functions properly



Waveform A GOOD and B BAD check Q4/Q14 and associated components.

Both waveforms BAD check Q23/Q22 and associated components.

CHANGE I

Table 6-3:
Change:
A4R36, R55, R96 and R112 to 0698-7257, R: FXD FLM 7.5K OHM 2% 1/8W, 28480, 0698-7257.

Service Sheet 11 and 12 Schematics:
Change:
A4R36, R55, R96 and R112 to 7500 OHMS.

Table 7-3. Replaceable Parts (Part of Change H) (1 of 2)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7	08552-60144	1	BOARD ASSY:DEFLECT AMPLIFIER	28480	08552-60108
A7	08552-60144	1	EXCHANGE ASSY:DEFLECT AMPLIFIER	28480	08552-60144
A7C1	0180-0116	1	C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A7C2	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A7C3	0160-2265	1	C:FXD CER 22 PF 5% 500VDCW	72982	301-NPO-22PF
A7C4	0180-0269		C:FXD ELECT 1.0 UF +50-10% 150VDCW	56289	30D105F150BA2-DSM
A7C5	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A7C6	0140-0194	1	C:FXD MICA 110 PF 5%	72136	RDM15F111J3C
A7C7	0140-0194		C:FXD MICA 110 PF 5%	72136	RDM15F111J3C
A7C8	0180-1746		C:FXD ELECT 15 UF 10% 20VDCW	28480	0180-1746
A7C9	0140-0194	4	C:FXD MICA 110 PF 5%	72136	RDM15F111J3C
A7C10	0160-0155	3	C:FXD MY 0.0033 UF 10% 200VDCW	56289	192P33292-PTS
A7C11	0160-2246		C:FXD CER 3.6+/-0.25 PF 500VDCW	72982	301-000-COJO-369C
A7C12	0160-2246		C:FXD CER 3.6+/-0.25 PF 500VDCW	72982	301-000-COJO-369C
A7C13	0160-0155	2	C:FXD MY 0.0033 UF 10% 200VDCW	56289	192P33292-PTS
A7C14	0160-2246	4	C:FXD CER 3.6+/-0.25 PF 500VDCW	72982	301-000-COJO-369C
A7C15	0160-2246		C:FXD CER 3.6+/-0.25 PF 500VDCW	72982	301-000-COJO-369C
A7C16	0160-0153		C:FXD MY 0.001 UF 10% 200VDCW	56289	192P10292-PTS
A7C17	0140-0190		C:FXD MICA 39 PF 5%	72136	RDM15E390J3C
A7C18	0160-0194		C:FXD MY 0.015 UF 10%	56289	192P15392-PTS
A7CR1	1901-0096	1	DIODE:SILICON 120V	01295	UG-888
A7CR2	1901-0081	2	DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR3	1901-0081	4	DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR4	1901-0096		DIODE:SILICON 120V	01295	UG-888
A7CR5	1901-0081	15	DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR6	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR7	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR8	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR9	1901-0096		DIODE:SILICON 120V	01295	UG-888
A7CR10	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR11	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR12	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR13	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR14	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR15	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR16	1901-0096		DIODE:SILICON 120V	01295	UG-888
A7CR17	1902-0683		DIODE BREAKDOWN:100V 2%	28480	1902-0683
A7CR18	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR19	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR20	1902-0683	2	DIODE BREAKDOWN:100V 2%	28480	1902-0683
A7CR21	1901-0081		DIODE:SILICON 50 VOLTS WORKING	07263	FD1415
A7CR22	1901-0518		DIODE:HOT CARRIER	28480	1901-0518
A7CR23	1902-0785		DIODE:BREAKDOWN 9.09V 5%	04713	1N936
A7K1	0490-0399		RELAY:REED ASSY, 1200 OHM 12VDC	28480	0490-0399
A7L1	9140-0129	1	COIL:FXD RF 220 UH	28480	9140-0129
A7L2	9140-0129	1	COIL:FXD RF 220 UH	28480	9140-0129
A7Q1	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q2	1853-0050		TSTR:SI PNP	28480	1853-0050
A7Q3	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q4	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A7Q5	1854-0071	5	TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A7Q6	1853-0050		TSTR:SI PNP	28480	1853-0050
A7Q7	1853-0050		TSTR:SI PNP	28480	1853-0050
A7Q8	1854-0234	2	TSTR:SI NPN	80131	2N3440
A7Q8	1205-0011	2	HEAT DISSIPATOR:FOR TO-5 AND TO-9 CASES	98978	TXBF-032-025B
A7Q9	1853-0050		TSTR:SI PNP	28480	1853-0050
A7Q10	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q11	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q12	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q13	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A7Q14	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q15	1854-0221		TSTR:SI NPN(REPL.BY 2N4044)	28480	1854-0221
A7Q16	1853-0034	2	TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0034
A7Q17	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A7Q18	1854-0234		TSTR:SI NPN	80131	2N3440
A7Q18	1205-0011		HEAT DISSIPATOR:FOR TO-5 AND TO-9 CASES	98978	TXBF-032-025B
A7Q19	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q20	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A7Q21	1854-0071		TSTR:SI NPN(SELECTED FROM 2N3704)	28480	1854-0071
A7Q22	1854-0232		TSTR:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232
A7Q23	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A7Q24	1854-0221		TSTR:SI NPN(REPL.BY 2N4044)	28480	1854-0221
A7Q25	1853-0020		TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A7R1	0757-0447		R:FXD MET FLM 16.2K OHM 1% 1/8W	28480	0757-0447
A7R2	0757-0443	4	R:FXD MET FLM 11.0K OHM 1% 1/8W	28480	0757-0443
A7R3	0698-3152		R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152

See introduction to this section for ordering information

Table 7-3. Replaceable Parts (Part of Change H) (2 of 2)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A7R4	0698-0082		R:FXD MET FLM 464 OHM 1% 1/8W	28480	0698-0082
A7R5	0757-0464		R:FXD MET FLM 90.9K OHM 1% 1/8W	28480	0757-0464
A7R6	0698-3152		R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152
A7R7	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R8	0698-3418	2	R:FXD MET FLM 26.1K OHM 1% 1/2W	28480	0698-3418
A7R9	0757-0443		R:FXD MET FLM 11.0K OHM 1% 1/8W	28480	0757-0443
A7R10	0698-3418		R:FXD MET FLM 26.1K OHM 1% 1/2W	28480	0698-3418
A7R11	0757-0439	1	R:FXD MET FLM 6.81K OHM 1% 1/8W	28480	0757-0439
A7R12	0698-3445		R:FXD MET FLM 348 OHM 1% 1/8W	28480	0698-3445
A7R13	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R14	0698-0083		R:FXD MET FLM 1.96K OHM 1% 1/8W	28480	0698-0083
A7R15	0698-3454		R:FXD MET FLM 215K OHM 1% 1/8W	28480	0698-3454
A7R16	0757-0424	2	R:FXD MET FLM 1.10K OHM 1% 1/8W	28480	0757-0424
A7R17	0757-0290		R:FXD MET FLM 6.19K OHM 1% 1/8W	28480	0757-0290
A7R18	0757-0463		R:FXD MET FLM 82.5K OHM 1% 1/8W	28480	0757-0463
A7R19	0698-0084		R:FXD MET FLM 2.15K OHM 1% 1/8W	28480	0698-0084
A7R20	0757-0441		R:FXD MET FLM 8.25K OHM 1% 1/8W	28480	0757-0441
A7R21	2100-2521	1	R:VAR FLM 2000 OHM 10% LIN 1/2W	28480	2100-2521
A7R22	0698-3152		R:FXD MET FLM 3.48K OHM 1% 1/8W	28480	0698-3152
A7R23	0757-0421		R:FXD MET FLM 825 OHM 1% 1/8W	28480	0757-0421
A7R24	2100-2413	2	R:VAR FLM 200 OHM 10% LIN 1/2W	28480	2100-2413
A7R25	0757-0441		R:FXD MET FLM 8.25K OHM 1% 1/8W	28480	0757-0441
A7R26	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A7R27	0698-3157		R:FXD MET FLM 19.6K OHM 1% 1/8W	28480	0698-3157
A7R28	0757-0443		R:FXD MET FLM 11.0K OHM 1% 1/8W	28480	0757-0443
A7R29	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	28480	0757-0394
A7R30	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	28480	0757-0420
A7R31	0698-3153	3	R:FXD MET FLM 3.83K OHM 1% 1/8W	28480	0698-3153
A7R32	0757-0858	2	R:FXD MET FLM 90.9K OHM 1% 1/2W	28480	0757-0858
A7R33	0757-0464		R:FXD MET FLM 90.9K OHM 1% 1/8W	28480	0757-0464
A7R34	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A7R35	0683-1555	2	R:FXD COMP 1.5 MEGOHM 5% 1/4W	01121	CB 1555
A7R36	0698-3647	1	R:FXD MET OX 15K OHM 5% 2W	28480	0698-3647
A7R37	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R38	0698-3416	2	R:FXD MET FLM 21.5K OHM 1% 1/2W	28480	0698-3416
A7R39	0764-0020	1	R:FXD MET FLM 5600 OHM 5% 2W	28480	0764-0020
A7R40	0698-3153		R:FXD MET FLM 3.83K OHM 1% 1/8W	28480	0698-3153
A7R41	0764-0006	1	R:FXD MET OX 18K OHM 5% 2W	28480	0764-0006
A7R42	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R43	0698-3416		R:FXD MET FLM 21.5K OHM 1% 1/2W	28480	0698-3416
A7R44	0757-0858		R:FXD MET FLM 90.9K OHM 1% 1/2W	28480	0757-0858
A7R45	0683-1555		R:FXD COMP 1.5 MEGOHM 5% 1/4W	01121	CB 1555
A7R46	0757-0460		R:FXD MET FLM 61.9K OHM 1% 1/8W	28480	0757-0460
A7R47	0757-0470	1	R:FXD MET FLM 162K OHM 1% 1/8W	28480	0757-0470
A7R48	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R49	0698-3455		R:FXD MET FLM 261K OHM 1% 1/8W	28480	0698-3455
A7R50	0698-3158		R:FXD MET FLM 23.7K OHM 1% 1/8W	28480	0698-3158
A7R51	0698-3421	1	R:FXD MET FLM 38.3K OHM 1% 1/2W	28480	0698-3421
A7R52	0757-0460		R:FXD MET FLM 61.9K OHM 1% 1/8W	28480	0757-0460
A7R53	0698-3453		R:FXD MET FLM 196K OHM 1% 1/8W	28480	0698-3453
A7R54	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A7R55	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R56	0698-3455		R:FXD MET FLM 261K OHM 1% 1/8W	28480	0698-3455
A7R57	0757-0400		R:FXD MET FLM 90.9 OHM 1% 1/8W	28480	0757-0400
A7R58	0757-0428		R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A7R59	0757-0290		R:FXD MET FLM 6.19K OHM 1% 1/8W	28480	0757-0290
A7R60	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R61	0757-0438		R:FXD MET FLM 5.11K OHM 1% 1/8W	28480	0757-0438
A7R62	0698-3444		R:FXD MET FLM 316 OHM 1% 1/8W	28480	0698-3444
A7R63	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	28480	0757-0279
A7R64	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A7R65	0698-3454		R:FXD MET FLM 215K OHM 1% 1/8W	28480	0698-3454
A7T81	08552-20108	1	BOARD:BLANK PC	28480	08552-20108
A7VR1	1940-0021	2	TUBE:ELECTRON 103V REF TYPE	74276	Z103R2
A7VR2	1940-0021		TUBE:ELECTRON 103V REF TYPE	74276	Z103R2

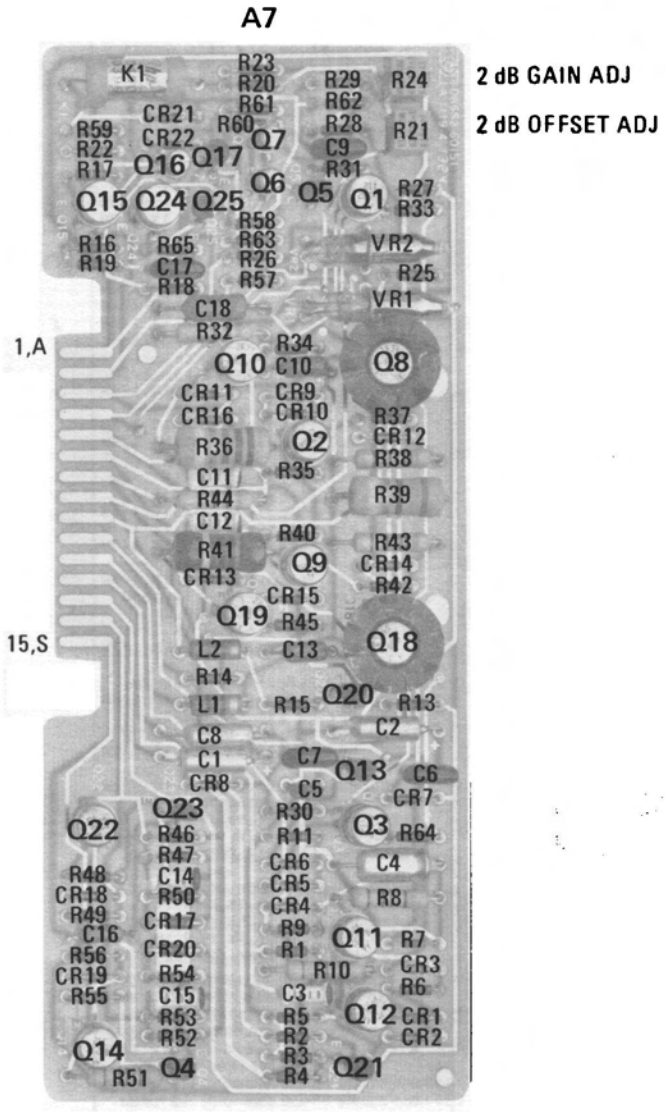


Figure 7-2. Deflection Amplifier A7 Component Identification (Part of Change H)

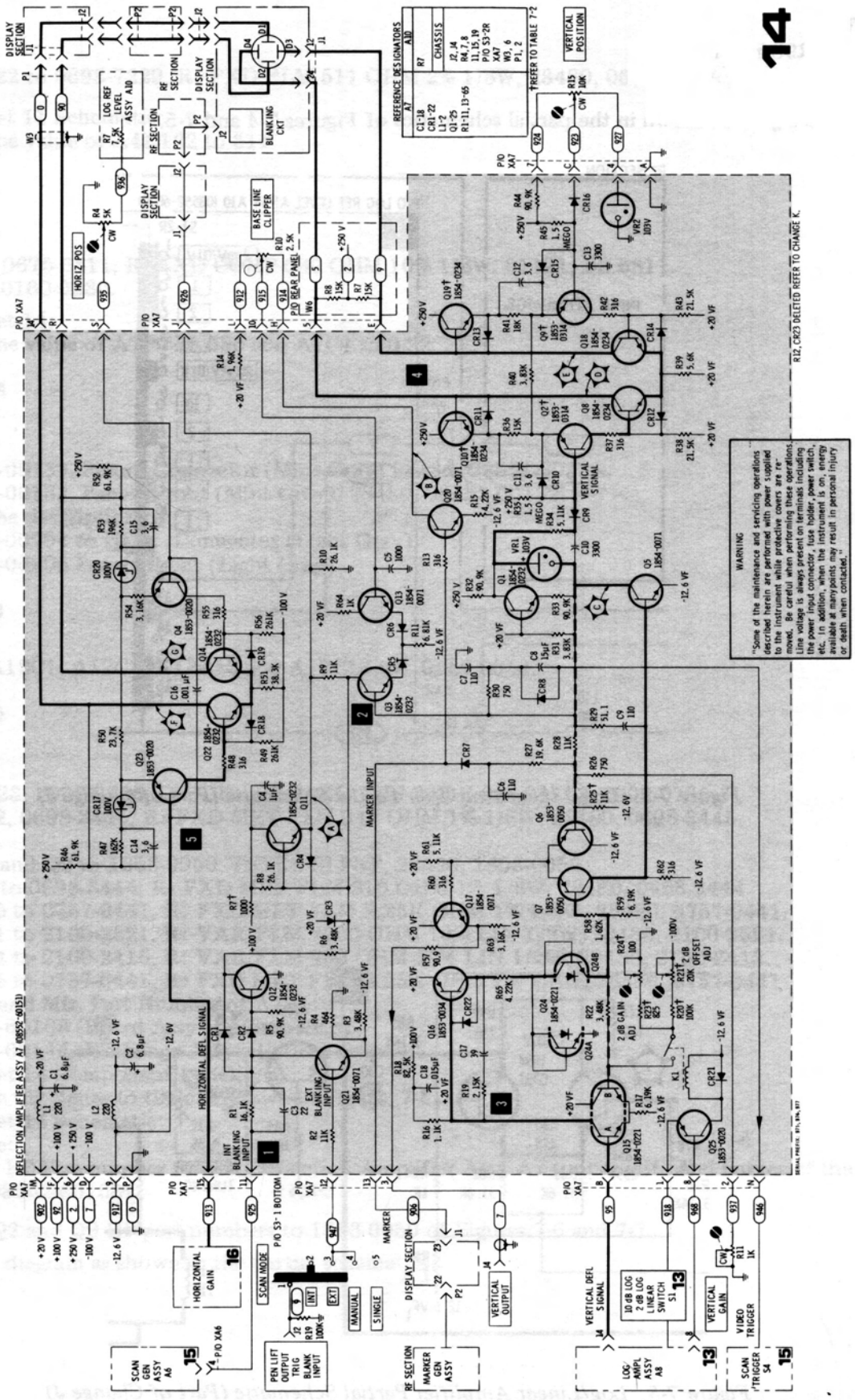


Figure 7-3. Deflection Amplifier (Part of Change H)

CHANGE J

Table 6-3:
Delete A8R98 and W13.

Service Sheet 13 Schematic:
Change the figure as shown in the partial schematics of Figures 7-4 and 7-5.

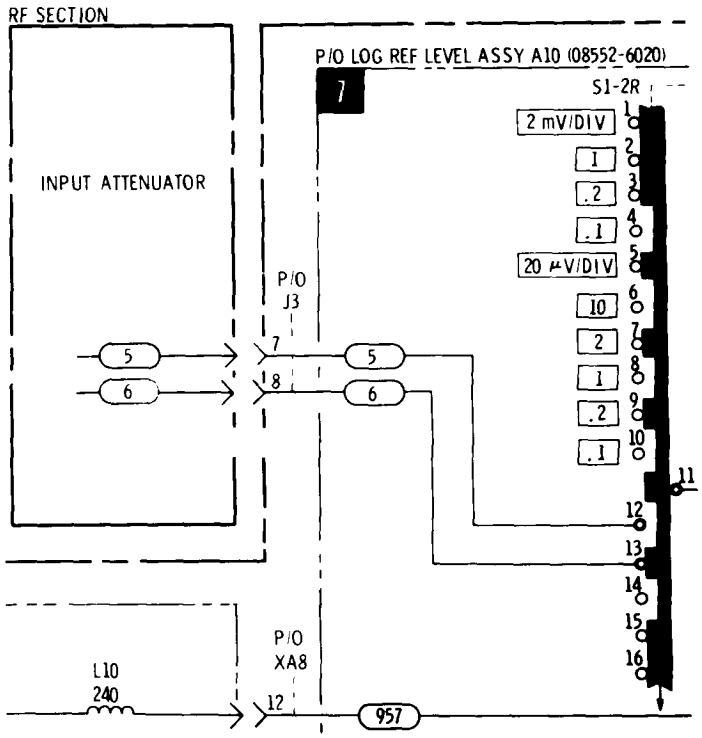


Figure 7-4. Log/Linear Amplifier Partial Schematic (Part of Change J)

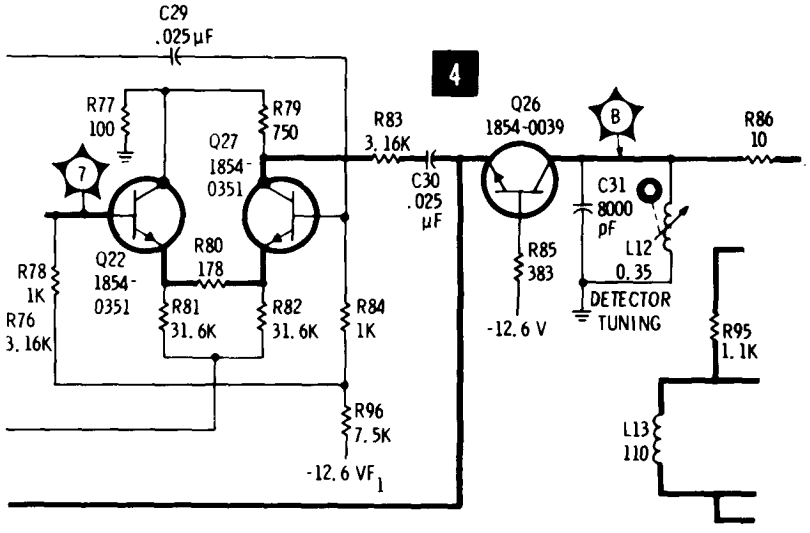


Figure 7-5. Log/Linear Amplifier Partial Schematic (Part of Change J)

CHANGE K

Table 6-3:
Change:
A4R122 to 0698-7229, R: FXD FLM 511 OHM 2% 1/8W, 28480, 0698-7229.

Service Sheet 11 Schematic:
Change the value of A4R122 to 511.

CHANGE L

Table 6-3:
Change:
A7R7 to 0675-6811, R: FXD COMP 680 OHM 10% 1/8W, 01121, BB 6811.
A7C4 to 0160-0380.

Service Sheet 14:
Change the value of A7R7 to 680 and A7C4 to 0.22.

CHANGE M

Table 6-3:
Add:
08552-00131, Plate: Connector (Mint Gray) 28480, 08552-00131.
08552-00132, Panel: Front (Mint Gray), 28480, 08552-00132.
Change the description of:
08552-00104 to Plate: Connector (Light Gray).
08552-00106 Panel: Front (Light Gray).

CHANGE N

Table 6-3:
Change A12C1, A12C3, A12C13 and A12C14 to: 0150-0050.

CHANGE O

Table 6-3:
Add:
A7CR23, 1902-0785, DIODE: BREAKDOWN 9.09V 5%, 04713, 1902-0785.
A7R12, 0698-3445, R: FXD MET FLM 348 OHM 1% 1/8W, 28480, 0698-3445.
Change:
A7Q2 and Q9 to 1853-0050, TSTR: SI PNP, 28480, 1853-0050.
A7R7 to 0698-3444, R: FXD MET FLM 316 OHM 1% 1/8W, 28480, 0698-3444.
A7R20 to 0757-0441, R: FXD MET FLM 8.25K OHM 1% 1/8W, 28480, 0757-0441.
A7R21 to 2100-2521, R: VAR FLM 2000 OHM 10% LIN 1/2W, 28480, 2100-2521.
A7R24 to 2100-2415, R: VAR FLM 200 OHM 10% LIN 1/2W, 28480, 2100-2413.
A7R25 to 0757-0441, R: FXD MET FLM 8.25K OHM 1% 1/8W, 28480, 0757-0441.
Change HP and Mfr. Part Number of A7 to:
08552-60108 (Board Assy: Deflect Amp).
08552-60144 (Exchange Assy: Deflect Amp).
Service Sheet 14 Component Locations:
Change the figure to the one shown in Figure 7-5.
Service Sheet 14 Schematic:
Change:
The HP Part number for the Deflection Amplifier Assy A7 (upper left-hand corner of the schematic) to 08552-60108.

A7Q2 and Q9 HP part numbers to 1853-0050 of Figures 7-6 and 7-7.

The diagram as shown in the partial schematics.

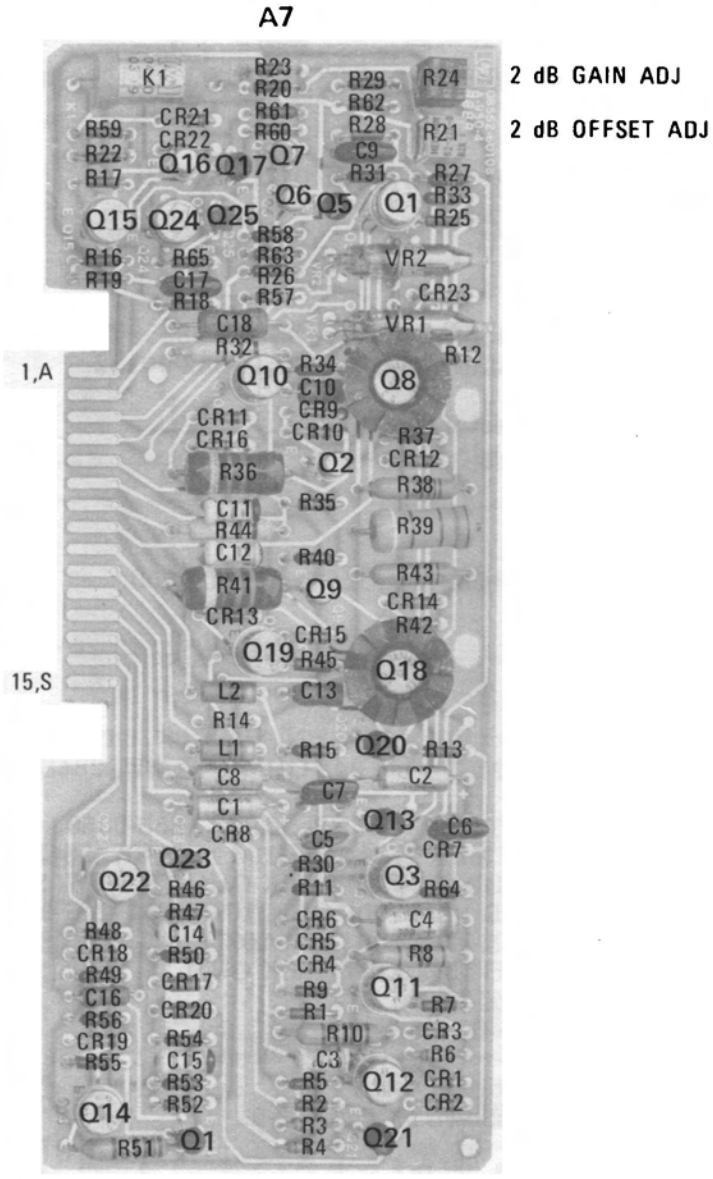


Figure 7-6. Deflection Amplifier A7 Component Identification (Part of Change O)

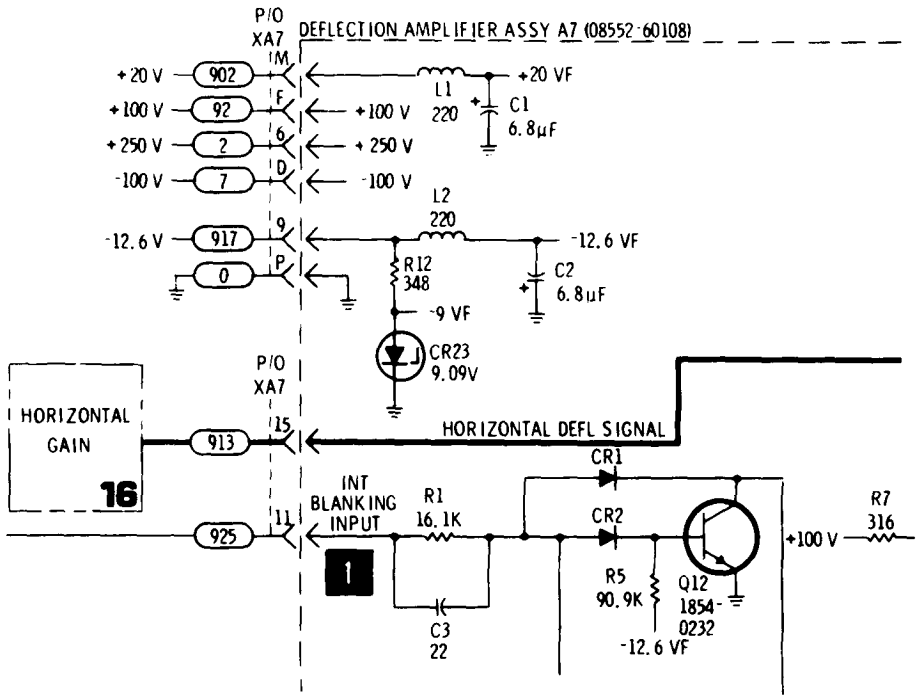


Figure 7-7. Deflection Amplifier Partial Schematic (Part of Change O)

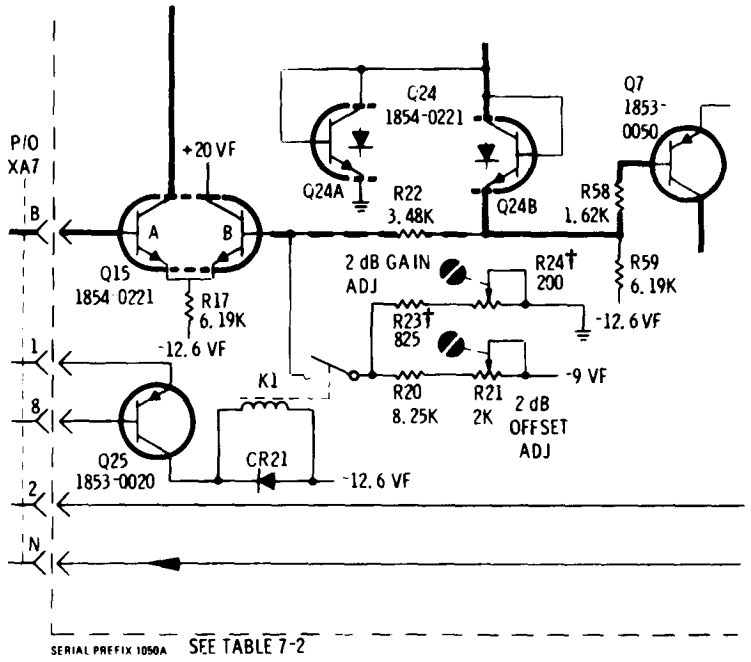


Figure 7-8. Deflection Amplifier Partial Schematic (Part of Change O)

CHANGE P

Table 6-3 and Service Sheet 19 Schematic:
Delete A5Z1.
Table 6-3 and Service Sheet 10 Schematic:
Delete A4CR48 and CR49.

CHANGE Q

Table 1-1:
Change the AMPLITUDE SPECIFICATIONS:
Amplitude Accuracy:
Switching between bandwidths (at 20°C)

	LOG	LINEAR
0.03 — 300 kHz	±0.05 dB	± 5.8%
0.01 — 300 kHz	±1.0 dB	±19.0%

CHANGE R

Table 6-3:
Change:
A4CR11, CR18, CR25, CR33 and CR41 to 1901-0040, DIODE SI 30 MA 30 WV, 07263, FDG 1088.

CHANGE S

Table 6-3:
Change:
R13 to 0698-3400, R: FXD MET FLM 147 OHM 1% 1/2W, 28480, 0698-3400.
Delete: A10R10.

Service Sheet 13 Schematic:
Change: R13 value to 147.
Delete: A10R10 and show the —12.6 Vdc supply voltage connected directly to the switch contact.

CHANGE T

Table 6-3:
Change:
A7Q10 and Q19 to 1854-0232, TSTR: SI NPN (Selected 2N3440), 28480, 1854-0232.
A11R1 to 0757-0123, R: FXD MET FLM 34.8K OHM 1% 1/8W, 28480, 0757-0123.
XF1 to 2100-0281, FUSE HOLDER: DUAL CLIP, 28480, 2110-0281.
Delete: XF2.

Service Sheet 14:
Change: A7Q10 and Q19 to 1854-0232.

Service Sheet 17:
Change: A11R1 to 34.8K.

CHANGE U

Service Sheet 13 Schematic:
Change the diagram as shown in the partial Schematics, Figure 7-9 and 7-10.

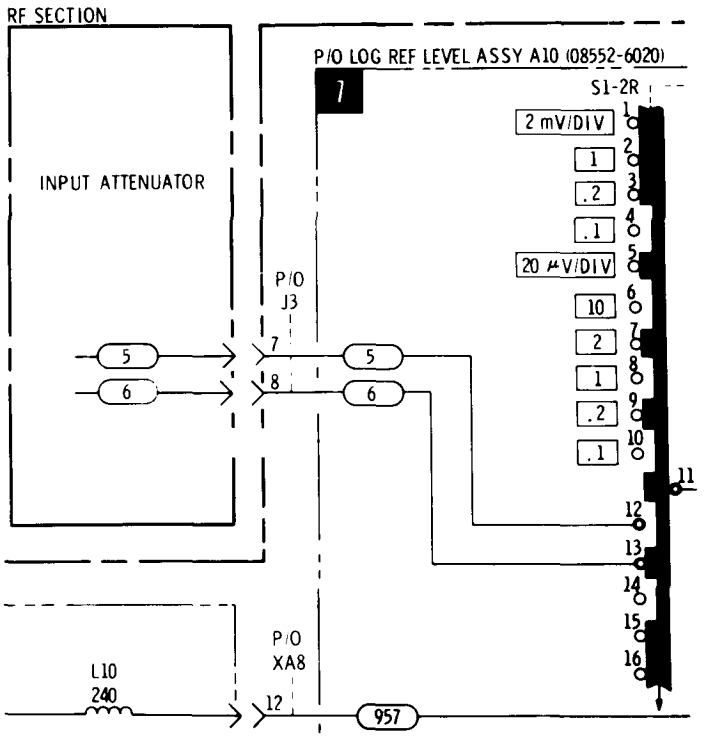


Figure 7-9. Log/Linear Amplifier Partial Schematic (Part of Change U)

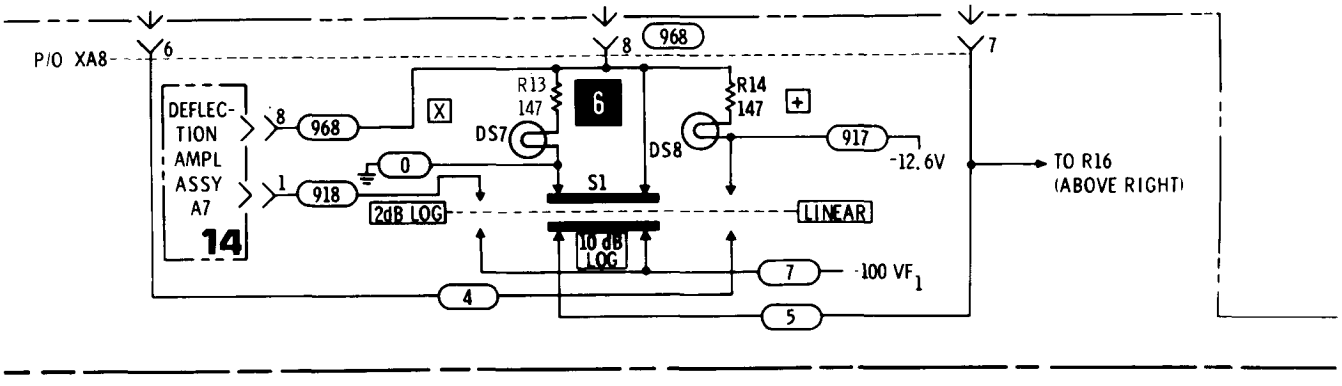


Figure 7-10. Log/Linear Amplifier Partial Schematic (Part of Change U)

CHANGE V

Table 6-3:
Change:
A4R115 to 0698-7216 R: FXD MET FLM 147 OHM 2% 1/8W, 28480, 0698-7216.
A4R122 to 0698-7236 R: FXD MET FLM 1K OHM 2% 1/8W, 28480, 0698-7236.
A5U1 and U2 to 1820-0216.
A6C13 to 0180-0116, C: FXD ELECT 12 UF 10% 35 VDCW, 28480, 0180-0116.
A6U1 and U2 to 1820-0216.
A7R23 to 0757-0422 R: FXD MET FLM 909 OHM 1% 1/8W, 28480, 0757-0422.
A7R24 to 2100-2631 R: VAR FLM 100 OHM 10% LIN 1/2W, 28480, 2100-2632.
A12U1 to 1820-0216.

Service Sheet 4 Schematic:
Change: A12U1 HP Part number to 1820-0216.

Service Sheet 5 Schematic:
Change: A5U1 and U2 HP part numbers to 1820-0216.

Service Sheet 11 Schematic:
Change the value of:
A4R115 to 147.
A4R122 to 1000.

Service Sheet 14 Schematic:
Change:
The value of A7R23 to 909.
A7R24 to 100 ohm potentiometer.

Service Sheet 15 Schematic:
Change:
The value of A6C13 to 12.
A6U1 and U2 HP part numbers to 1820-0216.

CHANGE W

Table 6-3:
Change:
A1R38 to 0757-0394, R:FXD MET FLM 51.1 OHM 1% 1/8W, 28480, 0757-0394.
A3A2 C15 to 0140-0190, C:FXD MICA 39 ρF 5%, 72136, RDM 15E390J3C.
A3A2R3 to 0698-0084, R:FXD MET FLM 2.15K OHM 1% 1/8W, 28480, 0698-0084.
A3A2R7 to 0698-3438, R:FXD MET FLM 147 OHM 1% 1/8W, 28480, 0698-3438.
A3A2R8 to 0757-0276, R:FXD MET FLM 61.9 OHM 1% 1/8W, 28480, 0757-0276.
A3A2R13 to 0698-3430, R:FXD MET FLM 21.5 OHM 1% 1/8W, 28480, 0698-3430.
A3A2R14 to 0757-0400, R:FXD MET FLM 90.9 OHM 1% 1/8W, 28480, 0757-0400.
A4R44, A4R70 and A4R81 to 0698-7267, R:FXD MET FLM 19.6K OHM 20% 1/8W, 28480, 0698-7267.
A4R45, A4R71 and A4R82 to 0698-7275 R:FXD FLM 42.2K OHM 2% 1/8W, 28480, 0698-7275.
A4R102 to 0698-7262, R:FXD FLM 12.1K OHM 2% 1/8W, 28480, 0698-7262.
A4R115 to 0698-7205, R:FXD FLM 51.1 OHM 2% 1/8W, 28480, 0698-7205.
A4R117 to 0698-7240, R:FXD FLM 1.47K OHM 2% 1/8W, 28480, 0698-7240.
A4R122 to 0698-7229, R:FXD FLM 511 OHM 2% 1/8W, 28480, 0698-7229.
A4R126 and R128 to 0698-7236, R:FXD FLM 1K OHM 2% 1/8W, 28480, 0698-7236.
A4R132 to 2100-2522, R:VAR CER MET 10K OHM 10% LIN 1/2W, 28480, 2100-2522.
A12R10 to 0698-0084, R:FXD MET FLM 2.15K OHM 1% 1/8W, 28480, 0698-0084.

CHANGE W (cont'd)

Service Sheet 3 Schematic:
Change the value of:
A3A2C15 to 39
A3A2R3 to 2150
A3A2R7 to 147
A3A2R8 to 61.9
A3A2R13 to 21.5
A3A2R14 to 90.9.
Service Sheet 4 Schematic:
Change the value of A4R10 to 2.15K.
Service Sheet 8 Schematic:
Change the value of A1R38 to 51.1.
Service Sheet 10 Schematic:
Change the value of:
A4R44 to 19.6K
A4R45 to 42.2K.
Service Sheet 11 Schematic:
Change the value of:
A4R70 and A4R81 to 19.6K
A4R71 and A4R82 to 42.2K
A4R102 to 12.1K
A4R115 to 51.1
A4R122 to 511
A4R126 and R128 to 1K
A4R132 to 10K.

CHANGE X

Table 6-3:
Change the parts list for the A3 assembly to that shown on Table 7-4.
A12L4 and A12L5 to 9140-0105, COIL: MOLDED CHOKE 8.2 μH 10%, 28480, 9140-0105.
A12R14 to 2100-1986, R:VAR CER MET 1000 OHM 10% LIN 1/2W, 28480, 2100-1986.
A13L2 to 9100-1625, COIL/CHOKE 33.0 μH 5%, 99800, 1537-52.
Delete: A12L6.
Service Sheet 3 Schematic Diagram:
Change the schematic to the one shown in Figure 7-11.
Service Sheet 4 Schematic Diagram:
Change the value of:
A12L4 and A12L5 to 8.2.
A12R14 to a 1000 ohm variable resistor.
A12R16 to 26.1
A13L2 to 33.0
Delete: A12L2.

Table 7-4. Replaceable Parts (Part of Change X)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3	08552-60114	1	BOARD ASSY:50 MHZ CONVERTER	28480	08552-60114
A3C1	0150-0050	24	C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3C2	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3C3	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3C4	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A3C5			NOT ASSIGNED		
A3C6	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A3C7	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3C8	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3C9	0160-2142	1	C:FXD CER 1500 PF +100-0% 500VDCW	91418	TYPE SM
A3C10	0160-2307	1	C:FXD MICA 47 PF 5%	28480	0160-2307
A3C11	0121-0059	4	C:VAR CER 2-8 PF 300VDCW	28480	0121-0059
A3C12	0160-2254	3	C:FXD CER 7.5 PF 500VDCW	72982	301-000-COHO-759C
A3C13	0160-2254		C:FXD CER 7.5 PF 500VDCW	72982	301-000-COHO-759C
A3C14	0121-0059		C:VAR CER 2-8 PF 300VDCW	28480	0121-0059
A3C15	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3C16	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3C17	0160-2201		C:FXD MICA 51 PF 5%	72136	RDM15E510J1C
A3C18	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3C19	0121-0059		C:VAR CER 2-8 PF 300VDCW	28480	0121-0059
A3C20	0160-2254		C:FXD CER 7.5 PF 500VDCW	72982	301-000-COHO-759C
A3CR1	1901-0050	7	DIODE:SILICON 75V	14433	S270
A3CR2	1901-0050		DIODE:SILICON 75V	14433	S270
A3CR3	1901-0050		DIODE:SILICON 75V	14433	S270
A3CR4	1901-0050		DIODE:SILICON 75V	14433	S270
A3CR5	1901-0050		DIODE:SILICON 75V	14433	S270
A3L1	9140-0114	2	COIL:FXD RF 10 UH	28480	9140-0114
A3L2	9140-0129	5	COIL:FXD RF 220 UH	28480	9140-0129
A3L3	9140-0129		COIL:FXD RF 220 UH	28480	9140-0129
A3L4	9100-0346	1	COIL:FXD 0.05 UH 20%	36196	H-10886
A3L5	9140-0096	4	COIL:FXD RF 1 UH	28480	9140-0096
A3L6	9140-0096		COIL:FXD RF 1 UH	28480	9140-0096
A3L7	9140-0114		COIL:FXD RF 10 UH	28480	9140-0114
A3L8	9140-0096		COIL:FXD RF 1 UH	28480	9140-0096
A3L9	9140-0096		COIL:FXD RF 1 UH	28480	9140-0096
A3Q1	1854-0247	1	TSTR:SI NPN	28480	1854-0247
A3Q2	1853-0089	1	TSTR:SI PNP	80131	2N4917
A3R1	0757-0438		R:FXD MET FLM 5.11K 1% 1/8W	14674	C4
A3R2	0698-3155	1	R:FXD MET FLM 4.64K 1% 1/8W	91637	MFF-1/10-32
A3R3	0757-0420		R:FXD MET FLM 750 OHM 1% 1/8W	14674	C4
A3R4	0757-0159	1	R:FXD MET FLM 1000 OHM 1% 1/2W	28480	0757-0159
A3R5	0698-3429		R:FXD MET FLM 19.6 OHM 1% 1/8W	28480	0698-3429
A3R6	0698-3441		R:FXD MET FLM 215 OHM 1% 1/8W	91637	MF-1/10-32
A3R7	0757-1092	1	R:FXD MET FLM 287 OHM 1% 1/2W	28480	0757-1092
A3R8	0698-3438		R:FXD MET FLM 147 OHM 1% 1/8W	28480	0698-3438
A3R8			FACTORY SELECTED PART		
A3R9	0698-3433	1	R:FXD MET FLM 28.7 OHM 1% 1/8W	28480	0698-3433
A3R9			FACTORY SELECTED PART		
A3R10	0757-0180	1	R:FXD MET FLM 31.6 OHM 1% 1/8W	28480	0757-0180
A3R11	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	14674	C4
A3R12	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	14674	C4
A3R13	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	14674	C4
A3R14	0757-0394		R:FXD MET FLM 51.1 OHM 1% 1/8W	14674	C4
A3R15	0757-0398	1	R:FXD MET FLM 75 OHM 1% 1/8W	28480	0757-0398
A3R16	0698-0082	3	R:FXD MET FLM 464 OHM 1% 1/8W	14674	C4
A3R17	0757-0465	10	R:FXD MET FLM 100K 1% 1/8W	14674	C4
A3T1	08552-6018	2	TRANSFORMER:RF(CODE=RED)	28480	08552-6018
A3T2	08552-6044	2	TRANSFORMER:RF (5 PIN)	28480	08552-6044
A3T3	08552-6018		TRANSFORMER:RF(CODE=RED)	28480	08552-6018
A3T4	08552-6044		TRANSFORMER:RF (5 PIN)	28480	08552-6044
A3TB1	08552-20114	1	BOARD:BLANK PC	28480	08552-20114
A3A1	08552-6009	1	FILTER ASSY:50 MHZ	28480	08552-6009
A3A1C1	0160-0778	2	C:FXD CER 56 PF 10% 500VDCW	01121	FB2B
A3A1C2	0160-2236	1	C:FXD CER 1.0 PF 500VDCW	72982	301-000-COKO-109C
A3A1C3	0160-0145	2	C:FXD MICA 82PF 2% 100VDCW	04062	RDM15E820G6S
A3A1C4	0160-2258	4	C:FXD CER 11 PF 5% 500VDCW	72982	301-000-COGO-110J
A3A1C5	0121-0036	9	C:VAR CER 5.5-18 PF	28480	0121-0036
A3A1C6	0121-0036		C:VAR CER 5.5-18 PF	28480	0121-0036
A3A1C7	0160-2258		C:FXD CER 11 PF 5% 500VDCW	72982	301-000-COGO-110J
A3A1C8	0160-2258		C:FXD CER 11 PF 5% 500VDCW	72982	301-000-COGO-110J
A3A1C9	0121-0036		C:VAR CER 5.5-18 PF	28480	0121-0036
A3A1C10	0121-0036		C:VAR CER 5.5-18 PF	28480	0121-0036
A3A1C11	0160-2258		C:FXD CER 11 PF 5% 500VDCW	72982	301-000-COGO-110J

Table 7-4. Replaceable Parts (Part of Change X)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3A1C12	0160-0145		C:FXD MICA 82PF 2% 100VDCW	04062	RDM15E820G6S
A3A1C13	0160-0778		C:FXD CER 56 PF 10% 500VDCW	01121	FB26
A3A1J1	1250-0829	1	CONNECTOR:RF	98291	50-045-0000
A3A1L1	08552-6023	2	INDUCTOR ASSY:AIR CORE	28480	08552-6023
A3A1L2	08552-6017	7	INDUCTOR ASSY:50 MHZ	28480	08552-6017
A3A1L3	08552-6023		INDUCTOR ASSY:AIR CORE	28480	08552-6023
A3A1MP1	08552-0021	1	SHIELD CAN:50 MHZ FILTER	28480	08552-0021
A3A1MP2	08552-0022	2	SHIELD COVER:47 MHZ OSC	28480	08552-0022
A3A1MP3	08552-0023	2	INSULATOR:47 MHZ OSC	28480	08552-0023
A3A1T81	08552-2042	1	BOARD:BLANK PC	28480	08552-2042
A3A1T81	08552-6042	1	BOARD ASSY:50 MHZ FILTER	28480	08552-6042
A3A2	08552-60112	1	OSCILLATOR ASSY:47 MHZ	28480	08552-60112
A3A2	08552-60113	1	BOARD ASSY:47 MHZ OSCILLATOR	28480	08552-60113
A3A2	0380-0810	4	STANDOFF:0.437" LG	08145	1530B7/16-11
A3A2C1	0122-0263	1	C:VOLTAGE VAR 47 PF 10% 60WV	04713	1N5148
A3A2C2	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3A2C3	0160-2200	1	C:FXD MICA 43 PF 5%	72136	RDM15E430J3C
A3A2C4	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3A2C5	0180-0116		C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A3A2C6	0160-2261	1	C:FXD CER 15 PF 5% 500VDCW	72982	301-NPO-15 PF
A3A2C7	0160-2265	2	C:FXD CER 22 PF 5% 500VDCW	72982	301-NPO-22PF
A3A2C8	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3A2C9	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3A2C10	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3A2C11	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3A2C12	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3A2C13	0150-0050		C:FXD CER DISC 1000 PF +80-20% 1000VDCW	56289	C067B102E102ZE19-CDH
A3A2C14	0160-0134	2	C:FXD MICA 220PF 5% 300VDCW	14655	RDM15F221J3C
A3A2CR1	1901-0040		DIODE:SILICON 30MA 30WV	07263	FDG1088
A3A2CR2	1902-0041	2	DIODE:BREAKDOWN 5.11V 5%	04713	SZ10939-98
A3A2CR3	1902-0041		DIODE:BREAKDOWN 5.11V 5%	04713	SZ10939-98
A3A2J1	1250-1194	1	CONNECTOR:RF BULKHEAD RECEPTACLE	98291	52-045-4610
A3A2L1	08552-80103	1	INDUCTOR ASSY:47 MHZ OSCILLATOR	28480	08552-80103
A3A2L2	9100-2258	1	COIL/CHOKE 1.2UH 10%	28480	9100-2258
A3A2MP1	0340-0038	5	FEEDTHRU:TERMINAL	28480	0340-0038
A3A2MP2	0340-0039	5	INSULATOR:BUSHING	28480	0340-0039
A3A2MP3	08552-00114	1	SHIELD CAN:47 MC OSCILLATOR	28480	08552-00114
A3A2MP4	08552-0022		SHIELD COVER:47 MHZ OSC	28480	08552-0022
A3A2MP5	08552-0023		INSULATOR:47 MHZ OSC	28480	08552-0023
A3A2Q1	1854-0238	1	TSTR:SI NPN	80131	2N3933
A3A2Q2	1853-0038	1	TSTR:SI PNP	28480	1853-0038
A3A2Q3	1854-0019		TSTR:SI NPN	28480	1854-0019
A3A2Q3	1205-0037	3	HEAT SINK:TRANSISTOR	28480	1205-0037
A3A2Q4	1854-0019		TSTR:SI NPN	28480	1854-0019
A3A2Q4	1205-0037		HEAT SINK:TRANSISTOR	28480	1205-0037
A3A2R1	0698-3157		R:FXD MET FLM 19.6K 1% 1/8W	14674	C4
A3A2R2	0757-0465		R:FXD MET FLM 100K 1% 1/8W	14674	C4
A3A2R3	0698-0084		R:FXD MET FLM 2.15K 1% 1/8W	14674	C4
A3A2R4	0757-0405	4	R:FXD MET FLM 162 OHM 1% 1/8W	28480	0757-0405
A3A2R5	0698-3441		R:FXD MET FLM 215 OHM 1% 1/8W	91637	MF-1/10-32
A3A2R6	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	14674	C4
A3A2R7	0698-3438		R:FXD MET FLM 147 OHM 1% 1/8W	28480	0698-3438
A3A2R8	0757-0276		R:FXD MET FLM 61.9 OHM 1% 1/8W	28480	0757-0276
A3A2R9	0757-0417	1	R:FXD MET FLM 562 OHM 1% 1/8W	14674	C4
A3A2R10	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	14674	C4
A3A2R11	0757-0279		R:FXD MET FLM 3.16K OHM 1% 1/8W	14674	C4
A3A2R12	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	14674	C4
A3A2R13	0698-3430	2	R:FXD MET FLM 21.5 OHM 1% 1/8W	28480	0698-3430
A3A2R14	0757-0400	3	R:FXD MET FLM 90.9 OHM 1% 1/8W	01295	MC550
A3A2R15	0757-0402	3	R:FXD MET FLM 110 OHM 1% 1/8W	28480	0757-0402
A3A2R16	0698-3441		R:FXD MET FLM 215 OHM 1% 1/8W	91637	MF-1/10-32
A3A2T1	08552-80102	1	INDUCTOR ASSY:47 MHZ OUT	28480	08552-80102
A3A2T81	08552-20113	1	BOARD:BLANK PC	28480	08552-20113

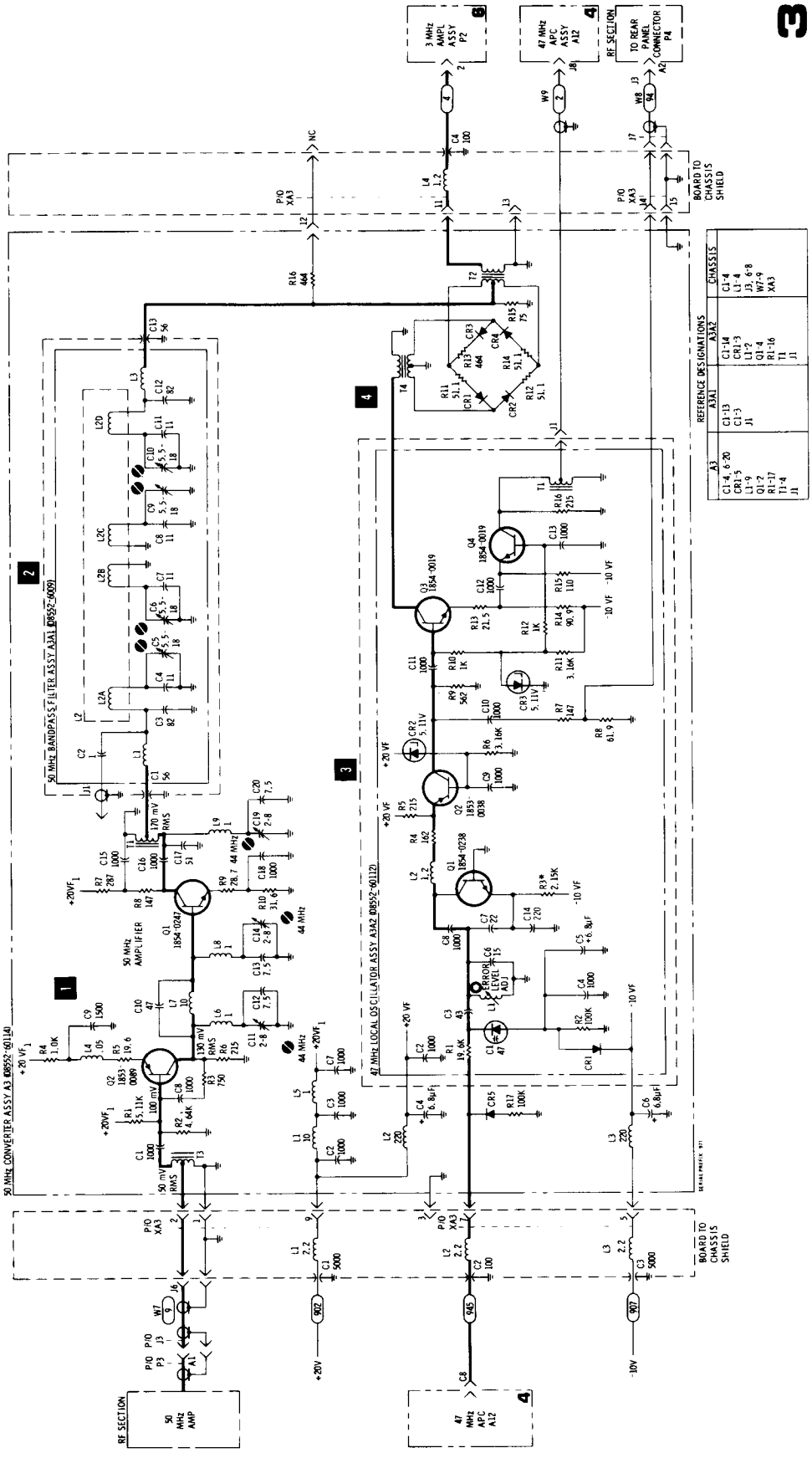


Figure 7-11. 50 MHz Converter (part of Change X)

CHANGE Y

Table 6-3:

Change

A5C14 to 0180-0049, C:FXD ELECT 40 μF +75-10% 50 VDCW, 56289, 30D206 G 050CC2-DSM.
A5C15 to 0180-0098, C:FXD ELECT 100 μF 2% 20VDCW, 56289, 150D 107X 002OS2-DYS.

Delete: A5C19.

Service Sheet 5 Schematic Diagram:

Change the Schematic as shown in Figure 7-12.

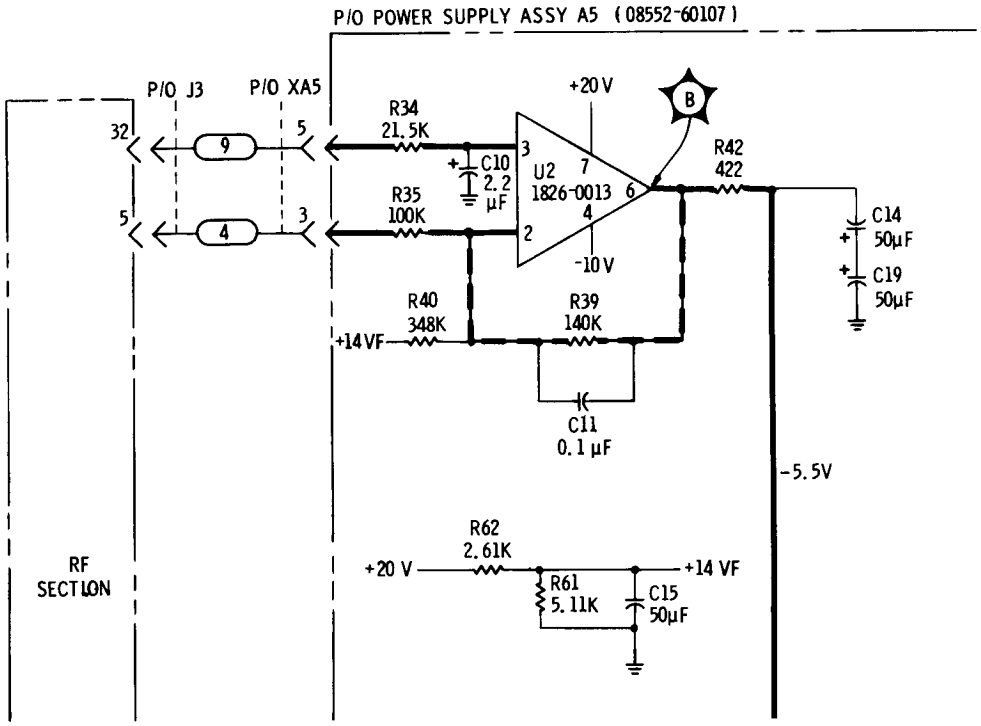


Figure 7-12. Power Supply Partial Schematic Diagram (Part of Change Y)

SECTION VIII
SERVICE

8-1. INTRODUCTION

8-2. This section provides instructions for troubleshooting and repair of the HP 8552B Spectrum Analyzer IF Section.

8-3. LINE VOLTAGE REQUIREMENTS

8-4. During adjustment and testing, the Spectrum Analyzer must be installed with an RF Section into a 140 Series Display Section which is connected to a source of power which is 50 to 60 Hz and 115 or 230 Vac ±10%. If adjustment of the dc voltage regulators is necessary, the Spectrum Analyzer should be connected to the ac power source through a variable auto transformer and then be adjusted to check regulator action when the line voltage varies as much as 10%.

WARNING

"Some of the maintenance and servicing operations described herein are performed with power supplied to the instrument while protective covers are removed. Be careful when performing these operations. Line voltage is always present on terminals including the power input connector, fuse holder, power switch, etc. In addition, when the instrument is on, energy available at many points may result in personal injury or death when contacted."

8-5. MAINTENANCE AIDS

8-6. Servicing aids provided on circuit boards include holes to fit the board removal tool, numbered test points (on some boards), transistor designators, adjustment callouts, and assembly stock numbers.

8-7. TEST EQUIPMENT AND ACCESSORIES REQUIRED

8-8. Test equipment and accessory requirements are listed in the System Test and Troubleshooting Procedure, the individual Service Sheets, and in the Test Equipments and Accessories list, Table 1-2. Test instruments other than those listed may be used if their performance equals or exceeds that of the equipment listed.

8-9. Two circuit board extenders are required to service the 8552B IF Section. A 15-pin extender is supplied with the HP 11592A Service Kit. It may be used to extend the A1 through A8 Assemblies. In addition, a 6-pin extender (HP 5060-5914) is required to extend the A13 Assembly.

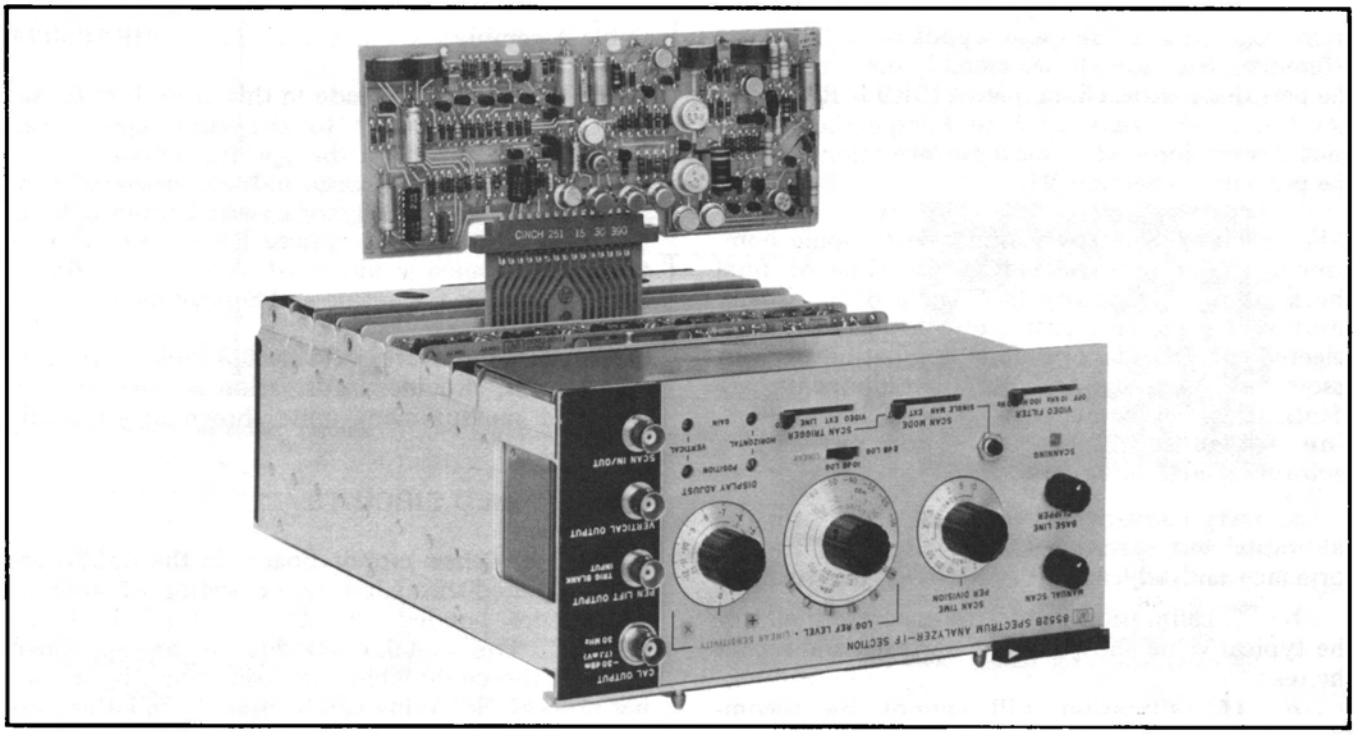


Figure 8-1. 8552B IF Section with Circuit Board Extended for Maintenance

8-10. ADJUSTMENTS

8-11. The procedures contained in these sections do not include calibration or adjustment. Service Sheets which contain adjustable components refer to procedures in the Performance and Adjustment Sections which should be performed after repairs are accomplished.

8-12. GENERAL PROCEDURES

8-13. The troubleshooting procedure is divided into two maintenance levels. The first, System Test and Troubleshooting Procedure, is designed to quickly isolate the cause of a malfunction to a circuit or assembly. The second provides circuit analysis and test procedures to aid in isolating faults to a defective component. Circuit descriptions and test procedures for the second maintenance level are located on the page facing the schematic diagram of the circuit to be repaired.

8-14. After the cause of a malfunction has been located and remedied in any circuit containing adjustable components, the applicable procedure specified in the Performance and Adjustment Section should be performed.

8-15. GENERAL SERVICE INFORMATION

8-16. Part Location Aids. The locations of chassis-mounted parts and major assemblies are shown in Figure 8-8. The locations of individual components mounted on printed circuit boards or other assemblies are shown on the appropriate schematic diagram page or on the page opposite it. The part reference designator is the assembly designator plus the part designator. (Example: A10R9 is R9 on the Log Reference Assembly A10). For specific component description and ordering information refer to the parts list in Section VI.

8-17. Factory Selected Components. Some component values are selected at the time of final checkout at the factory (see Table 5-4). Usually these values are not extremely critical; they are selected to provide optimum compatibility with associated components. These components are identified on individual schematics by an asterisk. The recommended procedure for replacing a factory-selected part is as follows:

a. Try the original value, then perform the calibration test specified for the circuit in the performance and adjustment sections of this manual.

b. If calibration cannot be accomplished, try the typical value shown in the parts list and repeat the test.

c. If calibration still cannot be accomplished, perform the calibration test using various values until calibration is accomplished.

8-18. Modular Exchange Program. Circuit boards for the 8552B Spectrum Analyzer IF Section are available on an exchange basis at a considerable savings in cost. Simply contact the Hewlett-Packard office nearest you and make your requirements known. The local Hewlett-Packard office will arrange for immediate airmail shipment to minimize equipment downtime. At least 90% of the orders for exchange modules (circuit boards) received by an HP Field Sales office will be shipped the same day — either from the sales office itself or from service center.

8-19. An exchange module should be ordered by the "Exchange Assembly" part number listed under the assembly designation in Table 6-3, Replaceable Parts. Upon receiving the exchange module, the faulty module should be returned in the same special carton in which the exchange module was received. A flow diagram of the Modular Exchange Program is shown in Figure 8-2.

8-20. System Test and Troubleshooting Procedure. Table 8-2 provides information that will, in most cases, isolate the causes of a malfunction to a circuit or assembly, RF Section, or Display Section. This procedure should be used in conjunction with the block diagrams and text located on Service Sheet 1. The test equipment required follows:

RF Voltmeter	HP 3406A
Oscilloscope	HP 180A/1801A/1821A
Signal Generator	HP 608F
Service Kit	HP 11592A
Adapter	UG-201 A/U
Cable Assembly	HP 10503A

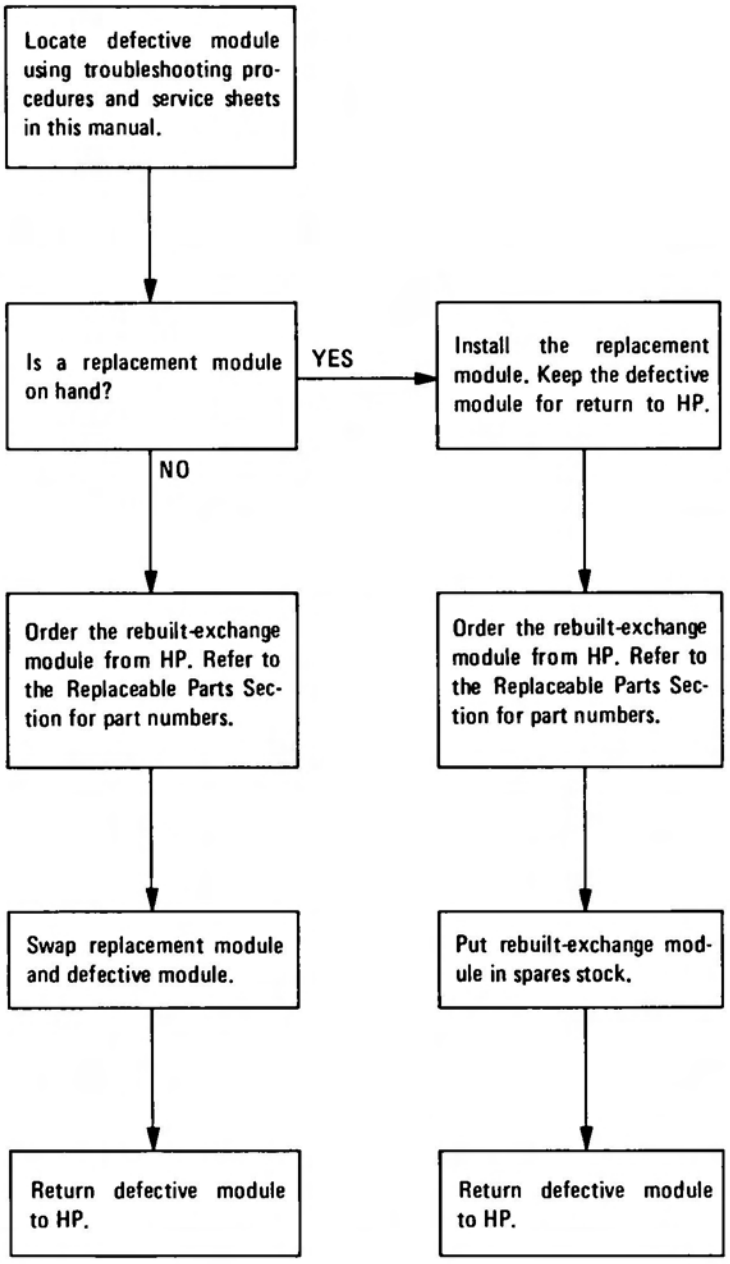
8-21. No attempt is made in this procedure to isolate causes of trouble to the component level. Reference is made to the specific Service Sheet which describes the circuits and test procedures for the portion of the analyzer to which the malfunction has been isolated. Where RF or Display Section maintenance is indicated, refer to the RF or Display Section Operating and Service manual.

8-22. Diagram Notes. Table 8-3, Schematic Diagram Notes, provides information relative to symbols and measurement units shown in schematic diagrams.

8-23. ETCHED CIRCUITS

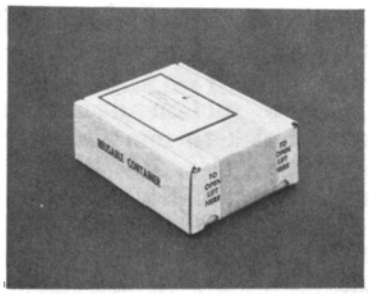
8-24. The etched circuit boards in the 8552B are of the plated-through type consisting of metallic conductors bonded to both sides of insulating material. The metallic conductors are extended through the component mounting holes by a plating process. Soldering can be done from either side of the board with equally good results. Table 8-1 lists recommendations and precautions pertinent to

The module exchange program described here is a fast, efficient, economical method of keeping your Hewlett-Packard instrument in service.



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

A.



Rebuilt-exchange modules are shipped individually in boxes like this. In addition to the circuit module, the box contains:

Module repair report
Return Address label
Tape for resealing box

B.

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

C.

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

Figure 8-2. Diagram of Modular Exchange Program

etched circuit repair work.

a. Avoid unnecessary component substitution; it can result in damage to the circuit board and/or adjacent components.

b. Do not use a high-power soldering iron on etched circuit boards. Excessive heat may lift a conductor or damage the board.

c. Use a suction device (Table 8-1) or wooden toothpick to remove solder from component mounting holes. DO NOT USE A SHARP METAL OBJECT SUCH AS AN AWL OR TWIST DRILL FOR THIS PURPOSE. SHARP OBJECTS MAY DAMAGE THE PLATED-THROUGH CONDUCTOR.

d. After soldering, remove excess flux from the soldered areas and apply a protective coating to prevent contamination and corrosion. See Table 8-1 for recommendations.

8-25. Etched Conductor Repair. A broken or burned section of conductor can be repaired by bridging the damaged section with a length of tinned copper wire. Allow adequate overlap and remove any varnish from etched conductor before soldering wire into place.

8-26. COMPONENT REPLACEMENT.

a. Remove defective component from board.

NOTE

Axial lead components, such as resistors and tubular capacitors, can be replaced without unsoldering. Clip leads near body of defective component, remove component and straighten leads left in board. Wrap leads of replacement component one turn around original leads. Solder wrapped connection, and clip off excess lead.

Table 8-1. Etched Circuit Soldering Equipment

Item	Use	Specification	Item Recommended
Soldering tool	Soldering Unsoldering	Wattage rating: 47½ — 56½ Tip Temp: 850—900 degrees	Ungar #776 Handle with *Ungar #4037 Heating Unit
Soldering *Tip	Soldering Unsoldering	*Shape: pointed	*Ungar #PL111
De-soldering Aid	To remove molten solder from connection	Suction device	Soldapullt by Edsyn Co. Arleta, California
Resin (flux) Solvent	Remove excess flux from soldered area before application of protective coating	Must not dissolve etched circuit base board material or conductor bonding agent	Freon Acetone Lacquer Thinner
Solder	Component replacement Circuit board repair Wiring	Resin (flux) core, high tin content (60/40 tin/lead), 18 gauge (SWG) preferred	
Protective Coating	Contamination, corrosion protection	Good electrical insulation, corrosion-prevention properties	Silicone Resin such as GE DRI-FILM**88

*For working on 8552B Boards: for general purpose work, use Ungar No. 1237 Heating Unit (37.5W, tip temperature of 750—800 degrees) and Ungar No. PL113 1/8" chisel tip.

**General Electric Co., Silicone Products Dept., Waterford, New York, U.S.A.

b. If component was unsoldered, remove solder from mounting holes, and position component as original was positioned. DO NOT FORCE LEADS INTO MOUNTING HOLES; sharp lead ends may damage plated-through conductor.

8-27. Transistor Replacement

8-28. Solid state transistors are in many physical forms. This sometimes results in confusion as to which lead is the collector, which is the emitter, and which is the base. Figures 8-3 and 8-4 show epoxy and metal case transistors and integrated circuits and the means of identifying the leads.

8-29. To replace a transistor, proceed as follows:

a. Do not apply excessive heat; see Table 8-1 for recommended soldering tools.

b. Use long-nose pliers between transistor and hot soldering iron as a heat sink. The instant solder is melted, use pliers to pull lead free of board.

c. When installing replacement transistor, ensure sufficient lead length to dissipate soldering heat by using about the same length of exposed lead as used for original transistor.

d. Integrated circuit replacement instructions are the same as those for transistors.

8-30. Some transistors are mounted for good heat dissipation. This requires good thermal contact with mounting surfaces. To assure good thermal contact for a replacement transistor, coat both sides of the black insulator with Dow Corning No. 5 silicone compound or equivalent before fastening the transistor to the chassis. Dow Corning No. 5 compound is available in 8-oz. tubes from Hewlett-Packard; order HP Part No. 8500-0059.

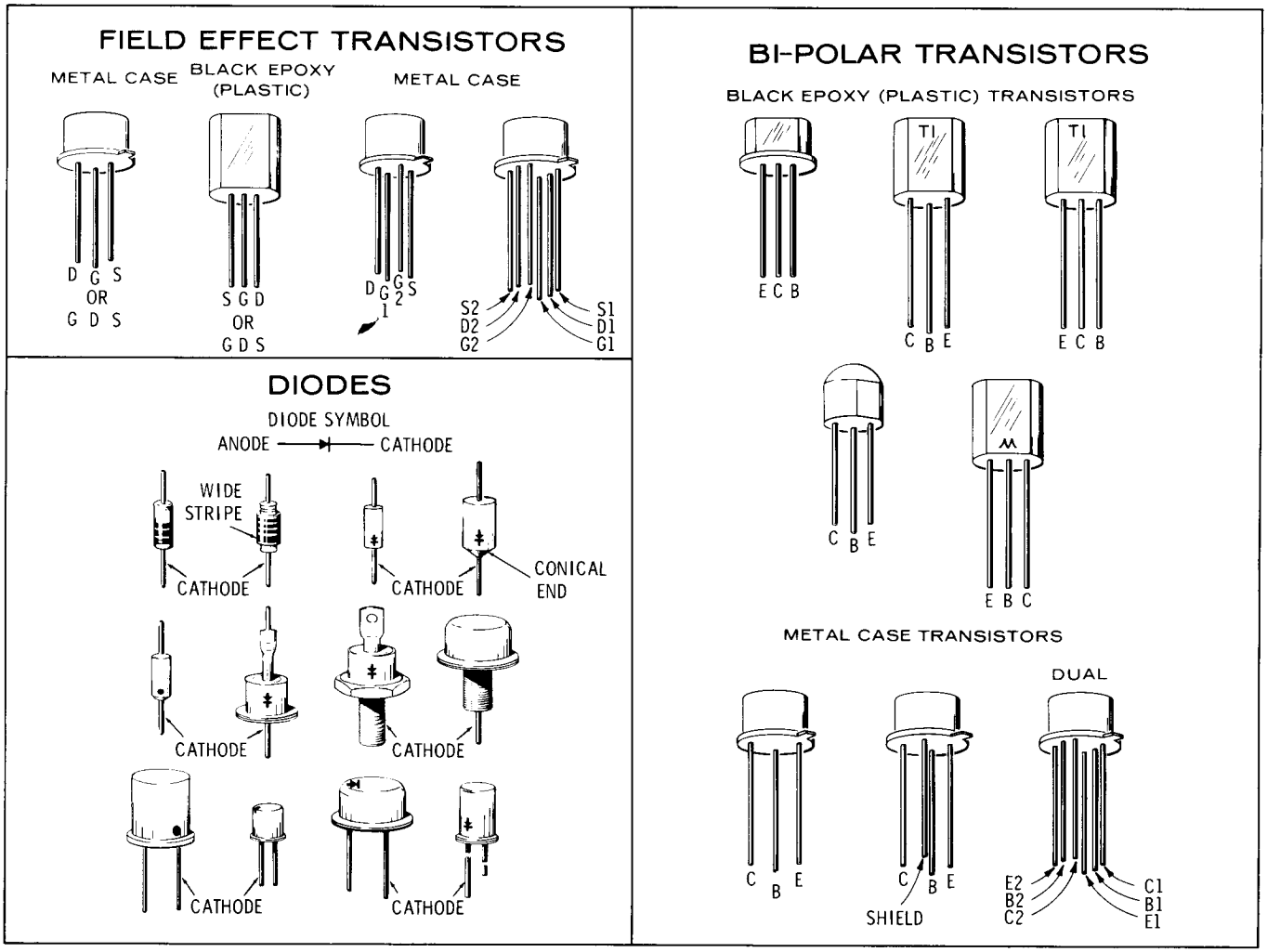


Figure 8-3. Examples of Diode and Transistor Marking Methods

8-31. Diode Replacement

8-32. Solid state diodes are in many physical forms. This sometimes results in confusion as to which lead or connection is for the cathode (negative) or anode (positive), since not all diodes are marked with the standard symbols. Figure 8-3 shows examples of some diode marking methods. If doubt exists as to polarity, an ohmmeter may be used to determine the proper connection. It is necessary to know the polarity of the ohms lead with respect to the common lead for the ohmmeter used. (For the HP Model 410B Vacuum Tube Voltmeter, the ohms lead is negative with respect to the common; for the HP Model 412A DC Vacuum Tube Voltmeter, the ohms lead is positive with respect to the common.) When the ohmmeter indicates the least diode resistance, the cathode of the diode is connected to the ohmmeter lead which is negative with respect to the other lead.

NOTE

Replacement instructions are the same as those listed for transistor replacement.

8-33. SWITCHING INFORMATION

8-34. The manner in which switch wafers are schematically presented in this manual is distinctly different from that used in previous Hewlett-Packard manuals. If the following information concerning the evolution of this system of switch presentation is carefully studied, it will be seen that circuits are more easily understood and much more easily traced.

8-35. One of the major objections to drawing switch wafer symbols as the wafer appears is that many lines must cross other lines on the schematics. This problem has not been completely eliminated by use of straight-line presentation, but it has been minimized and circuits are much easier to follow once the basic principles are understood.

8-36. *Figure 8-5 illustrates the evolution of* straight-line switch presentation from the pictorial view of a switch wafer. Part A shows the wafer as it actually appears. In parts B and C, when the wafer is viewed as being a flexible, stretchable material, the transition from wafer to straight-line presentation begins to be obvious. In part D the transition is complete and the wafer now appears to be a slide type switch. In part E the final result is shown. Note that those contacts which maintain contact with the metallic portion of the rotor regardless of switch position (in the illustration contact 7) are moved to the other side for clarification. Note too that lead lines and arrows to switch contacts are no longer required.

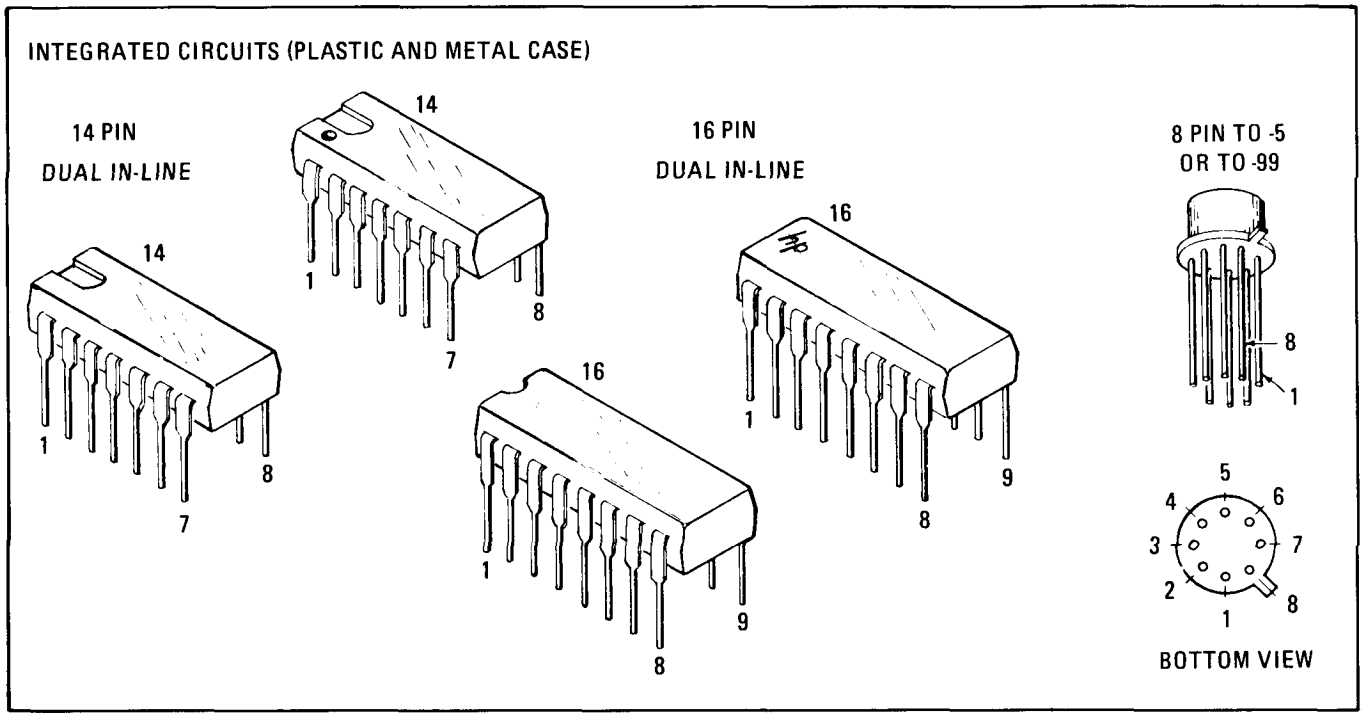


Figure 8-4. Integrated Circuit Packaging

8-37. *In all schematics in this manual, the switches are shown in the maximum ccw position*, unless otherwise noted. The physical layout of the switches are shown as well as a straight-line presentation of switch action. In Figure 8-6 note that the straight line rotor contact moves from the bottom to the top when the switch moves one step in a cw direction. Figure 8-7 illustrates the difference between the old method of switch presentation and the straight line presentation.

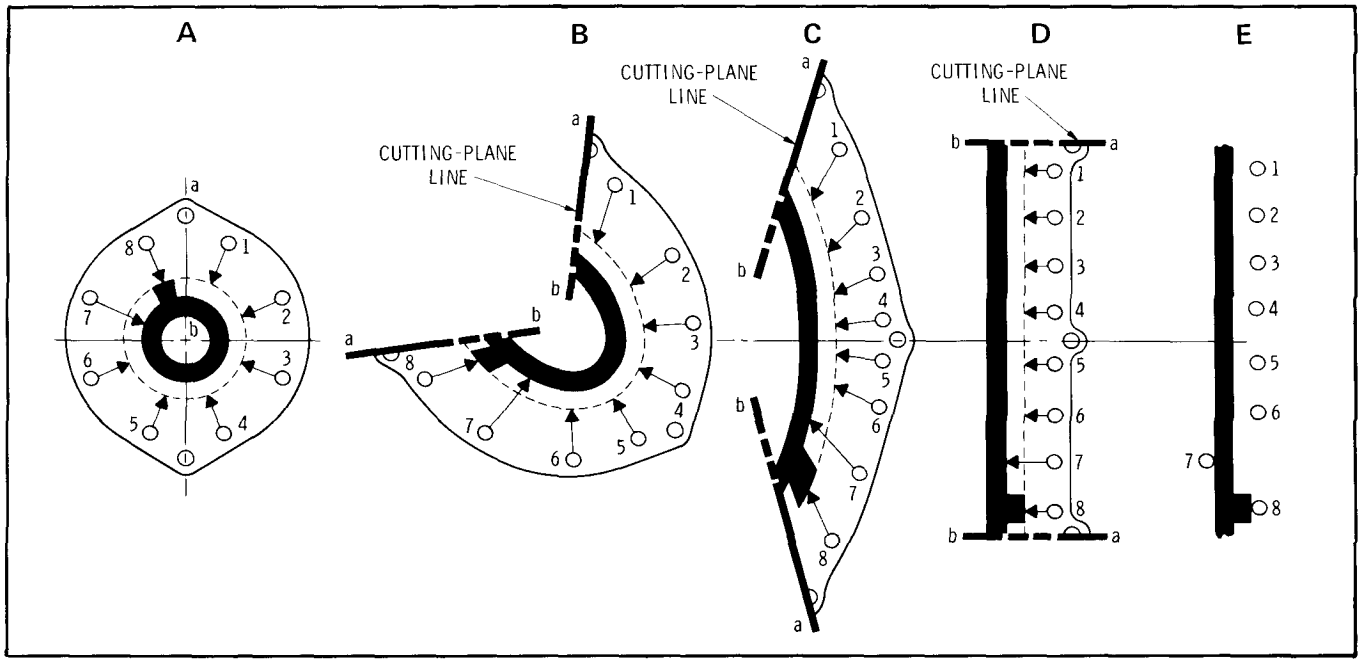


Figure 8-5. Evolution of Straight-Line Switch Presentation

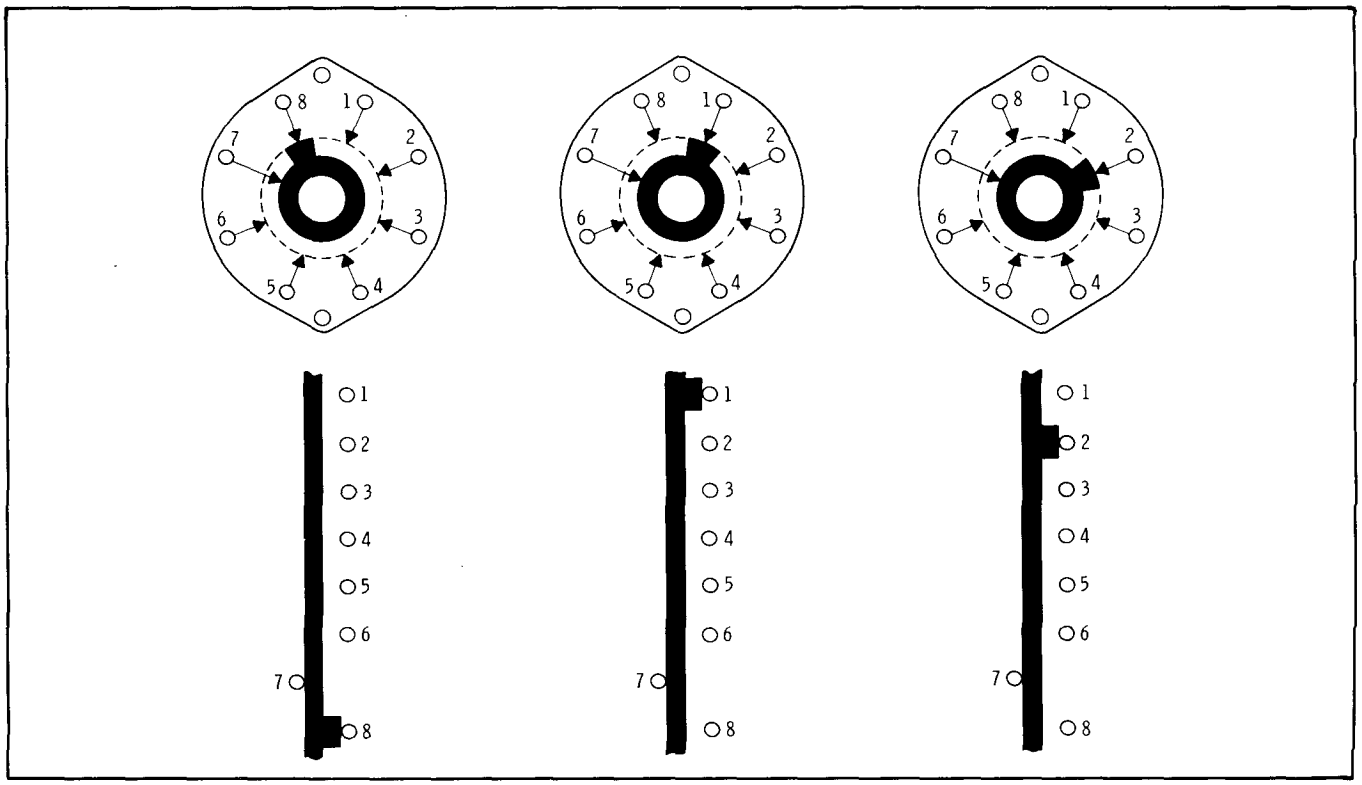


Figure 8-6. Three Positions of Typical Switch Wafers

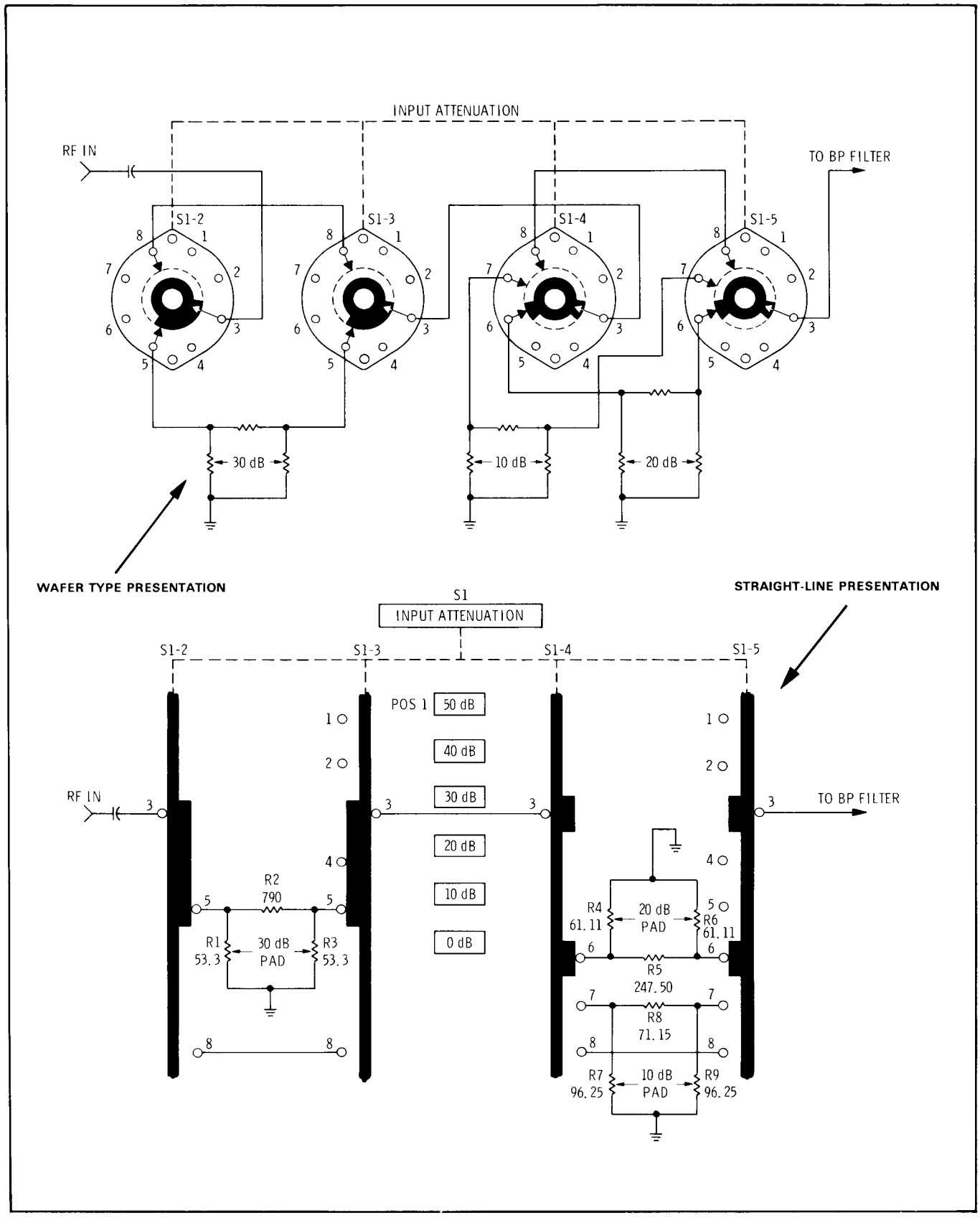


Figure 8-7. Wafer Switch Presentation Versus Straight-Line Presentation

Table 8-2. System Test and Troubleshooting Procedure

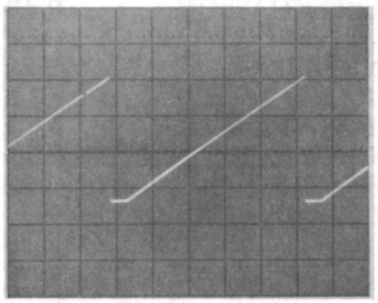
TEST	FAULT	PROCEDURE
1. Set POWER switch to ON. Power lamp on, fan operates. Proceed to test 2.	Light not on and/or fan inoperative	Check Display Section
2. Rotate INPUT ATTENUATION control and observe LOG REF LEVEL index lights.	None of the lights illuminate	Check the -12.6 volt supply from Display Section. If voltage is present see Service Sheet 18. If voltage is not present, check the Display Section power supply.
Lights operate properly.	Some but not all lights illuminate	Check light bulbs on Service Sheet 18.
Proceed to test 3.		
3. Set Analyzer controls as follows: SCAN TIME PER DIVISION . 5 ms SCAN MODE . . . . . .INT SCAN TRIGGER . . . . . AUTO and observe SCANNING light.	SCANNING light does not illuminate	Check power supply circuits on Service Sheet 19. If the power supply circuits are operating properly, proceed to test 4.
Light operates normally. Proceed to test 4.		
4. Adjust Display Section for a baseline trace.	Trace does not appear	Connect the oscilloscope to the SCAN IN/OUT jack on the front panel of the analyzer and observe the waveform.  Oscilloscope control settings: 0.2V/Div 10 msec/Div 10:1 probe If the waveform is not present, check the scan amplifier and the scan generator (Service Sheets 15 and 16). If the waveform is present, check the horizontal deflection amplifier, Service Sheet 14. If trouble persists, check Display Section.
Baseline trace is normal, Proceed to test 5		

Table 8-2. System Test and Troubleshooting Procedure (cont'd)

TEST	FAULT	PROCEDURE
5. Set analyzer controls as follows: FREQUENCY . . . . . 30 MHz BANDWIDTH . . . . . 10 kHz FINE TUNE . . . . . Centered SCAN WIDTH . . . . . PER DIVISION SCAN WIDTH PER DIVISION 1 MHz INPUT ATTENUATION . . . . 10 dB TUNING STABILIZER . . . . . On BASE LINE CLIPPER . . . . . ccw LOG REF LEVEL . . . . . 0 dBm LOG REF LEVEL Vernier . . . . . ccw LOG·LINEAR . . . . . 10 dB LOG VIDEO FILTER . . . . . OFF SCAN TIME PER DIVISION . . . . 2 MILLISECONDS Connect CAL OUTPUT to RF INPUT and observe display. The 30 MHz signal should appear close to the center of the display CRT at a level of -30 dBm. If signal is correct, proceed to test 8.	Signal does not appear on Display Section CRT Signal appears but sweeps back and forth about ±1 Div on CRT.	Connect the RF voltmeter to CAL OUTPUT jack. The voltmeter should indicate approximately -30 dBm. If the signal is not present refer to Service Sheet 17. Repair the calibration oscillator and repeat the test. If CAL OUTPUT is present proceed to test 6. Refer to Service Sheet 4 and check the 47 MHz APC and the 2 MHz VTO circuits.
6. Set analyzer controls as follows: BANDWIDTH . . . . . 10 kHz FINE TUNE . . . . . Centered SCAN WIDTH . . . PER DIVISION SCAN WIDTH PER DIVISION 20 kHz INPUT ATTENUATION . . . 0 dB TUNING STABILIZER . . . OFF BASELINE CLIPPER . . . . ccw LOG REF LEVEL . . . . -30 dBm LOG REF LEVEL Vernier . . . ccw LOG·LINEAR . . . . . 10 dB LOG VIDEO FILTER . . . . . OFF SCAN TIME PER DIVISION . . . . . 2 MILLISECONDS Connect a 50 MHz -33 dBm signal from the signal generator to J6 on the top of the 8552B using the 11592-60001 cable. Tune the signal generator slightly around 50 MHz until the signal is centered. With AMPL CAL centered the signal should read -30 dBm ±2 dBm.	If signal is correct Signal is missing	IF Section operating correctly. Trouble in RF Section. See Systems Test and Troubleshooting Procedure in RF Section Manual. Proceed to test 7

NOTE

For steps 7a through 7g connect CAL OUTPUT to RF INPUT and set the analyzer controls as specified in step 6.

Table 8-2. System Test and Troubleshooting Procedure (cont'd)

TEST	FAULT	PROCEDURE
7. Perform the following sub-tests until a malfunction has been found and corrected, then repeat test.		
7a. Connect the RF voltmeter to terminal labeled 3 MHz (C4) on the top of the 8552B. Tune frequency for maximum signal around 30 MHz. Signal should be about 8 mV rms. If signal is correct, proceed to test 7b.	Signal is missing or incorrect	Refer to Service Sheet 3 and repair the 50 MHz Converter.
7b. Connect the RF voltmeter to the 3 MHz terminal (C4), peak FREQUENCY, then set SCAN TIME PER DIVISION to 1 SECOND. Meter should fluctuate with peaks at about 8 mV rms. If signal is correct set SCAN TIME PER DIVISION to 2 MILLISECONDS and proceed to test 7c.	Meter does not fluctuate	Refer to Service Sheet 4 and check the 47 MHz APC and the 2 MHz VTO circuits. If trouble persists, check the 2 MHz Shaping circuits (Service Sheet 5).
7c. Set SCAN WIDTH to ZERO, connect the RF voltmeter to XA2 pin 14 and tune FREQUENCY for maximum. Signal level should be about 38 mV rms. Rotate AMPL CAL and LOG REF vernier cw; signal should increase. If signal is correct, re-center AMPL CAL, set vernier ccw and proceed to test 7d.	Signal is missing or incorrect	Refer to Service Sheets 6 and 7 and repair the 3 MHz Amplifier.
7d. Connect the RF voltmeter to XA1 pin 2 and tune FREQUENCY and FINE TUNE for maximum. Signal level should be about 230 mV rms. If signal is correct, proceed to test 7e.	Signal is missing or incorrect	Refer to Service Sheet 8 and repair the LC Filter.
7e. Connect the RF voltmeter to XA4 pin 14 and tune FREQUENCY and FINE TUNE for maximum. Signal should be about 930 mV rms. Set BANDWIDTH to 3 kHz and peak signal with FINE TUNE. Signal should remain about the same. If signal is correct, proceed to test 7f.	Signal is missing or incorrect	Refer to Service Sheets 10 and 11 and repair the Crystal Filter.

Table 8-2. System Test and Troubleshooting Procedure (cont'd)

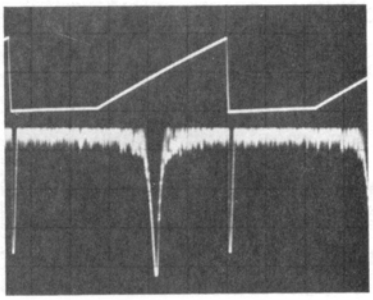
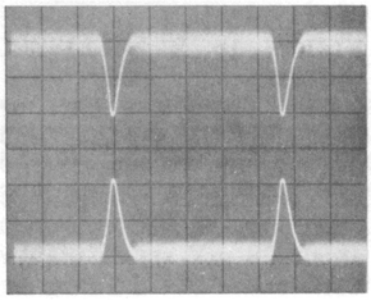
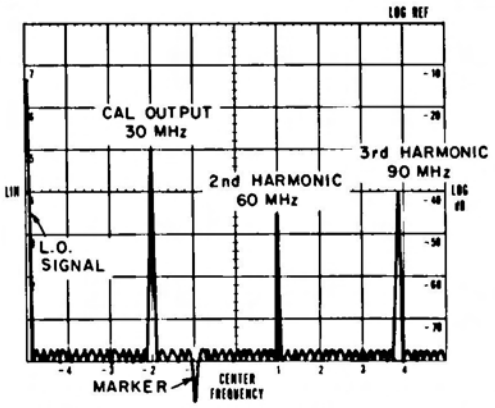
TEST	FAULT	PROCEDURE
7f. Set SCAN WIDTH to PER DIVISION and connect oscilloscope channel A probe to SCAN IN/OUT jack and the channel B probe to XA7, pin B. Oscilloscope control settings: Time/Div . . . . . .0.5 msec/div Channel A . . . . . 0.5 V/div Channel B . . . . . .02 V/div 10:1 probes If waveform is correct, proceed to test 7g.	Waveform B is missing or incorrect	Refer to Service Sheet 12 and 13 and repair the Log · Linear Amplifier circuits. 
7g. Connect the oscilloscope channel A input to XA7 pin 5 and the channel B input to XA7 pin E with analyzer set as in 7f. Oscilloscope control settings: VOLTS/DIV . . . . . 2V/Div TIME/DIV . . . . . 2 msec/Div 10:1 probes If waveform is correct, trouble is in the Display Section or in interconnecting wiring. After making repairs, repeat test 5.	Either waveform is missing or incorrect	Refer to Service Sheet 14 and repair the vertical deflection circuit. 
8. Set analyzer controls as follows: FREQUENCY . . . . . 40 MHz FINE TUNE . . . . . Centered BANDWIDTH . . . . . 300 kHz SCAN WIDTH . . . . . 0—100 MHz SCAN WIDTH PER DIVISION . . . . . 10 MHz INPUT ATTENUATION . . . . 10 dB RANGE — MHz . . . . . 0—110 TUNING STABILIZER . . . . . On BASE LINE CLIPPER . . . . . ccw SCAN TIME PER DIVISION . . 2 MILLISECONDS LOG REF LEVEL . . . . . -10 dBm LOG REF LEVEL Vernier . . . . . 0 LOG·LINEAR . . . . . 10 dB LOG VIDEO FILTER . . . . . OFF SCAN MODE . . . . . INT SCAN TRIGGER . . . . . AUTO		 *30 MHz Calibrator Signal & Harmonics*
Connect CAL OUTPUT to RF INPUT using a BNC to BNC cable. The display should be similar to that shown in the procedure column.	Sweep does not extend to full width of graticule Not all signals present or properly spaced	See Service Sheet 14. Check Scan Generator assembly. Same as above. Also refer to System Test and Troubleshooting Procedure in RF Section Manual.

Table 8-2. System Test and Troubleshooting Procedure (cont'd)

TEST	FAULT	PROCEDURE
Test 8 (cont'd) Vary VERTICAL position to center baseline trace on bottom CRT graticule. Signal amplitude is unimportant in this test. Proceed to test 9.	Baseline trace does not vary	See Service Sheet 14. Check vertical deflection circuit
9. Set LOG REF LEVEL maximum ccw. Set SCAN TIME PER DIVISION to 10 SECONDS and adjust focus and astigmatism. Adjust trace align to center trace on bottom CRT graticule. Proceed to test 10.	Focus and astigmatism inoperative or trace will not align	Refer to Display Section Manual and repair as required.
10. Turn FREQUENCY control and observe marker. Marker should move as FREQUENCY is tuned. Proceed to test 11.	Marker is missing	See System Test and Troubleshooting Procedure in RF Section Manual.
11. Tune FREQUENCY control to move the marker exactly under the signal three divisions from the left. The signal will null when the marker is tuned to the exact frequency of the signal. Set SCAN WIDTH PER DIVISION control to 0.05 MHz, BANDWIDTH to 10 kHz, and SCAN WIDTH to PER DIVISION. 30 MHz signal should appear close to the center graticule on the CRT. If correct signal is observed, proceed to test 12.	30 MHz signal does not appear on CRT	Check calibration and alignment of the analyzer.
12. Adjust FREQUENCY to center the 30 MHz signal on CRT, then reduce SCAN WIDTH PER DIVISION to 10 kHz and recenter the display with FINE TUNE control. Signal centers properly. Proceed to test 13.	Signal is unstable. FINE TUNE does not vary signal position	Refer to System Test and Troubleshooting Procedure in RF Section manual. See Service Sheet 5. Check 2 MHz VTO Shaping Circuit.
13. Turn LOG REF LEVEL fully ccw. Top of signal should be -70 dB graticule. Rotate LOG REF LEVEL seven steps cw. CRT display should be as shown in the figure. The fault column lists these steps in numerical order beginning with the first step from the ccw position.	Each of the first 4 steps: no increase in gain, not 10 dB gain or loss of signal.	See Service Sheet 11.

Table 8-2. System Test and Troubleshooting Procedure (cont'd)

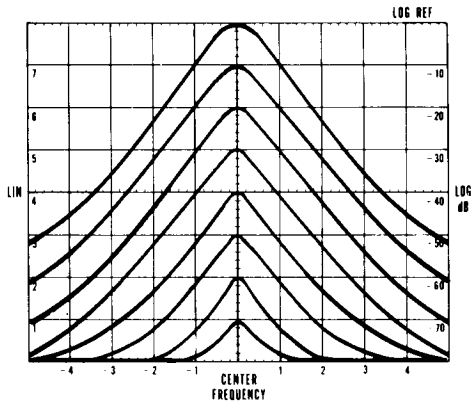
TEST	FAULT	PROCEDURE
13. (cont'd)		
Set INPUT ATTENUATION to 30 dB and rotate LOG REF LEVEL cw for remaining two steps. Signal amplitude should again reach the top CRT graticule.	Steps 5 and 6 same as above	Check 3 MHz step gain amplifier, Service Sheets 8 and 9.
	Steps 7, 8 and 9 same as above	Check 3 MHz step gain amplifier, Service Sheets 6 and 9.
INPUT ATTENUATION to 10 dB, LOG REF LEVEL to 0 dBm. Rotate LOG REF LEVEL Vernier to full cw. Signal shown should increase by 12 dB. Proceed to test 14.	All or most levels incorrect and cannot be corrected by adjustment.	Check Lin/Log amplifier, Service Sheets 12, 13.
	No change in signal level or change is incorrect.	Check variable gain amplifier, Service Sheet 7.
14. Set LOG REF LEVEL to -30 dBm (-30 +0). Adjust AMPL CAL so that the top of the signal is exactly on the LOG REF (TOP) graticule of the CRT. Proceed to test 15.	AMPL CAL does not vary signal level.	See Service Sheet 6. Check calibration amplifier.
15. Set LOG·LINEAR to 2 dB LOG. Signal should remain at LOG REF graticule on CRT. Set LOG REF LEVEL to -20 dBm. Signal should drop to about -50 dB graticule on CRT. Proceed to step 16.	Either level incorrect	See Service Sheet 14. Check 2 dB Log Amplifier.

Table 8-2. System Test and Troubleshooting Procedure (cont'd)

TEST	FAULT	PROCEDURE
16. Set LOG·LINEAR to LINEAR and LINEAR SENSITIVITY to 1 mV/DIV. The CRT deflection should be adjusted by the AMPL CAL control to 7.1 divisions. If display is correct, proceed to test 17.	AMPL CAL cannot be adjusted for 7:1 division display.	See Service Sheets 12 and 13. Probable trouble is in linear amplifier compensation circuit or linear scale factor circuit.
17. Set analyzer controls as follows: SCAN WIDTH .... 0—100 MHz SCAN WIDTH PER DIVISION ..... 10 MHz BANDWIDTH ..... 10 kHz LOG·LINEAR .....10 dB LOG LOG REF LEVEL .... -10 dBm		See Service Sheets 14, 15, and 16.
Turn BASE LINE CLIPPER full ccw.	Bottom 2 divisions of CRT not blanked.	Check base line clipper circuit.
Switch SCAN TIME PER DIVISION through its range. Return SCAN TIME PER DIVISION to 2 MILLISECONDS.	Scan does not occur in all positions	Check scan generator circuit.
Set SCAN WIDTH to PER DIVISION.	DISPLAY UNCAL does not illuminate	Refer to System Test and Troubleshooting Procedure in RF Section Manual and Service Sheet 17. Probable cause of trouble is in the analogic circuit or switching circuits.
Set SCAN TIME PER DIVISION to 2 SECONDS, SCAN MODE to SINGLE and push the button; a dot should appear on the CRT display moving from left to right. Push the SINGLE scan button again; the dot should disappear.	Display incorrect	Refer to Service Sheet 15 and repair the scan control flip-flop or S2.
Set SCAN MODE to MAN and rotate the MANUAL SCAN knob. Knob should control the dot on the CRT.	Display incorrect	Refer to Service Sheet 16 and check the manual scan circuits.
Set SCAN MODE to INT and SCAN TRIGGER to LINE. The scan circuits should trigger and sweep normally.	No sweep on CRT.	Refer to Service Sheet 15 and check the scan trigger circuits.

SCHEMATIC DIAGRAM NOTES

Resistance in ohms, capacitance in picofarads, and inductance in microhenries unless otherwise noted.

P/O = part of.

*Asterisk denotes a factory-selected value. Value shown is typical. Capacitors may be omitted or resistors jumpered.

Screwdriver adjustment.

Panel control.

Encloses front panel designations.

Encloses rear panel designation.

Circuit assembly borderline.

Other assembly borderline.

Heavy line with arrows indicates path and direction of main signal.

Heavy dashed line with arrows indicates path and direction of main feedback.

Wiper moves toward CW with clockwise rotation of control as viewed from shaft or knob.

Numbers in stars on circuit assemblies show locations of test points.

Encloses wire color code. Code used (MIL-STD-681) is the same as the resistor color code. First number identifies the base color, second number the wider stripe, and the third number identifies the narrower stripe. E.g., (947) denotes white base, yellow wide stripe, violet narrow stripe.

Table 8-3. Schematic Diagram Notes

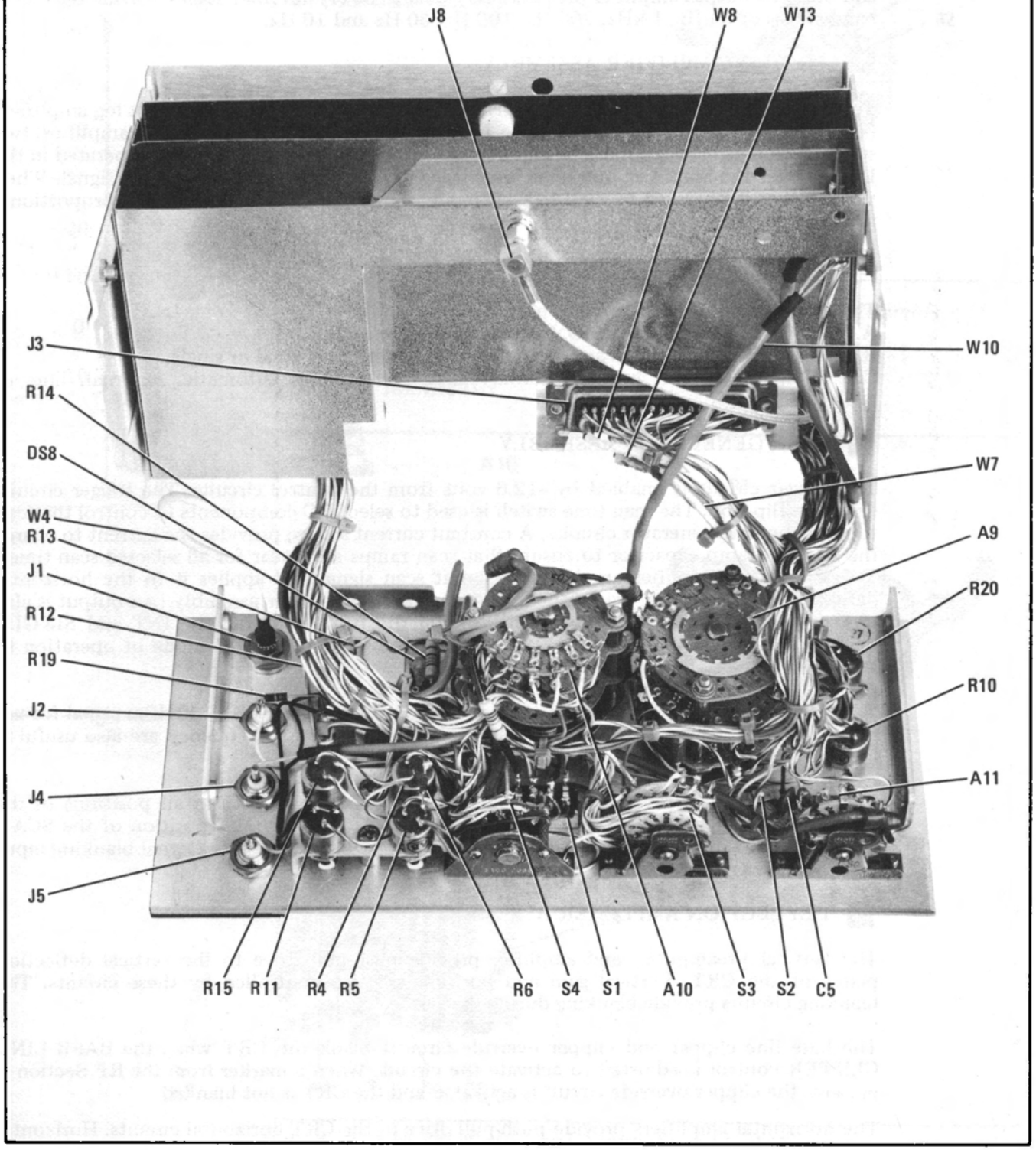
Table 8-4. IF Section Assembly and Component Location

Assembly		Service Sheet	Photo
A1	LC Filter	8	Figure 8-28
A2	3 MHz Amplifier	6, 7	Figure 8-24, 8-26
A3	50 MHz Converter	3	Figure 8-17
A4	Crystal Filter	10, 11	Figure 8-31, 8-33
A5	Power Supply	5, 17, 19	Figure 8-22, 8-46, 8-50
A6	Scan Generator	15, 16, 18	Figure 8-42, 8-44, 8-47
A7	Deflection Amplifier	14	Figure 8-40
A8	Log Amplifier	12, 13	Figure 8-36, 8-38
A9	Scan Time Switch	5, 15, 17	Figure 8-13
A10	Log Ref Level	6, 9, 11, 13, 18	Figure 8-12
A11	Video Filter Switch	13, 17	Figure 8-11
A12	47 MHz APC	4	Figure 8-19
A13	2 MHz VTO (requires 6-pin extender)	4	Figure 8-20
Component		**Service Sheet**	**Photo/Location**
C1 — 4		3	Chassis Top
C5		15	Front Panel
C6 — 10		4	Chassis Bottom
CR1		17	Rear Panel
DS 1 — 6	LOG REF Index Lights	18	Front Panel
DS 7	X	13	Front Panel
DS 8	+	13	Front Panel
DS 9	SCANNING	15	Front Panel
F1, 2		17	Rear Panel
J1	CAL OUTPUT	18	Front Panel
J2	PEN LIFT OUTPUT	14, 15, 16	Front Panel
J3	IF Section/RF Section	1, 3, 5, 6, 8, 9, 14, 16 17, 18, 19	Chassis Top
J4	VERTICAL OUTPUT	14	Front Panel
J5	SCAN IN/OUT	16	Front Panel
J6	50 MHz input	3	Chassis Top
J7	47 MHz output	3	Chassis Top
J8		4	Chassis Bottom
L1 — 4		3	On XA 3
P1	IF Section/Display Section	2, 14, 17, 19	Rear Panel
Q23, 24		19	Rear Panel
R1 — R3		19	Rear Panel
R4	HORIZONTAL POSITION	14	Front Panel
R5	HORIZONTAL GAIN	16	Front Panel

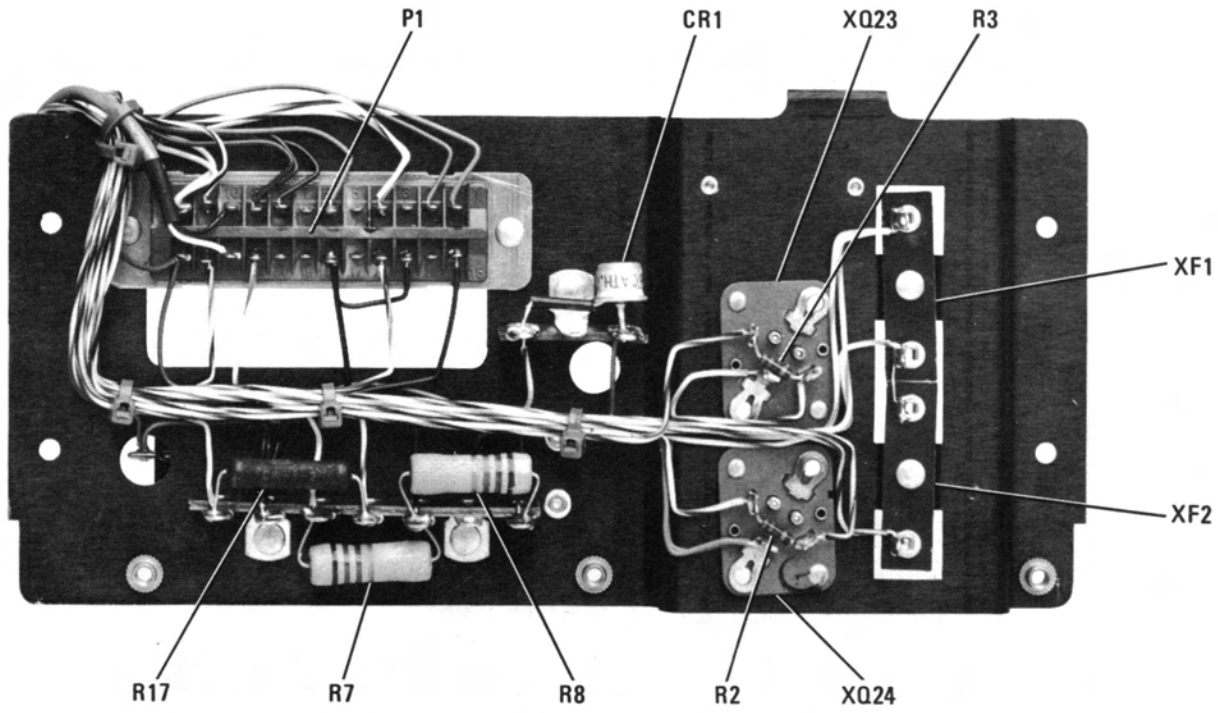
Table 8-4. IF Section Assembly and Component Location (cont'd)

Component		Service Sheet	Photo/Location
R6		14, 16	Front Panel
R7, 8		14	Rear Panel
R9		15	Front Panel
R10	BASE LINE CLIPPER	14	Front Panel
R11	VERTICAL GAIN	14	Front Panel
R12	Vernier	7	Front Panel
R13, 14		13	Front Panel
R15	VERTICAL POSITION	14	Front Panel
R16		13	Front Panel
R17		12	Rear Panel
R18		19	Chassis Top
R19		14, 15, 16	Front Panel
R20	MANUAL SCAN	16	Front Panel
S1	LOG·LINEAR	13, 14	Front Panel
S2	SINGLE SCAN	15	Front Panel
S3	SCAN MODE	15, 16, 17	Front Panel
S4	SCAN TRIGGER	15, 16	Front Panel
W1	Green	11, 12	Figure 8-8
W2	Blue, shielded	11	Figure 8-8
W3	Horiz Output	14	Figure 8-8
W4	Cal Output	18	Figure 8-8
W5	Orange	13	Figure 8-8
W6	Vert Output	14	Figure 8-8
W7	50 MHz Input	3	Figure 8-8
W8	47 MHz Output	3	Figure 8-8
W9	47 MHz APC	3, 4	Figure 8-8
W10	Blue, Twisted Pair	4, 5	Figure 8-8
W11	Blue, Shielded Pair	4, 5	Figure 8-8
W12	Red	8, 10	Figure 8-8

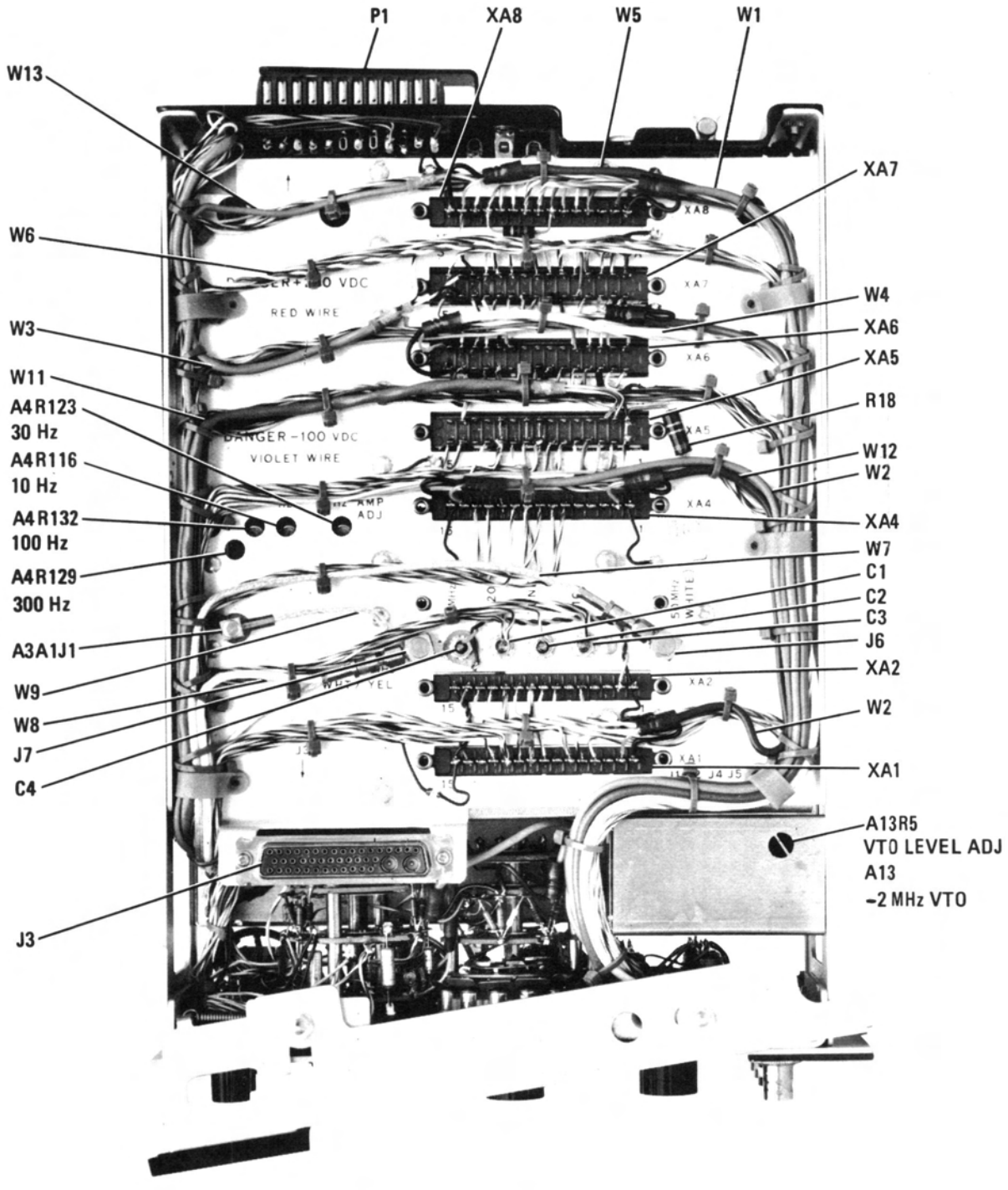
INSIDE FRONT PANEL



INSIDE REAR PANEL



TOP


P1
XA8
W5
W1
W13
XA7
W6
W4
W3
XA6
XA5
W11
A4R123
30 Hz
R18
A4R116
10 Hz
W12
W2
A4R132
100 Hz
XA4
A4R129
300 Hz
W7
C1
C2
C3
A3A1J1
J6
XA2
W9
W8
J7
C4
W2
XA1
A13R5
VTO LEVEL ADJ
A13
-2 MHz VTO
J3
RED WIRE
VIOLET WIRE
AMP ADJ

WARNING

"Some of the maintenance and servicing operations described herein are performed with power supplied to the instrument while protective covers are removed. Be careful when performing these operations. Line voltage is always present on terminals including the power input connector, fuse holder, power switch, etc. In addition, when the instrument is on, energy available at many points may result in personal injury or death when contacted."

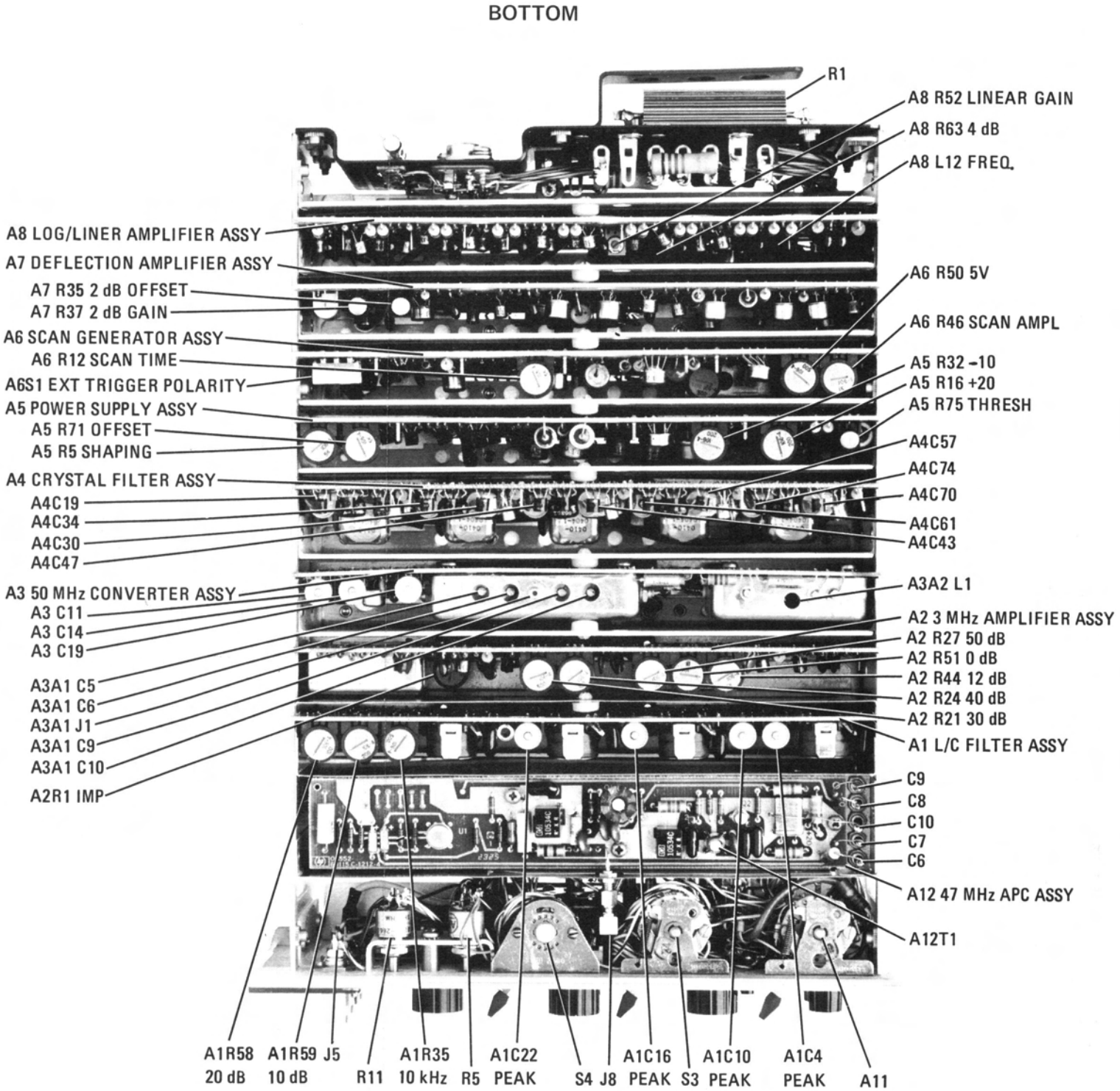


Figure 8-8. 8552B Component, Assembly, and Adjustment Locations

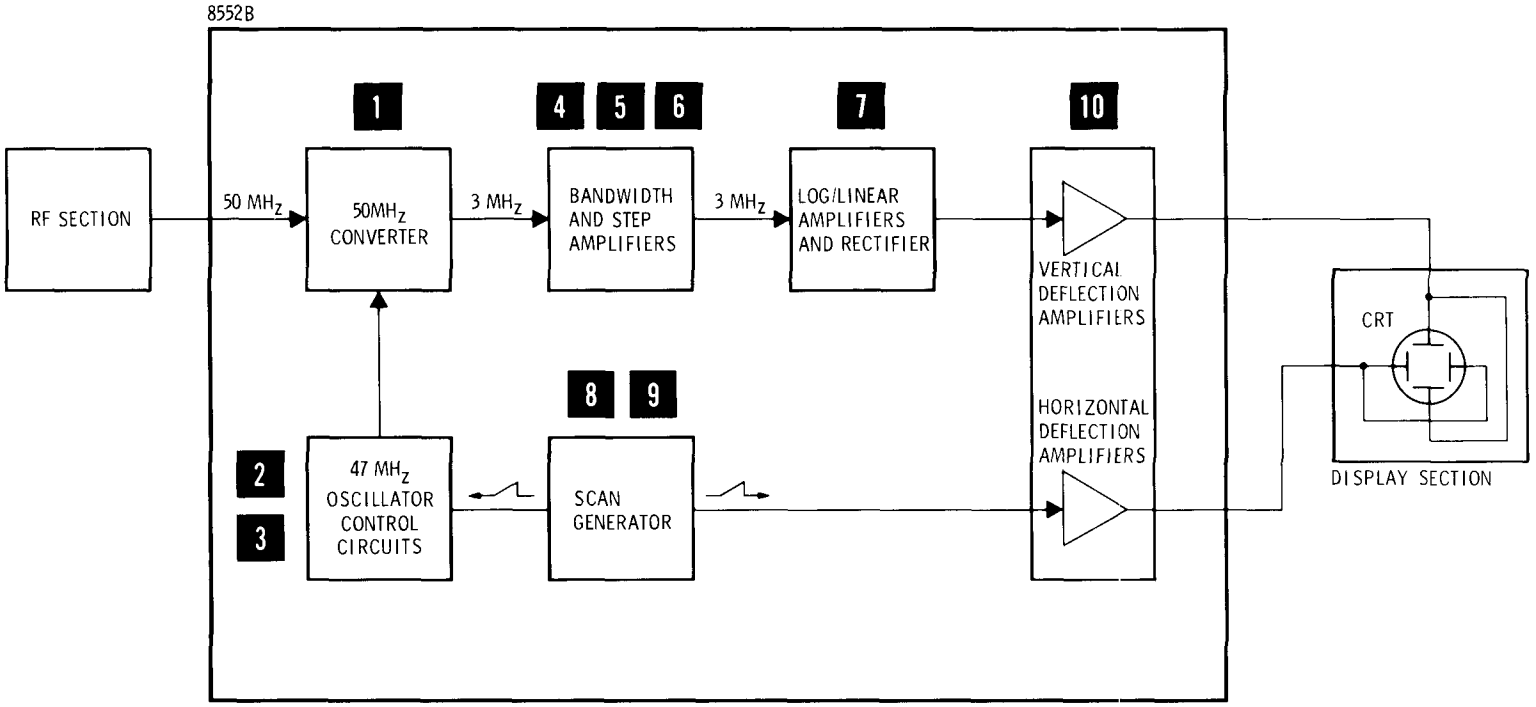


Figure 8-9. Simplified Block Diagram

SERVICE SHEET 1

1 50 MHz CONVERTER ASSEMBLY

The 50 MHz Converter assembly consists of an IF amplifier, a bandpass filter, a 47 MHz oscillator, and a double balanced mixer. The broadband IF amplifier provides 10 dB of gain. The 47 MHz oscillator is varactor controlled; the frequency is fixed or swept depending on the control voltage received from the APC Assembly.

2 POWER SUPPLY ASSEMBLY

The summing and offset amplifiers combine dc levels and a ramp received from the RF Section. (The dc levels eventually set the center frequency of the 47 MHz VTO — the ramp will sweep it symmetrically about that frequency). The RF Section inputs may or may not be present, depending upon the RF Section used and its switch positions. The shaping network converts the linear input into an exponential ramp which controls the 2 MHz VTO. This will cause the 2 MHz VTO output frequency to sweep linearly.

The light driver is controlled by the IF Section VIDEO FILTER and SCAN TIME PER DIVISION switches, and the RF Section SCAN WIDTH PER DIVISION and BANDWIDTH switches. When the switch settings prevent accurate amplitude calibration of the analyzer the light driver turns on and lights the DISPLAY UNCAL lamp in the RF Section.

3 47 MHz APC

The automatic phase control circuits lock the 47 MHz VTO to a stable reference: the 45 MHz crystal oscillator plus the 2 MHz VTO. The 47 MHz VTO frequency is mixed with the 45 MHz reference, filtered and the nominal 2 MHz result is compared to the 2 MHz VTO frequency (which may or may not be sweeping). Any phase difference is detected and used to correct the 47 MHz VTO.

4 3 MHz IF AMPLIFIER

The 3 MHz IF Amplifier consists of a bandpass filter, the calibrate amplifier, the 30/40/50 dB step amplifier, a 0 to 12 dB variable amplifier and an emitter follower output stage. The input bandpass filter is tuneable and is adjusted to provide a 300 kHz bandpass centered at 3 MHz.

5 LC BANDWIDTH FILTER ASSEMBLY

The LC Bandwidth Filter Assembly contains four tuned filter circuits, the 10/20 dB step amplifier and an output circuit to provide a low impedance source to the crystal filter input circuit. The bandwidth of individual filter stages is controlled by the RF Section BANDWIDTH switch which forward biases diodes to place resistors in parallel in the signal path. When the analyzer is operated in the 300 kHz bandwidth mode the four tuned stages are bypassed and only the output stage and the step amplifier process the signal. The four tuned stages provide selectable bandwidths of 100 kHz, 30 kHz, and 10 kHz.

SERVICE SHEET 1 (cont'd)

6 CRYSTAL FILTER ASSEMBLY

The Crystal Filter Assembly consists of five filter stages and an output amplifier. When the analyzer is operated at bandwidths of 10 kHz or greater, the five filter stages are bypassed and only the output amplifier processes the signal. The crystal filter stages provide selectable bandwidths of 3 kHz, 1 kHz, 300 Hz, 100 Hz, 30 Hz and 10 Hz.

7 LOG/LIN AMPLIFIER ASSEMBLY

The Log/Lin Amplifier Assembly consists of an input emitter follower, eight log amplifiers (six of these amplifiers are used in the LINEAR mode), a linear scale factor amplifier, two summing and isolation amplifiers, and a linear detector. When the analyzer is operated in the LOG mode, the amplifier output is logarithmically proportional to the input signal. When the analyzer is operated in the LINEAR mode, the amplifier output is directly proportional to the input signal.

8 SCAN CONTROL AND TRIGGER CIRCUITS

These circuits control the operation of the analyzer's scan.

A. SCAN TIME PER DIVISION selects internal scan time.
B. SCAN MODE selects scan source: internal, external, manual or single.
C. SCAN TRIGGER selects internal-scan trigger source: automatic, external, line, or video.

9 SCAN GENERATOR ASSEMBLY

The trigger circuit is enabled by -12.6 volts from the control circuits. The trigger circuits drive the flip-flop. The scan time switch is used to select RC components to control the scan time of the scan generator circuits. A constant current source provides the current to charge the selected ramp capacitor to ensure that scan ramps are linear for all selected scan times. The scan ramp amplifier amplifies the input scan signal and applies it to the horizontal deflection amplifier and the RF Section scan width attenuator assembly. An output is also provided at the SCAN IN/OUT connector, on the front panel, in the INT and SINGLE modes of operation. The connector may also be used in the EXT mode of operation to apply a signal from an external scan generator.

The calibration oscillator is crystal controlled and provides a 30 MHz, -30 dBm signal for use in calibrating the analyzer. The harmonics of the fundamental frequency are also useful in evaluating analyzer performance.

The penlift circuit provides penlift operation to recording devices in all positions of the SCAN TRIGGER switch except EXT and in the INT and SINGLE position of the SCAN MODE switch. In the EXT position of the SCAN MODE switch an external blanking input of -1.5 volts is required to blank the CRT.

10 DEFLECTION AMPLIFIER ASSEMBLY

The vertical preamplifier and amplifier provide push-pull drive to the vertical deflection plates of the CRT. Vertical gain and position are also controlled by these circuits. The blanking circuits provide blanking during the retrace cycle.

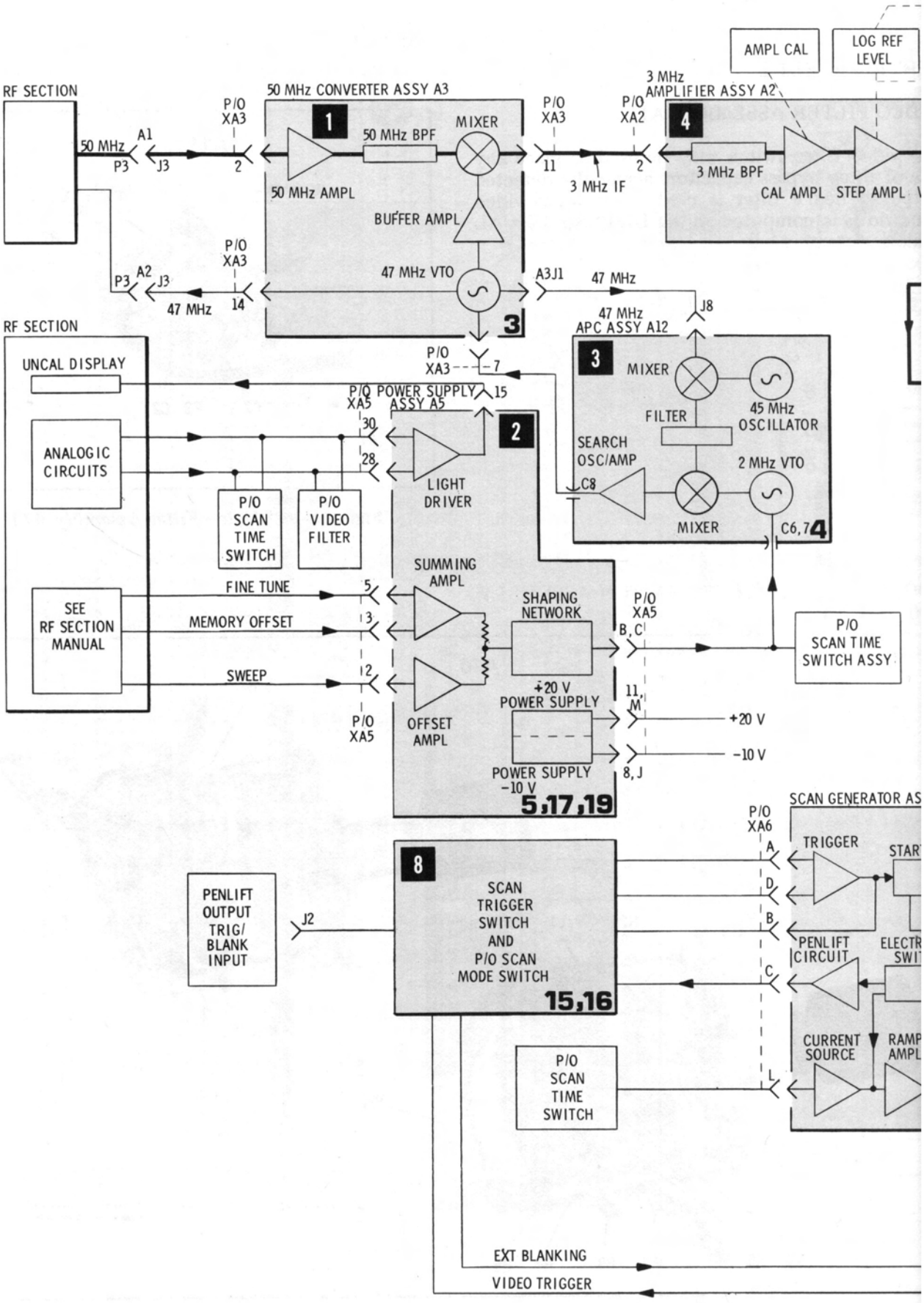
The base line clipper and clipper override circuits blank the CRT when the BASE LINE CLIPPER control is adjusted to activate the circuit. When a marker from the RF Section is present, the clipper override circuit is activated and the CRT is not blanked.

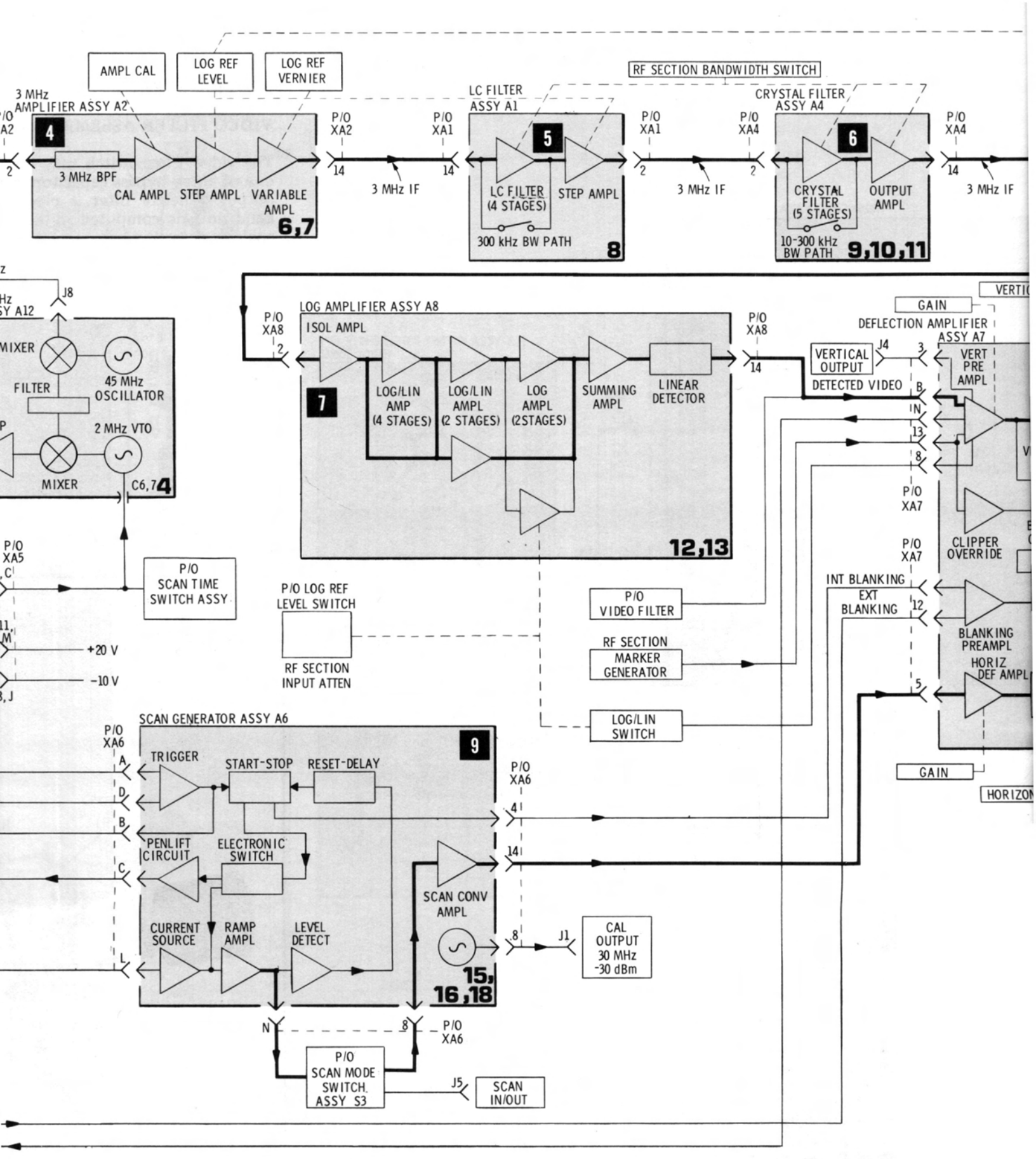
The horizontal amplifiers provide push-pull drive to the CRT horizontal circuits. Horizontal gain and position are also controlled by these circuits.

Table 8-5. Gain Changes When LOG REF LEVEL Switch is Adjusted

LOG REF LEVEL Switch Positions	3 MHz Amp Assy Gain * (dB)	LC Filter Assy Gain (dB)	Crystal Filter Assy Gain	LOG REF LEVEL Assy Atten (dB)
−60 (Log Positions)	30	20	0	0 (Total IF system gain (−10 dB) into LOG AMPLIFIER)
−50	20	20	0	0
−40	10	20	0	0
−30	0	20	0	0
−20	0	10	0	0
−10	0	0	0	0
0	0	0	0	−10
10	0	0	0	−20
(Linear Positions)	0	0	0	−30
	0	0	0	−40

*Individual 3 MHz IF assembly gains resulting in a constant IF system gain (−10 dB) into LOG AMPLIFIER when LOG REF LEVEL switch is in logarithmic display positions.


AMPL CAL
LOG REF LEVEL
RF SECTION
50 MHz CONVERTER ASSY A3
3 MHz AMPLIFIER ASSY A2
P/O XA3
P/O XA2
50 MHz
A1
P3
J3
2
1
50 MHz BPF
MIXER
50 MHz AMPL
BUFFER AMPL
11
3 MHz IF
4
3 MHz BPF
CAL AMPL
STEP AMPL
A2
47 MHz
14
47 MHz VTO
A3J1
47 MHz
3
J8
47 MHz APC ASSY A12
UNCAL DISPLAY
P/O POWER SUPPLY ASSY A5
XA5
15
7
30
28
2
ANALOGIC CIRCUITS
LIGHT DRIVER
P/O SCAN TIME SWITCH
P/O VIDEO FILTER
FILTER
45 MHz OSCILLATOR
SEARCH OSC/AMP
C8
2 MHz VTO
C6,7
SUMMING AMPL
FINE TUNE
MEMORY OFFSET
SWEEP
5
3
2
SEE RF SECTION MANUAL
SHAPING NETWORK
B, C
P/O SCAN TIME SWITCH ASSY
+20 V POWER SUPPLY
11, M
+20 V
OFFSET AMPL
-10 V
POWER SUPPLY -10 V
8, J
5,17,19
SCAN GENERATOR AS
P/O XA6
A
D
B
C
L
TRIGGER
PENLIFT CIRCUIT
CURRENT SOURCE
PENLIFT OUTPUT TRIG/ BLANK INPUT
J2
8
SCAN TRIGGER SWITCH AND P/O SCAN MODE SWITCH
15,16
P/O SCAN TIME SWITCH
EXT BLANKING
VIDEO TRIGGER


AMPL CAL
LOG REF LEVEL
LOG REF VERNIER
RF SECTION BANDWIDTH SWITCH
3 MHz AMPLIFIER ASSY A2
4
3 MHz BPF
CAL AMPL
STEP AMPL
VARIABLE AMPL
6,7
P/O XA2
P/O XA1
LC FILTER ASSY A1
5
LC FILTER (4 STAGES)
STEP AMPL
300 kHz BW PATH
8
P/O XA1
P/O XA4
CRYSTAL FILTER ASSY A4
6
CRYSTAL FILTER (5 STAGES)
OUTPUT AMPL
10-300 kHz BW PATH
9,10,11
P/O XA4
3 MHz IF
J8
MIXER
45 MHz OSCILLATOR
FILTER
2 MHz VTO
MIXER
C6,7
4
LOG AMPLIFIER ASSY A8
P/O XA8
ISOL AMPL
7
LOG/LIN AMP (4 STAGES)
LOG/LIN AMPL (2 STAGES)
LOG AMPL (2STAGES)
SUMMING AMPL
LINEAR DETECTOR
12,13
VERTICAL OUTPUT
J4
DETECTED VIDEO
GAIN
DEFLECTION AMPLIFIER ASSY A7
VERT PRE AMPL
P/O XA7
CLIPPER OVERRIDE
INT BLANKING
EXT BLANKING
BLANKING PREAMPL
HORIZ DEF AMPL
GAIN
HORIZON
P/O XA5
P/O SCAN TIME SWITCH ASSY
+20 V
-10 V
P/O LOG REF LEVEL SWITCH
RF SECTION INPUT ATTEN
P/O VIDEO FILTER
RF SECTION MARKER GENERATOR
LOG/LIN SWITCH
SCAN GENERATOR ASSY A6
P/O XA6
TRIGGER
START-STOP
RESET-DELAY
9
PENLIFT CIRCUIT
ELECTRONIC SWITCH
SCAN CONV AMPL
CURRENT SOURCE
RAMP AMPL
LEVEL DETECT
15, 16,18
CAL OUTPUT 30 MHz -30 dBm
J1
P/O SCAN MODE SWITCH ASSY S3
J5
SCAN IN/OUT

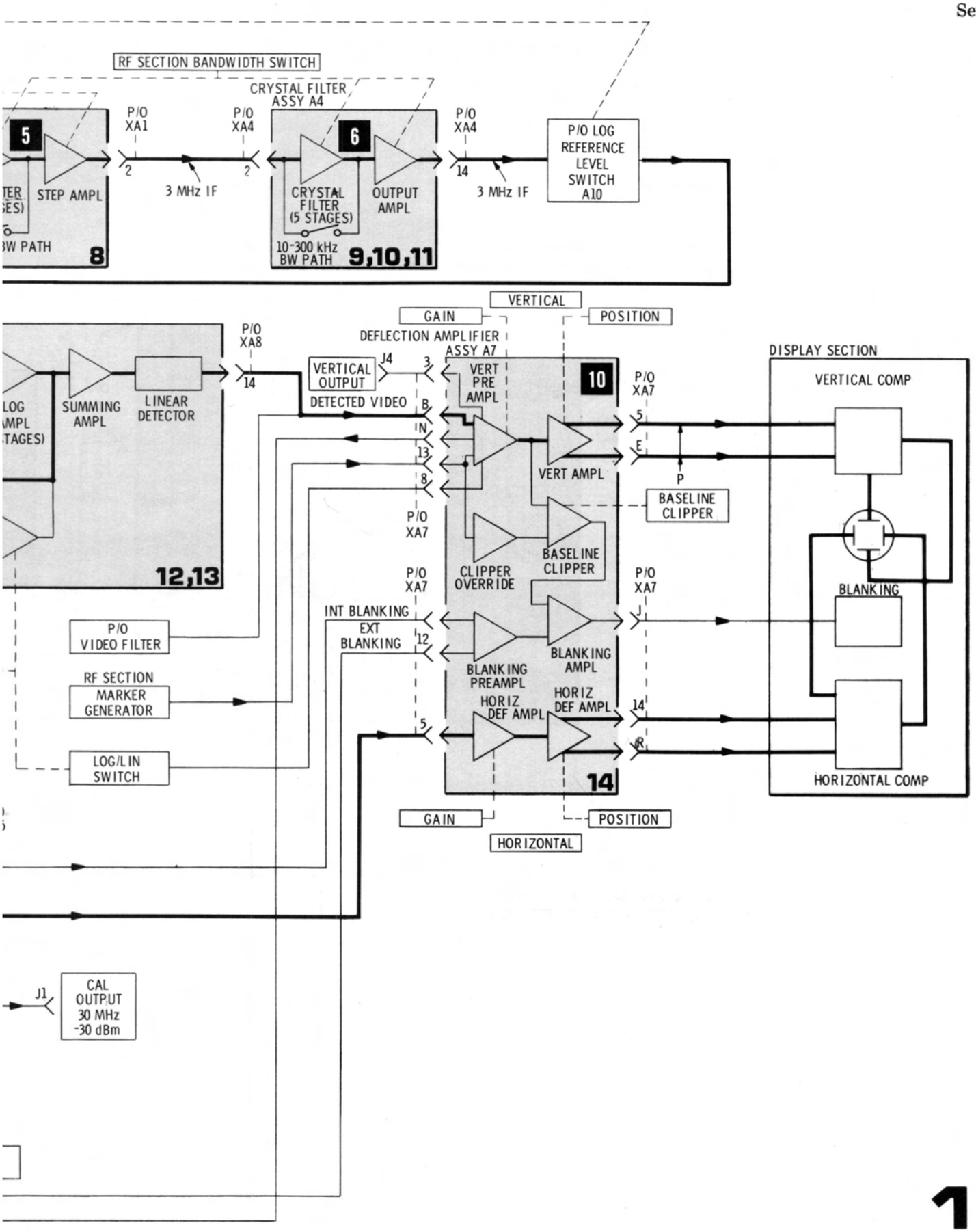


Figure 8-10. 8552B Block Diagram

SERVICE SHEET 2

VIDEO FILTER ASSEMBLY A11

The video filter switch may be used to place any one of three bypass capacitors across the detected output. When a filter is used the reduced video bandwidth is computed in the DISPLAY UNCAL analogic summing buss.

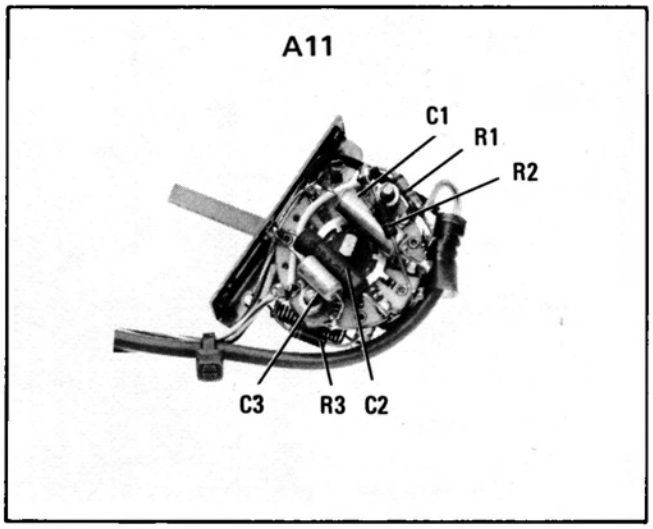


Figure 8-11. Video Filter Assembly A11

LOG REFERENCE LEVEL SWITCH ASSEMBLY A10

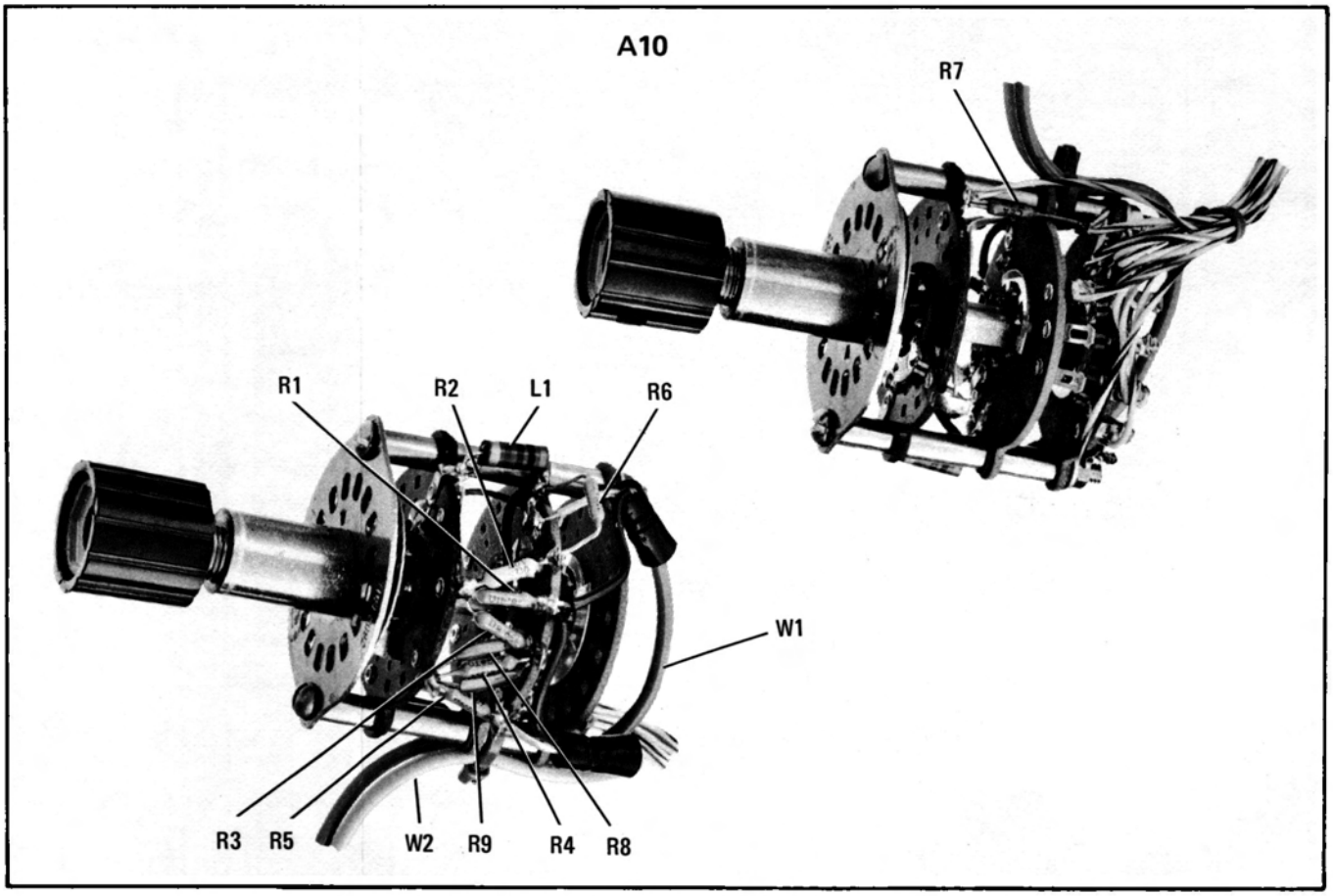


Figure 8-12. Log Reference Level Switch Assembly A10

A1,A2, A3, A4, A5, A6, A7, A8, A12
Block Diagram
SERVICE SHEET 1

SERVICE SHEET 2 (cont'd)

Switch wafers S1-1F, S1-2F, and S1-1R connect the 3 MHz IF Signal from the crystal filter circuit to the Log/Lin amplifier and provide attenuation to this signal when required.

Switch wafer S1-2R, in conjunction with the RF Section INPUT ATTENUATION control, programs the gain compensation function of the linear scale factor amplifier in the Log/Lin amplifier when the analyzer is operating in the LINEAR mode.

Switch wafers S1-3F and S1-3R provide dc levels to enable or disable diode switches which, in turn, enable or disable step gain amplifiers in the 3 MHz IF and LC Filter Assemblies.

SCAN TIME SWITCH ASSEMBLY A9

The various functions of the scan time switch assembly are as follows:

S1-1F selects the capacitor to be charged to generate the scan ramp.

S1-2R connects (or removes) a ground to R10 to partially control the operational parameters of constant current source Q6.

S1-2F selects the resistor to be used in the emitter circuit of constant current source Q6.

S1-1R selects the resistor (or resistors) to control the sweep reset (dead time) of the scan generator and switches a filter into the shaping circuit output on slow scan times.

S1-3F and S1-3R provide current to the analogic scanning buss to aid in illuminating the DISPLAY UNCAL lamp when switch settings are not compatible with analyzer calibration requirements.

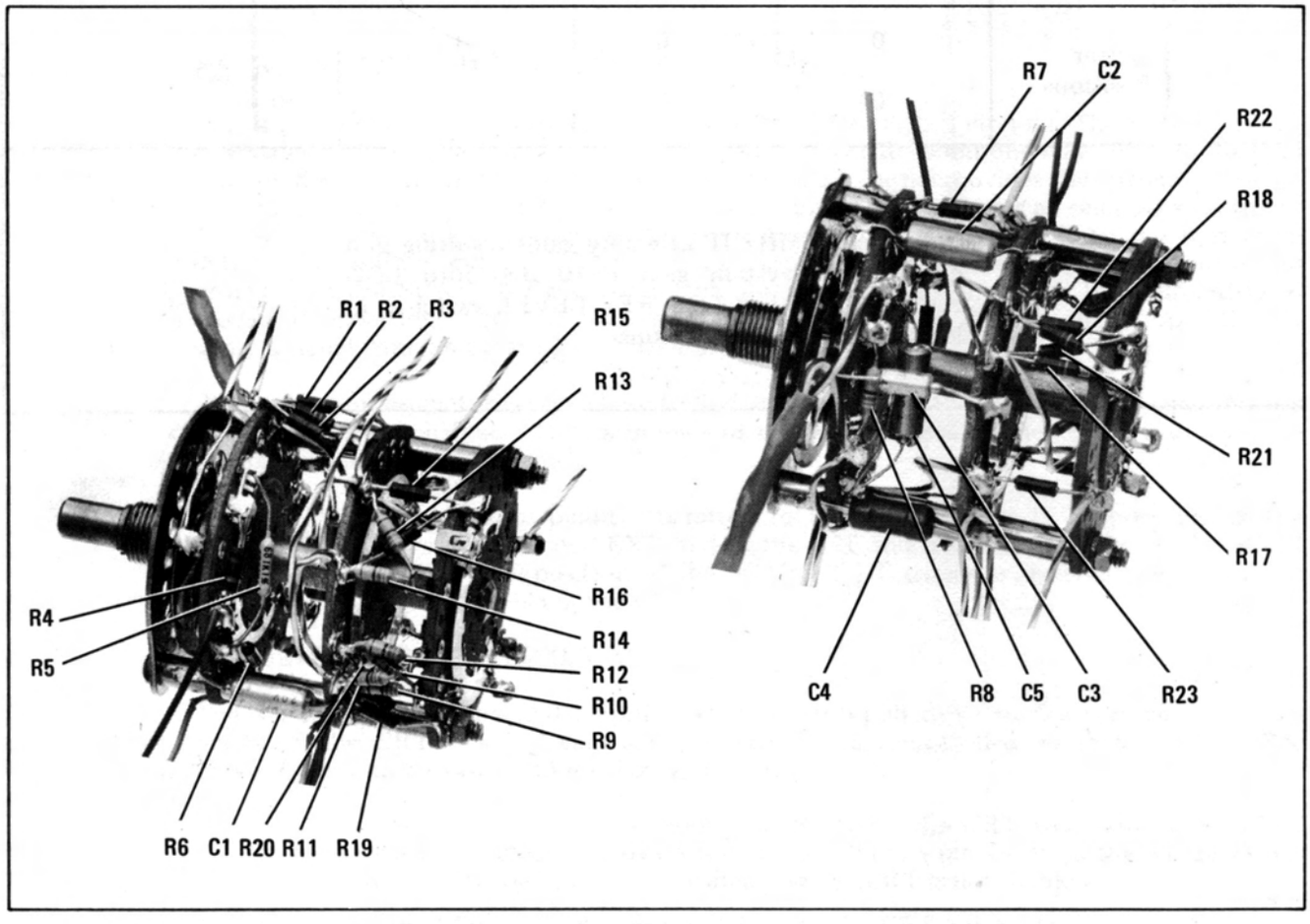


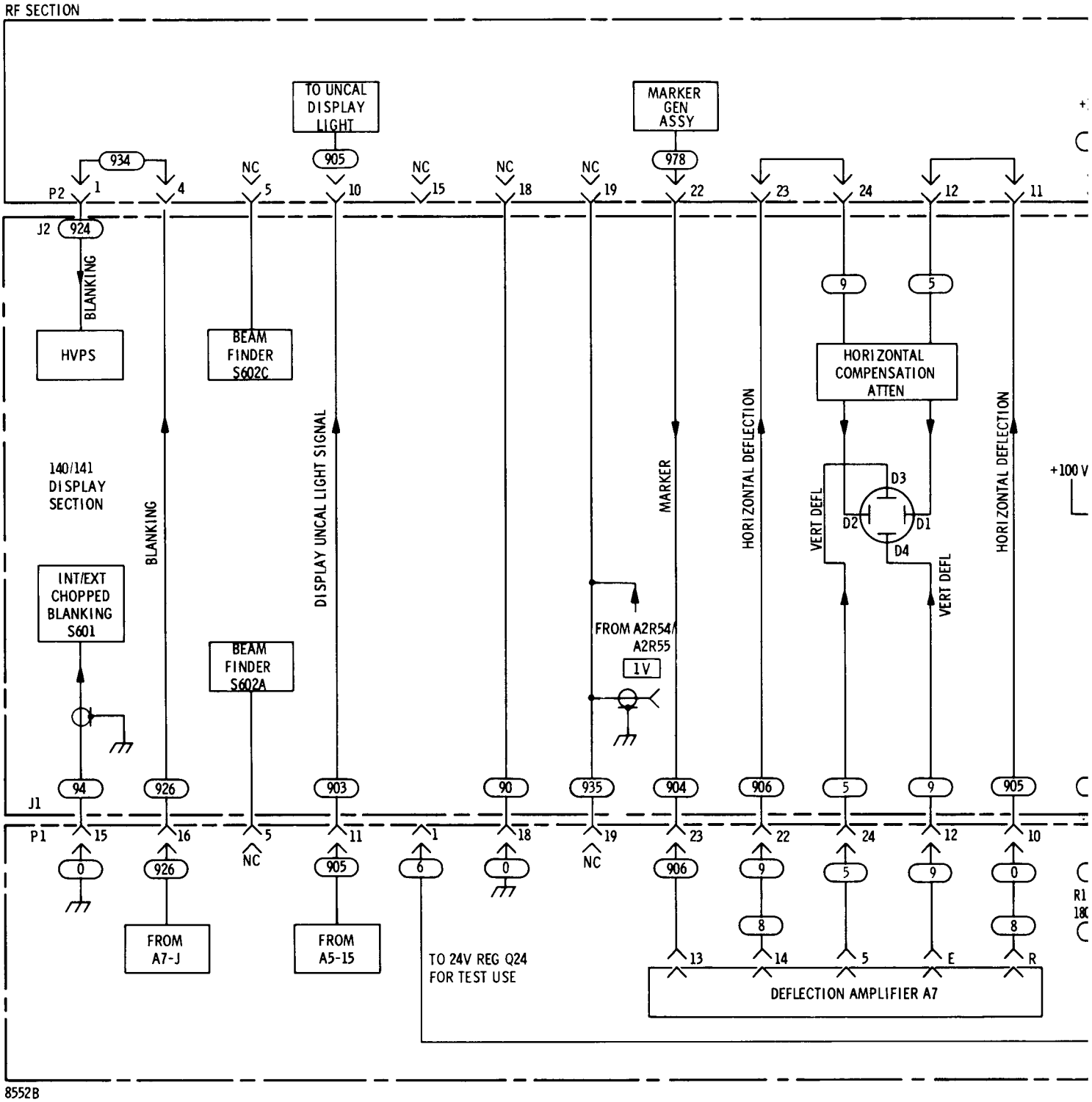
Figure 8-13. Scan Time Switch Assembly A9

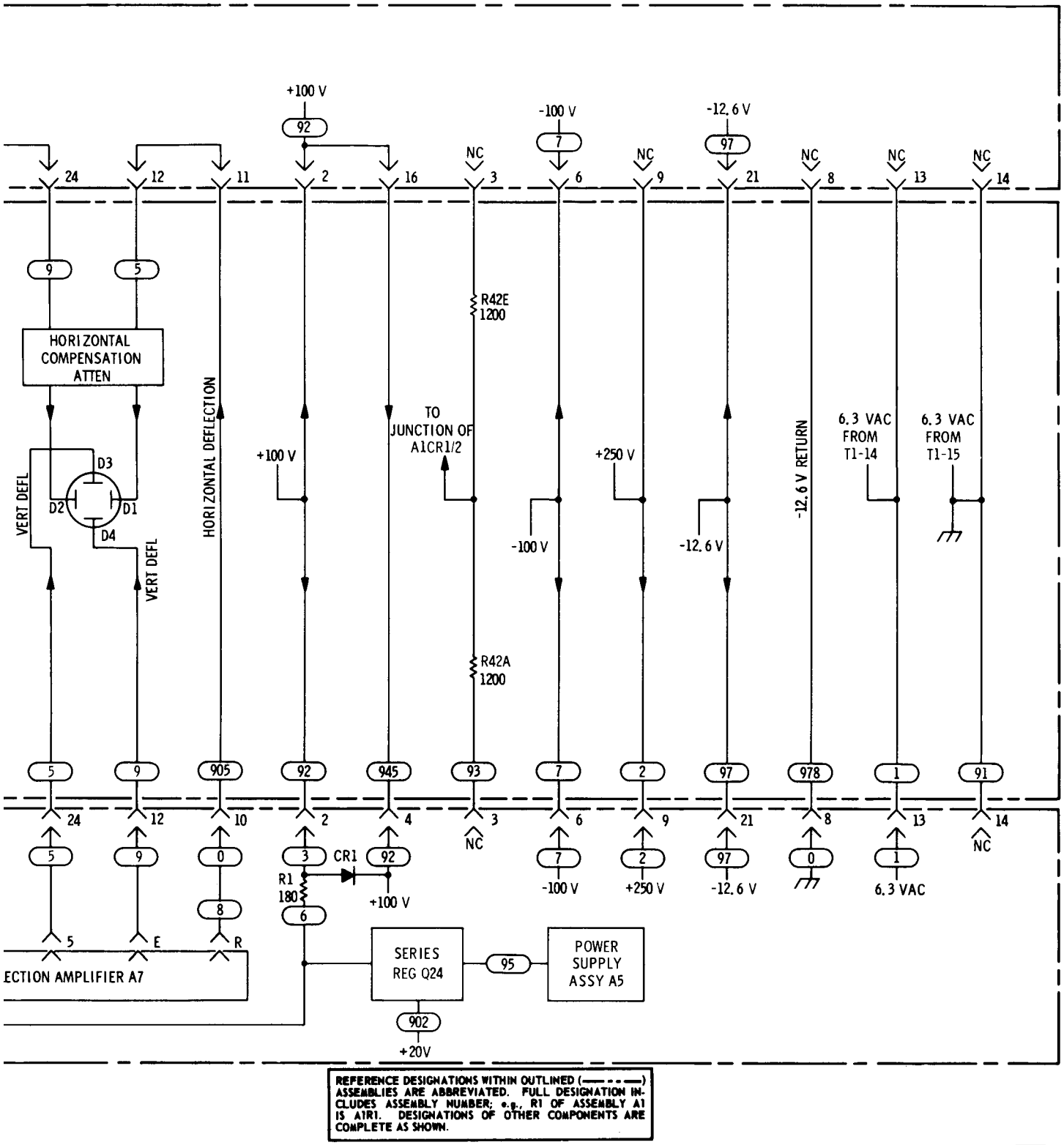
Table 8-6. IF-to-RF Sections Interconnecting Jack Identification

J3 Pin No.	Wire Color Code	Circuit Function
Pin 1	912	.03 kHz Bandwidth
2	913	0.1 kHz Bandwidth
3	914	0.3 kHz Bandwidth
4	915	1 kHz Bandwidth
5	4	Phase Lock Compensation
6	3	Preset Scan Voltage
7	5	Linear Compensation Control Voltage
8	6	Linear Compensation Control Voltage
9	938	Log Ref Level Lamp No. 4
10	945	Log Ref Level Lamp No. 5
11	946	Log Ref Level Lamp No. 6
12	90	Sensing Ground
13	8	Blanking for Tracking Generator
14	925	.01 kHz Bandwidth
15	902	+20 Volts for connector J3
22	90	Scanwidth Ground
23	8 (cable)	3 MHz IF
24	8 (cable)	Ground
25	916	10 kHz Bandwidth
26	927	30 kHz Bandwidth
27	918	100 kHz Bandwidth
28	923	300 kHz Bandwidth
29	96	Ampl Cal Adjustment
30	957	Normal Analogic Line
31	934	Scan Voltage to Shaping Ckt.
32	9	Fine Tune Voltage to Shaping Ckt.
33	935	Log Ref Level Lamp No. 1
34	936	Log Ref Level Lamp No. 2
35	937	Log Ref Level Lamp No. 3
36	907	−10 Volts
37	902	+20 Volts
38	956	Video Filter Analogic Line
39	958	Zero Scan Analogic Disable Line
40	968	Log/Linear Sense
41	928	0 to 8V ramp-scan control to tracking generator
A1	9	W7 50 MHz IF
A2	6	47 MHz Auxiliary Line

Table 8-7. IF-to-Display Sections Interconnecting Plug Identification

P1 Pin No.	Wire Color Code	Circuit Function
Pin 1	6	+20V
2	3	+100V
3		Open
4	92	+100V
5		Open
6	7	−100V
7		Open
8	0	Ground
9	2	+250V
10	0	Horizontal Deflection
11	905	Display Uncal Light
12	5	Vertical Deflection
13	1	6.3 Vac
14		Open
15	0	Ground
16	926	Blanking
17		Open
18	0	Ground
19		Open
20		Open
21	97	−12.6V
22	9	Horizontal Deflection
23	906	Marker
24	9	Vertical Deflection


RF SECTION
TO UNCAL DISPLAY LIGHT
MARKER GEN ASSY
934
905
978
NC
P2
1
4
5
10
15
18
19
22
23
24
12
11
J2
924
BLANKING
HVPS
BEAM FINDER S602C
HORIZONTAL COMPENSATION ATTEN
9
5
140/141 DISPLAY SECTION
BLANKING
DISPLAY UNCAL LIGHT SIGNAL
MARKER
HORIZONTAL DEFLECTION
VERT DEFL
D3
D2
D1
D4
+100 V
INT/EXT CHOPPED BLANKING S601
BEAM FINDER S602A
FROM A2R54/A2R55
1V
94
926
903
90
935
904
906
J1
P1
15
16
11
1
18
19
23
22
0
6
NC
FROM A7-J
FROM A5-15
TO 24V REG Q24 FOR TEST USE
8
13
14
E
R
DEFLECTION AMPLIFIER A7
8552B
SERIAL PREFIX: 971-, 974-, 977-



2

Figure 8-14. RF Section/IF Section/Display Section Interconnections

SERVICE SHEET 3

It is assumed that the procedures in Paragraphs 5-37, 5-38, and 5-39 of Section V could not be satisfactorily conducted. It is further assumed that the tuning input from A12, the 50 MHz input, and the correct operating voltages are present.

TROUBLESHOOTING PROCEDURE

When a malfunction has been isolated to the 50 MHz converter assembly, it should be removed from the mainframe and reinstalled using the extender board to provide easy access to all components. Both ground flanges will have to be connected to chassis ground. Connect CAL OUTPUT to 8447A INPUT and 8447A OUTPUT to RF INPUT. Test procedures follow the circuit description in each of the steps below.

EQUIPMENT REQUIRED

AMPLIFIER	HP 8447A
SERVICE KIT	HP 11592A
VECTOR VOLTMETER	HP 8405A
FREQUENCY COUNTER	HP 5245L/5251A

CONTROL SETTINGS
Unless otherwise specified in individual tests.

SCAN WIDTH	ZERO
BANDWIDTH	300 kHz
FREQUENCY	30 MHz
INPUT ATTENUATION	0 dB
TUNING STABILIZER	*OFF*

1 50 MHz AMPLIFIER

Broadband amplifier Q1/Q2 has built in 44 MHz traps to suppress image responses. (44 MHz mixed with the 47 MHz oscillator signal would produce a false 3 MHz IF signal). Input and output signals are applied through isolation transformers. Gain of the two-stage amplifier is typically 10 dB.

TEST PROCEDURE **1**

With a 30 MHz, -10 dBm signal applied to the analyzer RF INPUT, and the HP 8405A connected to XA3-2, tune the analyzer FREQUENCY control for maximum signal. Nominal reading is 44 mV rms. Next, connect the HP 8405A to the 50 MHz amplifier output (input feedthru capacitor C1 to the 50 MHz bandpass filter, adjacent to T1). Meter should indicate a typical value of approximately 150 mV rms.

If the 50 MHz amplifier output is correct, proceed to step **2**

If the 50 MHz amplifier is not providing the correct output, check Q1/Q2 and associated components.

NOTE

After making repairs to the 50 MHz amplifier circuit proceed to step **4**. If the test procedure in step **4** is satisfactorily concluded, steps **2** and **3** may be omitted. If repair to the 50 MHz amplifier is required the 44 MHz Rejection Adjustments defined in paragraph 5-39 of Section V should be made.

2 50 MHz BANDPASS FILTER

The 50 MHz Bandpass Filter consists of four tuned circuits wound on a common coil form. C5, C6, C9 and C10 are adjusted for maximum amplitude and flatness (±2 mV) at least 0.3 MHz on either side of 50 MHz.

TEST PROCEDURE 2

With a 30 MHz, -10 dBm signal applied to the analyzer RF INPUT, and the HP 8405A connected to the bandpass filter output (feedthru capacitor C13 at the output of bandpass filter)tune the analyzer FREQUENCY control for maximum signal. Nominal voltage is 90 mV rms.

If bandpass filter output signal voltage is correct, proceed to step 3

If bandpass filter output signal is low or missing, first try realignment in accordance with Paragraph 5-38 of Section V. If this does not correct the malfunction, replace the Bandpass Filter.

After bandpass filter replacement and adjustment is completed, proceed to step 4 . If the test results in step 4 are satisfactory, step 3 may be omitted.

NOTE

If bandpass filter replacement is necessary, the new filter should be adjusted in accordance with paragraph 5-38 of Section V.

3 47 MHz LOCAL OSCILLATOR

Depending on the RF Section used, the 47 MHz oscillator is operated at a fixed frequency of 47 MHz or is swept. See the appropriate RF Section manual for information on the modes of operation for the oscillator.

TEST PROCEDURE 3

Connect the HP 8405A Channel A probe to the 47 MHz local oscillator output at XA3-14 (use 50 ohm load) and the Channel B probe to the input of T4 (second feedthru from bottom of board on the local oscillator cover). Channel A should read approximately -7 dBm (100 mV into 50 ohms) and Channel B should read approximately 670 mV rms (approximately +10 dBm). Connect the HP 8405A Channel A probe to J8 (47 MHz input to APC Assy A12). Voltmeter should read approximately +10 dBm.

If the meter readings are correct proceed to step 4

The 47 MHz local oscillator is a sealed unit and field repairs are not practical. If the above readings are not obtained, replace the 47 MHz Local Oscillator Assembly A3A2.

SERVICE SHEET 3 (cont'd)

Check the oscillator frequency by connecting the 5245L/5251A to XA3-14. Vary R42 on A5 to adjust the oscillator to 47 MHz.

NOTE

If it is necessary to replace the 47 MHz Oscillator Assembly, the checks and adjustments in Paragraph 5-37 of Section V should be performed.

4 MIXER

The 50 MHz IF signal mixes with the 47 MHz local oscillator output to produce a 3 MHz IF signal containing all of the modulation components of the 50 MHz signal. The 3 MHz IF is coupled out through T2 to the 3 MHz IF Amplifier Assembly. Conversion loss through the mixer is approximately 7 dB.

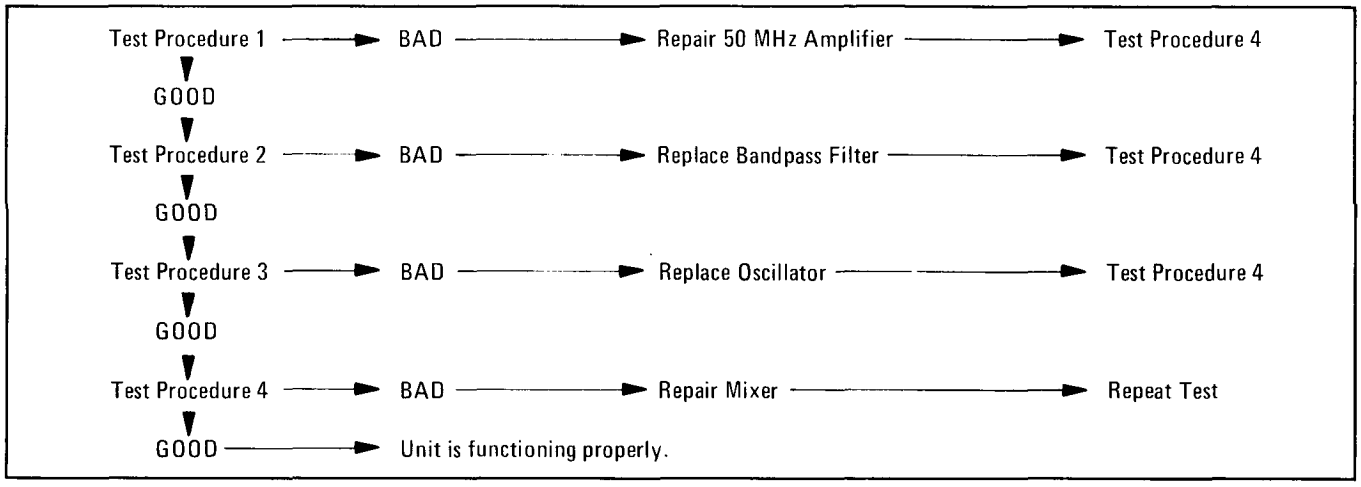
TEST PROCEDURE 4

With a 30 MHz, -10 dBm signal applied to the analyzer RF INPUT, and the HP 8405A connected to the mixer output at 3 MHz feedthru under chassis (C4), tune the analyzer FREQUENCY control for maximum. Typical signal level is 44 mV rms.

If the proper signal level is not present check the mixer circuit.

If the proper signal level is present, the unit is functioning properly.

Simplified Test Procedure Tree



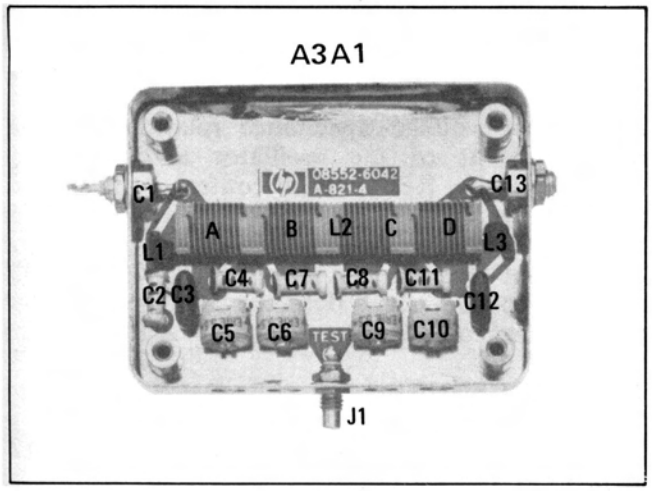


Figure 8-15. 50 MHz Bandpass Filter A3A1 Component Identification

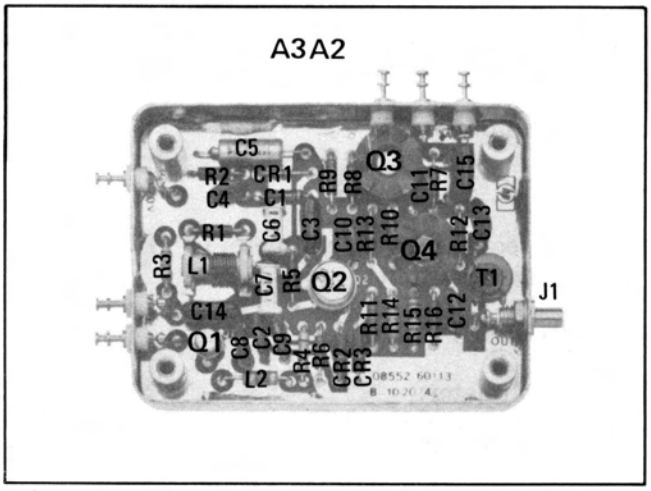


Figure 8-16. 47 MHz LO A3A2 Component Identification

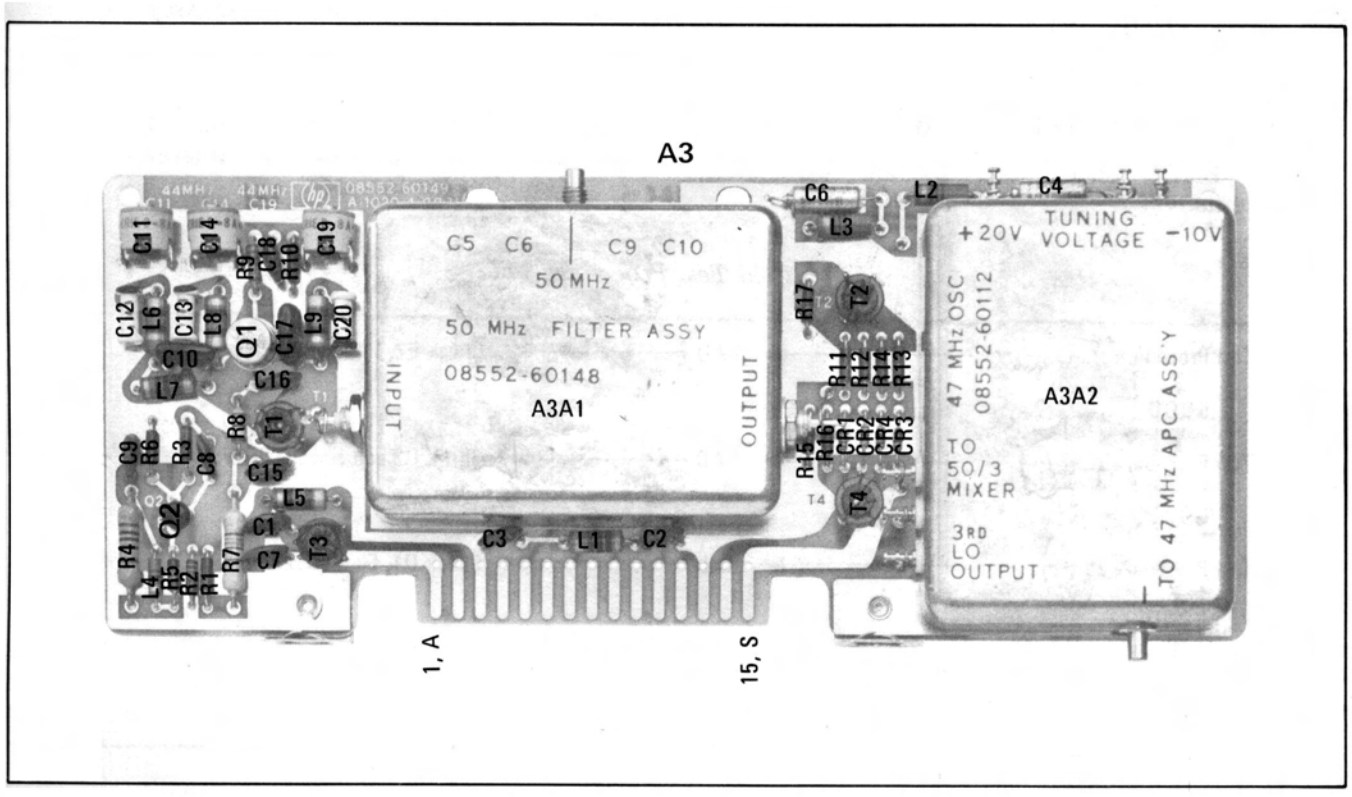
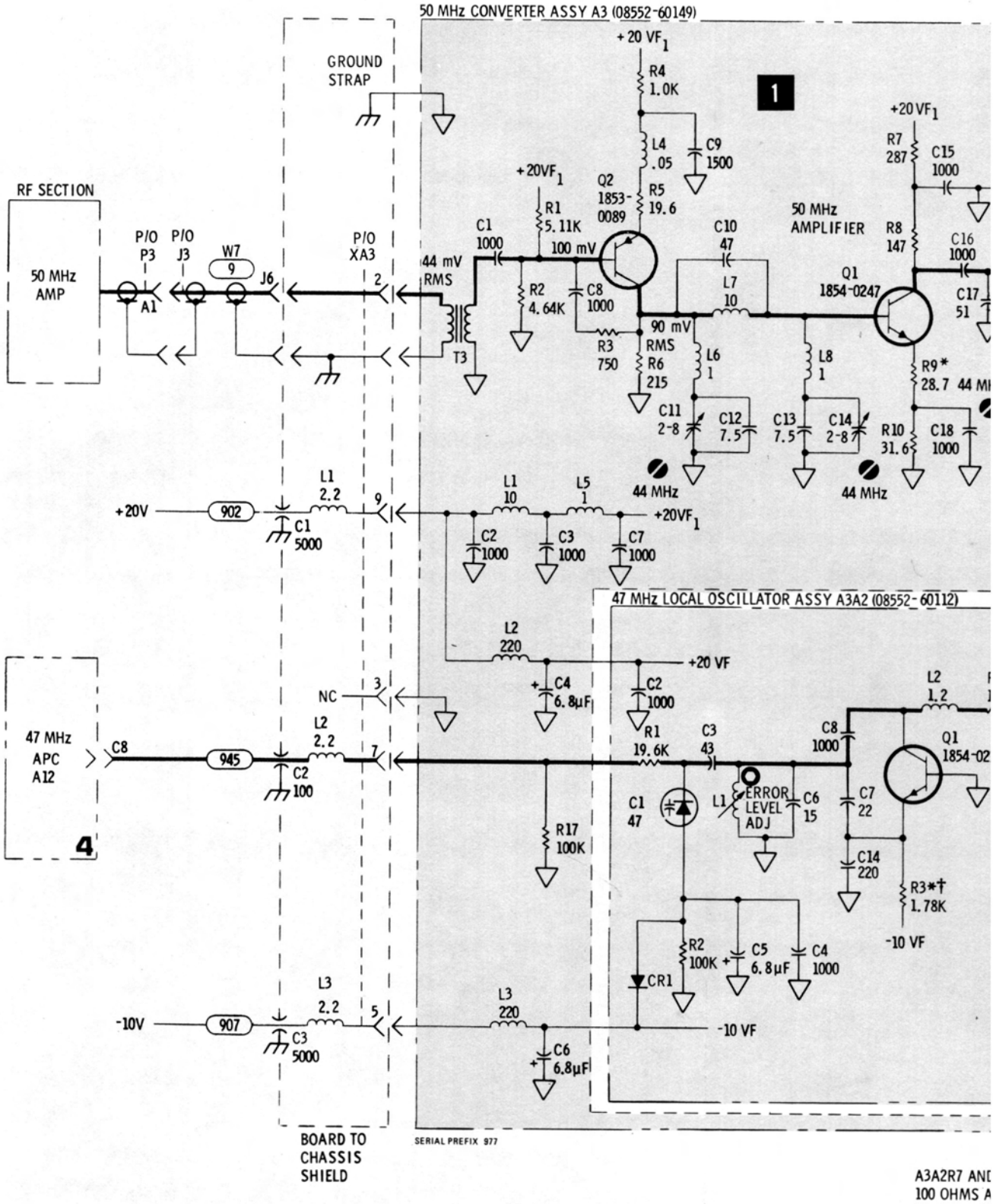
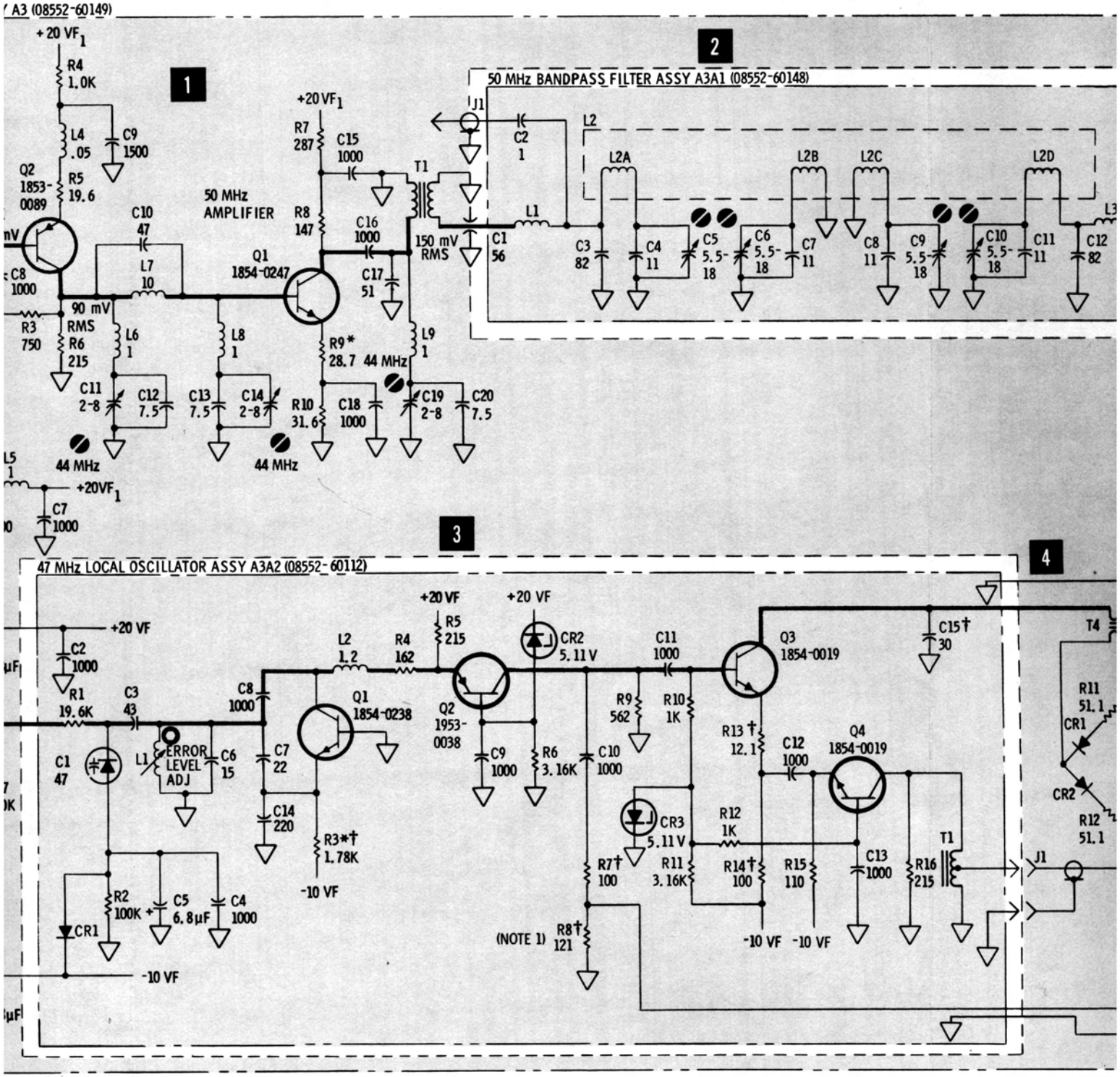


Figure 8-17. 50 MHz Converter A3 Component Identification



A3A2R7 AND
100 OHMS A
IF REPLACE
REPLACE BO



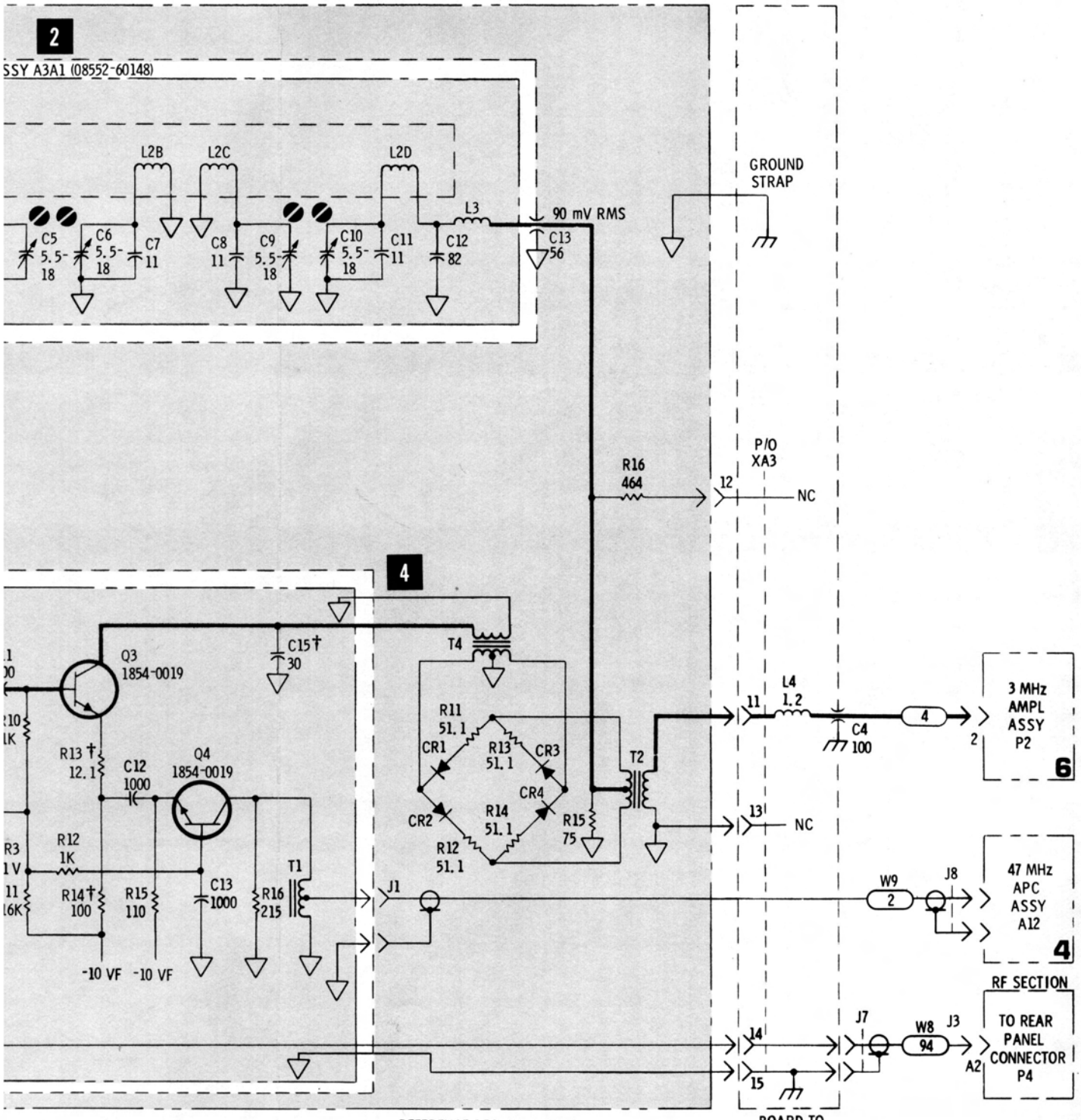
NOTE 1.

A3A2R7 AND A3A2R8 MAY BE 133 OHMS AND 90.9 OHMS RESPECTIVELY. 100 OHMS AND 121 OHMS, RESPECTIVELY, ARE PREFERRED VALUES. IF REPLACEMENT OF A3A2R7 OR A3A2R8 BECOMES NECESSARY, REPLACE BOTH COMPONENTS WITH PREFERRED VALUES.

REFERENCE

A3	A3A1
C1-4, 6-20	C1-13
CR1-5	C1-3
L1-9	J1
Q1-2	
R1-17	
T1-4	
J1	

†REFER TO TABLE 7-2



S RESPECTIVELY.
RED VALUES.
ESSARY.
S.

REFERENCE DESIGNATIONS

A3	A3A1	A3A2	CHASSIS
C1-4, 6-20	C1-13	C1-15	C1-4
CR1-5	C1-3	CR1-3	L1-4
L1-9	J1	L1-2	J3, 6-8
Q1-2		Q1-4	W7-9
R1-17		R1-16	XA3
T1-4		T1	
J1		J1	

†REFER TO TABLE 7-2

Figure 8-18. 50 MHz Converter

SERVICE SHEET 4

It is assumed that input DC voltages, the 47 MHz input and the 2 MHz VTO Shaping Circuit input are all correct and present.

TEST PROCEDURE

When trouble has been isolated to the 47 MHz Automatic Phase Lock Control circuits, remove the cover shield from the A13 and A1/A12 assemblies to provide access to components and test points.

EQUIPMENT REQUIRED

OSCILLOSCOPE ..... HP 180A/1801A/1821A
SERVICE KIT ..... HP 11592A
VECTOR VOLTMETER ..... HP 8405A

CONTROL SETTINGS

SPECTRUM ANALYZER ..... Any

1 SEARCH OSCILLATOR/AMPLIFIER AND PHASE DETECTOR

The Automatic Phase Control Circuits control the 47 MHz VTO in a phase lock loop. 45 MHz from a crystal oscillator is mixed with the nominal 47 MHz from the 47 MHz VTO to give a nominal 2 MHz difference frequency. This difference frequency is compared with the nominal 2 MHz VTO output in a phase detector. Any phase difference produces a dc error voltage that is amplified by the search oscillator/amplifier and fed back to correct the 47 MHz VTO. If the search oscillator/amplifier loses its lock, it will search at about a 50-Hz rate until it brings the 47 MHz VTO frequency into coincidence with the sum of the frequencies from the 45 MHz oscillator and the 2 MHz VTO.

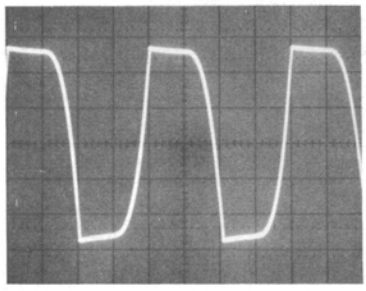
TEST PROCEDURE 1

When the Search Oscillator/Amplifier is locked on and controlling the 47 MHz VTO, its output is approximately steady dc. When the phase loop is broken the Search Oscillator/Amplifier output (≈50 Hz) is as shown in waveform. Connect the oscilloscope to TP B (feedthrough C8) and disconnect W9 (red coax) at A3J1.

CONTROL SETTINGS

Oscilloscope:

0.2 V/Div
5 msec/Div 10:1 probe



Waveform GOOD:
Reconnect W9 at A3J1 and proceed to step 2

Waveform BAD:
Check E2, U1 and associated components

SERVICE SHEET 4 (cont'd)

2 45 MHz CRYSTAL OSCILLATOR AND MIXER

Q2 and associated components form a crystal oscillator that feeds 45 MHz to mixer E1. Nominal 47 MHz from the 47 MHz VTO is fed to E1 by isolation amplifier Q1.

TEST PROCEDURE 2

2a. Connect the vector voltmeter to TP2 (45 MHz oscillator output).

CONTROL SETTINGS

Vector Voltmeter:
FREQ RANGE — MHz . . . . . 20—50
AMPLITUDE (dB) 0

Voltmeter should read about +1 dBm.

Reading GOOD: Proceed to 2b.

Reading BAD: Check Q2 and associated components.

2b. Connect the vector voltmeter to TP A (E1 output).

CONTROL SETTINGS

Vector Voltmeter:
FREQ RANGE — MHz . . . . . 1—5
AMPLITUDE (dB) 0

Voltmeter should read about -2 dBm.

Reading GOOD: proceed to step 3

Reading BAD: Check Q1, E1 and associated components.

3 2 MHz VTO ASSY A13

The exponential control voltage from the 2 MHz VTO Shaping Circuit is fed to varactors C1 and C2. C1, C2, and T1 form a tank circuit that controls the 2 MHz VTO, Q1. Because varactors have an exponential voltage-capacitance relationship, the frequency out of the oscillator is linear with respect to the RF Section control voltage (see Service Sheet 5).

The output frequency is amplified by Q2 and Q3 and fed to the phase detector E2. Q4 provides temperature compensation.

TEST PROCEDURE

Attach the vector voltmeter probe to A12 TP1 (2 MHz VTO Assy output).

CONTROL SETTINGS

Vector Voltmeter:
FREQ RANGE — MHz . . . . . 1—5
AMPLITUDE (dB) . . . . . +10

Voltmeter should read about +5 dBm.

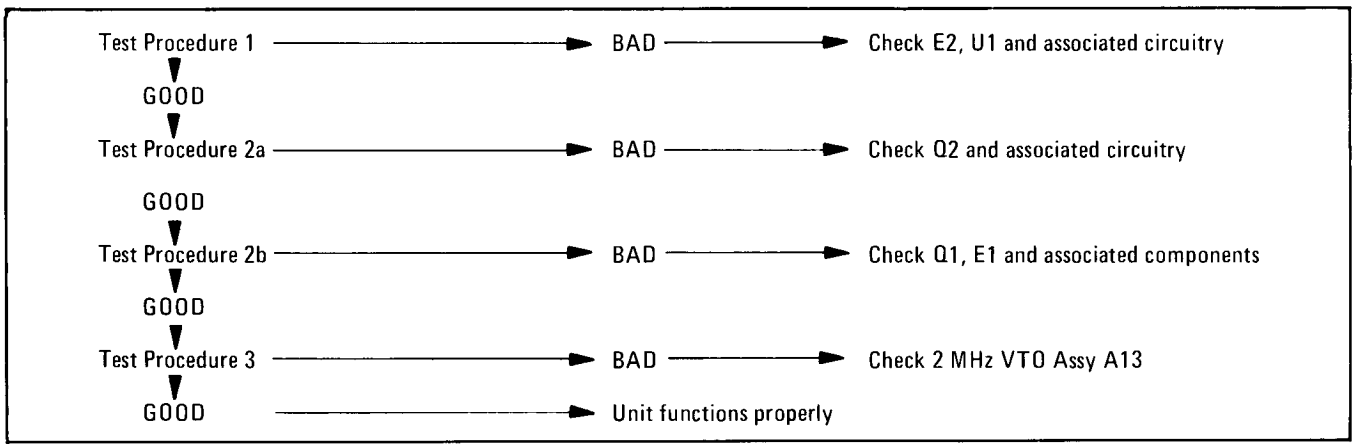
Reading GOOD: Assembly functions properly.

Reading BAD: Check 2 MHz VTO Assy A13.

NOTE

When repairs are required, the Adjustment specified in paragraph 5-37 should be performed.

Simplified Test Procedure Tree



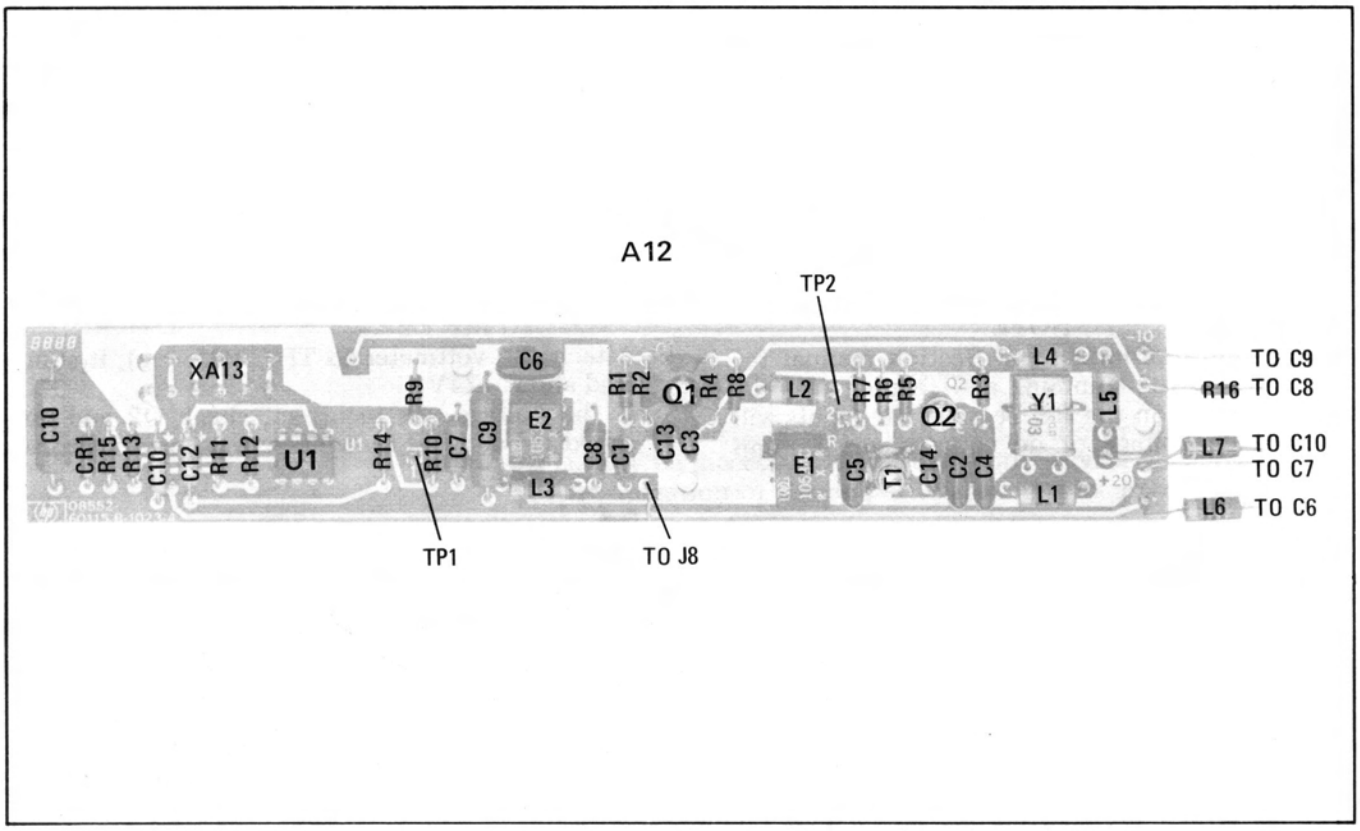


Figure 8-19. 47 MHz APC A12 Component Identification

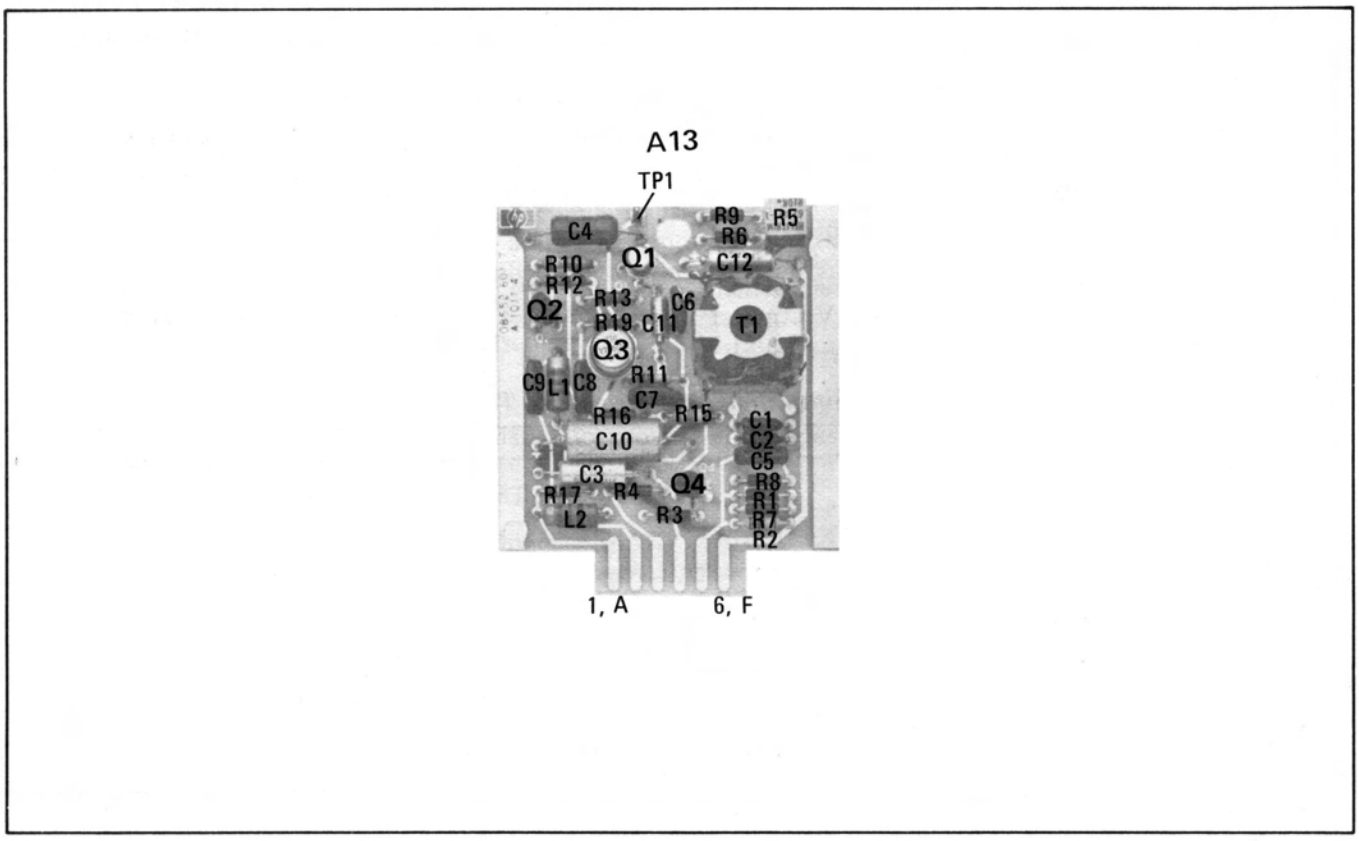
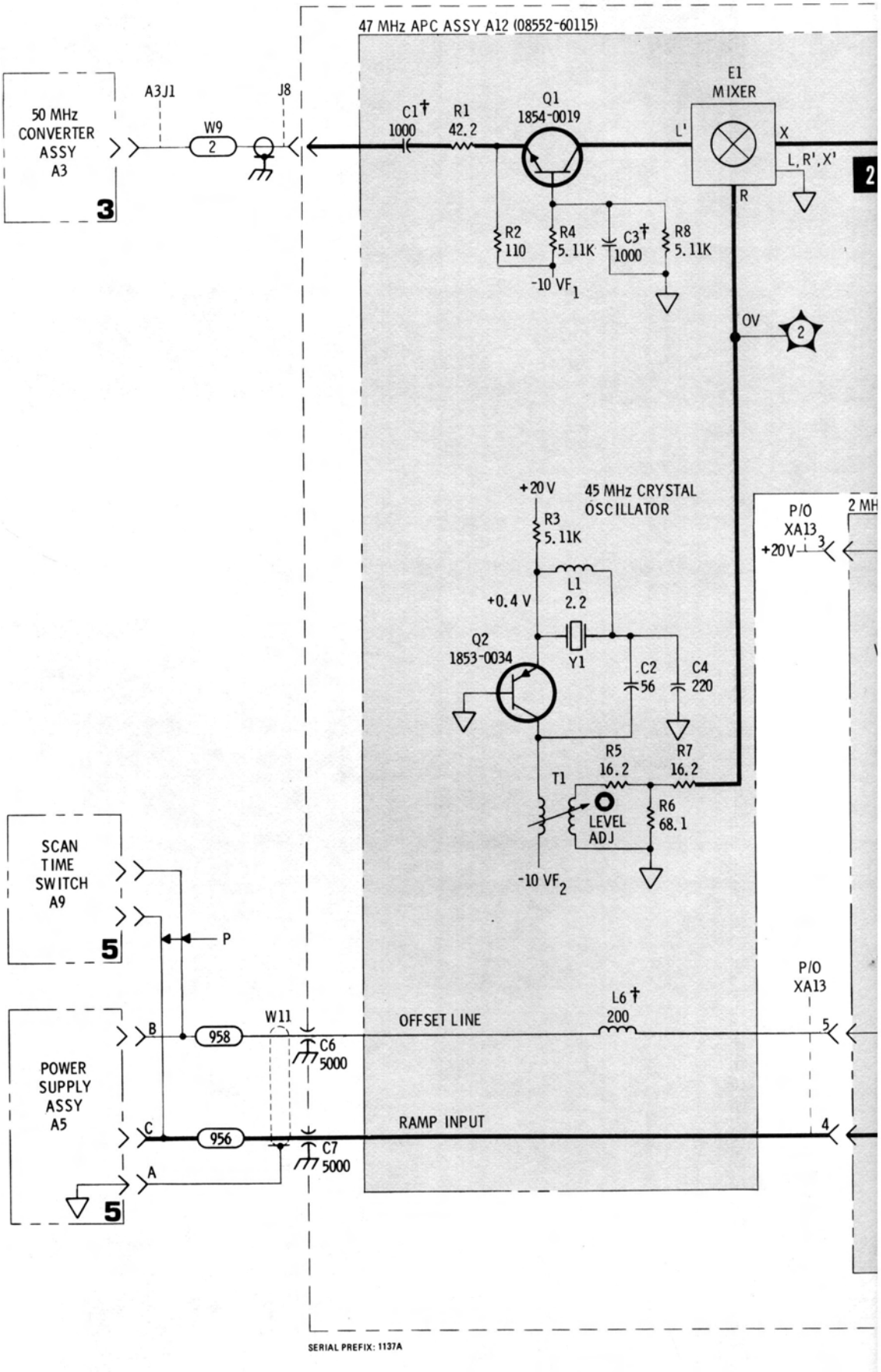
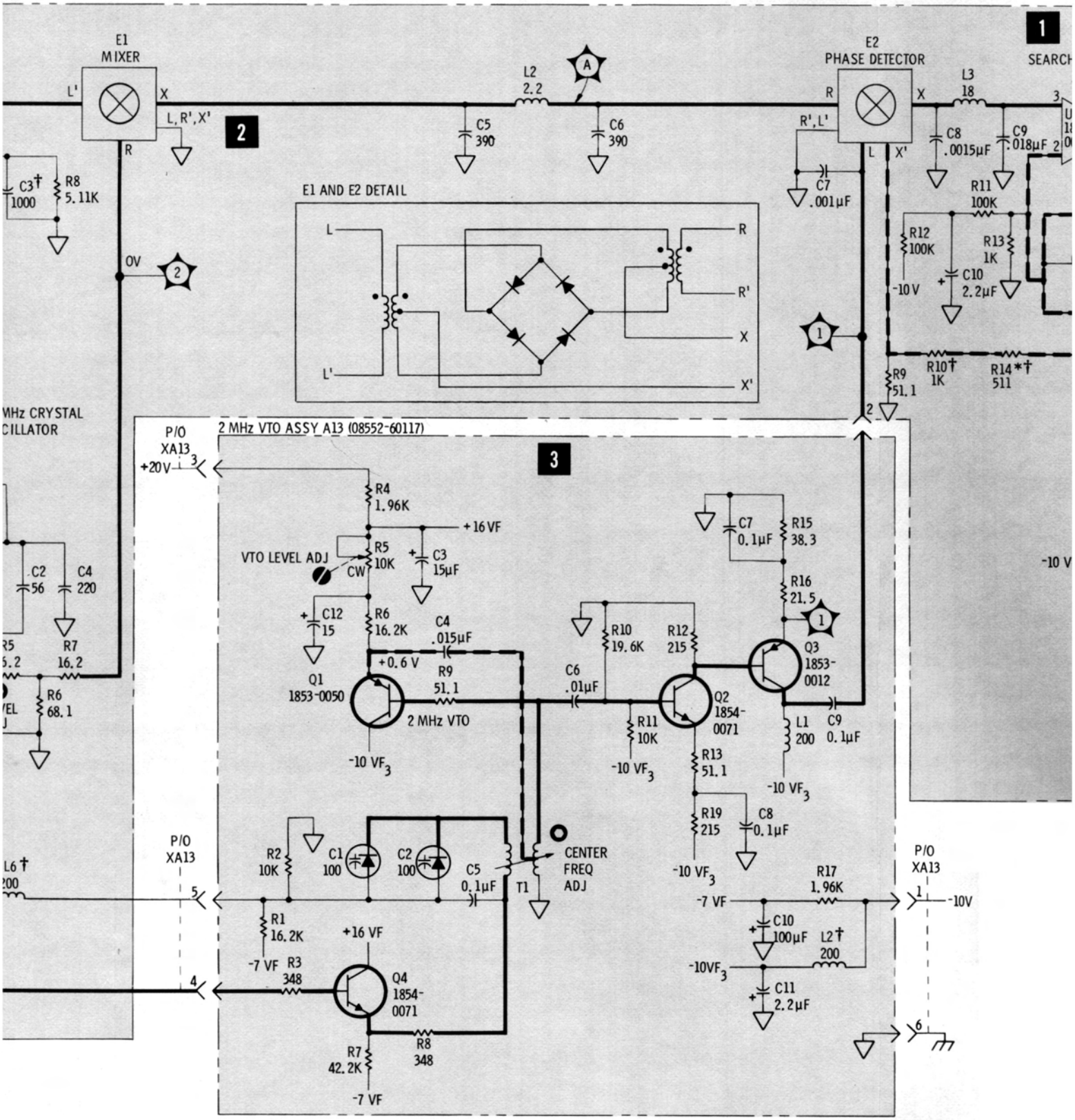
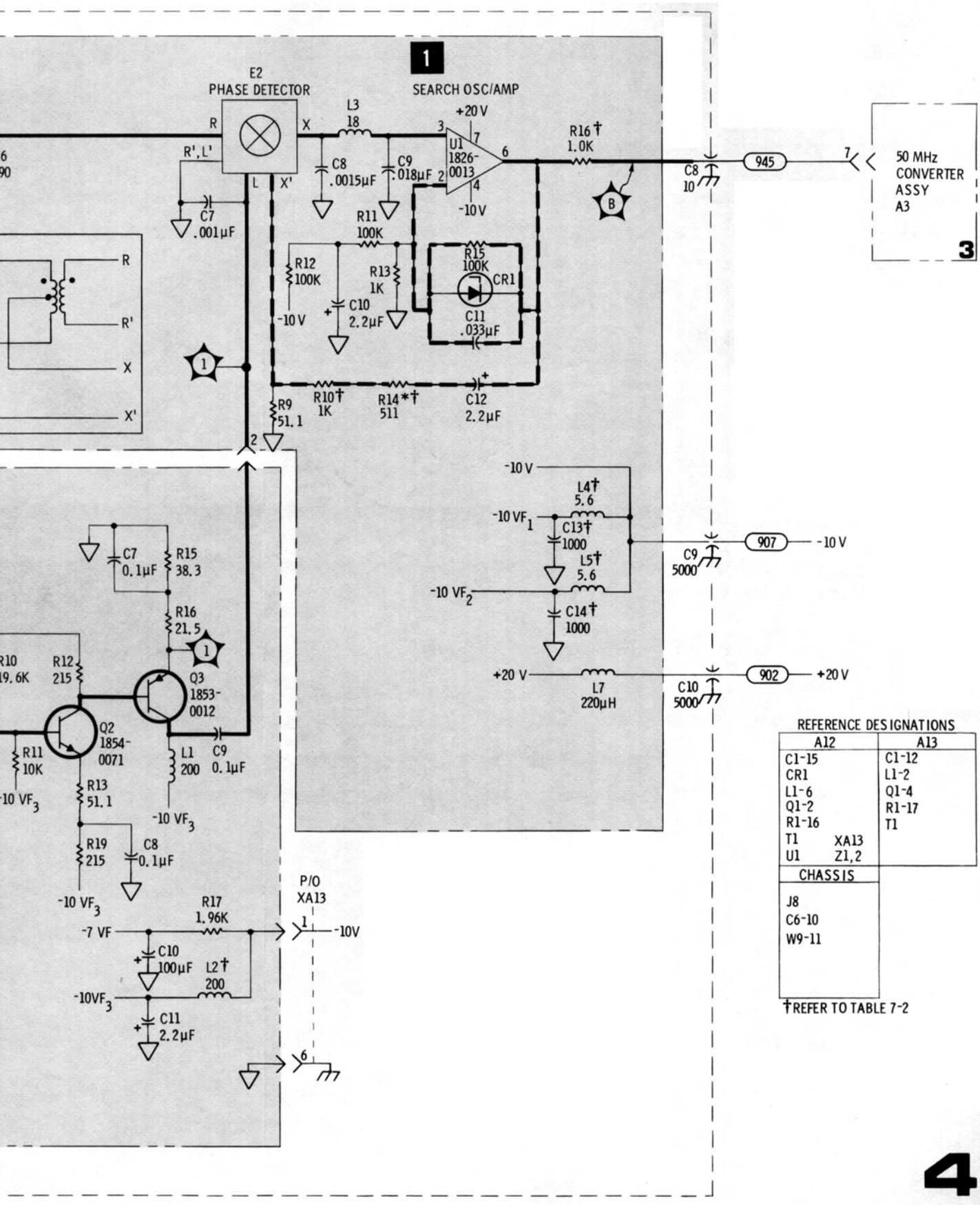


Figure 8-20. 2 MHz VTO A13 Component Identification



SERIAL PREFIX: 1137A


E1
MIXER
L'
X
L, R', X'
R
2
C3†
1000
R8
5.11K
OV
2
L2
2.2
A
C5
390
C6
390
E1 AND E2 DETAIL
L
L'
R
R'
X
X'
E2
PHASE DETECTOR
R
X
R', L'
L
X'
1
SEARCH
L3
18
3
C8
.0015μF
C9
.018μF
C7
.001μF
R11
100K
R12
100K
R13
1K
C10
2.2μF
-10 V
R10†
1K
R14*†
511
R9
51.1
2
MHz CRYSTAL
CILLATOR
C2
56
C4
220
R5
5.2
R7
16.2
R6
68.1
2 MHz VTO ASSY A13 (08552-60117)
3
P/O
XA13
3
+20V
R4
1.96K
+16 VF
VTO LEVEL ADJ
CW
R5
10K
C3
15μF
C12
15
R6
16.2K
C4
.015μF
+0.6 V
R9
51.1
Q1
1853-0050
2 MHz VTO
-10 VF3
C7
0.1μF
R15
38.3
R16
21.5
1
R10
19.6K
R12
215
C6
.01μF
Q3
1853-
0012
Q2
1854-
0071
R11
10K
-10 VF3
L1
200
C9
0.1μF
-10 VF3
R13
51.1
-10 VF3
R19
215
C8
0.1μF
P/O
XA13
L6†
200
5
R2
10K
C1
100
C2
100
C5
0.1μF
T1
CENTER
FREQ
ADJ
R1
16.2K
-7 VF
R3
348
+16 VF
4
Q4
1854-
0071
R8
348
R7
42.2K
-7 VF
R17
1.96K
-7 VF
C10
100μF
L2†
200
-10VF3
C11
2.2μF
P/O
XA13
1
-10V
6



REFERENCE DESIGNATIONS

A12	A13
C1-15	C1-12
CR1	L1-2
L1-6	Q1-4
Q1-2	R1-17
R1-16	T1
T1 XA13	
U1 Z1,2	

CHASSIS
J8
C6-10
W9-11

†REFER TO TABLE 7-2

Figure 8-21. 47 MHz Automatic Phase Control and 2 MHz Voltage Tuned Oscillator

A12, A13
47 MHz Automatic Phase Control
and 2 MHz Voltage Tuned Oscillator
SERVICE SHEET 4

SERVICE SHEET 5

It is assumed that input voltages are present and correct.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated to the 2 MHz VTO Shaping Circuit remove power supply assembly A5 and reinstall it on the extender board to provide access to components and test points.

NOTE

See the appropriate RF Section manual for inputs to the summing and shaping circuits. Depending on the RF Section, the inputs will be a dc voltage or dc voltages and a ramp voltage.

EQUIPMENT REQUIRED

DIGITAL VOLTMETER . . . . HP 3440A/3443A

CONTROL SETTINGS:

Any

1 SUMMING AND COMBINING CIRCUITS

In all 8552B/RF Section combinations, the RF Section, in some way, controls the 47 MHz VTO. The 47 MHz VTO may be just set to some fixed frequency or it may be set to some frequency and swept. In any case, the control inputs from the RF Section are summed and combined by U1, U2 and associated circuitry. U1 is an offset amplifier; U2 is a summing amplifier. U1 and U2 outputs are combined across R43 and R44 and fed to the shaping circuit.

TEST PROCEDURE **1**

Disconnect the RF Section and the 8552B (but leave both connected to the Display Section). Ground XA5 pin 2 (input to U1) to chassis; attach the voltmeter to TP A (U1, pin 6). Voltmeter should read about +5V. Ground XA5 pins 5 and 3 to chassis; attach voltmeter to TP B. (U2, pin 6). Voltmeter should read about -5.5V.

If the voltage at U1 or U2 was incorrect, check the IC and associated circuitry.

If the voltages were correct, reconnect the 8552B and the RF Section and proceed to step **2**

2 CONSTANT CURRENT SOURCE

Q2 and associated circuitry supplies current to the shaping circuit.

TEST PROCEDURE **2**

Attach the voltmeter to TP C (Q2 — e); it should read about +14V.

If the voltage was incorrect, check Q2 and associated circuitry. If the voltage was correct, proceed to step **3**

3 SHAPING CIRCUIT

The shaping circuit converts any linear input into an exponential output. Q21 is always on and provides temperature compensation. Q1, Q3—Q9, Q14 and Q20 are used as diodes (collector-base junctions) and turn on in sequence, from right to left, as the input goes from positive to negative. The exponential output is fed to the 2 MHz VTO. At scan times of 1 second or slower it is filtered by C5 on the Scan Time Switch Assembly A9; this filtering eliminates any low frequency components that might frequency modulate the 2 MHz VTO (and thus modulate the 47 MHz VTO) when narrow bandwidths and slow scan times are being used.

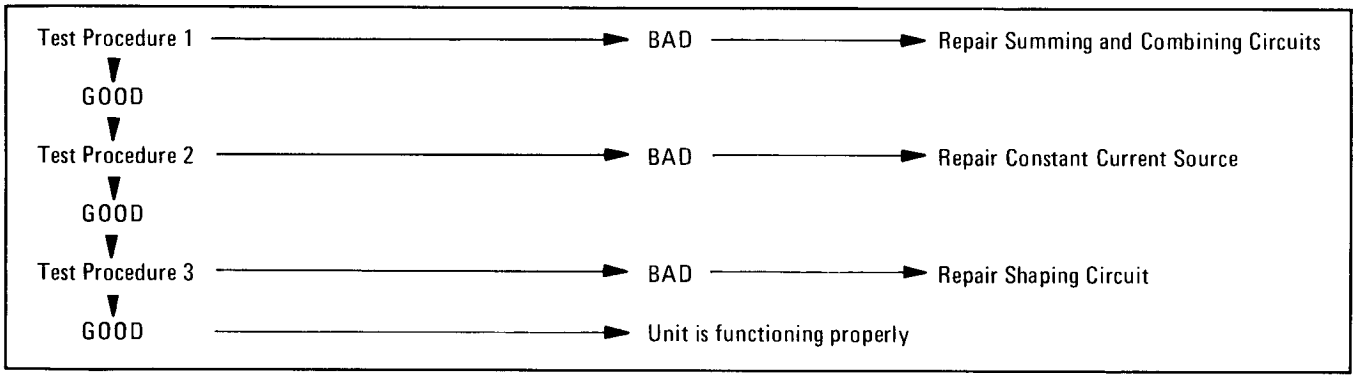
TEST PROCEDURE **3**

Testing the shaping circuit consists of checking the transistors for proper diode action and checking the resistors for proper resistance.

NOTE

When repairs are required, the Adjustments specified in paragraph 5-37 should be performed.

Simplified Test Procedure Tree



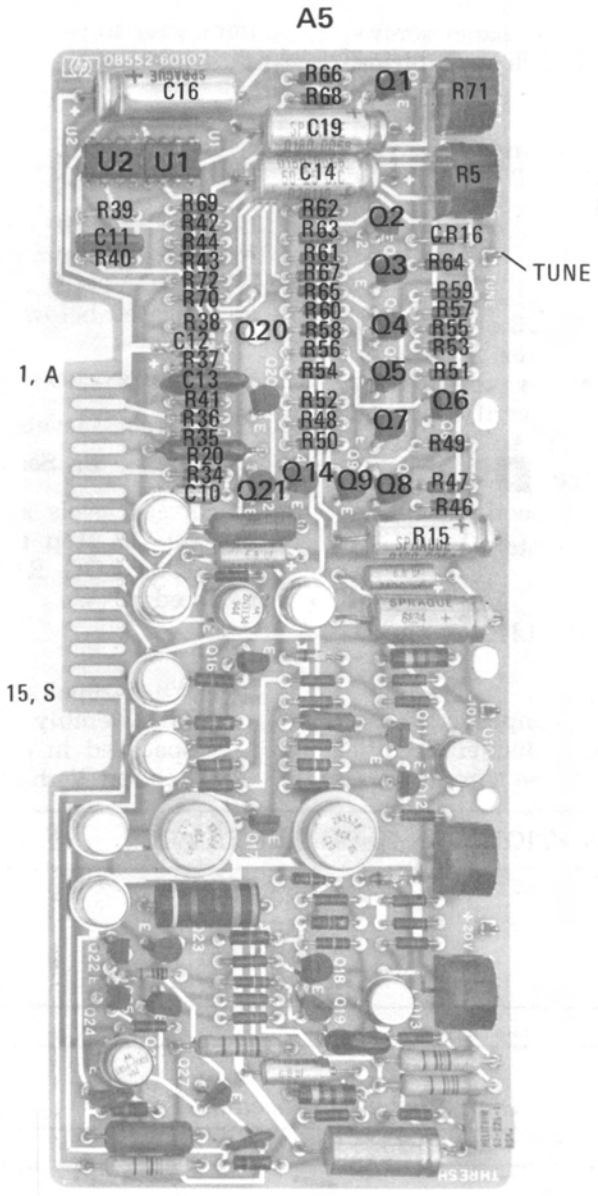
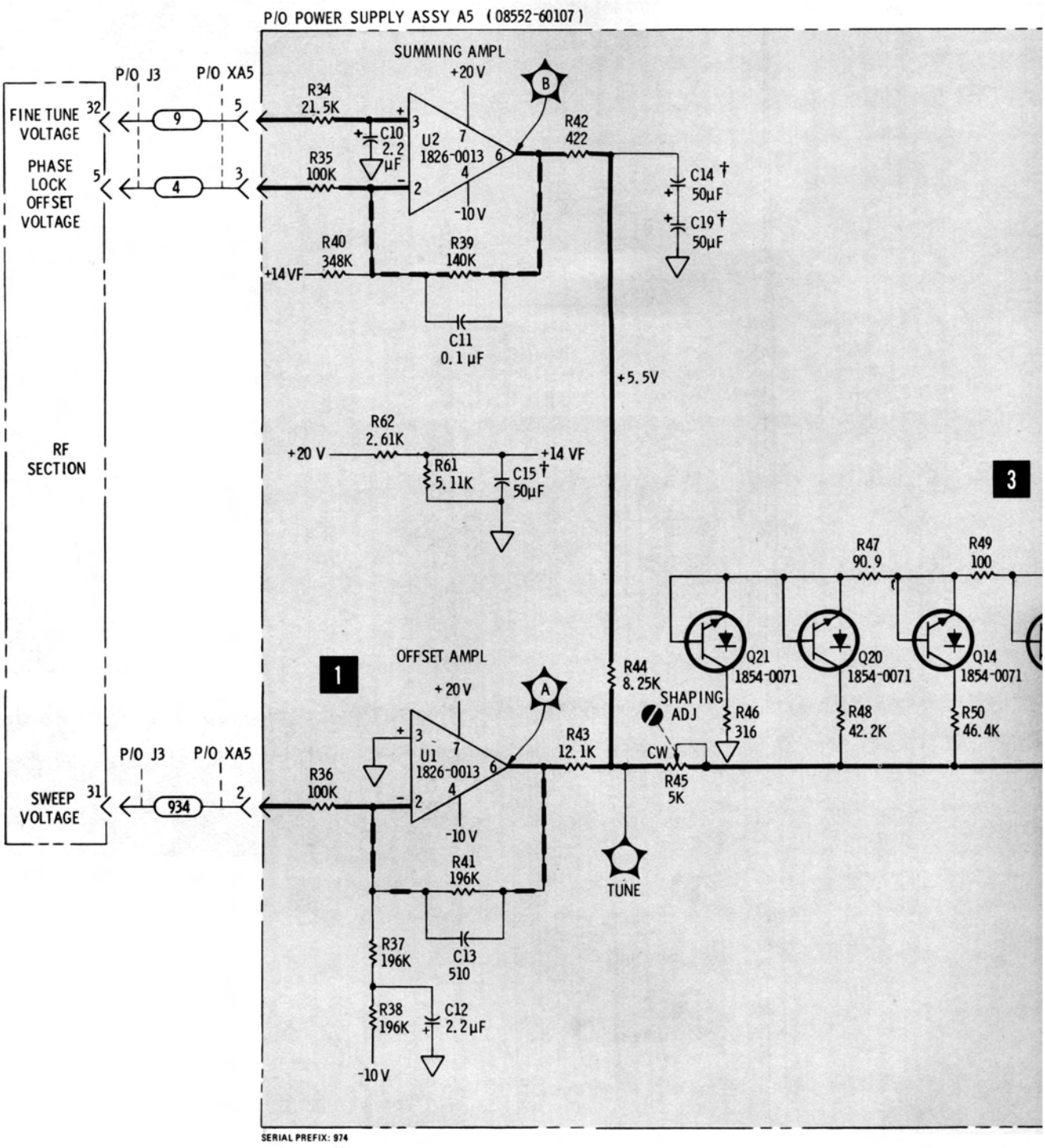
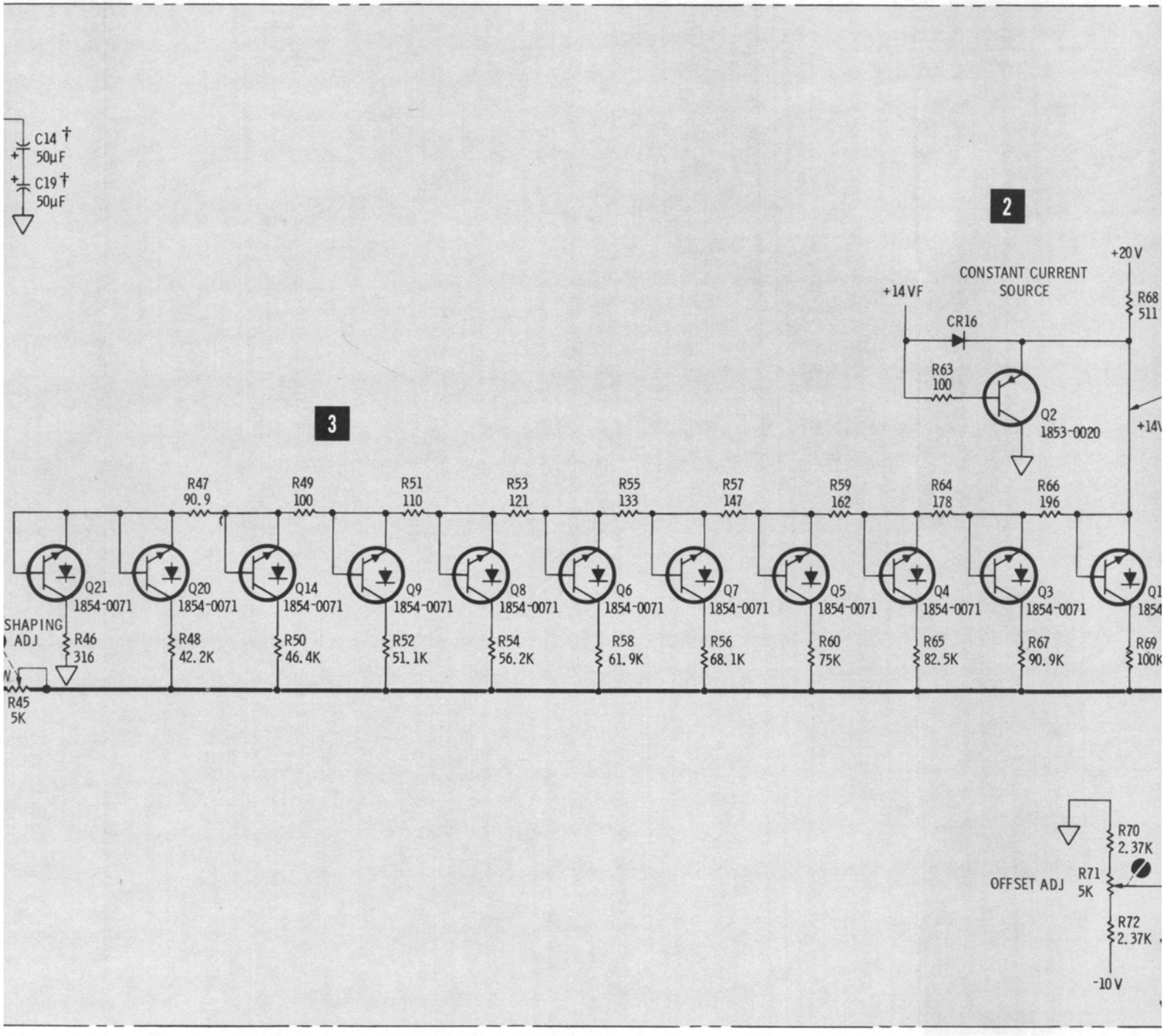


Figure 8-22. P/O Power Supply A5 Component Identification


P/O POWER SUPPLY ASSY A5 (08552-60107)
SUMMING AMPL
+20V
B
P/O J3
P/O XA5
FINE TUNE VOLTAGE
32
9
5
R34
21.5K
C10
2.2 µF
U2
1826-0013
R42
422
PHASE LOCK OFFSET VOLTAGE
5
4
3
R35
100K
-10V
C14 †
50µF
C19 †
50µF
R40
348K
R39
140K
+14VF
C11
0.1 µF
+5.5V
R62
2.61K
+20 V
+14 VF
R61
5.11K
C15 †
50µF
RF SECTION
3
R47
90.9
R49
100
Q21
1854-0071
Q20
1854-0071
Q14
1854-0071
OFFSET AMPL
1
+20 V
A
R44
8.25K
SHAPING ADJ
R46
316
R48
42.2K
R50
46.4K
R43
12.1K
CW
R45
5K
P/O J3
P/O XA5
SWEEP VOLTAGE
31
934
2
R36
100K
U1
1826-0013
-10V
TUNE
R41
196K
R37
196K
C13
510
R38
196K
C12
2.2µF
-10 V
SERIAL PREFIX: 974


C14 †
50µF
C19 †
50µF
2
+20V
CONSTANT CURRENT
SOURCE
+14VF
CR16
R68
511
R63
100
Q2
1853-0020
+14V
3
R47
90.9
R49
100
R51
110
R53
121
R55
133
R57
147
R59
162
R64
178
R66
196
Q21
1854-0071
Q20
1854-0071
Q14
1854-0071
Q9
1854-0071
Q8
1854-0071
Q6
1854-0071
Q7
1854-0071
Q5
1854-0071
Q4
1854-0071
Q3
1854-0071
SHAPING
ADJ
R46
316
R48
42.2K
R50
46.4K
R52
51.1K
R54
56.2K
R58
61.9K
R56
68.1K
R60
75K
R65
82.5K
R67
90.9K
R69
100K
R45
5K
R70
2.37K
OFFSET ADJ
R71
5K
R72
2.37K
-10V

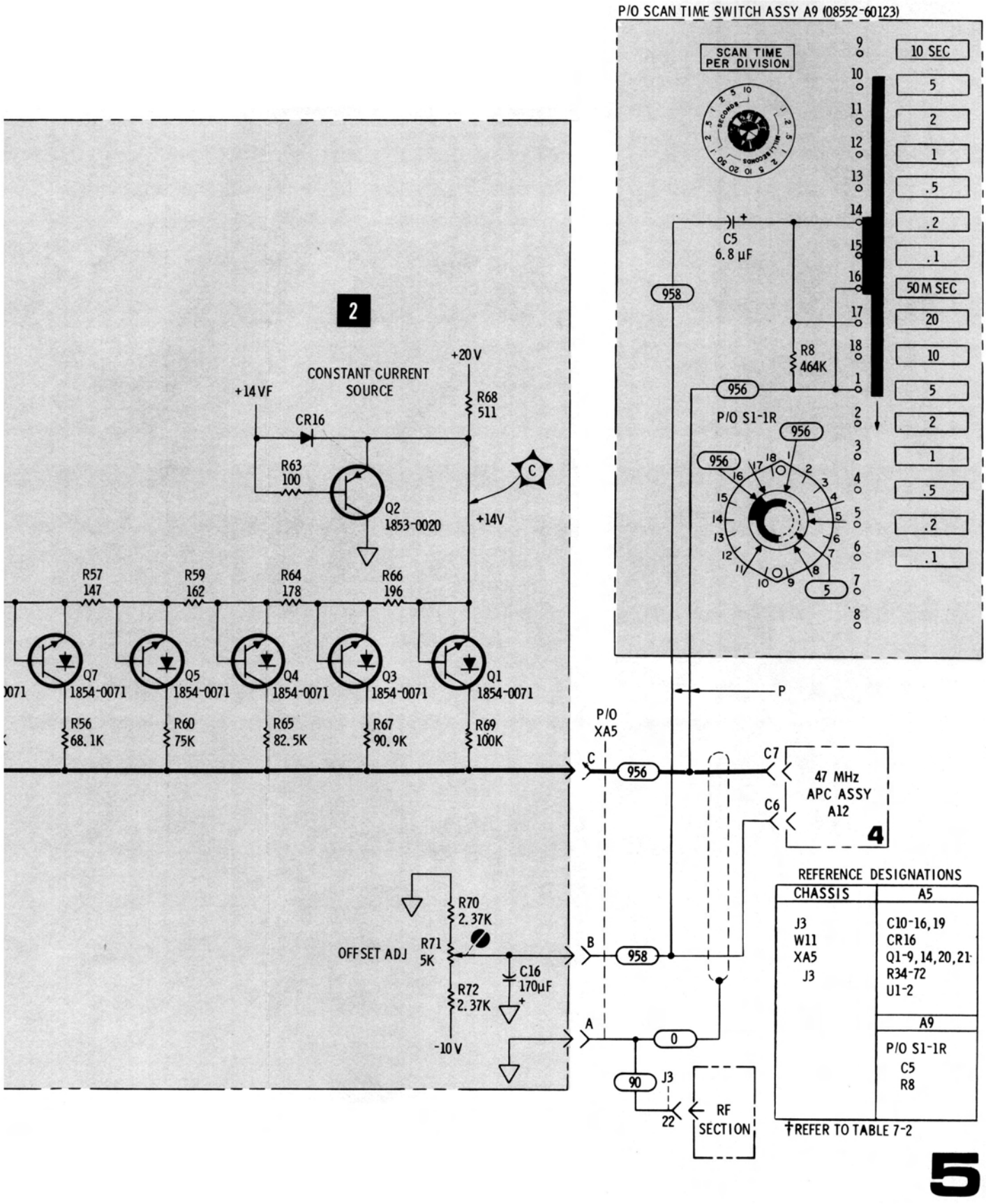


Figure 8-23. 2 MHz VTO Shaping Circuit

SERVICE SHEET 6

It is assumed that the 3 MHz input signal and the correct dc input voltages are present and that the output signal is missing or out of tolerance.

TROUBLESHOOTING PROCEDURE

When a malfunction has been isolated to the 3 MHz IF amplifier A2, the board should be removed and reinstalled using the extender board to provide access to components. Connect the CAL OUTPUT to the RF INPUT.

NOTE

Part of the 3 MHz IF amplifier circuit is shown on Service Sheet 7. It will be necessary to utilize both service sheets to verify proper operation of the amplifier after repairs are completed.

EQUIPMENT REQUIRED

VECTOR VOLTMETER	HP 8405A
SERVICE KIT	HP 11592A

CONTROL SETTINGS

Unless otherwise specified in individual tests.

INPUT ATTENUATION	10 dB
SCAN WIDTH PER DIVISION	20 kHz
LOG REF LEVEL	-10 dBm
SCAN WIDTH	ZERO
LOG·LINEAR	10 dB LOG
FREQUENCY	30 MHz

3 MHz AMPLIFIER ASSEMBLY (General)

The 3 MHz amplifier assembly consists of a bandpass filter, the amplitude calibration amplifier, the 30, 40, 50 dB step amplifier, a variable 0 to 12 dB amplifier, and an emitter follower output stage. The 0 to 12 dB amplifier and the emitter follower output stage are shown on Service Sheet 7.

1 3 MHz BANDPASS FILTER

The 3 MHz bandpass filter is a two-section adjustable filter which is adjusted to provide a bandpass of 300 kHz centered at 3 MHz.

TEST PROCEDURE 1

Connect the HP 8405A to TP A (Q1-b) and tune the analyzer for maximum signal. Meter should indicate approximately 6.0 mV rms. If the signal level is correct proceed to step 2 . If the signal is low or missing, check the bandpass filter and R1.

NOTE

If the bandpass filter circuit required repairs the adjustment procedure specified in paragraph 5-32 of Section V should be performed.

A5, A9
2 MHz VTO Shaping Circuit
SERVICE SHEET 5

SERVICE SHEET 6 (cont'd)

2 AMPLITUDE CALIBRATION AMPLIFIER

The gain of the amplitude calibration amplifier, Q1, Q2, and Q3 is controlled by a variable capacitive voltage divider. The variable capacitive elements are varactors which are controlled by a dc level from the RF Section front panel screwdriver adjustment. This circuit is adjusted during the analyzer alignment procedure to compensate for overall gain requirements and to provide absolute amplitude calibration of the displayed signal. Circuit gain is nominally 10 dB and is adjustable by approximately ±4 dB.

TEST PROCEDURE 2

Connect the HP 8405A to TP 1 (Q3-c) and tune analyzer for maximum signal. Meter reading is typically 30 mV rms. If this level is present turn the AMPL CAL adjustment to verify proper operation, return control setting to the level observed first, and proceed to step 3 . If signal is missing or level is not as specified, check Q1/Q2/Q3 and associated components.

3 30, 40, 50 dB STEP AMPLIFIER AND CONTROL CIRCUITS

Q4, Q5 and Q6 form a feedback amplifier whose gain is controlled by the feedback divider circuits in the emitter circuit of Q4. These circuits are controlled by the LOG REF LEVEL switch. When all of the diodes (CR1-6) are reverse biased, the amplifier's gain is unity. When the 30 dB divider is switched into the feedback path, the amplifier's gain is 10 dB; when the 40 dB divider is activated, the gain is 20 dB and when the 50 dB divider is activated, the gain is 30 dB. R21, R24 and R27 are adjusted to calibrate the amplifier's gain steps.

TEST PROCEDURE 3

Connect the HP 8405A to TP2 and tune the analyzer for maximum signal. Rotate the INPUT ATTENUATION and LOG REF LEVEL controls as indicated below and observe meter readings.

Signal levels shown are typical.

If correct levels are observed proceed to step 1 on Service Sheet 7.

If correct levels are not obtained check the 30, 40, 50 dB step amplifier, feedback divider networks or LOG REF LEVEL switch assembly as required.

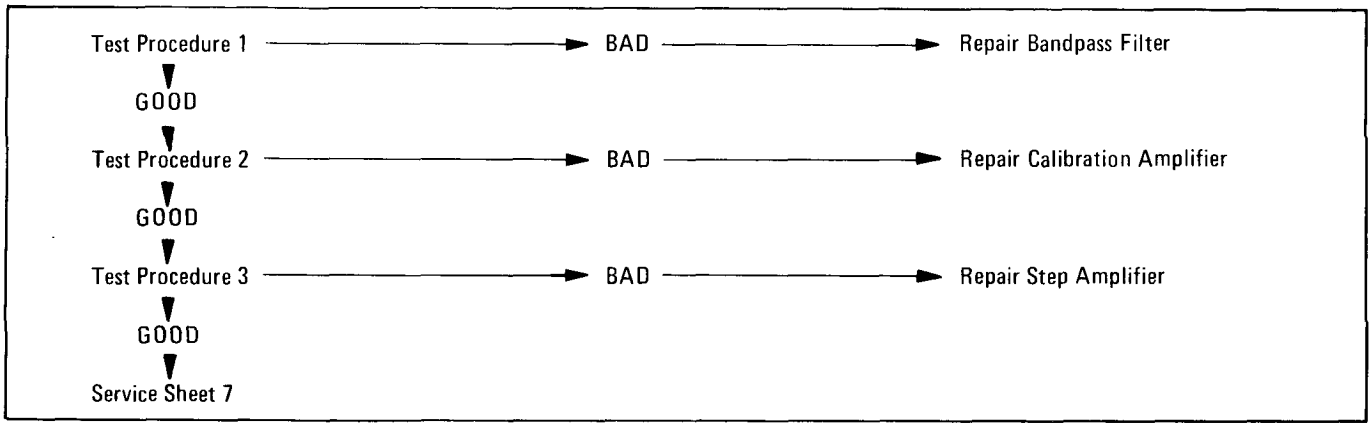
NOTE

When repairs are required to the 3 MHz IF assembly the tests and adjustments specified in paragraphs 5-32 and 5-36 of Section V should be performed.

INPUT ATTENUATION	LOG REF LEVEL*	TP 2
0 dB	-30 dBm	-15 dBm
10 dB	-30 dBm	-15 dBm
20 dB	-30 dBm	-15 dBm
30 dB	-30 dBm	-15 dBm

*Read at lit index lamp.

Simplified Test Procedure Tree



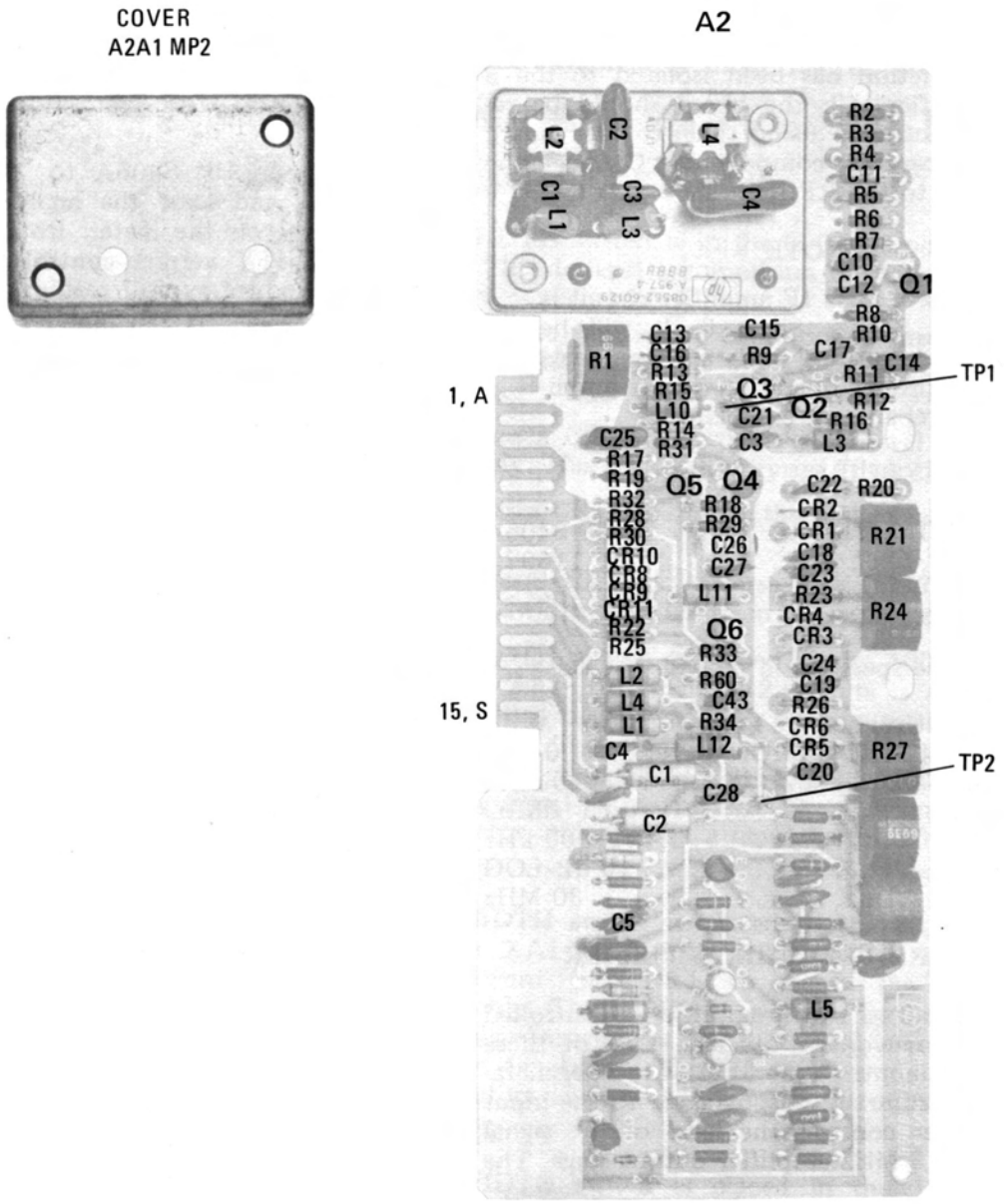
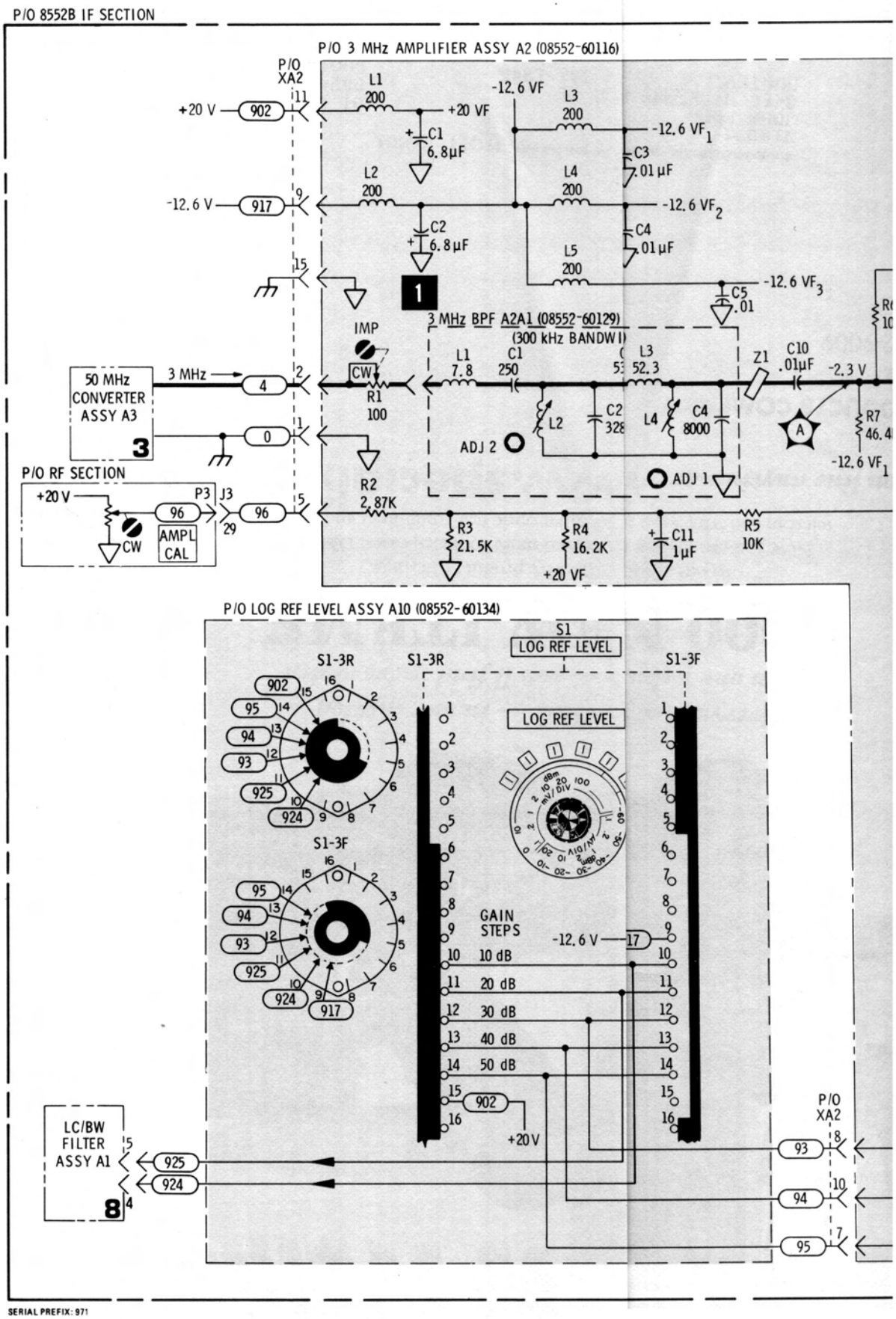
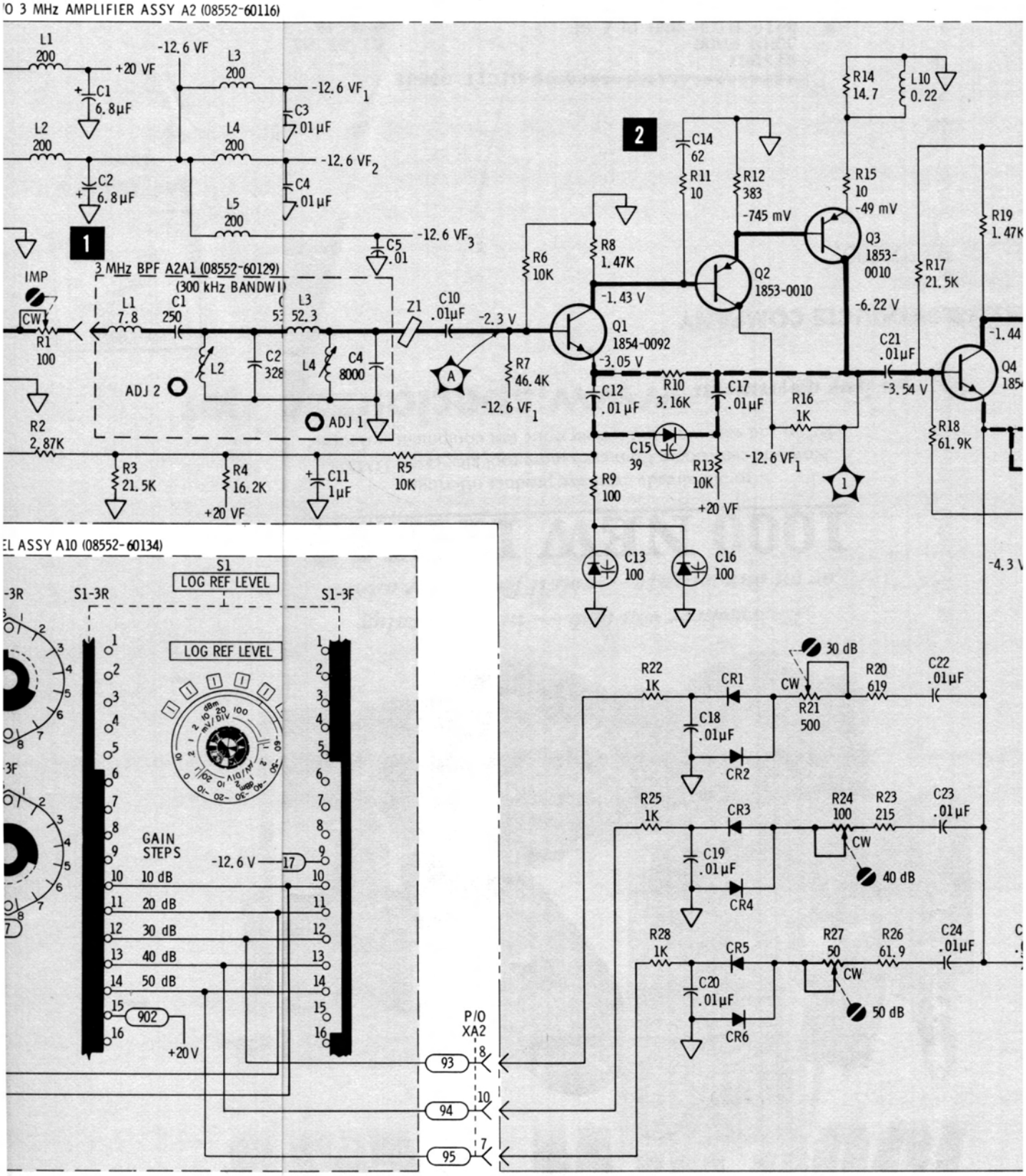
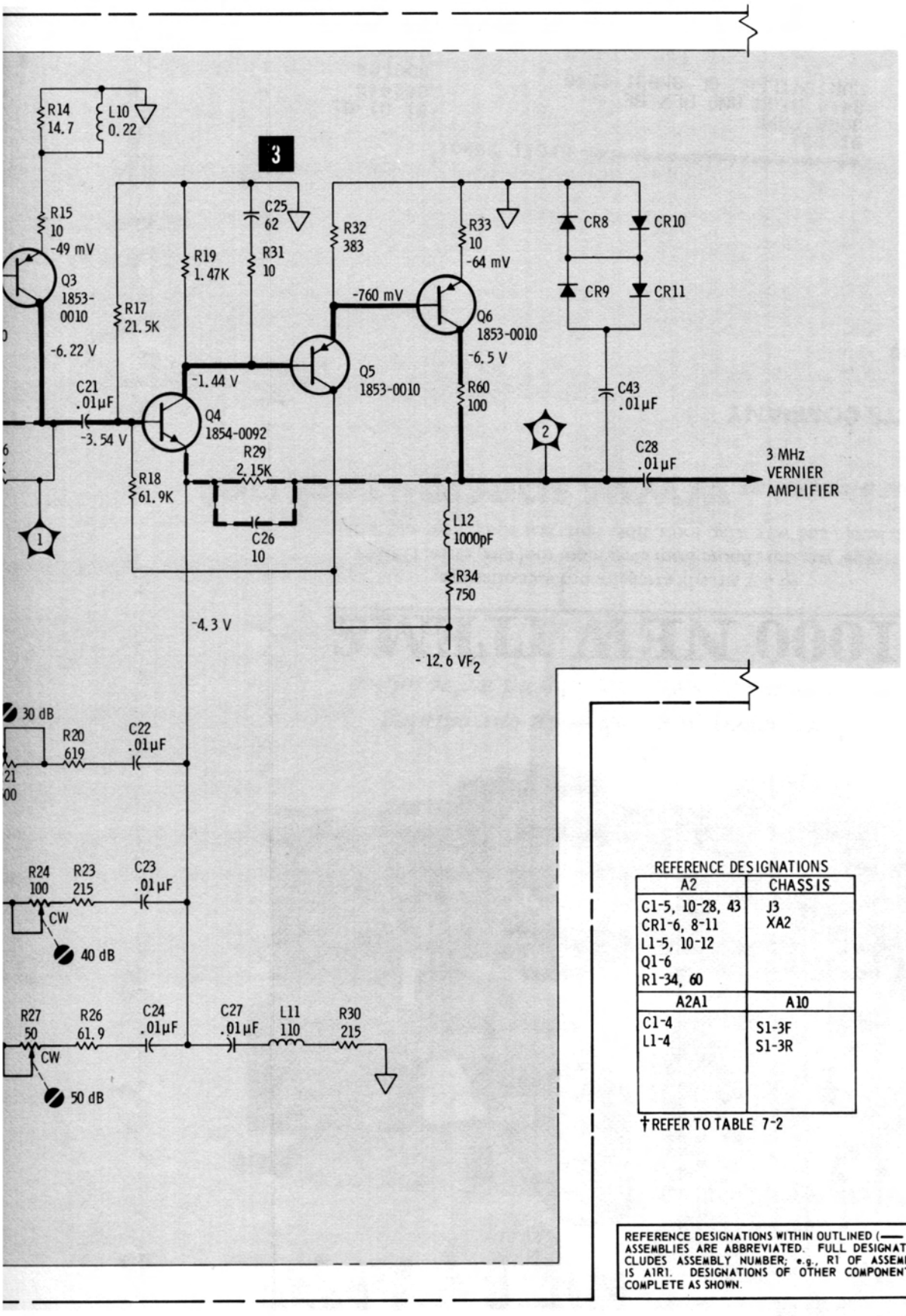


Figure 8-24. P/O 3 MHz Amplifier A2 Component Identification



SERIAL PREFIX: 971


O 3 MHz AMPLIFIER ASSY A2 (08552-60116)
L1 200
+20 VF
C1 6.8µF
L2 200
C2 6.8µF
-12.6 VF
L3 200
-12.6 VF1
C3 .01µF
L4 200
-12.6 VF2
C4 .01µF
L5 200
-12.6 VF3
C5 .01
1
2
IMP
CW
R1 100
R2 2.87K
3 MHz BPF A2A1 (08552-60129)
(300 kHz BANDWI)
L1 7.8
C1 250
L2
C2 328
L3 52.3
L4
C4 8000
ADJ 2
ADJ 1
Z1
C10 .01µF
-2.3 V
A
R7 46.4K
-12.6 VF1
R3 21.5K
R4 16.2K
+20 VF
C11 1µF
R5 10K
R6 10K
R8 1.47K
-1.43 V
Q1 1854-0092
-3.05 V
C14 62
R11 10
R12 383
-745 mV
Q2 1853-0010
R14 14.7
L10 0.22
R15 10
-49 mV
Q3 1853-0010
-6.22 V
R19 1.47K
R17 21.5K
C21 .01µF
-3.54 V
Q4
R18 61.9K
C12 .01µF
R10 3.16K
C17 .01µF
R16 1K
C15 39
R13 10K
+20 VF
-12.6 VF1
R9 100
C13 100
C16 100
-4.3 V
EL ASSY A10 (08552-60134)
S1
LOG REF LEVEL
S1-3R
S1-3F
LOG REF LEVEL
GAIN STEPS
-12.6 V
10 dB
20 dB
30 dB
40 dB
50 dB
902
+20V
P/O XA2
93
94
95
R22 1K
CR1
30 dB
CW
R21 500
R20 619
C22 .01µF
C18 .01µF
CR2
R25 1K
CR3
R24 100
R23 215
C23 .01µF
CW
40 dB
C19 .01µF
CR4
R28 1K
CR5
R27 50
R26 61.9
C24 .01µF
CW
50 dB
C20 .01µF
CR6



REFERENCE DESIGNATIONS

A2	CHASSIS
C1-5, 10-28, 43 CR1-6, 8-11 L1-5, 10-12 Q1-6 R1-34, 60	J3 XA2
A2A1	**A10**
C1-4 L1-4	S1-3F S1-3R

†REFER TO TABLE 7-2

REFERENCE DESIGNATIONS WITHIN OUTLINED (— - - —) ASSEMBLIES ARE ABBREVIATED. FULL DESIGNATION INCLUDES ASSEMBLY NUMBER; e.g., R1 OF ASSEMBLY A1 IS A1R1. DESIGNATIONS OF OTHER COMPONENTS ARE COMPLETE AS SHOWN.

6

Figure 8-25. 3 MHz Amplifier (1 of 2)

A2, A10
3 MHz Amplifier (1 of 2)
SERVICE SHEET 6

SERVICE SHEET 7

It is assumed that the 3 MHz input signal and the circuit dc input voltages are present and that the output signal is missing or out of tolerance.

TROUBLESHOOTING

When a malfunction has been isolated to the 3 MHz IF amplifier A2, the board should be removed and reinstalled using the extender board to provide access to components. Connect the CAL OUTPUT to the RF INPUT.

NOTE

Part of the 3 MHz IF amplifier circuit is shown on Service Sheet 6. It will be necessary to utilize both service sheets to verify proper operation of the amplifier after repairs are completed.

EQUIPMENT REQUIRED

VECTOR VOLTMETER ..... HP 8405A
SERVICE KIT ..... HP 11592A

CONTROL SETTINGS

Unless otherwise specified in individual tests.

INPUT ATTENUATION ..... 0 dB
SCAN WIDTH PER DIVISION ..... 20 kHz
LOG REF LEVEL ..... -10 dBm
SCAN WIDTH ..... ZERO
BANDWIDTH ..... 300 kHz
LOG·LINEAR ..... 10 dB LOG
FREQUENCY ..... 30 MHz

1 12 dB VARIABLE GAIN AMPLIFIER

The gain of the 0 to 12 dB amplifier is controlled by two varactor voltage dividers. One of these voltage dividers controls the level of the degenerative feedback from the output stage to the input stage; the other controls the level of the signal applied to the 3 MHz amplifier output stage. The LOG REF LEVEL·LINEAR SENSITIVITY vernier control, R12, on the front panel controls the gain of the variable gain amplifier. R12 is calibrated by adjustments located on the 3 MHz IF amplifier assembly. R44 calibrates the 12 dB maximum and R51 calibrates the 0 dB minimum.

TEST PROCEDURE 1

Connect the HP 8405A to TP B (junction of C40/C41) and tune the analyzer for maximum signal level on the meter. Rotating the LINEAR SENSITIVITY vernier control to both extremes should produce typical readings of 30 mV rms to 130 mV rms. If the meter readings are correct proceed to step 2.

If the meter readings are not correct, repair the variable gain amplifier and repeat the test.

2 3 MHz IF AMPLIFIER OUTPUT CIRCUIT

The 3 MHz IF amplifier output circuit consists of an emitter follower. The purpose of this stage is to provide isolation between the variable gain IF amplifier and the LC Filter assembly.

TEST PROCEDURE

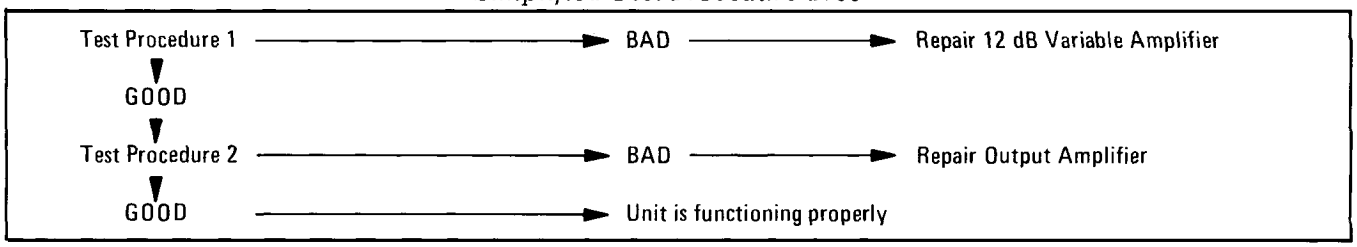
Connect the HP 8405A to TP 4 and tune the analyzer for maximum signal level on the meter. Typical reading is 30 mV rms with LOG/LIN vernier CCW.

If the meter reading is incorrect check Q10 and associated components.

NOTE

When repairs are required, the tests specified in paragraph 5-36 of Section V should be performed.

Simplified Test Procedure Tree



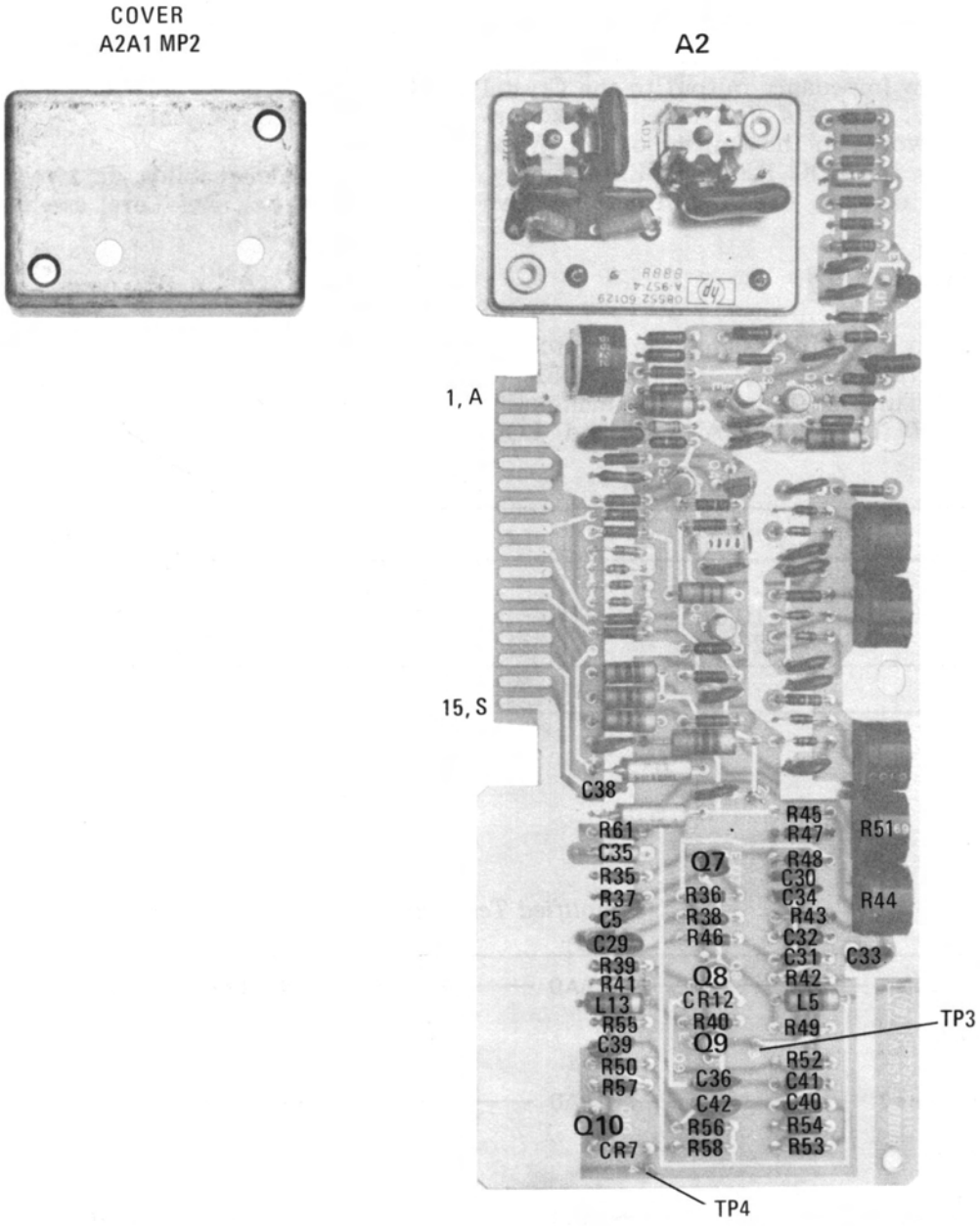
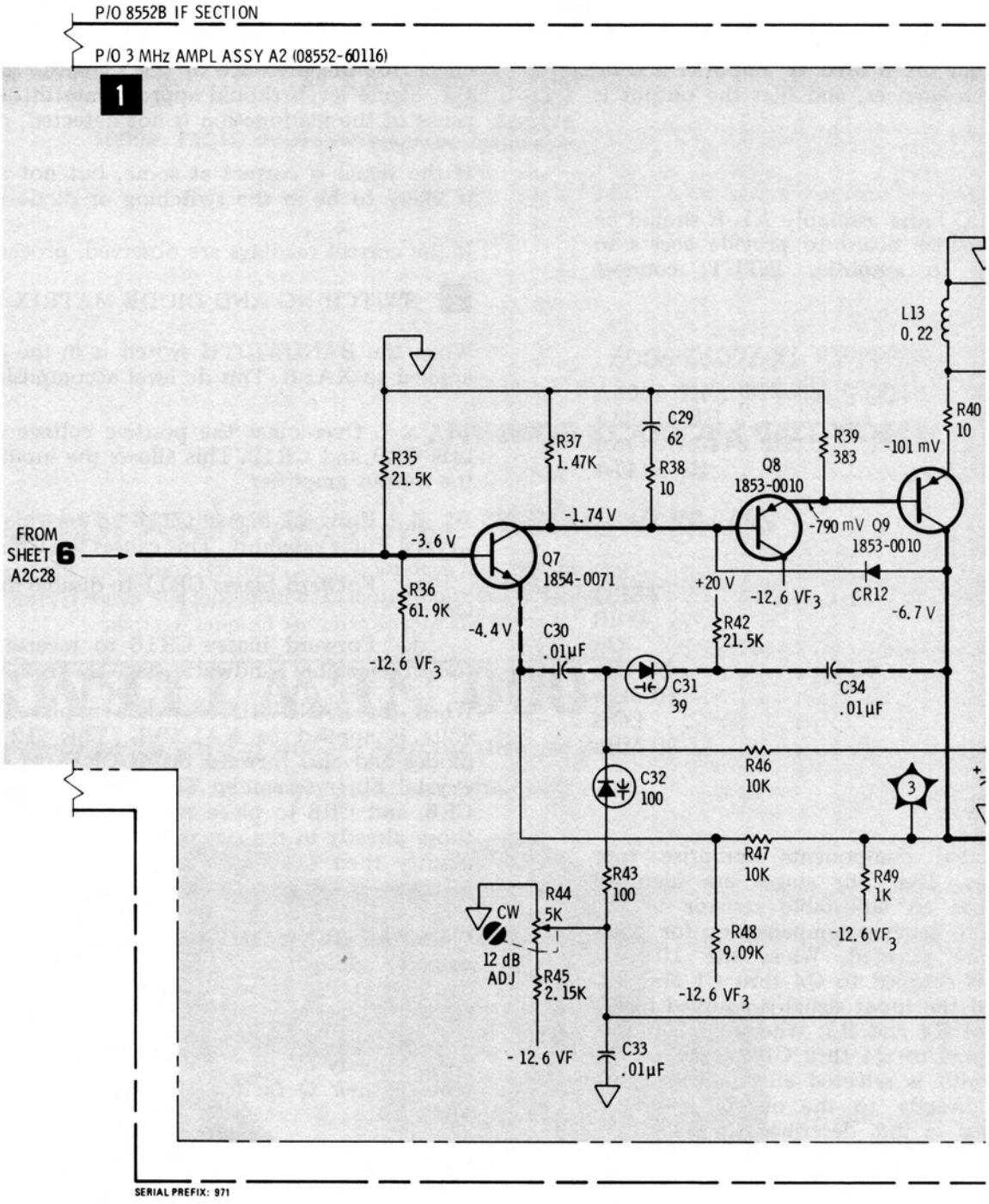
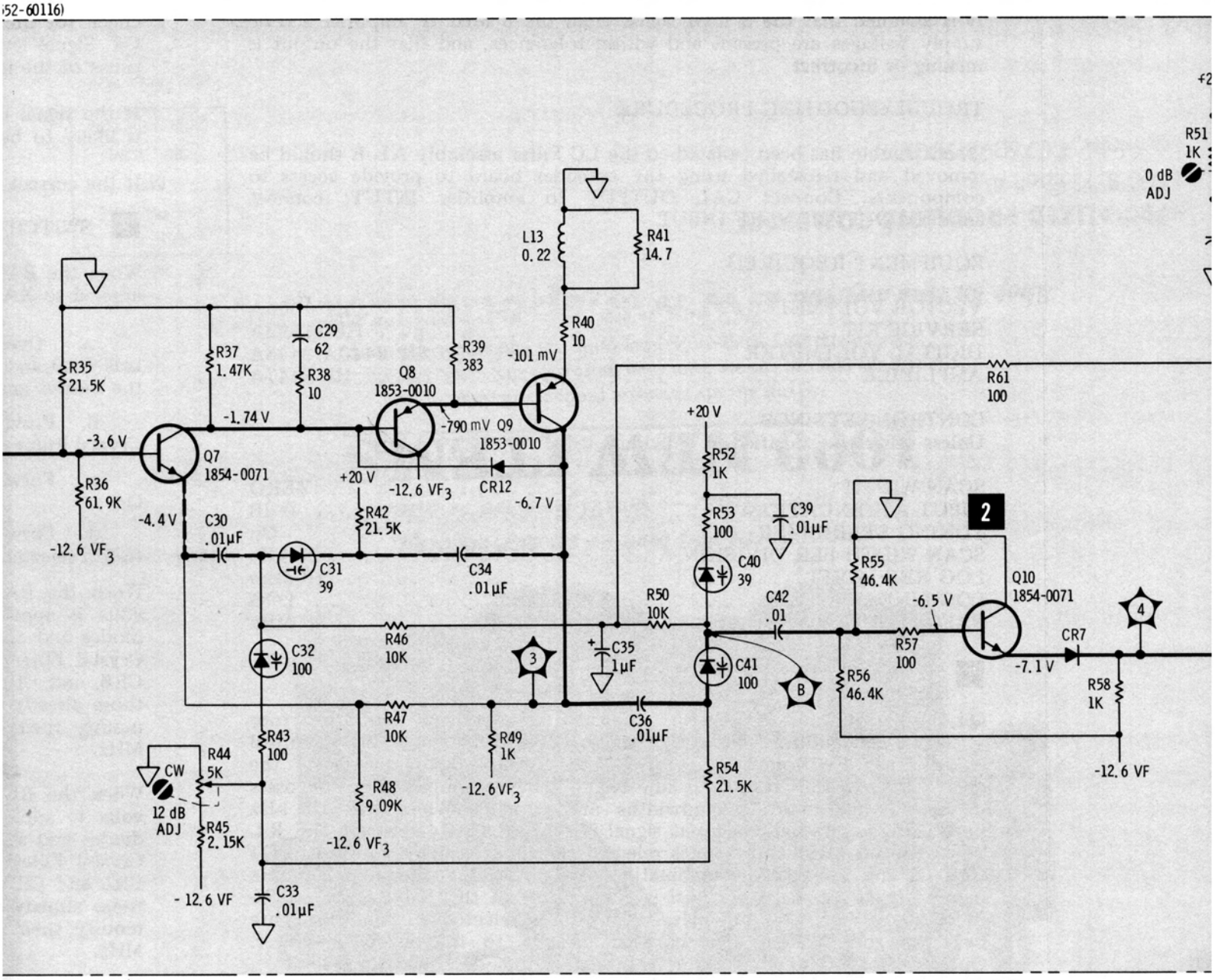


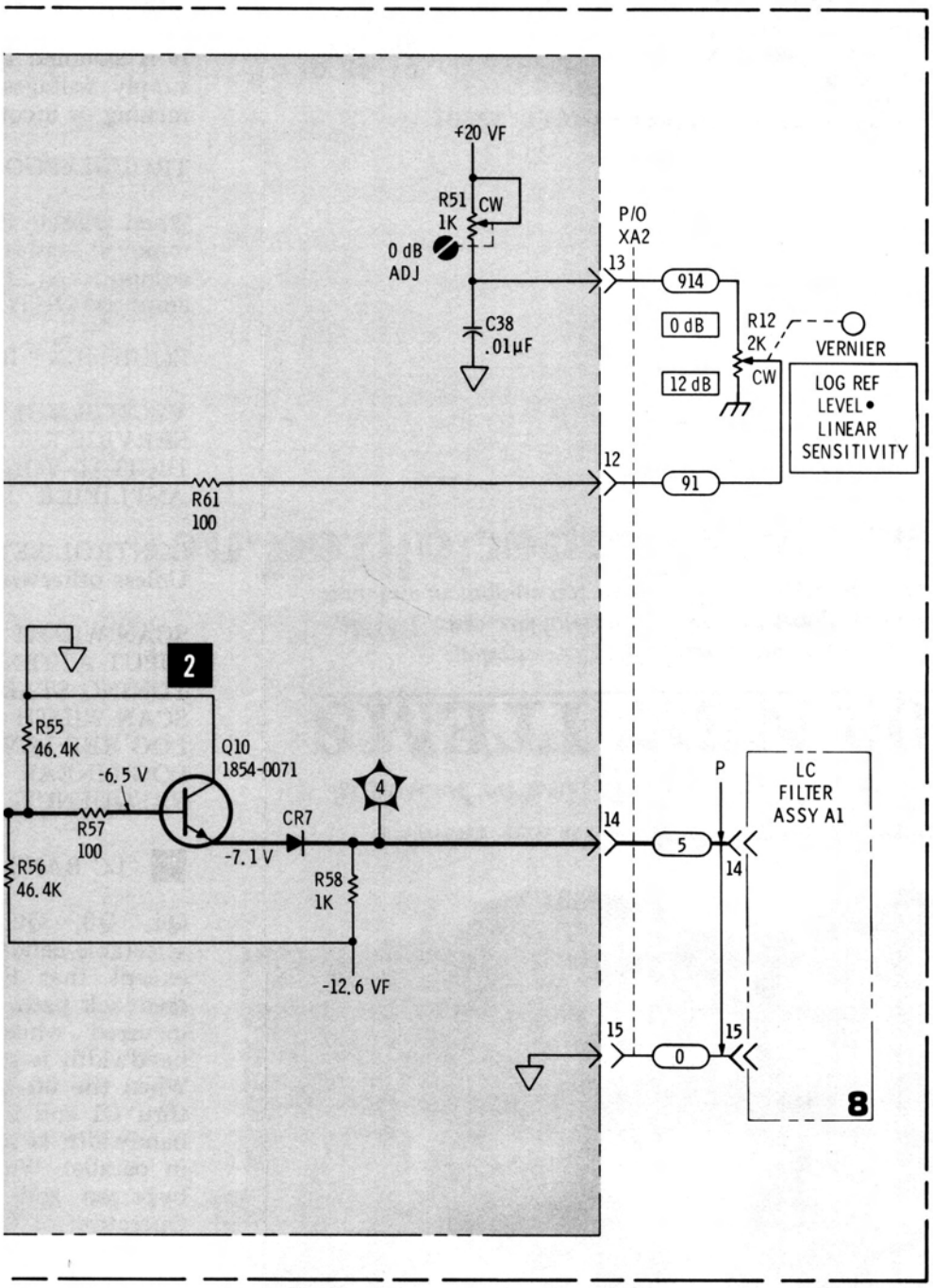
Figure 8-26. P/O 3 MHz Amplifier A2 Component Identification


P/O 8552B IF SECTION
P/O 3 MHz AMPL ASSY A2 (08552-60116)
1
FROM SHEET 6 A2C28
R35 21.5K
R37 1.47K
C29 62
R38 10
R39 383
L13 0.22
R40 10
-101 mV
Q8 1853-0010
-790 mV Q9 1853-0010
-1.74 V
-3.6 V
Q7 1854-0071
+20 V
-12.6 VF3
CR12
-6.7 V
R36 61.9K
-12.6 VF3
-4.4 V
C30 .01µF
R42 21.5K
C31 39
C34 .01µF
C32 100
R46 10K
3
R47 10K
R43 100
R44 5K
CW
12 dB ADJ
R45 2.15K
R48 9.09K
R49 1K
-12.6 VF3
-12.6 VF3
-12.6 VF
C33 .01µF
SERIAL PREFIX: 971

52-60116)



REFERENCE DESIGNATIONS WITHIN OUTLINED (—
ASSEMBLIES ARE ABBREVIATED. FULL DESIGN
CLUDES ASSEMBLY NUMBER; e.g., R1 OF ASS
IS A1R1. DESIGNATIONS OF OTHER COMPON
COMPLETE AS SHOWN.



REFERENCE DESIGNATIONS WITHIN OUTLINED (— - - —) ASSEMBLIES ARE ABBREVIATED. FULL DESIGNATION INCLUDES ASSEMBLY NUMBER; e.g., R1 OF ASSEMBLY A1 IS A1R1. DESIGNATIONS OF OTHER COMPONENTS ARE COMPLETE AS SHOWN.

REFERENCE DESIGNATIONS

A2	CHASSIS
C29-36, 38-42 CR7, 12 L13, 14 Q7 - 10 R35 - 58, 61	R12 XA2

†REFER TO TABLE 7-2

7

Figure 8-27. 3 MHz Amplifier (2 of 2)

SERVICE SHEET 8

It is assumed that the 3 MHz signal from the 3 MHz IF amplifier and dc supply voltages are present and within tolerances, and that the output is missing or incorrect.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated to the LC Filter assembly A1, it should be removed and reinstalled using the extender board to provide access to components. Connect CAL OUTPUT to amplifier INPUT; connect amplifier OUTPUT to RF INPUT.

EQUIPMENT REQUIRED

VECTOR VOLTMETER	HP 8405A
SERVICE KIT	HP 11592A
DIGITAL VOLTMETER	HP 3440A/3443A
AMPLIFIER	HP 8447A

CONTROL SETTINGS
Unless otherwise specified in individual tests.

SCAN WIDTH	ZERO
INPUT ATTENUATION	0 dB
TUNING STABILIZER	On
SCAN WIDTH PER DIVISION	20 kHz
LOG REF LEVEL	-10 dBm
LOG·LINEAR	LOG
FREQUENCY	30 MHz

1 LC BANDWIDTH FILTER STAGES

Q4, Q3, Q2 and Q1 with associated components comprise four selectable-bandwidth, unity gain stages. The four stages are identical except that the fourth stage (Q1) has an adjustable resistor in the feedback path. This resistor is adjusted to provide compensation for losses incurred when narrow bandwidths are selected. When the 10 kHz bandwidth is selected the input signal is coupled to Q4 thru C1 and R4. When the 30 kHz bandwidth is selected the input signal is coupled to Q4 thru C1 and the parallel combination of R4 and R3. When the 100 kHz bandwidth is selected the signal is coupled to Q4 thru C1/R4 and C2/R5 in parallel. When the 300 kHz bandwidth is selected all four stages are bypassed and the signal is coupled directly to the output amplifier. Operation of Q3, Q2 and Q1 is identical to that described for Q4.

TEST PROCEDURE 1

With a 30 MHz, -10 dBm signal applied to the analyzer RF INPUT, connect the HP 8405A to TP 1, Q1 emitter. Tune the analyzer for maximum with the BANDWIDTH switch in the 10 kHz position. Typical meter reading is 300 mV rms.

Rotate the BANDWIDTH switch to the 30, 100 and 300 kHz positions. The meter reading should be approximately the same for bandwidths of 10, 30, and 100 kHz, and drop to approximately 0 volt in the 300 kHz BANDWIDTH position.

If the signal is not present at any of the BANDWIDTH settings the trouble is likely to be in one of the four stages. To isolate to a defective stage

check for the presence of the signal at the emitter of Q2, then Q3, then Q4. Signal levels should approximate those specified for Q1 emitter. If the cause of the malfunction is not detected, proceed to step 2

If the signal is correct at some, but not all, bandwidth selections, trouble is likely to be in the switching or diode matrix. Proceed to step 2

If the correct readings are observed, proceed to step 3

2 SWITCHING AND DIODE MATRIX

When the BANDWIDTH switch is in the 300 kHz position, -12.6 volts are applied to XA1-8. This dc level accomplishes the following:

a. Overcomes the positive voltage applied through R42 to forward bias CR9 and CR12. This allows the input signal to be coupled directly to the output amplifier.

b. Forward biases CR13 to provide a dc level to the diodes in the Crystal Filter assembly. This causes the Crystal Filter circuits to be bypassed.

c. Forward biases CR11 to disable the first selectable bandwidth stage Q4.

d. Forward biases CR16 to reverse bias CR17 and disconnect the fourth selectable bandwidth stage Q1 from the output stage.

When the BANDWIDTH switch is placed in the 100 kHz position, -12.6 volts is applied to XA1-10/L. This -12.6 volts is applied to LC Filter diodes and also forward biases CR15 to operate the bypass circuit in the Crystal Filter assembly. The diode bias voltage forward biases CR2, CR4, CR6, and CR8 to place resistors R5, R14, R23, and R33 in parallel with those already in the signal path. This effectively swamps the LC circuits to modify their Q factor and provide a bandpass of 100 kHz centered at 3 MHz.

When the BANDWIDTH switch is placed in the 30 kHz position, -12.6 volts is applied to XA1-12/N. This -12.6 volts is applied to LC Filter diodes and also forward biases CR14 to operate the bypass circuit in the Crystal Filter assembly. The diode bias voltage forward biases CR1, CR3, CR5 and CR7 to place resistances R3, R11, R20, and R31 in parallel with those already in the signal path. This effectively swamps the LC circuits to modify their Q factors and provide a bandpass of 30 kHz centered at 3 MHz.

When the BANDWIDTH switch is placed in the 10 kHz position the switching diodes are not used for signal steering and the LC filter provides a 10 kHz bandpass centered at 3 MHz.

TEST PROCEDURE

Use the HP 3440A/3443A to check for voltages shown in the chart for XA1 contacts on Service Sheet 9, step 2

If the correct readings are obtained at XA1 pins 6, 12, 10, and 8, check the diode matrix. If correct readings are not obtained, check the BANDWIDTH switch, SCAN WIDTH switch, CR1, CR2, CR3, wiring, etc.

When correct readings are obtained, recheck step 1 then proceed to step 3

SERVICE SHEET 8 (cont'd)

3 0 dB, 10 dB, 20 dB STEP AMPLIFIER

Q5, Q6, Q7 and associated components comprise a feedback amplifier which provides unity gain, 10 dB of gain or 20 dB of gain depending on the position of the LOG REF LEVEL control. When operated as a unity gain amplifier it provides isolation and a low impedance output to the Crystal Filter assembly. Gain of the amplifier is controlled by networks in the emitter of Q5. When switched on by the LOG REF LEVEL assembly, these circuits control the amplifier's negative feedback.

TEST PROCEDURE 3

With a 30 MHz, -10 dBm signal applied to the analyzer RF INPUT, connect the HP 8405A to TP 6 (Q7-e). Tune the analyzer for maximum, rotate the INPUT ATTENUATION and LOG REF LEVEL controls as indicated below and observe meter readings. Signal levels shown are typical.

If signal levels are correct, the step amplifier and diode-switched networks are functioning properly.

If signal levels are incorrect, check Q5/Q6/Q7 and associated components.

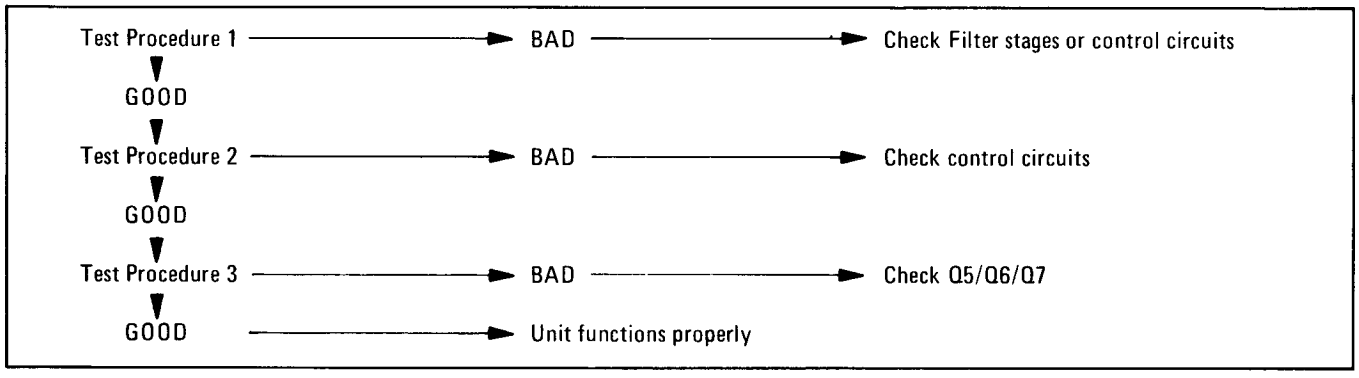
If the diode enabling dc levels are not present, check the Log Ref Level assembly, Service Sheet 9.

NOTE

When repairs are required the tests specified in paragraphs 5-33 and 5-36 of Section V should be performed.

INPUT ATTENUATION	LOG REF LEVEL*	TP6
0 dB	-10 dBm	0 dBm
10 dB	-10 dBm	0 dBm
20 dB	-10 dBm	0 dBm
*Read at lit index lamp		

Simplified Test Procedure Tree



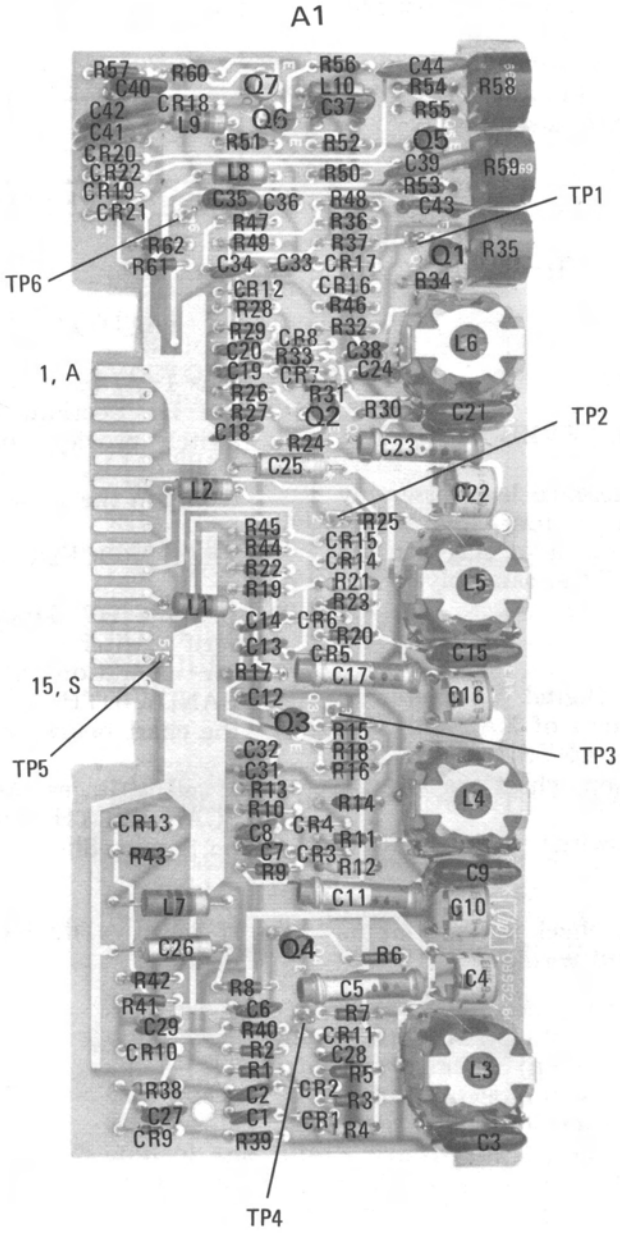
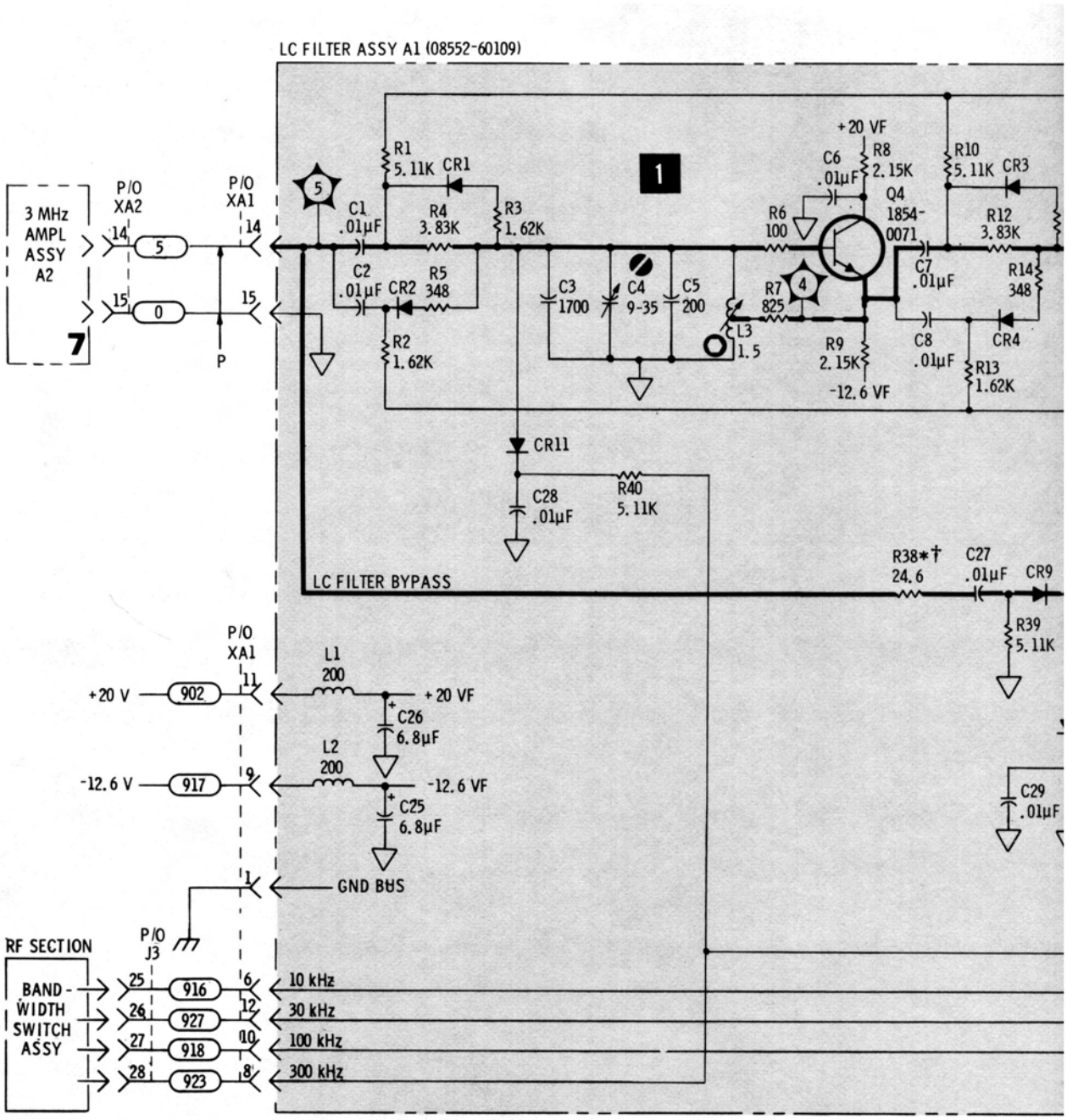
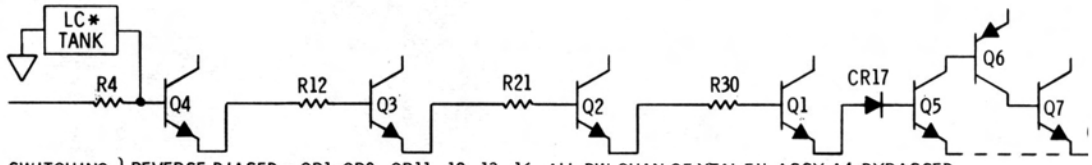


Figure 8-28. LC Filter A1 Component Identification



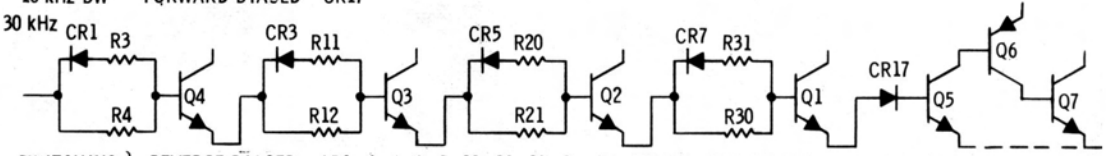
SIGNAL FLOW

SIGNAL FLOW - 10 kHz BW



SWITCHING 10 kHz BW | REVERSE BIASED - CR1-CR9, CR11, 12, 13, 16, ALL BW CHAN OF XTAL FIL ASSY A4 BYPASSED.
FORWARD BIASED - CR17

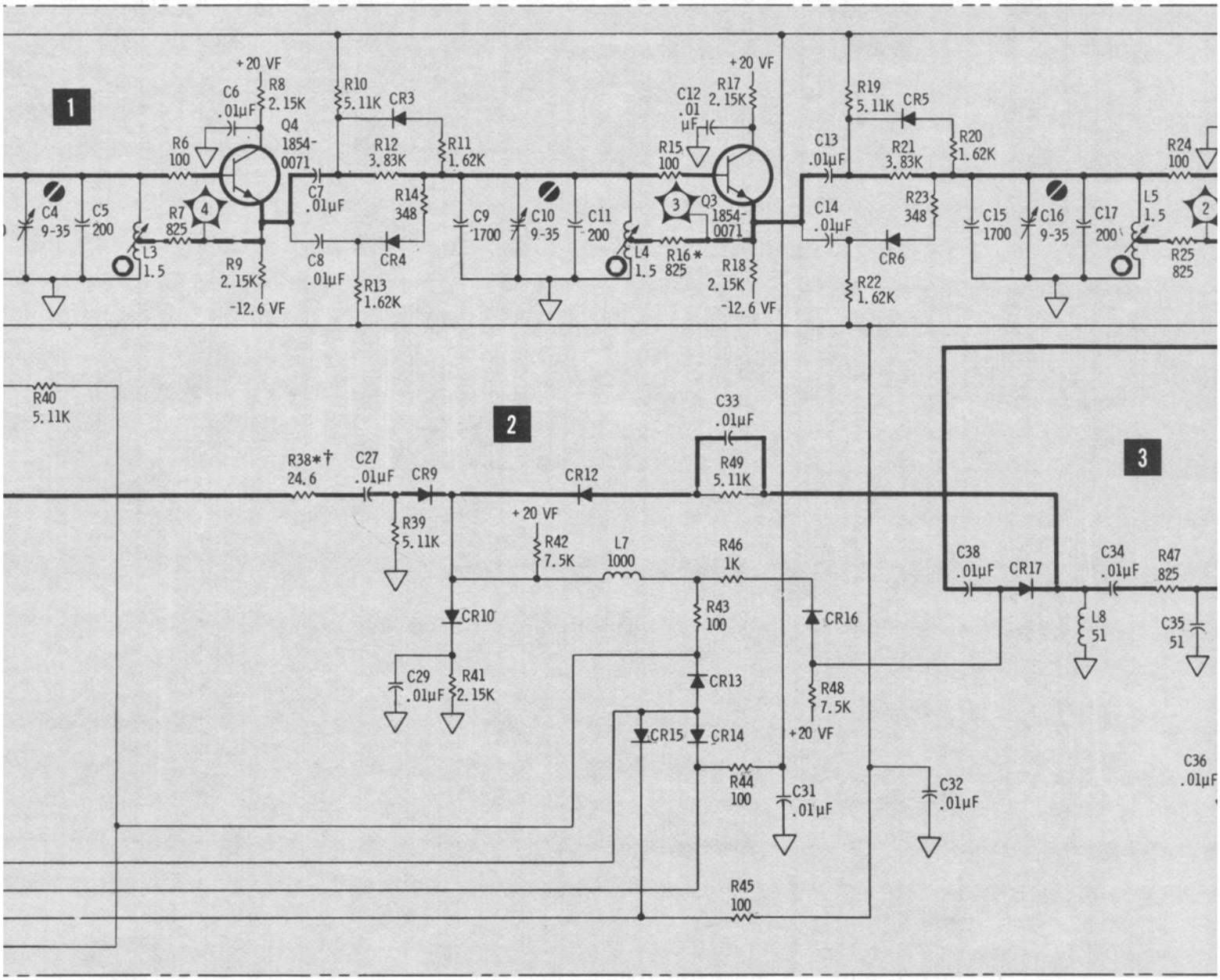
SIGNAL FLOW - 30 kHz



SWITCHING 30 kHz BW | REVERSE BIASED - CR2, 4, 6, 8, 9, 11, 12, 13, 15, 16, ALL BW CHAN OF XTAL FIL ASSY A4 BYPASSED.
FORWARD BIASED - CR1, 3, 5, 7, 14, 17

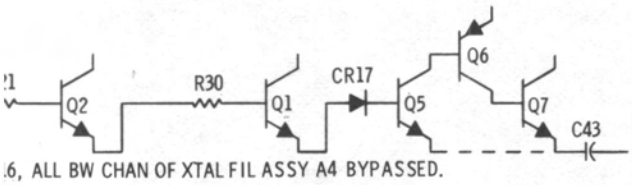
*COMMON TO F

SERIAL PREFIX: 977

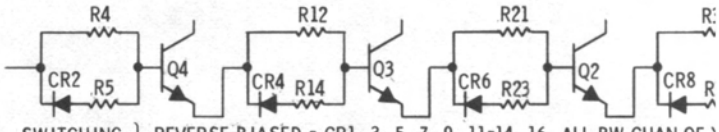


SIGNAL FLOW PATH

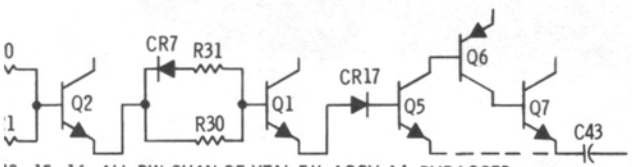
SIGNAL FLOW - 100 kHz



.6, ALL BW CHAN OF XTAL FIL ASSY A4 BYPASSED.



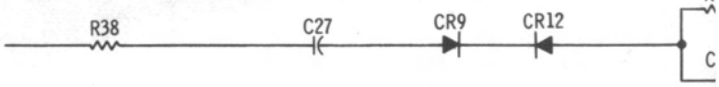
SWITCHING 100 kHz BW } REVERSE BIASED - CR1, 3, 5, 7, 9, 11-14, 16, ALL BW CHAN OF X
FORWARD BIASED - CR2, 4, 6, 8, 15, 17



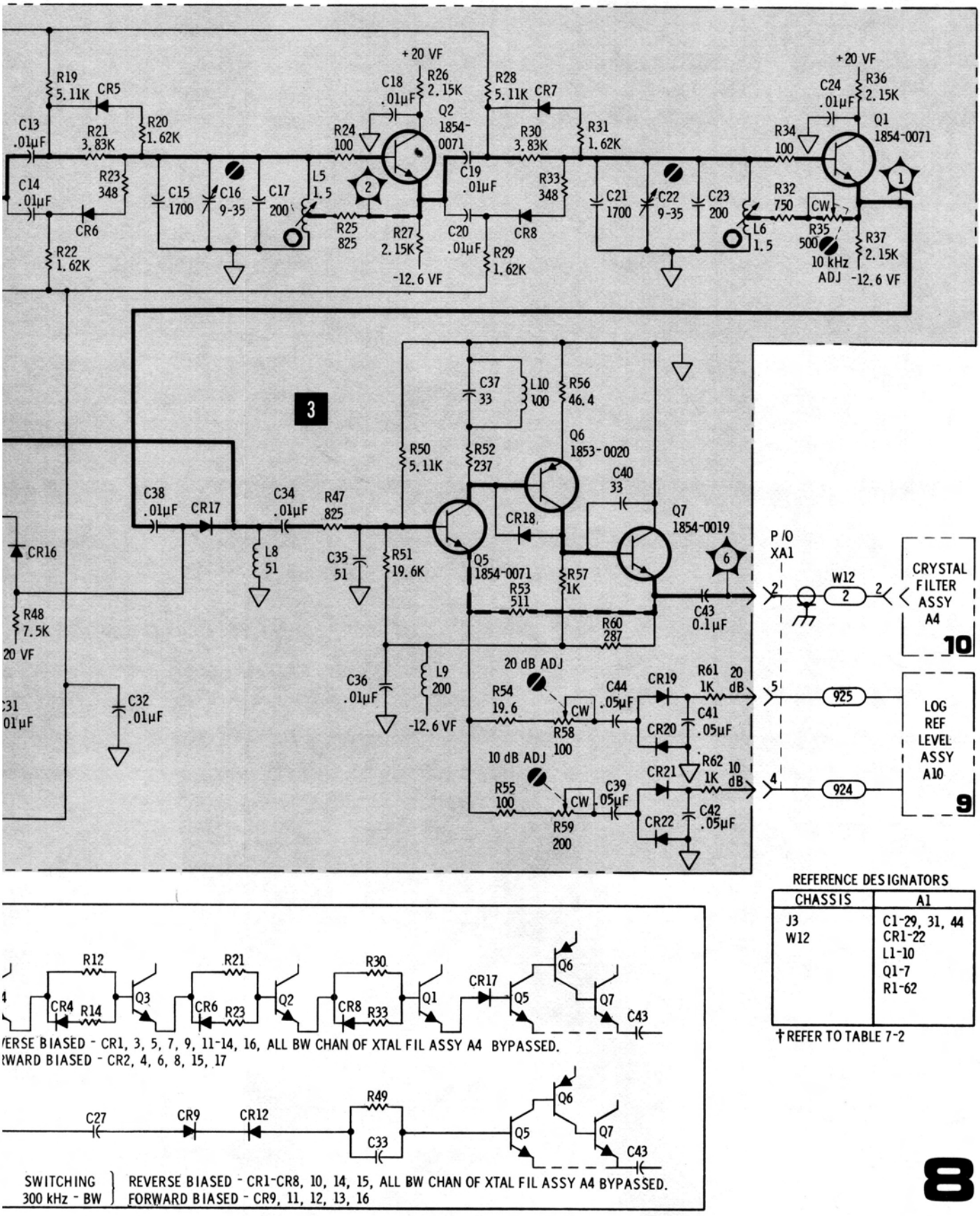
13, 15, 16, ALL BW CHAN OF XTAL FIL ASSY A4 BYPASSED.

*COMMON TO FIRST FOUR STAGES FOR EACH SELECTED BW.

SIGNAL FLOW - 300 kHz



SWITCHING 300 kHz - BW } REVERSE BIASED - CR1-CR8, 10, 14, 15,
FORWARD BIASED - CR9, 11, 12, 13, 16



REFERENCE DESIGNATORS

CHASSIS	A1
J3 W12	C1-29, 31, 44 CR1-22 L1-10 Q1-7 R1-62

† REFER TO TABLE 7-2

Figure 8-29. LC Bandwidth Filter

A1
LC Bandwidth Filter

SERVICE SHEET 9

Normally, malfunctions which occur in the switching circuits will be detected and corrected while troubleshooting circuits shown on Service Sheets 6 and 8.

TROUBLESHOOTING PROCEDURE

Since these switches function for voltage switching only, all components and wiring can be checked by monitoring voltage levels at the input connector to the 3 MHz IF amplifier, LC Filter assembly, and the Crystal Filter assembly.

EQUIPMENT REQUIRED

SERVICE KIT . . . . . HP 11592A
DIGITAL VOLTMETER . . . HP 3440A/3443A

CONTROL SETTINGS

As required to check dc levels

1 P/O LOG REFERENCE LEVEL ASSEMBLY

This portion of the log reference level assembly applies +20 volts or -12.6 volts to enable or disable switches to control the gain of stages in the 3 MHz IF amplifier and LC Filter assembly.

TEST PROCEDURE **1**

Use the HP 3440A/3443A Digital Voltmeter to verify switching voltages at pins of XA1 and XA2 for operation of LOG REF LEVEL switch. The voltages shown in the adjacent chart are typical.

If voltages are correct, the switch section is functioning properly.

If voltages are not correct, check voltage inputs to switch, switch contacts and wiring.

Pin of XA2	Log Ref Level Switch Settings (dBm) *					
	-10	-20	-30	-40	-50	-60
8	+20	+20	+20	-12.6	-12.6	-12.6
10	+20	+20	+20	+20	-12.6	-12.6
7	+20	+20	+20	+20	+20	-12.6
Pin of XA1						
4	+20	-12.6	-12.6	-12.6	-12.6	-12.6
5	+20	+20	-12.6	-12.6	-12.6	-12.6

*Read at left index lamp.

2 BANDWIDTH CONTROL

Pins 1—4, 14, and 25—28 of J3 make contact with the RF Section. The RF Section BANDWIDTH switch provides positive or negative voltages to add, bypass or remove bandwidth shaping elements in the signal path.

TEST PROCEDURE **2**

Use the HP 3440A/3443A Digital Voltmeter to verify switching voltages at pins of XA1 and XA4 for operation of SCAN WIDTH switch and BANDWIDTH switches. The voltages shown in the chart below are typical.

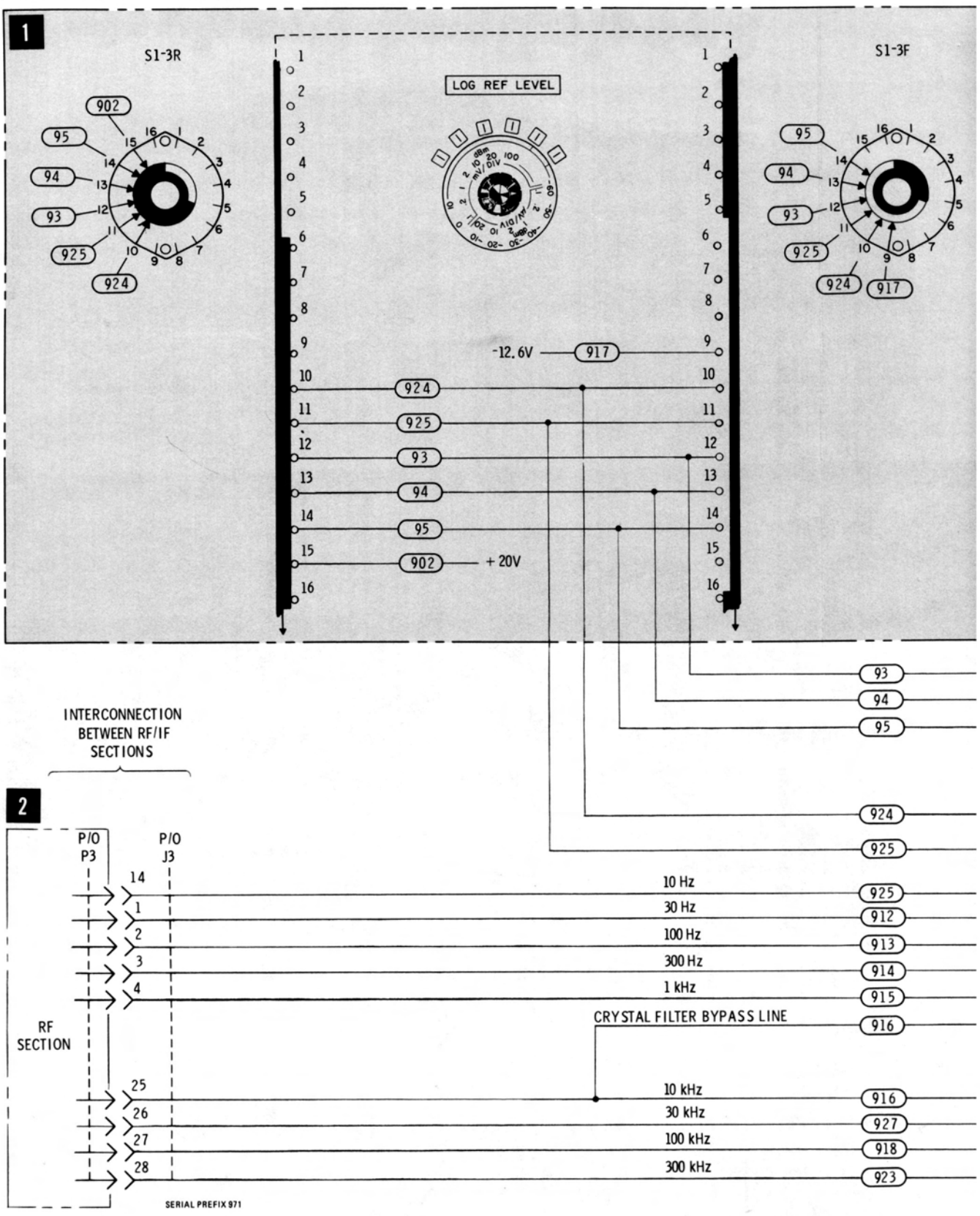
If all voltages are correct the portions of the SCAN WIDTH and BANDWIDTH switches shown on Service Sheet 9 are functioning properly.

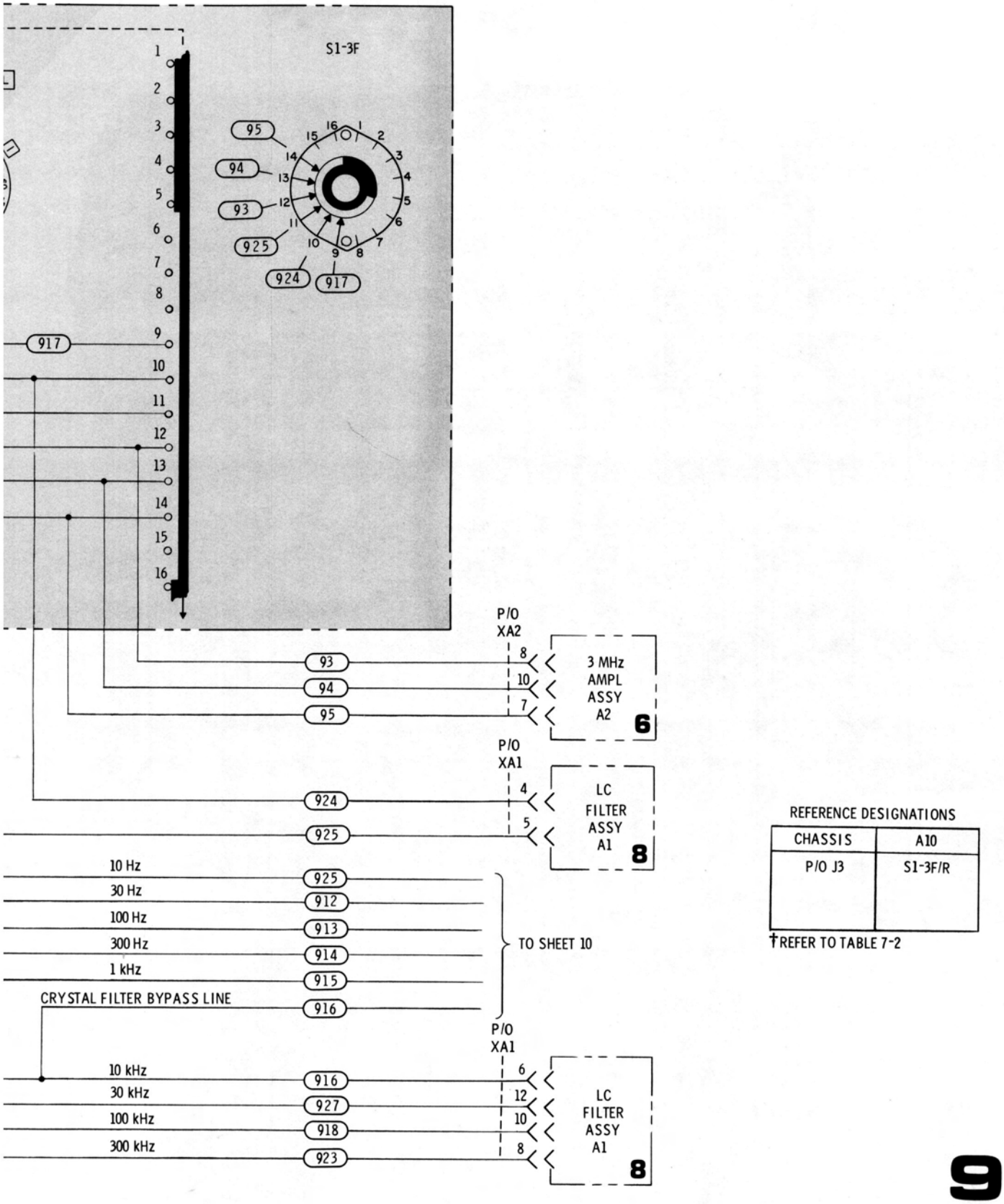
If negative dc levels are missing, check the RF Section.

Pin of XA1	Bandwidth Switch Settings (kHz)									
	.01/.05	.03/.05	0.1	0.3	1	3	10	30	100	300
8*	+ 5	+ 5	+ 5	+5	+ 5	+ 5	+ 5	+ 5	+ 5	- 10
8**	-10	- 10	- 10	- 10	- 10	- 10	- 10	- 10	- 10	- 10
10*	+20	+20	+20	+20	+20	+20	+20	+20	- 10	+20
10**	+20	+20	+20	+20	+20	+20	+20	+20	- 3	+20
12*	+20	+20	+20	+20	+20	+20	+20	- 10	+20	+20
12**	+20	+20	+20	+20	+20	+20	+20	0	+20	+20
6*	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5	- 10	- 10	- 10	- 10
6**	- 9	- 9	- 9	- 9	- 9	- 9	- 9	- 9	- 9	- 9
Pin of XA4										
13*	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5	- 9	- 9	- 9	- 9
13**	- 9	- 9	- 9	- 9	- 9	- 9	- 9	- 9	- 9	- 9
11*	+20	+20	+20	+20	+20	+20	+20	+20	+20	+20
11**	+20	+20	+20	+20	+20	+20	+20	+20	+20	+20
10*	+20	+20	+20	- 10	+20	+20	+20	+20	+20	+20
10**	+20	+20	+20	+0.8	+20	+20	+20	+20	+20	+20
8*	+20	+20	- 10	+20	+20	+20	+20	+20	+20	+20
8**	+20	+20	+0.9	+20	+20	+20	+20	+20	+20	+20
7*	-10	- 10	+20	+20	+20	+20	+20	+20	+20	+20
7**	+1.2	+1.2	+20	+20	+20	+20	+20	+20	+20	+20
6*	- 10	+20	+20	+20	+20	+20	+20	+20	+20	+20
6**	+0.5	+20	+20	+20	+20	+20	+20	+20	+20	+20

*ZERO or PER DIVISION mode **Preset mode

LOG REF LEVEL ASSY A10 (08552-60134)





REFERENCE DESIGNATIONS

CHASSIS	A10
P/O J3	S1-3F/R

†REFER TO TABLE 7-2

Figure 8-30. Amplifier/Filter Control Circuits

SERVICE SHEET 10

It is assumed that the 3 MHz IF signal from the LC Filter and the dc operating voltages are present and correct and that the 3 MHz output is missing or out of tolerance.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated to the 3 MHz Crystal Filter assembly, the assembly should be removed and reinstalled using the extender board to provide access to components. Test procedures follow descriptions of individual circuits.

NOTE

Some of the Crystal Filter circuits are shown on Service Sheet 11.

EQUIPMENT REQUIRED

SERVICE KIT	HP 11592A
VECTOR VOLTMETER	HP 8405A
DIGITAL VOLTMETER	HP 3440A/3443A

CONTROL SETTINGS

INPUT ATTENUATION	0 dB
BANDWIDTH	3 kHz
LOG REF LEVEL	-30 dBm
SCAN WIDTH	ZERO
LOG·LINEAR	10 dB LOG
FREQUENCY	30 MHz

1 SELECTABLE BANDWIDTH CRYSTAL FILTER STAGES

Filter stages Y1-3 (and Y4 and 5 on Service Sheet 11) are unity gain, selectable bandwidth crystal filters; their basic bandwidth is 3 kHz. Bandwidth can be narrowed in steps (1, 0.3, 0.1, .03 and .01 kHz) by enabling resistive networks that are in parallel with each stage's output.

All five stages are basically the same: Q1, Q2 and Q4 comprise a unity-gain feedback amplifier with high input impedance at 3 MHz. Q3 and C18 null out the parasitic (holder) capacitance of Y1. L11, L12 and C19 form a tank that tunes out stray capacitance to give Y1 a pure resistive load at 3 MHz. The selectable resistive networks at Y1's output control the filter's bandwidth, by decreasing Y1's output load, without drastically effecting the amplitude of the 3 MHz signal. C30 and 43 (and C57 and 70 on Service Sheet 11) tune the center frequency of crystal stages Y2-5 to equal the center frequency of the first stage.

SERVICE SHEET 10 (cont'd)

TEST PROCEDURE 1

With CAL OUTPUT connected to RF INPUT, measure the signal level at TP 10 (on Service Sheet 11) at bandwidths of 1 kHz, 0.3 kHz, 0.1 kHz, .03 kHz, and .01 kHz with the HP 8405A. Readjust FINE TUNE for maximum signal during each measurement. Meter readings should be about 150 mV rms.

NOTE

FINE TUNE adjustment is very critical at narrow bandwidths and extreme care will be required to obtain correct measurements.

If the signal were correct at all bandwidths, proceed to step 3 . If the signal were incorrect at some, but not all bandwidths, proceed to step 2 .

If the signal were incorrect at all bandwidths, isolate the faulty stage by measuring the signal at TP6 and TP7 (and TP8 and TP9 on Service Sheet 11). Meter readings should be about the same as TP10.

2 DIODE SWITCHING AND BANDWIDTH CONTROL NETWORKS

There are five switching and bandwidth control networks, one for each of the five crystal filter stages. When the analyzer is operated in the 3 kHz BANDWIDTH mode all of the switching diodes are reverse biased and the inherent characteristics of the filter plus the fixed output load determines the filter bandwidth. The bandwidth is decreased as resistive networks are switched in parallel with the output load of each crystal filter stage. For example, R68 and C54 are switched across the output of Y3 when the BANDWIDTH switch is placed in the 1 kHz position; CR25 is forward biased by -12.6 volts.

TEST PROCEDURE 2

Using the digital voltmeter, check the five control lines. There should be about -12.6 volts on the line selected by the BANDWIDTH switch and about +20 volts on the unselected lines.

If the voltages are incorrect, see Service Sheet 9.

If the voltages are correct, use step 2 and step 1 to find the faulty stage and resistive network.

3 CRYSTAL FILTER BYPASS CIRCUIT

Described on Service Sheet 11.

NOTE

After repairing any of the circuits on the Crystal Filter Assembly, the assembly should be adjusted in accordance with Paragraph 5-34 of Section V.

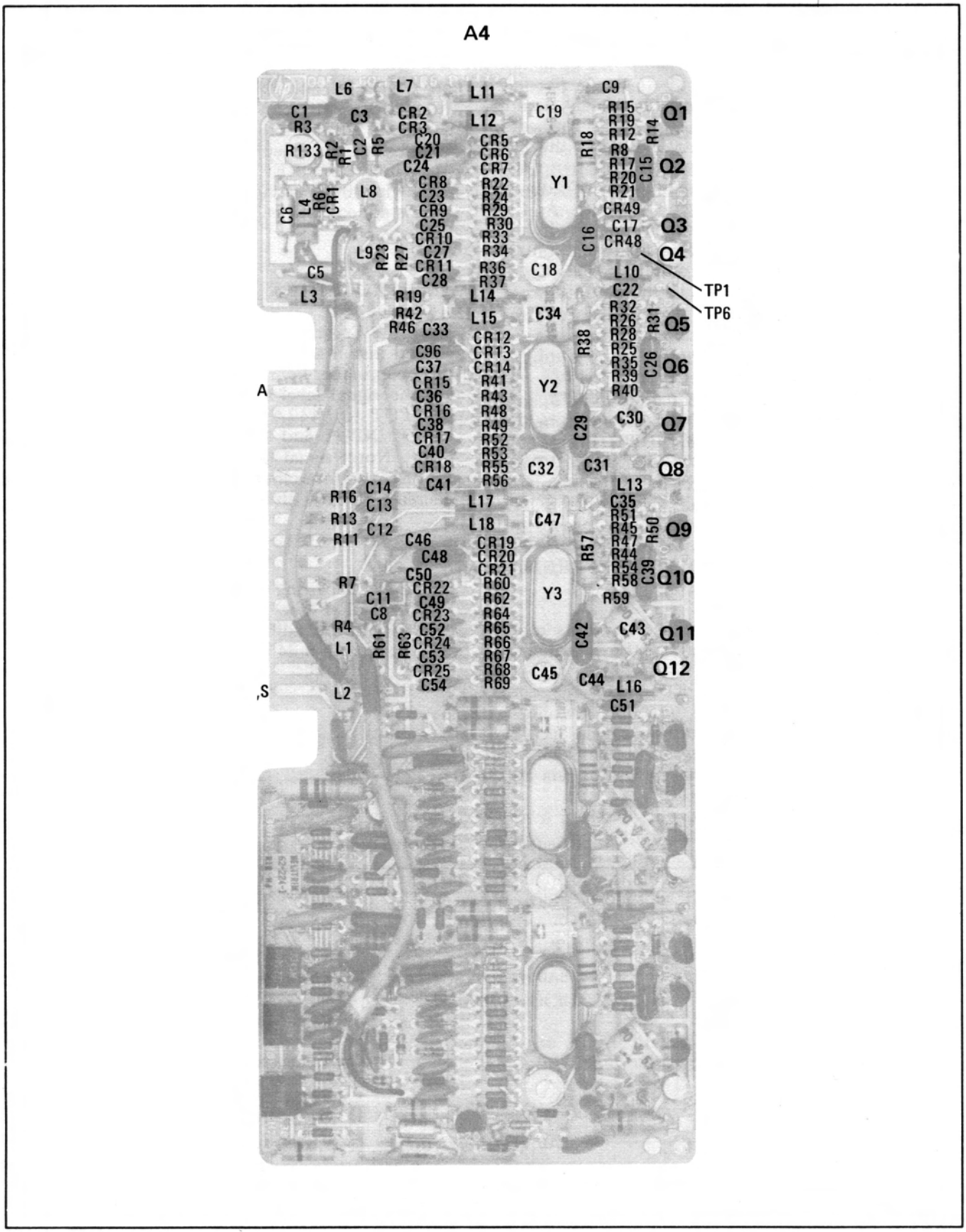
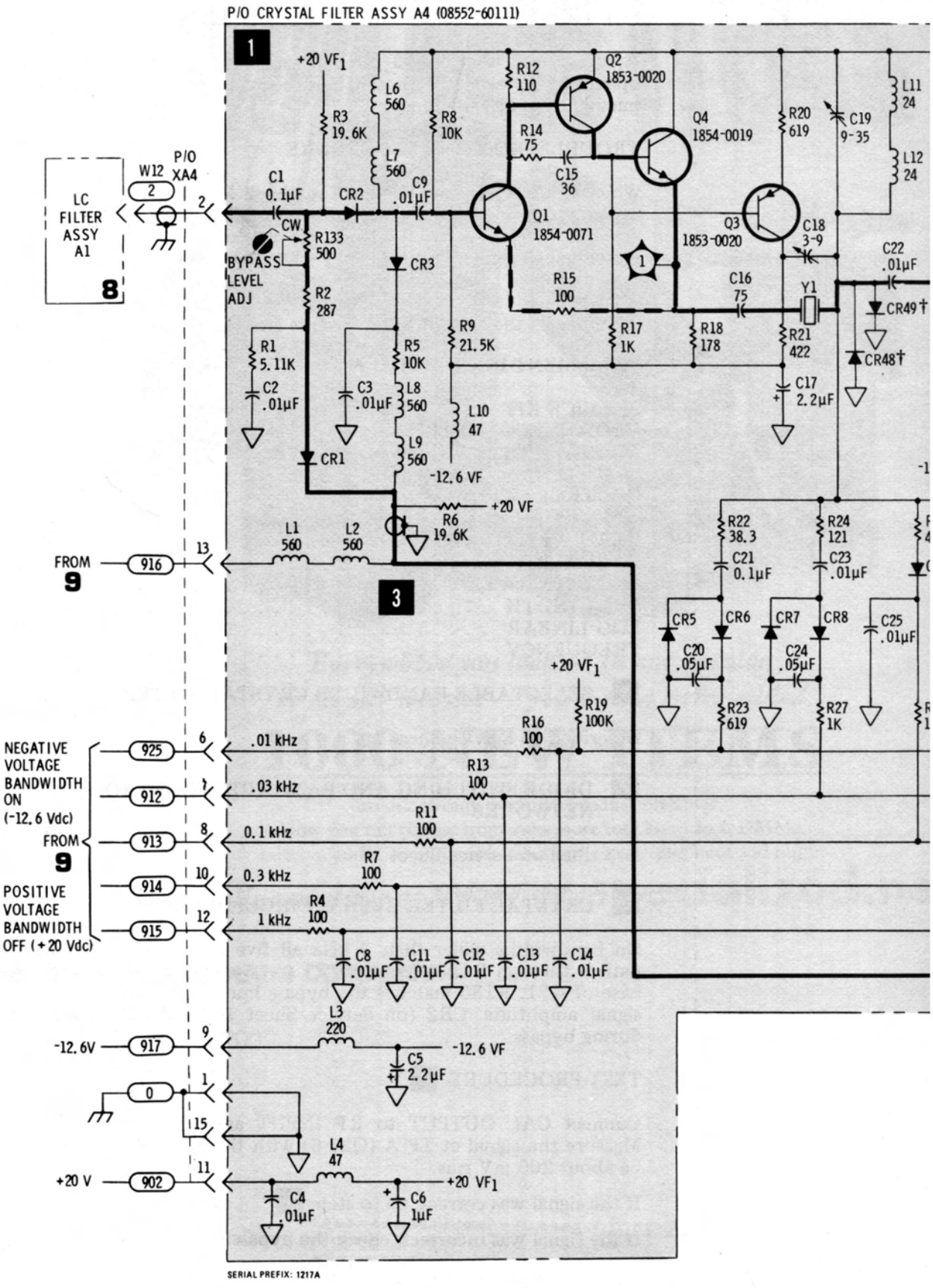
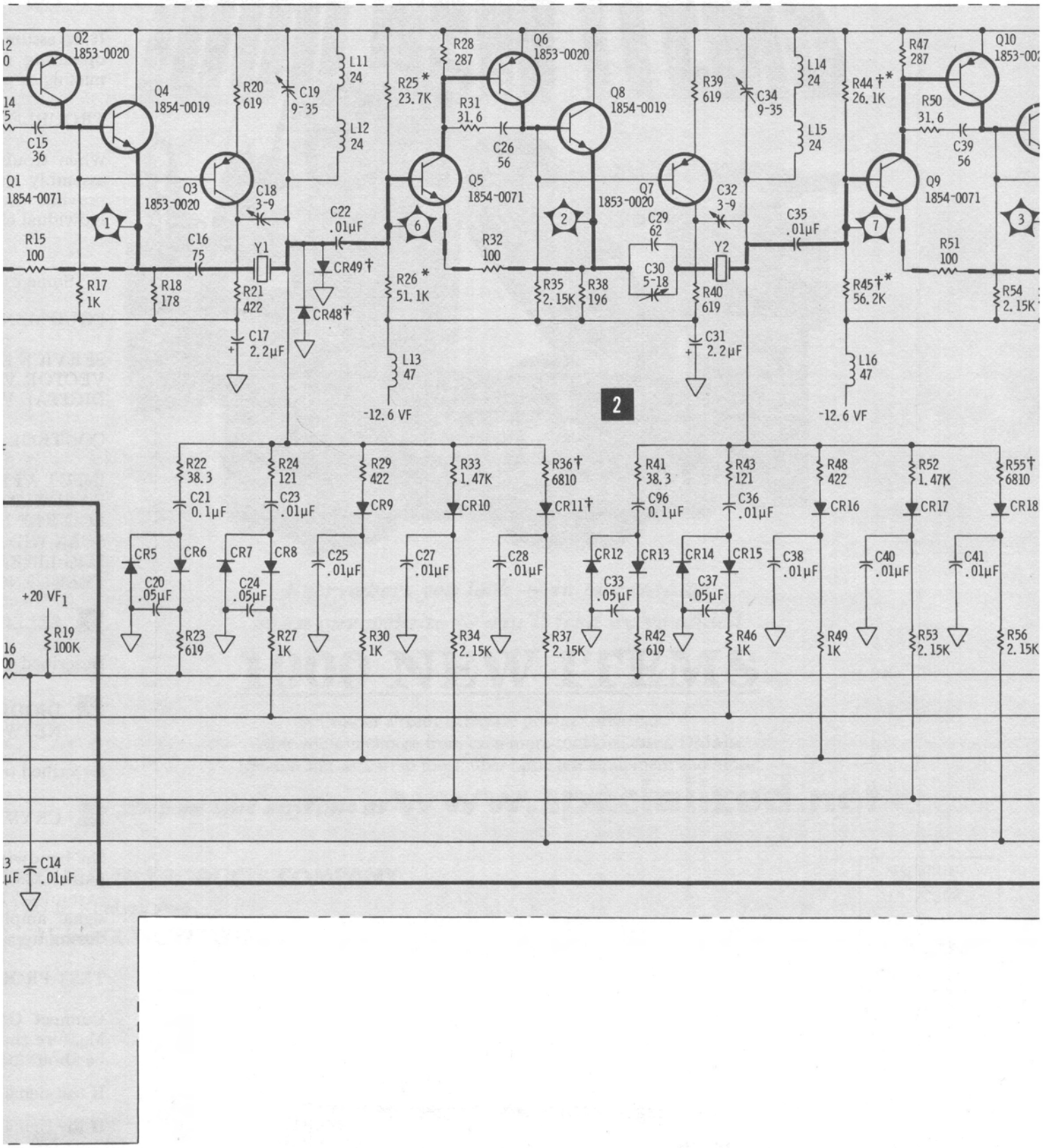
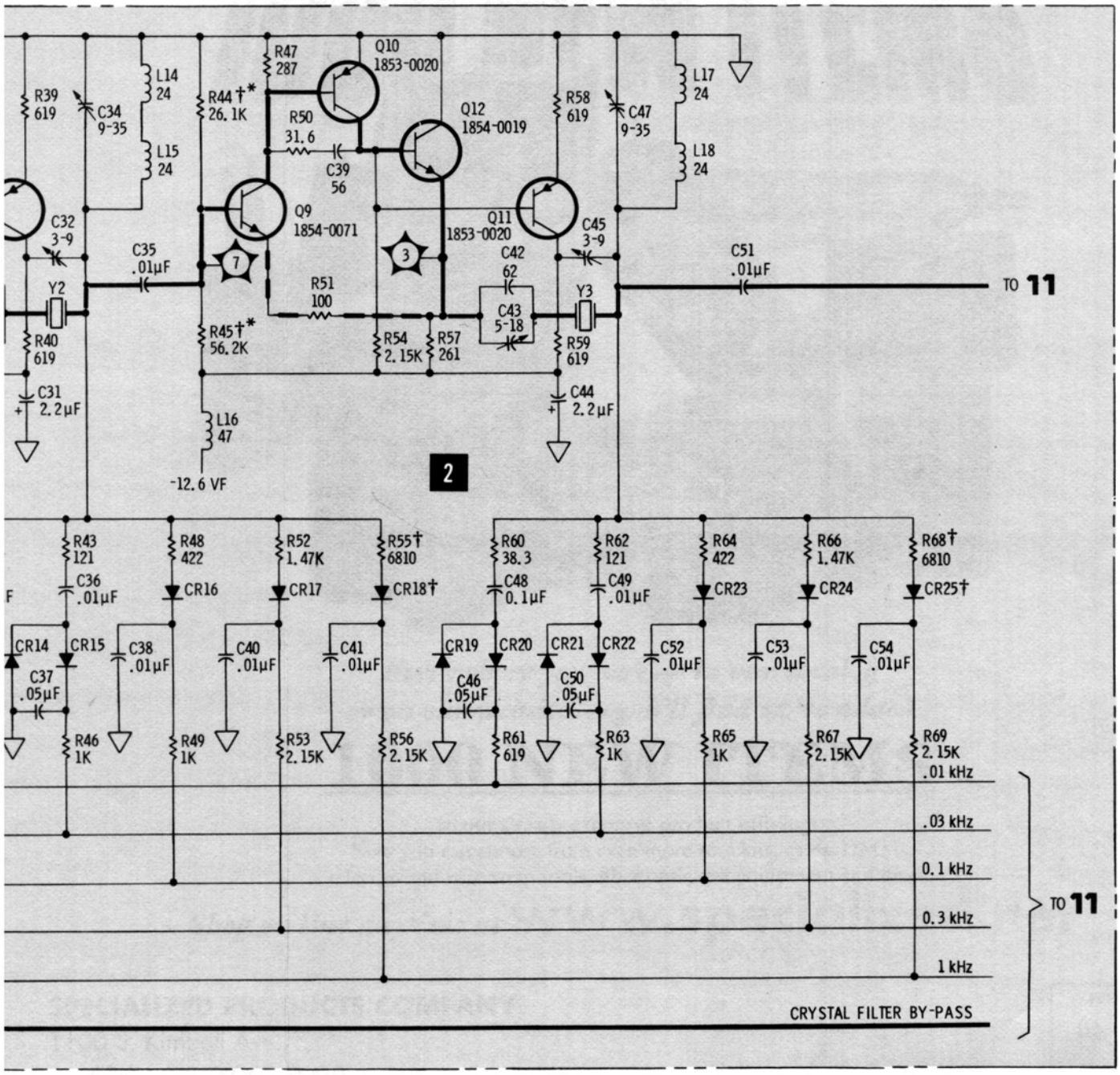


Figure 8-31. P/O Crystal Filter A4 Component Identification


P/O CRYSTAL FILTER ASSY A4 (08552-60111)
1
+20 VF1
R3 19.6K
L6 560
L7 560
R8 10K
R12 110
Q2 1853-0020
R14 75
C15 36
Q4 1854-0019
R20 619
C19 9-35
L11 24
L12 24
C1 0.1µF
CR2
C9 .01µF
Q1 1854-0071
Q3 1853-0020
C18 3-9
C22 .01µF
CR49†
CR48†
P/O XA4
W12
2
LC FILTER ASSY A1
8
CW
R133 500
BYPASS LEVEL ADJ
R2 287
CR3
R15 100
C16 75
Y1
R1 5.11K
C2 .01µF
R5 10K
C3 .01µF
L8 560
L9 560
CR1
R9 21.5K
L10 47
R17 1K
R18 178
R21 422
C17 2.2µF
-12.6 VF
+20 VF
R6 19.6K
L1 560
L2 560
FROM 916
13
3
R22 38.3
C21 0.1µF
R24 121
C23 .01µF
CR5
CR6
CR7
CR8
C25 .01µF
C20 .05µF
C24 .05µF
R23 619
R27 1K
+20 VF1
R19 100K
R16 100
NEGATIVE VOLTAGE BANDWIDTH ON (-12.6 Vdc)
FROM 9
925
6
.01 kHz
912
.03 kHz
R13 100
913
8
0.1 kHz
R11 100
914
10
0.3 kHz
R7 100
POSITIVE VOLTAGE BANDWIDTH OFF (+20 Vdc)
915
12
1 kHz
R4 100
C8 .01µF
C11 .01µF
C12 .01µF
C13 .01µF
C14 .01µF
L3 220
-12.6V
917
9
-12.6 VF
C5 2.2µF
0
1
15
L4 47
+20 V
902
11
+20 VF1
C4 .01µF
C6 1µF
SERIAL PREFIX: 1217A


Q2
1853-0020
Q4
1854-0019
Q1
1854-0071
Q3
1853-0020
Q6
1853-0020
Q8
1854-0019
Q5
1854-0071
Q7
1853-0020
Q10
Q9
1854-0071
R20
619
C19
9-35
L11
24
L12
24
R25 *
23.7K
R28
287
R31
31.6
C26
56
R39
619
C34
9-35
L14
24
L15
24
R44 †*
26.1K
R47
287
R50
31.6
C39
56
C15
36
R15
100
C16
75
Y1
C18
3-9
C22
.01µF
CR49†
CR48†
R17
1K
R18
178
R21
422
C17
2.2µF
R26 *
51.1K
L13
47
-12.6 VF
R32
100
R35
2.15K
R38
196
C29
62
C30
5-18
Y2
C32
3-9
C35
.01µF
R40
619
C31
2.2µF
R45†*
56.2K
L16
47
-12.6 VF
R51
100
R54
2.15K
2
R22
38.3
C21
0.1µF
R24
121
C23
.01µF
R29
422
CR9
R33
1.47K
CR10
R36†
6810
CR11†
R41
38.3
C96
0.1µF
R43
121
C36
.01µF
R48
422
CR16
R52
1.47K
CR17
R55†
6810
CR18
CR5
CR6
CR7
CR8
C20
.05µF
C24
.05µF
C25
.01µF
C27
.01µF
C28
.01µF
CR12
CR13
CR14
CR15
C33
.05µF
C37
.05µF
C38
.01µF
C40
.01µF
C41
.01µF
+20 VF1
R19
100K
R23
619
R27
1K
R30
1K
R34
2.15K
R37
2.15K
R42
619
R46
1K
R49
1K
R53
2.15K
R56
2.15K
C14
.01µF



REFERENCE DESIGNATIONS

A4	CHASSIS
C1-6,8,9 11-54,96 CR1-3,5-25, 48,49 L1-4, 6-18 Q1-12 R1-9, 11-69,133 Y1-3	W12 P/O XA4

†REFER TO TABLE 7-2

10

Figure 8-32. Crystal Filter (1 of 2)

SERVICE SHEET 11

It is assumed that the 3 MHz IF signal from the LC Filter and the dc operating voltages are present and correct and that the 3 MHz output is missing or out of tolerance.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated to the 3 MHz Crystal Filter assembly, the assembly should be removed and re-installed using the extender board to provide access to components. Test procedures follow descriptions of individual circuits.

NOTE

Some of the Crystal Filter circuits are shown on Service Sheet 10.

EQUIPMENT REQUIRED

SERVICE KIT	HP 11592A
VECTOR VOLTMETER	HP 8405A
DIGITAL VOLTMETER	HP 3440A/3443A

CONTROL SETTINGS

INPUT ATTENUATION	0 dB
BANDWIDTH	3 kHz
LOG REF LEVEL	0 dBm
SCAN WIDTH	ZERO
LOG·LINEAR	10 dB LOG
FREQUENCY	30 MHz

1 SELECTABLE BANDWIDTH CRYSTAL FILTER STAGES

Described on Service Sheet 10.

2 DIODE SWITCHING AND BANDWIDTH CONTROL NETWORKS

Described on Service Sheet 10.

3 CRYSTAL FILTER BYPASS CIRCUIT

On bandwidths wider than 3 kHz all five crystal filters are bypassed. The path is through R133, R2 and CR1 (on Service Sheet 10) and CR26 to the base of Q21. R133 matches the bypass line's signal amplitude to the filter's signal amplitude. CR2 (on Service Sheet 10) and CR38 isolate the filters during bypass.

TEST PROCEDURE 3

Connect CAL OUTPUT to RF INPUT and set BANDWIDTH to 3 kHz. Measure the signal at TP A (Q21-6) with the HP 8405A; signal level should be about 200 mV rms.

If the signal was correct, go to step 4

If the signal was incorrect, check the bypass circuit.

SERVICE SHEET 11 (cont'd)

4 OUTPUT AMPLIFIER GAIN AND COMPENSATION CIRCUIT

The output amplifier compensates for any bandwidth-gain differences in the filter stages for bandwidths 0.3 kHz and below. Q23 isolates the last filter stage from the compensation amplifier, Q21, 22 and 24. The compensation amplifier is feedback controlled and has a basic gain of four. As the narrow bandwidth control networks are switched into the filters, a corresponding feedback control network is switched into the amplifier. The legs of the networks are adjustable and the amplitudes of the narrower bandwidths (0.3, 0.1, .03 and .01 kHz) are referenced to the 3 kHz amplitude.

TEST PROCEDURE 4

With CAL OUTPUT connected to RF INPUT, connect the HP 8405A to TP B (XA4-14) and tune the analyzer for maximum with BANDWIDTH set to 3 kHz. Meter should read about 900 mV rms. Check the 0.3, 0.1, .03, and .01 kHz bandwidths; meter should read the same (peak signal with FINE TUNE at each bandwidth).

5 IF ATTENUATOR (P/O) LOG REFERENCE LEVEL ASSEMBLY A10

The portion of the Log Reference Level assembly shown on Service Sheet 11 is the IF Attenuator. 8552B IF signal gain, from the 50 MHz input to the Log Amplifier, is unity when LOG REF LEVEL is set to -10 dBm (read at left index light). When LOG REF LEVEL is rotated clockwise (-20 dBm, -30 dBm, etc.) 10 dB of IF amplification is added with each step (see Service Sheets 6 through 9). When LOG REF LEVEL is rotated counterclockwise (0 dBm, 10 dBm, etc.) 10 dB of attenuation is added with each step by the IF Attenuator.

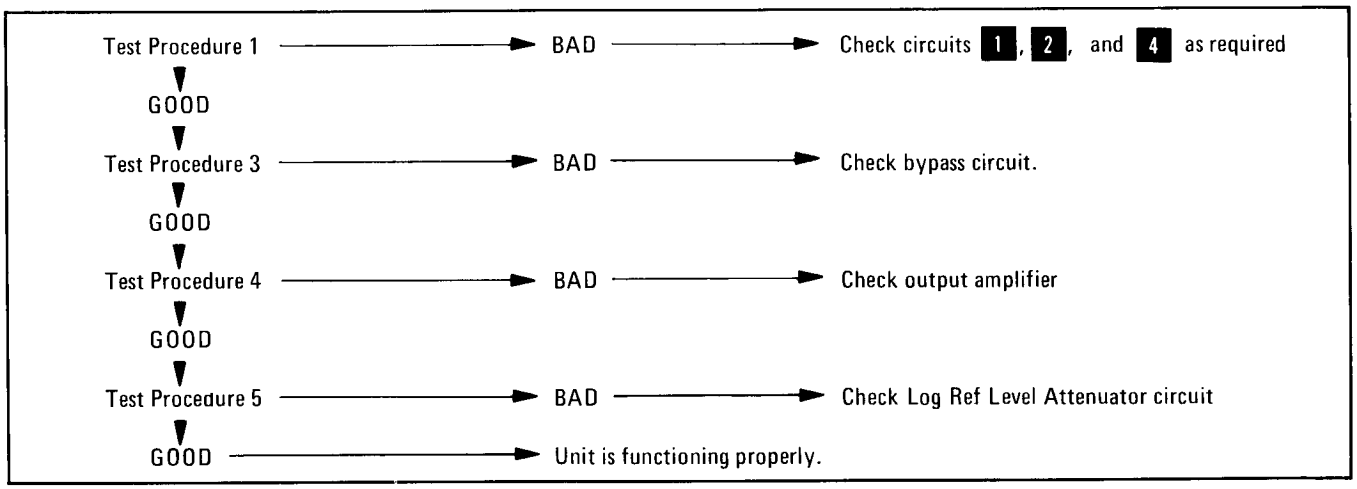
TEST PROCEDURE 5

Place the Crystal Filter assembly back in the chassis and install the Lin/Log Amplifier Assembly A8 on the extender board. Use the HP 8405A to monitor the signal level at TP C (XA8-2). Attach CAL OUTPUT to 8447A INPUT and 8447A OUTPUT to RF INPUT and set LOG REF LEVEL to -10 dBm. Note signal level and rotate LOG REF LEVEL counterclockwise. Signal level should decrease 10 dB with each step.

NOTE

After repairing any of the circuits on the Crystal Filter Assembly, the assembly should be adjusted in accordance with paragraph 5-34 of Section V.

Simplified Test Procedure Tree



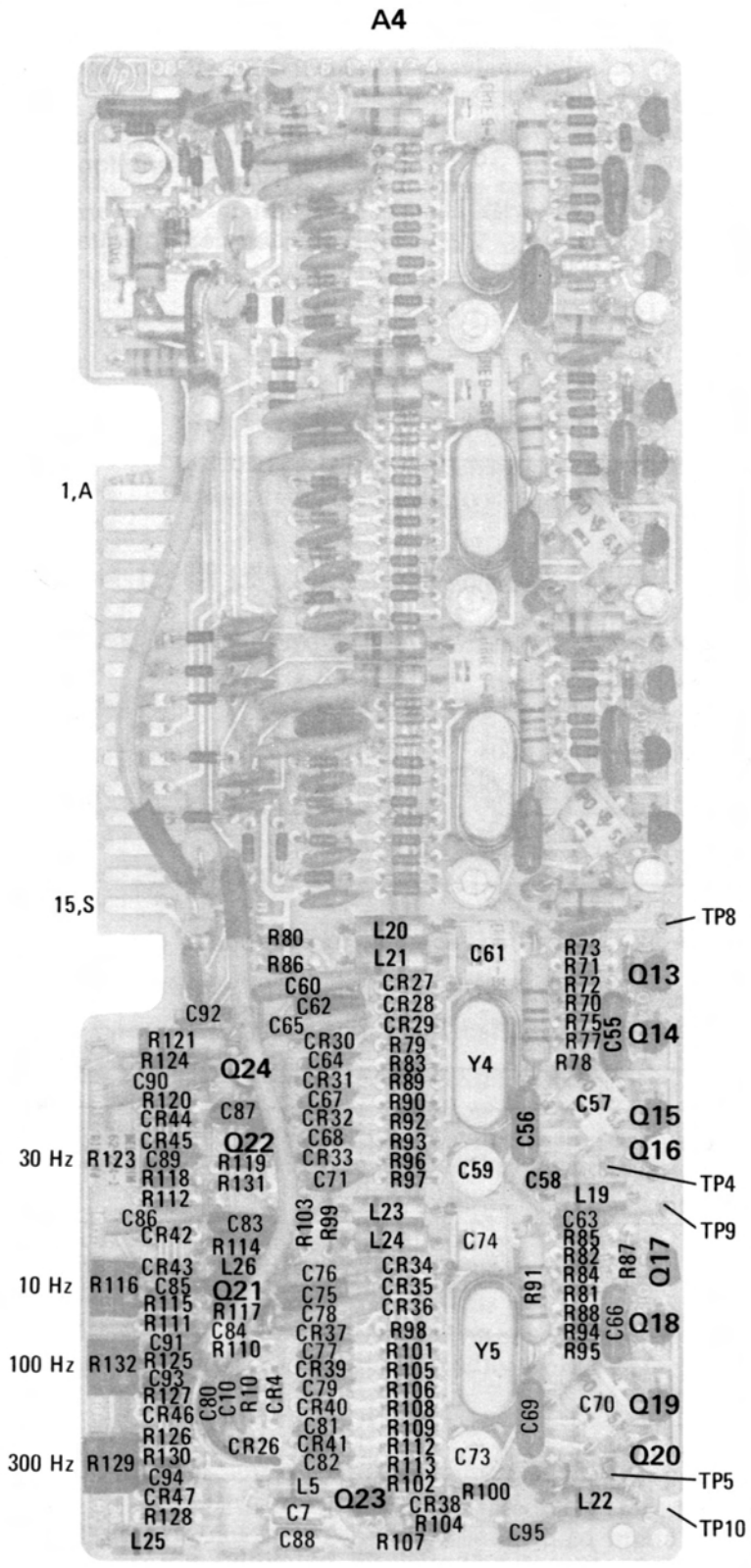
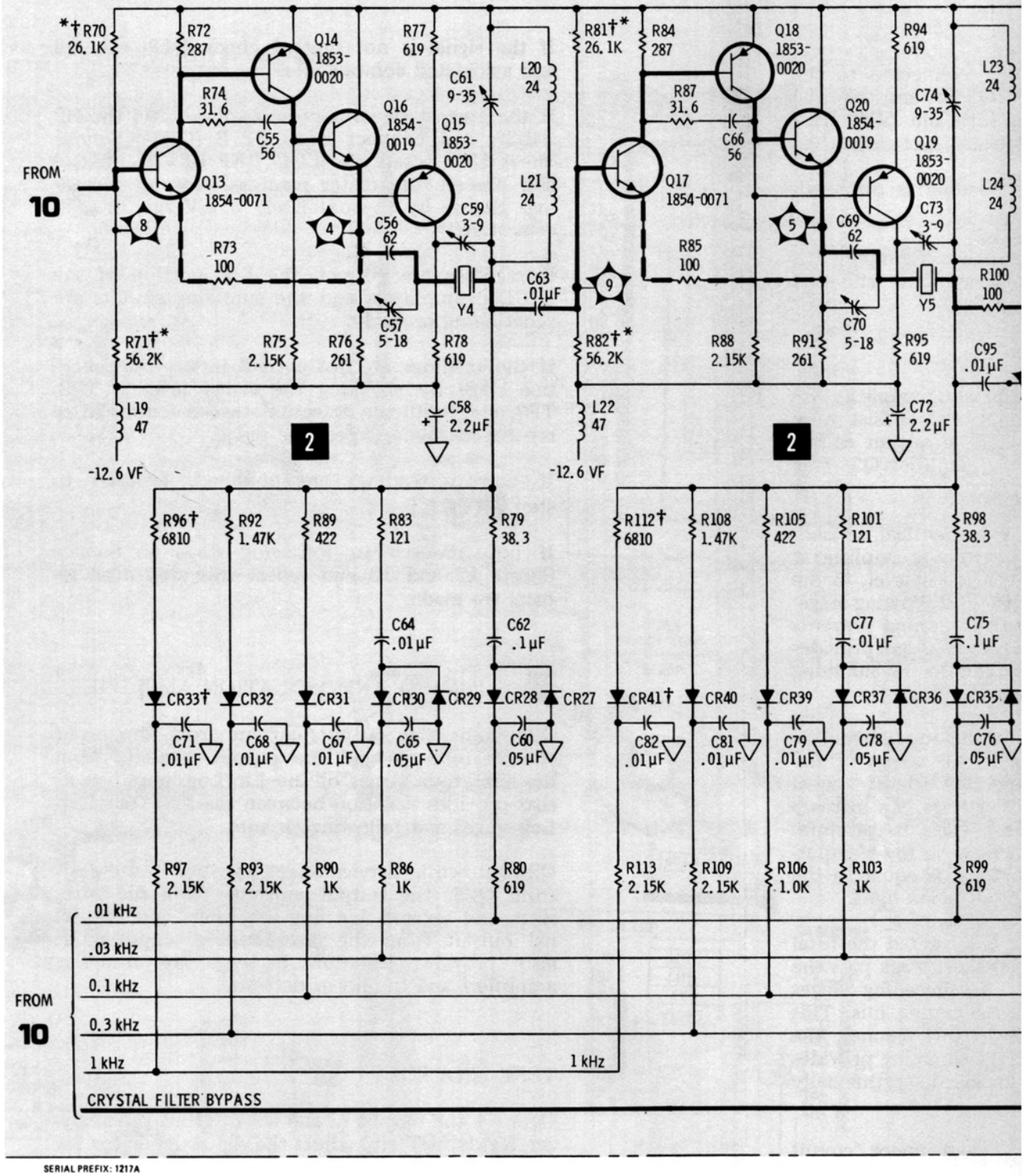
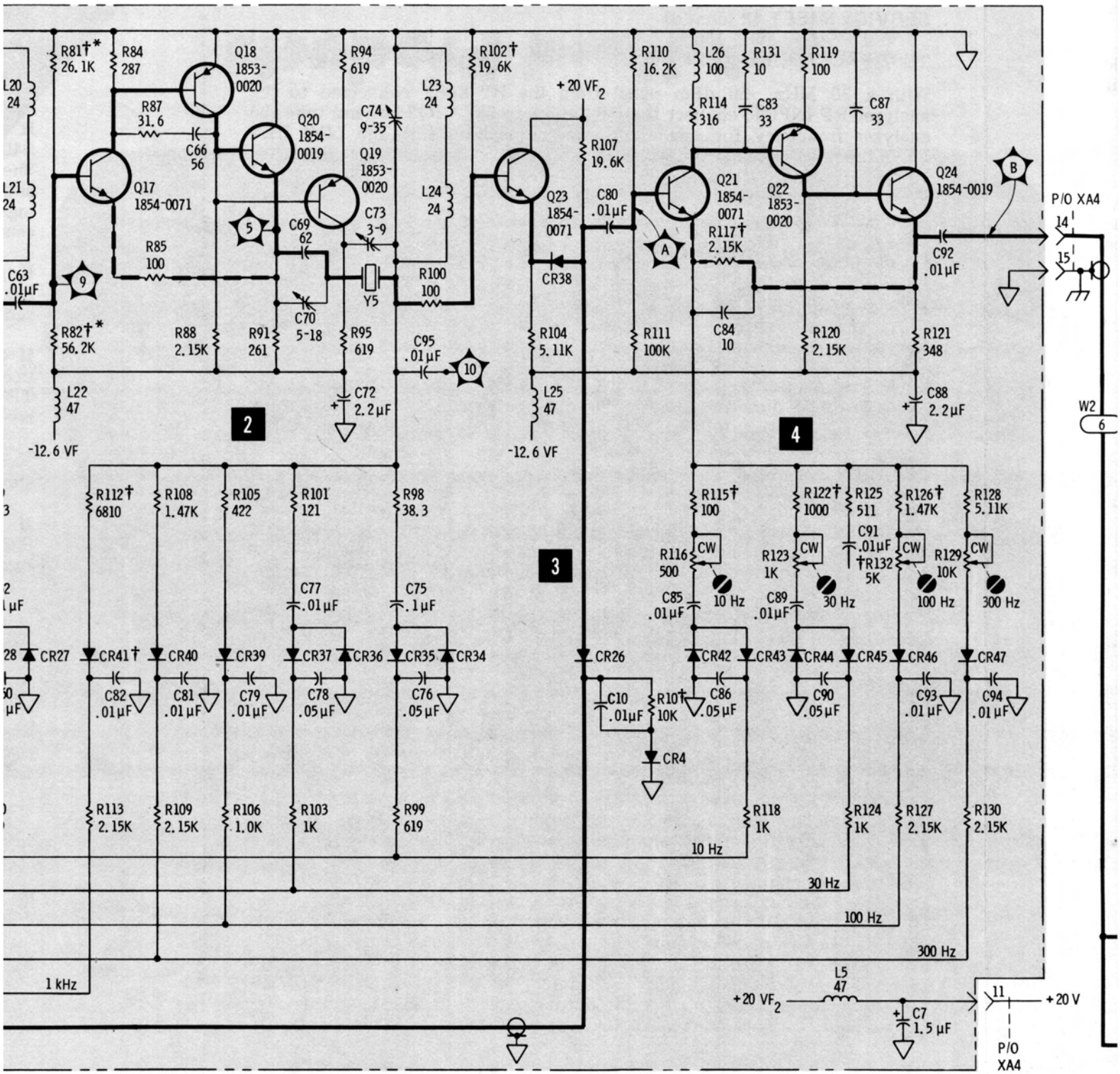


Figure 8-33. P/O Crystal Filter A4 Component Identification

P/O CRYSTAL FILTER ASSY A4 (08552-60111)



SERIAL PREFIX: 1217A


L20 24
L21 24
R81†* 26.1K
R84 287
Q18 1853-0020
R87 31.6
C66 56
Q17 1854-0071
Q20 1854-0019
Q19 1853-0020
R94 619
C74 9-35
C73 3-9
L23 24
L24 24
R102† 19.6K
+20 VF2
R107 19.6K
C80 .01µF
Q23 1854-0071
CR38
R110 16.2K
L26 100
R131 10
R119 100
R114 316
C83 33
C87 33
Q21 1854-0071
R117† 2.15K
Q22 1853-0020
Q24 1854-0019
P/O XA4
14
15
C92 .01µF
C63 .01µF
R85 100
C69 62
C70 5-18
Y5
R100 100
C84 10
R82†* 56.2K
R88 2.15K
R91 261
R95 619
C95 .01µF
R104 5.11K
R111 100K
R120 2.15K
R121 348
L22 47
C72 2.2µF
L25 47
C88 2.2µF
-12.6 VF
-12.6 VF
W2
6
R112† 6810
R108 1.47K
R105 422
R101 121
R98 38.3
R115† 100
R122† 1000
R125 511
R126† 1.47K
R128 5.11K
C91 .01µF
†R132 5K
R116 500
R123 1K
R129 10K
CW
10 Hz
30 Hz
100 Hz
300 Hz
C85 .01µF
C89 .01µF
C77 .01µF
C75 .1µF
CR27
CR41†
CR40
CR39
CR37
CR36
CR35
CR34
CR26
CR42
CR43
CR44
CR45
CR46
CR47
C82 .01µF
C81 .01µF
C79 .01µF
C78 .05µF
C76 .05µF
C10 .01µF
R10† 10K
C86 .05µF
C90 .05µF
C93 .01µF
C94 .01µF
CR4
R113 2.15K
R109 2.15K
R106 1.0K
R103 1K
R99 619
R118 1K
R124 1K
R127 2.15K
R130 2.15K
10 Hz
30 Hz
100 Hz
300 Hz
1 kHz
L5 47
+20 VF2
C7 1.5 µF
11
+20 V
P/O XA4
2
3
4
5
9
10
A
B

SERVICE SHEET 12

It is assumed that the 3 MHz signal from the crystal filter and dc operating voltages are present and correct, and that the output signal is not present or is out of tolerance.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated to the Log/Lin Amplifier assembly, A8, it should be removed from the chassis and re-installed on the extender board to provide access to components. After repairing the assembly the procedures specified in paragraphs 5-30 and 5-31 of Section V should be performed.

NOTE

Since parts of the circuit appear on Service Sheet 13, Service Sheets 12 and 13 should be used jointly in troubleshooting the assembly.

EQUIPMENT REQUIRED

SERVICE KIT	HP 11592A
VECTOR VOLTMETER	HP 8405A
SIGNAL GENERATOR	HP 608F

CONTROL SETTINGS

Unless otherwise specified in individual tests.

SCAN WIDTH	ZERO
INPUT ATTENUATION	0 dB
SCAN MODE	INT
FREQUENCY	30 MHz
BANDWIDTH	300 kHz
SCAN TRIGGER	AUTO
LOG·LINEAR	10 dB LOG

1 LIN/LOG AMPLIFIER AND CONTROL CIRCUITS (General)

This general discussion covers operation of circuits shown schematically on Service Sheets 12 and 13. The assembly is designed to provide one of two different types of video outputs. Most of the circuit elements are common to both modes of operation.

When the analyzer is operated in the LINEAR mode the Lin/Log amplifier provides a video output which varies in amplitude in direct proportion to the amplitude of of the input rf voltage. The CRT display is calibrated in terms of volts (mV or μV).

When the analyzer is operated in the LOG mode the output video signal has a logarithmic relationship to the input rf signal. The CRT display is calibrated in terms of power (dBm).

2 EMITTER FOLLOWER INPUT STAGE Q24

Emitter follower Q24 provides a high impedance input which prevents loading the output of the crystal filter assembly and also provides isolation between the input and the first Lin/Log amplifier.

TEST PROCEDURE 2

With a 30 MHz, -60 dBm signal from the HP 608F connected to the analyzer RF INPUT, connect the HP 8405A to TP A (Q24-e) and tune the analyzer frequency for maximum meter deflection with the LOG REF LEVEL control set to -60 dBm.

Typical meter reading is 608 mV rms. If correct reading is obtained, proceed to step 3 .

If correct reading is not obtained, check Q24 and associated components. If Q24 and associated components check good and signal is still not present, check Q25 (see step 3).

3 LIN/LOG AMPLIFIERS IN LOG MODE

When the analyzer is operated in the LOG mode the Lin/Log amplifier has eight cascaded amplifier stages. The first seven amplifiers consist of a differential amplifier followed by an emitter follower. The output of the eighth differential amplifier is applied to the summing amplifier Q26 (see step 4 on Service Sheet 13).

Operation of the first seven cascaded amplifier stages is identical, so only the first stage will be described. The output of the differential amplifier is split and applied to the emitter follower and, at a much lower level, to the base of the output half of the differential amplifier in the following stage. A 100 ohm resistor (R5) from the low level signal path to ground prevents parasitic oscillation. The emitter follower output of each stage provides the input signal to the following stage and signal currents to the summing bus.

The logarithmic relationship of the output signal to the input signal is provided by controlled limiting and saturation (in 10 dB steps) of the eight amplifiers in reverse order. A relatively low level signal (approximately -70 dBm) will saturate the last amplifier stage. An increase of 10 dB in the input signal will cause the seventh stage to saturate. Preceding amplifier stages saturate at each 10 dB increase in the rf input. Finally the first amplifier saturates when the input signal is equal to the LOG REF LEVEL control setting as referenced to the lit index light.

The gain of each stage is 9 dB. When the last stage is saturated the total output of the eight stages consists of the output of the last stage plus the summing bus currents from all preceding stages. As preceding stages saturate each supplies a maximum of 3 mA to the summing bus. This corresponds to a 10 dB increase in power input. In this manner, the combination of sequential amplifier limiting and current summing provides amplitude compression to force the output signal to remain logarithmically proportional to the input signal.

The simplified diagram below shows signal paths and major circuit components.

TEST PROCEDURE 3

Connect the output of the HP 608F to the analyzer RF INPUT and adjust the signal generator for a 30 MHz, -60 dBm signal. Connect the HP 8405A to TP 1, set the analyzer LOG REF LEVEL control to -30 dBm, and tune the analyzer frequency for maximum signal level on the HP 8405A. Typical level is 58 mV rms.

If the signal is not present check Q23, Q1, Q2 and associated components.

If the correct signal is present, disconnect the HP 8405A and connect it to TP B (Q26-c Service Sheet 13). Rotate the LOG REF LEVEL control and observe the meter readings. Note that readings change by approximately 6 mV rms at adjacent steps.

If readings are correct, the Log portion of the Lin/Log amplifiers and the summing circuits are functioning properly.

If the readings are not correct isolate the defective stage by checking the signal level at TP2, TP3, etc., until the defective stage is found. After repairs are made, repeat the test.

If correct readings are obtained, proceed to step 4 .

If not, proceed to following steps on Service Sheets 12 and 13 and repeat this step after repairs are made.

4 SUMMING AND ISOLATION AMPLIFIERS

Q25 sums the output current from the input emitter follower and the output currents from the first four stages of the Lin/Log amplifier. It also provides isolation between the first four Lin/Log stages and following circuits.

Q26 (shown in Service Sheet 13) sums the output from Q25, the output currents from the fifth, sixth and seventh Lin/Log amplifiers and the signal output from the last Lin/Log amplifier. It also provides isolation between the Lin/Log amplifiers and the linear detector.

TEST PROCEDURE 4

Connect the output of the HP 608F to the analyzer RF INPUT and adjust the signal generator for

SERVICE SHEET 12 (cont'd)

a 30 MHz, -60 dBm signal output. Connect the HP 8405A to TP C (Q25-e), set the analyzer LOG REF LEVEL control to -60 dBm, and tune the analyzer for maximum signal level on the HP 8405A. Typical level is 9 mV rms.

Check the signal level at TP D (Q25-c) with the HP 8405A. Typical level is 33 mV rms.

Check the signal level at TP B (Q26-c Service Sheet 13) with the HP 8405A. Typical level is 50 mV rms.

If correct readings are obtained the summing amplifiers are functioning properly.

If readings are incorrect, check Q25, Q26 and associated components.

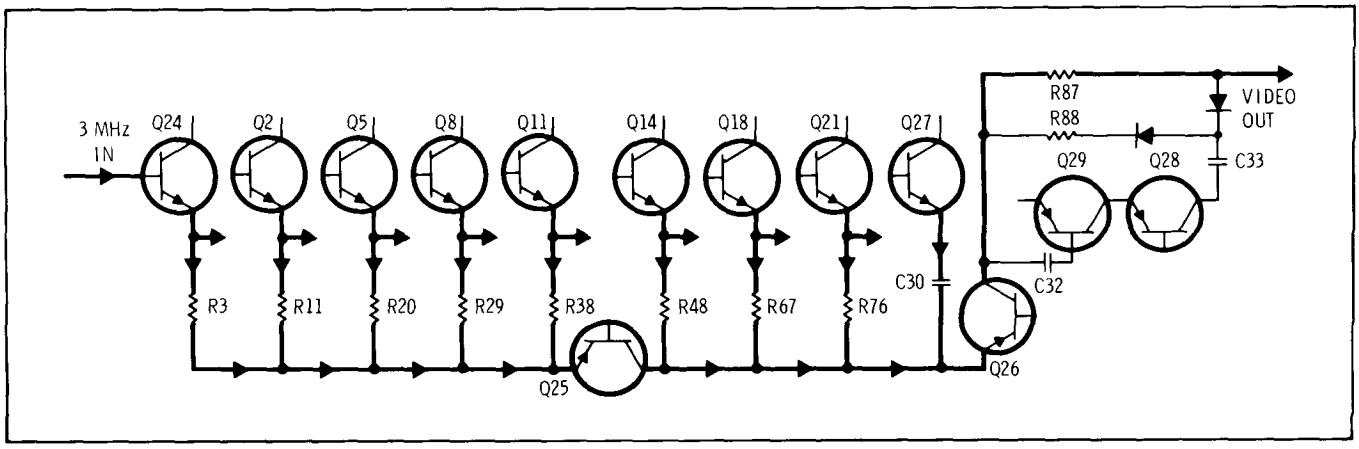
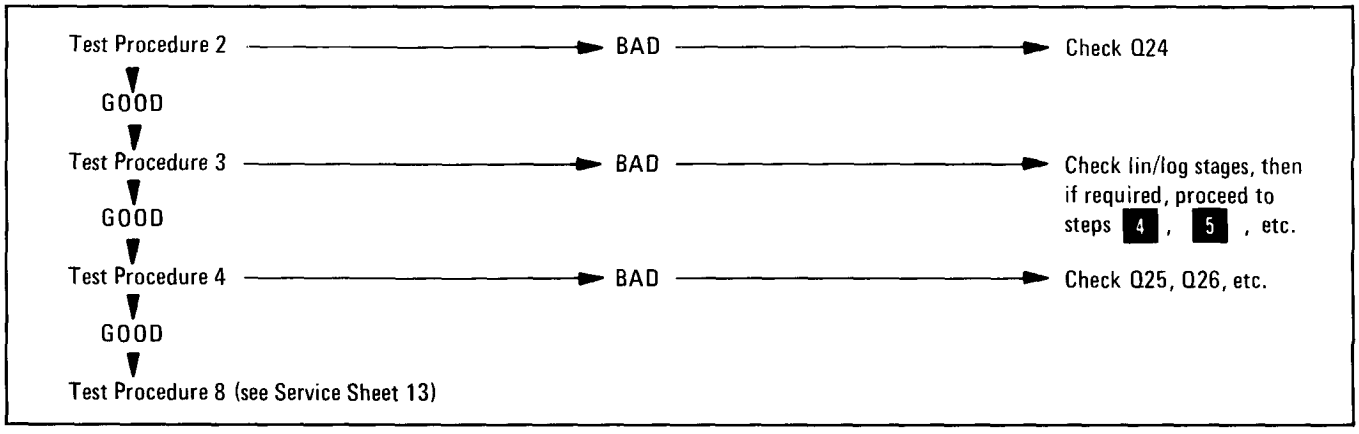


Figure 8-35. Simplified Diagram — Log Mode of Operation

Simplified Test Procedure Tree



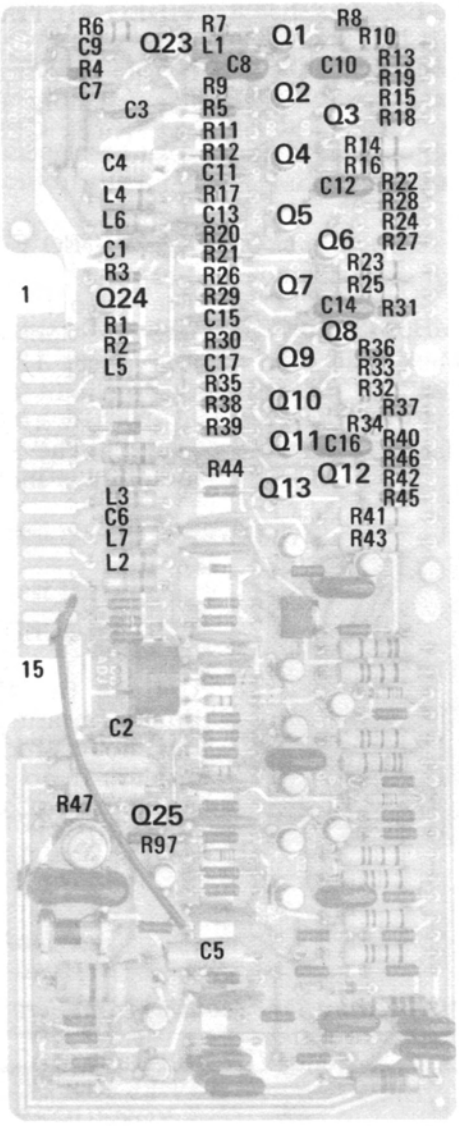
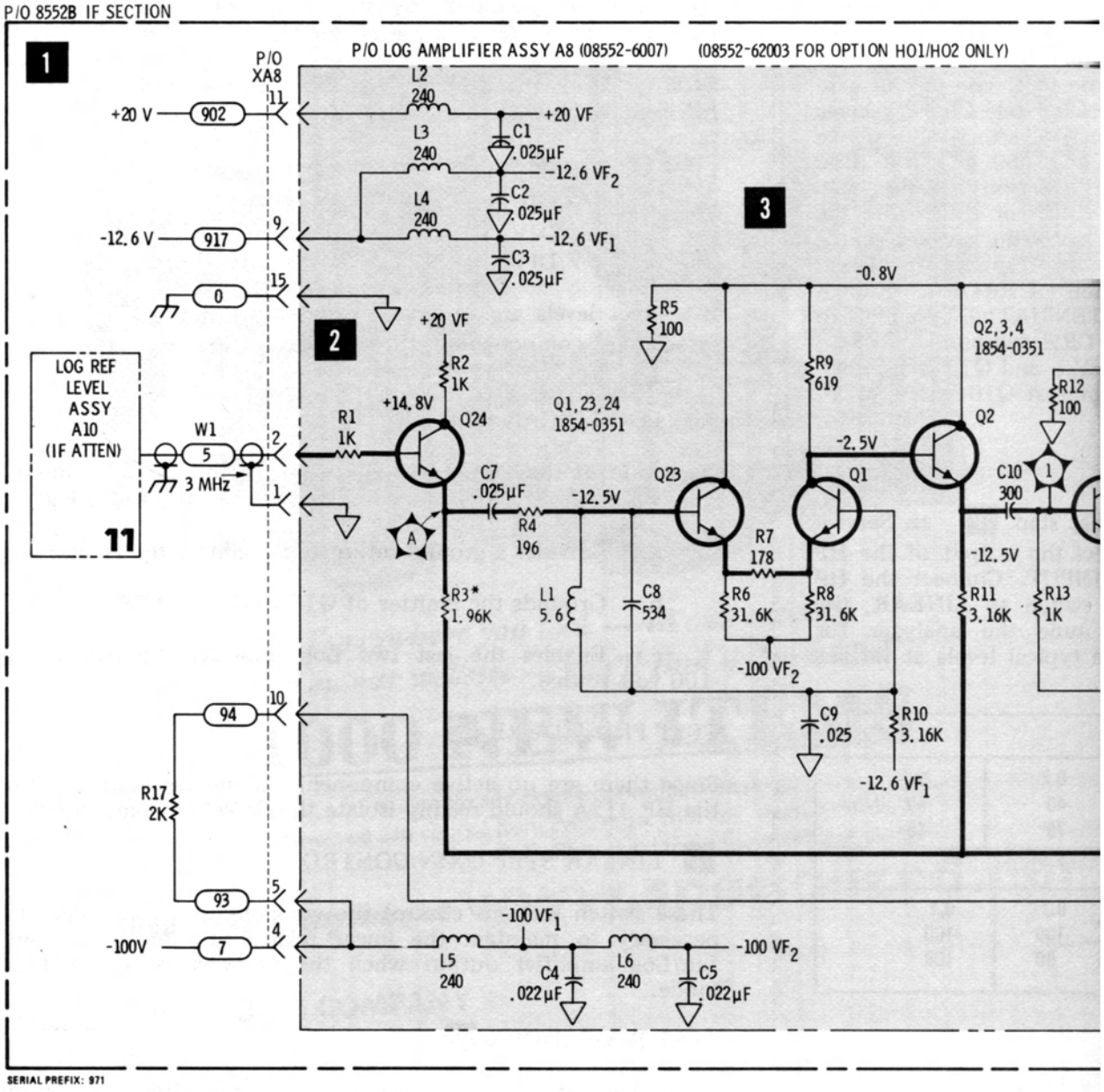
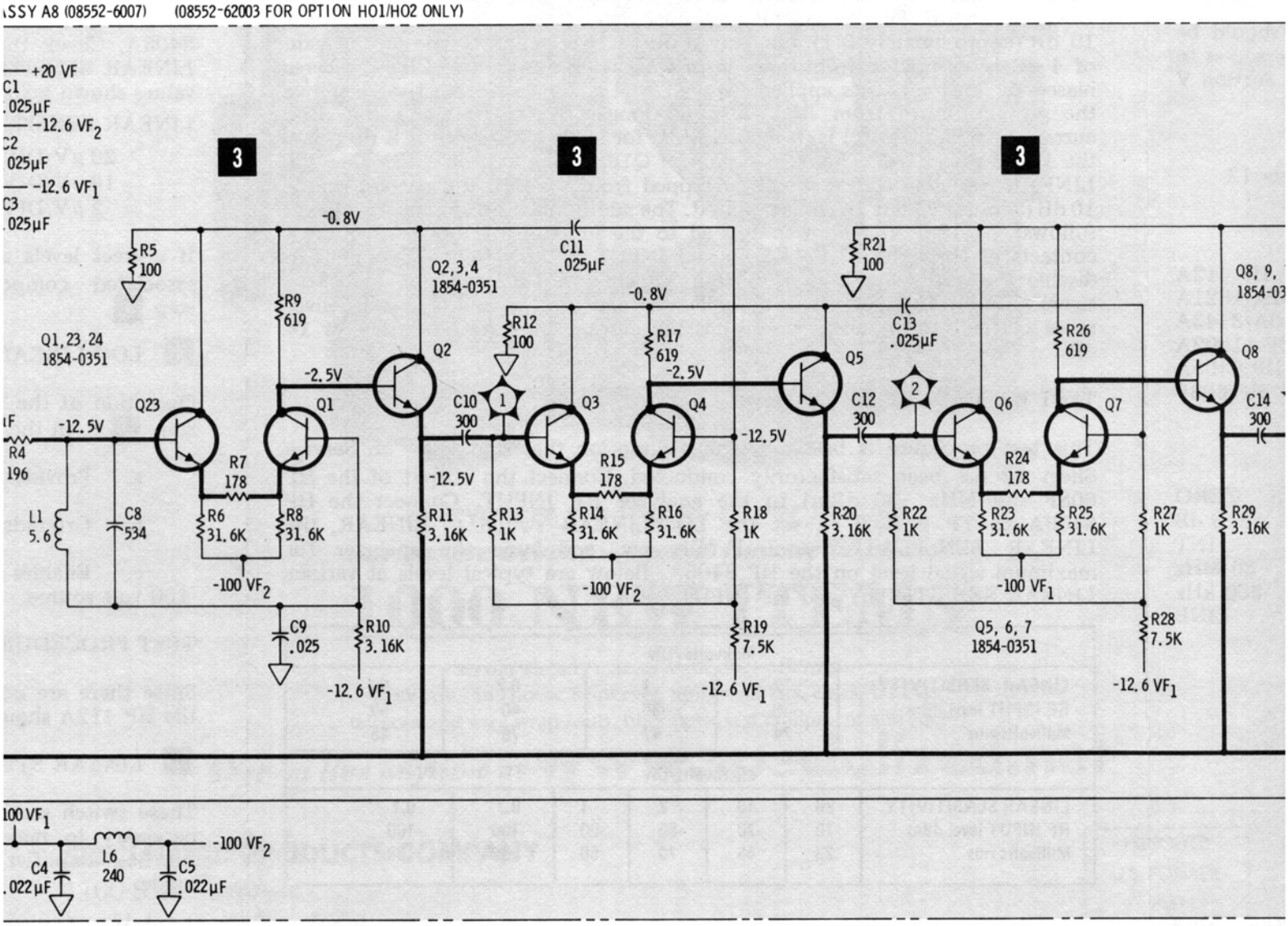


Figure 8-36. P/O Log/Linear Amplifier A8 Component Identification

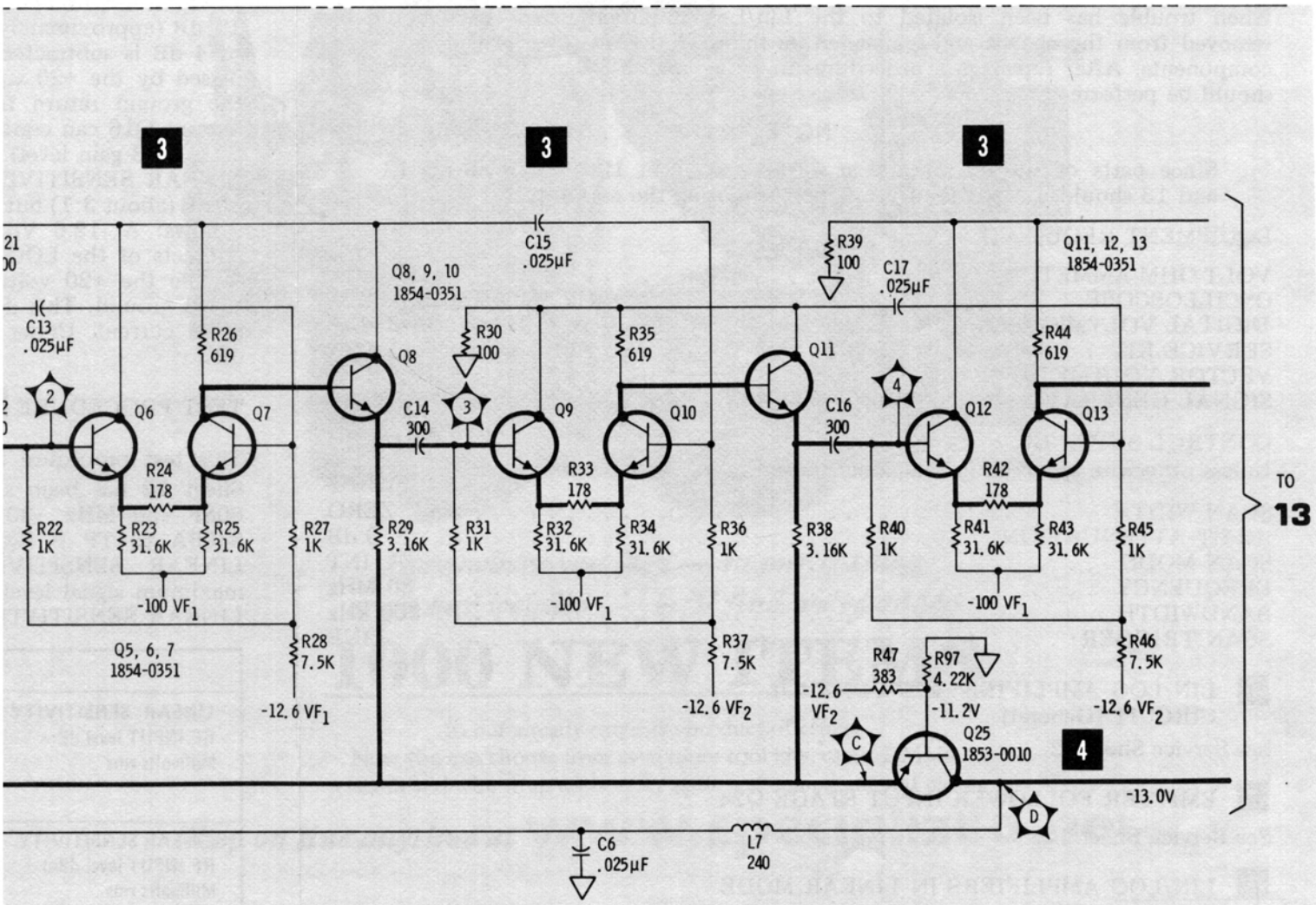

P/O 8552B IF SECTION
P/O LOG AMPLIFIER ASSY A8 (08552-6007) (08552-62003 FOR OPTION H01/H02 ONLY)
1
2
3
P/O XA8
+20 V
902
-12.6 V
917
0
LOG REF LEVEL ASSY A10 (IF ATTEN)
11
W1
5
3 MHz
94
93
7
-100V
L2 240
+20 VF
C1 .025µF
L3 240
-12.6 VF2
C2 .025µF
L4 240
-12.6 VF1
C3 .025µF
R2 1K
+14.8V
R1 1K
Q24
Q1, 23, 24 1854-0351
C7 .025µF
-12.5V
R4 196
A
R3* 1.96K
L1 5.6
C8 534
R5 100
-0.8V
R9 619
Q2, 3, 4 1854-0351
Q23
Q1
Q2
-2.5V
R7 178
R6 31.6K
R8 31.6K
-100 VF2
C9 .025
R10 3.16K
-12.6 VF1
R12 100
C10 300
-12.5V
R11 3.16K
R13 1K
R17 2K
-100 VF1
L5 240
C4 .022µF
L6 240
C5 .022µF
-100 VF2
SERIAL PREFIX: 971

ASSY A8 (08552-6007) (08552-62003 FOR OPTION H01/H02 ONLY)



REFERENCE DESIGNATIONS

A8	CHASSIS
C1-17	R17
L1-7	W1
R1-47,97	XA8
Q1-13,23-25	



REFERENCE DESIGNATIONS	
A8	CHASSIS
C1-17	R17
L1-7	W1
R1-47,97	XA8
Q1-13,23-25	

REFERENCE DESIGNATIONS WITHIN OUTLINED (— - - —) ASSEMBLIES ARE ABBREVIATED. FULL DESIGNATION INCLUDES ASSEMBLY NUMBER; e.g., R1 OF ASSEMBLY A1 IS A1R1. DESIGNATIONS OF OTHER COMPONENTS ARE COMPLETE AS SHOWN.

12

Figure 8-37. Log/Linear Amplifier (1 of 2)

SERVICE SHEET 13

It is assumed that the 3 MHz signal from the crystal filter and dc operating voltages are present and correct, and that the output signal is not present or is out of tolerance.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated to the Lin/Log amplifier assembly it should be removed from the chassis and reinstalled on the extender board to provide access to components. After repairs the procedures in paragraphs 5-30 and 5-31 of Section V should be performed.

NOTE

Since parts of the circuit appear on Service Sheet 12, Service Sheets 12 and 13 should be used jointly in troubleshooting the assembly.

EQUIPMENT REQUIRED

VOLT-OHM-AMMETER	HP 412A
OSCILLOSCOPE	HP 180A/1801A/1821A
DIGITAL VOLTMETER	HP 3440A/3443A
SERVICE KIT	HP 11592A
VECTOR VOLTMETER	HP 8405A
SIGNAL GENERATOR	HP 608F

CONTROL SETTINGS

Unless otherwise specified in individual tests.

SCAN WIDTH	ZERO
INPUT ATTENUATION	0 dB
SCAN MODE	INT
FREQUENCY	30 MHz
BANDWIDTH	300 kHz
SCAN TRIGGER	LINE

1 LIN/LOG AMPLIFIER AND CONTROL CIRCUIT (General)

See Service Sheet 12.

2 EMITTER FOLLOWER INPUT STAGE Q24

See Service Sheet 12.

3 LIN/LOG AMPLIFIERS IN LINEAR MODE

See Service Sheet 12 for LOG mode.

When the LOG/LINEAR switch is placed in the LINEAR position it accomplishes the following:

a. Supplies -12.6 Vdc to illuminate the LINEAR lamp, DS7.

b. Disables the last two log amplifiers by removing their -100 volt source.

c. Provides an added current source to Q15/Q17 to prevent the stage from saturating.

d. Enables Q16, the linear scale factor amplifier.

Operation of the Lin/Log amplifiers for those stages ahead of Q15 is identical for LINEAR and LOG modes of operation. The output of current amplifier Q16 is 180 degrees out of phase with the signals in the summing bus and of sufficient amplitude to cancel them. In the LINEAR mode only the Q16 output drives the summing and isolation stage Q26.

Since the analyzer IF amplifier and attenuator are calibrated in 10 dB increments, compensation must be provided to maintain a linear relationship between the input RF signal and the output from the Lin/Log amplifier. The attenuator selector for the linear mode is calibrated in 1/2/10/20 steps so a fixed amount of compensation cannot be used for all steps. When the LINEAR SENSITIVITY control is stepped from 1 to 2, the current gain is 10 dB (approximately 3:1), but only 6 dB (2:1) is required. The surplus gain of 4 dB is subtracted from the gain of Q16 as follows: Diode CR2 is reverse biased by the +20 volts applied through R64 and R65 to effectively remove the ground return from R63. R63 no longer shunts R50 and the total current Q16 can control is decreased 4 dB for a total variation of 8 dB (from the 14 dB gain level). The current gain of Q16 is thus 2:1, or 6 dB. When the LINEAR SENSITIVITY control is stepped from 2 to 10 the current gain is 10 dB (about 3:1) but 14 dB is required. The additional 4 dB gain is provided as follows: A -12.6 Vdc level is applied to the junction of R64/R65 through contacts of the LOG REF LEVEL and INPUT ATTENUATION controls to disable the +20 volts from R65 and forward bias CR2 to connect R63 to signal ground. This decreases the collector load of Q16 and Q16 can deliver more current. Under these conditions the current gain of Q16 is 5:1 or 14 dB.

TEST PROCEDURE 3

This test procedure is based on the assumption that step 3 on Service Sheet 12 has been satisfactorily conducted. Connect the output of the HP 608F (30 MHz, -30 dBm) to the analyzer RF INPUT. Connect the HP 8405A to TP B (Q26-c), set the LOG·LINEAR switch to LINEAR, the LINEAR SENSITIVITY control fully cw, and tune the analyzer for maximum signal level on the HP 8405A. Below are typical levels at various LINEAR SENSITIVITY and RF INPUT levels.

Millivolts /Div				
LINEAR SENSITIVITY	2	1	0.2	0.1
RF INPUT level dBm	-30	-30	-40	-50
Millivolts rms	24	47	78	45

Microvolts/Div						
LINEAR SENSITIVITY	20	10	2	1	0.2	0.1
RF INPUT level dBm	-70	-70	-80	-90	-100	-100
Millivolts rms	23	45	70	50	90	108

If correct signal levels are observed, proceed to step 8 . If not, check Q15/Q17/Q18 and associated components and proceed to steps 5 6 and 7 , if required. After repairs repeat this test.

4 See Service Sheet 12 for information about Q26.

5 LINEAR SCALE FACTOR AMPLIFIER Q16

Operation of Q16 is described as part of step 3

TEST PROCEDURE 5

Connect the output of the HP 608F to the analyzer RF INPUT and adjust the signal generator for a 30 MHz, -80 dBm signal output. Connect the HP 8405A to TP E (Q16-b), set the analyzer LINEAR SENSITIVITY control to 20 μV/DIV, and tune the analyzer for maximum signal level on the HP 8405A. Check the 3 MHz signal level at base and emitter of Q16 with the LINEAR SENSITIVITY control set to 20, 10 and 2 μV/DIV for the typical values shown below.

LINEAR SENSITIVITY	Q16 Base	Q16 Emitter
20 μV/DIV	6 mV rms	4 mV rms
10 μV/DIV	38 mV rms	24 mV rms
2 μV/DIV	70 mV rms	40 mV rms

If correct levels are observed, proceed to step 6. If not, check Q16 and associated components, then proceed to step 6 and if required, step 7

6 LOG·LINEAR SWITCH

Operation of the LOG·LINEAR switch in the LINEAR mode is discussed in step 3. In the LOG mode the switch does the following:

a. Provides a ground return to illuminate the (LOG) lamp DS8.

b. Grounds the emitter of Q16 to disable Q16.

c. Enables the last two Log amplifiers by connecting them to the -100 volt source.

TEST PROCEDURE 6

Since there are no active components in the assembly, continuity tests with the HP 412A should readily isolate the defective components.

7 LINEAR STEP GAIN CONTROL

These switch sections control the compensation gain steps of Q16 which are necessary to maintain the linear relationship between input rf signal and Lin/Log amplifier output when the analyzer is operated in the LINEAR mode.

TEST PROCEDURE 7

Since there are no active components in the assembly, continuity tests with the HP 412A should readily isolate defective components.

8 LINEAR DETECTOR

The linear detector includes a high gain amplifier with a high level of negative feedback. The feedback loop ensures that the detected output current is linear in relationship to input current to enhance the accuracy of the calibrated display. The output of Q28 is applied to CR3 and CR4 180

SERVICE SHEET 13 (cont'd)

degrees out of phase with the signals applied to CR3 and CR4 by the output of Q26. The result is that positive half cycles from the collector of Q26 are cancelled when the inverted signal from Q28 forward biases CR3. When the Q26 output is negative the inverted signal from Q28 reverse biases CR3 and the negative signal from Q26 becomes the video output. Simultaneously CR4 is forward biased and the result is improved linearity of the output signal.

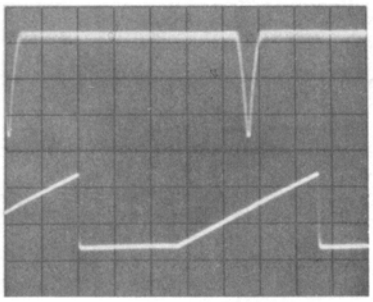
L13/C36 and L14/C37/C38 filter out the rf components of the video output.

TEST PROCEDURE 8

Connect the HP 608F set for 30 MHz, -30 dBm to the analyzer RF INPUT. Connect the HP 180A/1801A/1821A Channel A input to TP G (XA8-14) and the Channel B input to the SCAN IN/OUT jack on the front of the analyzer and observe the waveform.

CONTROL SETTINGS:

Oscilloscope:
Channel A:
.02 V/Div
Channel B:
0.5 V/Div
TIME/DIV:
5 msec/DIV



Analyzer:
SCAN WIDTH ..... PER DIVISION
PER DIVISION ..... 20 kHz
BANDWIDTH ..... 30 kHz
LOG REF LEVEL ..... -10 dBm
LOG·LINEAR ..... 10 dB LOG
VIDEO FILTER ..... OFF

If the waveforms are correct the Lin/Log amplifier assembly should be functioning properly. If not, check Q28, Q29, CR3, CR4 and associated components.

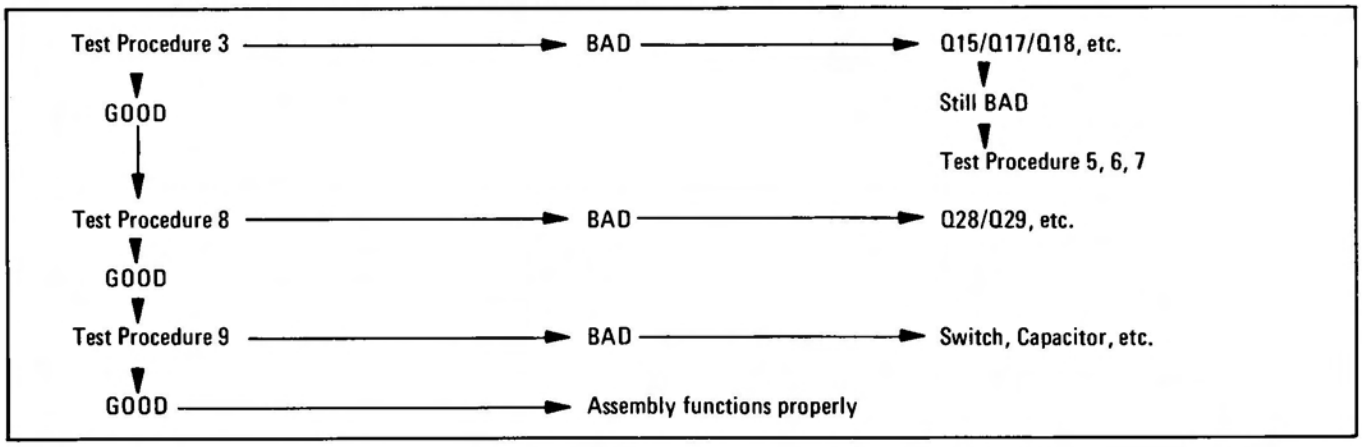
9 VIDEO FILTER ASSEMBLY

The video filter switch is a lever type two-pole, four position switch. The section shown on Service Sheet 13 switches bypass capacitors in the video circuit to bypass signal components down to 10 kHz (0.01 μf) 100 Hz (1.0 μf) or 10 Hz (10 μf). The remainder of the video filter switch assembly is shown on Service Sheet 17.

TEST PROCEDURE 9

Use the HP 412A to make point-to-point continuity measurements. Switching the filters into the circuit produces an obvious change in the CRT display. If no change in display occurs when the switch is used, check for an open circuit or faulty capacitor.

Simplified Test Procedure Tree (cont'd) from Service Sheet 12)



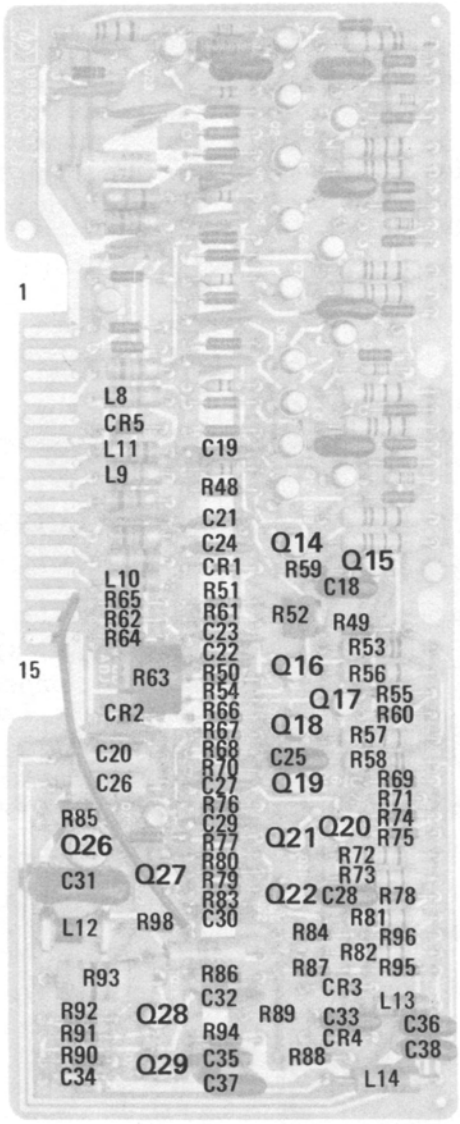


Figure 8-38. P/O Log/Linear Amplifier A8 Component Identification

REFERENCE DESIGNATIONS

A8	A11
C18-38 CR1-5 L8-14 R48-98 Q14-22, 26-29	S1-1F C1-3
A10	**CHASSIS**
S1-2R R10	DS7, 8 R13, 14, 16 S1 W5, 13

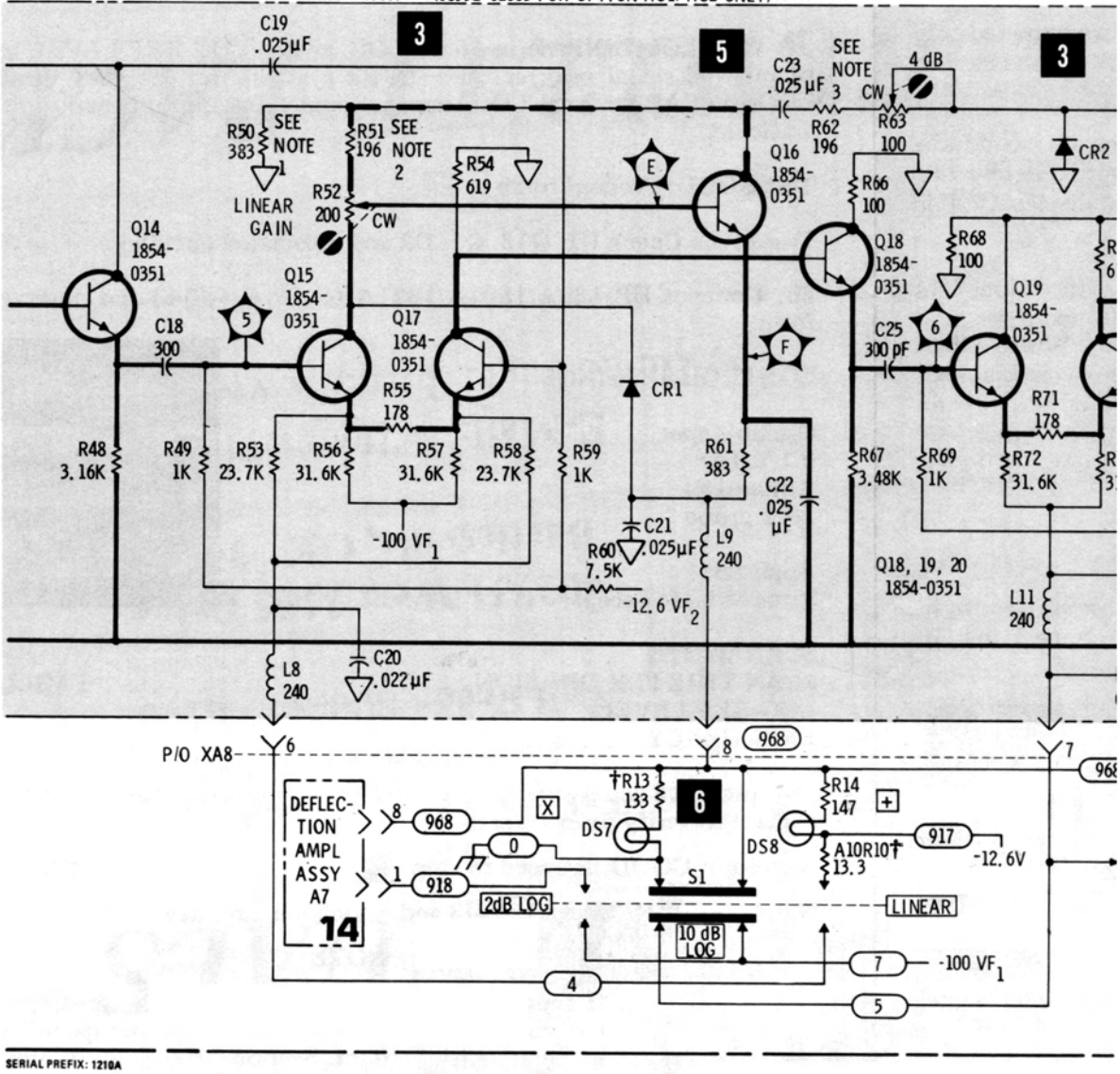
†REFER TO TABLE 7-2

NOTES

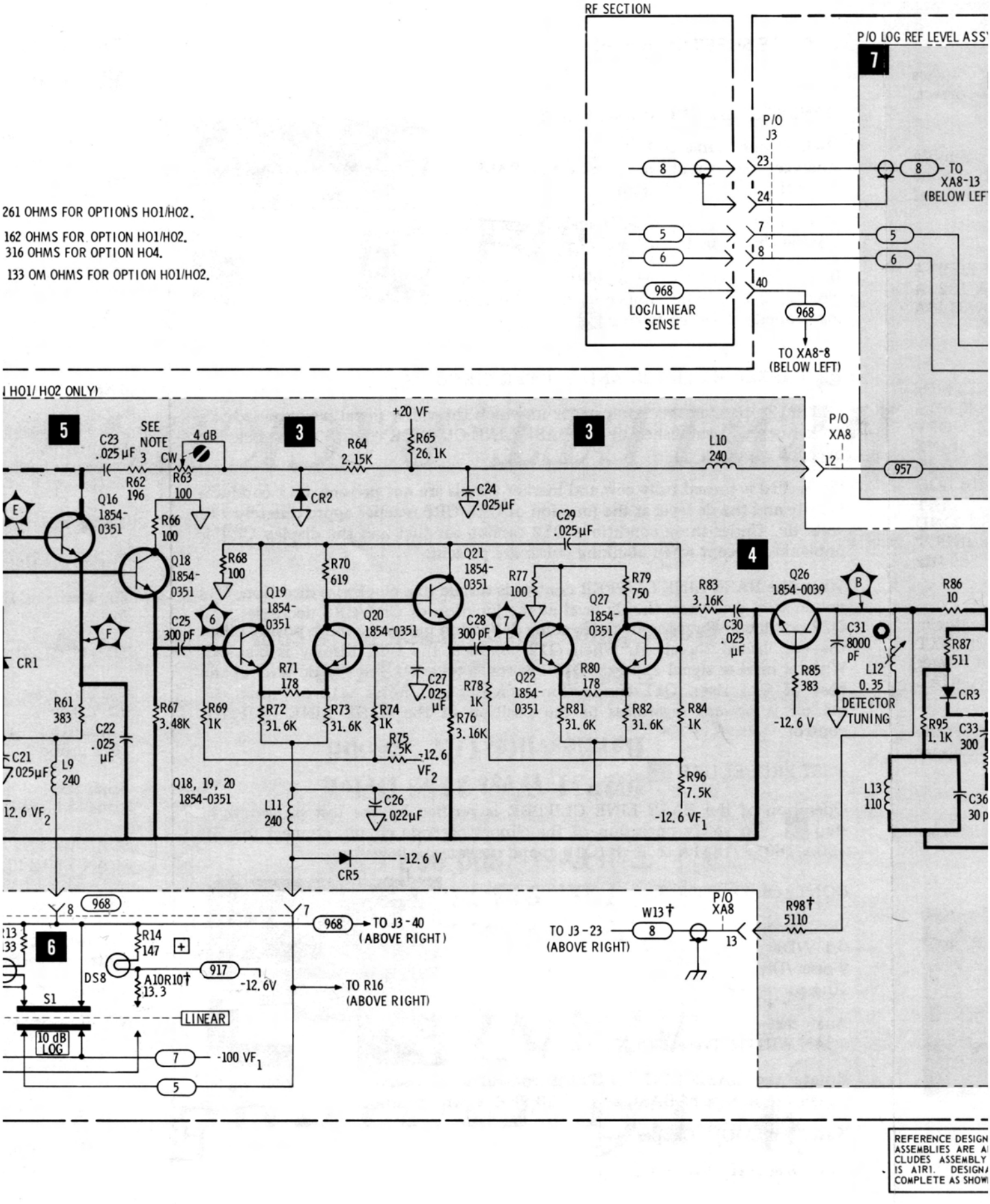
1. R50 IS 261 OHMS FOR OPTIONS H01/H02.
2. R51 IS 162 OHMS FOR OPTION H01/H02.
   R51 IS 316 OHMS FOR OPTION H04.
3. R62 IS 133 OM OHMS FOR OPTION H01/H02.

P/O 8552B IF SECTION

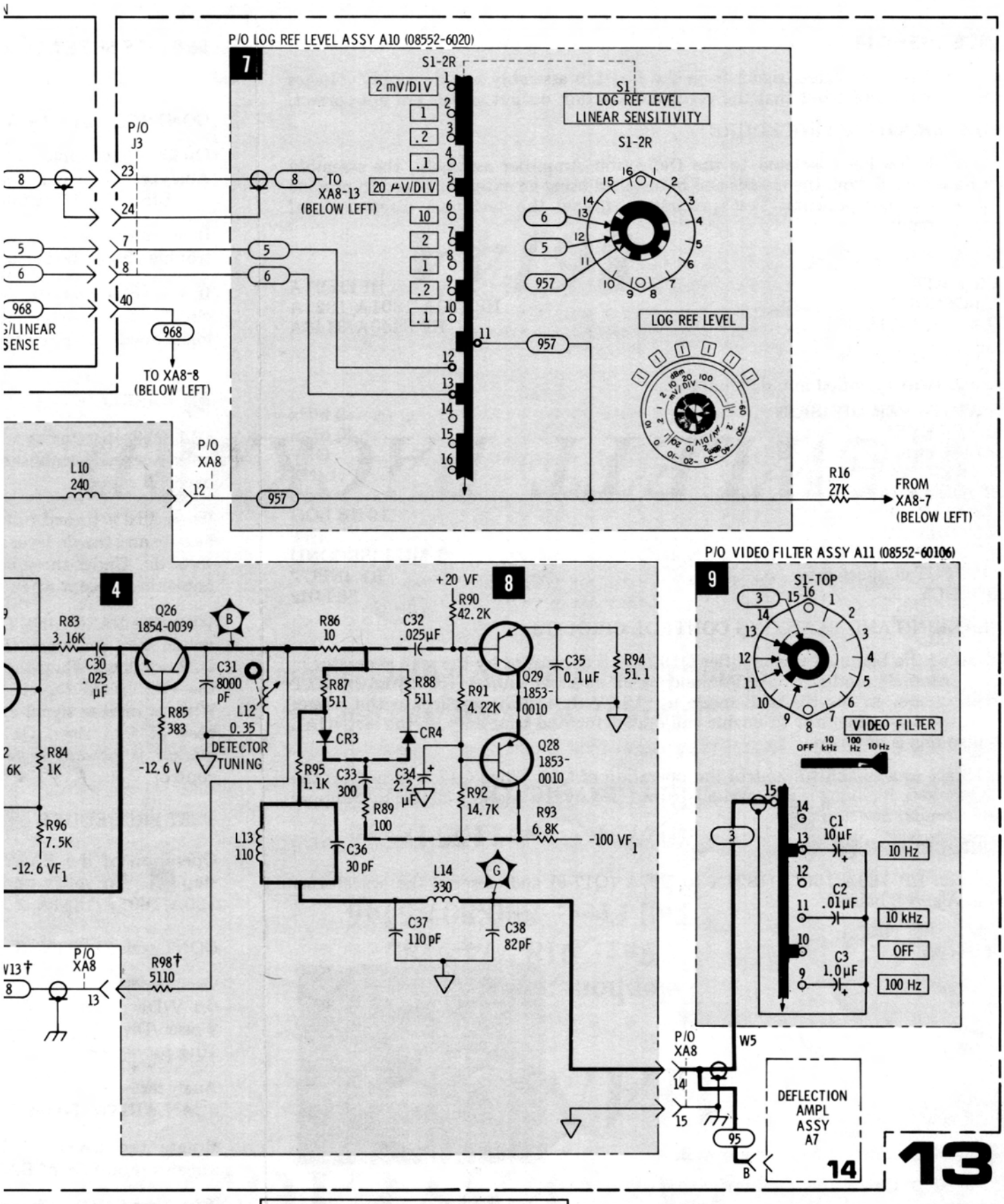
P/O LOG AMPLIFIER ASSY A8 (08552-6007) (08552-62003 FOR OPTION H01/ H02 ONLY)



SERIAL PREFIX: 1210A



REFERENCE DESIGN
ASSEMBLIES ARE A
CLUDES ASSEMBLY
IS A1R1. DESIGNA
COMPLETE AS SHOW



REFERENCE DESIGNATIONS WITHIN OUTLINED (— - - —) ASSEMBLIES ARE ABBREVIATED. FULL DESIGNATION INCLUDES ASSEMBLY NUMBER; e.g., R1 OF ASSEMBLY A1 IS A1R1. DESIGNATIONS OF OTHER COMPONENTS ARE COMPLETE AS SHOWN.

Figure 8-39. Log/Linear Amplifier (2 of 2)

SERVICE SHEET 14

It is assumed that the video signal from the Log/Lin assembly and dc supply voltages are present and correct but that the vertical deflection output signals are not correct.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated to the Deflection Amplifier assembly, the assembly should be removed from the chassis and re-installed using an extender board to provide easy access to components. Test procedures follow the technical discussions of individual circuits.

EQUIPMENT REQUIRED

SERVICE KIT HP11591A
OSCILLOSCOPE . . . . . HP 180A/1801A/1821A
DIGITAL VOLTMETER . . . . . HP 3440A/3443A

CONTROL SETTINGS

Unless otherwise specified in individual tests.

SCAN WIDTH PER DIVISION . . . . . 2 MHz
LOG REF LEVEL . . . . . —30 dBm
VIDEO FILTER . . . . . OFF
SCAN TRIGGER . . . . . LINE
INPUT ATTENUATION . . . . . 0 dB
LOG-LINEAR . . . . . 10 dB LOG
SCAN MODE . . . . . INT
SCAN TIME PER DIVISION . . . . . 1 MILLISECOND
CAL OUTPUT connected to . . . . . RF INPUT
FREQUENCY . . . . . 30 MHz

1. BLANKING AND BLANKING CONTROL CIRCUITS

Operation of the blanking preamplifier Q19/Q18 is controlled by the scan generator in the INT (internal) mode of operation and by an external source (via J2) in the EXT (external) mode. In the SINGLE mode a —12.6V dc level is applied to the trigger circuit in the scan generator to enable the circuit for one scan only. In the MANUAL mode, blanking is not used.

Q19/Q18 act as a switch to control the operation of Q17. When Q17 is turned off the CRT is blanked. Blanking is also partially controlled by the baseline clipper and clipper override circuits. See step 2

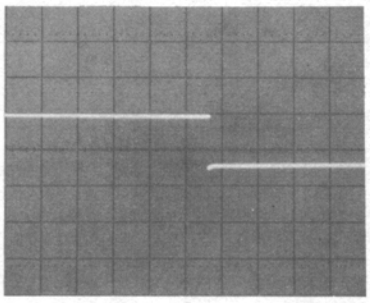
TEST PROCEDURE 1

Connect the HP 180A/1801A/1821A to TP A (Q17-e) and observe the waveforms shown in A and B below.

CONTROL SETTINGS:
(Waveform A)

Oscilloscope:
5V/Div
2 msec/Div
10:1 Probe

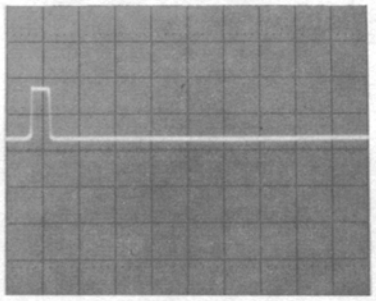
Analyzer:
BASE LINE
CLIPPER ccw



Waveform GOOD: Proceed to waveform B.

Waveform BAD: Check Q17/Q18/Q19 and associated components.

CONTROL SETTINGS: Waveform B



Oscilloscope: Same as A.
Analyzer: Same as above except rotate BASE LINE CLIPPER full cw.

If waveform A was GOOD and B was BAD, trouble should be in the baseline clipper circuits.

If correct waveforms were obtained, blanking circuits and baseline clipper circuit is functioning properly. Proceed to step **2**

2 BASELINE CLIPPER AND CLIPPER CIRCUITS

Q11/Q12 operates as a comparator in which the video signal is compared to a reference level established by the BASE LINE CLIPPER control and the clipper override circuit.

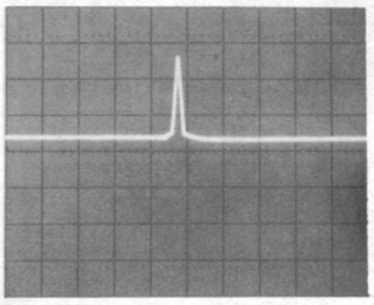
When R10 is turned fully ccw and marker signals are not present, Q11 conducts heavily and the dc level at the junction of CR5/CR6 reaches approximately +14 volts dc. Under these conditions Q12 cannot conduct and the display CRT is unblanked except when blanking pulses are present.

When the BASE LINE CLIPPER control is turned in a clockwise direction, Q11 conduction decreases, the dc level at the junction of CR5/CR6 decreases, and Q12 conducts when the negative-going deflection pulses are more positive than the established threshold. When Q12 conducts the CRT display is blanked. When a marker signal appears, Q10 inverts the marker and the dc level at the base of Q11 rises. Q11 conduction increases and holds Q12 off while the marker is present regardless of the position of the BASE LINE CLIPPER control.

TEST PROCEDURE **2**

Operation of the BASE LINE CLIPPER is verified by the test procedure in step **1**. To verify operation of the clipper override circuit, connect the HP 180A/1801A/1821A to TP B (Q10-c) and observe the waveform.

CONTROL SETTINGS:



Oscilloscope:
0.1 V/Div
2 msec/Div
10:1 probe

Analyzer:
SCAN WIDTH: Preset SCAN

Rotate the BASE LINE CLIPPER control and observe that marker signal remains regardless of BASE LINE CLIPPER control position.

Waveform GOOD: Clipper override functions properly.

Waveform BAD: Check Q10. (After verifying presence of marker input.)

3 2 dB LOG AND VERTICAL PREAMPLIFIER CIRCUITS

U1 and associated circuitry comprise an operational amplifier; when S1 (LOG-LINEAR switch) is in the 10 dB LOG position the amplifier's gain is 1. When S1 is in the 2 dB LOG position, K1 is energized by Q3. This adds a feedback divider and an offset to the amplifier to increase its gain to 5 and re-reference the maximum signal point to the CRT LOG REF graticule. The transistor associated with pins 6-8 of U2 is used as a diode to raise the signal level 0.7 V. The transistors associated with pins 1-5 of U2 are used as a clipper to prevent the signal on the CRT from going below the base line. The transistor associated with pins 9-11 drop the clipped signal level to the level of the signal out of the input operational amplifier.

U3 is an operational amplifier that has a gain of approximately 10. VERTICAL GAIN control R11 controls the amplifier's feedback and thus its gain.

TEST PROCEDURE 3

3a. With LOG-LINEAR in 10 dB LOG, switch LOG REF LEVEL to −20 dBm to put the signal peak at the −10 dB graticule on the CRT display. Switch LOG-LINEAR to 2 dB LOG; signal should drop approximately to the −50 dB graticule.

Test GOOD: Proceed to 3b

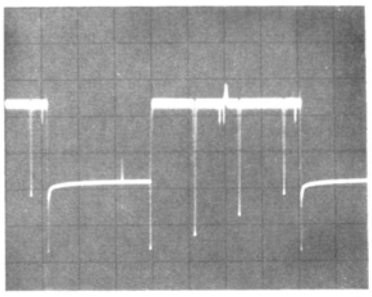
Test BAD: Check U1, Q13, Q1, U2 and associated circuitry.

3b. Connect HP 180A/1801A/1821A to TP C (U3-6) and observe the waveform.

CONTROL SETTINGS

Oscilloscope:
0.1 V/Div
2 msec/Div
10:1 probe

Analyzer:
Same as basic except:



SCAN WIDTH	0—100 MHz
SCAN TIME PER DIVISION	1 MILLISECOND
LOG REF LEVEL	−10 dBm
FREQUENCY	50 MHz

Note negative-going video and positive-going marker pulses. Rotate vertical gain control to verify proper operation

Waveform GOOD: Proceed to step 4

Waveform BAD: Check U2, U3 and associated circuitry.

NOTE

If repairs to the 2 dB LOG and vertical preamplifier circuits are required, the adjustments specified in paragraphs 5-30 of Section V should be performed.

A8, A10, A11
Log/Linear Amplifier (2 of 2)
◀ SERVICE SHEET 13

SERVICE SHEET 14 (cont'd)

4 VERTICAL DEFLECTION POWER AMPLIFIERS

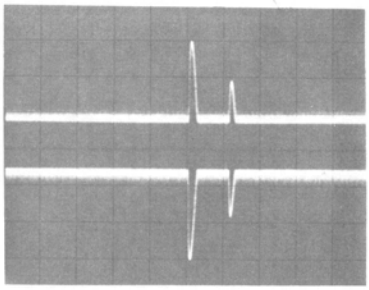
The negative-going signal from U3 is applied to the vertical driver amplifier. Q4 inverts the signal and applies it to Q6 where it is again inverted and applied to one of the CRT vertical deflection plates. Q4 also applies a non-inverted signal to Q5 which applies it to Q7 where it is inverted and applied to the other CRT vertical deflection plate. Thus, a push-pull signal is applied to the CRT. VERTICAL POSITION control R15 controls the vertical position of the CRT trace by controlling the dc level of the pedestal on which the vertical deflection signals are applied to the CRT deflection plates.

TEST PROCEDURE 4

Connect the HP 180A/1801A/1821A Channel A probe to TP D (Q6-b) and the Channel B probe to TP E (Q7-b), and observe the waveforms.

CONTROL SETTINGS

Oscilloscope:
1 V/Div
2 msec/Div
10:1 probes



Analyzer:
Same as basic except:

SCAN TIME PER DIVISION 0.5 MILLISECOND
LOG REF LEVEL . . . . . −10 dBm

Waveform GOOD: Proceed to step 5

Waveform BAD: Check Q4 through Q9 and associated components.

5 HORIZONTAL DEFLECTION AMPLIFIER

Driver stage Q16 inverts the scan ramp and applies it to the base of Q13. Q13 inverts the signal and supplies the positive-going deflection signal. The scan ramp is also emitter coupled to Q14 which supplies the negative-going deflection signal. The signals at the emitters and bases of Q14 and Q13 are in phase but the collector signals are 180 degrees out of phase and provide push-pull deflection signals to the horizontal deflection plates of the CRT. Controls are provided to vary the width and position of the CRT trace.

TEST PROCEDURE 5

Connect the HP 180A/1801A/1821A Channel A input to TP F(Q13-c) and the Channel B input to TP G(Q14-c) and observe the waveforms.

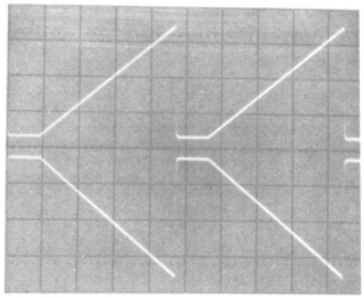
Note

If repairs to the deflection amplifier assembly are required, the Front Panel Check Procedure, paragraph 4-12 of Section IV, should be performed.

CONTROL SETTINGS

Oscilloscope:

2V/Div
5 msec/Div
10:1 probe



Waveform GOOD:
Unit functions properly

Waveform A GOOD and B BAD check Q14, 15 and associated components.

Both waveforms BAD check A13, 16 and associated components.

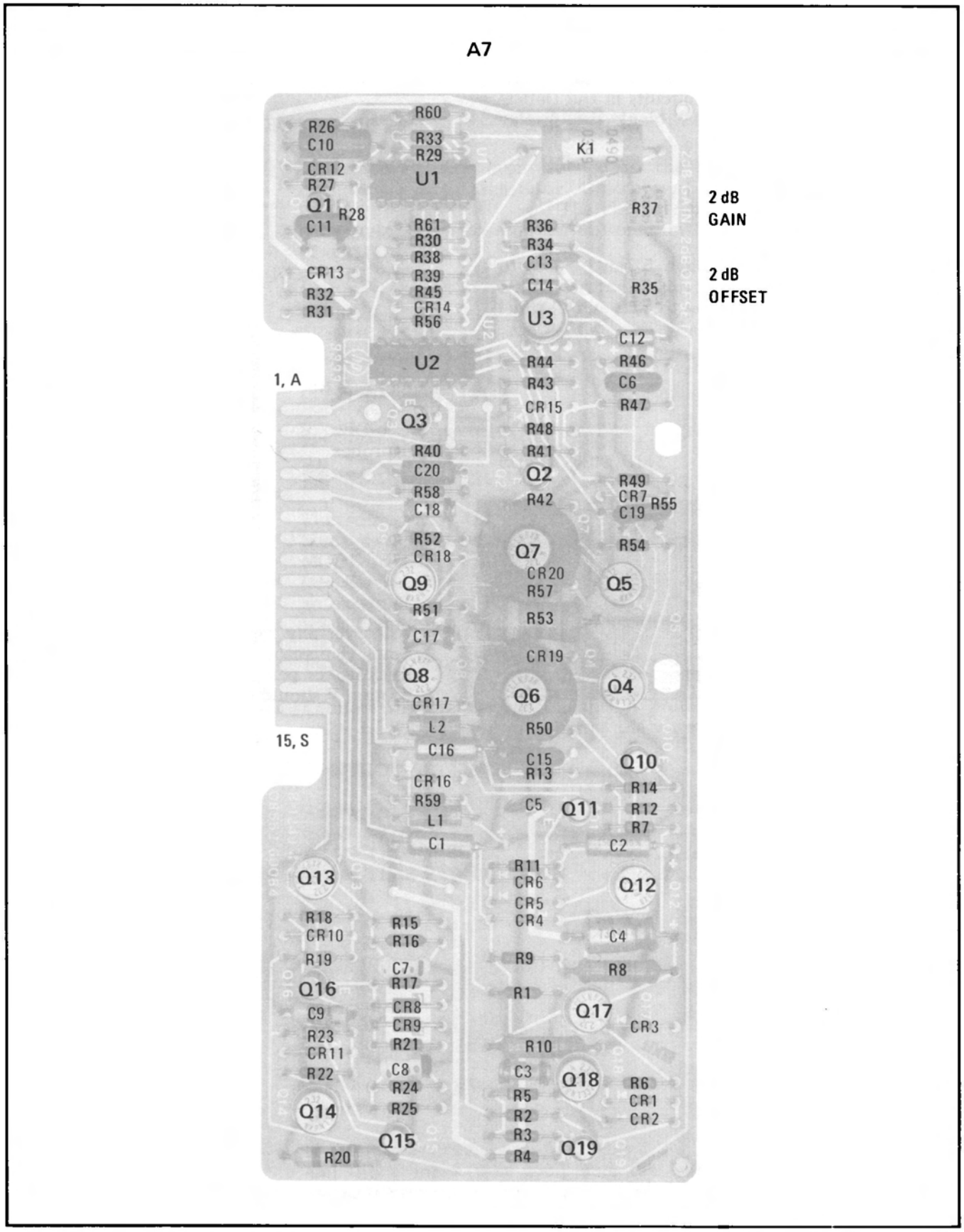
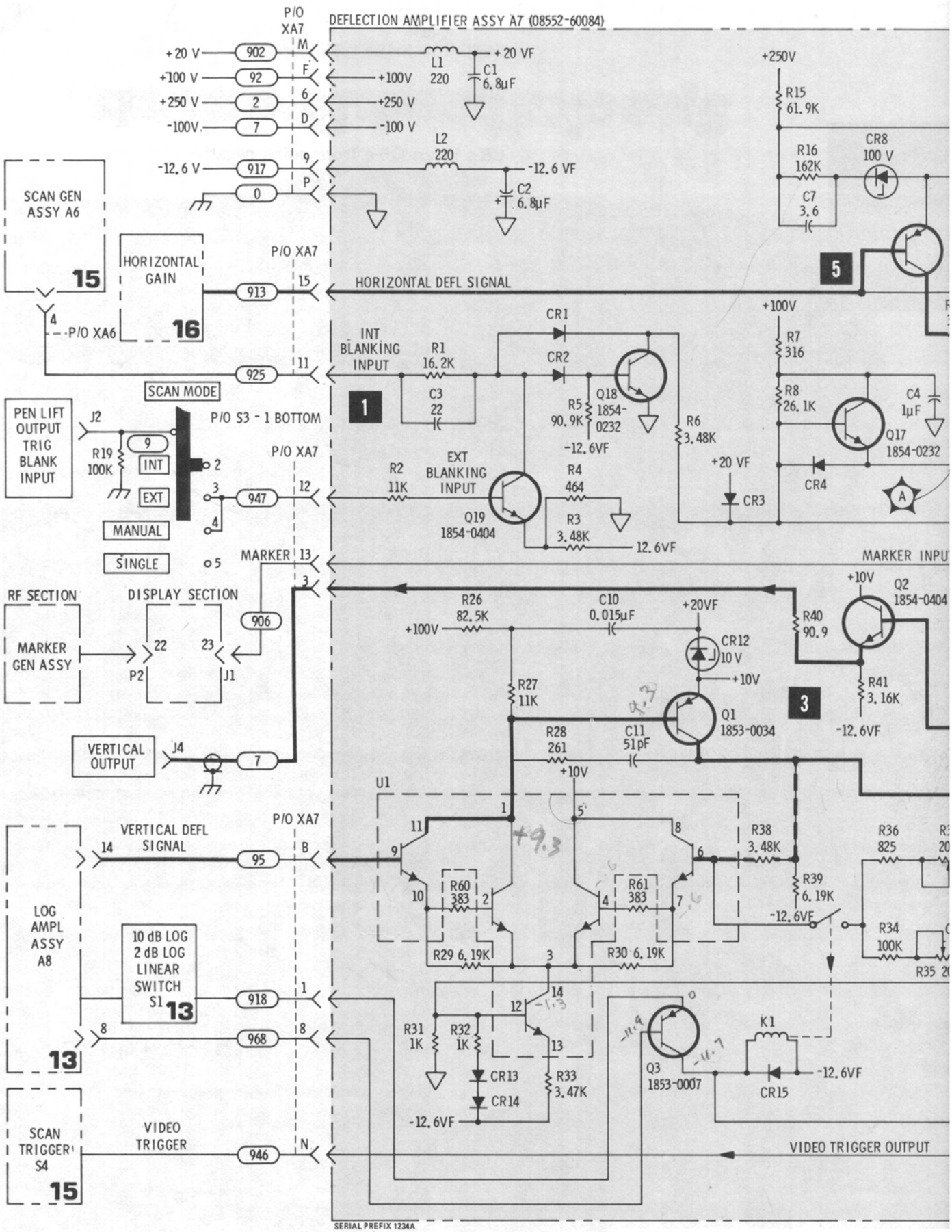
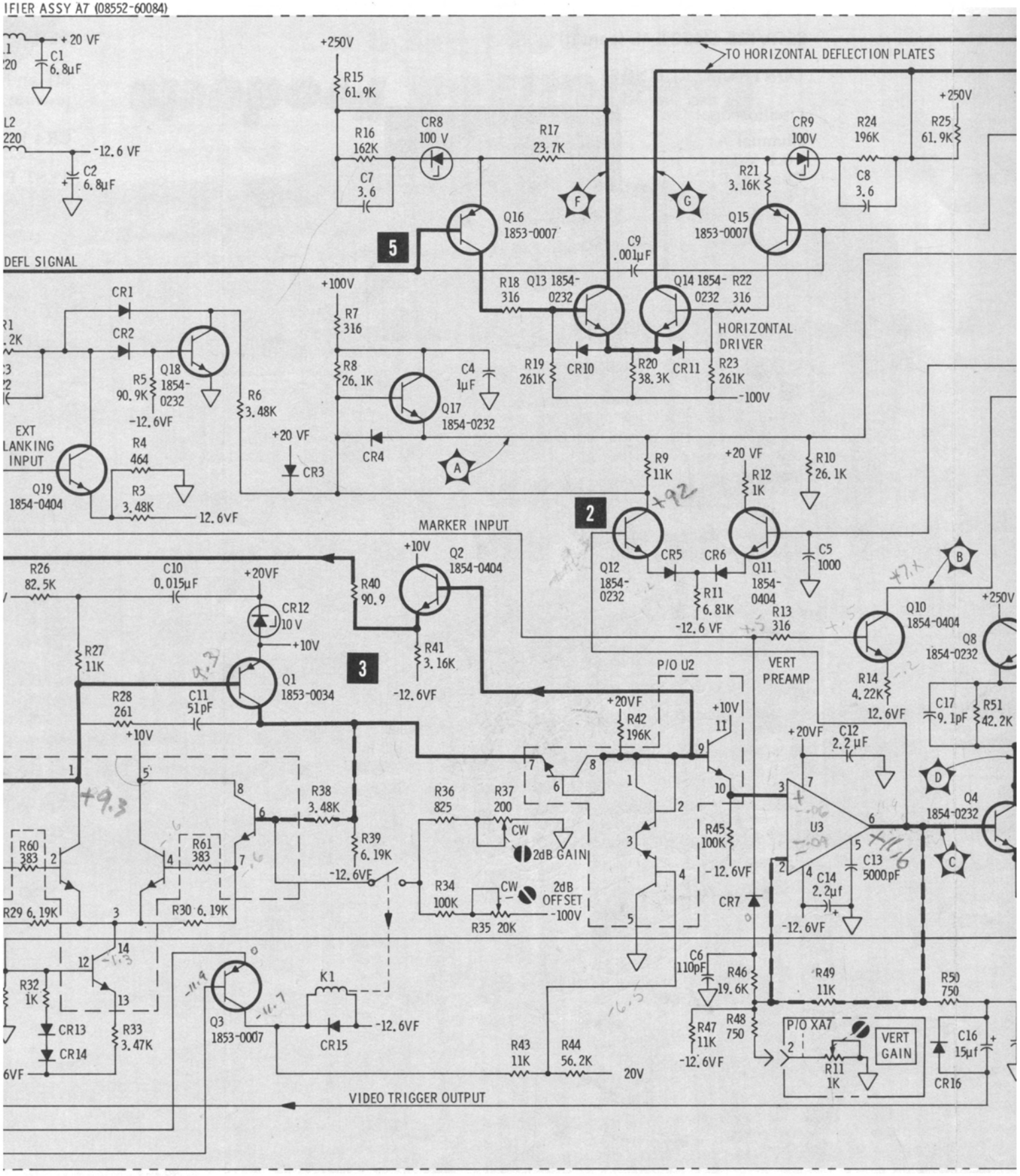
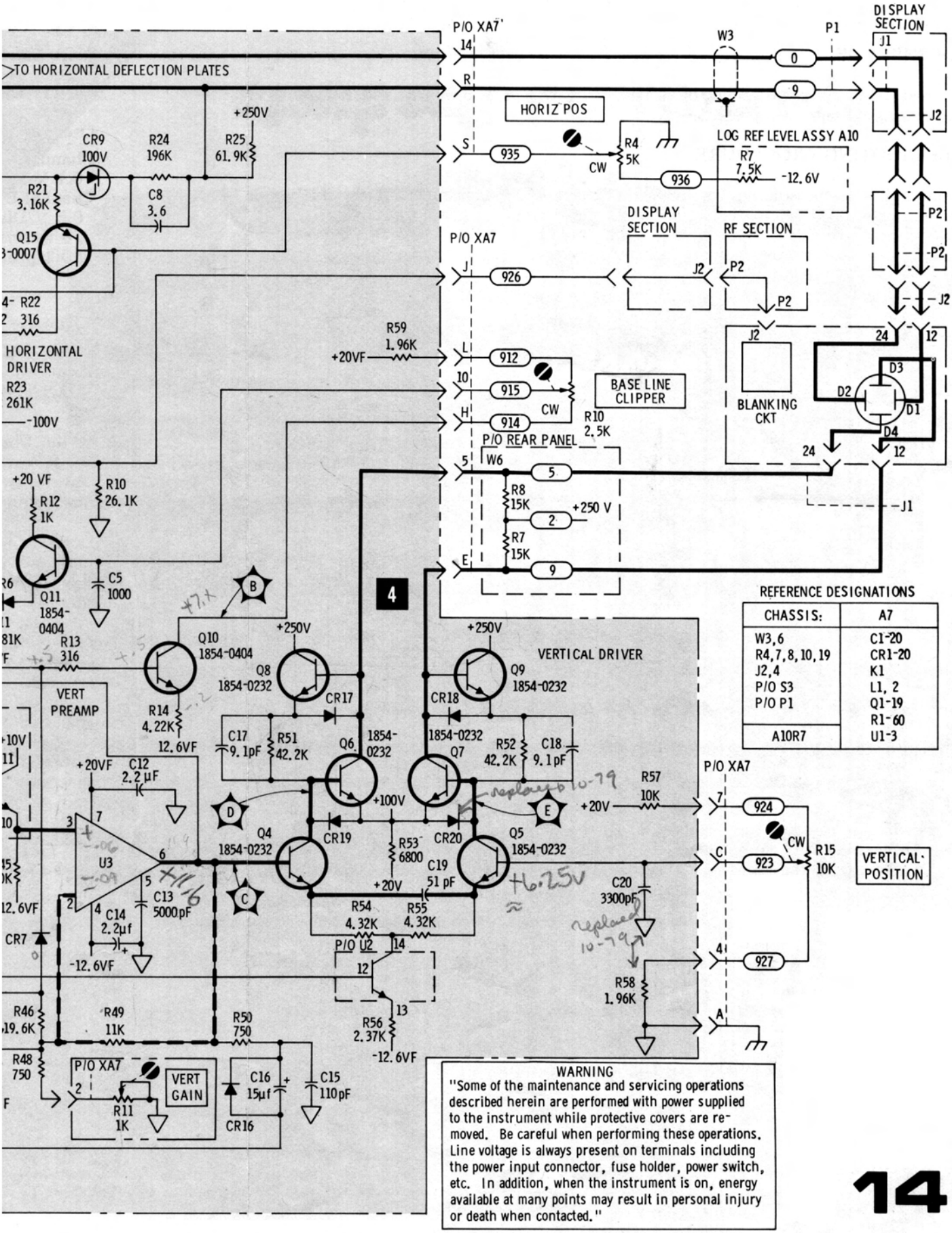


Figure 8-40. Deflection Amplifier A7 Component Identification


DEFLECTION AMPLIFIER ASSY A7 (08552-60084)
P/O XA7
+20 V
902
M
+100 V
92
F
+250 V
2
6
-100V
7
D
-12.6 V
917
9
0
P
L1
220
C1
6.8µF
+20 VF
+100V
+250 V
-100 V
L2
220
C2
6.8µF
-12.6 VF
+250V
R15
61.9K
R16
162K
CR8
100 V
C7
3.6
SCAN GEN ASSY A6
15
HORIZONTAL GAIN
16
P/O XA7
913
15
HORIZONTAL DEFL SIGNAL
4
P/O XA6
925
11
5
CR1
CR2
INT BLANKING INPUT
R1
16.2K
C3
22
1
Q18
1854-0232
R5
90.9K
-12.6VF
R6
3.48K
+100V
R7
316
R8
26.1K
C4
1µF
Q17
1854-0232
CR4
+20 VF
CR3
A
SCAN MODE
PEN LIFT OUTPUT TRIG BLANK INPUT
J2
R19
100K
9
INT
EXT
2
3
4
P/O S3 - 1 BOTTOM
P/O XA7
947
12
MANUAL
SINGLE
5
R2
11K
EXT BLANKING INPUT
Q19
1854-0404
R4
464
R3
3.48K
12.6VF
MARKER
13
3
MARKER INPUT
RF SECTION
DISPLAY SECTION
MARKER GEN ASSY
22
23
P2
J1
906
+10V
Q2
1854-0404
R40
90.9
R41
3.16K
-12.6VF
R26
82.5K
+100V
C10
0.015µF
+20VF
CR12
10 V
+10V
R27
11K
Q1
1853-0034
3
R28
261
C11
51pF
+10V
VERTICAL OUTPUT
J4
7
U1
VERTICAL DEFL SIGNAL
14
95
B
P/O XA7
+9.3
R38
3.48K
R39
6.19K
-12.6VF
R36
825
R34
100K
R35
R60
383
R61
383
R29 6.19K
R30 6.19K
LOG AMPL ASSY A8
10 dB LOG
2 dB LOG
LINEAR
SWITCH
S1
13
918
1
968
8
13
R31
1K
R32
1K
CR13
CR14
R33
3.47K
-12.6VF
Q3
1853-0007
K1
CR15
-12.6VF
SCAN TRIGGER S4
15
VIDEO TRIGGER
946
N
VIDEO TRIGGER OUTPUT
SERIAL PREFIX 1234A

IFIER ASSY A7 (08552-60084)





14

Figure 8-41. Deflection Amplifier

SERVICE SHEET 15

It is assumed that the scan generator is not being triggered properly and that the correct operating voltages are present.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated to the Scan Generator Assembly A6, it should be removed from the chassis and reinstalled using the extender board to provide easy access to components. Troubleshooting information follows the technical discussion of circuit operation.

NOTE

The Scan Generator is a loop circuit and the failure of some components will prevent a scan being generated. If this is the case, set SCAN MODE to SINGLE and use the nominal voltages shown to check the generator.

EQUIPMENT REQUIRED

OSCILLOSCOPE	HP 180A/1801A/1821A
SERVICE KIT	HP 11592A
VOLT-OHM-AMMETER	HP 412A
DIGITAL VOLTMETER	HP 3440A/3443A

CONTROL SETTINGS

Specified in individual tests.

1 TRIGGER GENERATOR

These circuits control the operation of flip-flop Q15 and Q16 in the scan generator. When S3 is in the INT (internal) position and S4 is in the AUTO (automatic) position a dc level (-12.6 Vdc) forward biases CR10 to provide an enable signal to the scan control flip-flop. The trigger generator Q2/Q3 is passive in this mode and the scan generator cycle is controlled by the scan generator circuits only. With either switch in any other position the -12.6 volts is removed from CR10 and a trigger must be provided to initiate the scan cycle. In the SINGLE scan mode closing the SINGLE pushbutton switch applies the -12.6 volts to the junction of R23 and R22. The abrupt change in the dc level at the junction of R23 and R22 is coupled through C22 to enable the scan generator for one scan only,or coupled through C8 to defeat the scan.

When the SCAN MODE switch is in the INT position and the SCAN TRIGGER switch is in the LINE, EXT, or VIDEO positions, Q2/Q3 provides the required triggers to initiate the scan generator cycle. Input triggering to the trigger circuit may be either positive or negative. Input triggers are inverted by Q3 and applied to Q2. Q2 functions as a phase splitter and the output may be taken from collector or emitter. When the input trigger is positive, Q2 is operated as an emitter follower to provide triggers of the right polarity to the scan generator circuit. Q1 disables the trigger circuits during the scan period.

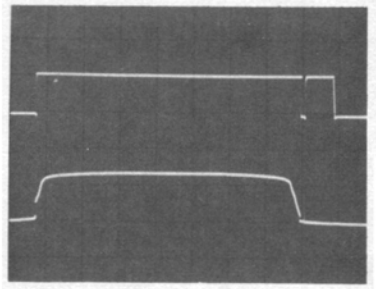
TEST PROCEDURE 1

Connect the HP 180A/1801A/1821A Channel A probe to Q3-base and the Channel B probe to TP 1 and observe the waveforms. If neither waveform is present first check switching, then Q2 circuit.

CONTROL SETTINGS:

Oscilloscope:

Channel A:
0.1 V/Div
Channel B:
0.5 V/Div
10 msec/Div
10:1 probes



Analyzer:

SCAN TRIGGER: LINE
SCAN MODE: INT
SCAN TIME PER DIVISION: 0.1 msec

If the Channel A waveform is correct and Channel B waveform is not, check Q2 circuit. If both waveforms are present and the scan generator is not being triggered check scan control flip-flop.

Correct operation of Q2 should be verified by momentarily placing the NORM REV switch in the REV position. The Channel B waveform should be reversed in polarity. (180 degrees out of phase with Channel A). All switch contacts and wiring can be checked with the HP 412A Ohmmeter for continuity after removal of A6 and A7 assemblies.

2 SCAN CONTROL FLIP-FLOP

The scan control flip-flop controls the scan cycle. Whenever Q15 is on, a scan ramp is being generated. Whenever Q16 is on (Q15 off) the Scan Generator is off. When Q15 is triggered on, it turns off the discharge switch and the R/C network on the Scan Time Switch A9 begins to charge. When the charge (scan ramp) reaches a predetermined level, the level detector turns on and turns Q15 off through the scan reset circuits.

TEST PROCEDURE 2

If any circuit in the scan generator loop is faulty, no waveforms will be present at the test points. To troubleshoot, set SCAN MODE to SINGLE and check the loop circuits for the typical voltages shown on the schematic.

3 RAMP DISCHARGE SWITCH

When Q15/Q16 is in the rest state (Q15 off), Q9 and Q13 are both conducting and the ramp capacitor discharges through Q9. When Q15/Q16 returns to the scan state Q9 and Q13 are turned

off and the ramp capacitor begins to charge and provide the ramp signal to the ramp amplifier.

CR4 keeps Q6-e from going negative.

TEST PROCEDURE 3

See Step 2

4 CONSTANT CURRENT SOURCE AND RAMP CHARGE NETWORK

The R/C network selected by the Scan Time Switch Assembly A9, wafers 1-F, 2F and 2R, determines the ramp slope (or time). Constant current source Q6 keeps the ramp linear by keeping its conduction constant as the voltage on its collector rises.

TEST PROCEDURE 4

See step 2

5 RAMP AMPLIFIER AND RAMP LEVEL DETECTOR CIRCUITS

U1 is a low gain linear amplifier. The high input impedance of the circuit prevents loading of the constant current source, Q6. The output ramp voltage is applied to the SCAN MODE switch. The output ramp from U1 also turns on transistor switch Q7 when the ramp voltage reaches a point high enough to overcome the voltage breakdown point of zener diode CR12 through the base-emitter junction of Q7. When Q7 conducts it turns on Q8 to turn off Q10 in the reset circuit.

TEST PROCEDURE 5

See Step 2

6 SCAN RESET CIRCUIT

When the level detector turns on, it turns off the scan reset circuits which turns off Q15 to stop the scan ramp. When the scan reset circuits turn off, C10 charges up and holds them off until it discharges; the discharge time of C10 is determined by a resistor (or resistors) selected by Scan Time Switch Assembly A9. When C10 has discharged, the scan reset circuits turn on and Q15 turns on (or waits for the next trigger).

SERVICE SHEET 15 (cont'd)

During the scan reset off time, Q15 cannot be triggered on, the ramp capacitor on S1-1F is fully discharged and the blanking circuits in the Deflection Amplifier Assembly A7 blank the display CRT.

TEST PROCEDURE **6**

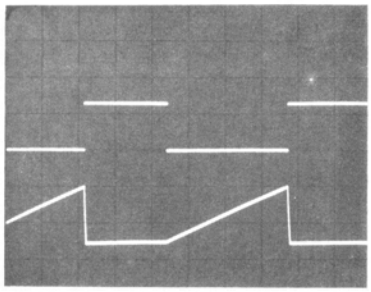
See Step **2** .

The waveforms at TP2 through 5 can be used to verify proper Scan Generator operation. Attach the oscilloscope Channel A probe to TP2 and Channel B probe to TP 3.

CONTROL SETTINGS

Analyzer:
SCAN TRIGGER ..... LINE
SCAN MODE ..... INT
SCAN TIME PER DIVISION 2 MILLISECONDS

Oscilloscope:
Channel A:
1V/Div
Channel B:
0.5V/Div
5 msec/Div
10:1 probes



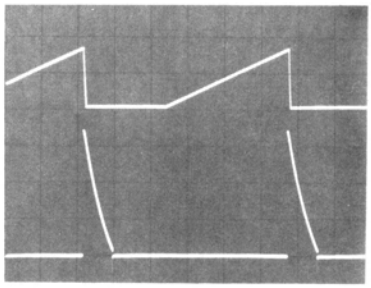
Attach Channel A probe to TP4 and Channel B probe to TP5.

CONTROL SETTINGS

Analyzer:

SCAN TRIGGER ..... LINE
SCAN MODE ..... INT
SCAN TIME
PER DIVISION ..... 2 MILLISECONDS

Oscilloscope:
Channel A & B:
0.5 V/Div
5 msec/Div
10:1 probes



NOTE

Whenever any repairs are required to the Scan Generator circuits the procedures specified in paragraphs 5-28 and 5-29 of Section V should be performed.

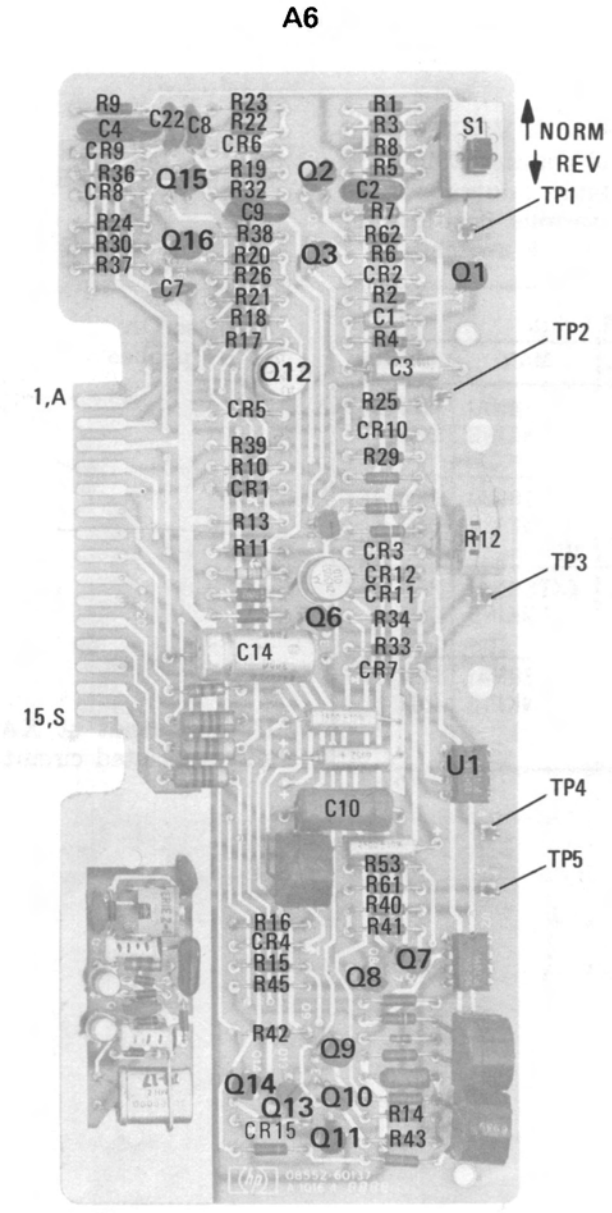
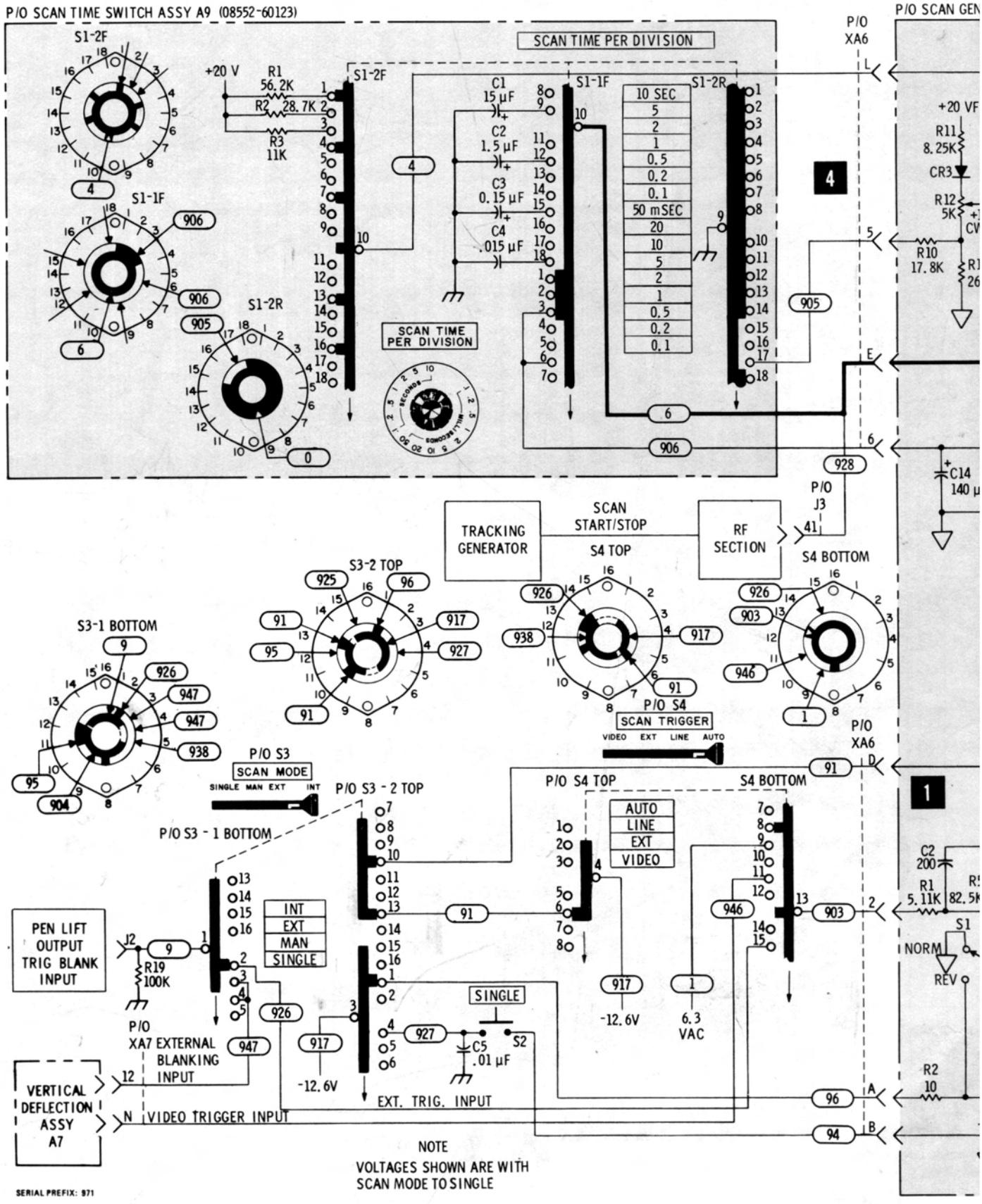
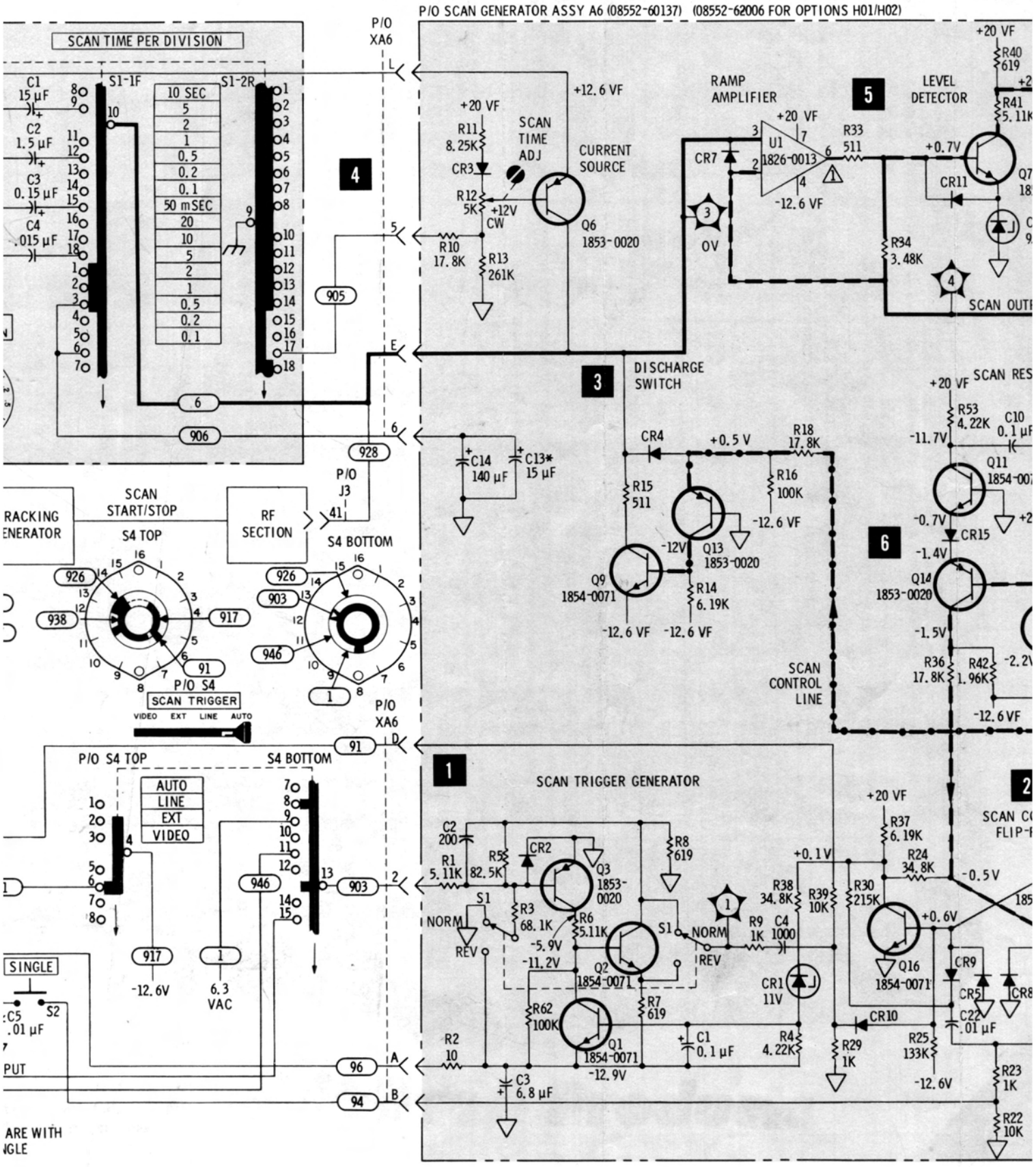


Figure 8-42. P/O Scan Generator A6 Component Identification


P/O SCAN TIME SWITCH ASSY A9 (08552-60123)
P/O SCAN GEN
SCAN TIME PER DIVISION
S1-2F
S1-1F
S1-2R
+20 V
R1 56.2K
R2 28.7K
R3 11K
C1 15 µF
C2 1.5 µF
C3 0.15 µF
C4 .015 µF
10 SEC
5
2
1
0.5
0.2
0.1
50 mSEC
20
10
5
2
1
0.5
0.2
0.1
SCAN TIME PER DIVISION
SECONDS
MILLISECONDS
P/O XA6
+20 VF
R11 8.25K
CR3
R12 5K
R10 17.8K
C14 140 µ
P/O J3
41
928
TRACKING GENERATOR
SCAN START/STOP
RF SECTION
S4 TOP
S4 BOTTOM
S3-2 TOP
S3-1 BOTTOM
P/O S4
SCAN TRIGGER
VIDEO EXT LINE AUTO
P/O S3
SCAN MODE
SINGLE MAN EXT INT
P/O S3 - 2 TOP
P/O S3 - 1 BOTTOM
P/O S4 TOP
S4 BOTTOM
AUTO
LINE
EXT
VIDEO
INT
EXT
MAN
SINGLE
PEN LIFT OUTPUT TRIG BLANK INPUT
J2
R19 100K
P/O XA7 EXTERNAL BLANKING INPUT
VERTICAL DEFLECTION ASSY A7
VIDEO TRIGGER INPUT
EXT. TRIG. INPUT
-12.6V
6.3 VAC
C5 .01 µF
S2
SINGLE
C2 200
R1 5.11K
S1
NORM
REV
R2 10
NOTE
VOLTAGES SHOWN ARE WITH SCAN MODE TO SINGLE
SERIAL PREFIX: 971


P/O SCAN GENERATOR ASSY A6 (08552-60137) (08552-62006 FOR OPTIONS H01/H02)
SCAN TIME PER DIVISION
S1-1F
S1-2R
10 SEC
5
2
1
0.5
0.2
0.1
50 mSEC
20
10
5
2
1
0.5
0.2
0.1
C1 15 µF
C2 1.5 µF
C3 0.15 µF
C4 .015 µF
P/O XA6
4
SCAN TIME ADJ
CURRENT SOURCE
+12.6 VF
+20 VF
R11 8.25K
CR3
R12 5K
+12V CW
R10 17.8K
R13 261K
Q6 1853-0020
RAMP AMPLIFIER
5
U1 1826-0013
CR7
R33 511
-12.6 VF
OV
R34 3.48K
LEVEL DETECTOR
R40 619
R41 5.11K
+0.7V
CR11
Q7
SCAN OUT
905
906
928
6
E
5
DISCHARGE SWITCH
3
C14 140 µF
C13* 15 µF
CR4
+0.5 V
R18 17.8K
R15 511
R16 100K
Q13 1853-0020
-12V
Q9 1854-0071
R14 6.19K
-12.6 VF
SCAN RES
R53 4.22K
C10 0.1 µF
-11.7V
Q11 1854-007
-0.7V
CR15
-1.4V
Q14 1853-0020
-1.5V
R36 17.8K
R42 1.96K
-2.2V
SCAN CONTROL LINE
6
RACKING ENERATOR
SCAN START/STOP
RF SECTION
P/O J3
41
S4 TOP
S4 BOTTOM
926
938
917
903
946
91
1
P/O S4
SCAN TRIGGER
VIDEO EXT LINE AUTO
P/O XA6
D
P/O S4 TOP
S4 BOTTOM
AUTO
LINE
EXT
VIDEO
SINGLE
S2
C5 .01 µF
PUT
917
-12.6V
1
6.3 VAC
946
903
2
96
94
A
B
1
SCAN TRIGGER GENERATOR
C2 200
R1 5.11K
R5 82.5K
CR2
Q3 1853-0020
R8 619
S1
NORM
REV
R3 68.1K
R6 5.11K
-5.9V
-11.2V
Q2 1854-0071
R62 100K
R7 619
Q1 1854-0071
-12.9V
R2 10
C1 0.1 µF
C3 6.8 µF
R4 4.22K
+0.1 V
R9 1K
C4 1000
R38 34.8K
R39 10K
CR1 11V
R30 215K
+0.6V
Q16 1854-0071
R37 6.19K
R24 34.8K
-0.5V
CR9
CR5
CR8
CR10
C22 .01 µF
R25 133K
R29 1K
-12.6V
R23 1K
R22 10K
2
SCAN C
FLIP-F
ARE WITH
NGLE

REFERENCE DESIGNATIONS

A9	CHASSIS	A6
P/OS1 C1-4 R1-7	C5-7 DS9 J2 P/O J3 S2, P/O S3 P/O S4 R9, 19 P/O XA5 P/O XA6 P/O XA7	C1-4, 7-10 13, 14, 22 CR1-, 12, 15 Q1-3, 5 6-16 U1, S1 R1-8, 10-26 29, 30, 32-34, 36-43, 45, 53, 61, 62

†REFER TO TABLE 7-2

WARNING

"Some of the maintenance and servicing operations described herein are performed with power supplied to the instrument while protective covers are removed. Be careful when performing these operations. Line voltage is always present on terminals including the power input connector, fuse holder, power switch, etc. In addition, when the instrument is on, energy available at many points may result in personal injury or death when contacted."

08552-62006 FOR OPTIONS H01/H02)

RAMP AMPLIFIER 5 LEVEL DETECTOR

+20 VF R40 619 +20 V +20 VF

R41 5.11K Q8 1853-0020 -2.8V

U1 1826-0013 R33 511 +0.7V R61 5.11K

CR7 CR11 Q7 1854-0071

-12.6 VF CR12 9.V

OV R34 3.48K

SCAN OUTPUT

P/O XA6 N

P/O SCAN MODE SWITCH ASSY S3 16

P/O SCAN TIME SWITCH ASSY A9 (08552-60123)

SCAN TIME PER DIVISION P/O S1-1R S1-1R

SCAN RESET +20 VF R53 4.22K C10 0.1 µF -2.8V -11.7V

+0.5 V R18 17.8K R16 100K -12.6 VF

Q11 1854-0071 -0.7V +20 VF

6 CR15 -1.4V R45 133K

Q13 1853-0020 Q14 1853-0020 -2.1V

R14 6.19K -1.5V Q10 1853-0020

VF R36 17.8K R42 1.96K -2.2V R43 17.8K

SCAN CONTROL LINE -12.6VF

2 SCAN CONTROL FLIP-FLOP +20 VF +20 VF

+20 VF R37 6.19K R26 4.22K +14V

+0.1 V R24 34.8K R20 46.4K -0.5 V

R38 34.8K R39 10K R30 215K Q15 1854-0071 R17 5.11K

1 R9 1K C4 1000 +0.6V R19 215K C7 .01 µF

NORM REV Q16 1854-0071 Q12 1854-0232

CR1 11V CR9 CR6 R21 619 INT BLANKING

CR5 CR8 CR10 C22 .01 µF C8 .01 µF C9 430

C1 0.1 µF R4 4.22K R29 1K R25 133K R32 23.7K

-12.6V R23 1K

R22 10K

PEN LIFT DRIVER 16

+100V 92

SCANNING P/O XA6 DS9

926 R9 68.1K

P/O XA7 DEFLECTOR AMPLIFIER ASSY A7 14

925 P/O J3

RF SECTION TRACKING GENERATOR

15

Figure 8-43. Scan Generator and Trigger Circuits

SERVICE SHEET 16

It is assumed that all dc voltages and the waveforms at TP 2 and 4 (see Service Sheet 15) are present and correct.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated to the scan driver or pen lift driver circuits, the Scan Generator Assembly A6 should be removed from the chassis and reinstalled using the extender board to provide easy access to components. Troubleshooting information follows the technical discussion of circuit operation.

EQUIPMENT REQUIRED

OSCILLOSCOPE . . . . . HP 180A/1801A/1821A
SERVICE KIT . . . . . HP 11592A
DIGITAL VOLTMETER . . . . . HP 3440A/3443A

CONTROL SETTINGS

Specified in individual tests.

1 SCAN DRIVER

The scan driver, U2, amplifies a generated scan and feeds it to the Scan Mode switch, the RF Section, and the Deflection Amplifier. With SCAN MODE in INT or SINGLE, the scan is generated by the Scan Generator (see Service Sheet 15); with SCAN MODE in EXT, the scan is provided by an external source. When SCAN MODE is in MANUAL, the conduction of U2 is determined by the position of R20, MANUAL SCAN knob.

TEST PROCEDURE **1**

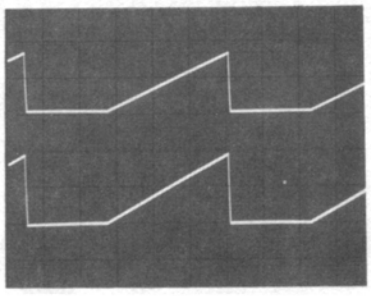
Connect the oscilloscope Channel A probe to XA6 pin P and Channel B probe to XA6 pin 14 and observe the waveforms.

CONTROL SETTINGS

Analyzer:
SCAN MODE . . . . . INT
SCAN TRIGGER . . . . . LINE
SCAN TIME PER DIVISION . . . . . 2 MILLISECONDS

Oscilloscope:

Both Channels:
0.5V/Div
5 msec/Div
10:1 probes



If both waveforms are bad, check S3, SCAN MODE switch. If the amplifier's input was good and the output was bad, check U2 and associated circuitry.

A6, A9
Scan Generator and Trigger Circuits
SERVICE SHEET 15

SERVICE SHEET 16 (cont'd)

2 PEN LIFT DRIVER

During the scan ramp, Q4 is off and Q5 is on and the pen lift driver's output is approximately 0V. When the scan stops, and as long as Q15 (on Service Sheet 15) is off, Q4 turns on, turning off Q5 which puts approximately +14V at the driver output.

When the driver output goes to 0V, CR13 and CR14 prevent the pen lift coil counter EMF voltage from damaging Q5. The table below describes the function of J2 for the various positions of SCAN MODE and SCAN TRIGGER switches.

SCAN TRIGGER Switch	SCAN MODE Switch			
	INT	EXT	MAN	SINGLE
AUTO	PEN LIFT OUT	EXTERNAL BLANKING IN	EXTERNAL BLANKING IN	PEN LIFT OUT
LINE	PEN LIFT OUT	EXTERNAL BLANKING IN	EXTERNAL BLANKING IN	PEN LIFT OUT
EXT	EXTERNAL TRIGGER IN	EXTERNAL BLANKING IN	EXTERNAL BLANKING IN	PEN LIFT OUT
VIDEO	PEN LIFT OUT	EXTERNAL BLANKING IN	EXTERNAL BLANKING IN	PEN LIFT OUT

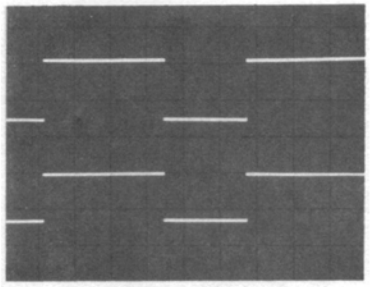
TEST PROCEDURE 2

Connect the oscilloscope Channel A probe to TP 2 and Channel B probe to XA6 pin C and observe the waveforms.

CONTROL SETTINGS

Analyzer:
SCAN MODE . . . . . INT
SCAN TRIGGER . . . . . LINE
SCAN TIME PER DIVISION 2 MILLISECONDS

Oscilloscope:
Both channels:
1V/Div
5 msec/Div
10:1 probes



If the output at XA6-C is BAD, check Q4, Q5 and associated circuitry.

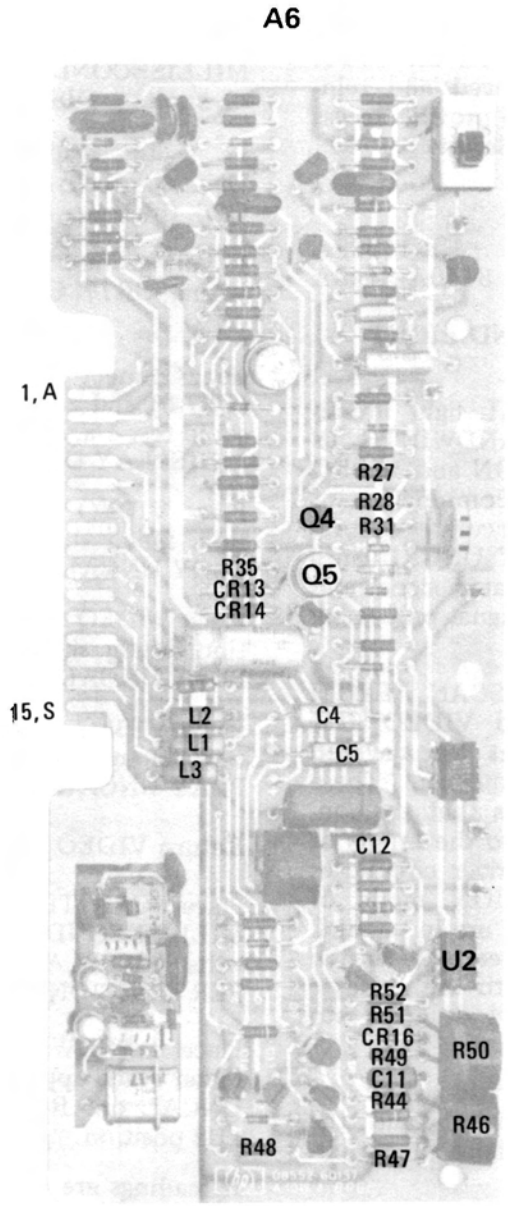
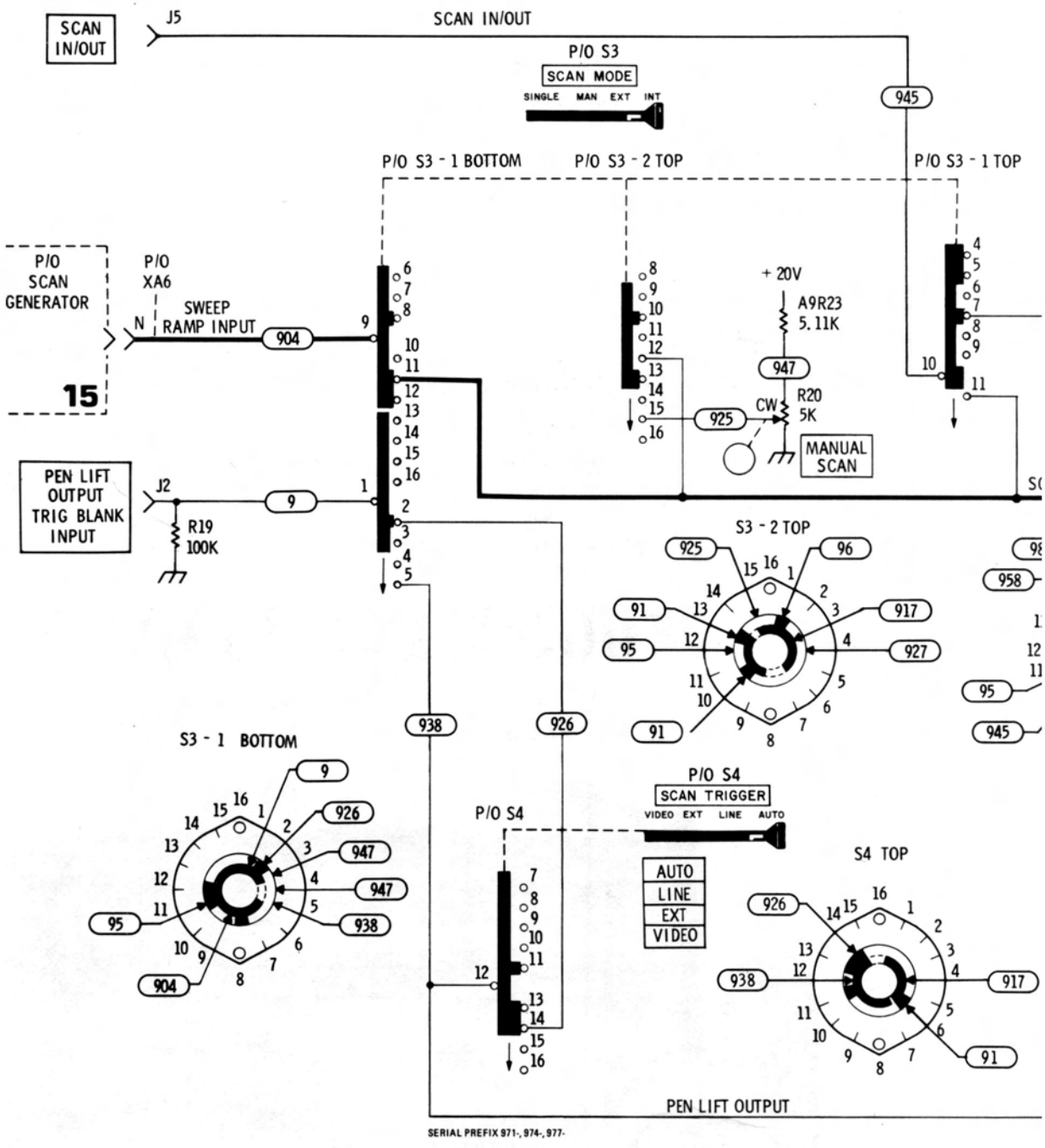
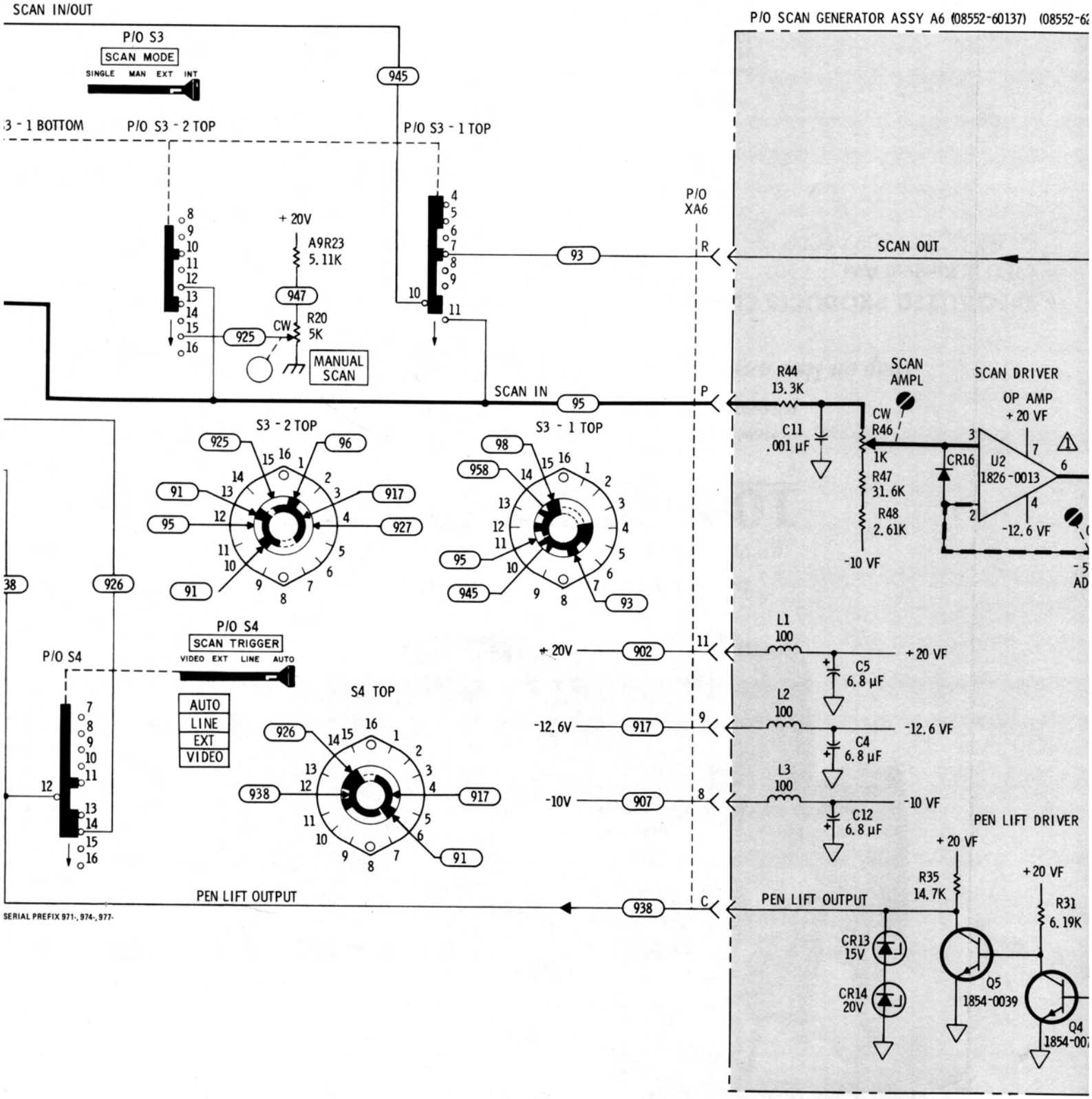
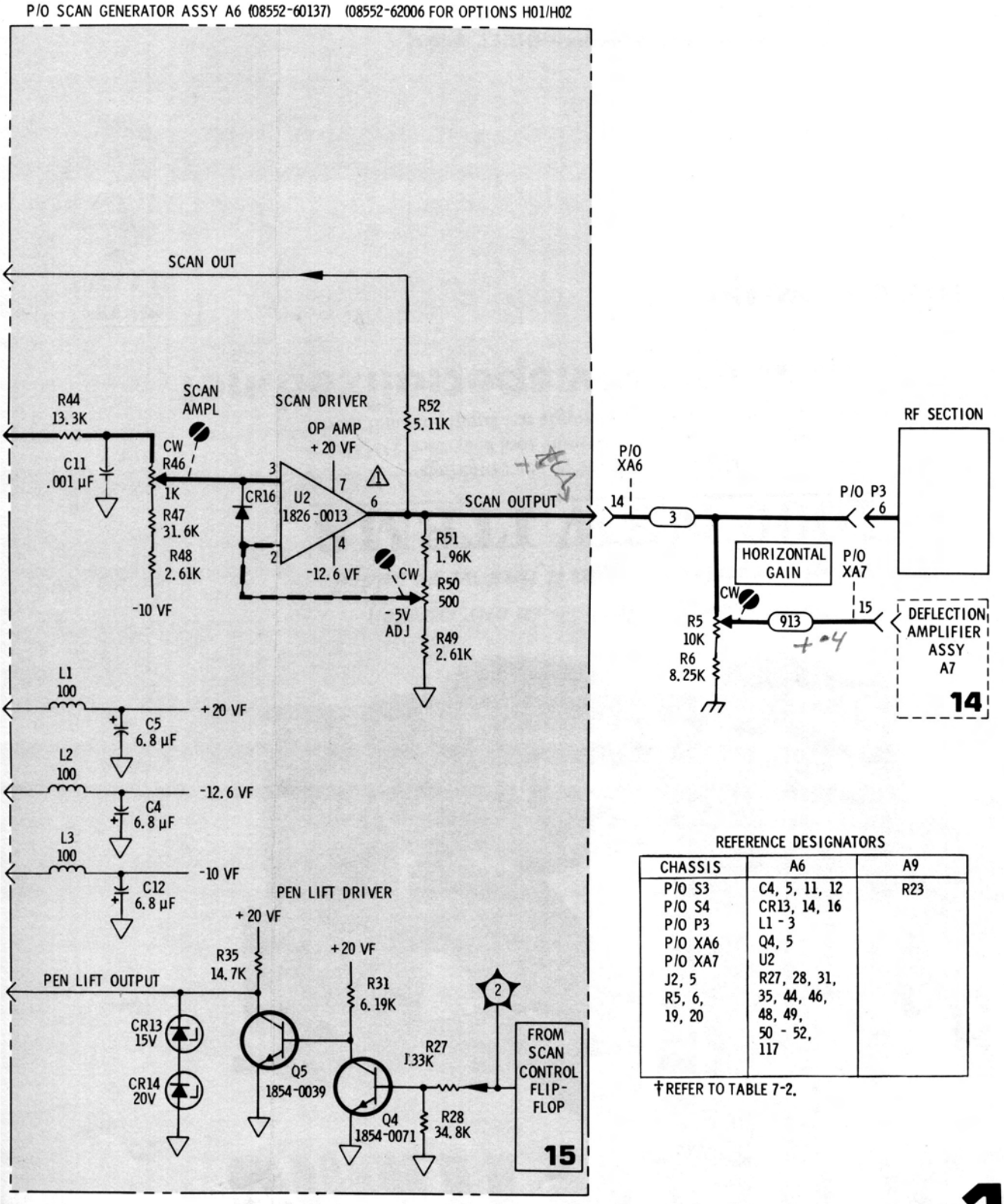


Figure 8-44. P/O Scan Generator A6 Component Identification



SERIAL PREFIX 971-, 974-, 977-


SCAN IN/OUT
P/O SCAN GENERATOR ASSY A6 (08552-60137) (08552-62
P/O S3
SCAN MODE
SINGLE MAN EXT INT
945
3 - 1 BOTTOM
P/O S3 - 2 TOP
P/O S3 - 1 TOP
+ 20V
A9R23
5.11K
947
CW
R20
5K
925
MANUAL
SCAN
93
P/O
XA6
R
SCAN OUT
SCAN IN
95
P
R44
13.3K
C11
.001 µF
SCAN
AMPL
CW
R46
1K
R47
31.6K
R48
2.61K
-10 VF
SCAN DRIVER
OP AMP
+ 20 VF
CR16
U2
1826-0013
-12.6 VF
S3 - 2 TOP
925
96
91
917
95
927
91
S3 - 1 TOP
98
958
95
945
93
926
P/O S4
SCAN TRIGGER
VIDEO EXT LINE AUTO
P/O S4
AUTO
LINE
EXT
VIDEO
S4 TOP
926
938
917
91
L1
100
+ 20V
902
11
+ 20 VF
C5
6.8 µF
L2
100
-12.6V
917
9
-12.6 VF
C4
6.8 µF
L3
100
-10V
907
8
-10 VF
C12
6.8 µF
PEN LIFT DRIVER
+ 20 VF
R35
14.7K
+ 20 VF
R31
6.19K
PEN LIFT OUTPUT
PEN LIFT OUTPUT
938
C
CR13
15V
CR14
20V
Q5
1854-0039
Q4
1854-00
SERIAL PREFIX 971-, 974-, 977-



REFERENCE DESIGNATORS

CHASSIS	A6	A9
P/O S3 P/O S4 P/O P3 P/O XA6 P/O XA7 J2, 5 R5, 6, 19, 20	C4, 5, 11, 12 CR13, 14, 16 L1 - 3 Q4, 5 U2 R27, 28, 31, 35, 44, 46, 48, 49, 50 - 52, 117	R23

†REFER TO TABLE 7-2.

Figure 8-45. Scan Driver and Pen Lift Driver

A6
Scan Driver and Pen Lift Driver
SERVICE SHEET 16

SERVICE SHEET 17

It is assumed that the DISPLAY UNCAL lamp is operating erratically or not at all and that the adjustment procedure in paragraph 5-41 of Section V will not correct the problem.

TROUBLESHOOTING PROCEDURE

When a malfunction has been isolated to the analogic light driver or switching matrix, the Power Supply Assembly should be removed and reinstalled using the extender board to provide access to components in the light driver circuit.

EQUIPMENT REQUIRED

SERVICE KIT . . . . . HP 11592A
DIGITAL VOLTMETER . . . HP 3440A/3443A

1 ANALOGIC THRESHOLD AND LIGHT DRIVER CIRCUIT

The RF Section DISPLAY UNCAL light illuminates when the SCAN WIDTH, BANDWIDTH, IF Section SCAN TIME PER DIVISION and VIDEO FILTER switches are set at any combination of positions which do not permit accurate calibration of the analyzer. The DISPLAY UNCAL lamp is caused to illuminate by a simulated signal and has no actual connection to the signal processing circuits.

The SCAN TIME switch, the SCAN WIDTH switch, BANDWIDTH switch, and VIDEO FILTER switch all have wafers that are devoted exclusively to the analogic function. These switches control resistive networks that are connected from the -10 Vdc supply to the inputs of the analogic threshold and light driver circuit. In the SCAN WIDTH PER DIVISION mode of operation, these resistive networks are in parallel. At any time that the total resistance between the -10 Vdc supply and either input to the analogic circuit is low enough to bias Q24 or Q27 into conduction the light driver is enabled.

In the preset scan mode of operation only the SCAN TIME PER DIVISION switch and the VIDEO FILTER switch control the analogic circuit.

In the ZERO scan mode the analogic circuit is inoperative. (The VIDEO FILTER switch is still in the circuit but cannot, by itself, bias Q24 into conduction.)

TEST PROCEDURE 1

1a. Connect the HP 3440A/3443A to TP A (Q24-b) and set the analyzer controls as follows:
SCAN WIDTH . . . . . PER DIVISION
BANDWIDTH . . . . . 10 kHz
VIDEO FILTER . . . . . OFF
SCAN WIDTH PER DIVISION . . . . . 20 kHz
SCAN TIME PER DIVISION . 1 MILLISECOND

The voltmeter should read about +580 mVdc — DISPLAY UNCAL lamp off.

Place VIDEO FILTER switch in 10 kHz position. Meter should read about +10 mVdc — DISPLAY UNCAL lamp on. Return VIDEO FILTER to OFF.

Place SCAN TIME PER DIVISION switch in 0.5 MILLISECOND position. Meter should read about -2.4 volts — DISPLAY UNCAL lamp on.

If meter readings are correct but DISPLAY UNCAL does not illuminate, check Q22, Q24, Q26, the lamp, and associated components.

If voltages are incorrect, check switches, resistors, wiring, CR17, CR18, etc.

1b. Connect the HP 3440A/3443A to TP B (Q27-b) and set the Analyzer controls as initially set in test 1-a. Meter should read about +265 mVdc — DISPLAY UNCAL off.

Place VIDEO FILTER switch in the 10 kHz position. Meter should read about +50 mVdc — DISPLAY UNCAL on.

Place VIDEO FILTER switch in the 100 Hz position. Meter should read about -163 mVdc — DISPLAY UNCAL on.

Place VIDEO FILTER switch in the 10 Hz position. Meter should read about -300 mVdc — DISPLAY UNCAL on.

Return VIDEO FILTER switch to OFF.

Place SCAN TIME PER DIVISION switch to 0.5 MILLISECOND. Meter should read about -2.0 volts — DISPLAY UNCAL on. Return SCAN TIME PER DIVISION switch to 1 MILLISECOND.

Place BANDWIDTH switch to 3 kHz position. Meter reads approximately -58 mVdc — DISPLAY UNCAL on. Return BANDWIDTH switch to 10 kHz position.

If readings are correct but DISPLAY UNCAL does not illuminate, check Q27, the lamp, and associated components.

If readings are incorrect, check switches, resistors, wiring, etc.

NOTE

A further aid to troubleshooting is Table 5-3 of Section V. Using the table in conjunction with the schematic should aid in localizing cause of malfunction to specific components.

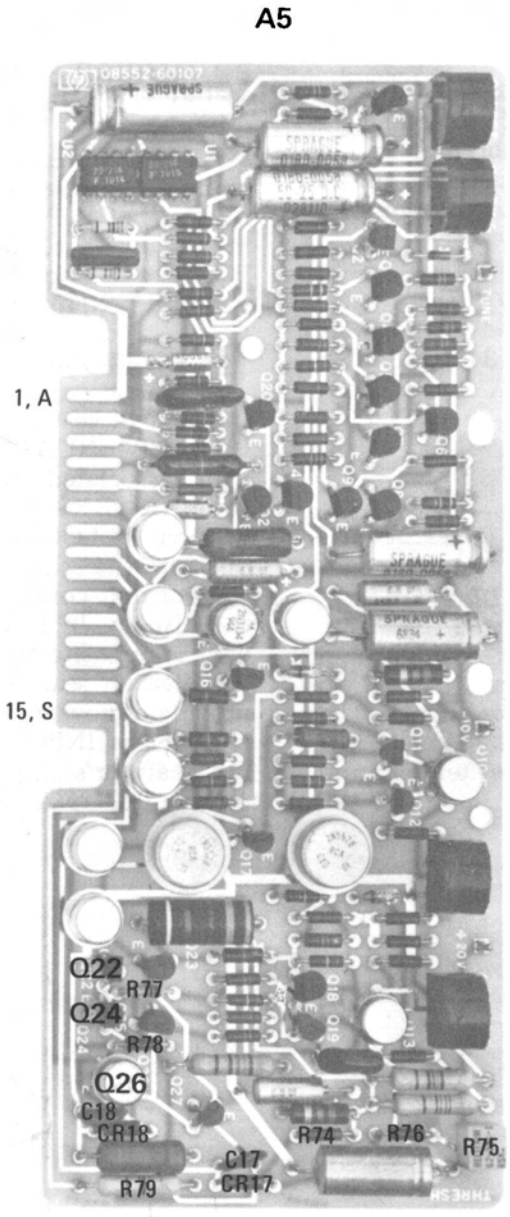
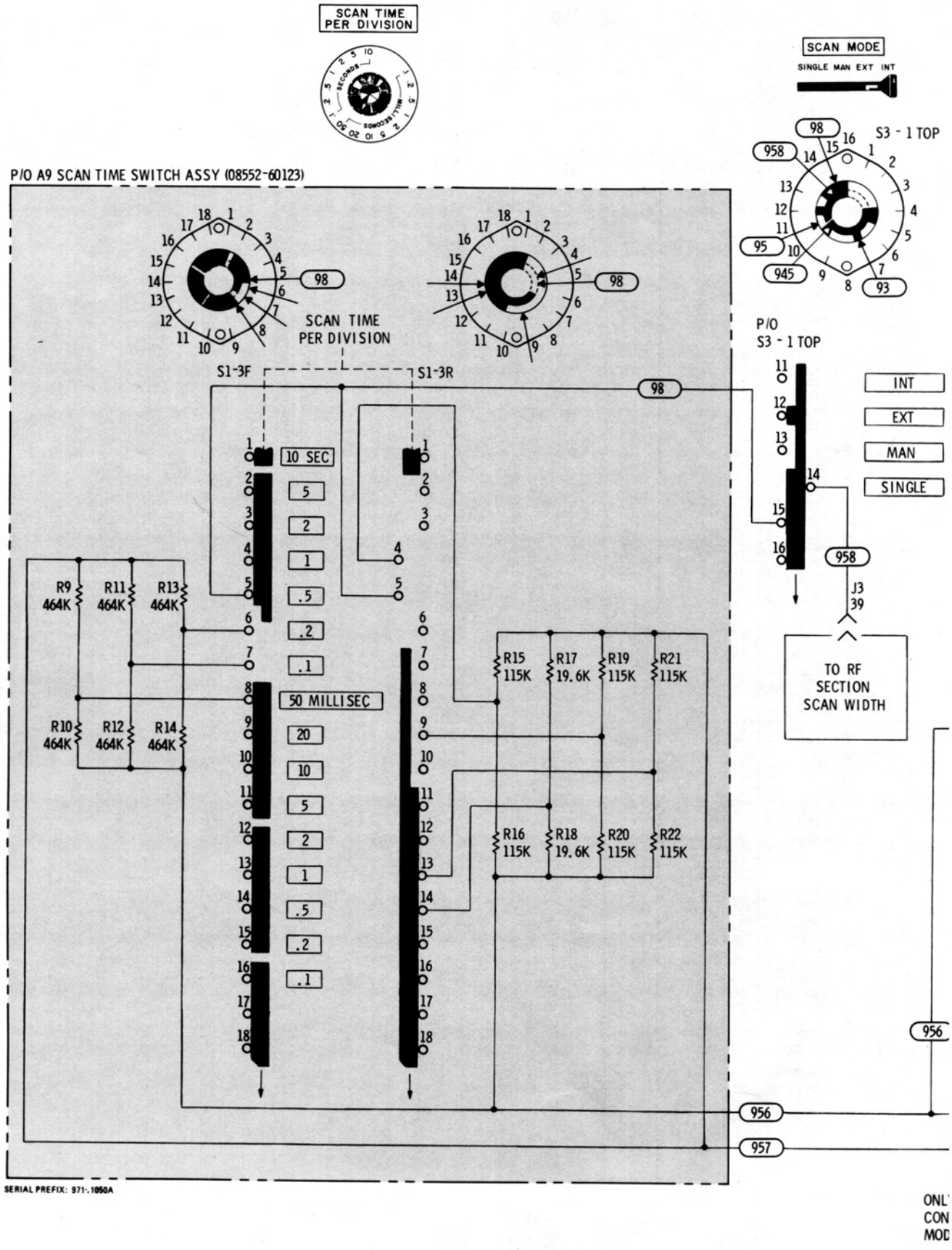
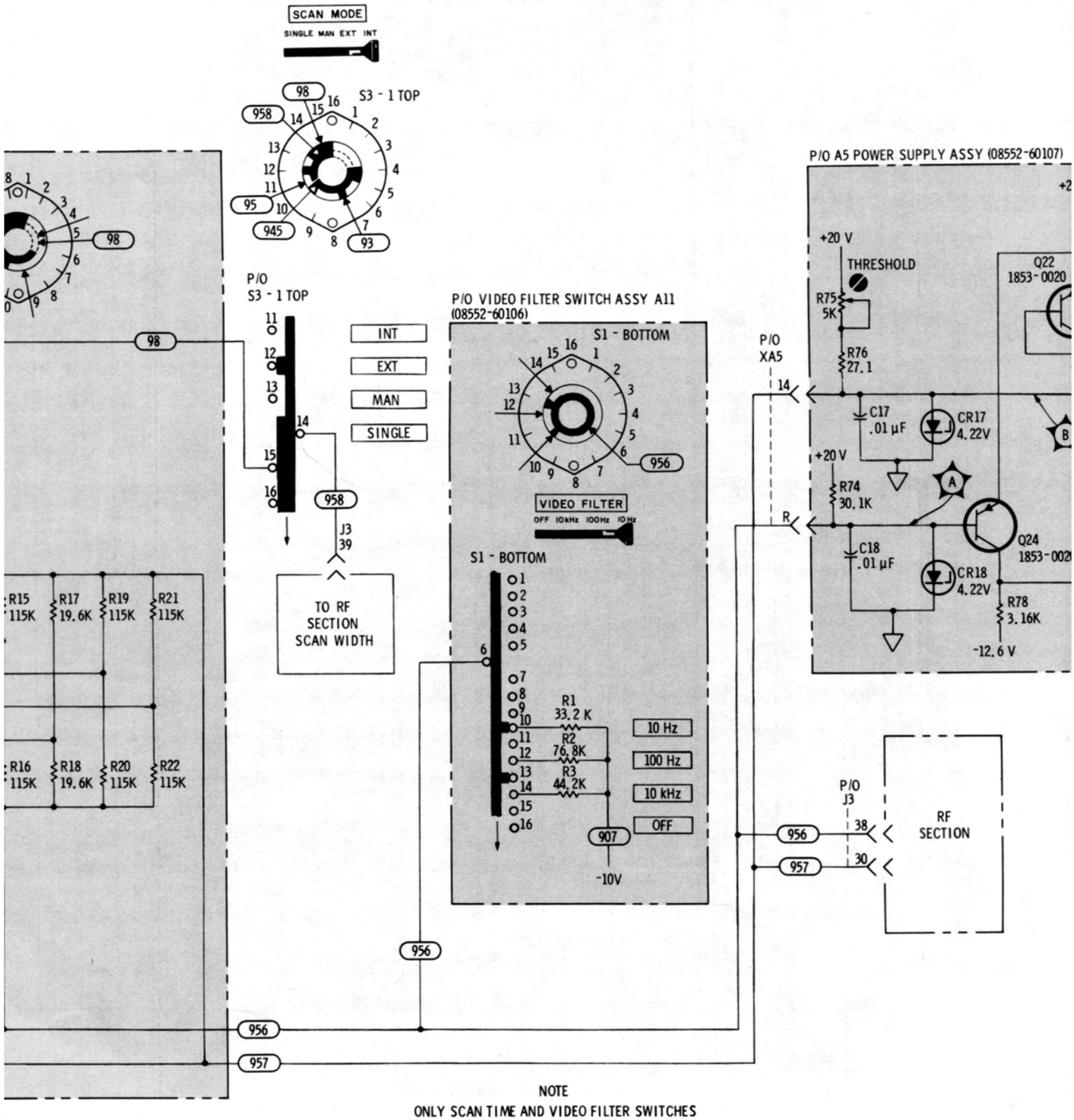


Figure 8-46. P/O Power Supply A5 Component Identification



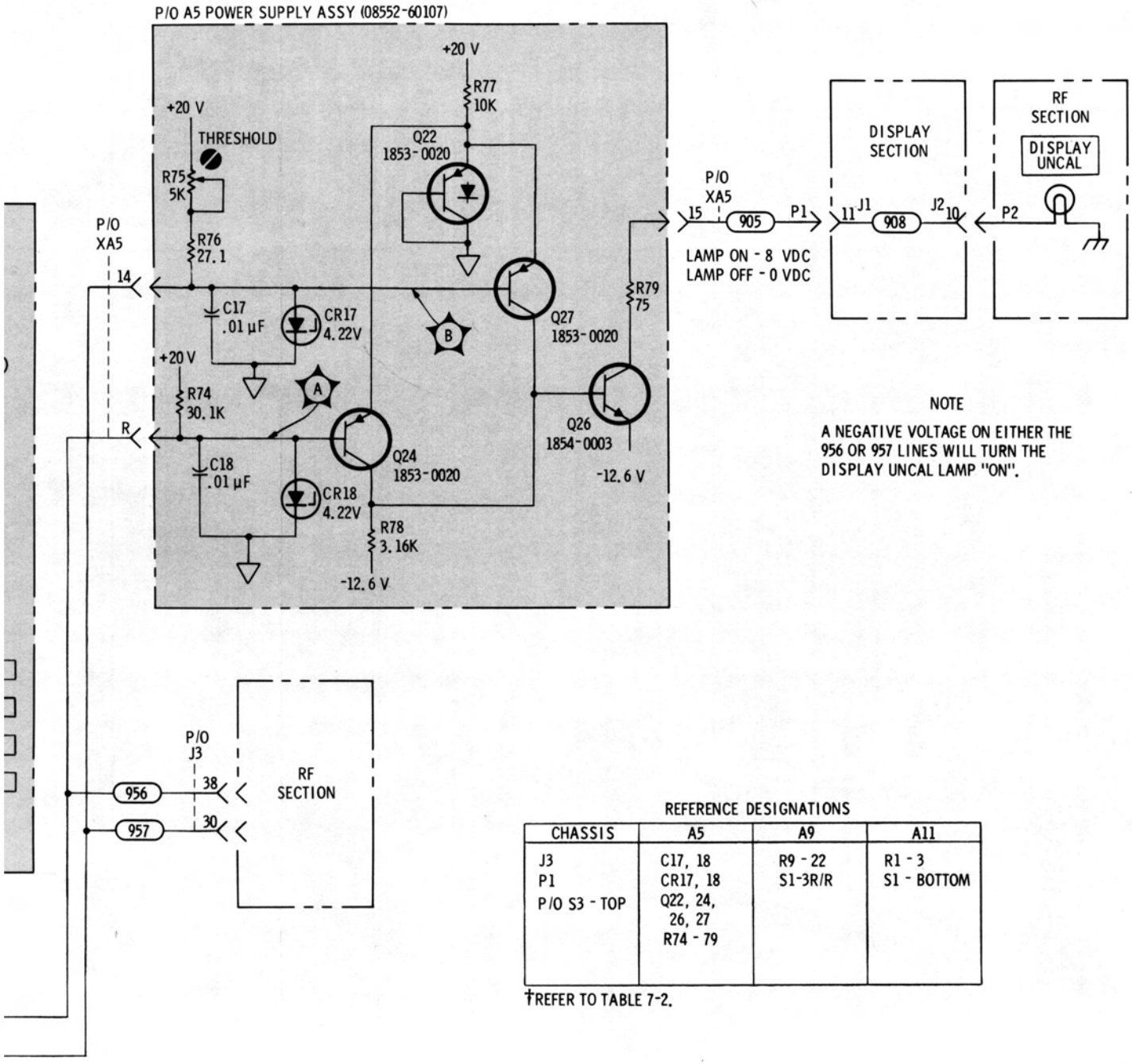
SERIAL PREFIX: 971-.1050A

ONL
CON
MOD



NOTE

ONLY SCAN TIME AND VIDEO FILTER SWITCHES CONTROL ANALOGIC CIRCUIT IN PRESET SCAN MODE.



REFERENCE DESIGNATIONS

CHASSIS	A5	A9	A11
J3 P1 P/O S3 - TOP	C17, 18 CR17, 18 Q22, 24, 26, 27 R74 - 79	R9 - 22 S1-3R/R	R1 - 3 S1 - BOTTOM

†REFER TO TABLE 7-2.

Figure 8-47. Analogic Circuit

SERVICE SHEET 18

It is assumed that the 30 MHz signal at the CAL OUTPUT jack is out of tolerance (and cannot be brought into tolerance by performing procedures specified in paragraph 5-40 of Section V) or missing.

TROUBLESHOOTING PROCEDURE

When it has been determined that the 30 MHz CAL OUTPUT signal is out of tolerance or missing the Scan Generator Assembly A6 should be removed from the frame and reinstalled on the extender board to provide access to components.

EQUIPMENT REQUIRED

SERVICE KIT . . . . . HP 11592A
DIGITAL VOLTMETER . . . HP 3440A/3443A
VOLT-OHM-AMMETER . . . . . HP 412A

CONTROL SETTINGS

Any

1 30 MHz CALIBRATION OSCILLATOR

Q17 and associated components comprise a simple, crystal controlled oscillator designed to provide a stable, 30 MHz, -30 dBm signal. The signal and its harmonics are used to calibrate and check the analyzer. Q18 provides temperature compensation.

TEST PROCEDURE 1

Use the ohmmeter and digital voltmeter to check the oscillator. After repairing the circuit, adjust the oscillator by performing the procedures in paragraph 5-40 of Section V.

2 LINEAR AMPLIFIER COMPENSATION SELECTOR S1-R1

RF connections to J3 pin 7 and 8 are part of an amplifier compensation programming circuit for 10 dB steps of INPUT ATTENUATION control when the analyzer is operated in the LINEAR mode. Refer to Service Sheets 12 and 13 for detailed circuit description.

3 INDEX LIGHT SELECTOR WAFER

Index light selection wafer on the RF Section INPUT ATTENUATION control selects the index light associated with the LOG REF LEVEL/ LINEAR SENSITIVITY control in the analyzer IF Section. In LOG mode, the selected index lamp is opposite the scale factor on the LOG REF LEVEL control that corresponds to full-scale deflection on the display. In LINEAR mode, the selected index light is opposite the LINEAR SENSITIVITY volts per division scale factor. Lights DS1 through DS6 provide a moveable index point, positioned by the RF Section INPUT ATTENUATION control, thus the analyzer's amplitude calibration is maintained for any INPUT ATTENUATION control setting.

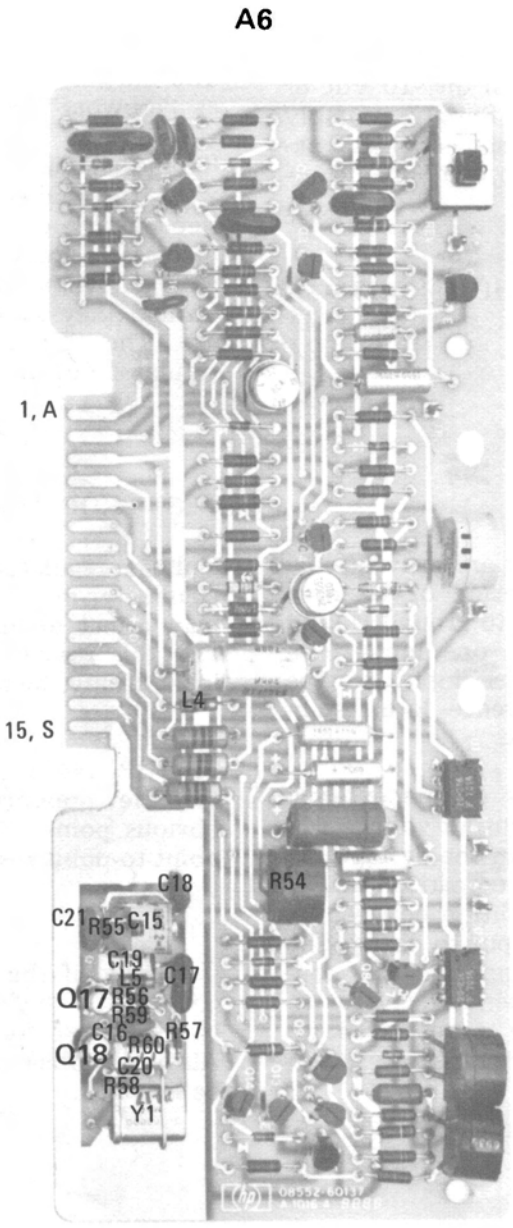
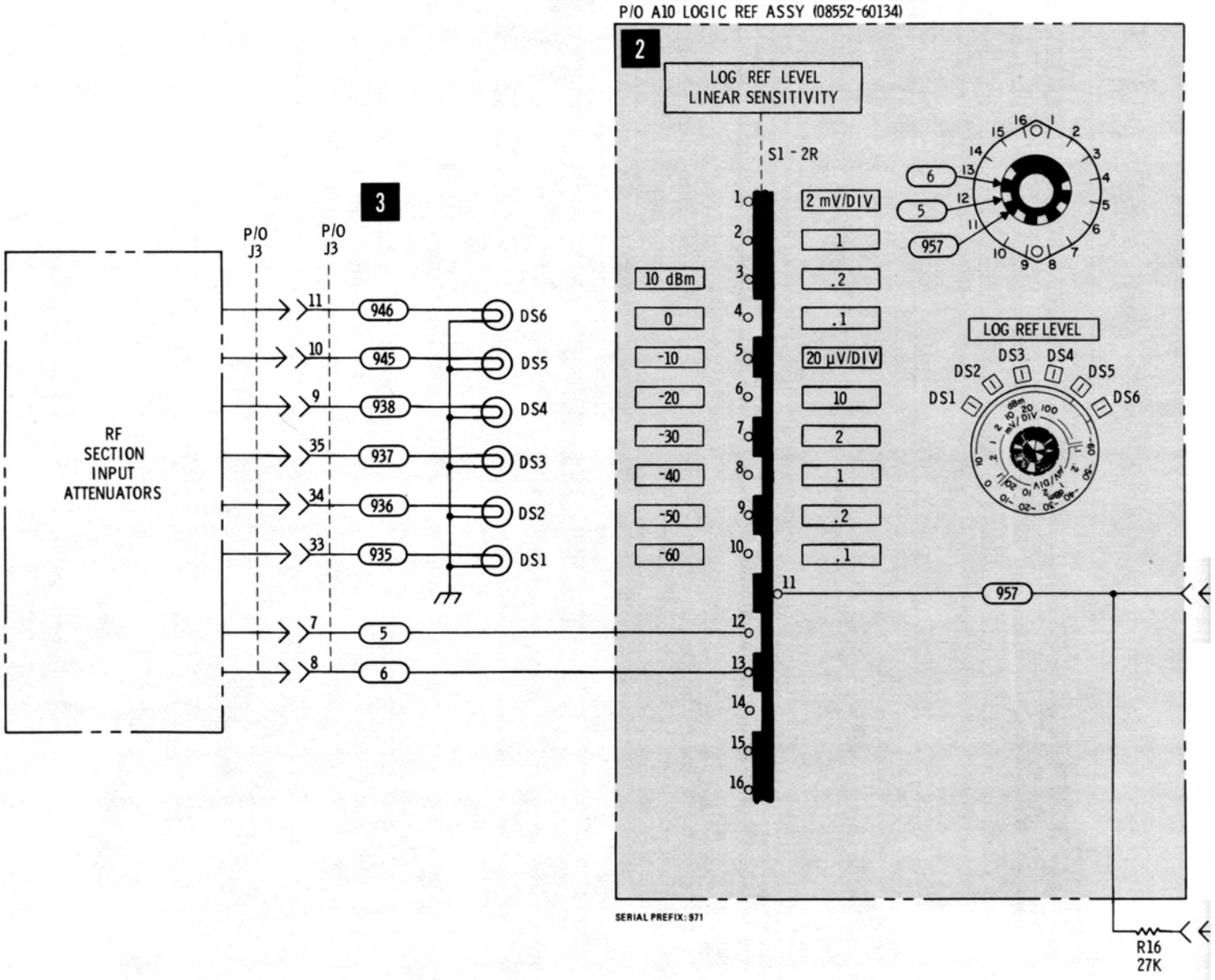
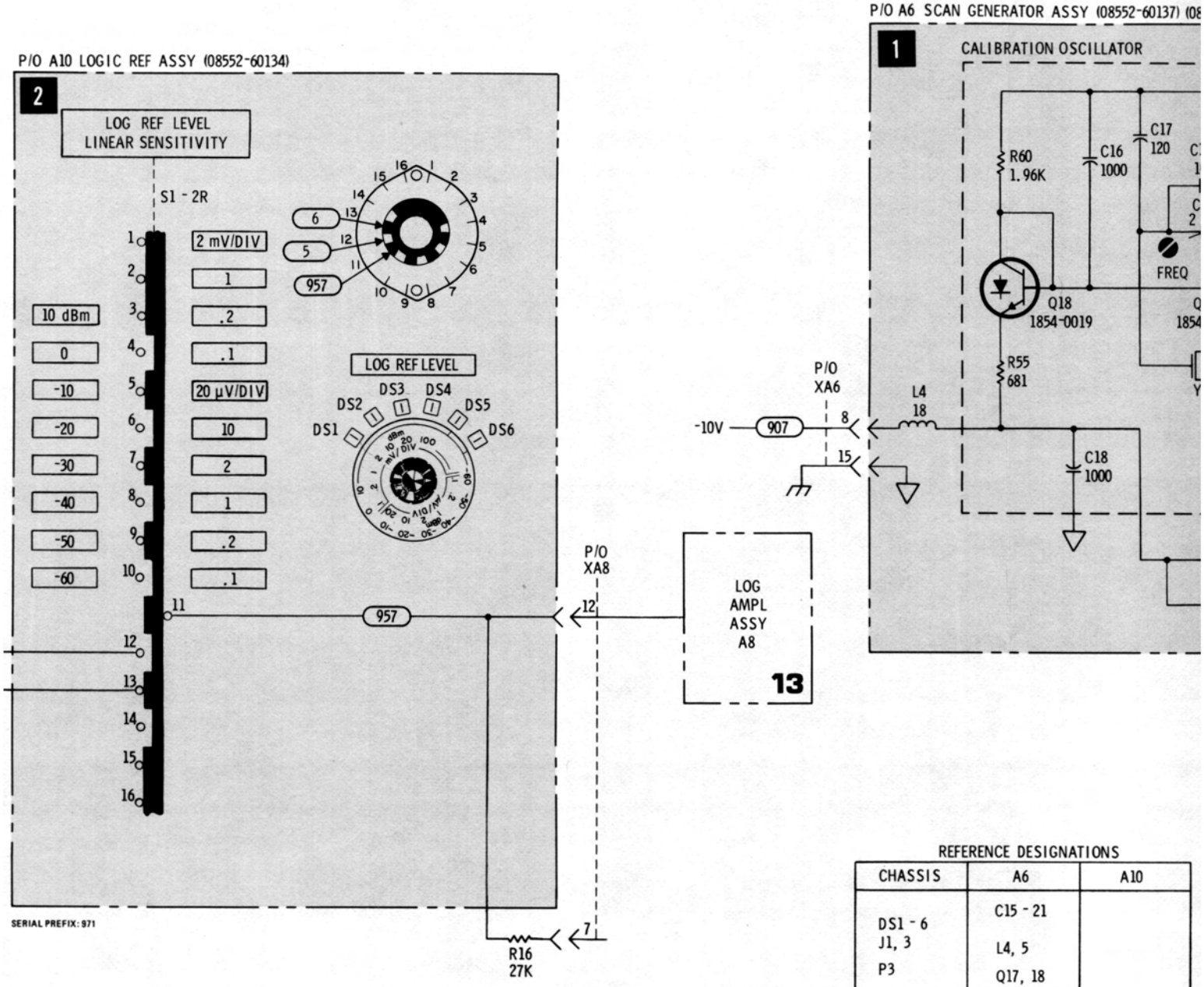


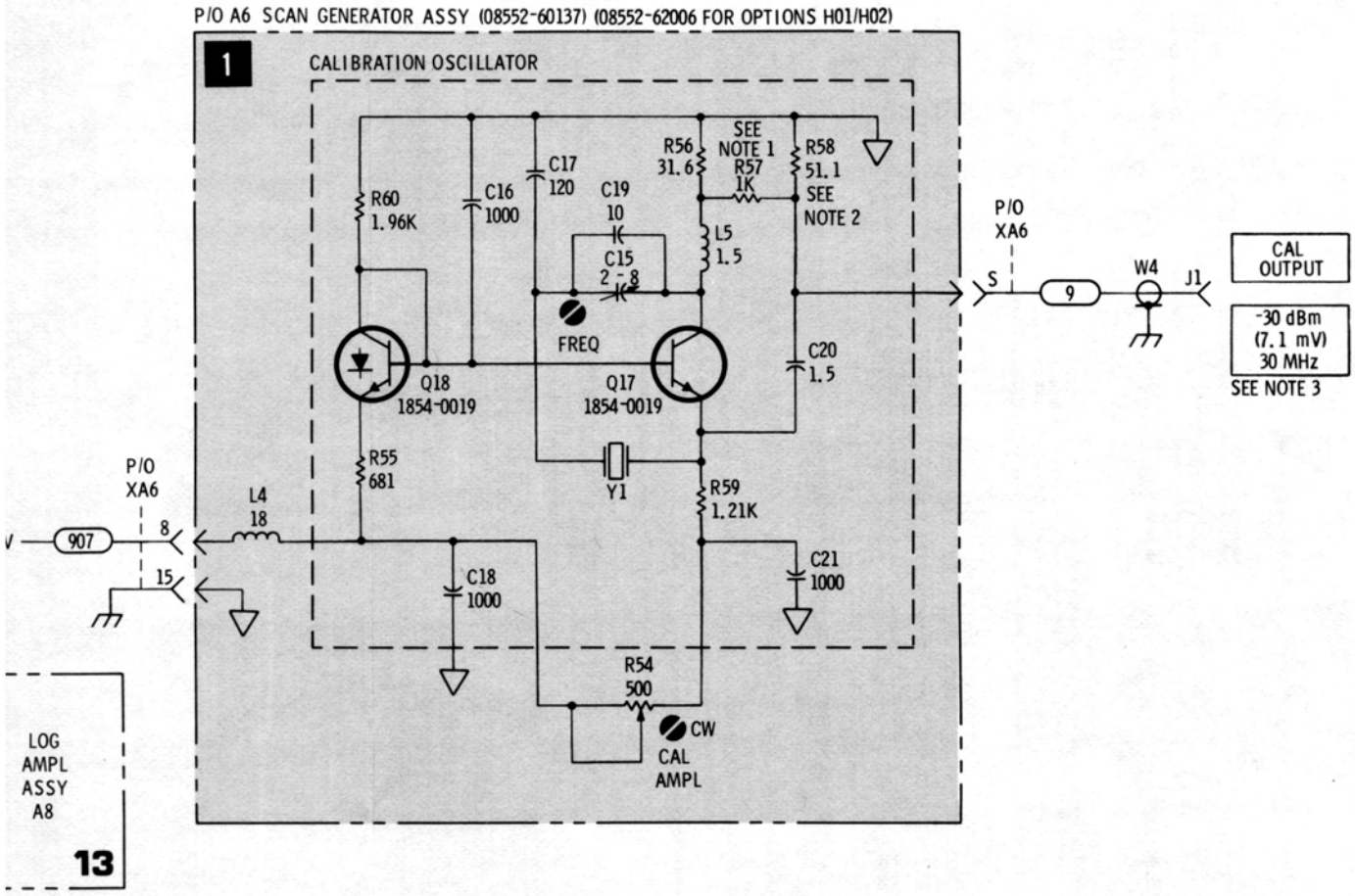
Figure 8-48. P/O Scan Generator A6 Component Identification


P/O A10 LOGIC REF ASSY (08552-60134)
2
LOG REF LEVEL
LINEAR SENSITIVITY
S1 - 2R
2 mV/DIV
1
.2
.1
20 µV/DIV
10
2
1
.2
.1
10 dBm
0
-10
-20
-30
-40
-50
-60
LOG REF LEVEL
DS1
DS2
DS3
DS4
DS5
DS6
957
3
P/O J3
P/O J3
RF SECTION INPUT ATTENUATORS
946
945
938
937
936
935
5
6
DS6
DS5
DS4
DS3
DS2
DS1
SERIAL PREFIX: 971
R16
27K



REFERENCE DESIGNATIONS

CHASSIS	A6	A10
DS1 - 6 J1, 3 P3 W4 XA6, 8	C15 - 21 L4, 5 Q17, 18 R54 - 60 Y1	S1 - 2R



REFERENCE DESIGNATIONS

CHASSIS	A6	A10
DS1 - 6 J1, 3 P3	C15 - 21 L4, 5 Q17, 18 R54 - 60	S1 - 2R
W4 XA6, 8	Y1	

NOTES:

1. R57 IS 1.1K OHMS FOR OPTIONS H01/H02.
2. R58 IS 75 OHMS FOR OPTIONS H01/H02.
3. CHANGE 7.1 mV TO 8.7 mV FOR OPTIONS H01/H02.

18

Figure 8-49. Reference Oscillator and LOG REFERENCE Index Light Circuit

A6, A10
Reference Oscillator and LOG
REFERENCE Index Light Circuit
SERVICE SHEET 18

SERVICE SHEET 19

It is assumed that the -12.6 volt, -100 volt, and +100 volt inputs from the display unit are present and that one or more of the outputs (-12.6 volts, -10 volts, and +20 volts) is missing or out of tolerance.

TROUBLESHOOTING PROCEDURE

When trouble has been isolated in the -10 Vdc or +20 Vdc regulators, the Power Supply assembly A5 should be removed and reinstalled on the extender board to provide access to components.

EQUIPMENT REQUIRED

DIGTIAL VOLTMETER . . . HP 3440A/3443A
VOLT-OHM-AMMETER . . . . . HP 412A
SERVICE KIT . . . . . HP 11592A

CONTROL SETTINGS
Any

1 VOLTAGE REGULATOR

The +20 and -10 volt regulators are conventional voltage regulation circuits. In each of them, a voltage divider from the output to ground is used as a sensing circuit to provide one input to a comparison amplifier. The other input to the comparison amplifier is a reference level established by diode clamping circuits.

When the current requirements of the external circuit increases, the regulated output voltage will decrease and cause a reduction in the dc input to the comparison amplifier. The comparison amplifier detects the unbalanced condition between its two inputs and provides an output to change the operating bias of the control amplifier. The control amplifier then causes the series regulator to conduct more heavily, providing more current to the external circuit to allow the voltage to return to the proper level.

The series regulator acts like a variable resistance in series with the power supply output. When the external circuit requires more current (as evidenced by a decrease in output voltage) the series regulator is caused to present less impedance to the current flow.

The Silicon Control Rectifiers CR4 and CR10 act as "crowbar" protectors to protect external circuits in the event of a shorted series regulator. Should a series regulator short, the output voltage would be limited only by the output of the rectifier and the current in the external circuit would increase in proportion to the increase in output voltage. When this occurs, the SCR's are turned on and they short out the regulator output voltage. The SCR's remain in conduction until the regulator output voltage has reached zero.

TEST PROCEDURE 1

Voltage regulators function as a "closed loop." Generally, malfunction of almost any component may affect dc levels at all points in the circuit. For this reason, typical voltage levels would be little, if any, help in servicing the assembly.

The HP 3440A/3443A should be used to check for the presence or absence of dc levels at obvious points. The HP 412A should be used for point-to-point resistance measurements.

Generally, if the output is completely missing or consistently high, the series regulator should be checked first for an open or shorted condition. Also, if voltage is high the SCR crowbar should be checked.

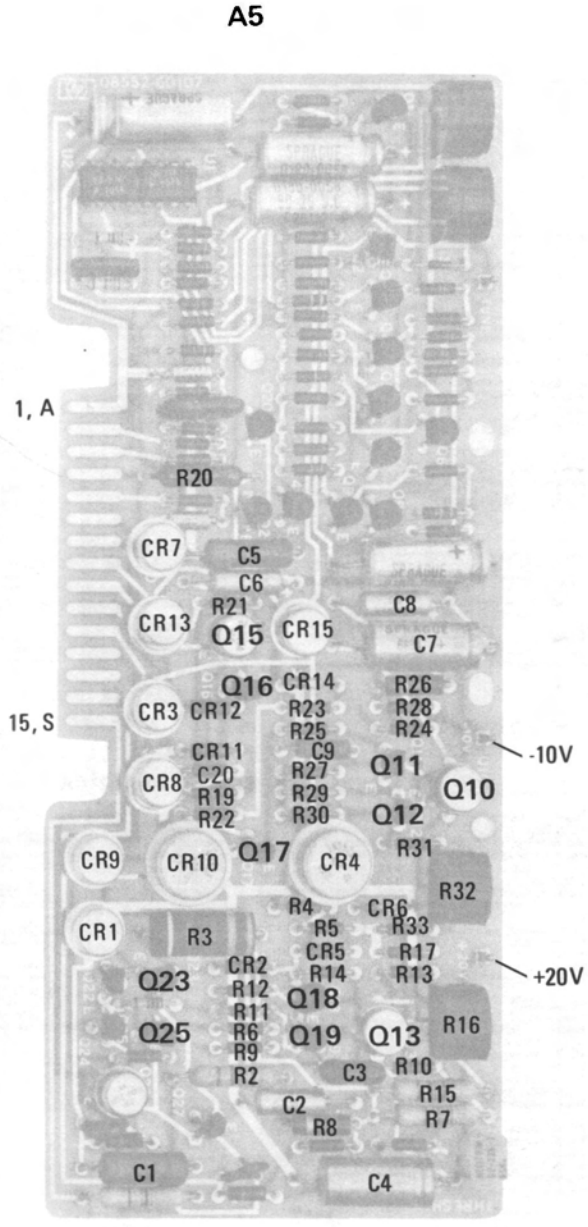
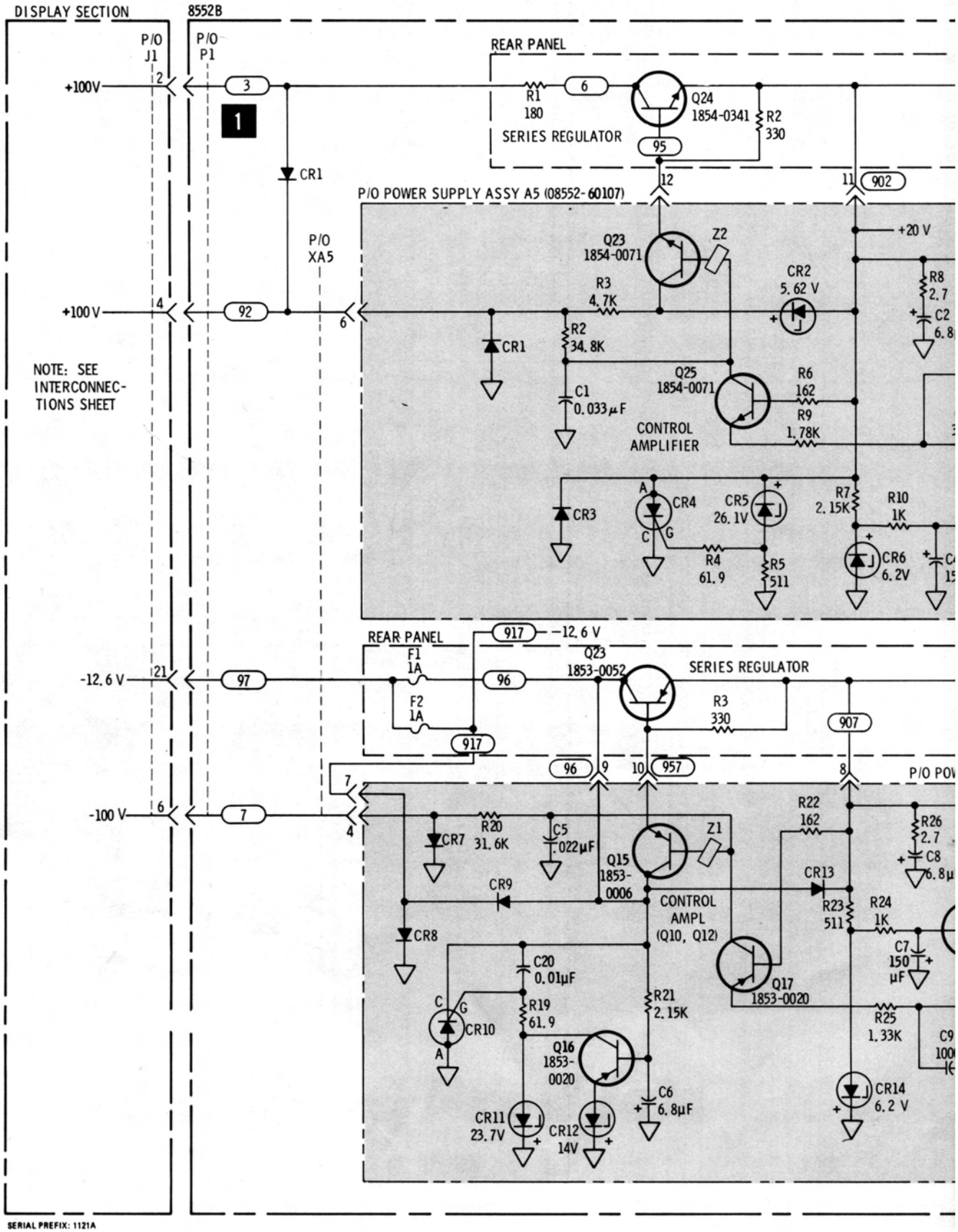
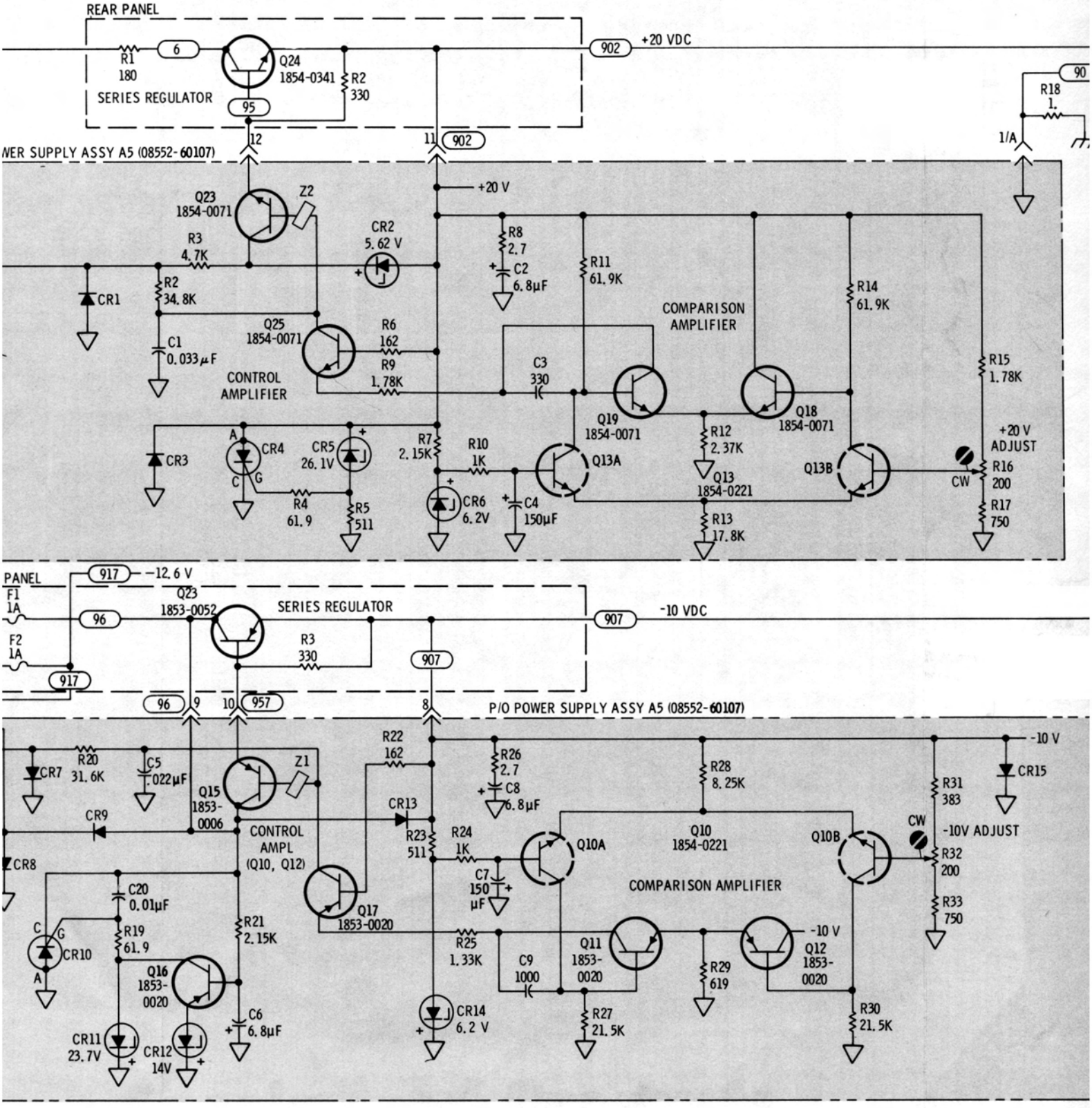
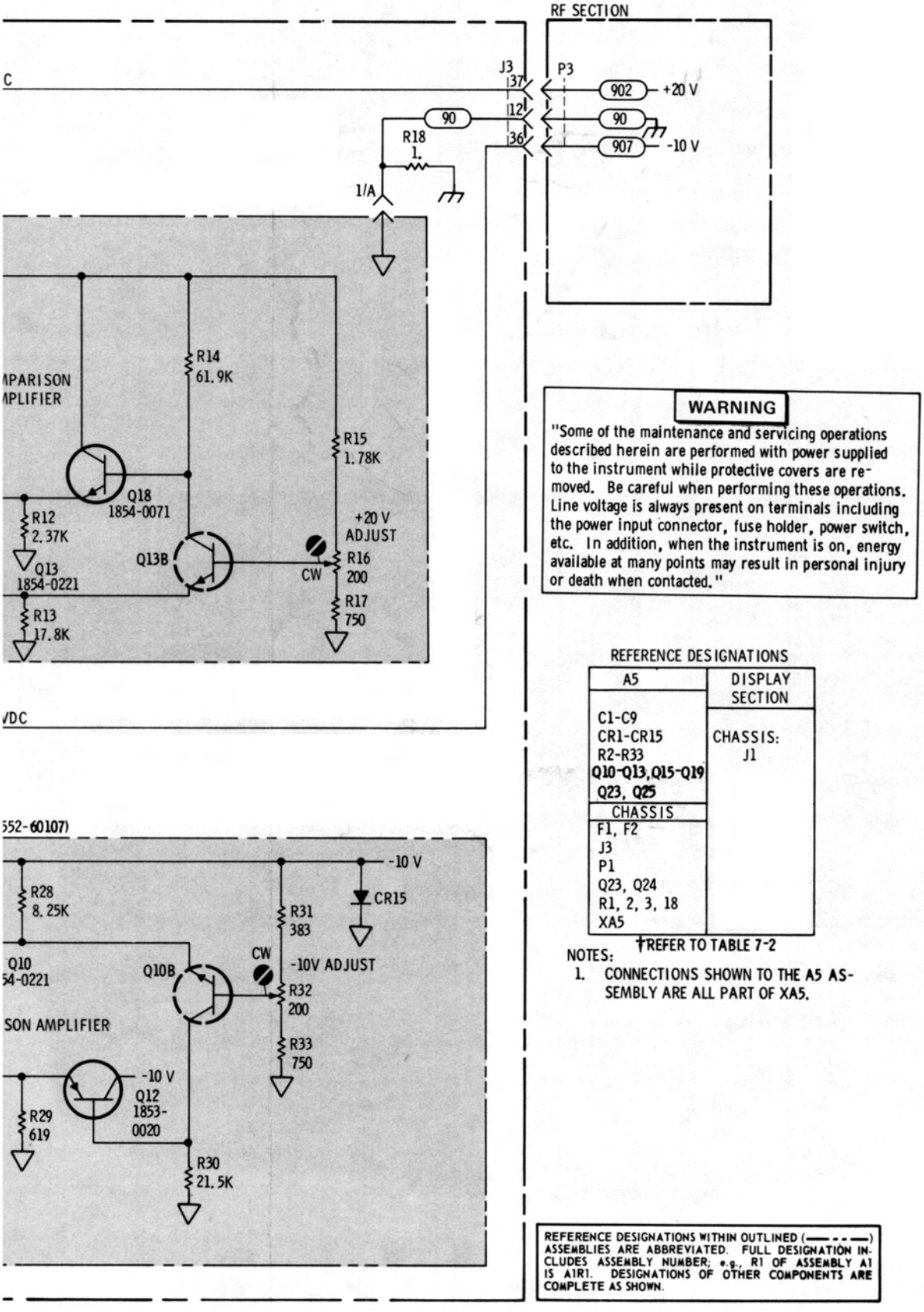


Figure 8-50. P/O Power Supply A5 Component Identification



SERIAL PREFIX: 1121A


REAR PANEL
R1
180
6
Q24
1854-0341
R2
330
SERIES REGULATOR
95
902
+20 VDC
90
R18
1.
1/A
12
11
902
WER SUPPLY ASSY A5 (08552-60107)
+20 V
Q23
1854-0071
Z2
CR2
5.62 V
R3
4.7K
R8
2.7
C2
6.8µF
R11
61.9K
R14
61.9K
CR1
R2
34.8K
C1
0.033µF
Q25
1854-0071
R6
162
R9
1.78K
CONTROL
AMPLIFIER
C3
330
COMPARISON
AMPLIFIER
R15
1.78K
Q19
1854-0071
Q18
1854-0071
R12
2.37K
+20 V
ADJUST
CR3
A
CR4
C
G
CR5
26.1V
R7
2.15K
R10
1K
Q13A
Q13B
CW
R16
200
R4
61.9
R5
511
CR6
6.2V
C4
150µF
Q13
1854-0221
R13
17.8K
R17
750
PANEL
917
-12.6 V
F1
1A
Q23
1853-0052
SERIES REGULATOR
96
907
-10 VDC
F2
1A
R3
330
917
907
96
9
10
957
8
P/O POWER SUPPLY ASSY A5 (08552-60107)
R22
162
-10 V
CR7
R20
31.6K
C5
.022µF
Z1
R26
2.7
C8
6.8µF
R28
8.25K
R31
383
CR15
Q15
1853-
0006
CR13
CR9
CONTROL
AMPL
(Q10, Q12)
R23
511
R24
1K
Q10A
Q10
1854-0221
Q10B
CW
-10V ADJUST
R32
200
CR8
C7
150
µF
COMPARISON AMPLIFIER
C20
0.01µF
R21
2.15K
Q17
1853-0020
R33
750
C
G
CR10
A
R19
61.9
R25
1.33K
C9
1000
Q11
1853-
0020
-10 V
Q12
1853-
0020
R29
619
Q16
1853-
0020
CR14
6.2 V
R27
21.5K
R30
21.5K
C6
6.8µF
CR11
23.7V
CR12
14V



WARNING

"Some of the maintenance and servicing operations described herein are performed with power supplied to the instrument while protective covers are removed. Be careful when performing these operations. Line voltage is always present on terminals including the power input connector, fuse holder, power switch, etc. In addition, when the instrument is on, energy available at many points may result in personal injury or death when contacted."

REFERENCE DESIGNATIONS

A5	DISPLAY SECTION
C1-C9 CR1-CR15 R2-R33 Q10-Q13, Q15-Q19 Q23, Q25	CHASSIS: J1
CHASSIS	
F1, F2 J3 P1 Q23, Q24 R1, 2, 3, 18 XA5	

†REFER TO TABLE 7-2

NOTES:

1. CONNECTIONS SHOWN TO THE A5 ASSEMBLY ARE ALL PART OF XA5.

REFERENCE DESIGNATIONS WITHIN OUTLINED (— - - —) ASSEMBLIES ARE ABBREVIATED. FULL DESIGNATION INCLUDES ASSEMBLY NUMBER; e.g., R1 OF ASSEMBLY A1 IS A1R1. DESIGNATIONS OF OTHER COMPONENTS ARE COMPLETE AS SHOWN.

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Figure 8-51. Power Supply

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